



LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Patton
WTP, Devens, MA
Date: 2020-07-23

Y ? N

Y	?	N	Credit	Integrative Process	1
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0	0	0	Location and Transportation		16
Y			Credit	LEED for Neighborhood Development Location	16
Y			Credit	Sensitive Land Protection	1
Y			Credit	High Priority Site	2
Y			Credit	Surrounding Density and Diverse Uses	5
Y			Credit	Access to Quality Transit	5
Y			Credit	Bicycle Facilities	1
Y			Credit	Reduced Parking Footprint	1
Y			Credit	Green Vehicles	1

7	0	3	Sustainable Sites		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
0		2	Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
3			Credit	Rainwater Management	3
1		1	Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

0	0	0	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
			Credit	Outdoor Water Use Reduction	2
			Credit	Indoor Water Use Reduction	6
			Credit	Cooling Tower Water Use	2
			Credit	Water Metering	1

0	0	0	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
			Credit	Enhanced Commissioning	6
			Credit	Optimize Energy Performance	18
			Credit	Advanced Energy Metering	1
			Credit	Demand Response	2
			Credit	Renewable Energy Production	3
			Credit	Enhanced Refrigerant Management	1
			Credit	Green Power and Carbon Offsets	2

0	0	0	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

0	0	0	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
			Credit	Enhanced Indoor Air Quality Strategies	2
			Credit	Low-Emitting Materials	3
			Credit	Construction Indoor Air Quality Management Plan	1
			Credit	Indoor Air Quality Assessment	2
			Credit	Thermal Comfort	1
			Credit	Interior Lighting	2
			Credit	Daylight	3
			Credit	Quality Views	1
			Credit	Acoustic Performance	1

0	0	0	Innovation		6
			Credit	Innovation	5
			Credit	LEED Accredited Professional	1

0	0	0	Regional Priority		4
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

7	0	3	TOTALS	Possible Points: 110
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Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

SS CREDIT: SITE ASSESSMENT

BD&C

1 point

This credit applies to

- New Construction (1 point)
- Core & Shell (1 point)
- Schools (1 point)
- Retail (1 point)
- Data Centers (1 point)
- Warehouses & Distribution Centers (1 point)
- Hospitality (1 point)
- Healthcare (1 point)

site selection and layout utilized the assessment data gathered and worked to avoid sensitive areas such as wetlands and steep slopes. The design also considered how to minimize removal of existing vegetation.

1 point

Intent

To assess site conditions before design to evaluate sustainable options and inform related decisions about site design.

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Complete and document a site survey or assessment¹ that includes the following information:

- ✓ • *Topography.* Contour mapping, unique topographic features, slope stability risks.
- ✓ • *Hydrology.* Flood hazard areas, delineated wetlands, lakes, streams, shorelines, rainwater collection and reuse opportunities, TR-55 initial water storage capacity of the site (or local equivalent for projects outside the U.S.).
- ✗ • *Climate.* Solar exposure, heat island effect potential, seasonal sun angles, prevailing winds, monthly precipitation and temperature ranges.
- ✓ • *Vegetation.* Primary vegetation types, greenfield area, significant tree mapping, threatened or endangered species, unique habitat, invasive plant species.
- ✓ • *Soils.* Natural Resources Conservation Service soils delineation, U.S. Department of Agriculture prime farmland, healthy soils, previous development, disturbed soils (local equivalent standards may be used for projects outside the U.S.).
- ✓ • *Human use.* Views, adjacent transportation infrastructure, adjacent properties, construction materials with existing recycle or reuse potential.
- ✓ • *Human health effects.* Proximity of vulnerable populations, adjacent physical activity opportunities, proximity to major sources of air pollution.

The survey or assessment should demonstrate the relationships between the site features and topics listed above and how these features influenced the project design; give the reasons for not addressing any of those topics.

¹ Components adapted from the Sustainable Sites Initiative: Guidelines and Performance Benchmarks 2009, Prerequisite 2.1: Site Assessment.

SS CREDIT: SITE DEVELOPMENT—PROTECT OR RESTORE HABITAT

BD&C

1–2 points

This credit applies to

- New Construction (1–2 points)
- Core & Shell (1–2 points)
- Schools (1–2 points)
- Retail (1–2 points)
- Data Centers (1–2 points)
- Warehouses & Distribution Centers (1–2 points)
- Hospitality (1–2 points)
- Healthcare (1 point)

Onsite soils will be reused, likely will import topsoil for final stabilization but origin unknown at this time . 0 points

Intent

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

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

- ✓ Preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such areas exist).

AND

Option 1. On-Site Restoration (2 points except Healthcare, 1 point Healthcare)

Using native or adapted vegetation, restore 30% (including the building footprint) of all portions of the site identified as previously disturbed. Projects that achieve a density of 1.5 floor-area ratio may include vegetated roof surfaces in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity.

- ✗ Restore all disturbed or compacted soils that will be revegetated within the project's development footprint to meet the following requirements²:
- Soils (imported and in situ) must be reused for functions comparable to their original function.
 - Imported topsoils or soil blends designed to serve as topsoil may not include the following:
 - soils defined regionally by the Natural Resources Conservation Service web soil survey (or local equivalent for projects outside the U.S.) as prime farmland, unique farmland, or farmland of statewide or local importance; or
 - soils from other greenfield sites, unless those soils are a byproduct of a construction process.
 - Restored soil must meet the criteria of *reference soils* in categories 1–3 and meet the criteria of either category 4 or 5:
 1. organic matter;
 2. compaction;
 3. infiltration rates;
 4. soil biological function; and
 5. soil chemical characteristics.

² Components adapted from the Sustainable Sites Initiative: Guidelines and Performance Benchmarks 2009, Credit 7.2: Restore Soils Disturbed During Construction

Project teams may exclude vegetated landscape areas that are constructed to accommodate rainwater infiltration from the vegetation and soils requirements, provided all such rainwater infiltration areas are treated consistently with SS Credit Rainwater Management.

Schools only:

Dedicated athletic fields that are solely for athletic uses are exempted from the soil restoration criteria. These areas may not count toward the minimum required area.

OR

Option 2. Financial Support (1 point)

Provide financial support equivalent to at least \$0.40 per square foot (US\$4 per square meter) for the total site area (including the building footprint).

Financial support must be provided to a nationally or locally recognized land trust or conservation organization within the same EPA Level III ecoregion or the project's state (or within 100 miles of the project [160 kilometers] for projects outside the U.S.). For U.S. projects, the land trust must be accredited by the Land Trust Alliance.

SS CREDIT: OPEN SPACE

BD&C

1 point

This credit applies to

- New Construction (1 point)
- Core & Shell (1 point)
- Schools (1 point)
- Retail (1 point)
- Data Centers (1 point)
- Warehouses & Distribution Centers (1 point)
- Hospitality (1 point)
- Healthcare (1 point)

most of the subject parcel will remain vegetated in its natural state and continue to provide access to the nearby trail system. Public use of plant itself for recreation uses is not applicable
- 1 point

Intent

To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have *overhead vegetated canopy*.

The outdoor space must be physically accessible and be one or more of the following:

- a pedestrian-oriented paving or turf area with physical site elements that accommodate outdoor social activities;
- a recreation-oriented paving or turf area with physical site elements that encourage physical activity;
- a garden space with a diversity of vegetation types and species that provide opportunities for year-round visual interest;
- a garden space dedicated to community gardens or urban food production;
- preserved or created habitat that meets the criteria of SS Credit Site Development—Protect or Restore Habitat and also includes elements of human interaction.

For projects that achieve a density of 1.5 floor-area ratio (FAR), and are physically accessible, extensive or intensive vegetated roofs can be used toward the minimum 25% vegetation requirement, and qualifying roof-based physically accessible paving areas can be used toward credit compliance.

Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical : horizontal) or less and are vegetated.

For projects that are part of a multitenant complex only

Open space can be either adjacent to the building or at another location in the *site master plan*. The open space may be at another master plan development site as long as it is protected from development. If the open space is not adjacent to the building, provide documentation showing that the requirements have been met and the land is in a natural state or has been returned to a natural state and conserved for the life of the building.

SS CREDIT: RAINWATER MANAGEMENT

BD&C

1–3 points

This credit applies to

- New Construction (2–3 points)
- Core & Shell (2–3 points)
- Schools (2–3 points)
- Retail (2–3 points)
- Data Centers (2–3 points)
- Warehouses & Distribution Centers (2–3 points)
- Hospitality (2–3 points)
- Healthcare (1–2 points)

Intent

To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Option 1. Percentile of Rainfall Events

Path 1. 95th Percentile (2 points except Healthcare, 1 point Healthcare)

In a manner best replicating *natural site hydrology* processes, *manage on site* the runoff from the developed site for the 95th percentile of regional or local rainfall events using *low-impact development (LID)* and *green infrastructure*.

Use daily rainfall data and the methodology in the U.S. Environmental Protection Agency (EPA) Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act to determine the 95th percentile amount.

OR

Path 2. 98th Percentile (3 points except Healthcare, 2 points Healthcare)

Achieve Path 1 but for the 98th percentile of regional or local rainfall events, using LID and green infrastructure.

OR

Path 3. Zero Lot Line projects only – 85th Percentile (3 points except Healthcare, 2 points Healthcare)

The following requirement applies to zero lot line projects in urban areas with a minimum density of 1.5 FAR. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 85th percentile of regional or local rainfall events, using LID and green infrastructure.

3 points

OR

Option 2. ~~Natural Land Cover Conditions (3 points except Healthcare, 2 points Healthcare)~~

Manage on site the annual increase in runoff volume from the natural land cover condition to the postdeveloped condition.

Projects that are part of a multitenant complex only

The credit requirements may be met using a coordinated approach affecting the defined project site that is within the *master plan boundary*. Distributed techniques based on a watershed approach are then required.

SS CREDIT: HEAT ISLAND REDUCTION

BD&C

1–2 points

This credit applies to

- New Construction (1-2 points)
- Core & Shell (1-2 points)
- Schools (1-2 points)
- Retail (1-2 points)
- Data Centers (1-2 points)
- Warehouses & Distribution Centers (1-2 points)
- Hospitality (1-2 points)
- Healthcare (1 point)

so get 0.5 points

Intent

To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Choose one of the following options:

Option 1. Nonroof and Roof (2 points except Healthcare, 1 point Healthcare)

Meet the following criterion:

$$\begin{array}{ccccccc}
 \boxed{304,920 \text{ sf}} & & \boxed{0 \text{ sf}} & & \boxed{0 \text{ sf}} & & \boxed{27,511 \text{ sf}} & & \boxed{8,066 \text{ sf}} \\
 \text{Area of} & & \text{Area of High-} & & \text{Area of} & & & & \\
 \text{Nonroof} & & \text{Reflectance Roof} & & \text{Vegetated Roof} & & & & \\
 \text{Measures} & & & & & & & & \\
 \hline
 & + & & + & & \geq & & + & \\
 \text{0.5} & & \text{0.75} & & \text{0.75} & & \text{Total Site} & & \text{Total Roof Area} \\
 & & & & & & \text{Paving Area} & & \\
 \end{array}$$

Alternatively, an SRI and SR weighted average approach may be used to calculate compliance.

Use any combination of the following strategies.

Nonroof Measures

- Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf.
- Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.
- Provide shade with architectural devices or structures that have a three-year aged *solar reflectance (SR)* value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation,
- Provide shade with vegetated structures.
- Use paving materials with a three-year aged *solar reflectance (SR)* value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation.
- Use an *open-grid pavement system* (at least 50% unbound).

High-Reflectance Roof

Use roofing materials that have an SRI equal to or greater than the values in Table 1. Meet the three-year aged SRI value. If three-year aged value information is not available, use materials that meet the initial SRI value.

Table 1. Minimum solar reflectance index value, by roof slope

	Slope	Initial SRI	3-year aged SRI
Low-sloped roof	≤ 2:12	82	64
Steep-sloped roof	> 2:12	39	32

Vegetated Roof

Install a vegetated roof.

OR

Option 2. Parking under Cover (1 point)

Place a minimum of 75% of *parking spaces under cover*. Any roof used to shade or cover parking must (1) have a three-year aged SRI of at least 32 (if three-year aged value information is not available, use materials with an initial SRI of at least 39 at installation), (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.

SS CREDIT: LIGHT POLLUTION REDUCTION

BD&C

1 point

This credit applies to

- New Construction (1 point)
- Core & Shell (1 point)
- Schools (1 point)
- Retail (1 point)
- Data Centers (1 point)
- Warehouses & Distribution Centers (1 point)
- Hospitality (1 point)
- Healthcare (1 point)

light fixtures at building only, full cutoff with no uplighting.

1-point

Intent

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

Requirements

NC, CS, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method (Option 1) or the calculation method (Option 2). Projects may use different options for uplight and light trespass.

Meet these requirements for all exterior luminaires located inside the project boundary (except those listed under "Exemptions"), based on the following:

- the photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design; and
- the lighting zone of the project property (at the time construction begins). Classify the project under one lighting zone using the lighting zones definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide.

Additionally, meet the internally illuminated signage requirement.

Uplight

Option 1. BUG Rating Method

Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the luminaire, as defined in IES TM-15-11, Addendum A.

Table 1. Maximum uplight ratings for luminaires

MLO lighting zone	Luminaire uplight rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3

LZ4	U4
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OR

Option 2. Calculation Method

Do not exceed the following percentages of total lumens emitted above horizontal.

Table 2. Maximum percentage of total lumens emitted above horizontal, by lighting zone

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.5%
LZ3	3%
LZ4	6%



OPTICS

Well crafted reflector optics allow the light engine to be recessed within the luminaire, providing visual comfort, superior distribution, uniformity, and spacing in wall-mount applications. The WEDGE LED has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

LZ-1	Lighting Zone 1 pertains to areas that desire low ambient lighting levels. These typically include single and two family residential communities, rural town centers, business parks, and other commercial or industrial/storage areas typically with limited nighttime activity. May also include the developed areas in parks and other natural settings.	Recommended default zone for rural and low density residential areas. Includes residential single or two family; agricultural zone districts; rural residential zone districts; business parks; open space include preserves in developed areas.
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AND

Light Trespass

Option 1. BUG Rating Method

Do not exceed the following luminaire backlight and glare ratings (based on the specific light source installed in the luminaire), as defined in IES TM-15-11, Addendum A, based on the mounting location and distance from the lighting boundary.

Table 3. Maximum backlight and glare ratings

Luminaire mounting	MLO lighting zone				
	LZ0	LZ1	LZ2	LZ3	LZ4
Allowed backlight ratings					
> 2 mounting heights from lighting boundary	B1	B3	B4	B5	B5
1 to 2 mounting heights from lighting boundary and properly oriented	B1	B2	B3	B4	B4
0.5 to 1 mounting height to lighting boundary and properly oriented	B0	B1	B2	B3	B3
< 0.5 mounting height to lighting boundary and properly oriented	B0	B0	B0	B1	B2
Allowed glare ratings					
Building-mounted > 2 mounting heights from any lighting boundary	G0	G1	G2	G3	G4

Building-mounted 1–2 mounting heights from any lighting boundary	G0	G0	G1	G1	G2
Building-mounted 0.5 to 1 mounting heights from any lighting boundary	G0	G0	G0	G1	G1
Building-mounted < 0.5 mounting heights from any lighting boundary	G0	G0	G0	G0	G1
All other luminaires	G0	G1	G2	G3	G4

The lighting boundary is located at the property lines of the property, or properties, that the LEED project occupies. The lighting boundary can be modified under the following conditions:

- When the property line abuts a public area that includes, but is not limited to, a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to 5 feet (1.5 meters) beyond the property line.
- When the property line abuts a public street, alley, or transit corridor, the lighting boundary may be moved to the center line of that street, alley, or corridor.
- When there are additional properties owned by the same entity that are contiguous to the property, or properties, that the LEED project is within and have the same or higher MLO lighting zone designation as the LEED project, the lighting boundary may be expanded to include those properties.

Orient all luminaires less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary line. Building-mounted luminaires with the backlight oriented toward the building are exempt from the backlight rating requirement.

OR

Option 2. Calculation Method

Do not exceed the following vertical illuminances at the lighting boundary (use the definition of lighting boundary in Option 1). Calculation points may be no more than 5 feet (1.5 meters) apart. Vertical illuminances must be calculated on vertical planes running parallel to the lighting boundary, with the normal to each plane oriented toward the property and perpendicular to the lighting boundary, extending from grade level to 33 feet (10 meters) above the height of the highest luminaire.

Table 4. Maximum vertical illuminance at lighting boundary, by lighting zone

MLO lighting zone	Vertical illuminance
LZ0	0.05 fc (0.5 lux)
LZ1	0.05 fc (0.5 lux)
LZ2	0.10 fc (1 lux)
LZ3	0.20 fc (2 lux)
LZ4	0.60 fc (6 lux)

FC = footcandle.



vertical illuminance at site boundary will be zero

AND

Internally Illuminated Exterior Signage

Do not exceed a luminance of 200 cd/m² (nits) during nighttime hours and 2000 cd/m² (nits) during daytime hours.

Exemptions from Uplight and Light Trespass Requirements

The following exterior lighting is exempt from the requirements, provided it is controlled separately from the nonexempt lighting:

- specialized signal, directional, and marker lighting for transportation;
- lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 a.m.;
- lighting for theatrical purposes for stage, film, and video performances;
- government-mandated roadway lighting;
- hospital emergency departments, including associated helipads;
- lighting for the national flag in MLO lighting zones 2, 3, or 4; and
- internally illuminated signage.