

Cambridge Cool Score Information and Guidelines

The purpose of this document is to guide applicants in completing the Cool Score Sheet, which is required for projects that are subject to the Green Factor Standard. For detailed standards, refer to Section 22.90 of the Cambridge Zoning Ordinance. **Note that in the event of any conflict between these Guidelines and the text of the Zoning Ordinance, the text of the Zoning Ordinance shall control.**

How to calculate the Cool Score

1. Review all information

- Section 22.90 of the Zoning Ordinance (available online). When applying for a permit, the Applicant is responsible for compliance with all zoning requirements.
- These Guidelines.
- Cool Score Sheet (Excel format). Available online or by request from the Community Development Department.
- Green Factor Certification Form. This form needs to be filled out so that City staff can review for compliance before a permit is issued.

2. Draw a site plan

- Show all landscape elements at the ground level and on the roofs of buildings on the site.
- Draw plans to scale and include a north arrow and graphic scale on each sheet.
- Draw lines showing what parts of the site are within 20 feet of a street (public and private roads, including sidewalks, are considered “streets”).
- Shade and label all areas that are included in the Cool Score calculation and calculate the size of each area.
- If the project does not involve new construction or enlargement of a building, you may need to draw an existing and proposed site plan to show the proposed change in the Cool Score (see below).

3. Download and fill out the Cool Score Sheet

- First, fill out the fields at the top, including the total lot area of the site in square feet and the district open space requirement per the Zoning Ordinance. *Note: where different parts of a lot or development parcel are subject to different open space requirements, calculate the total required open space for the lot or development parcel and then divide by the total lot area to get the required percentage.*
- For all strategies except those in category A, enter the total number of square feet dedicated to the strategy (such as B3: Planting Area or C3: Green Roof). Note that areas can only be counted toward one strategy. For example, an area that is both planted and shaded by a structure would count only as Planted Area.
- For strategies in category A, simply enter the number of trees and the area is automatically calculated.
- Separately enter figures for areas that are inside and outside the 20-foot distance from a street.
- The area of each strategy is automatically multiplied by the weighting factor in Section 22.94 of the Zoning Ordinance.
- To comply with the Green Factor Standard, the Cool Score must be at least 1.0. However, if the project involves no new buildings or enlargement of buildings on the site, the Cool Score can be less than 1.0 if it is not less than the existing conditions on the site.
- If the Cool Score is too low, try revising the plan to achieve a higher score. Strategies with higher multipliers (such as tree preservation and planting) and strategies within 20’ of the street will have the greatest impact.

A. TREES

Terms

Preserved Existing Trees are trees that are preserved and protected onsite throughout the construction process. Because of their maturity, existing trees often provide more shade than new trees, which is why they receive a relatively high multiplier on the score sheet. In order to receive credit, existing trees must be in good health. Existing tree size is defined by the canopy width at the time of score sheet submittal. Also see the [Tree Protection Ordinance](#) (Section 8.66 of the Cambridge Municipal Code).

New or Transplanted Trees are brought from off site. These trees may take several years before they form a mature canopy and contribute to shading of the site, therefore, they receive a smaller multiplier than preserved existing trees. They should be maintained until they reach maturity following the [City's default 5 year care and maintenance plan](#).

Understory Tree is defined in the Zoning Ordinance as “A type of tree that is small enough and sufficiently shade tolerant to thrive under the canopies of taller trees. Understory trees form a vegetative layer between low-lying ground cover and tall canopy trees. Understory trees typically reach a canopy spread of eight (8) to fifteen (15) feet at maturity.” Examples include Serviceberry (*Amelanchier canadensis*), Eastern redbud (*Cercis canadensis*), and Cornelian-cherry dogwood (*Cornus mas*). The Score Sheet values the canopy coverage area of understory trees at 150 square feet.

Canopy Tree is defined in the Zoning Ordinance as “A large, tall tree that has a well-defined trunk and a distinct and definite formed crown. Canopy trees are intended to provide shade and typically reach a canopy spread of twenty-five (25) feet or larger at maturity.” Examples include Pin oak (*Quercus palustris*), Kentucky coffeetree (*Gymnocladus dioica*), and American linden (*Tilia americana*). The Score Sheet values the canopy coverage area of canopy trees at 700 square feet.

Cool Score Components

A1: Preserved Existing Understory Tree, currently <10' canopy spread.

A2: Preserved Existing Understory Tree, currently >10' canopy spread.

A3: Preserved Existing Canopy Tree, currently <15' canopy spread.

A4: Preserved Existing Canopy Tree, currently between 15' and 25' canopy spread.

A5: Preserved Existing Canopy Tree, currently >25' canopy spread.

A6: New or Transplanted Understory Trees should have at least 400 cu. ft. of soil per tree with a maximum planting depth of 3-4 feet.

A7: New or Transplanted Canopy Trees should have at least 700 cu. ft. of soil per tree with a maximum planting depth of 3-4 feet.

For more information about tree standards in the City of Cambridge, refer to the Department of Public Works Urban Forestry Division:

<https://www.cambridgema.gov/Services/urbanforestry>

B. PLANTING AREAS

Terms

Planting Area is defined in the Zoning Ordinance as “A landscaped area of land capable of supporting the growth of trees, grass, ground cover, shrubs, and similar vegetation.” Planting areas may include lawn, perennials and groundcovers, or woody plants, such as shrubs. Planting areas are divided into categories based on the plants’ mature height. Taller plants contribute more to temperature reduction, which is why plants taller at maturity receive a higher multiplier.

NOTE: *Permanent above-grade planters may be counted as a Planting Area, but movable planters are not counted.*

Herbaceous plants (i.e. plants without persistent woody stems) include Little blue stem (*Schizachyrium scoparium*), New England aster (*Aster novae-angliae*), and Foamflower (*Tiarella cordifolia*).

Woody plants (i.e. plants with hard stems) include Winterberry (*Ilex verticillata*), Summersweet (*Clethra anifolia*), and Oakleaf hydrangea (*Hydrangea quercifolia*).

Cool Score Components

B1: Lawn Area should have minimum 8” soil depth and include sod or seeded tall grasses.

B2: Low Planting Area should have minimum 12” soil depth and include herbaceous or woody plants less than 2' tall at maturity.

B3: High Planting Area should have minimum 18” soil depth and include herbaceous or woody plants more than 2' tall at maturity.

C. GREEN ROOFS & FACADES

Terms

Green Façade is defined in the Zoning Ordinance as “A vertical system, attached to existing walls or built as freestanding structures, designed to support the growth of plants on a lattice, cable, mesh, or similar wall surface. The growing medium for Green Façades may be at grade or elevated in planters at the base of the structure or at intermediate levels. are vertical surfaces covered with vines or climbing species that are planted in the ground and attach themselves to a lattice, cable, mesh, or wall surface. Some species need vertical support structures while others do not.”

Living Wall is defined in the Zoning Ordinance as “A vertical system comprised of pre-vegetated panels affixed to an exterior structural wall or free-standing frame. The surface of Living Walls is designed to be continuously covered with vegetation and the growing medium is distributed throughout the surface of the system.”

Green Roof Area is defined in the Zoning Ordinance as “Area atop a roof surface on a building that is covered by a layer of living vegetation planted in a minimum of four (4) inches of growth medium over a waterproofing system in accordance with the provisions of Section 22.30 of this Zoning Ordinance. (Also known as a vegetated roof.)” Green Roof Area can be “Non-Intensive,” “Short Intensive,” or “Intensive,” as described below. Green Roof Area must have a maintenance and operation plan that is reviewed by the Department of Public Works.

Cool Score Components

C1: Green Façade area is calculated as the expected extent of coverage within 10 years or the total area of the support structure, whichever is smaller. Green Façades should include:

- Minimum 15’ wide and 10’ tall structure for vines that need a support system.
- Plant species based on their recommended spacing to cover at least a 15’ wide portion of wall for vines that do not need support.
- Minimum 6 cubic feet of soil per plant.

C2: Living Walls should include an irrigation system.

C3: Non-Intensive Green Roof Area should have minimum 4” soil depth and include low planting such as succulents and grasses.

C4: Short Intensive Green Roof Area should have minimum 18” soil depth and include accommodate herbaceous and woody plants less than 2’ tall at maturity.

C5: Intensive Green Roof Area should have minimum 24” soil depth and include herbaceous and woody plants greater than 2’ tall at maturity (trees counted separately).

D. PAVING & STRUCTURES

Where trees and vegetation are not feasible, non-vegetative strategies are encouraged to provide shade and reduce heat gain. “Solar reflective cool pavements stay cooler in the sun than traditional pavements. Pavement reflectance can be enhanced by using reflective aggregate, a reflective or clear binder, or a reflective surface coating” (*Berkeley Lab, Heat Island Group*).

Terms

Shade Canopy is defined in the Zoning Ordinance as “An unenclosed structure that is freestanding or attached to a building, such as a pergola, arbor, porch cover, or awning, which is intended to protect outdoor areas from solar heat gain, and whose upper surface (which may be porous or nonporous) has a minimum Solar Reflectance Index (SRI) of 0.82 except in the case of a Solar Canopy.”

Solar Canopy is defined in the Zoning Ordinance as “A Shade Canopy that is covered in whole or in part by a Solar Energy System; the portion covered by a Solar Energy System shall not have a minimum Solar Reflectance Index (SRI).”

Shaded Area is defined in the Zoning Ordinance as “An outdoor area of a building or lot that is directly beneath a Shade Canopy as defined in this Zoning Ordinance, and that is horizontally open to the air on at least fifty percent (50%) of its perimeter.”

Solar Reflective Index (SRI) is defined in the Zoning Ordinance as “The measure of a constructed surface’s ability to stay cool in the sun by reflecting solar radiation and emitting thermal radiation, as defined by ASTM International. It is expressed as a unitless value ranging from 0 to 100, with 0 representing the lowest possible solar reflectance and 100 representing the highest possible solar reflectance.”

Cool Score Components

D1: High SRI Roof, low slope roofs (i.e. < 2:12) must have a minimum SRI of 82. Steep slope roofs (i.e. ≥ 2:12) are not required to meet a minimum SRI but are recommended to have an SRI of 39.

D2: High-SRI Paving must have an SRI of 33 or higher.

D3: Shade Canopies may include fabric or tensile shade structures as well as hard-material structures, and may include Solar Canopies.