

PLANNING BY DESIGN

Montgomery County Planning Commission

Shading Parking Lots

Communities can transform their parking lots while adding environmental benefits by planting more trees in parking areas. Trees provide welcoming shade in parking lots, especially on hot days. They shade cars and pedestrian walkways, reduce glare, screen views, and muffle noise. Trees can reduce the excess heat generated by large expanses of paving and can reduce stormwater runoff and pollution. In time, the shade provided by trees will cool pavement surfaces, reducing air temperatures and mitigating the heat island effect. Planting trees creates more pleasant and attractive parking environments and increases tree canopy cover, making communities greener and healthier places.



Millennium Corporate Center, Conshohocken, PA



Top photo: Colorcon Global Headquarters & Technology Center, Harleysville, PA

Middle photo: YMCA Ambler, Ambler, PA

Bottom photo: Shelly Shopping Center, Upper Salford, PA

Successful Tree Planting

Planting trees in parking lots provides many benefits and some challenges. When planting trees, it is essential to provide what a tree needs to grow—adequate space, soil, and water.

Growing Space

Many planting areas in parking lots are simply too small to provide adequate root space for trees to grow. This causes trees to grow slowly, become prone to disease, and struggle to survive. Designing planting areas with generous growing space allows trees to reach their full height and size, providing maximum shading. Trees need enough room to grow for both their roots and canopy. Tree size and longevity depend on the amount of soil volume available. A minimum soil volume of 300–600 cubic feet was previously suggested per tree, but recent studies suggest larger soil volumes—ranging from 800 to over 1000 cubic feet—are needed to sustain a large canopy tree. Trees should be planted in strips, islands, or along the perimeter. All of these areas should be at least 8 feet wide and at least 3 feet deep. Improved techniques for planting trees in parking lots could include using engineered soils and larger continuous planters.

Adequate Soils

A common issue in parking lot planting areas is that soil is compacted, may contain construction materials, and lacks nutrients. Trees receive nutrients from soil, but roots need oxygen and water found in the voids between soil particles to grow. In compacted soil, these voids are reduced; roots do not receive adequate water and oxygen and trees decline. Most trees grow best in neutral to slightly acidic soil (below PH 7). When construction materials—such as concrete and limestone gravel—are found in soil, alkalinity (higher than PH 7) increases, which affects a tree's ability to withdraw nutrients. Only trees tolerant of alkaline soils should be planted. Soils in planting areas should be a balanced mix of sand, silt, and clay with generous amounts of organic matter. A layer of mulch should be applied around trees every year to suppress weeds, replenish organic matter, and preserve soil moisture. Before planting trees in parking lots, the soil should be improved by excavating to a depth of at least 30 inches, adding soil amendments to increase fertility if needed.



Rainwater Runoff

Planting areas, whether along the perimeter or in the interior of parking lots, can be designed to capture stormwater runoff. Typical planting areas are surrounded by curbs, preventing rainwater runoff from reaching trees. A more innovative approach involves using curb cuts with depressed islands to capture rainwater runoff, helping manage stormwater while watering trees. Trees in parking lots also can be planted as part of a larger bioretention system.



Tree Selection

To successfully thrive in parking areas, the tree species selected should be tolerant of harsh conditions including drought, salt, pollution, excessive heat, and compacted soil. They should be low in maintenance and produce minimal debris. The placement of light fixtures and signs should be coordinated to avoid conflicts with tree plantings. We suggest canopy trees (with a minimum mature height of 30 feet or more) be strategically placed throughout the parking lot and along the perimeter to provide maximum shade. Many native and introduced species are appropriate for planting. Parking lots have two distinct planting areas—the interior and the perimeter. Perimeter trees can consist of larger shade trees, such as red maple (*Acer rubrum*), chestnut oak (*Quercus prinus*), and little leaf linden (*Tilia cordata*), because perimeter planting areas are typically wider, providing more space to grow. Trees, such as Honey Locust (*Gleditsia Triacanthos* var *Inermis*), Japanese Zelkova (*Zelkova serrata*), and Lackbark Elm (*Ulmus parvifolia*), are good for parking lot interiors because of their tolerance of alkaline soils and harsh conditions. To promote overall tree health, no more than 25 percent of the total planted trees should be from one species.



Top photo: Fischer's Park, Towamencin, PA

Middle photo: Haddonfield, NJ

Bottom photo: 1100 First Avenue, Upper Merion, PA

Shading Requirements

Today's innovative shading standards combine requirements to effectively shade paved areas. Traditionally, tree planting regulations have required one tree for a certain number of parking spaces or a specified amount of planting area (green space) per parking space. Newer shading regulations provide a maximum distance (50 to 120 feet) from any parking space to



Beacon, NY

the nearest tree or increase the percentage of shade cover (20–50 percent) within a specified time period. For example, in Sacramento, California 50 percent of a parking lot must be shaded within 15 years. An approved tree list is used to estimate the amount of future shade by species. For communities in Montgomery County, we suggest incorporating parking lot landscape regulations similar to those in Prince George’s County, Maryland. These requirements use performance standards that include both perimeter and interior tree plantings. To provide flexibility, various perimeter planting options are permitted. Interior planting areas are calculated as a percentage of the total parking lot area and are based on the size of the parking lot. The percentage of landscape area increases as parking lots become larger. These examples also contain minimum planting area dimensions, tree species diversity requirements, and approved plant lists.

While the technique for requiring trees in parking areas can vary, the goal of providing shade and improving environmental performance is the same. Shading parking lots offers communities a simple way to green their neighborhoods while providing environmental benefits.

Online Resources

Urban Forestry South Expo

<http://www.urbanforestrysouth.org/resources/collections/parking-lot-design-issues-trees/>

City of Sacramento, California - Parking Lot Tree Shading Design and Maintenance Guidelines

www.cityofsacramento.org/transportation/urbanforest/uf-media/shading_guidelines_06-05-03.pdf

Prince George’s County, Maryland – Landscape Manual December 2010

<http://www.pgplanning.org/Assets/Planning/Development+Review/Prince+George%2080%99s+County+Landscape+Manual/Prince+George%27s+County+Landscape+Manual+-+December+2010.pdf>

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