Cambridge Cool Factor

Strategy Definitions & Prerequisites

How to use this document

This document guides applicants in completing the Cool Factor Score Sheet. Below, each strategy that contributes to the score is defined, and any requirements for utilizing and counting the strategies are explained.

How to fill out the Score Sheet

First, fill out the fields at the top of the Score Sheet, including the total lot area of the site in square feet and the open space requirement per the Zoning Ordinance. Then, for all strategies except those in category A, enter the number of square feet dedicated to the strategy (such as B3: Planting Area or C3: Green Roof). For strategies in category A, simply enter the number of trees; the corresponding square footage of tree canopy is automatically calculated by the Score Sheet. The Score Sheet distinguishes between strategies that are within 20 feet of the public right-of-way and those that are not. Note that a strategy can only be counted once.

How the Score Sheet is calculated

For all strategies, the area of each strategy is automatically multiplied by a weighting factor, so strategies that provide a greater cooling benefit have a higher relative value. For example, preserving large canopy trees, which provide large areas of shade and significant cooling, has the highest value due to its high multiplication factor. Similarly, strategies that are within 20 feet of the public right-of-way have a higher multiplication factor than strategies that are outside of that area because they provide an additional public benefit. The Score Sheet automatically calculates the value of all strategies, then divides that sum by the total cooling area goal, which is simply the total lot area multiplied by the open space requirement. If the resulting figure is 1 or above, then the requirements of the Cool Factor have been met. If the score is below 1, revisit the initial site strategies and try to identify any opportunities to increase the use of strategies with higher multipliers and strategies within 20’ of the public right of way. Also consider increasing the area of individual strategies.

A 1-5 PRESERVATION OF EXISTING TREES

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 young 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. The score sheet approximates the canopy width of understory trees at 150 square feet and the canopy width of canopy trees at 700 square feet.

Definitions

Understory Trees are defined as trees reaching a canopy spread of 8' to 15' at maturity. Examples include Serviceberry (*Amelanchier Canadensis*), Eastern Redbud (*Cercis Canadensis*), and Cornelian-cherry dogwood (*Cornus mas*).

Canopy Trees are defined as trees reaching a spread of 25' to 30' at maturity. Examples include Pin oak (*Quercus palustris*), Kentucky Coffeetree (*Gymnocladus dioicus*), and American Linden (*Tilia Americana*).

Strategies

A1: Understory Tree, currently <10’ canopy spread

A2: Understory Tree, currently >10’ canopy spread

A3: Canopy Tree, currently <15’ canopy spread

A4: Canopy Tree, currently between 15’and 25’ canopy spread

A5: Canopy Tree, currently >25’ canopy spread

A 6-7 NEW AND TRANSPLANTED TREES

The following strategies are for newly planted trees brought from off site as well as transplanted trees. 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. The score sheet approximates the canopy width of understory trees at 150 square feet and the canopy width of canopy trees at 700 square feet.

Strategies

A6: New and Transplanted Understory Trees (at least 400 cubic feet of soil per tree required)

A7: New and Transplanted Canopy Trees (at least 700 cubic feet of soil per tree required)

B PLANTING AREAS

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. Permanent above-grade planters may be counted for credit; movable planters may not be counted for credit.

Definitions

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*).

Strategies

B1: Lawn Area, sod or seeded tall grasses (minimum 8" soil depth is required)

B2: Low Planting Area, herbaceous or woody plants less than 2' tall at maturity (minimum 12" soil depth is required)

B3: Planting Area, herbaceous or woody plants more than 2' tall at maturity (minimum 18" soil depth is required)

C 1-2 GREEN FACADE + LIVING WALL

Green facades and living walls are living vertical systems that contain plant species and/or a planting medium.

Definitions

Green Façades 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 Walls are vertical surfaces comprised of plants that are planted directly in a suspended growing medium. These systems are usually more intensive to construct and maintain because they require special structures to hold the soil volume.

Strategies

C1: Green Façade, requirements include:

- Provide a 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;
- Green facades can receive a maximum credit equivalent to the expected extent of coverage within 10 years or the total area of the support structure, whichever is smaller;
- Soil requirements: minimum 6 cubic feet per plant.

C2: Living Wall (an irrigation system is required to receive the credit)

C 3-5 GREEN ROOFS

Definitions

Green Roof is defined as a planted area over a built structure with a "lightweight with a shallow layer of growing substrate of less than 8" deep, requiring minimal maintenance. They generally have lower water requirements and use small, low-growing plant species, particularly succulents." (*Growing Green Guide*)

Intensive Green Roof is defined as a planted area over built structure that is "generally heavier, with a deeper layer of growing substrate, that supports a wider variety of plant types. Intensive green roofs need more irrigation and maintenance than extensive roofs, and are highly engineered landscapes, often built directly on structures with considerable weight load capacity." (*Growing Green Guide*)

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Strategies

C3: Green Roof, low soil volume planting such as succulents and grasses (minimum 4" soil depth)

C4: Short Intensive Green Roof, herbaceous and woody plants less than 2' tall at maturity (minimum 18" soil depth)

C5: Tall Intensive Green Roof, herbaceous and woody plants greater than 2' tall at maturity (minimum 24" soil depth, trees counted separately)

D PAVING AND SHADE STRUCTURES

"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*). Note that all projects are required to have a high SRI roof, per the definition and strategies below.

Definitions

Solar Reflective Index (SRI): "The SRI is a composite score of solar reflectance and thermal emittance. Solar reflectance, or albedo, is the percentage of solar energy reflected by a surface." (Hui Li Ph.D., P.E., In *Pavement Materials for Heat Island Mitigation*, 2016). Thermal emittance characterizes the surface capability to reemit the previously absorbed heat away from itself (A.L. Pisello, in *Eco-Efficient Materials for Mitigating Building Cooling Needs*, 2015).

Strategies

D1: High SRI Roof, low slope roofs (i.e. ≤ 2:12) must have a minimum SRI of 82 and steep slope roofs (i.e. > 2:12) must have a minimum SRI of 39

D2: High-SRI Paving must have an SRI of 39 or higher (LEED, V4)

D3: High-SRI Shade structures may include fabric or tensile shade structures as well as hard-material structures, the shade structure material must have an SRI of 39 or higher (LEED, V4)