LEED® 2009 for Healthcare
New Construction & Major Renovation

Redlined Draft Rating System for 2\textsuperscript{nd} Public Comment

Spring 2010
Innovation in Design/Integrative Design Credits

ID Prerequisite 1: Integrative Project Planning & Design Required

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

Requirements
Use cross discipline design and decision making, beginning in the programming and pre-design phase. At a minimum, ensure the following process:

- **Owner’s Project Requirements Document.** Prepare an Owner’s Project Requirements document for the project. Prepare a Health Mission Statement and incorporate it in the Owner’s Project Requirements. The health mission statement should address "triple bottom line" values - economic, environmental, and social, and include goals 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.

- **Preliminary Rating Goals.** As early as practicable and preferably before Schematic Design, conduct a Preliminary LEED meeting including participation from the Owner and a minimum of four key members of the project team, in addition to the Owner or Owner’s representative. As part of the meeting, create a LEED® action plan that identifies, at a minimum, includes the following:
  - The targeted LEED award level (Certified, Silver, Gold, or Platinum);
  - The LEED credits that have been selected to meet the targeted award level; and
  - The primary responsible party accountable for meeting the selected credit.

- **Integrative Project Team.** Assemble and involve a Project Green Team involving as many members of the following project team available members from the list below (draw from existing team members; it is not necessary to hire new members just, in addition to fill out this team):

  Engage individuals the Owner or organizations whose capabilities the following skill sets or perspectives: Owner’s representative, and as many as feasible.
• Owner or Owner’s Representative
• Owner’s capital budget manager
• Architecture Architect or building design designer
• Mechanical Engineering Engineer
• Electrical Engineering or Lighting Design Engineer
• Structural engineering engineer
• Energy Modeling Modeler
• Equipment Planner
• Acoustical Consultant
• Telecommunications Designer
• Controls Designer
• Building science or performance testing agents / Commissioning
• Green building or sustainable design consultant
• Sustainability Coordinator
• Facility Green Teams
• Physician and nursing teams
• Facility managers
• Housekeeping Environmental Services staff
• Functional and space programmers
• Interior designer
• Lighting consultant / designer
• Commissioning agent
• Community representatives
• Civil engineering, landscape architecture, habitat restoration, or land planning
• Construction Management or General Contractor
• Life cycle cost analysis; construction cost estimating;
• Other disciplines appropriate to the specific project type.

• **Design Charette** As early as practicable and preferably before schematic design, conduct at least one full-day integrated design workshop charette with the Project Integrative Project Team as defined above. The goal of the workshop charette shall be to optimize the integration of green strategies across all aspects of the building design, drawing on the expertise of all participants.

• **Owner’s Project Requirements Document.** Prepare an Owner’s Project Requirements document for the project. Prepare a Health Mission Statement and incorporate it in the Owner’s Project Requirements. The health mission statement should address “triple bottom line” values—economic, environmental, and social, and include goals 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.
Potential Technologies & Strategies

- Reinforce corporate/institutional commitments to environmental health and community responsibility.
- Use cross discipline design, decision-making, and charrettes. Use goal-setting workshops and build a team approach to the project.
- Prepare checklists for points and strategies prior to beginning the design process; refer to the checklist at milestones during the design process.
- Engage owner, staff, contractors, green teams, user groups and community groups, educating them on the benefits of green design and bringing them into the design process at key points in the decision-making process.
- Participate in peer-to-peer information exchange and problem solving through the Green Guide Forum with other project teams implementing sustainable design, construction and operations.
- Consider performance-based incentives in professional contracts that reward achievement of The health mission statement should address “triple bottom line” values – economic, environmental, and social, and include goals 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.
- Integrative Design Goals and Project Vision. Incentives may be based on life cycle cost-based equipment and material selection, levels of achievement in LEED for Healthcare, or comparisons to benchmarks of existing facility performance or combinations of these and other benchmarks.
- Contractually apportion professional fees to create specific line items for the Integrative Design Charette and subsequent monitoring and follow-up meetings. Integrative Design may benefit from re-apportioning design fees to provide a higher percentage early in the process leading to stronger integration and streamline in subsequent design stages.
- Consider seeking foundation support for integrative design initiatives.
ID Credit 1–1.4: Innovation in Design 1–4 Points

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

Requirements
Credit can be achieved through any combination of the Innovation in Design and Exemplary Performance paths as described below:

PAT H 1. Innovation in Design (1-4 points)
Achieve significant, measurable environmental performance using a strategy not addressed in the LEED 2009 for Healthcare Rating System.

One point is awarded for each innovation achieved. No more than 4 points under IDC1 may be earned through PATH 1—Innovation in Design.

Identify the following in writing:
• The intent of the proposed innovation credit,
• The proposed requirement for compliance,
• The proposed submittals to demonstrate compliance, and
• The design approach (strategies) that might be used to meet the requirements.

Credit
PAT H 2. Exemplary Performance (1.2-1.3 points)

Same as Credit 1.1 may be earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED.

Credit 1.3 (1-point) Same as Credit 1.1
Credit 1.4 (1-point) Same as Credit 1.1

One point is awarded for each exemplary performance achieved. No more than 3 points under IDC1 may be earned through PATH 2—Exemplary Performance.
Potential Technologies & Strategies

Substantially exceed LEED 2009 for Healthcare performance credits such as energy performance or water efficiency. Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environmental and/or health benefits.
**ID Credit 2: LEED Accredited Professional**  

**1 Point**

**Intent**
To support and encourage the design integration required by a LEED for Healthcare green building project and to streamline the application and certification process.

**Requirements**
At least one principal participant of the project team shall be a LEED Accredited Professional (AP).

**Potential Technologies & Strategies**
Educate the project team members about green building design & construction, the LEED requirements and application of the LEED Rating System process early in the life of the project. Consider assigning the LEED AP as a facilitator of an integrated design & construction process facilitation to the LEED AP.
ID Credit 3: Integrative Project Planning & Design
1 Point

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

Requirements
- Assemble and involve a project team as described in IDp1
- Actively involve all team members referenced above in at least three of the following phases of project design and construction process:
  - Conceptual/schematic design
  - LEED planning
  - Preliminary design
  - Energy/envelope systems analysis or design
  - Design development
  - Final design, working drawings, or specifications and construction documents
  - Construction administration
- Conduct regular meetings with the project team at least monthly from the end of schematic design until the owner's certificate of occupancy to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities, and identify next steps. These meetings can be integrated into other required project team meetings. A plan should be determined for regular integrative team coordination. At minimum, 12 meetings should be included with the integrative project team. In these meetings, utilize the process framework established by the ANSI Market Transformation to Sustainability Guideline Standard March 2007 revision for distribution Whole System Integration Process (WSIP).

Potential Technologies & Strategies
- Reinforce corporate/institutional commitments to environmental health and community responsibility.
- Use cross discipline design, decision-making, and charettes. Use goal setting workshops and build a team approach to the project.
- Prepare checklists for points and strategies prior to beginning the design process; refer to the checklist at milestones during the design process.

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• Engage owner, staff, contractors, user groups and community groups, educating them on the benefits of green design and bringing them into the design process at key points in the decision-making process.

• Participate in peer-to-peer information exchange and problem solving through the Green Guide Forum with other project teams implementing sustainable design, construction and operations.

• Consider performance-based incentives in professional contracts that reward achievement of Integrated Charettes. Use goal-setting workshops and build a team approach to the project.

• Prepare checklists for points and strategies prior to beginning the design process; refer to the checklist at milestones during the design process.

• Engage owner, staff, contractors, user groups and community groups, educating them on the benefits of green design and bringing them into the design process at key points in the decision-making process.

• Participate in peer-to-peer information exchange and problem solving through the Green Guide Forum with other project teams implementing sustainable design, construction and operations.

• Consider performance-based incentives in professional contracts that reward achievement of Integrative Design Goals and Project Vision. Incentives may be based on life cycle cost-based equipment and material selection, levels of achievement in LEED-Healthcare, or comparisons to benchmarks of existing facility performance or combinations of these and other benchmarks.

• Contractually apportion professional fees to create specific line items for the Integrative Design Charette and subsequent monitoring and follow-up meetings. Integrative Design may benefit from re-apportioning design fees to provide a higher percentage early in the process leading to stronger integration and streamline in subsequent design stages.

• Consider seeking foundation support for Integrative design initiatives.
Sustainable Sites Credits

SS Prerequisite 1: Construction Activity Pollution Prevention Required

Intent
Reduce To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

Requirements
Create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Plan shall describe the measures implemented to accomplish the following objectives:

- Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
- Prevent sedimentation of storm sewer or receiving streams.
- Prevent polluting the air with dust and particulate matter.

The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite. Information on the EPA CGP is available at: http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

Potential Technologies & Strategies
Create an Erosion and Sedimentation Control Plan during the design phase of the project. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins.

- Consider employing strategies such as:
  - Temporary and permanent seeding
  - Mulching
  - Earth dikes
  - Silt fencing
  - Sediment traps
  - Sediment basins
• Minimize unnecessary ground disturbance (topsoil stripping) and removal of existing groundcover by protecting existing vegetation, including clusters or groupings of existing trees or shrub masses.

• Site Utilization:
  - Compile and implement a site access plan to minimize site disruption associated with the project's construction phase.
  - Plan temporary construction facilities, designated staging areas, access roads and construction parking within new building and paving footprints to minimize site disturbance.
  - Establish measures to protect priority sensitive areas of the site, including prohibiting staging, stockpiling and soil compaction.
  - Prevent disturbance to natural resources, protected wetlands and endangered species.
  - Handle and store fuels to prevent spills and discharges into waterways.
  - Do not remove any topsoil from the site.
SS Prerequisite 2: Environmental Site Assessment Required

Intent
To ensure that the site is assessed for environmental contamination and if contaminated, that the environmental contamination has been remediated to protect occupant health.

Requirements
Conduct a Phase I Environmental Site Assessment (as described in ASTM E1527-05) to determine if environmental contamination exists at the site. If contamination is suspected conduct a Phase II Environmental Site Assessment (as described in ASTM E1903-97 (2002)).

AND
Sites that are contaminated due to the past existence of a landfill on the site are prohibited. If the site is otherwise contaminated, then it must be remediated to meet local, state, or federal EPA region residential (unrestricted) standards whichever is most stringent. Documentation from the authority must be provided (such as EPA’s “Ready for Reuse” document) to prove “safe” levels of contamination have been achieved. As the remediation process leads to significant environmental benefit, one point (in SS credit 3) will be given for successful documented remediation of the site.

Potential Technologies and Strategies
To discover if the site has any chemical contaminants, research current and past site land using:

- Federal, state and local regulatory agencies’ databases and files.
- Private records of current and past land uses
- Review historical aerial photographs
- Review privately held environmental databases
- Conduct interviews with people familiar with the site’s history (including past and present owners).

Many local agencies have databases regarding the use of the land. For example, Oregon Department of Environmental Quality has a database of buried fossil fuel storage tanks. This Department also has other databases (e.g., dry cleaner locations) that can be used to determine the historical usage of the site. These lists can be compiled to determine if potential environmental contaminants exist at the schools proposed site.

Develop and implement a site remediation plan using strategies such as pump-and-treat, bioreactors, land farming and in-situ remediation. Contact your state environmental protection agency to find out about remediation standards for residential (unrestricted) use. It is strongly recommended that projects use standards equivalent or more stringent than EPA Region 9 clean-up standards, as these are set at the most appropriate level for protecting occupant health and safety.
SS Credit 1: Site Selection
1 Point

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

Requirements
Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any one of the following criteria:
- Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)
- Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency)
- Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists
- Within 100 feet of any wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent
- Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act
- Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt)

Potential Technologies & Strategies
During the site selection process, give preference to those sites that do not include sensitive site elements and restrictive land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption of those environmentally sensitive areas identified above.
SS Credit 2: Development Density & Community Connectivity
1 Point

Intent
ChannelTo channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources. In rural areas, increase development density on sites with existing or previously existing developed health care facilities rather than on undeveloped rural land.

Requirements
OPTION 1 — DEVELOPMENT DENSITY

Construct or renovate a building on a previously developed site AND in a community with a minimum density of 60,000 square feet per acre net (Note: The density calculation must include the area of the project being built and is based on a typical two-story downtown development). and must include the area of the project being built.

OR

OPTION 2 — COMMUNITY CONNECTIVITY

Construct or renovate a building on a site that meets the following criteria:

- Is located on previously developed site AND
- Is within 1/2 mile of a residential zone area or neighborhood with an average density of 10 units per acre net AND
- Is within 1/2 mile of at least 10 Basic Services AND with
- Has pedestrian access between the building and the services.

Basic ServicesFor mixed use projects, no more than three services within the project boundary, provided they are open to the public, may be counted towards the ten basic services. No more than 2 of the 10 services required may be anticipated (i.e., at least 8 must be existing and operational). In addition, the anticipated services must demonstrate that they will be operational in the locations indicated within one year of occupation of the applicant’s project.

Examples of basic services include, but are not limited to the following:


Proximity is determined by drawing a 1/2 mile radius around the main building entrance on a site map and counting the services within that radius.
OPTION 3 – EXISTING RURAL SITES

For previously developed existing rural health care campus sites, increase achievement of the existing site to a minimum development density of 30,000 square feet per acre.

Note – For the purposes of this credit, “rural sites” are defined in accordance with U.S. Census Bureau definitions: settlements comprising less than 2,500 persons, areas outside of incorporated census designated places and the rural portions of extended cities. For additional information, visit http://www.census.gov/population/censusdata/urdef.txt

Potential Technologies & Strategies

During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

Increase development density on previously developed sites rather than achieving expansion through acquisition of undeveloped rural land.
SS Credit 3: Brownfield Redevelopment: Residential Remediation Level
1 Point

Intent
Rehabilitate To rehabilitate damaged sites where development is complicated by environmental contamination, reducing and to reduce pressure on undeveloped land.

Requirements
Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) OR on a site defined as a brownfield by a local, state or federal government agency AND Remediate the site to the residential level as defined by the EPA Region 9 Preliminary Remediation Goals. Projects can only obtain this point via SS prerequisite 2, by remediating site contamination.

Potential Technologies & Strategies
During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Coordinate site development plans with remediation activity, as appropriate. There are many remediation techniques available to developers, depending upon the contaminant, the nature of the soil involved, the receptor pathway, and the individuals to be protected. One potential technique is to simply haul away the offending substance and dump the material. Other techniques might involve some kind of incineration of the material, which will lead to the creation of greenhouse gasses and other potential pollution. Avoid remediation methods with negative environmental side effects.
SS Credit 4.1: Alternative Transportation: Public Transportation Access
13 Points

Intent
To reduce pollution and land development impacts from automobile use.

Requirements
Locate project within 1/2 mile walking distance of an existing—or planned and funded—commuter rail, light rail or subway station—(measured from a main building entrance).
For stations located greater than 200 yards 1/8 mile from building entrance, provide an on-demand shuttle service with a documented service plan.

OR
Locate project within 200 yards 1/8 mile walking distance of one or more stops for two or more public or campus/private bus lines usable by building occupants—(measured from a main entrance).

Potential Technologies & Strategies
Perform a transportation survey of future building occupants to identify transportation needs.
Site the building near mass transit. Allow access to shuttle service to all facility users, including visitors and patients.
**SS Credit 4.2: Alternative Transportation: Bicycle Storage & Changing Rooms**

**1 Point**

**Intent**

Reduce To reduce pollution and land development impacts from automobile use.

**Requirements**

Provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all FTE staff (measured at peak periods) AND, provide shower and changing facilities in the building, or within 200 yards of a primary staff building entrance, for 0.5% of FTE staff (measured at peak periods). (Only staff shower facilities available to all staff within the building may be incorporated into the calculation.)

OR

For residential healthcare buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants FTE staff measured at peak periods, in lieu of changing/shower facilities.

**Potential Technologies & Strategies**

- Design the building with transportation amenities such as bicycle racks and showering/changing facilities. Share shower and changing facilities with Staff Locker facilities.

- **Ideal bicycle storage for staff includes enclosed lockers or other secure systems, conveniently located near staff entries.**

- Consider patients’ abilities to use the specific facility being designed. Some patients treated in medical office buildings, hospitals and other healthcare facilities may be capable of commuting by bicycle, consistent with an emphasis on preventative medicine.

- Conduct annual reviews of commute modes and preferences and increase bicycle storage capacity if needed to meet potential demand.

- Consider the placement of showers to provide availability for all staff members.

**Expansions/Renovations**

- This credit is not available to a renovation project unless the facility provides the bicycle storage and changing facilities up to the building minimum for a building that does not already have sufficient facilities.

- This credit is available for an addition project if it adds sufficient bicycle storage and changing/shower facilities to support the FTE staff being added as a result of the expansion,
and if it provides additional bicycle storage and changing facilities up to the building minimum, for a building that does not have sufficient facilities.
SS Credit 4.3: Alternative Transportation: Low Emitting & Fuel Efficient Vehicles

1 Point

Intent
Reduce To reduce pollution and land development impacts from automobile use.

Requirements

OPTION 1
Provide low-emitting and fuel-efficient vehicles for 3% of staff (measured at peak periods) AND provide preferred parking for these vehicles.
OR
OPTION 2
Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site. Providing a discounted parking rate is an acceptable substitute for preferred parking for low-emitting/fuel efficient vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area and available for a minimum of two years.
OR
OPTION 3
Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).
OR
OPTION 4
Provide staff access to a low emitting/fuel efficient vehicle sharing program. The following requirements must be met:
- One low-emitting or fuel-efficient vehicle must be provided per 3% of FTE staff measured at peak periods, assuming that one shared vehicle can carry 8 persons (i.e., one vehicle per 267 FTE staff). For buildings fewer than 267 staff, at least one low-emitting or fuel-efficient vehicle must be provided.
- A vehicle sharing contract must be provided that has an agreement of at least 2 years.
• The estimated number of customers served per vehicle must be supported by documentation.

• A narrative explaining the vehicle-sharing program and its administration must be submitted.

• Parking for low-emitting and fuel-efficient vehicles must be located in the nearest available spaces in the nearest available parking area. Provide a site plan or area map clearly highlighting the walking path from the parking area to the project site and noting the distance.

For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

“Preferred parking” refers to the parking spots that are closest to the main entrance of the project (exclusive of accessible spaces designated for handicapped) or parking passes provided at a discounted price.

Potential Technologies & Strategies

Provide transportation amenities such as alternative fuel refueling stations. Consider sharing the costs and benefits of refueling stations with neighbors.

Retain existing preferred handicapped parking areas. Handicapped parking is inclusive of any patient population that is designated by the hospital as weak.

Alternative fuel vehicle fleets can be used to provide on campus transportation or between campus transportation, transportation to remote parking and staff housing, ambulance and ambulette fleets, and carpool/vanpool programs.

Low-sulfur diesel fuel is required in the U.S. beginning in 2006 for highway diesel fuel, and in 2007 for nonroad diesel fuel. Biodiesel is becoming increasingly available, particularly in regions designated as non-attainment areas or where there are high levels of ground level ozone. Biodiesel is usable in most diesel engines, although in some older engines may require changing of rubber gaskets and more frequent changing of filters during initial use as the biodiesel cleans the system.

Expansion/Renovation

• A renovation project can achieve this point by amending an existing parking system that does not already comply with the requirements for a new building.

• An expansion project can achieve this point by complying with these requirements for any new parking being added to support the addition, and by amending the existing parking system that does not already comply with the requirements for a new building.
SS Credit 4.4: Alternative Transportation: Parking Capacity
1 Point

Intent
Reduce To reduce pollution and land development impacts from single occupancy vehicle use.

Requirements

OPTION CASE 1 — NON-RESIDENTIAL HEALTHCARE PROJECTS

OPTION 1

• Size parking capacity to meet, but not exceed, minimum local zoning requirements OR health department regulatory authority, whichever is the overriding requirement, AND, provide requirements.

• Provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.

OR

OPTION 2 — NON-RESIDENTIAL

For projects that provide parking for less than 5% of FTE staff (measured at peak periods):

• Provide preferred parking for carpools or vanpools, marked as such, for 5% of total provided parking spaces. Providing a discounted parking rate is an acceptable substitute for preferred parking for carpool or vanpool vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area, and available for a minimum of two years.

OR

OPTION 3 —

• Provide no new parking.

CASE 2: RESIDENTIAL HEALTHCARE BUILDINGSLICENSED LONG TERM CARE

OPTION 1

• Size parking capacity to meet but not exceed minimum local zoning requirements, AND, provide or health department regulatory authority, whichever is the overriding requirement.

• Provide infrastructure and support programs to facilitate shared vehicle use such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit.
• Provide preferred parking for carpools or vanpools for 5% of the total parking spaces provided for staff; OR, for projects that provide parking for less than 5% Full Time Equivalent (FTE) staff (measured at peak periods), provide preferred parking for carpools or vanpools, marked as such, for 5% of total provided parking spaces. Providing a discounted parking rate is an acceptable substitute for preferred parking for carpool or vanpool vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area, and available for a minimum of two years.

OR

OPTION 4—ALL 2

• Provide no new parking.

CASE 3: MIXED USE HEALTHCARE (i.e., including Residential, Retail and/or Medical Office components)

OPTION 1

• Mixed-use buildings with less than 10% non-residential area must be considered residential and adhere to the residential requirements in Case 2. For mixed-use buildings with more than 10% non-residential area, the non-residential space must adhere to Case 1 requirements and the residential component must adhere to Case 2 requirements. Note – This option applies only to mixed use healthcare projects including residential, retail, and/or medical office components.

OR

OPTION 2

• Provide no new parking.

“Preferred parking” refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped accessibility) or parking passes provided at a discounted price.

Potential Technologies & Strategies

Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings and implementing shared staff carpool and vanpool programs. Consider alternatives that will limit the use of single occupancy vehicles. Retain existing preferred handicapped accessible parking areas. Handicapped Accessible parking is inclusive of any patient population that is designated by the hospital as weak.

Minimize parking lot/garage size.

Share parking facilities with adjacent buildings and implement shared staff carpool and vanpool programs.
Institute shuttle bus services for staff members who live in the neighborhood, or to link with bus or rail lines.

**Expansion/Renovation**
An expansion project can achieve this point by complying with these requirements for any new parking being added to support the addition.
SS Credit 5.1: Site Development: Protect or Restore Habitat
1 Point

Intent
ConserveTo conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

Requirements

OPTION 1
On greenfield sites, limitCASE 1: Greenfield Sites
Limit all site disturbance to the following parameters:
• 40 feet beyond the building perimeter;
• 10 feet beyond surface walkways, patios, surface parking and utilities less than 12 inches in diameter;
• 15 feet beyond primary roadway curbs and main utility branch trenches; and
• 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

OR

OPTION 2
On previously developed or graded sites, restoreCASE 2: Previously Developed Areas or Graded Sites
Restore or protect a minimum of 50% of the site area (excluding the building footprint) or 20% of the total site area (including building footprint), whichever is greater, with native or adapted vegetation. Projects earning SS Credit 2: Development Density and Community Connectivity may include vegetated roof surface in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity. Projects earning SS Credit 9.1 Outdoor Places of Respite may apply the planted areas to this calculation if the plants are native or adapted, provide habitat and promote biodiversity.

Native/adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds. Projects earning SS Credit 2 and using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted.

Greenfield sites are those that are not previously developed or graded and remain in a natural state. Previously developed sites are those that previously contained buildings, roadways, parking lots, or were graded or altered by direct human activities.
Potential Technologies & Strategies

On greenfield sites, perform a site survey to identify site elements and adopt a master plan for development of the project site. Carefully site the building to minimize disruption to existing ecosystems and design the building to minimize its footprint. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. For previously developed sites, utilize local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of appropriate native or adapted plant materials. Prohibit plant materials listed as invasive or noxious weed species. Native/adapted plants require minimal or no irrigation following establishment, do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides, and provide habitat value and promote biodiversity through avoidance of monoculture plantings.
SS Credit 5.2: Site Development: Maximize Open Space
1 Point

Intent
*ProvideTo provide* a high ratio of open space to development footprint to promote biodiversity.

Requirements

OPTION 1
Reduce the development footprint (defined as the total area of the building footprint, hardscape, access roads and parking) and/or provide vegetated open space within the project boundary to exceed the local zoning’s open space requirement for the site by 25%.

OR

OPTION 2
For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint.

OR

OPTION 3
Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project’s site area.

ALL OPTIONS:
- For projects located in urban areas that earn SS Credit 2, vegetated roof areas can contribute to credit compliance.
- For projects located in urban areas that earn SS Credit 2, pedestrian oriented hardscape areas can contribute to credit compliance. For such projects Outdoor places of respite can contribute to credit compliance. In these instances, a minimum of 25% of the open space counted must be vegetated.
- 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.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors to maximize open space on the site.
SS Credit 6.1: Stormwater Design: Quantity Control
1 Point

Intent
Limit To limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

Requirements
CASE 1 — EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

CASE 2 — EXISTING IMPERVIOUSNESS IS GREATER THAN 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Potential Technologies & Strategies
Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.
SS Credit 6.2: Stormwater Design: Quality Control

1 Point

Intent

Limit To limit disruption and pollution of natural water flows by managing stormwater runoff.

Requirements

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall\(^1\) using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

Potential Technologies & Strategies

Use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration thereby reducing pollutant loadings.

Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters, and open channels to treat stormwater runoff.

---

\(^1\) In the United States, there are three distinct climates that influence the nature and amount of rainfall occurring on an annual basis. Humid watersheds are defined as those that receive at least 40 inches of rainfall each year, Semi-arid watersheds receive between 20 and 40 inches of rainfall per year, and Arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from:

- (a) Humid Watersheds – 1 inch of rainfall;
- (b) Semi-arid Watersheds – 0.75 inches of rainfall; and
- (c) Arid Watersheds – 0.5 inches of rainfall.
SS Credit 7.1: Heat Island Effect: Non-Roof
1 Point

Intent
To reduce heat islands\(^2\) (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements
OPTION 1
Provide any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):
- **Shade** Provide shade from existing tree canopy or within five years of landscape installation; landscaping (trees) must be in place at the time of occupancy.
- **Paving** Provide shade from structures covered by solar panels that produce useable solar or electric energy used to offset some non-renewable resource use.
- **Provide shade from architectural devices or structures that have a solar reflectance index (SRI)\(^3\) of at least 29.
- **Have paving** materials with a Solar Reflectance Index (SRI) of at least 29.
- **Open** Have an open-grid pavement system (at least 50% pervious).

OR

OPTION 2
Place a minimum of 50% of parking spaces under cover\(^4\) (defined as under ground, under deck, under roof, or under a building). Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof, or be covered by solar panels that produce energy used to offset some nonrenewable resource use.

Potential Technologies & Strategies
Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hardscape. Employ strategies, materials and landscaping techniques that reduce

\(^2\) Heat islands are defined as thermal gradient differences between developed and undeveloped areas.

\(^3\) The Solar Reflectance Index (SRI) is a measure of the constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values for some materials will be available in the LEED-NC v2.2 Reference Guide.

\(^4\) For the purposes of this credit, under cover parking is defined as parking underground, under deck, under roof, or under a building.
heat absorption of exterior materials. Use shade (calculated on June 21, noon solar time) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider the use of new coatings and integral colorants for asphalt to achieve light-colored surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces. Consider replacing constructed surfaces (i.e. roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials to reduce the heat absorption.
SS Credit 7.2: Heat Island Effect: Roof
1 Point

Intent

**To** reduce heat islands\(^5\) (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

**OPTION 1**

Use roofing materials having a Solar Reflectance Index\(^6\) (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface. Roofing materials having a lower SRI value than those listed below may be used if the weighted rooftop SRI average meets the following criteria:

\[
\frac{\text{Area of SRI roof}}{\text{Total roof area}} \times \frac{\text{SRI of installed roof}}{\text{Required SRI}} \geq 75\%
\]

OR

**OPTION 2**

Install a vegetated roof for at least 50% of the roof area.

OR

**OPTION 3**

Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria:

\[
\frac{\text{Area of SRI Roof}}{0.75} + \frac{\text{Area of vegetated roof}}{0.5} \geq \text{Total Roof Area}
\]

<table>
<thead>
<tr>
<th>Roof Type</th>
<th>Slope</th>
<th>SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Sloped Roof</td>
<td>≤ 2:12</td>
<td>78</td>
</tr>
<tr>
<td>Steep-Sloped Roof</td>
<td>&gt; 2:12</td>
<td>29</td>
</tr>
</tbody>
</table>

\(^5\) Heat islands are defined as thermal gradient differences between developed and undeveloped areas.

\(^6\) The Solar Reflectance Index (SRI) is a measure of the constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.
Potential Technologies & Strategies

Consider installing high-albedo and vegetated roofs to reduce heat absorption. Consider using vegetated roofs as healing gardens. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values will be available in the LEED for Healthcare Reference Guide. Product information is available from the Cool Roof Rating Council website, at www.coolroofs.org and the ENERGY STAR website at www.energystar.gov.
SS Credit 8: Light Pollution Reduction
1 Point

Intent
MinimizeTo minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact from lighting on nocturnal environments.

Requirements
Project teams must comply with 1 of the 2 options for interior lighting AND the requirement for exterior lighting.

FOR INTERIOR LIGHTING
The angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows.

In spaces, with fenestration, that do not function occupied 24/7:

OPTION 1
- Reduce the input power (by automatic device) of all non-emergency interior lighting shall be automatically controlled luminaires, with a direct line of sight to turn off during non-business any openings in the envelope (translucent or transparent), by at least 50% between 11 PM and 5 AM. After hours, provide up to 2-hour manual override capability for after hours use may be provided by a manual or occupant sensing device provided that the override lasts no more than 30 minutes.

OR

OPTION 2

All openings in the envelope (translucent or transparent) with a direct line of sight to any non-emergency luminaires must have shielding (controlled/closed by automatic device for a resultant transmittance of less than 10%) between 11 PM and 5 AM.

AND

FOR EXTERIOR LIGHTING
Zone and control lights so as to restrict full night

Light areas only as required for safety, security and comfort. Lighting power densities must not exceed ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda*) for the
classified zone. Meet exterior lighting to the control requirements from ANSI/ASHRAE/IESNA Standard 90.1-2007, (with errata but without addenda*).

Note — The following areas may be excluded from credit requirements: Emergency Department, (including helipads), a small-employee designated parking area for night staff, a small visitor designated parking area for night visitors, pedestrian walkways, service/loading areas, and associated circulation routes. Reduce sight lighting by 50% in all other non-essential areas after 11 pm. Helipad areas shall be illuminated in accordance with applicable transportation requirements.

Only light areas as required for safety and comfort. Do not exceed 80% of the lighting power densities for exterior areas and 50% for building facades and landscape features as defined in ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.

All projects shall be classified Classify the project under one of the following zones, as defined in IESNA RP-33, and shall follow all of the requirements for that specific zone:

LZ1 — Dark (Park and Rural Settings) Developed areas within national parks, state parks forest land and rural areas
Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.01 horizontal and vertical footcandles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down).

LZ2 — Low (Residential Areas predominantly consisting of, Residential zoning, Neighborhood business districts, Light industrial with limited nighttime use, Residential mixed use areas)
Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 10 feet beyond the site boundary. Document that no more than 2% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights of way, light trespass requirements may be met relative to the curb line instead of the site boundary.

LZ3 — Medium (All other areas not included in LZ1, LZ2 or LZ4 such as Commercial/Industrial, High-Density Residential)
Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights of way, light trespass requirements may be met relative to the curb line instead of the site boundary.

LZ4 — High (Major City Centers, Entertainment Districts)
LZ4 — High (High activity commercial districts in major metropolitan areas. To be LZ4 the area must be so designated by the local jurisdiction such as the local zoning authority)
Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed site fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

For LZ2, LZ3 & LZ4 - For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

For ALL Zones - Illuminance generated from a single luminaire placed at the intersection of a vehicular driveway and public roadway accessing the site, is allowed to use the centerline of the public roadway as the site boundary for a length of 2 times the driveway width centered at the centerline of the driveway.

Potential Technologies & Strategies

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.

Expansion/Renovation

- An expansion may earn this credit if it meets the New Construction requirements for its interior lighting, and if it maintains any exterior light pollution measures in place, and meets the new construction requirements for exterior lighting added as part of the project.
- A renovation may earn this credit if it meets the New Construction requirements for its interior lighting. Renovations that do not include windows to the outdoors may earn this credit by upgrading the exterior lighting to meet the requirements of the new construction.

*Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may to do so at the project team’s discretion. Addenda must be applied consistently across all LEED credits.
SS Credit 9.1: Connection to the Natural World: Outdoor Places of Respite
1 Point

Intent
To provide outdoor places of respite on the healthcare campus to connect healthcare patients, staff, and visitors to the health benefits of the natural environment.

Requirements
- Provide patient, staff, and visitor accessible outdoor places of respite equal to 5% of the net usable program area. Qualifying areas are defined below of the building or project. AND
- Provide additional dedicated outdoor place(s) of respite for staff equal to 2% of the net usable program area of the building or project.

- Exterior places of respite shall be subject to occupancy. Qualifying areas must meet the following requirements:
  - Accessible from within the building or located within 200 feet of a building entrance or access point, and must be spaces
  - Located where no medical intervention or direct medical care is delivered. Qualifying areas shall be open
  - Open to fresh air, the sky and the natural elements, including seasonal weather. In addition, qualifying areas shall comply with all of the following:
    - Seating areas shall provide options for shade or indirect sun. Provide shade structures, a trellis or tree-shaded wheelchair accessible seating areas at a minimum of 1 space/200 sf of garden area with 1 wheelchair space per 5 seating spaces. Examples of qualifying shade structures include trellises and tree-shaded wheelchair accessible seating areas.
  - Non-smoking areas in compliance with EQ
- Prerequisite 2.

- In addition, qualifying areas must comply with the following:
  - Interior atria, greenhouses, solaria or conditioned spaces may be used to meet up to 30% of the required area if 90% of each qualifying space’s square footage achieves a direct line of sight to unobstructed views of nature. If views of nature are exterior to the space, calculate lines of sight between 30 inches and 90 inches above the finish floor.
  - Horticulture therapy or, other specific clinical special use gardens (Cancer Healing Garden, for example), or regularly scheduled physical rehabilitation
exterior space unavailable to all building occupants may be used to meet up to 50% of the required area.

- Universal access natural trails with places to pause, available to visitors, staff and/or patients. (Nature trails may comprise be used to meet up to 30% of the required area, provided trail access is available within 200 feet of a building entrance.)

- Places of respite must be designated as non-smoking in compliance with EQ Pre-Requisite 1.
  - Exterior places of respite shall comply with the requirements of Exterior Site Noise Exposure Category "B," or better, from the 2006 AIA/AHA Draft Interim Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities, Table 1.3-1. For projects that achieve SSc2, exterior places of respite may comply with the requirements of Exterior Site Noise Exposure Category "C," or better.
  - Existing exterior places of respite on the hospital campus may be used to comply with this credit, provided that the location of the existing spaces meets the credit requirements.

Note - For the purposes of this credit, “net usable program area” shall be defined as the sum of all interior areas in the project available to house the project’s Program. Areas housing building equipment, vertical circulation, and structure shall be excluded.

Potential Technologies & Strategies
Select appropriate locations for places of respite, taking into account:
- Environmental factors (e.g., winds, orientation, views, etc.)
- Programs of care (i.e., Horticultural Therapy, etc.)
  - Needs of specific patient populations (e.g., immune suppression, sunlight sensitivity, etc.)
  - Realistic levels of maintenance
- Consider issues of wayfinding and orientation, accessibility, strength and stamina, activity and interest, privacy and security, independence.
- Provide choice and variety in the design of spaces (for example, spaces that engage all the senses but also areas with limited sensory stimulation). Consider a variety of smaller spaces conveniently located throughout the facility rather than one large space. Also consider integrating these exterior spaces with interior public spaces to enhance the connection to nature throughout the facility.

- Design considerations should include freedom from distractions, such as noise from mechanical systems, facility administrative activities and medical treatments.
- Direct connection to the natural environment includes views of distant and nearby nature (such as inaccessible rooftop spaces with “green” (vegetated) roofs and mature street trees). Positive views and vistas should be considered and visual barriers into patient rooms, treatment rooms and mechanical systems should be implemented.

- Realistic maintenance levels
• Coordinate the integration of gardens and nature for exterior environments with the facility’s Infectious Disease Control Specialist. This includes addressing concerns of chemical sensitivities and allergens with certain high-pollen plant materials.

• **Plant** Specify and install plant materials **should be natural that are** appropriate to sun/shade requirements and hardiness zone, **are indigenous**, and able to display seasonal habit and change.

• Qualifying areas should not be used for regularly scheduled physical rehabilitation.

• Consider the development of on-grade gardens and green spaces that will also help integrate the facility into the surrounding community.

• For greenhouses, see EQ Credit 8.2.

• For dedicated protected/preserved natural site area, see SS Credit 5.1.
**SS Credit 9.2:** Connection to the Natural World: Direct Exterior Access for Patients

1 Point

**Intent**

Provide outdoor places of respite on the healthcare campus to connect healthcare patients, visitors, and staff to the health benefits associated with direct access to the natural environment.

**Requirements**

To provide direct access to an exterior courtyard, terrace, garden or balcony with a minimum area of five SF/patient served for 75% of all inpatients AND 75% of qualifying outpatients with clinical length of stay (LOS) greater than 4 hours. Vegetation (including planters) shall use either non-potable water for irrigation or a high-efficiency irrigation system.

- Patients with length of stay greater than four hours, whose treatment makes them unable to move, such as those in Emergency, Stage 1 surgical recovery, and critical care, may be excluded. Qualifying outpatients may include Outpatient Renal Dialysis, Chemotherapy, Ambulatory Surgery Intake and Stage 2 Recovery.

- Immediately adjacent outdoor places of respite, as defined by outside the building envelope that meet the requirements of LEED for Healthcare SS Credit 9.1, immediately adjacent to clinical areas or with direct access from inpatient units may be used to meet this requirement. Included in the calculation if they are immediately adjacent to clinical areas or are directly accessible from inpatient units.

- Qualifying spaces must be designated as non-smoking and meet the requirements of EQ Prerequisite 12.

- Qualifying spaces must meet the requirement for outdoor air quality enumerated in EQ Credit 5: Pollutant Source Control and be located more than 100 feet from building exhaust air locations, loading docks, building entrances and roadways subject to idling vehicles.

**Potential Technologies & Strategies**

Direct access means not having to pass through another patient room, dedicated staff or service/utility space, major public space, or travel vertically on elevators. Patient/public circulation corridors or common sitting areas, waiting and day space may be on the circulation route to the outdoor space. This credit encourages exterior (or passively conditioned, operable greenhouse/ solaria spaces) on individual inpatient units and directly adjacent to qualifying outpatient clinical functions.
Locate patient accessible outdoor spaces in direct line of sight from the most continuously occupied staff workstation. Provide appropriate safety barriers to secure upper level patient accessible outdoor spaces.

Locate patient accessible outdoor spaces facing south, east or west insite specific priority order orientation, ideally within or with views over exterior places of respite and other natural site amenities. Provide planting where possible. Provide the majority of seating and wheelchair space in filtered sunlight. Consider additional full sunlight area as well as full shade areas where possible.
Water Efficiency Credits

**WE Prerequisite 1: Water Use Reduction Required**

**Intent**
To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

**Requirements**

**BUILDING WATER USE**
Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation). The baseline shall meet the requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code pertaining to fixture performance. Calculations are based on estimated occupant usage and shall include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets and pre-rinse spray valves. Fixtures used for clinical use such as surgical scrub sinks and exam room sinks are exempt from this calculation.

**Table 1: National Efficiency Baselines for Commercial & Residential Water-Using Fixtures, Fittings and Appliances** (adapted from information developed and summarized by the U.S. Environmental Protection Agency [EPA] Office of Water)

<table>
<thead>
<tr>
<th>Fixtures, Fittings and Appliances</th>
<th>Current Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>1.6 gallons per flush (gpf)(^7)</td>
</tr>
<tr>
<td>Urinals</td>
<td>1.0 gallons per flush (gpf)</td>
</tr>
<tr>
<td><strong>Lavatory (restroom) Faucets</strong></td>
<td>2.2 gallons per minute (gpm) at 60 pounds per square inch (psi) - Private applications only (e.g., hospital patient rooms) 0.5 gallons per minute (gpm) at 60 psi(^8) all applications except private applications 0.25 gallons per cycle for metering faucets</td>
</tr>
<tr>
<td><strong>Pre-rinse Spray Valves</strong> (for food service applications)</td>
<td>Flow rate ≤ 1.6 gpm</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.5 gpm at 80 psi per shower stall</td>
</tr>
</tbody>
</table>

---

\(^7\) EPAct 1992 standard for toilets applies to both commercial and residential models.

\(^8\) In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code.
AND

PROCESS WATER USE

Employ strategies that in aggregate use 20% less water than the process water use baseline calculated for equipment performance requirements as listed in Table 2. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the project scope): clothes washers, dishwashers, ice machines, food steamers and combination ovens.

Exemptions from Calculations:
- Those appliances & equipment for which water is used toward human consumption may be excluded. For example, bread misters, soda machines, coffee making machines, misters for produce and fixtures used to fill sinks for washing produce.
- Fixtures whose flow rates are regulated by health codes may be excluded from the calculation. For example, regulated medical equipment are excluded. See LEED for Healthcare WE Prerequisite 2 for requirements applicable to heat rejecting medical equipment.

For applicable equipment not addressed by Tables 1 or 2, additional equipment performance baseline requirements may be proposed, provided that documentation supporting the proposed benchmark or industry standard is provided.

Table 2. Equipment Performance Requirements Table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Clothes Washer – less than 80 lbs.</td>
<td>9 gallon/CF/cycle</td>
</tr>
<tr>
<td>Commercial Dishwashers</td>
<td></td>
</tr>
<tr>
<td>Undercounter- high temp</td>
<td>1.98 gallon/rack</td>
</tr>
<tr>
<td>Undercounter- low temp</td>
<td>1.95 gallon/rack</td>
</tr>
<tr>
<td>Door type- high temp</td>
<td>1.44 gallon/rack</td>
</tr>
<tr>
<td>Door type- low temp</td>
<td>1.85 gallon/rack</td>
</tr>
<tr>
<td>Single tank rack conveyor- high temp</td>
<td>1.13 gallon/rack</td>
</tr>
<tr>
<td>Single tank rack conveyor- low temp</td>
<td>1.23 gallon/rack</td>
</tr>
<tr>
<td>Multi- tank rack conveyor- high temp</td>
<td>1.1 gallon/rack</td>
</tr>
<tr>
<td>Multi- tank rack conveyor- low temp</td>
<td>0.99 gallon/rack</td>
</tr>
<tr>
<td>Flight type</td>
<td>180 gallon/hour</td>
</tr>
<tr>
<td>Commercial Ice Machines</td>
<td></td>
</tr>
<tr>
<td>Water-cooled ice machine capacity &lt; 450 lb/day</td>
<td>&lt; 25 gal/100 lb ice</td>
</tr>
<tr>
<td>Air-cooled ice machine capacity ≥ 450 lb/day</td>
<td>&lt; 25 gal/100 lb ice</td>
</tr>
<tr>
<td>Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity &lt; 1000 lb/day</td>
<td>&lt; 25 gal/100 lb ice</td>
</tr>
<tr>
<td>Air-cooled ice machine with remote condensing unit (w/o remote compressor) capacity ≥ 1000 lb/day</td>
<td>&lt; 25 gal/100 lb ice</td>
</tr>
</tbody>
</table>
### Air-cooled ice machine with remote condensing unit (with remote compressor)

**Capacity:**
- **< 934 lb/day**: < 25 gal/100 lb ice
- **≥ 934 lb/day**: < 25 gal/100 lb ice

**Water-cooled ice machines**
- Must be on closed cooling loop

**Water-cooled ice machines once through cooling**
- Not allowed

### Food Steamers

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boiler Type Steam cooker- batch cooking</strong></td>
<td>8 gallon/hour/pan</td>
</tr>
<tr>
<td><strong>Boilerless Type Steam cooker- high production/cook to order</strong></td>
<td>8 gallon/hour/pan</td>
</tr>
<tr>
<td><strong>Combination Oven</strong></td>
<td>40 gph</td>
</tr>
<tr>
<td><strong>Countertop or stand mounted</strong></td>
<td>40 gph</td>
</tr>
<tr>
<td><strong>Roll-in</strong></td>
<td>60 gph</td>
</tr>
</tbody>
</table>

### Other equipment
- Performance baseline based on industry standards

---

### Potential Technologies & Strategies

WaterSense-certified fixtures and fixture fittings should be used where available. Use high-efficiency fixtures (water closets and urinals) and dry fixtures such as toilets attached to composting systems to reduce the potable water demand. Consider use of alternate on-site sources of water, such as rainwater, stormwater, and air conditioner condensate, and greywater for non-potable applications such as toilet and urinal flushing and custodial uses. The quality of any alternate source of water being used must be taken into consideration based on its application or use.
**WE Prerequisite 2: Minimize No-Potable Water Use for Medical Equipment Cooling Required**

**Intent**

*Minimize Eliminate* potable water use for medical equipment cooling.

**Requirements**

For ALL medical equipment in the project, demonstrate that potable water use will be minimized for equipment cooling. Potable water usage is ONLY acceptable in emergency backup systems or where local requirements mandate. The following is required:

- Do not use potable water for once through cooling for any medical equipment that rejects heat. No potable water use for once through cooling for ALL medical equipment that rejects heat. (Note: This credit does not apply to potable water for cooling tower makeup, or for other evaporative cooling systems; refer to WE Credit 4 for Process Water Use Reduction.)

- Where local requirements mandate limiting the discharge temperature of fluids into the drainage system, a tempering device must be used that runs water only when the equipment discharges hot water. Alternatively, provide a thermal recovery heat exchanger that allows drained discharge water to be cooled below code required maximum discharge temperatures while simultaneously preheating inlet makeup water, or if the fluid is steam condensate, return it to the boiler.

- New equipment shall be equipped with water tempering devices for steam traps, other hot water discharges and vacuum pumps in place of venturi devices when vacuum is used to evacuate the chamber.

- When using closed-loop cooling systems for critical applications (i.e. where failure of equipment due to loss of cooling would result in danger to patients or medical personnel, damage to equipment, loss of medical information, or other significant adverse impacts), owners should utilize multiple pieces of cooling equipment (n+1 redundancy). Where this is not possible, an owner may elect to use potable water in an open-loop (once-through) configuration as the emergency back-up cooling system only, not as the primary cooling system. The primary cooling system in these critical applications MUST be a closed-loop system requiring no potable water usage. Such emergency back-up systems shall only be used in the event that the primary closed-loop cooling equipment has failed, and such a failure is visually and audibly indicated at the point of use and alarmed at a continuously monitored location.

**Potential Technologies & Strategies**

Use air-cooled or closed-loop cooling water for equipment cooling instead of open-loop (once-through). Often, cooling of equipment is considered a critical application, where redundancy is desired to significantly reduce or eliminate the possibility of a loss of cooling.
WE Credit 1: Water Efficient Landscaping: No Potable Water Use or No Irrigation
1 Point

Intent
Eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.

Requirements
Use only captured rainwater, recycled wastewater, recycled greywater, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation.

OR

Install landscaping that does not require and does not have permanent irrigation systems. Temporary irrigation systems used for plant establishment are allowed only if removed within one year of installation.

Vegetated areas in compliance with SS Credit 5.1: Site Disturbance: Protect or Restore Habitat; SS Credit 7.2: Heat Island Effect: Roof; SS Credit 9.1: Connection to the Natural World: Outdoor Places of Respite; or SS Credit 9.2: Connection to the Natural World: Exterior Access for Patients is exempted from compliance with this credit if they use a high-efficiency irrigation system.

Potential Technologies & Strategies
Perform a soil/climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Consider using stormwater, greywater, and/or condensate water for irrigation.


**WE Credit 2: Potable Water Use Reduction: Measurement & Verification**

**42 Points**

**Intent**

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

**Requirements**

- **Meter** install meters to track the following water uses (as applicable to the project):
  - Cooling tower make-up and blowdown
  - Incoming water to the project
  - Purified water system (reverse osmosis and/or de-ionized)
  - Filter backwash water

  **AND**

- **Meter** the water use in any 3 of the following:
  - Water use in laboratory
  - Water use in dietary department
  - Water use in laundry
  - Outdoor irrigation systems
  - Steam boiler systems make-up water

  **AND**

- **Install meters to track** the water use in any 3 of the following:
  - Water use in laboratory
  - Water use in central sterile and processing department
  - Water use in laboratory: physio- and hydrotherapy treatment areas
  - Water use in radiology and imaging department
  - Water use in surgical suite
  - Outdoor irrigation systems
  - Steam boiler systems make-up water
  - Closed loop hydronic systems make-up water
  - Cold-water make up for domestic hot water systems

- The M&V period shall cover a period of no less than one year of post-construction occupancy.
• Use the International Performance Measurement and Verification Protocol (IPMVP) Volume 1, Concepts for Determining Energy and Water Savings, March 2002, to provide for long term continuous measurement of potable cold water uses within the facility. [Option D: Calibrated Simulation (Savings Estimation Method 2 - See Volume III, April 2003, for description of Option D, Savings Estimation Method) – for new construction; or Option B: Retrofit Measure Isolation – for renovation].

<table>
<thead>
<tr>
<th>Potential Technologies &amp; Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design the building with equipment to measure water performance. Sub-meter potable water systems.</td>
</tr>
</tbody>
</table>
WE Credit 3: **Potable Water Use Reduction: Domestic Water** 30-40% Reduction

1-3 Points

Project teams earn points by achieving the following percent reductions for both building water use and process water use:

**Intent**

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

*Note: This credit refers to domestic potable water use. For reduction of potable water use in cooling and process applications, refer to WE Credit 4, Process Water and Building System Equipment. For reduction of potable water uses in irrigation, refer to WE Credit 1, Water Efficient Landscaping.*

**Requirements**

- Equip all hand wash sinks (but not compounding sinks, housekeeping sinks, or sinks in toilet rooms for inpatient bed rooms) with sensor operators.

**AND**

Use high-efficiency plumbing fixtures and fittings, or control fixture flows to achieve the following maximum water flows: lavatories 1.5 gpm; showers 2.0 gpm; urinals with an average of 0.5 gallons/flush; and flushometer valve or pressure-assist single-flush toilets with a maximum flush volume of 1.28 gallons/flush.

<table>
<thead>
<tr>
<th>Percent Reduction Achieved</th>
<th>Points Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>1</td>
</tr>
<tr>
<td>35%</td>
<td>2</td>
</tr>
<tr>
<td>40%</td>
<td>3</td>
</tr>
</tbody>
</table>

**Building Water Use**

Employ strategies that in aggregate use less water than the water use baseline calculated for the building (not including irrigation). The baseline shall meet the requirements of the Energy Policy Act (EPAct) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPAct of 2005, and the plumbing code requirements as stated in the 2006 editions of the Uniform Plumbing Code or International Plumbing Code as to fixture performance. Calculations are based on estimated occupant usage and shall include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, showers, kitchen sink faucets and pre-rinse spray valves. Fixtures used for clinical use such as surgical scrub sinks and exam room sinks are exempt from this calculation.
Table 1: National Efficiency Baselines for Commercial & Residential Water-Using Fixtures, Fittings and Appliances

<table>
<thead>
<tr>
<th>Fixtures, Fittings and Appliances</th>
<th>Current Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>1.6 gpf&lt;sup&gt;9&lt;/sup&gt;</td>
</tr>
<tr>
<td>Urinals</td>
<td>1.0 gpf</td>
</tr>
<tr>
<td>Lavatory (restroom) Faucets</td>
<td>2.2-gpm at 60 psi - Private applications only (hotel-motel guest rooms, hospital patient rooms) 0.5 gpm at 60 psi&lt;sup&gt;10&lt;/sup&gt; all others except private applications</td>
</tr>
<tr>
<td>Pre-rinse Spray Valves (for food service applications)</td>
<td>Flow rate ≤ 1.6 gpm (no pressure specified; no performance requirement)</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.5 gpm at 80 psi per shower stall</td>
</tr>
</tbody>
</table>

AND

PROCESS WATER USE

Employ strategies that in aggregate use less water than the process water use baseline calculated for equipment performance requirements as listed in Table 2. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the project scope): clothes washers, dishwashers, ice machines, food steamers and combination ovens.

Exemptions from Calculations:

- Those appliances & equipment for which water is used toward human consumption may be excluded. For example, bread misters, soda machines, coffee making machines, misters for produce and fixtures used to fill sinks for washing produce.
- Fixtures whose flow rates are regulated by health codes may be excluded from the calculation. For example, regulated medical equipment are excluded. See LEED for Healthcare WE Prerequisite 2 for requirements applicable to heat rejecting medical equipment.

For applicable equipment not addressed by Tables 1 or 2, additional equipment performance baseline requirements may be proposed, provided that documentation supporting the proposed benchmark or industry standard is provided.

Table 2. Equipment Performance Requirements Table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Baseline</th>
</tr>
</thead>
</table>

<sup>9</sup> EPAct 1992 standard for toilets applies to both commercial and residential models.

<sup>10</sup> In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code.
<table>
<thead>
<tr>
<th>Commercial Clothes Washer – less than 80 lbs.</th>
<th>9 gallon/CF/cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial Dishwashers</strong></td>
<td></td>
</tr>
<tr>
<td>Undercounter- high temp</td>
<td>1.98 gallon/rack</td>
</tr>
<tr>
<td>Undercounter- low temp</td>
<td>1.95 gallon/rack</td>
</tr>
<tr>
<td>Door type- high temp</td>
<td>1.44 gallon/rack</td>
</tr>
<tr>
<td>Door type- low temp</td>
<td>1.85 gallon/rack</td>
</tr>
<tr>
<td>Single tank rack conveyor- high temp</td>
<td>1.13 gallon/rack</td>
</tr>
<tr>
<td>Single tank rack conveyor- low temp</td>
<td>1.23 gallon/rack</td>
</tr>
<tr>
<td>Multi- tank rack conveyor- high temp</td>
<td>1.1 gallon/rack</td>
</tr>
<tr>
<td>Multi- tank rack conveyor- low temp</td>
<td>0.99 gallon/rack</td>
</tr>
<tr>
<td><strong>Flight type</strong></td>
<td>180 gallon/hour</td>
</tr>
<tr>
<td><strong>Commercial Ice Machines</strong></td>
<td></td>
</tr>
<tr>
<td>ice machine (ice making head) IMH H &lt; 450 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine (ice making head) IMH H &gt; 450 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine RCU (w/o remote compressor) H &lt; 1000 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine RCU (w/o remote compressor) H &gt; 1000 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine RCU (with remote compressor) H &lt; 934 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine RCU (with remote compressor) H &gt; 934 lb/day</td>
<td>&lt; 0.25 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine self contained unit (SCU)</td>
<td>&lt; 0.35 gal/100 lb ice</td>
</tr>
<tr>
<td>ice machine water cooled</td>
<td>Must be on closed cooling loop</td>
</tr>
<tr>
<td>Ice machines once through water cooled</td>
<td>Not allowed</td>
</tr>
<tr>
<td><strong>Food Steamers</strong></td>
<td></td>
</tr>
<tr>
<td>Boiler Type Steam cooker- batch cooking</td>
<td>8 gallon/hour/pan</td>
</tr>
<tr>
<td>Boilerless Type Steam cooker- high</td>
<td>8 gallon/hour/pan</td>
</tr>
<tr>
<td>production/cook to order</td>
<td></td>
</tr>
<tr>
<td><strong>Combination Oven</strong></td>
<td>40 gph</td>
</tr>
<tr>
<td>Countertop or stand mounted</td>
<td>40 gph</td>
</tr>
<tr>
<td>Roll-in</td>
<td>60 gph</td>
</tr>
<tr>
<td><strong>Other equipment</strong></td>
<td>Performance baseline based on industry standards</td>
</tr>
</tbody>
</table>

**Potential Technologies & Strategies**

- Provide a separate glass-fill device in patient room sinks located to prevent activation of the hand wash sensor.
- WaterSense-certified fixtures and fixture fittings should be used where available. Use high-efficiency fixtures: (water closets and urinals) and dry (non-water) fixtures such as toilets attached to composting toilet systems and non-water using urinals to reduce the potable water demand. Consider reuse and treatment of use of alternate on-site sources of water, such as rainwater, stormwater and/or, and air conditioner condensate, and greywater for non-potable
applications such as toilet and urinal flushing, landscape irrigation, mechanical systems (see WE Credit 4) and custodial uses, as consistent with infection control policies and procedures. The quality of any alternate source of water being used must be taken into consideration based on its application or use.

Water-efficient shower heads are available that require less than 2.5 GPM. Lavatory faucets are typically used only for wetting purposes and can be effective with as little as .5 GPM by using water-saving faucet aerators. Specify self-closing or slow-closing faucets, particularly in high-use public areas where it is likely that faucets may be carelessly left running. Water closets are a significant user of potable water. There are a number of high-efficiency toilets (HETs) that flush at or below the HET maximum of 1.28 gallons per flush, including pressure-assist toilets and flushometer valve toilets. Flushometer valve high-efficiency toilets are recommended for healthcare applications.
WE Credit 4: Potable.1: Water Use Reduction: Process Water & Building System Equipment

1-2 Points

Intent
Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements
Implement the following requirements and either Option One OR Two (for one point) OR the following requirements and Option One AND Option Two (for two points) of the following prescriptive requirements:

- **Use** Install only dry vacuum pumps for central vacuum systems and all other systems except for vacuum systems for sterilizer, which may use oil-lubricated liquid ring pumps.
- **Do not install** venturi vacuum systems for sterilizers.
- For air compressors, use install either air cooling or closed loop cooling such as a cooling tower or chilled water system.
- **Large frame** X-Ray facilities Processors and/or Developers of more than 150 mm (six inches) in length or width, shall use film processor water recycling units (smaller. Smaller x-ray equipment such as dental X-Ray film processors are exempt from this requirement).

AND

**OPTION ONE (1-point)**

**Potential Technologies & Strategies**
Assess the process water equipment needs for the project, based on programmatic considerations and size of the facility. Specify the use of high-efficiency equipment, appropriately sized, to reduce the potable water demand. Specify the use of digital imaging equipment. Specify the use of composting food waste. Use appropriately recycled and treated wastewater for non-potable applications.
WE Credit 4.2: Water Use Reduction: Cooling Towers
1 Point

Intent
Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements
- Cooling towers for air conditioning systems such as chilled water systems shall achieve a minimum of five (5) cycles of concentration based on a ratio of the conductivity of the water being discharged (blowdown) divided by the conductivity of the feed (makeup) water(s), or four (4) cycles of concentration if the makeup water hardness exceeds 200 mg/l expressed as Calcium Carbonate, or shall achieve a minimum discharge (blowdown) concentration of 1500 mg/L (1500 ppm) expressed as Calcium Carbonate, or 175 mg/L (175 ppm) of silica measured as silicon dioxide, whichever is met first.
- Cooling towers shall be equipped with makeup and blowdown meters, conductivity controllers and overflow alarms and efficient drift eliminators that reduce drift loss to less than or equal to 0.001% of recirculating water in a counter-flow tower or 0.005% in a cross-flow tower.
- Use no more potable water than 2.3 gallons per ton hour for cooling tower make-up.

-OR-

OPTION TWO (1 point)
- No garbage disposals, AND
- At least 4 process items where water use is at or below the levels shown in the table below. For equipment not addressed by the table, additional equipment performance requirements may be proposed provided documentation supporting at least a 20% reduction over the proposed benchmark or industry standard is submitted.

Commercial Equipment Performance Requirements Table

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Maximum Water Use</th>
<th>Other Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothes Washers</td>
<td>Total of 7.5 gallons/ft²/cycle</td>
<td></td>
</tr>
<tr>
<td>Dishwashers</td>
<td>EPA Energy Star</td>
<td></td>
</tr>
<tr>
<td>Ice Machines</td>
<td>EPA Energy Star</td>
<td></td>
</tr>
<tr>
<td>Food Steamers</td>
<td>2 gallons/hour</td>
<td>EPA Energy Star</td>
</tr>
<tr>
<td>Combination ovens</td>
<td>4.0 gallons per hour</td>
<td></td>
</tr>
<tr>
<td>Pre-Rinse-Spray Valves</td>
<td>1.4 gallons per minute</td>
<td></td>
</tr>
</tbody>
</table>

11 Commercial CEE Tier 3a - Residential CEE Tier 1
12 CEE Tier 3
Alternative paths that achieve reductions at least 10% of total project potable water use may be substituted for compliance with either Option One or Two.

Potential Technologies & Strategies

Assess the process water equipment needs for the project, based on programmatic considerations and size of the facility. Specify the use of high-efficiency equipment, appropriately sized, to reduce the potable water demand. Specify the use of digital imaging equipment. Specify the use of composting food waste. Use appropriately recycled and treated wastewater for non-potable applications.
WE Credit 4.3: Water Use Reduction: Food Waste Systems
1 Point

Intent
Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Requirements
- When a food waste disposer system is used the following requirements must be met:
  - Use cold water - common code requirement.
  - Equip systems with a load sensing device that regulates the water use to 1 gpm in a no load situation and 3-8 gpm in a full load situation.
  - Automatic time shutoff - 10 minute time-out system (push button to reactivate)

When Pulpers, extractors, and scrap basket and/or strainer type systems are used the following requirements must be met:
- Mechanical pulpers and extractors, and mechanical scrapper systems shall use no more than 2 gpm of potable water, excluding end of day wash-down cycles.
- Non-mechanical strainer (scraper) baskets shall not be part of a flowing trough collection system connected to potable water at a rate greater than 2 gpm.
- Automatic time shutoff - 10 minute time-out system (push button to reactivate)

Potential Technologies & Strategies
Assess the process water equipment needs for the project, based on programmatic considerations and size of the facility. Specify the use of high-efficiency equipment, appropriately sized, to reduce the potable water demand. Specify the use of digital imaging equipment. Specify the use of composting food waste. Use appropriately recycled and treated wastewater for non-potable applications.
Energy & Atmosphere Credits

**EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems Required**

**Intent**

*To verify* that the building's energy related systems are installed, calibrated and perform according to the owner’s project requirements, basis of design, and construction documents.

**Benefits of Commissioning**

Benefits of commissioning include reduced energy use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity, and verification that the systems perform in accordance with the owner’s project requirements.

**Requirements**

The following commissioning process activities shall be completed by the commissioning team, in accordance with the LEED-NC 2.2 Reference Guide project team.

- Designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities.
  - The CxA shall have documented commissioning authority experience in at least two building projects.
  - The individual serving as the CxA shall be independent of the project’s design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the Owner.
  - The CxA shall report results, findings and recommendations directly to the Owner.
  - For projects smaller than 50,000 gross square feet, the CxA may include qualified persons on the design or construction teams who have the required experience.
- The Owner shall document the Owner’s Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents.
- Develop and incorporate commissioning requirements into the construction documents.
- Develop and implement a commissioning plan.
- Verify the installation and performance of the systems to be commissioned.
- Complete a summary commissioning report.
Commissioned Systems

Commissioning process activities shall be completed for the following energy-related systems, at a minimum:

- Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls
- Lighting and daylighting controls
- Domestic hot water systems
- Renewable energy systems (wind, solar etc.)

For renovations and additions, listed energy-related systems that meet the following criteria, shall be commissioned or recommissioned. All other systems in the facility are exempt from this Prerequisite.

- All existing energy-related systems located within the boundaries of the project that serve the addition or alteration.
- Existing energy-related systems equipment or systems that do not have sufficient capacity to serve the addition or alteration and are supplemented to provide the required capacity.
- Energy-related equipment that is replaced or relocated.
- New energy-related equipment serving the addition or alteration.
- Existing energy-related systems where the project uses more than 25% of the capacity of such systems.

Potential Technologies & Strategies

Engage a Commissioning Authority as early as possible in the design process. Determine the owner’s project requirements, develop and maintain a commissioning plan for use during design and construction, and incorporate commissioning requirements in bid documents. Assemble the commissioning team, and prior to occupancy verify the performance of energy consuming systems. Complete the commissioning reports with recommendations prior to acceptance of the commissioned systems.

Owners are encouraged to seek out qualified individuals to lead the commissioning process. Qualified individuals are identified as those who possess a high level of experience in the following areas:

- Energy systems design, installation and operation
- Commissioning planning and process management
- Hands-on field experience with energy systems performance, interaction, start-up, balancing, testing, troubleshooting, operation, and maintenance procedures
- Energy systems automation control knowledge
Include commissioning requirements in bid documents and task the commissioning authority to produce a commissioning report once commissioning activities are completed. Hospitals and healthcare systems with in-house expertise in design and commissioning may perform this work. However, this is extremely specialized expertise and the Owner may benefit from engaging a credentialed Commissioning Authority.

Owners are encouraged to consider including water-using systems, building envelope systems, and other systems in the scope of the commissioning plan as appropriate. The building envelope is an important component of a facility which impacts energy consumption, occupant comfort and indoor air quality. While it is not required to be commissioned by this LEED prerequisite, an owner can often receive significant financial savings and reduced risk of poor indoor air quality by including building envelope more extensive commissioning of building systems.

The LEED for Healthcare 2009 Reference Guide provides guidance on the rigor expected for this prerequisite for the following:

- Owner’s project requirements
- Basis of design
- Commissioning plan
- Commissioning specification
- Performance verification documentation
- Commissioning report
EA Prerequisite 2: Minimum Energy Performance Required

Intent
Establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

Requirements
Design the building project to comply with one of the following two options:

OPTION 1: PRESCRIPTIVE PATH WHOLE BUILDING ENERGY SIMULATION
- The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ASHRAE/IESNA Standard 90.1-2004; and
- the prescriptive requirements (Sections 5.5, 6.5, 7.5 and 9.5) requirements (Section 11) of ASHRAE/IESNA Standard 90.1-2004

OR

OPTION 2: PERFORMANCE RATING PATH
Demonstrate a 10% improvement in the proposed building performance rating for new buildings or a 5% improvement in the proposed building performance rating is equal to or exceeds for major renovations to existing buildings, compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004.

Calculate the baseline building performance rating according to the building performance rating method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda*). The default process energy cost is 25% of the total energy cost for the baseline building. If the building’s process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include documentation substantiating that process energy inputs are appropriate.

LEED for Healthcare Rating System Draft for 2nd PC
Obtain an energy performance rating for estimated energy use of both the baseline and proposed design from EPA’s Energy Star® Target Finder design tool and submit the Statement of Energy Design Intent document (generated by Target Finder) as part of the project’s design submittal.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps).

Regulated (non-process) energy includes lighting (for the interior, parking garage, surface parking, façade, or building grounds, etc., except as noted above), heating, ventilation and air conditioning (HVAC) (for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

Process loads must be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ANSI/ASHRAE/IESNA Standard 90.1-2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

Projects in California are permitted to use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IESNA 90.1-2007 for Option 1.

OR

OPTION 2 — PRESCRIPTIVE COMPLIANCE PATH: Advanced Buildings™ Core Performance™ Guide

Comply with the prescriptive measures of the 2007 New Buildings Institute Advanced Buildings Core Performance Guide. The following restrictions apply:

- Buildings must be 100,000 square feet or less.
- Project teams must fully comply with all applicable criteria as established in the Advanced Buildings Core Performance Guide for the climate zone in which the building is located.
- The HVAC system serving all areas must include Variable Air Volume (VAV) air handling units. In addition, provide zoning controls to maintain pressure relationships as specified in the 2006 Guidelines for Design and Construction of Hospitals and Healthcare Facilities. Zoning controls must be used on both supply air and return/exhaust air systems.
OPTION 3 — PRESCRIPTIVE COMPLIANCE PATH: Green Guide for Healthcare Prescriptive Path for Energy Improvements in Hospitals

- Buildings must be over 100,000 square feet
- Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in ASHRAE Standard 90.1-2007
- Incorporate all energy efficiency measures (EEMs) listed below:

1. High Performance Windows and Glazing
   - Thermally broken metal window frames
     - U value at the center of glass ≤ 0.29
     - Solar heat gain coefficient at the center of glass ≤ 0.38
     - U value of the window including framing effects ≤ 0.40

2. Lighting Power Density (LPD)
   - Reduce overall LPD a minimum of 10% below IESNA/ASHRAE Standard 90.1-2007.

3. Lighting Controls
   - Install occupancy sensor lighting controls, at a minimum, in all offices, storage areas and mechanical spaces.
   - Install additional lighting controls to achieve the following lighting energy reduction:
     - Offices: 15% during the day
     - Storage: 60% during the day; 30% at night
     - Mechanical Spaces: 50% for 23 hours/day

4. The HVAC system serving all areas shall include Variable Air Volume (VAV) air handling units supplied by a central chilled water and boiler plant. In addition, provide zoning controls to maintain pressure relationships as specified in the 2006 Guidelines for Design and Construction of Hospitals and Healthcare Facilities. Zoning controls shall be used on both supply air and return/exhaust air systems.

5. Reduce Fan power a minimum of 10% less than the limit under ASHRAE 90.1-2007.

6. Reduce turndown ratio on VAV Boxes in accordance with ASHRAE 90.1-2007 Prescriptive Requirement 6.5.2.1.


8. Design the heating plant (including boilers and auxiliary equipment) to achieve a minimum system efficiency (BTUH output/ BTUH input) of 90%.
9. Design hot and chilled water pumps (3 hp or greater) with variable speed drives and a minimum part load ratio of 30%.

10. For fans and pumps, use only motors that meet National Electrical Manufacturers’ Association (NEMA) standards for premium efficiency.

11. Chillers shall operate at a maximum of 0.52 kW/ton at Full Load and an integrated part load value (IPLV) of 0.399 kW/ton.

Potential Technologies & Strategies

Design the building envelope, HVAC, lighting, and other systems to maximize energy performance. The ASHRAE 90.1-2004 User’s Manual contains worksheets that can be used to document compliance with this prerequisite. For projects pursuing points under EA Credit 1, the computer simulation model may be used to confirm satisfaction of this prerequisite.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then it may be used to satisfy this prerequisite in lieu of ASHRAE 90.1-2004. Details on the DOE process for commercial energy code determination can be found at www.energycodes.gov/implement/determinations_com stm.
EA Prerequisite 3: Fundamental Refrigerant Management Required

Intent
To reduce ozone depletion.

Requirements
Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits. For existing buildings, requirements are met if a third-party audit (as defined in the LEED for Healthcare Reference Guide) shows that system replacement or conversion is not economically feasible or the building demonstrates that a phase out plan for CFC-based refrigerants is in place.

Required economic analysis: The replacement of a chiller will be considered to be not economically feasible if the simple payback of the replacement is greater than 10 years. To determine the simple payback, divide the cost of implementing the replacement by the annual cost avoidance for energy that results from the replacement and any difference in maintenance costs. If CFC-based refrigerants are maintained in the building, reduce annual leakage to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the total leakage over the remaining life of the unit to less than 30% of its refrigerant charge.

Potential Technologies & Strategies
When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and provide a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment in the base building that uses no CFC refrigerants. Specify only non-CFC-based refrigerants in all new building HVAC&R systems. Identify all existing CFC-based refrigerant uses and upgrade the equipment if economically feasible and/or develop a phase-out plan that identifies a schedule for when equipment will be replaced in the future.
EA Credit 1: Optimize Energy Performance

1–242–10 Points

Intent
Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements
Select one of the three compliance path options described below. Project teams documenting achievement using any of the three options are assumed to be in compliance with EA Prerequisite 2.

OPTION 1—WHOLE BUILDING ENERGY SIMULATION (1–241–10 Points)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) by a whole building project using a computer simulation using the Building Performance Rating Method in Appendix G of the Standard. The minimum energy cost savings percentage for each point threshold is as follows:

<table>
<thead>
<tr>
<th>New Buildings</th>
<th>Existing Building Renovations</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>12%</td>
<td>8%</td>
<td>1</td>
</tr>
<tr>
<td>14%</td>
<td>10% 7%</td>
<td>2</td>
</tr>
<tr>
<td>16% 17.5%</td>
<td>12% 10.5%</td>
<td>3</td>
</tr>
<tr>
<td>21%</td>
<td>14%</td>
<td>4</td>
</tr>
<tr>
<td>18% 24.5%</td>
<td>14% 17.5%</td>
<td>5</td>
</tr>
<tr>
<td>28%</td>
<td>21%</td>
<td>6</td>
</tr>
<tr>
<td>20% 21.5%</td>
<td>16% 24.5%</td>
<td>7</td>
</tr>
<tr>
<td>35%</td>
<td>28%</td>
<td>8</td>
</tr>
<tr>
<td>22% 30.5%</td>
<td>18% 21.5%</td>
<td>9</td>
</tr>
<tr>
<td>42%</td>
<td>35%</td>
<td>10</td>
</tr>
<tr>
<td>24%</td>
<td>20%</td>
<td>11</td>
</tr>
<tr>
<td>26%</td>
<td>22%</td>
<td>13</td>
</tr>
<tr>
<td>28%</td>
<td>24%</td>
<td>14</td>
</tr>
<tr>
<td>30%</td>
<td>26%</td>
<td>15</td>
</tr>
<tr>
<td>32%</td>
<td>28%</td>
<td>16</td>
</tr>
<tr>
<td>34%</td>
<td>30%</td>
<td>17</td>
</tr>
<tr>
<td>36%</td>
<td>32%</td>
<td>18</td>
</tr>
<tr>
<td>38%</td>
<td>34%</td>
<td>19</td>
</tr>
<tr>
<td>40%</td>
<td>36%</td>
<td>20</td>
</tr>
<tr>
<td>42%</td>
<td>38%</td>
<td>21</td>
</tr>
</tbody>
</table>
Appendix G of Standard 90.1-2007 requires that the energy analysis done for the Building Performance Rating Method include ALL of the energy costs *within* and associated with the building project. To achieve points *underlying* this credit, the proposed design must meet the following criteria:

- must be **Compliance** with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2007 (with errata but without addenda*); 90.1-2004;
- must be **Inclusion** of all the energy costs within and associated with the building project; and
- must be **Comparison** against a baseline building that complies with Appendix G of Standard 90.1-2007 (with errata but without addenda*). The default process energy cost is 25% of the total energy cost for the baseline building. If the building’s process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include documentation substantiating that process energy inputs are appropriate 90.1-2004.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps). Regulated (non-process) energy includes lighting (such as e.g., for the interior, parking garage, surface parking, façade, or building grounds, except as noted above), heating, ventilating, and air conditioning (HVAC) (such as e.g., for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

**OR**

**OPTION 2 — PRESCRIPTIVE COMPLIANCE PATH (2 Points)**

- Comply with the prescriptive measures of the 2007 New Buildings Institute Advanced Buildings Core Performance Guide. Buildings must be 70,000 square feet or less

**OPTION 3 — PRESCRIPTIVE COMPLIANCE PATH (2 Points)**

- Buildings must be over 70,000 square feet
- Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in ASHRAE Standard 90.1-2004
- Incorporate all energy efficiency measures (EEMs) listed below:
  1. High Performance Windows and Glazing
  1. Thermally broken metal window frames

<table>
<thead>
<tr>
<th>44%</th>
<th>40%</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>46%</td>
<td>42%</td>
<td>23</td>
</tr>
<tr>
<td>48%</td>
<td>44%</td>
<td>24</td>
</tr>
</tbody>
</table>
- U value at the center of glass ≤ 0.29
- Solar heat gain coefficient at the center of glass ≤ 0.38
- U value of the window including framing effects ≤ 0.40

2. Lighting Power Density (LPD)
   - Reduce LPD in each space a minimum of 10% below IESNA/ASHRAE Standard 90.1–2004.

3. Lighting Controls
   - Install occupancy sensor lighting controls, at a minimum, in all offices, storage areas and mechanical spaces.
   - Install additional lighting controls to achieve the following lighting energy reduction:
     - Offices: 15% during the day
     - Storage: 60% during the day, 30% at night
     - Mechanical Spaces: 50% for 23 hours/day

4. The HVAC system serving all areas shall include Variable Air Volume (VAV) air handling units supplied by a central chilled water and a central boiler plant. In addition, provide zoning controls to maintain pressure relationships as specified in the 2006 Guidelines for Design and Construction of Hospitals and Healthcare Facilities. Zoning controls shall be used on both supply air and return/exhaust air systems.

5. Reduce fan power a minimum of 10% less than the limit under ASHRAE 90.1-2004 Addendum AC.

6. Reduce turndown ratio on VAV Boxes in accordance with ASHRAE 90.1-2004 Prescriptive Requirement 6.5.2.1.

7. Reduce Exterior Lighting to 20% below IESNA/ASHRAE 90.1-2004 requirements.

8. Design the heating plant (including boilers and auxiliary equipment) to achieve a minimum system efficiency (BTUH output/ BTUH input) of 90%.

9. Design hot and chilled water pumps (3-hp or greater) with variable-speed drivers and a minimum part load ratio of 30%.

10. For fans and pumps, use only motors that meet National Electrical Manufacturers’ Association (NEMA) standards for premium efficiency.
    - Equip chillers with variable-frequency drives. Chillers shall operate at a maximum of 0.52 kW/ton at Full Load and an integrated part load value (IPLV) of 0.399 kW/ton.

For this credit, process loads shall be identical for both the baseline building performance rating and the proposed building performance rating. However, project teams may follow the
Exceptional Calculation Method (ANSI/ASHRAE/IESNA Standard 90.1-2007 G2.5) to document measures that reduce process loads. Documentation of process load energy savings must include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.


**Potential Technologies & Strategies**

Design the building envelope and systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then the results of that analysis may be used to correlate local code performance with ASHRAE 90.1-2007 90.1-2004. Details on the DOE process for commercial energy code determination can be found at [www.energycodes.gov/implement/determinations_com.stm](http://www.energycodes.gov/implement/determinations_com.stm).

* Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may to do so at the project team’s discretion. Addenda must be applied consistently across all LEED credits.
EA Credit 2: On-Site Renewable Energy

1-2-8 Points

Intent
Encourage To encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use.

Requirements
Use on-site renewable energy systems to offset building energy cost.

OPTION 1 (1-2 Points)
Calculate project performance by expressing the energy produced by the renewable systems as a percentage of the building annual energy cost and using the table below to determine the number of points achieved.

Use the building annual energy cost calculated in EA Credit 1 or use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use. (Table of use for different building types is provided in the Reference Guide.)

<table>
<thead>
<tr>
<th>% Renewable Energy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>1</td>
</tr>
<tr>
<td>3%</td>
<td>2</td>
</tr>
<tr>
<td>10%</td>
<td>5</td>
</tr>
<tr>
<td>20%</td>
<td>6</td>
</tr>
<tr>
<td>30%</td>
<td>7</td>
</tr>
<tr>
<td>40%</td>
<td>8</td>
</tr>
</tbody>
</table>

OR

OPTION 2 (1-2 Points)
Supply a net fraction of the building’s total energy use (as expressed as a fraction of watts per square foot) with on-site renewable energy systems.

<table>
<thead>
<tr>
<th>Point total</th>
<th>Renewable energy provided as fraction of annual energy use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit 2.1</td>
<td>0.215 w/sf of generating capacity</td>
</tr>
<tr>
<td>Credit 2.2</td>
<td>0.645 w/sf of generating capacity</td>
</tr>
</tbody>
</table>

Note: The renewable energy fraction in the above table is based on the following calculation:

\[ (21.5 \text{ kWh/sf}) \times (1.0\%) \times (1,000 \text{ Wh/1 kW}) = 215.00 \text{ Wh/sf} \]
This calculation makes two assumptions:

- A typical hospital uses 21.5 kwh/sf of electricity per year.
- A typical PV array operates 1,000 hours per year.


Note: Natural gas and oil consumption are not addressed in this credit.

Potential Technologies & Strategies

Assess the project for non-polluting and renewable energy potential including: solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

- Solar; Photovoltaic and active thermal systems
- Wind
- Bio-fuel and biogas-based electrical systems (including biodiesel)
- Geothermal heating systems
- Geothermal electric systems
- Low-impact hydro electric power systems
- Wave and tidal power systems

When applying these strategies, take advantage of "net metering" with the local utility.

Ineligible On-Site Renewable Energy Systems

- Architectural features
- Passive solar strategies (included under EA Credit 1 calculation)
- Daylighting strategies
- Geo-exchange systems (ground source heat pumps)
- Renewable or Green-power from off-site sources
**EA Credit 3: Enhanced Commissioning**

**1-2 Points**

**Intent**

Begin To begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.

**Requirements**

Complete the requirements under Option 1 (1 point) or complete Option 1 AND Option 2 (for 2 points). Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1 and in accordance with the LEED for Healthcare 2009 Reference Guide:

**OPTION 1 (1 point)**

1. Prior to the start of the construction documents phase, designate an independent Commissioning Authority (CxA) to lead, review, and oversee the completion of all commissioning process activities. The CxA shall, at a minimum, perform Tasks 2, 3 and 6. Other team members may perform Tasks 4 and 5:
   
   a. The CxA shall have documented commissioning authority experience in at least two building projects.
   
   b. The individual serving as the CxA shall be—
      
      i. independent of the work of design and construction;
      
      ii. not an employee of the design firm, though they may be contracted through them;
      
      iii. not an employee of, or contracted through, a contractor or construction manager holding construction contracts; and
      
      iv. (can be) a qualified employee or consultant of the Owner.
   
   c. The CxA shall report results, findings and recommendations directly to the Owner.
   
   d. This requirement has no deviation for project size.

2. The CxA shall conduct, at a minimum, one commissioning design review of the Owner’s Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission.

3. The CxA shall review contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and the Owner.

4. Develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.
7.5 Verify that the requirements for training operating personnel and building occupants are completed.

8.6 Assure the involvement by the CxA in reviewing building operation within 10 months after substantial completion with O&M staff and occupants. Include a plan for resolution of outstanding commissioning-related issues.

OPTION 2 (2 points)

*(1 point in addition to OPTION 1. OPTION 2 cannot be completed without OPTION 1)* Achieve Option 1 AND


The building thermal envelope entails all exterior wall assemblies separating a building’s conditioned spaces from outdoor ambient conditions including; roof assemblies, vapor barriers, diffusion retarders, air barrier systems, rain-screen layers, flashings, cladding and siding; windows, curtain-wall assemblies, doors, thermal bridges (1) and utility penetrations such as for piping, electrical conduit, duct-banks and other entry-points made routing for HVAC system components.

In support of the process requirements in Option 1, the following sequence of steps should be taken to assure an effective building thermal envelope commissioning process, typically including (but are not limited to):

- Startup meeting; coordinate with entire green building project team on goals and objectives of the process
- Conduct building thermal envelope design review
- Developing thermal envelope commissioning work plan and schedule
- Developing coordinated documentation plan
- Functional performance test and inspection procedures ascertained (reference standards)
- Review thermal envelope components and assemblies mock-ups where relevant
- Conduct scheduled field QA inspections per work plan; document inspections
- Inspect corrections of defects encountered during inspections
- Prepare final report

Potential Technologies & Strategies

Although it is preferable that the CxA be contracted by the Owner, for the enhanced commissioning credit, the CxA may also be contracted through the design firms or construction management firms not holding construction contracts.

The LEED for Healthcare 2009 Reference Guide provides detailed guidance on the rigor expected for following process activities:

- Commissioning design review
- Commissioning submittal review
- Systems manual

Reduction of air and vapor transmission through the building envelope will enhance the operation, comfort, and energy efficiency of the structure.

**EA Credit 4: Enhanced Refrigerant Management**

**1 Point**

**Intent**

*Reduce* To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

**Requirements**

OPTION 1

Do not use refrigerants.

OR

OPTION 2

Complete both of the following:

Select refrigerants and HVAC&R that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment shall comply with the following formula, which sets a maximum threshold for the combined contributions to ozone depletion and global warming potential:

\[
\text{LCGWP} + \text{LCODP} \times 10^5 \leq 100
\]

Where:

- LCODP: Lifecycle Ozone Depletion Potential \( \text{lbCFC11/Ton-Year} \)
- LCGWP: Lifecycle Direct Global Warming Potential \( \text{lbCO}_2/\text{Ton-Year} \)
- GWPr: Global Warming Potential of Refrigerant \( 0 \text{ to } 12,000 \text{ lbCO}_2/\text{lbr} \)
- ODP: Ozone Depletion Potential of Refrigerant \( 0 \text{ to } 0.2 \text{ lbCFC11/lbr} \)
- Lr: Refrigerant Leakage Rate \( 0.5\% \text{ to } 2.0\%; \text{ default of } 2\% \text{ unless otherwise demonstrated} \)
- Mr: End-of-life Refrigerant Loss \( 2\% \text{ to } 10\%; \text{ default of } 10\% \text{ unless otherwise demonstrated} \)
- Rc: Refrigerant Charge \( 0.5 \text{ to } 5.0 \text{ lbs of refrigerant per ton of cooling capacity} \)
- Life: Equipment Life \( 10 \text{ years; default based on equipment type, unless otherwise demonstrated} \)

For multiple types of equipment, a weighted average of all base building level HVAC&R equipment shall be applied using the following formula:

\[
\left[ \sum (\text{LCGWP} + \text{LCODP} \times 10^5) \times \text{Qunit} \right] / \text{Qtotal} \leq 100
\]

Where:

- Qunit = *Cooling Gross ARI rated cooling capacity* of an individual HVAC or refrigeration unit (Tons)
\[ Q_{\text{total}} = \text{Total gross ARI rated} \text{ cooling capacity of all HVAC or refrigeration} \]

Small HVAC units (defined as containing less than 0.5 lbs of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 lbs of refrigerant, are not considered part of the “base building” system and are not subject to the requirements of this credit.

AND

Do not operate or install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs or Halons).

**Potential Technologies & Strategies**

Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC and refrigeration systems for the refrigeration cycle that minimizes direct impact on ozone depletion and global warming. Select HVAC&R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Utilize fire suppression systems that do not contain HCFCs or Halons.
EA Credit 5: Measurement & Verification

1-2 Points

Intent

Provide To provide for the ongoing accountability of building energy consumption over time.

Requirements

  
  o The M&V period for the above plan shall cover a period of no less than one year of post-construction occupancy.

  Provide for

  o Provide a process for corrective action to ensure energy savings are realized if the results of the M & V plan indicate that energy savings are not being achieved.

  In addition, provide evidence of the long term M&V (minimum 2 years after the M&V period above).

  o Develop and implement a long term M&V Plan consistent with Option B, C, or D of Volume 1 of the IPMVP: Concepts and Options for Determining Energy and Water Savings, March, 2002. The application of Volume I methods is contingent upon establishing a stable base year of operation as a result of the initial Volume III M&V period. If a stable base year cannot be established, the Volume III methods should be continued into the long term M&V period.

Potential Technologies & Strategies

- Model the energy systems to predict savings based on whole building energy use.

- Design the building with equipment to measure whole building energy performance.

- Provide submetering of building systems in accordance with the recommendations of the IPMVP. Consider submetering for the following electrical and mechanical systems (as applicable to the scope of the project):
  
  o Lighting system power and controls
  
  o Miscellaneous Motor loads (including air compressors, vacuum pumps, etc.)
• Chiller Systems (chillers, pumps, cooling towers, etc.)

• Heating Systems

• Data Centers

• Critical Equipment Electrical Distribution Systems

• Air distribution systems

- Develop an M&V Plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance.

- While the IPMVP describes specific actions for verifying savings associated with energy conservation measures (ECMs) and strategies, this LEED credit expands upon typical IPMVP M&V objectives. M&V activities should not necessarily be confined to energy systems where ECMs or energy conservation strategies have been implemented. The IPMVP provides guidance on M&V strategies and their appropriate applications for various situations. These strategies should be used in conjunction with monitoring and trend logging of significant energy systems to provide for the ongoing accountability of building energy performance.

- Research possible peak load reduction incentive programs offered by some states.

For the corrective action process, consider installing diagnostics within the control system to alert the staff that equipment is not being optimally operated. Alarms to alert staff could include:

- Leaking valves in the cooling and heating coils within air handling units
- Missed economizer opportunities (e.g., faulty economizer damper controls)
- Software and manual overrides allowing equipment to operate 24/7.
- Equipment operation during unusual circumstances (e.g., boiler on when outside air temperature above 65°F)

Besides control diagnostics, consider employing retro-commissioning services or dedicating staff to investigate increases in energy usage (such a staff member is usually a resource conservation manager—see http://www.energy.state.or.us/rcm/rcmhm.htm for additional information).
EA Credit 6: Green Power
1 Point

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

Requirements
Provide at least 25\% to 35\% of the building’s electricity from renewable sources by engaging in at least a two-year renewable energy contract. The annual electricity usage should be compiled. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e Energy products certification requirements.

DETERMINE THE BASELINE ELECTRICITY USE

Use the annual electricity consumption from the results of EA Credit 1.

OR

Use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use.

Note - All purchases of green power shall be based on the quantity of energy consumed, not the cost.

Potential Technologies & Strategies
Determine the energy needs of the building and investigate opportunities to engage in a green power contract. Green power is derived from solar, wind, geo-thermal, biomass or low-impact hydro sources. Visit www.green-e.org/energy for details about the Green-e Energy program. The power product purchased to comply with credit requirements need not be Green-e Energy certified. Other sources of green power are eligible if they satisfy the Green-e program’s technical requirements. Renewable energy certificates (RECs), tradable renewable certificates (TRCs), green tags and other forms of green power that comply with Green-e Energy’s technical requirements can be used to document compliance with EA Credit 6 requirements.
EA Credit 7: Medical and Process Equipment Efficiency

1 Point

Intent
Reduce energy consumption by using efficient medical and other equipment.

Requirements
For all diagnostic imaging equipment (x-rays, MRIs, etc), sterilization, and physiological monitoring equipment installed in the project, (but excluding other types of medical equipment):

• At least 50%, by rated power, of medical equipment purchased for the project shall be among the 25th percentile of lowest energy consumers for that class of equipment. Equipment shall be compared based on their continuous (or “standby”) mode electrical energy consumption.

Potential Technologies & Strategies
To learn more about the purchase of medical equipment visit the Emergency Care Research Institute (www.ecri.org)
**EA Credit 78: Community Contaminant Prevention: Airborne Releases**

**1 Point**

**Intent**

Prevent To prevent contaminant releases to air from products of combustion.

**Requirements**

Meet California South Coast Air Quality Management District standards for all products of combustion. Do not exceed the emission limits below for products of combustion as outlined in the following California South Coast Air Quality Management District Rules:

1110.2 (Amended June 3, 2005 February 1, 2008), Emissions from Gaseous- and Liquid-Fueled Internal Combustion Engines

1111 (Amended July 8, 1983), NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces

1121 (Amended September 3, 2004) Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters

1146 (Amended November 17, 2000), Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters


1146.2 (Amended May 5, 2006), Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters

<table>
<thead>
<tr>
<th>Products ofCombustion</th>
<th>Oxides of Nitrogen (NO\textsubscript{x})</th>
<th>Volatile Organic Compounds (VOCs)</th>
<th>Carbon Monoxide (CO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaseous and Liquid-Fueled Stationary Engines — Emergency or Standby Power Uses</td>
<td>36\textsuperscript{11} ppm</td>
<td>250\textsuperscript{12} ppm</td>
<td>2,000\textsuperscript{70} ppm</td>
</tr>
<tr>
<td>Natural-Gas-Fired, Fan-Type Central Furnaces Gaseous and Liquid-Fueled Stationary Engines — Non-Emergency and Non-Standby Power Uses</td>
<td>40 nanograms per Joule of useful heat 0.070 lbs/MW-hr\textsuperscript{2}</td>
<td>0.10 lbs/MW-hr\textsuperscript{2}</td>
<td>0.20 lbs/MW-hr\textsuperscript{3}</td>
</tr>
<tr>
<td>Small Boilers, Steam Generators, and Process Heaters (2–5 Kbtu/hour = 5–20 Kbtu/hour rated heat input capacity)</td>
<td>Landfill and Digestor Gas-Fired Stationary Engines</td>
<td>400 ppm</td>
<td>2,000 ppm</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Landfill Gas: 40 \textsuperscript{1,2}</td>
<td>Digester Gas: 250 x ECF\textsuperscript{1,2,6}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Large Water Heaters (rated heat input capacity ≤ 2,000,000 BTU/hour)</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Small Boilers and Process Heaters (rated heat input capacity ≤ 2,000,000 BTU/hour)</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residential Type, Natural Gas- Fired Water Heaters</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity less than or equal to 400,000 BTU per hour)</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity greater than 400,000 BTU per hour and less than or equal to 2,000,000 BTU per hour)</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boilers, Steam Generators, Water Heaters, and Process Heaters (rated heat input capacity greater than 2,000,000 BTU per hour and less than 5,000,000 BTU per hour)</th>
<th>Landfill and Digestor Gas-Fired Stationary Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas: 40 \textsuperscript{2}</td>
<td></td>
</tr>
<tr>
<td>Boilers, Steam Generators, Water Heaters, and Process Heaters</td>
<td>30 ppm$^7$ or 0.036 pounds per million BTU of heat input</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>(rated heat input capacity greater than or equal to 5,000,000 BTU per hour)$^8,9$</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. **Corrected Parts per million by volume, corrected** to 15% oxygen on a dry basis and averaged over 15 minutes.

2. Measured as carbon.

3. The averaging time of the emission standards is 15 minutes.


5. Emissions limits shall be subject to adjustment for engines that produce combined heat and electrical power (see Rule 1110.2)

6. ECF is the efficiency correction factor.

7. Parts per million by volume, corrected to 3% oxygen on a dry basis.

8. Capacity Factor greater than 25%.

9. **Units with a heat input capacity greater than 40 million BTU per hour and an annual heat input greater than 200 x 10$^6$ BTU per year shall have a continuous in-stack nitrogen oxides monitor or equivalent verification system in compliance with 40 CFR part 60 Appendix B Specification 2.**

For engines of 1,000 bhp and greater, Install, operate and maintain in calibration a NO$_x$ continuous emission monitoring system (CEMS) with data gathering and retrieval capability.

**Potential Technologies & Strategies**

- Provide scrubbers and filters for boilers and diesel generators.
- Test and certify all filters as installed prior to occupancy and placard them for at least annual recertification.
- Burn ultra-low sulfur diesel fuels. Provide air quality abatement equipment for equipment that burns fossil fuels.
- **Burn bio-diesel fuels in lieu of fossil fuels.**
- Substitute a ground-cooled heat exchanger for the cooling tower to eliminate biohazard from cooling water.
Expansion/Renovation

- An expansion or renovation may earn this credit by ensuring that any equipment added as part of the project meets the relevant standard, and by upgrading any existing equipment serving the expansion to comply with the relevant standard.
Materials & Resources Credits

MR Prerequisite 1: Storage & Collection of Recyclables Required

Intent
FacilitateTo facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills, and incinerators through reduction, reuse, recycling and composting.

Requirements
• Provide an easily accessible area or areas that serve the entire building and is dedicated to the collection and storage of materials for recycling in accordance with Section 6.5.3 (and Appendix) of the 2006 Guidelines for Design and Construction of Healthcare Facilities.
• Establish a collection system and controlled areas serving the portion of the building affected by the project dedicated to the separation, storage, and collection of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics, metals, batteries, fluorescent lamps (tube, compact fluorescent and HID) and captured mercury-containing products and devices*.
  * Applicable mercury-containing products and devices include but are not limited to lamps (such as linear fluorescent, pin-based compact fluorescent, integrally ballasted compact fluorescent, and HID) and dental wastes (such as scrap amalgam, chair side traps, and separator wastes).

Potential Technologies & Strategies
To facilitate space planning, develop a Waste Management Plan projecting the categories and volumes of waste. Designate an areas for recycling.
• The functional program should include the space requirements associated with the waste management plan, to include sufficient space in aisle ways to facilitate the movement of recyclables through the facility, and centralized recycling collection and storage spaces.
• Determine size of spaces based upon volume of projected waste and length of anticipated storage. At loading docks or other waste removal areas, include space for compactors and balers for recycling that are appropriately sized and located in a convenient area. Identify local waste handlers and buyers for glass, plastics, metals, office paper, newspaper, corrugated cardboard waste.
• Paper should include all HIPPA compliant paper as well as other paper products. Glass primarily involves food and beverage containers and not products required to be

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handled as biohazards. Metals should include segregation of both food and beverage containers and items collected in sharps containers. More information on assessing hospital waste streams for maximizing diversion to recycling is available from Hospitals for a Healthy Environment (www.h2e-online.org).

- Staging areas for sharps containers and recycling containers must be included to facilitate efficient operation of the recycling program.

- Secure storage should be provided for fluorescent lamps and batteries to minimize risk of mercury contamination. Captured mercury recycling space planning should account for all mercury-containing products and devices including dental wastes, such as scrap amalgam, chair-side traps, and separator wastes.

- Coordinate the size and functionality of the recycling areas with the anticipated collection services for glass, plastic, office paper, newspaper, cardboard, fluorescent lamps, batteries, and organic wastes to maximize the effectiveness of the dedicated areas. Instruct occupants on the recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes and collection bins at administrative and office areas, food service areas, and public areas. Other waste management strategies to further enhance the recycling program.

- Coordinate on-site processing and haul-away arrangements for collected recyclables with storage space and methods of containment to preserve protect facility and neighborhood health and safety.
MR Prerequisite 2: PBT Source Reduction: Mercury Required

Intent
Reduce mercury-containing building products and devices and mercury discharge through product substitution and capture.

Requirements
• Highlight Identify as part of the recycling collection system developed in the project’s Waste Management Plan (see compliance with MR Prerequisite 1):
  • the types of mercury containing products and devices that* to be collected,
  • criteria governing how they are to be handled by the recycling program, and
  • disposal methods for captured mercury. Include dental wastes, such as scrap amalgam, chair side traps, and separator wastes.
• In facilities delivering dental care, specify and install amalgam separation devices that meet or exceed the standard ISO-11143.
• Comply with the 2006 Guidelines for Design and Construction of Hospital and Healthcare Facilities requirement regarding mercury elimination (Section 1.3, 4.2 Mercury Elimination):
  • 4.2.1.1 New construction. In new construction, healthcare facilities shall not use mercury-containing equipment, including thermostats, switching devices, and other building system sources. (Excludes lamps)
  • 4.2.1.2 Renovation. For renovation, healthcare facilities shall develop a plan to phase out mercury-containing sources and upgrade current mercury-containing lamps to high efficiency, low or no-mercury or mercury free lamp technology.
• Do not specify or install preheat, T-9, T10 or T-12 fluorescents or mercury vapor High Intensity Discharge type high intensity discharge (HID) lamps in the project. Do not specify probe start metal halide HID lamps in interior spaces in the project.
• Specify Only specify and install all illuminated exit signs to meet the following criteria: that use light-emitting diode (LED) or light-emitting capacitor (LEC) lamps, Energy Star qualified and UL-certified—use less than 5 watts of electricity.

* Applicable mercury-containing products and devices include but are not limited to lamps (such as linear and circular fluorescents, integrally ballasted and non-integrally ballasted compact fluorescents and HIDs) and dental wastes (such as scrap amalgam, chair side traps, and separator wastes).
• Specify and install low-mercury fluorescent and high pressure sodium lamps according to that meet the following specifications:

**Fluorescent Lamp** | **Criteria**
--- | ---
T-8 Eight-foot T-8 (Standard and High Output) | Maximum 10 mg mercury
T-8 Four-foot T-8 (Standard and High Output or shorter) | Maximum 3.5 mg mercury
Three-foot T-8 U-Bent | Maximum 6 mg mercury
Two-foot T-8 S Linear | Maximum 6.5 mg mercury
U-Bent T-8 S Circular | Maximum 8.9 mg mercury
28-watt T-5 Compact fluorescent, non-integral ballast | Maximum 23.5 mg mercury
24-watt T5HO (High Output) | Maximum 2.5 mg mercury
54-watt T5HO (High Output) | Maximum 2.5 mg mercury
22-watt Circular T-5 | Maximum 9 mg mercury
Compact fluorescent lamps, integral ballast | Maximum 3.5 mg mercury

**High Pressure Sodium Lamp** | **Criteria**
--- | ---
50 Up to 400-watt HPS | Maximum 1810 mg mercury
70-150 Above 400-watt HPS | Maximum 1532 mg mercury
200-watt or greater HPS | Maximum 32 mg mercury

**Potential Technologies & Strategies**

• Establish a project goal for mercury-free materials, products and devices, and identify materials and suppliers to fulfill this goal. Consider digital measurement devices and controls, LED lamps and very low-mercury induction lamps.

• Mercury elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major healthcare systems and organizations. Refer to the listing of PBT policies in LEED for Healthcare MR Credit 4.

• Very low mercury induction lamps, with instant on–off control, offer reduced energy usage and long life.
- Recognize that all mercury-containing lamps can expose staff to mercury contamination due to breakage during installation and removal. Note that eight-foot and U-bent lamps may be particularly prone to breakage due to their size and configuration.

- LED lamps are a mercury-free alternative to low wattage fluorescent lamps.

- Account for all mercury-containing devices including dental wastes, such as scrap amalgam, chair-side traps, and separator wastes
MR Credit 1.1: Building Reuse: Maintain 40% of Existing Walls, Floors & Roof

1 Point - 3 Points

Intent

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

Requirements

Maintain at least 40% (based on surface area) of at least two (2) of the following:

- Existing building structure (including structural floor and slab-on-grade)
- Existing building structure roof decking
- Existing building and envelope (exterior skin and framing), excluding window assemblies and non-structural roofing material. The minimum percentage building reuse for each point threshold is as follows:

<table>
<thead>
<tr>
<th>% Building Reuse</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>55%</td>
<td>1</td>
</tr>
<tr>
<td>75%</td>
<td>2</td>
</tr>
<tr>
<td>95%</td>
<td>3</td>
</tr>
</tbody>
</table>

Hazardous materials that are remediated as a part of the project scope shall be excluded from the calculation of the percentage maintained.

Calculate the total area of existing exterior envelope and existing building structure to ensure that the credit goals have been met. Building materials demolished to create courtyards to increase daylighting may be counted as retained in calculations for this credit, provided that the new courtyards meet the requirements of EQ 8.2 Daylight & Views. If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building. This credit is not applicable.

Use only areas (sf) to calculate the quantity of preserved materials. The area to be used in the denominator is the sum of all new and reused floor or roof area, exterior envelope including the ground floor to account for slabs-on-grade and footings or the exterior wall area. The area to be used in the numerator is the sum of reused floor, roof or wall area.
Potential Technologies & Strategies

Consider reuse of existing, previously occupied buildings, including structure and building envelope elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

Consider increasing the building envelope thermal energy performance by 10% when assessing strategies to comply with Energy and Atmosphere Prerequisite 2, Minimum Energy Performance.
MR Credit 1.2: Building Reuse: Maintain 80% of Existing Walls, Floors & Roof

1 Point in addition to MR Credit 1.1

Intent

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

Maintain an additional 40% (80% total, based on surface area) of at least two (2) of the following:

- Existing building structure (including structural floor and slab-on-grade)
- Existing building structure roof decking
- Existing building envelope (exterior skin and framing).

Hazardous materials that are remediated as a part of the project scope shall be excluded from the calculation of the percentage maintained.

Calculate the total area of existing exterior envelope and existing building structure to ensure that the credit goals have been met. If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building.

Use only areas (sf) to calculate the quantity of preserved materials. The area to be used in the denominator is the sum of all new and reused floor or roof area, exterior envelope including the ground floor to account for slabs-on-grade and footings or the exterior wall area. The area to be used in the numerator is the sum of reused floor, roof or wall area.

Potential Technologies & Strategies

Consider reuse of existing, previously occupied buildings, including structure and building envelope elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

Think about increasing the building envelope thermal energy performance by 10% when reviewing the Energy and Atmosphere Minimum Energy Performance prerequisite 2.
**MR Credit 1.32:** Building Reuse: Maintain 50% of Interior Non-Structural Elements

1 Point

**Intent**

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

**Requirements**

*Reuse* existing interior non-structural elements *(interior walls, doors, floor coverings and ceiling systems)* in at least 50% (by area) of the *original* completed building for at least two *(including additions).* Hazardous materials that are remediated as a part of the following:

- **Interior walls**
- **Doors** *(calculated by each (EA) in lieu of surface area)*
- **Floor coverings** *(with project scope shall be excluded from* the exception that if carpeting is replaced with a different type of flooring material, you may discount this reused area by 100%)*
- **Ceiling systems**

*Calculate* the total and reused areas *(sf)* of each non-structural interior element in compliance with the credit goals, *percentage maintained.* If the project includes an addition to an existing building, *this credit is not applicable if the square footage of the addition that is more than 2 times the square footage of the existing building, this credit is not applicable.*

*Use only areas (sf) to calculate the quantity of preserved materials.* The area to be used in the denominator is the sum of all new and reused area. The area to be used in the numerator is the sum of reused area.

**Potential Technologies & Strategies**

Consider reuse of existing buildings, including *structure, envelope and* interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency, such as mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

*Consider recycling abandoned wiring—Aluminum and copper wiring are valuable recyclable commodities.*
**MR Credit 2.1: Construction Waste Management: Divert 50% From Disposal**

1-2 Points

**Intent**

*Divert* construction– and demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites. Redirect hazardous waste in compliance with federal and state regulations.

**Requirements**

Recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal in landfill or incineration and whether the materials will be sorted on-site or co-mingled. Excavated soil and land-clearing debris, and hazardous wastes do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout. Comply with all applicable state and federal regulations for hazardous waste disposal. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows:

<table>
<thead>
<tr>
<th>Recycled or Salvaged</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>1</td>
</tr>
<tr>
<td>75%</td>
<td>2</td>
</tr>
</tbody>
</table>

**Potential Technologies & Strategies**

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical board and tile, mineral fiber panel, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Construction debris processed into a recycled content commodity which has an open market value – e.g., Wood Derived Fuel (WDF), alternative daily cover material, etc. – may be applied to the construction waste calculation. Designate a specific area(s) on the construction site for segregated or co-mingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.
MR Credit 2.2: Construction Waste Management: Divert 75% From Disposal

1 Point in addition to MR Credit 2.1

Intent
Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites. Redirect hazardous waste in compliance with federal and state regulations.

Requirements
Recycle and/or salvage an additional 25% beyond MR Credit 2.1 (75% total) of non-hazardous construction and demolition debris. Excavated soil and land-clearing debris, and hazardous wastes do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout. Comply with all applicable state and federal regulations for hazardous waste disposal.

Potential Technologies & Strategies
Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical board and tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or co-mingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.
MR Credit 3.1-3.4: Sustainably Sourced Materials and Products 1-4 Points

Intent
Reduce To reduce the environmental burdens of materials and products acquired to construct buildings and to upgrade building services.

Requirements
One point (up to a maximum of four) will be awarded for each 10% of the total value of all building materials and products used in the project (on a dollar basis) that meet the following criteria (based on cost) that meet the criteria below. If concrete or steel structural elements are applied toward this credit, the project must include at least two other materials or products from CSI MasterFormat divisions other than 03 and 05 to attain the first point. Of the total recycled content, no more than 75% may be steel or concrete.

1. The dollar value cost of any individual material or product may be added for each of the following sustainability criteria which the material or product meets:

   • Contains at least 70% salvaged material. Salvaged, refurbished or reused materials.

   OR

   • Contains recycled content. There is no minimum threshold value for recycled content, but the material or product value is determined by multiplying the recycled content fraction of the assembly (based on weight) by the cost of the assembly. The recycled content fraction is the sum of all post-consumer recycled content plus one-half of the pre-consumer content. NOTE: The same material cannot contribute to both salvaged and recycled content values.

   OR

   • Contains at least 50% rapidly renewable Regionally sourced/manufactured materials.

   OR

   • Contains wood all of which is 100% certified in accordance with the Forest Stewardship Council’s (FSC) Principles and Criteria.

   OR

   • Contains at least 50% materials that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the project site.

   OR

   • Rapidly renewable materials. The rapidly renewable content value is determined by multiplying the rapidly renewable content fraction of the assembly (based on weight) by the cost of the assembly.
OR

• Wood certified, in accordance with the Forest Stewardship Council’s (FSC) Principles and Criteria. The certified wood content value is determined by multiplying the certified wood content fraction of the assembly (based on weight) by the cost of the assembly. Note – Only virgin wood stock shall contribute towards the certified wood criteria. Certified wood shall not contribute to the rapidly renewable criteria.

NOTE: All wood certification requirements will be updated to reflect the new criteria being put forth for member approval across all LEED rating systems

AND

2. Wall, ceiling and flooring systems & finishes, composite wood, agrifiber and fiberglass products, plus both exterior and interior adhesives, sealants, coatings, roofing, and waterproofing products must meet the relevant EQc4 requirements to contribute toward the credit.

AND

2—A minimum of four different materials or products must qualify per point taken (i.e., 4 materials or products for one point, 8 materials for two)

Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. Furniture is not included (see Credit 5.1-5.3).

Recycled content shall be defined in accordance with the International Organization of Standards document, ISO 14021-1999—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

• Post-consumer material is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.

• Pre-consumer material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Acceptable supplemental cementitious materials used as substitutes for Portland cement include:

• derived from coal fired power plant wastes shall not have mercury content >5.5ppb (0.0055 mg/L). Fly ash generated as a coal combustion by-product, compliant with ASTM C618, and only with documentation that the fly ash has verified mercury content ≤2ppb—and is not derived from coal burning plants fueled with hazardous waste. Fly ash as a by-product from by-product of municipal solid waste incinerators does not qualify as a recycled-content material for this credit.

• Ground granulated blast furnace slag as a by-product of pig iron production only with documentation that the plant was not co-fired with hazardous waste, or medical waste.

• Rice husk ash.

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Potential Technologies & Strategies

Identify opportunities to incorporate salvaged, reused, regional, rapidly renewable and FSC-certified wood materials into building design and research potential material suppliers.

Consider salvaged—a range of environmental, economic and performance attributes when selecting products and materials such as:

- Beams and posts
- Flooring
- Paneling
- Doors and frames
- Metal casework
- Brick
- Decorative items

During construction, ensure that the specified recycled-content materials are procured and installed and quantify the total percentage of recycled content those materials installed. Third party certification can be useful to assure validity of recycling and other sustainable source claims. While mechanical and electrical components are not included in this calculation, specification of products with recycled content is encouraged where available for electrical equipment, such as light fixture housings, electrical raceways and mechanical products such as air ducts, diffusers and return grilles.

Seek to incorporate products into the building design that not only have recycled content but are also recyclable, reusable or compostable at their end of life in the building.

- For rapidly renewable materials, seek materials from producers using low impact sustainable agricultural practices to avoid eutrophication, soil depletion, and use of toxic chemicals. Sustainable agriculture certifications for rapidly renewable materials include, but are not limited to:
  
  - Certified USDA Organic or equivalent state organic standard.
  
  - Grown using environmentally sustainable agriculture harvest methods certified through a program that meets the criteria of ISEAL Alliance full membership (e.g., IFOAM organically grown materials).
  
  - Offset through credits for the same crop type grown using environmentally sustainable agriculture harvest methods certified through a program that meets the criteria of ISEAL Alliance full membership (e.g., IATP Working Landscape Certificates).

Consider rapidly renewable materials such as:

- Bamboo flooring
- Wool carpet
- Straw and wheat board
- Sunflower seed board
- Cotton batt insulation and duct insulation
- Soy-based insulation
• Linoleum flooring
• Cork flooring
• Poplar OSB
• Plastics produced from bio-based materials

Consider also seeking FSC-certified wood for non-rented temporary construction applications such as bracing, concrete formwork and pedestrian barriers.

**MR Credit 4.1: PBT Source Reduction: Dioxins and Halogenated Compounds**

**1 Point**

**Intent**
Reduce the release of persistent bioaccumulative toxic chemicals (PBTs) associated with the life cycle of building materials.

**Requirements**

• Accomplish a minimum of three of the following five strategies:

  • Cement shall not be from kilns fired with hazardous waste.

  • Exterior and structural components (including, but not limited to, roof membranes, waterproofing membranes, window and door frames, siding) shall not be manufactured with added halogenated compounds.

  • Interior finishes (including, but not limited to, flooring (minimum of 50% of total floor area), base, ceiling tiles, wall coverings, and window treatments) shall not be manufactured with added halogenated compounds.

  • Piping, conduit and electrical boxes shall not be manufactured with added halogenated compounds.

  • Building-installed electrical cable and wire jacketing shall not be manufactured with added halogenated compounds.

• Due to the importance of indoor air quality in healthcare facilities, products must also meet the relevant EQc4 requirements to contribute toward the credit.

• Compounds that constitute less than five percent of the product by weight, are exempt from complying with the credit requirements, with the exception of halogenated flame retardants (HFRs), including, but not limited to, Polybrominated Diphenyl Ethers (PBDEs) which have no minimum threshold.

**Potential Technologies & Strategies**

• While compounds representing less than 5% of the product weight are not required to comply with the credit requirements (with the exception of HFRs), specification and
procurement of halogen-free minor parts is encouraged when meet or exceed performance requirements.

Consider materials free of added chlorine or other halogens in all applications when meet or exceed performance requirements. Options of materials with reduced PBTs include, but are not limited to, TPO, EPDM, and FPO for roof membranes; natural linoleum, rubber, or alternate polymers for flooring and surfacing; natural fibers, polyethylene, polyester and paint for wall covering; polyethylene for wiring; and wood, fiberglass, HDPE, and aluminum with thermal breaks for windows and copper, steel, concrete, clay, polypropylene and HDPE for piping. Cast iron pipe should be avoided based on air quality concerns associated with manufacturing practices (see TSAC PVC report).

Substitutions consistent with this credit are also encouraged in furniture. See MRe5.
**MR Credit 4.21**: PBT Source Reduction: Mercury Use in Equipment

**1 Point**

**Intent**
Reduce the release of persistent bioaccumulative and toxic chemicals (PBTs) associated with the life cycle of building materials.

**Requirements**
- In addition to the Credit Goals outlined in MR Prerequisite 2: PBT Source Reduction: Mercury, specify and install long lasting reduced mercury fluorescent lamps consistent with the following minimum criteria:

<table>
<thead>
<tr>
<th>Fluorescent Lamp</th>
<th>Minimum Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eight-foot T-8 (both Standard and High-Output)</td>
<td>1824,000 rated hours on instant start ballasts OR 24,000 rated hours on program start ballasts (3 hour starts)</td>
</tr>
<tr>
<td>Four Eight-foot T-8 (both Standard and High Output)</td>
<td>18,000 rated hours on instant start ballasts OR 24,000 rated hours on program start ballasts (3 hour starts)</td>
</tr>
<tr>
<td>Three Four-foot T-8 (both Standard and High Output)</td>
<td>1830,000 rated hours on instant start ballasts OR 2436,000 rated hours on program start ballasts (3 hour starts)</td>
</tr>
<tr>
<td>Two-foot and Three-foot T-8</td>
<td>1824,000 rated hours on instant start ballasts OR 24,000 rated hours on program start ballasts (3 hour starts)</td>
</tr>
<tr>
<td>U-Bent T-8</td>
<td>18,000 rated hours on instant start ballasts OR 24,000 rated hours on program start ballasts (3 hour starts)</td>
</tr>
<tr>
<td>28-watt T5 T-5 (both Standard and High Output)</td>
<td>2025,000 rated hours on program start ballasts</td>
</tr>
<tr>
<td>24-watt T5HO (High Output) Compact fluorescent lamps – non integral ballast</td>
<td>2012,000 rated hours on program start ballasts</td>
</tr>
<tr>
<td>Compact fluorescent lamps – integral ballast - bare bulb</td>
<td>10,000 rated hours</td>
</tr>
<tr>
<td>Compact fluorescent lamps – integral ballast – covered models such as globes, reflectors &amp; A-19s</td>
<td>8,000 rated hours</td>
</tr>
<tr>
<td>54-watt T5HO (High Output) Pressure Sodium Lamp</td>
<td>25,000 rated hours on program start ballasts Criteria</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Compact fluorescent lamps All HPS</td>
<td>Minimum 10,000 rated hours Use non cycling type or replace with LED lamps or induction lamps</td>
</tr>
</tbody>
</table>

*Note: Longer lamp life contributes to lower mercury use by reducing the frequency of lamp replacement.*

- Do not specify or install circular fluorescent lamps on the project.
- Do not specify or install standard (e.g., non-pulse probe start) metal halide lamps in interior spaces in the project.

**Potential Technologies & Strategies**

See MR Prerequisite 2 for Potential Technologies & Strategies and Credit Synergies.

- Establish a project goal for mercury-free products and devices and identify materials and suppliers to fulfill this goal. Consider digital measurement devices and controls, LED lamps and very low-mercury induction lamps.
**MR Credit 4.3c: PBT Source Reduction: Lead, Cadmium and Copper**

**12 Points**

**Intent**

Reduce To reduce the release of persistent bioaccumulative and toxic chemicals (PBTs) associated with the life cycle of building materials.

**Requirements**

- Specify substitutes for materials manufactured with lead and cadmium, as follow:
  - Specify and use 100% lead-free solder used to connect plumbing pipe on-site. Specify and flux used to connect plumbing pipe on-site for water intended for human consumption that meets the California AB1953 standard that solder must not contain more than 0.2% lead, and flux not more than a weighted average of 0.25% for wetted surfaces.
  - Specify and use pipes, pipe fittings, plumbing fittings and faucets for water intended for human consumption that meets the California AB1953 standard of a weighted average lead content of the wetted surface area of not more than 0.25% lead.
  - Specify and use lead-free roofing. Lead is typically found in terne and copper roofing and in roof flashing.
  - Specify and use 100% lead-free insulated jacketing of electrical wire and cable, with lead content <300ppm.
  - Specify no use of interior or exterior paints containing cadmium or lead. Green Seal certified paints or paints meeting Green Seal criteria exclude metals including cadmium, lead, mercury, antimony, and hexavalent chromium.
  - Lead used for radiation shielding is exempt from the requirements of this Credit.
  - For renovation projects, ensure the removal and appropriate disposal of disconnected wires with lead stabilizers, consistent with the 2002 National Electric Code requirements.
  - For copper pipe applications, reduce or eliminate joint related sources of copper corrosion:
    - use mechanically crimped copper joint system, or
    - specify that all solder joints are compliant with ASTM B828 and specify and use ASTM B813 flux.

**Note:** To comply with the intent of this credit, specify “100% lead free” products. The “lead free” label as defined by the U.S. EPA Safe Drinking Water Act (SDWA) ([http://www.epa.gov/safewater/sdwa/index.html](http://www.epa.gov/safewater/sdwa/index.html)), does not provide adequate screening for the purposes of this credit because these products may still contain lead. The SDWA defines “lead free” as:

- Solders and flux containing 0.2% lead or less.
• Pipes, pipe fittings, and well pumps containing 8% lead or less. To comply with the intent of this credit, specify “100% lead free” products.

• Lead used for radiation shielding and copper used for MRI shielding are exempt from the requirements of this Credit.

Potential Technologies & Strategies

• Establish a project goal for lead- and cadmium-free products and identify products and suppliers to fulfill this goal. Consider products such as silver and other lead-free solder, solderless copper connectors and polyethylene piping, aluminum flashing and Green Seal compliant paints. Note that it is understood that there may be small allowable use of cadmium in equipment beyond the knowledge and access of the designer, such as relay contacts.

• Consider lead-free alternate radiation shielding materials.

• Establish a project goal to eliminate use of exterior copper building products at the project’s inception, particularly if the run-off from the building site flows into a sensitive aquatic zone.
MR Credit 5: Furniture & Medical Furnishings

1 Point - 2 Points

Intent

To enhance the environmental and human health performance attributes associated with freestanding furniture and medical furnishings products through their life cycle.

Requirements

One point will be awarded for 30% of the total value of all freestanding furniture and medical furnishings (including mattresses, foams, panel fabrics, cubicle curtains and other textiles) used in the project (based on a dollar basis that cost) must meet the following criteria in 1, 2 or of the 3 options below. Teams are encouraged to attain an innovation score for exemplary performance on this credit.

The minimum percentage for each point for exemplary performance in this credit is as follows:

<table>
<thead>
<tr>
<th>Percentage of Total Material</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>1</td>
</tr>
<tr>
<td>40%</td>
<td>2</td>
</tr>
</tbody>
</table>

- Built-in casework and built-in millwork items must be included in the base building calculations, even if manufactured offsite. The dollar value of any individual product may be included towards the 30% total qualifying value if the product meets one of the following chemical of concern criteria:

1. The product does not contain more than one of any of the following chemicals or materials at more than 100 parts per million in 3 options.

**OPTION 1**

All components of a furniture components or medical furnishing assembly (including textiles, finishes and dyes) must contain less than 100 parts per million (ppm) of at least 4 of the following chemicals:

- Urea formaldehyde
- Heavy metals including mercury, cadmium, lead, antimony
- Hexavalent chromium in plated finishes (consistent with EU RoHS (Restriction of the Use of Certain Hazardous Substances of the European Union) Directive.

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13 Furniture is defined as any fixtures, such as shelving, tables, storage units, chairs, desks or cabinets, purchased as a free standing or modular unit, regardless of where the assembly takes place.
Halogenated compounds (chlorinated and fluorinated plastics and halogenated flame retardants as listed in MR Credit 4).

- Stain and non stick treatments utilizing derived from perfluorinated compounds (PFCs), including PFOA.

- Antimicrobial Halogenated or nanosilver antimicrobial treatments.

- Only furniture Halogenated or nanosilver antimicrobial components that constitute more than five percent of the product by weight are required to comply with the credit requirements this option.

OR

OPTION 2—The product contains no more

All components of a furniture or medical furnishing assembly (including textiles, finishes and dyes) must contain less than two of the six above-listed categories 100 parts per million (ppm) of at least 2 of the 5 chemicals of materials listed in Option 1 AND meets the product must meet or exceed the indoor air quality requirements of California’s Special Environmental Requirements, Specifications Section 01350, updated with California DHS Standard Practice CA/DHS/EHLB/R-174 as determined by independent laboratory testing and using the standard office building furniture protocol parameters. The following programs currently utilize 01350 requirements for compliance for furniture:

- Scientific Certification Systems (SCS) Indoor Advantage Gold Environmental Certification Program

3. Greenguard Product Emission Standard for Children & Schools

OPTION 3.

All components of a furniture or medical furnishing assembly (including textiles, finishes and dyes) must meet the Sustainably Sourced materials criteria (salvaged, recycled, rapidly renewable, FSC certified wood, local manufacture) See of LEED for Healthcare MRc3 for more details to achieve this portion of the credit. MR Credit 3: Sustainably Sourced Materials and Products. (Note: Furniture and Medical Furnishings do not contribute to MRc3.)

Potential Technologies & Strategies

- All new furniture is not necessarily “new”. Identify opportunities to salvage and reuse furniture and medical furnishings from existing inventory into project design and research potential used material suppliers. Consider salvaging and reusing systems furniture and furnishings such as used or refurbished furniture resources into project design, including, case pieces, seating, filing systems, medical furnishings such as exam tables, stools, carts, etc and decorative lighting and accessories. Also consider specifying and purchasing strategies that identifies new furnishings for purchase during design & construction to be usable in the existing facility and later relocated to the new facility.

- Furniture dealers are sources for reused furniture and furniture recycling programs at the local and regional levels. This helps save energy and other resources and manufacturing
and transportation-related emissions by reducing reshipping impacts and creation of new product using virgin material.

- Textiles used in upholstery, backing or barrier cloths, panel fabrics and window textiles are available with dyes free of added heavy metals.
- Specify furniture from manufacturers that offer FSC-certified wood products, with an emphasis on regionally supplied products that can contribute to achieving this goal.
MR Credit 6: Resource Use: Design for Flexibility

1 Point

Intent

Conserve To conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation, and service life of constituent components and assemblies.

Requirements

Increase building flexibility and ease of adaptive reuse over the life of the structure by employing a minimum of three (3) of the following design and/or space planning strategies:

- Use of interstitial space serving for a minimum 20% of project diagnostic & treatment or other clinical floor area (calculation based on Departmental Gross Square Foot (DGSF). Provide 'zoned' service. Design distribution systems for electrical, information technology (IT), communication, medical gases, and sprinklers with the capability to control multiple zones in all clinical spaces. (Inpatient units are included in this calculation.)

- Provide programmed 'soft space' (such as administration/storage) equal to a minimum of 5% of total clinical space. Locate 'soft space' adjacent to clinical departments that anticipate growth. Determine strategy for future accommodation of displaced 'soft space' (calculation based on project DGSF).

- Provide 'shelled space' equal to a minimum of 5% of total project departmental clinical space; locate where it can be occupied without displacing occupied space (calculation based on project DGSF).

- Identify horizontal expansion capacity equal to a minimum of 30% of for diagnostic and treatment or other clinical space accessible equal to a minimum of 30% of existing gross square footage (excluding inpatient units) without demolition of occupied space (other than at the connection point of future expansion). Reconfiguration of additional existing occupied space that has been constructed with movable partition systems is permitted. (Calculation based on project DGSF. Inpatient units are excluded.) Design for future vertical expansion on a minimum of 75% of the roof, ensuring minimal disruption to that existing operations and service systems will be able to operate at or near capacity during the expansion.

- Designate location(s) for future above-grade parking structure(s) equal to 50% of existing on-grade parking capacity, with direct access to the main hospital lobby/circulation/vertical transportation pathways.

- Use movable walls for 50% of applicable areas as a strategy for future flexibility.

- Use movable/modular casework for a minimum of 50% of casework and custom millwork. (Calculation is based upon the combined value of the two elements, as determined by the Cost Estimator or Constructor/Contractor.)
Definitions

Interstitial space: An intermediate space located between floors, often used to run mechanical equipment, wiring, and other support services to the occupied floors above and/or below.

Soft space: A lightly programmed area that can be easily displaced to allow a neighboring area (such as a clinical department) opportunity to expand.

Shell space: An area designed to be fitted out for future expansion. Shell spaces are enclosed by the exterior building shell, but otherwise left unfinished.

Potential Technologies & Strategies

Flexible Consider strategies such as flexible, adaptable and modular generic spaces—increase building longevity. Strategies for achieving this include:

- Right size the space program, insuring that space assignments are optimized through considering multiple uses for individual spaces, alternative office (whereby unassigned, flexible workstations are shared by multiple users), and universal and dimensional sizing (standardized room or workstation sizing).

- Dimensional planning to recognize aligned with standard material sizes—wherever possible, design rooms using 2 foot incremental dimensions. An 8' x 12' room creates less waste than a 7'6" x 11'4" dimension.

  - On large scale projects, consider repetitive design elements—Using repetitive dimensions throughout the design of the project facilitates cutting in large batches in a single location, which in turn facilitates recycling and efficient disposal of cutoffs.

- Future adaptability, including ample floor-to-floor heights, raised floor distribution systems or interstitial space to allow for ease of ability to accommodate future modifications, implementation of undifferentiated “technology floors” to accommodate surgical, cardiology and radiological procedures in equally sized and adaptable planning modules.

- Locating locating shell or soft-space soft space adjacent to major clinical areas (such as radiology, surgery, etc) allows for ease of expansion rather than early obsolescence. Determine which programs are likely to require such expansion and locate shell or soft space to permit this needed expansion without major disruption or reconfiguration of existing operational space.

- Consider easy to disassemble or reconfigurable building systems and components that can be removed and reused in future reconfigurations or may be salvaged for future renovations.

- Plan using screws and bolts vs. nails and adhesives; corridor systems and exit stairways to support future building additions such that demolition of occupied space will not be required. Strategies encourage buildings with smaller footprints, include exit stairs to have the dual purpose of providing vertical circulation and minimize elevator use and avoid exiting tunnels. This will cause less disruption during future construction as well as reduce waste from demolition.
- Adopt related debris; acuity adaptable and universal patient room concepts to both enhance patient care quality and reduce the probability of need for future change rooms.

- Ease of installation and deconstruction, including modular, demountable building systems that can be relocated, reused, or salvaged in the future. Detailing for easy disassembly by using screws and bolts in place of nails and adhesives will reduce future renovation costs.

- Employ design strategies to reduce the use of materials, such as exposed ceilings, sealed concrete floors, and exposed structural framework. (EPA may reconsider the standard that bans the use of mercury-containing fly ash. This may affect the use of coal fly ash as a green material in concrete.)
Environmental Quality Credits

EQ Prerequisite 1: Minimum IAQ Performance Required

Intent
Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

Requirements
Meet the minimum requirements of Sections 4-7 of ASHRAE 62.1-2004, for Acceptable Indoor Air Quality. Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent of Health Care Facilities (with errata but without addenda*).

AND
CASE 1: MECHANICALLY VENTILATED SPACES
Mechanical ventilation systems shall be designed using the ventilation rates in Section 7 of the standard, the requirements of the 2006 Guidelines for Design and Construction of Healthcare Facilities Table 2.1-2, or the applicable local code, whichever is more stringent.

CASE 2: NATURALLY VENTILATED SPACES
Naturally ventilated buildings shall comply with ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality, paragraph 5.1-1 (with errata but without addenda*).

Potential Technologies & Strategies
Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant health. Use the ASHRAE 62 Users Manual for detailed guidance on meeting the referenced requirements.

*Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at the project team’s discretion. Addenda must be applied consistently across all LEED credits.
EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control Required

Intent

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

Requirements

OPTION 1

- Prohibit smoking in the building.
- Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and bus stops, qualifying places of respite, operable windows.

OR

OPTION 2

- Prohibit smoking in and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building except... Provide signage to allow smoking in designated areas, prohibit smoking in designated smoking areas, or prohibit smoking on the entire property.
- Designated smoking areas may not be located in or proximate to places of respite used to meet the requirements of SS Credit 9.1.

OR

OPTION 2

For residential health care occupancies only where accommodation for resident smoking is programmatically mandated:

- Prohibit smoking in resident rooms and all common areas of the building.
- Locate any exterior designated smoking areas including balconies where smoking is permitted, at least 25 feet away from entries, outdoor air intakes and bus stops, operable windows.
- Locate and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building. Provide signage to either allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.
- All exterior doors and operable windows in the residential units shall be gasketed to minimize leakage from outdoors.
- Provide designated smoking rooms as mandated by the functional program designed to effectively contain, capture and remove ETS from the building. At a minimum, the
smoking room must be directly exhausted to the outdoors, away from air intakes and building entry paths, with no re-circulation of ETS-containing air to the non-smoking area of the building areas, and enclosed with impermeable–sealed deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure differential with respect to the adjacent surrounding spaces of at least an average of 5 Pascals (Pa) (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge) when the door(s) to the smoking room are closed.

- Performance Verify performance of the smoking room(s) differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The conduct the testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces room(s) (with the smoking rooms’ doors closed doors) to the adjacent spaces.

OR

OPTION 3 (For residential buildings only)

- Prohibit smoking in all common areas of the building.
- Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas.
- Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units.
- All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.
- If the common hallways are pressurized with respect to the residential units then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2 above, considering the residential unit as the smoking room. Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization, AND use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California’s 2001 Energy Efficiency Standards (www.energy.ca.gov/title24/residential_manual). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling and floor areas).

Potential Technologies & Strategies

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Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas, design building envelope and systems to minimize ETS transfer among dwelling units.
EQ Prerequisite 3: Hazardous Material Removal or Encapsulation (Major - Renovations Only)

Required

Intent
Reduce To reduce building occupants’ potential exposure to hazardous materials such as asbestos, mercury, lead and mold in existing buildings undergoing renovation.

Requirements
- Have in place Develop and implement a hazardous material management program, for the construction and pre-occupancy phases of the building.
- Identify the applicable local, state, and federal regulatory requirements.
- Obtain survey records that identify where hazardous material is located in the building and on the site so that the material(s) present can be addressed appropriately in the ongoing hazardous material management program. If the existing survey records do not cover all areas of the building, conduct a survey to identify where hazardous materials are present in the remaining areas of the building. Include a plan for capture of historical mercury sources in demolition plans including, but not limited to, piping infrastructure. Collection of any mercury devices shall be designated for recycling and preclude overseas donation/disposal.
- Provide contract Contract must include requirements for reporting and investigating suspect mold encountered in demolition. Identify and remedy the source of water and/or moisture to prevent future mold development.
- Remediate contaminated surfaces by removing and disposing of contaminated materials in accordance with recognized procedures performed by licensed abatement contractors to protect workers, building occupants and the public.
- To address mold and mildew conditions, identify and remedy the source of water and/or moisture penetration. Use lead containment methodologies to prevent release into the air to protect people and prevent soil contamination.
- Ensure the removal and appropriate disposal of disconnected wires with lead stabilizers.
- Obtain a letter from the licensed abatement contractor stating that all hazardous materials within the affected demolition or renovation areas have been removed or encapsulated, and that all sources of mold/mildew have been identified and remedied. Provide a certified letter of destruction to the owner for record.

Potential Technologies & Strategies
Review the current hazardous material removal management program and prepare a description of the program that identifies the applicable regulatory requirements and explains how the program will address asbestos remaining in the building on an ongoing basis.

Review hazardous material removal work done in the building and on the building site and use this data to prepare the history-based component of the hazardous material survey, collecting the available information on: (1) where hazardous material has been removed, (2) where hazardous material remains and (3) how the remaining hazardous material is being addressed.

Update this survey with current information by: (1) sampling additional likely locations in building and on the site for hazardous material and (2) testing samples to see if hazardous material is present. If the survey identifies any new locations with hazardous material, add these to the description of how the hazardous material removal management program is addressing hazardous material remaining in the building on an ongoing basis.

Separate sheet lead, lead lined gypsum board products, lead-lined doors, frames or glazing products for reuse, salvage or reprocessing.

Specify and install materials that are inherently mold and mildew resistant.

Mercury elimination and recovery is a requirement as described in the AIA Guidelines for Design and Construction of Healthcare Facilities Section 1.3 Paragraph 4.2. Decontamination of biological pathogens should also be addressed if required.
EQ Credit 1: Outdoor Air Delivery Monitoring
1 Point

Intent
Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being.

Requirements
Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions (either airflow value or CO2 level) vary by 10% or more from the value expected at design minimum outdoor air rate conditions, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

CASE 1 – FOR MECHANICALLY VENTILATED SPACES

- Monitor carbon dioxide concentrations within all densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 sq.ft.). CO2 monitoring locations shall be between 3 feet and 6 feet above the floor.

- For each mechanical ventilation system serving non-densely occupied spaces, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of plus or minus 5% of the design minimum outdoor air rate as defined by ASHRAE 170-2008 (with errata but without addenda*) for mechanical ventilation systems where 20% or more of the design supply airflow serves non-densely occupied spaces. Note: CO2 monitoring is required in densely occupied spaces, in addition to outdoor air intake flow measurement.

CASE 2 – FOR NATURALLY VENTILATED SPACES

- Monitor CO2 concentrations within all naturally ventilated interior spaces. CO2 monitoring shall be located within the room between 3 feet and 6 feet above the floor. One CO2 sensor may be used to represent multiple non-densely occupied spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.

Potential Technologies & Strategies
Install carbon dioxide and airflow measurement equipment and feed the information to the HVAC system and/or Building Automation System (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the
measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.
EQ Credit 2: Acoustic Environment: **Exterior Noise, Acoustical Finishes & Room Noise Levels**

1-2 Points

**Intent**

*Provide* To provide building occupants with an indoor healing environment free of intrusive or disruptive levels of sound.

**Requirements**

*The* [Follow the intent of the Health Information Insurance Portability and Accountability Act (HIPAA)](https://www.hhs.gov/hipaa/index.html) *mandates that all individually identifiable health information communicated orally is kept private.* The intent set out in the HIPAA guidelines should be followed, providing adequate speech privacy to patients.

Design the facility’s acoustic environment in accordance with [facility to meet or exceed](https://www.fgi.org/) the following [four sections of the 2006 AIA/AHA Draft Interim sound and vibration criteria in the 2010 Facilities Guideline Institute Guidelines for the Design and Construction of Health Care Facilities (2010 FGI Guidelines) and in the](https://www.fgi.org/) [Sound and Vibration Design Guidelines for Hospital and Healthcare](https://www.fgi.org/) [Health Care Facilities, Public Draft 2.0, January 1, 2010 (SV Guidelines)].

**OPTION 1 (1 point)**

4. **Sound Isolation** Speech Privacy Goal: Adequate

Design sound isolation will result in to achieve speech privacy, acoustic comfort, and a reduction in noise-produced minimal annoyance. Sound from noise-producing sources. Adequate sound isolation between hospital occupants and noise sources is healthcare facility spaces is achieved when the sound level difference between levels at both the source and receiver spaces, and adjusted for locations the background sound at the receiver's location, receiver locations, and the occupant’s acoustical privacy and comfort needs are considered.

- Design the facility to meet the criteria of Table 4-3 Speech Privacy goals for Enclosed Rooms and Table 4-4 Speech Privacy Goals for Open Plan Spaces. [Design sound isolation between spaces in accordance with Table 4-1, Recommended 2010 FGI Guidelines Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms and the Design Criteria for Speech Privacy for Enclosed Rooms.](https://www.fgi.org/) In the submission, show the acoustic basis of design analysis referenced to the contract documents Room and Open-Plan Spaces.

- During Acoustical Commissioning, test privacy. Measure or calculate sound isolation values achieved in representative adjacencies as necessary to confirm compliance with criteria. [Measurement procedures are as identified in Sections 4.4 & 4.5 of the 2010 FGI Guidelines](https://www.fgi.org/).

**Room Noise Levels:**

LEED for Healthcare Rating System Draft for 2nd PC
5. Consider background sound levels generated by all building mechanical-electrical-plumbing systems, air distribution systems and other hospital facility noise sources (MRI equipment, elevators, etc.)

- Design the facility to meet the requirements of Table 3-1, Recommended 2010 FGI Guidelines Minimum-Maximum Design Criteria for Noise in Interior Spaces.

- Measure or calculate sound levels in representative rooms of each type as necessary to confirm compliance with criteria. Measure sound levels in accordance with applicable ANSI in the ASHRAE 2003 Handbook, Chapter 47, Sound and ASTM standard(s). Vibration Control, Table 34, using a sound level meter that conforms to ANSI S1.4 for type 1 precision sound measurement instrumentation.

OPTION 2 (1 point 2 points)

- Achieve Option 1 and

Acoustical Finishes and Detail: Design the facility by selecting and specifying

- Specify materials, products, mechanical systems installation details and other design features to meet the 2010 FGI Guidelines criteria for sound and vibration, and to meet or exceed absorption.

- During Acoustical Commissioning test and measure the average sound absorption coefficient through the measurement of the reverberation time (RT) generally in accordance with the current edition of ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method. Test occupied Calculate the room average sound absorption coefficients shown in Table 2.3.1.

In the design process, select room finishes using room sound absorption coefficients as listed in Table 2-1 and Table 2-2 (or other similar laboratory data for the materials considered) as guidance towards meeting the requirements of Table 2.3-1. In the submission, show the acoustic basis of design analysis referenced to the contract documents.

OR

- During Acoustical Commissioning test and measure the average sound absorption coefficient through the measurement of the reverberation time (RT) generally in accordance with the current edition of ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method. Test occupied Test representative unoccupied rooms of each type (see Table 2.3-1) in the building as necessary to confirm compliance with criteria.

- Minimize the Impact of Site Exterior Noise

- Minimize the impact of site exterior noise on the Building Occupants and on the Surrounding Community: For exterior noise exposure, taking into account the effect of sources, including road traffic, aircraft flyovers, railroads, on-site heliports, emergency power generators during maintenance testing, outdoor mechanical equipment, and building services, equipment, etc.
to comply with Section 1.4 Classification of Facility Produced Noise Exposure - of the 2010 FGI Guidelines (see SV Guidelines).

- Measure and collect analyze data to determine the 2010 FGI Guidelines Exterior Site Noise Exposure Category (A, B, C, or D - Table 1.3-1: Categorization of hospital sites by exterior ambient sound - see SV Guidelines).

- Design the building envelope composite STC rating based on Table A.1.3-2 to meet the design goals in Table 1.4 of the 2010 FGI Guidelines for the Exterior Site Exposure Category that applies. In the submission, show the acoustic basis of design analysis referenced to the contract documents.

- During Acoustical Commissioning, test and measure For Exterior Site Exposure Categories A, B, C or D, measure or calculate the exterior building envelope sound isolation performance using methods generally conforming to the current edition of ASTM E966 Standard Guide for Field Measurements of Airborne Sound Insulation of Building Façades and Façade Elements. Conduct tests for occupied representative exterior rooms of each façade type and condition as necessary to confirm compliance with the provisions of Table 1.3-1. — Testing of façade noise reduction of buildings in Category A sites is not required.

Potential Technologies & Strategies

- In inpatient floor planning, avoid locating Retain consulting expertise to evaluate needs and make recommendations on the efficient incorporation of 2010 FGI Guidelines acoustical requirements into facility design.

- Prior to under taking any acoustical testing after construction, prepare a test plan that addresses all applicable requirements for these EQ points.

- Plan patient rooms adjacent to elevators, stairwells, and visitor/away from noisy exterior exposures, public spaces.

- Acoustically isolate or other interior areas to acoustically buffer patient rooms from each and other spaces. Where increased sound isolation between the patient rooms and corridors does not interfere with clinical operation, install gasketed doors. Glass doors and/or vision panels provide both visual supervision and sound isolation.

- Enclose nursing and chart stations in IPU areas.

- Locate televisions in public and staff areas only where there is adequate space for patients and staff to be out of hearing range if they so choose. Provide headsets and/or pillow speakers for televisions and radios located in semi-private rooms or other locations where sound can carry to other patients.

- Specify Consider specifying and installing ceiling tiles with Ceiling Attenuation Class (CAC) ratings of 35 or greater for spaces with noisy plenum equipment - or walls that. If partitions stop short of the deck - Walls, use ceiling tile systems having a minimum CAC rating of 45. Partitions should penetrate make minimum penetrations of ceiling plane as a minimum (i.e. not terminate at the suspended ceiling).
• Specify and install flooring products to reduce footfall impact and cart rolling noise.

• Use sound-absorbing finish materials in waiting areas and other public spaces.

• In open-bay treatment areas, such as Emergency Departments or Recovery rooms, select ceiling products with an NRC of 0.65 or higher.

• At nurse stations and open staff areas, carefully integrate sound-absorbing elements (ceilings, furniture systems, etc.) to reduce noise.

• Enclose nursing and chart stations in IPU areas.

• Isolate vibration-generating equipment from the building structure in accordance with the Sound and Vibration Chapter of the current ASHRAE Applications Handbook.

• Locate noise-generating mechanical and electrical equipment away from patient and staff areas, and from neighboring residential communities.

• Consider specifying and installing wireless intercom systems worn by staff wherever possible or carefully designed distributed loudspeaker paging systems (e.g., closely spaced loudspeakers) that may be operated at low volume levels while still achieving adequate intelligibility.

• Implement noise control protocols. This is particularly important in Neonatal Intensive Care Units.

• Install Consider specifying and installing noise level sensor systems, which provide visual feedback when acoustic thresholds are exceeded.
EQ Credit 3.1: Environmental Quality Management Plan (EQMP): During Construction
1 Point

Intent
Implement site management practices during construction to minimize adverse impacts. Reduce To reduce air quality problems, noise and vibration resulting from the construction and/or renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

Requirements
Develop and implement an Environmental Quality Management Plan (EQMP) for the construction and pre-occupancy phases of the building. Minimize air and noise pollution from during the construction process as prescribed below.

For major renovations, additions adjacent to occupied facilities or phased occupancy in new construction:

- Follow the 2006 Guidelines for Design and Construction of Healthcare Facilities and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) to establish an integrated Infection Control Team comprised of the Owner, Designer and Contractor to evaluate infection control risk and document the required precautions in a project-specific plan. Utilize the Infection Control Risk Assessment (ICRA) standard published by ASHE and the CDC as a guideline for construction activities to assess the risk and to select mitigation procedures. This will apply to renovation projects and new construction projects where occupancy of the building is phased in during the construction process.

- Mold and Mildew – Prepare a written program to guide actions to prevent mold and mildew growth. Protect stored on-site or Utilize the Infection Control Risk Assessment (ICRA) standard published by the American Society of Healthcare Engineering (ASHE) and the U.S. Centers for Disease Control and Prevention (CDC) as a guideline for construction activities to assess risk and to select mitigation procedures.

For all projects:

- Develop and implement a moisture control plan to address measures that will maintain dry conditions to protect stored on-site and installed absorptive materials from moisture damage. Immediately remove from site and properly dispose of any materials with stains, mold, mildew or other evidence of water damage susceptible to microbial growth and replace with new, undamaged materials. Also include strategies for protecting the building from moisture intrusion and occupant exposures to dangerous mold spores.
• If permanently installed air handlers are used during construction, **use filtration**:
  - **Filtration** media on those air handlers with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE 52.2. **Protect-1999 (with errata but without addenda*)**.
  - **Active** outdoor air intakes and return air grilles with filtration media—**Replace all filtration must be protected**.
  - **Temporary filter** media must be evaluated and replaced as necessary.
  - All filtration media must be replaced immediately prior to occupancy.

• VOC Absorption – Schedule construction procedures to minimize exposure of absorbent materials to VOC (volatile organic compound) emissions. Complete “wet” construction procedures such as painting and sealing before storing or installing “dry” absorbent materials such as carpet or ceiling tiles. These materials accumulate pollutants and release them over time. Store fuels, solvents and other sources of VOCs separately from absorbent materials.

• **Tobacco Products** – Prohibit the use of tobacco products inside the building and within 50 feet (or greater if local jurisdiction requires it) of the building entrance during construction.

• Noise and Vibration Exposure to Occupants and Construction Crews – Develop a plan based upon the British Standard BS 5228 to reduce noise emissions and vibrations from construction equipment and other non-road engines by specifying low noise emission design or the lowest decibel level available that meets performance requirements in the British Standard to ensure it is within acceptable limits to the occupants. Construction crews must wear ear protection in areas where sounds levels exceed 85 dB for extended time periods.

**Potential Technologies & Strategies**

Adopt an **Environmental Quality Management Plan** utilizing an **Infection Control Risk Assessment (ICRA)** standard to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorbptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard. Coordinate with Environmental Quality Credits EQ 3.2 and EQ 5.2 to determine the appropriate specifications and schedules for filtration media.

Where indicated by the Infection Control Risk Assessment, prepare temporary ventilation and exhaust systems to maintain a negative pressure relationship in the construction area relative to the adjacent space. Maintain containment areas (negative air pressure) with the use of negative air machines ducted to outside of the building that is under construction. Use air-pressure monitors (i.e., magnahelic gauges) connected to an audible or visual alarm that notifies the construction area when negative pressure has not been maintained. Reduce the amount of supply air to the construction area (if construction is adjacent to an occupied area or building) to
help facilitate this negative pressure area. Seal off windows and building envelope locations separating patients adjacent to the construction area that may be susceptible to the suction created by negative air machines in the construction zone to prevent possible particulate exposure.

If possible, avoid using permanently installed air handlers for temporary heating/cooling during construction. Use the Environmental Protection Agency (EPA) as a reference for VOC compliance as relates to sequencing of installation of wet and dry materials. Also use California Department of Health Services (CA DHS) for VOC reduction.

Consult the LEED for Healthcare Reference Guide for more detailed information on how to ensure the well-being of construction workers and building occupants if permanently installed air handlers must be used during construction.

In addition to protecting nearby patients by utilizing negative air machines, construction crews and the overall building “cleanliness” will also benefit by having the negative air machines vented to the outside atmosphere to extract floating dust or particulate matter even if negative air is not required. This reduces the amount of exposure to the construction crews by constantly “vacuuming” or cleaning the air which will effectively reduce the air of materials that have adverse health impacts. Maintain indoor air quality meeting the National Institute for Occupational Safety and Health (NIOSH) standards for worker exposures.

Provide effective dust control. When existing ventilation systems serving occupied areas are to be modified, the designer shall evaluate the changes and provide guidance to the contractor to avoid disturbing pressure relationships in the occupied areas of the building during the modifications. Survey existing ventilation systems to determine the extent of dust accumulation and include requirements for proper duct cleaning when the survey indicates a need. Use water sprinkling to control dust generation outside.

Consider outdoor vectors like mosquitoes and rodents that increase infection risk and degrade ambient air quality and implement effective mitigation measures using integrated pest management (IPM) strategies.

Install full height (floor to deck) partitions to contain dust, fumes and odors generated during construction (e.g., demolition, cutting/sawing, grinding, painting, epoxy flooring, adhesive and coating applications) and an Ante Room for secondary air containment and wipe down and changing area if recommended by the ICRA process in occupied buildings.

Wear “bootsies” within the construction area if access is through an occupied building and utilize floor “tacky” mats just outside construction areas to trap particles from shoes after booty removal and wheeled items like covered and taped debris carts leaving the construction zone.

Frequently wet mop floors outside of construction area that are being used for access to the construction area to prevent particle disturbance if recommended by the ICRA process in existing buildings.

Vacuum and disinfect the bottom metal stud tracks prior to second-side drywall installation to remove construction dust and debris.

When construction requires working above existing ceilings in occupied areas or corridors, confirm that a ceiling access permit has been issued if required by the facility. The facility may require the installation of a pre-fabricated plastic partition, “zip wall” or similar for this work taking place outside the construction area.
Utilize rotary sanders with vacuum and/or HEPA vacuum attachments during sanding processes such as taping and floating process to reduce particulate generation.

Reduce air emissions from construction equipment and other non-road diesel engines by utilizing low-sulfur diesel fuel or biodiesel, or converting to natural gas powered or electric engines.

Limit space relative humidity to 60% or less after the absorptive finish materials have been installed.

A complete guide to preventing mold and reducing the probability of it recurring can per the GREENGUARD for Building Construction Program which offers comprehensive steps for preventing mold during the design, construction and operation phases of the project, including principles and best practices that serve as valuable resources.

A complete guide to preventing mold and reducing the probability of it recurring can be found in the EPA’s Mold Remediation in Schools and Commercial Buildings, EPA reference number 402-K-01-001. The GREENGUARD Environmental Institute offers its GREENGUARD Mold Protection Program™. These documents contain a comprehensive overview of the principles and practices stated here and serve as valuable resources in constructing commissioning plans and operation and maintenance guides.
**EQ Credit 3.2: Indoor Air Quality (IAQ) Management Plan: Before Occupancy**

**1 Point**

**Intent**
Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

**Requirements**
Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre- and implement after installation of all finishes, furnishings, completion of building cleaning, and before occupancy phase as follows:

OPTION 1 — Flush-Out

- After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

  OR

  If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

  **Note:** All finishes and furnishings must be installed prior to flush out.

OR

OPTION 2 — Air Testing

- Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the Reference Guide.

- Demonstrate that the contaminant maximum concentrations listed below are not exceeded.
<table>
<thead>
<tr>
<th>CONTAMINANT</th>
<th>MAXIMUM CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formaldehyde</td>
<td>27 parts 20 micrograms per billion cubic meter</td>
</tr>
<tr>
<td>Particulates (PM10)</td>
<td>50 parts 20 micrograms per cubic meter</td>
</tr>
<tr>
<td>Total Volatile Organic Compounds (TVOC)</td>
<td>500 parts 200 micrograms per cubic meter</td>
</tr>
<tr>
<td>* 4-Phenylcyclohexene (4-PCH)</td>
<td>6.5 parts 3 micrograms per cubic meter</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>9 parts per million and no greater than 2 parts per million above outdoor levels</td>
</tr>
</tbody>
</table>

- * This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.
- For each sampling point where the maximum concentration limits are exceeded conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.
- The air sample testing shall be conducted as follows:
  1) All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
  2) The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
  3) The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
  4) Air samples shall be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

**Potential Technologies & Strategies**

Prior to occupancy, perform a building flush-out or test the air contaminant levels in the building. The flush-out is often used where occupancy is not required immediately upon substantial completion of construction. IAQ testing can minimize schedule impacts but may be more costly. Coordinate with Indoor Environmental Quality Credits 3.1 and 5 to determine the appropriate specifications and schedules for filtration media.
For additional chemical testing criteria that is not required as part of this credit, you may reference nationally recognized lists or regional lists such as the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Levels (CREL), the Occupational Safety and Health Administration – (OSHA) Permissible Exposure Limits (PEL) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV).

The intent of this credit is to eliminate indoor air quality problems that occur as a result of construction. Architectural finishes used in tenant build-outs constitute a significant source of air pollutants, and must be addressed in order to qualify for this credit.
EQ Credit 4: Low-Emitting Materials

1-4 Points

Intent

Reduce To reduce the quantity of air contaminants that are odorous, irritating and/or harmful to the health, comfort and well-being of installers and occupants.

Requirements

One point (maximum 4) is possible can be achieved for each group in which the project complies. Teams are encouraged to attain an Innovation Point for complying group of materials that comply with a fifth group: the requirements

GROUP 1: Interior Adhesives & Sealants

▲ Adhesives All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following reference standards:

- Adhesives, Sealants and Sealant Premixes shall not exceed the VOC content limits established in: South Coast Air Quality Management District (SCAQMD) Rule #1168 VOC limits are listed in the table below and correspond to an effective date of July 1, 2005 and rule amendment date of January 1, 2007, 2005.
- Aerosol Adhesives shall not exceed the VOC content limits established in: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.
- Adhesives and sealants shall contain no carcinogen or reproductive toxicant components present at more than 1% of total mass of the product as defined in the following lists: California Office of Environmental Health Hazard Assessment (OEHHA) list of Chemicals Known to the State to Cause Cancer or Reproductive Toxicity, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) and the California Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics).

GROUP 2: Wall & Ceiling Finishes

▲ Paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on July 1, 2008.

▲ Ceiling tiles (including suspended acoustical tiles) and wall coverings shall meet or exceed comply with the indoor air quality testing and product requirements of California’s Special Environmental Requirements, Specifications Section 01350, as specified in the California Department of Health Services Standard Practice for the Testing Of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda CA/DHS/EHLB/R-174. Testing should be conducted by an independent laboratory and modeling should use modeled using the standard office building protocol parameters. The following programs currently utilize 01350 requirements for compliance, and certified as compliant by an independent third party
• Scientific Certification Systems (SCS) Indoor Advantage Gold Environmental Certification Program.
• Greenguard Product Emission Standard For Children & Schools.
• Collaborative for High Performance Schools Low-Emitting Materials Table
• Ceiling tiles (including suspended acoustical tiles) and wall coverings shall contain no polybrominated diphenyl ethers (PBDE—a flame retardant) or phthalates

GROUP 3: Flooring Systems

• Carpet and resilient flooring systems assemblies installed in the building interior shall meet comply with the indoor air quality testing and product requirements of California’s Special Environmental Requirements, Specifications Section 01350, as specified in the California Department of Public Health Services (DHS) Standard Practice CA/DHS/EHLB/R-174. Testing should be conducted by an independent laboratory and modeling should use Of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, CA/DHS/EHLB/R-174 modeled using the standard office building protocol parameters. Systems shall and certified as compliant by an independent third party. Assembly components including recommended adhesive may be tested including backer and adhesive. The following programs currently utilize 01350 requirements for compliance: separately or together as an assembly.
  • Carpet and Rug Institute (CRI) Green Label Plus program for both All carpet and adhesive.
  • Greenguard Product Emission Standard For Children & Schools,
  • Scientific Certification Systems FloorScore program
  • Collaborative for High Performance Schools Low-Emitting Materials Table

• Carpet cushion installed in the building interior shall meet comply with the requirements of the Carpet and Rug Institute Green Label program.

• Adhesives All flooring related adhesives shall meet comply with the requirements of Group 1. Grout shall comply with requirements for ceramic tile adhesive.
  • Flooring systems shall contain no polybrominated diphenyl ethers (PBDE) or phthalates
  • Coatings, sealants and other finishes for wood, concrete or any other floors shall meet the VOC requirements of Group 2.

— Concrete, wood, bamboo, cork and other floor finishes such as sealer, stain and finish shall not exceed the VOC limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on July 1, 2008

GROUP 4: Composite Wood, Agrifiber Products and Fiberglass Batt Insulation Products

• Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins.
Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as: particleboard, medium density fiberboard (MDF), plywood, wheat board, strawboard, panel substrates and door cores. Materials considered fit-out, furniture, fixtures, and equipment (FF&E) are not considered base building elements and are not included.

- Fiberglass batt insulation products shall contain no added formaldehyde, including urea formaldehyde, phenol formaldehyde, and urea-extended phenol formaldehyde.

GROUP 5: Exterior Applied Products

- Adhesives, sealants, coatings, roofing and waterproofing materials (defined as from the weatherproofing system out and applied on-site) shall not exceed volatile organic content (VOC) content limits of South Coast Air Quality Management District (SCAQMD) Rules Rule 1113 effective July 1, 2008 and Rule 1168 effective date of July 1, 2005 and rule amendment date of January 1, 2007.
- Roofing installations shall not use hot-mopped asphalt installation techniques.
- Parking lots and other paved surfaces shall not use coal tar sealants.
- For any waterproofing, asphalt roofing needing repair, parking lot sealing or other high VOC emissions outdoor construction process, create a plan to manage fumes and avoid infiltration to occupied spaces. Comply with procedures established by NIOSH Publication No. 2003-112: Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs.

<table>
<thead>
<tr>
<th>Reference Table for all EQ Credit 4 groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Adhesives (SCAQMD 1168)</td>
</tr>
<tr>
<td>Indoor Carpet Adhesives</td>
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<tr>
<td>Carpet Pad Adhesives</td>
</tr>
<tr>
<td>Wood Flooring Adhesives</td>
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<tr>
<td>Rubber Floor Adhesives</td>
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<tr>
<td>Subfloor Adhesives</td>
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<tr>
<td>Ceramic Tile Adhesives</td>
</tr>
<tr>
<td>VCT &amp; Asphalt Adhesives</td>
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<tr>
<td>Drywall &amp; Panel Adhesives</td>
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<tr>
<td>Cove Base Adhesives</td>
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<tr>
<td>Multipurpose Construction Adhesives</td>
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<tr>
<td>Structural Glazing Adhesives</td>
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<table>
<thead>
<tr>
<th>Specialty Adhesives</th>
<th>VOC Limit [g/L less water]</th>
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<tbody>
<tr>
<td>PVC Welding</td>
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<tr>
<td>CPVC Welding</td>
<td>490</td>
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<tr>
<td>ABS Welding</td>
<td>325</td>
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<tr>
<td>Plastic Cement Welding</td>
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<tr>
<td>Adhesive Primer for Plastic</td>
<td>550</td>
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<tr>
<td>Contact Adhesive</td>
<td>80</td>
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<tr>
<td>Special Purpose Contact Adhesive</td>
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<tr>
<td>Structural Wood Member Adhesive</td>
<td>140</td>
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<tr>
<td>Sheet Applied Rubber Lining Operations</td>
<td>850</td>
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<tr>
<td>Top &amp; Trim Adhesive</td>
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<table>
<thead>
<tr>
<th>Substrate Specific Applications</th>
<th>Sealants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal to Metal</td>
<td>Architectural</td>
</tr>
<tr>
<td>Plastic Foams</td>
<td>Nonmembrane Roof</td>
</tr>
</tbody>
</table>

LEED for Healthcare Rating System Draft for 2nd PC
<table>
<thead>
<tr>
<th>Porous Material (except wood)</th>
<th>50</th>
<th>Roadway</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td>30</td>
<td>Single-Ply Roof Membrane</td>
<td>450</td>
</tr>
<tr>
<td>Fiberglass</td>
<td>80</td>
<td>Other</td>
<td>420</td>
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</tbody>
</table>

### Sealant Primers

<table>
<thead>
<tr>
<th>Architectural Non Porous</th>
<th>250</th>
<th>General purpose mist spray</th>
<th>65% VOCs by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Porous</td>
<td>775</td>
<td>General purpose web spray</td>
<td>55% VOCs by weight</td>
</tr>
<tr>
<td>Other</td>
<td>750</td>
<td>Special purpose aerosol adhesives (all types)</td>
<td>70% VOCs by weight</td>
</tr>
</tbody>
</table>

### Coating (SCAQMD 1113)

| Paints (flat and non flat, except anti rust) | 50 | Rust preventative paints & coatings | 100 |
| Clear wood finishes: (varnish, lacquer or sanding sealers) | 275 | Sealers: Waterproofing & all other | 100 |
| Floor coatings               | 50 | Shellacs: Clear (avoid) | 730 |
| Primers and undercoaters     | 100 | Shellacs: Pigmented (avoid) | 550 |
| Swimming pool coatings (avoid) | 340 | Stains                          | 100 |

### Potential Technologies & Strategies

- Specify **no- and low-VOC materials** in construction documents and track during procurement and construction. Ensure that VOC limits are clearly stated in each section of the specifications where paints, coatings, adhesives and sealants, roofing and waterproofing materials are addressed. Common adhesive and sealant products to evaluate include: general construction adhesives, flooring adhesives, plumbing adhesives, cove base adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives, and cove base adhesives.

- Specify low-VOC paints and coatings in construction documents. Ensure that VOC and other chemical limits are clearly stated in each section of the specifications where paints, coatings are addressed. Track the VOC and criteria content of all interior paints, coatings and other wall and ceiling finishes. Note that paint tints can add substantially to VOC levels. Use only low or zero VOC tints, particularly for richer tints. Review product cut sheets, MSDS sheets, signed attestations or other official literature from the manufacturer clearly identifying the VOC contents or compliance with referenced standards and track during construction.

- Note that the current Section 01350 standard is considered a minimum standard and does not cover all VOCs of concern nor many other non-VOC chemicals of concern that can affect indoor health.

- Avoid paints with added antimicrobials.

Avoid The following third party certification programs currently require testing in compliance with California Department of Public Health Standard Practice for the Testing Of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda as required for Group 2 & 3:

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LEED for Healthcare Rating System Draft for 2nd PC 132
Carpet and Rug Institute (CRI) Green Label Plus for carpet and adhesive.

GREENGUARD Product Emission Standard For Children & Schools for all interior finishes.

Scientific Certification Systems FloorScore for resilient flooring

Scientific Certification Systems Indoor Advantage Gold for interior finishes other than resilient flooring

Collaborative for High Performance Schools Low-Emitting Materials Table for all interior finishes

Specify and track during procurement and construction wood, agrifiber and fiberglass products (including thermal and acoustical insulation and acoustical and other suspended ceiling tiles) that contain no added formaldehyde resins. Specify laminating adhesives for field and shop applied assemblies that contain no added formaldehyde resins.

Specify and track during procurement and construction self-adhering, cold adhesive, torch-applied, or heat weldable membranes and installation techniques for membrane roofing installations instead of hot asphalt.

Specify and track during procurement and construction pre-finished metal panels and products to reduce field-applied painting entirely by using pre-finished metals.

Avoid all halogenated organic flame retardants (HFRs), including not only PBDEs (polybrominated diphenyl ether) but also Tetramobisphenol A (TBBPA), Hexabromocyclododecane (HBCD), Deca-BDE (Decabromodiphenyl ether), Tris(2-chloroisopropyl phosphate) (TCPP), Tris(2-chloroethyl) phosphate (TCEP), and Dechlorane.

Several chemicals of concern, listed below, should be avoided where possible. While substitutes are not yet widely available to support inclusion in a credit, substitution is encouraged where equal or better performing alternatives exist for products containing the following:

- Polycarbonate: The bisphenol A (BPA) used in its production is a suspected endocrine disruptor.
- PFOA (Perfluorooctanoic acid or C8) used in its production persists in the environment and is found on a widespread basis in human blood samples. Studies have linked PFOA to cancer, birth defects and other serious health problems in animals. Because of concerns regarding the health impact of PFOS and some other stain resistant treatments are now made from a different perfluoroochemical, PFBS (perfluorobutane sulfonate, or C4). All perfluoroochemical related products should be avoided when possible.
- The Green Label Plus program for carpets and associated VOC emission criteria in micrograms per square meter per hour, along with information on testing method and sample collection developed by the Carpet & Rug Institute (CRI) in coordination with California's Sustainable Building Task Force and the California Department of Health Services (DHS), are described in Section 9, Acceptable Emissions Testing for Carpet, DHS Standard Practice CA/DHS/EHLB/R-174, dated 07/15/04. This document is available at:
Specify wood, agrifiber and fiberglass products (including thermal and acoustical insulation and acoustical and other suspended ceiling tiles) that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop applied assemblies that contain no added urea-formaldehyde resins.

Consider formaldehyde-free composite wood, agrifiber, and fiberglass products that are free of all formaldehyde chemicals, including phenol formaldehyde. Many manufacturers are shifting to MDI and soy-based binders as safer alternatives to formaldehyde-based binder.
**EQ Credit 5: Indoor Chemical & Pollutant Source Control**

**1 Point**

**Intent**

Minimize To minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.

**Requirements**

Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas:

- Employ permanent entryway systems at least sixteen feet long in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are regular entry points directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users.

AND

- Minimize the entry of contaminants into the building from vehicles, pesticides, herbicides, helipads, diesel generators, designated smoking areas, sources of exhaust air, and other sources of potential contaminants. Achieve this by contaminant as follows:
  - Provide pressurized entryway vestibules at high-volume building entrances; and
  - To minimize contamination from exhaust contaminants at outside air intakes:
  - Ensure, through the results of mathematical modeling (e.g. CFD, Gaussian Dispersion Analyses) and/or physical testing (e.g. wind tunnel, tracer gas) that the air contaminant concentrations at outdoor air intakes are less than the thresholds established for the project under worst case meteorological conditions. These thresholds can be achieved through a combination of (1) appropriately locating outdoor air intakes, (2) moving emission/pollutant sources, and (3) cleaning emissions at the source (e.g. filtering air contaminants entering or leaving exhaust systems). Consideration should be given to emissions from vehicles idling at loading docks and entry points, and policies prohibiting or limiting these sources may be part of the design strategy to comply with this credit goal.
  - The primary “emissions of concern” shall be carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), and particulate matter (PM10 and PM2.5). Other contaminants specific to the conditions of the project shall be included in the analyses (i.e., considering such sources as fume hood exhausts, sterilizer exhausts, housekeeping area exhausts, smoking areas, etc.).
• For pollutants regulated by the NAAQS, air intake concentrations shall never be greater than the allowable annual average (or 8-hour or 24-hour average where an annual standard does not exist). For other air contaminants, the outside air intake concentrations shall be no higher than 2.5% of the 8-hour and short term/ceiling limits prescribed by the Permissible Exposure Limits (PELs) established by the Occupational Safety and Health Administration (OSHA), or the Threshold Limit Values (TLVs) established by the American Council of Governmental Industrial Hygienists (ACGIH), or the Recommended Exposure Limits (RELS) established by the National Institute of Occupational Health and Safety (NIOSH), whichever is lower. Where the concentrations of air contaminants at the outdoor air intake cannot be achieved for specific pollutants, demonstrate by calculations that indoor concentrations shall not exceed 2.5% of the above exposure limits. Indoor concentration limits can be achieved through a combination of (1) appropriate design of air distribution systems for dilution through ventilation and (2) filtering the air contaminants from the outside air entering the ventilation system.

AND

• Demonstrate that outside air intake concentrations pollutants meet the limits in the following table OR demonstrate by calculations that indoor concentrations shall not exceed 2.5% of the exposure limits listed in the table.

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Maximum Outside Air Intake Concentrations</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulated by National Ambient Air Quality Standard (NAAQS)</td>
<td>Allowable Annual average OR 8-hour or 24-hour average where an annual standard does not exist</td>
<td>National Ambient Air Quality Standard (NAAQS)</td>
</tr>
<tr>
<td>Other air contaminants</td>
<td>2.5% of 8-hour and short term/ceiling limits</td>
<td>Most stringent of the following: Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) American Council of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) National Institute of Occupational Health and Safety (NIOSH) Recommended Exposure Limits (RELS)</td>
</tr>
</tbody>
</table>

AND
Design to minimize and control cross-contamination of regularly occupied areas:

- Where hazardous gases or chemicals may be present or used (including garages, soiled utility areas, sterilization and disinfection areas, housekeeping/laundry areas and copying/printing rooms), exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 6 air changes/hour (for rooms containing disinfectant and sterilant applications, provide minimum 12 air changes/hour), with no air re-circulation. The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.

AND

- Provide containment drains plumbed for appropriate disposal of hazardous liquid wastes in places where water and chemical concentrate mixing occurs for materials management (Central Sterile Supply), environmental services (housekeeping) and laboratory purposes.

Potential Technologies & Strategies

Design facility chemical use, sterilant, cleaning and maintenance areas with isolated exhaust systems and drainage systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Anticipate the potential for such uses in the future, and plan for the ability to easily and appropriately accommodate this need after initial building occupancy.

Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops.

Chapter 44 of the 2007 ASHRAE HVAC Applications Handbook discusses proper design of exhaust stacks and placement of outdoor air intakes to avoid adverse air quality impacts. Chapter 45 of this same Handbook discusses control of gaseous indoor air contaminants in the event that available outdoor air contains undesirable gaseous contaminants at unacceptable concentrations.
EQ Credit 6.1: Controllability of Systems: Lighting
1 Point

Intent
Provide To provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms, conference areas, critical care areas, emergency room areas) to promote the productivity, comfort and well-being of building occupants.

Requirements

For All Occupants
Provide lighting system controls for all shared multi-occupant spaces that enable adjustments that meet group needs and preferences.

AND

For Staff Areas
Provide individual lighting controls for 90% (minimum) of the building occupants FTE staff (measured at peak periods) to enable adjustments to suit individual task needs and preferences.

AND

For Patient Areas
Provide individual lighting controls for 90% (minimum) of patients, to enable adjustments to suit individual task needs and preferences.

Install lighting controls in patient areas that are readily accessible from the patient bed.

In staff areas provide individual lighting controls for each bed in multi-occupant patient spaces, such as such as recovery rooms, emergency departments, infusion areas, and similar open areas. Provide individual lighting controls.

In private rooms, provide occupant controls over window shades, blinds, and/or curtains that are readily accessible from the patient bed for exterior window shades, blinds, and/or curtains. Exempted areas include in-patient critical care, pediatric, and psychiatric patient rooms.

Potential Technologies & Strategies
Design the building with occupant controls for lighting. Strategies to consider include lighting controls and task lighting. Integrate lighting systems controllability into the overall lighting design, providing ambient and task lighting while managing the overall energy use of the building.

Provide dimming or other multi-level switching capable of reasonably uniform illuminance reduction for treatment areas, offices, conference rooms, dining areas, lounges, and all other
spaces larger than 100 square feet in which the connected lighting load exceeds 0.8 watts per square foot.

Provide occupant controls for shading devices in staff and multi-occupant spaces.

Provide photocell daylighting controls for daylit spaces, including corridors.
EQ Credit 6.2: Controllability of Systems: Thermal Comfort
1 Point

Intent
Provide To provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of building occupants.

Requirements
Provide individual thermal comfort controls for every single occupant patient room

AND

Provide individual thermal comfort controls for 50% (minimum) of the remaining building occupants to enable adjustments to suit individual task needs and preferences.

Operable windows can be used in lieu of comfort controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62.1-2004 (with errata but without addenda*).

AND

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences.

Conditions for thermal comfort are described in ASHRAE Standard 55-2004 (with errata but without addenda*) to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control for the purposes of this credit is defined as the provision of control over at least one of these primary factors in the occupant’s local environment.

Potential Technologies & Strategies
Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria to allow adjustments to suit individual needs and preferences. These may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, or control of individual radiant panels, or other means integrated into the overall building, thermal comfort systems, and energy systems design. In addition, designers should evaluate the closely tied interactions between thermal comfort (as required by ASHRAE Standard 55-2004) and acceptable indoor air quality (as required by ASHRAE Standard 62.1-2004, whether natural or mechanical ventilation).
Additional strategies to consider include:

- Underfloor HVAC systems with individual diffusers
- Displacement ventilation systems
- Operable windows

*Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may to do so at the project team’s discretion. Addenda must be applied consistently across all LEED credits.*
EQ Credit 7: Thermal Comfort: Design and Verification
1 Point

Intent

Design for an appropriate thermal environment for a healthcare setting that supports the productivity, health and well-being of building occupants, and provide for the assessment of building occupants’ thermal comfort over time.

Requirements

- Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda*), and local codes or current Guidelines for the Design and Construction of Healthcare Facilities, Table 2.1-2 requirements for design temperature and relative humidity, where local codes do not apply. Demonstrate design compliance in accordance with ASHRAE Standard 55-2004, Section 6.1.1; Documentation: (with errata but without addenda*).

- Provide a permanent monitoring system to ensure that the building performs to the desired comfort criteria as determined above.

- Agree to implement a thermal comfort survey of building occupants** within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004 (with errata but without addenda*) and 2006 Guidelines for Design and Construction of Healthcare Facilities.

**In acute care hospitals and outpatient healthcare projects, occupants are defined as full-time staff. For residential healthcare occupancies, such as long term care or rehabilitation facilities, occupants include both full-time staff and residents.

Potential Technologies & Strategies

ASHRAE Standard 55-2004 provides guidance for establishing thermal comfort criteria and the documentation and validation of building performance to the criteria. While the standard is not intended for purposes of continuous monitoring and maintenance of the thermal environment, the principles expressed in the standard provide a basis for design of monitoring and corrective action systems. In addition, the 2006 Guidelines provide specific thermal design criteria for specific areas of hospitals and outpatient facilities that should be used as design goals rather than the comfort criteria of the AHSRAE Standard.
Once thermal performance criteria are established, design the building envelope and HVAC systems to meet these criteria under expected environmental and use conditions. Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion, and coordinate these criteria with EQ Prerequisite 1 and EQ Credit 1.

In acute care hospitals, consider grouping spaces with similar thermal comfort criteria.

*Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may to do so at the project team’s discretion. Addenda must be applied consistently across all LEED credits.*
EQ Credit 8.3: Views and 1: Daylight and Views: Daylight Quantity 1 Point

Note: A maximum total of 4 points may be earned from the 6 available points in EQ Credit 8. Project teams are encouraged to seek innovation points for exemplary performance in EQ Credit 8.

Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of views and daylight into the occupied areas of the building.

Requirements

This credit may be achieved only if at least Achieve a minimum of 2 points have been achieved under Credit 8.1 EQ Credits and 8.2.

AND

For a minimum of 75% of areas counted in credit 8.1 and 8.2 or more of all regularly occupied spaces, achieve one of the following:

OPTION 1 - SIMULATION

- Demonstrate through computer simulations or physical models that these areas 75% or of all regularly occupied spaces achieve daylight illuminance levels of a minimum of 25fc and a maximum of 500 fc in a clear sky condition on September 21 at 9.00 am and 3.00 pm; areas with illuminance levels below or above the range do not comply. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 25 fc illuminance level.

- OR

OPTION 2 - PRESCRIPTIVE

Demonstrate through computer simulations or physical models that these areas Use a combination of side-lighting and/or top-lighting to achieve a total Daylighting zone that is at least 75% of all regularly occupied spaces as follows:

Sidelighting Daylight Zone:

- A sidelighted daylight factors of a minimum of 2% and a maximum zone is the floor area where the product of 20% under a CIE overcast sky condition; areas with illuminance levels below or the visible light transmittance (VLT) and window to floor area ratio (WFR) of the zone is a value between 0.150 and 0.180 Window area included in the calculation must be of the portion of the window at least 2’-6” above the range: 0.150 < VLT x WFR < 0.180

- The ceiling must not comply. However, designs obstruct a line in section that incorporate view-preserving automated shades for joins the window-head to a line on the floor that is parallel to the plane of the window, and is, in distance
from the plane of glass as measured perpendicular to the plane of the glass, two times the height of the window head above the floor. See diagram below.

- Provide sunlight redirection and/or glare control devices to ensure daylight effectiveness.

Toplighting Daylight Zone:

- The daylit zone under a skylight is the outline of the opening beneath the skylight, plus in each direction the lesser of: 70% of the ceiling height, one half of the distance to the edge of the nearest skylight, or the distance to any permanent opaque partition (if transparent show VLT) which is farther away than 70% of the distance between the top of the partition and the ceiling. See diagram below.
- Achieve a skylight roof coverage that is between 3% and 6% of the roof area with a minimum 0.5 visible light transmittance (VLT) of the skylights.
- The distance between the skylights shall not be more than 1.4 times the ceiling height.
- Skylight diffuser with a measured haze value of greater than 90% when tested according to ASTM D1003. Avoid direct line of sight to skylight diffuser.

Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

OR

OPTION 3 – MEASUREMENT

Demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 25 foot-candles has been achieved in at least 75% of all regularly occupied areas. Measurements must be taken on a 10-foot grid for all occupied spaces and shall be recorded on building floor plans.

Only the square footage associated with the portions of rooms or spaces meeting the minimum illumination requirements can be counted in this calculation.

For all projects pursuing this Option, provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

OR

OPTION 4 - COMBINATION

Any of the above calculation methods may demonstrate compliance for only be combined to document the minimum daylight factor illumination in at least 75% of the regularly occupied spaces. The different methods used in each space must be clearly recorded on all building plans.
In all cases, only the area associated with the portions of rooms or spaces meeting the requirements can be applied towards the total area calculation required to qualify for this credit.

In all cases, provide glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

**Potential Technologies & Strategies**

Design the building to maximize access to windows. Ensure compliance with the goal early in the design process through computer simulations or physical models. Strategies to consider include building orientation, window area, shallow floor plates, increased building perimeter, exterior and location, interior permanent shading devices and light shelves, visible transmittance of, high performance glazing, and high ceiling reflectance values; additionally, automatic photocell-based controls can help to reduce energy use. Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess foot-candle levels and interior surface reflectances.
**EQ Credit 8.2: Views and Daylight: Inpatient Units**

**1-2 Points**

*Note:* A maximum total of 4 points may be earned from the 6 available points in EQ Credit 8. Project teams are encouraged to seek Innovation points for exemplary performance in EQ Credit 8.

**Intent**

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of views and daylight into the occupied areas of the building.

**Requirements**

For Inpatient Units, provide access to windows to meet the following criteria.

- For 1 point, a minimum of 75% of the occupied areas (excluding inpatient bedrooms) shall be within 20 feet (or twice the window head height, whichever is smaller) of the perimeter. All such perimeter areas must have windows that provide at least an 11 degree angle of unobstructed view in the vertical and horizontal direction.

- For 1 additional point, a minimum of 90% of the inpatient staff and public areas shall be within 20 feet (or twice the window head height, whichever is smaller) of the perimeter. All such perimeter areas must have windows that provide at least an 11 degree angle of unobstructed view in the vertical and horizontal direction.

**Potential Technologies & Strategies**

Design the building to maximize access to windows. Ensure compliance with the goal early in the design process, acknowledging site constraints at the programming stage, when block planning is tested and initial design parameters are established. Strategies to consider include building orientation, shallow floor plates, increased window head and ceiling heights, glazed partitions, increased building perimeter, courtyards, and atria.
**EQ Credit 8. 2: Views and Daylight: Diagnostic & Treatment and Views: Non-Inpatient Buildings or Areas**

1–43 Points

Note: A maximum total of 4 points may be earned from the 6 available points in EQ Credit 8. Project teams are encouraged to seek Innovation points for exemplary performance in EQ Credit 8.

**Intent**

Provide building occupants with views and daylight.

**Requirements**

For Diagnostic & Treatment (D&T) Areas Non-Inpatient buildings or areas, provide access to windows to views that meet the following criteria below. The requirements for each point threshold are as follows:

<table>
<thead>
<tr>
<th>View and Energy Thresholds</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter Area Threshold A</td>
<td>1</td>
</tr>
<tr>
<td>Perimeter Area Threshold A + 33% lighting energy reduction in Threshold A square footage</td>
<td>2</td>
</tr>
<tr>
<td>OR Perimeter Area Threshold B</td>
<td></td>
</tr>
<tr>
<td>Perimeter Area Threshold B + 33% lighting energy reduction in Threshold B square footage</td>
<td>3</td>
</tr>
<tr>
<td>Perimeter Area Threshold B + 33% lighting energy reduction in Threshold B square footage</td>
<td>4</td>
</tr>
</tbody>
</table>

- **Design** In the block planning stage, configure the building floor plates such that the area within 15 feet of the perimeter exceeds the perimeter area requirement shown in the table below. Interpolation of the perimeter area requirement using floor plate sizes in the table is allowed as determined by the table outlined below.

- **Confirm** at the conclusion of detailed planning that 90% of the perimeter rooms must have windows that provide at least an 11 degree angle of unobstructed view in the vertical and horizontal direction.

<table>
<thead>
<tr>
<th>Perimeter Area with Window Access Required</th>
<th>For 1-point</th>
<th>For 2-points</th>
<th>For 3-points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of D&amp;T-Floor plate area (bgsf)</td>
<td>Threshold A</td>
<td>Threshold B</td>
<td></td>
</tr>
<tr>
<td>Up to 15,000</td>
<td>7348</td>
<td>8248</td>
<td>9148</td>
</tr>
<tr>
<td>20,000</td>
<td>8785</td>
<td>9985</td>
<td>11185</td>
</tr>
<tr>
<td>25,000</td>
<td>10087</td>
<td>11587</td>
<td>13087</td>
</tr>
<tr>
<td>30,000</td>
<td>11292</td>
<td>13092</td>
<td>14892</td>
</tr>
</tbody>
</table>
Portions of sidelit areas beyond the 15’ view area boundary that meet the requirements of Credit 8.1 may be included in the qualifying areas of this credit.

For calculation methodology for floor plates that vary in size and configuration, refer to the Reference Guide.

For one additional point, meet the requirement for one point above and provide sufficient daylighting and daylight harvesting controls to reduce annual lighting energy use in the non-inpatient building area counted for one point above by 33% compared to a baseline situation with manual lighting controls.

For two additional points, meet the requirement for two points above, and provide sufficient daylighting and daylight harvesting controls to reduce annual lighting energy use in the non-inpatient building area counted for two points above by 33% compared to a baseline situation with manual lighting controls.

Potential Technologies & Strategies

Design the building to maximize access to windows. Ensure compliance with the goal early in the design process, acknowledging site constraints at the programming stage, when block planning is tested and initial design parameters are established. Strategies to consider include building orientation, shallow floor plates, increased window head and ceiling heights, glazed partitions, increased building perimeter, courtyards, and atria. Use high light reflectance surfaces to enhance the penetration of daylighting. Test daylighting controls and their associated lighting energy reduction with an annual energy simulation.