# Cambridge Cool Factor Guidance Document

This document includes definitions relevant to the Cool Factor scoring and implementation. Also included is the relative temperature reduction each strategy provides, prerequisites to implementation, and the multiplication factor of each strategy.

## Cool Factor Glossary

**Cool Paving:** “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)

**Cool Roof**: “A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof.” (Energy.gov)

**Green Roof:** “lightweight with a shallow layer of growing substrate of less than 200 mm 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:** “generally heavier, with a deeper layer of growing substrate, and support a wider variety of plant types. Because they can support a heavier weight, they are readily accessed by people. 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)

**Planting:**

Herbaceous plants (plants without persistent woody stems): examples include Little blue stem (Schizachyrium scoparium), New England Aster (Aster novae-angliae), Foamflower (tiarella cordifolia)

Woody plants (plants with hard stems): examples include winterberry (Ilex verticillata), Summersweet (Clethra anifolia), Oakleaf hydrangea (hydrangea quercifolia)

Tree minimum caliper: 2” caliper

Small species trees: examples include Serviceberry (Amelanchier Canadensis), Eastern Redbud (Cercis Canadensis), Cornelian-cherry dogwood (Cornus mas)

Medium species trees: examples include American hornbeam (carpinus caroliniana), Golden raintree (Koelreutaria paniculara), Red Horsechestnut (Aesculus x carnea)

Large species trees: examples include Pin oak (Quercus palustris), Kentucky Coffeetree (Gymnocladus dioicus), American Linden (Tilia Americana)

## Cool Factor Strategies – Relative effectiveness and scores

| | COOL FACTOR STRATEGY | RELATIVE TEMPERATURE REDUCTION | MULTIPLICATION FACTOR |
|---|---|---|---|
| Hardscapes and Structures | **Paving with SRI of 39 or higher**<br>*Aligned with LEED V4 requirements | Reflective 'cool' materials contributed to at least 1˚ F and in many cases an excess of 3˚ F. On a hot day contributed to reduction of up to 6˚ F<br>(Louisville Urban Heat Management, Urban Climate Lab) | 0.15 |
| | **Shade structure with SRI of 39 or higher**<br>* Aligned with LEED V4 requirements | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. (Environmental Protection Agency) | 0.3 |
| Planting Area | **Lawn or turf area**<br>* Minimum 8” soil depth | Between 1 and +2°F of cooling from tree planting and grass cover<br>(Louisville Urban Heat Management Study, Urban Climate Lab) | 0.3 |
| | **Low planting area** – includes herbaceous or woody plants less than 2’ tall at maturity<br>* Minimum 18” soil depth | Between 1 and +2°F of cooling from tree planting and grass cover<br>(Louisville Urban Heat Management Study, Urban Climate Lab) | 0.4 |

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| Planting Area | **Planting area** – includes herbaceous or woody plants greater than 2’ tall at maturity<br>* Minimum 24” soil depth | Between 1 and +2°F of cooling from tree planting and grass cover (Louisville Urban Heat Management Study, Urban Climate Lab) | 0.5 |
| Green Roofs | **Green roof**<br>* Minimum 4” soil depth | Green roof temperatures can be 30–40°F<br>lower than those of conventional roofs and can reduce city-wide ambient temperatures by up to 5°F.<br>(Environmental Protection Agency) | 0.3 |
| | **Low intensive green roof**, less than 2’ tall at maturity<br>* Minimum 18” soil depth | Green roof temperatures can be 30–40°F<br>lower than those of conventional roofs and can reduce city-wide ambient temperatures by up to 5°F.<br>(Environmental Protection Agency) | 0.4 |
| | **Intensive green roof**, greater than 2’ tall at maturity<br>* Minimum 24” soil depth | Green roof temperatures can be 30–40°F<br>lower than those of conventional roofs and can reduce city-wide ambient temperatures by up to 5°F.<br>(Environmental Protection Agency) | 0.5 |
| Tree canopy | **Tree canopy for “small tree species” or equivalent**<br>* Canopy spread of 8’-15’, 2” caliper<br>* Minimum 400 cu ft of soil/tree | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (Environmental Protection Agency) | 0.6 |

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| Tree canopy | **Tree canopy for “medium tree species” or equivalent**<br>*Canopy spread of 16’-21’, 2” caliper<br>*Minimum 800 cu ft of soil/tree | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (Environmental Protection Agency) | 0.7 |
| | **Tree canopy for “large tree species” or equivalent**<br>*Canopy spread of 25’-30’, 2” caliper<br>*Minimum 1000 cu ft of soil/tree | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (Environmental Protection Agency) | 0.8 |
| | **Tree canopy for “small trees”**<br>* Canopy spread of 6’-15’ | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (Environmental Protection Agency | 0.8 |
| | **Tree canopy for “large trees”**<br>* Canopy spread of 16’+ | Shaded surfaces may be 20–45°F cooler than the peak temperatures of unshaded materials. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2–9°F (Environmental Protection Agency | 1.4 |