



NYC Parks



NYC TREE VALUATION PROTOCOL

INTRODUCTION

Urban forests are integral to the health, beauty, and resiliency of a city and its residents. Trees clean the air, cool streets, and mitigate storm water runoff; they conserve energy by shading buildings and reducing heating and cooling costs, while also reducing a neighborhood's vulnerability to extreme heat and blocking harmful ultra-violet sun rays. Trees also improve human health and well-being, beautify neighborhoods, and increase property values.

The best way to sustain and increase tree canopy benefits is to preserve and protect our trees. Trees are living organisms. They are susceptible to challenging environmental conditions including pollution, drought, heat, and invasive pests and disease. Trees in an urban setting are constrained by limited growing space above and below ground. What's more, trees are often damaged or destroyed by human activity such as vandalism, improper cutting, soil removal, construction, vehicular impacts, and dumping. Even seemingly minor damage can contribute to tree decline and death over time.

Street, park, and forest trees are the living infrastructure of our sidewalks, parks, and natural areas. They are as essential to the urban environment as roads, buildings, and utility lines.

TREE JURISDICTION AND TREE VALUATION AND REPLACEMENT LAWS

More than half (53%) of NYC's tree canopy falls under the jurisdiction of NYC Parks. This includes all trees on land mapped as City parkland as well as most trees growing along streets, sidewalks, traffic triangles, medians, malls, and parkways. Parks' jurisdiction as it pertains to tree valuation and replacement is codified within the New York City Charter, the New York City Administrative Code, and Parks' Rules & Regulations. The rest of NYC's tree canopy grows mostly on private (and some public) properties, including residential front and back yards, campuses, non-City owned open space, and vacant lands. Most of these trees are not subject to any regulations or protection.

Trees under the jurisdiction of NYC Parks may not be removed without a permit. Tree removal is always a last resort. Any entity proposing tree removal must provide adequate justification. When tree removal is unavoidable, Parks applies the NYC Tree Valuation Protocol to determine the value of the tree and fee for replacement. If trees are damaged, destroyed, or removed unlawfully, the perpetrator is subject to restitution based on the NYC Tree Valuation Protocol, as well as civil fines and/or criminal charges.

Several laws govern the fees to replace trees permitted for removal, and the fines for restitution in the case of illegal tree damage or destruction. Local Law 3 of 2010 codified the NYC Tree Valuation Protocol, the method used to assess the value of an existing tree to determine the number of replacement trees required. Other laws set the minimum standard for tree replacement and limit the number of replacement trees required in certain residential districts.¹

¹ Local Law 3 of 2010 requires NYC Parks to set a "fee" for tree replacement and to promulgate rules for valuation that "substantially comply" with International Society of Arboriculture guidelines (NYC Administrative Code section 18-107 (e) and Title 56 of NYC Rules & Regulations. The Caliper Law of 1980 (NYC Administrative Code section 18-107) establishes caliper replacement as the minimum standard. Local Law 141 of 2021 caps the number of replacement trees that are required to be planted to replace lawfully removed trees in zoning districts R1, R2, and R3 to no more than two times the caliper inches removed.

NYC TREE VALUATION PROTOCOL

Tree appraisal is the process of establishing a value for the loss associated with the damage or destruction of a tree. It is both a science and an art. As required by local law, Parks applies a methodology established by the Council of Tree and Landscape Appraisers (CTLA)² to appraise trees under its jurisdiction that require removal. The Trunk Formula method establishes the value of a tree based on its **size** (as measured by the cross-sectional area of the trunk) and then adjusts for the tree's **condition**, **species**, and **location**. NYC Parks applies a local – as opposed to regional – scoring system that is tailored specifically to the unique range of conditions in NYC. The NYC Tree Valuation Protocol follows the methodology as described below:

1. **CONDITION**

The condition of the tree is assessed through a series of field observations by a trained forestry inspector. The condition is rated according to the structure and health of the following tree parts:

- a) Roots
- b) Trunk
- c) Large branches
- d) Small branches and twigs
- e) Foliage and/or buds

2. **SPECIES**

Species ratings vary regionally and geographically and are based on species characteristics without regard to a tree's condition or site factors. The New York State Chapter of the International Society of Arboriculture (ISA) notes in its Species Rating Guide that "...it is recognized that even within these regions there are differences and the appraisers may want to adjust their percentages."³ NYC is a densely urbanized area with distinct climatic, biophysical, economic, demographic, and structural characteristics. The environmental and public health challenges facing this region set it apart from suburban and ex-urban areas, and therefore, Parks has adapted its species ratings, referencing other geographically associated species guides, to accommodate the uniqueness of NYC.

The NYC species rating system reflects the value of trees in terms of the magnitude and longevity of the benefits they provide. The magnitude of a tree's benefits relates to the size of its canopy. Tree magnitude and longevity are measured by:

- a) Stature (canopy size) at maturity
- b) Expected life span

Each species is assigned to a large-, medium-, or small-stature category according to the canopy size expectations for a typical specimen. Each species is also assigned to a short-, medium-, or long-lived category, again according to what is typical for that species. Species ratings are shown in Table 1 based on this combination of stature and longevity:

² Guide for Plant Appraisal, 9th edition

³ Tree Species Ratings for New York State. Guidebook prepared by the Shade Tree Evaluation Committee, 1995. An official publication of the New York State Arborists ISA Chapter, Inc., page 1.

Stature (at maturity)	Longevity	Rating (%)	Examples
Large	Long	100%	Oak, sycamore, elm, hickory, ginkgo, sweetgum
Large	Medium	95%	Horsechestnut, ash, linden, birch, honey-locust
Medium	Long	95%	Southern magnolia, yellowwood
Large	Short	90%	<i>Ailanthus</i> , willow, poplar, silver maple, Siberian elm
Medium	Medium	90%	hornbeam, white mulberry, <i>Sophora</i>
Small	Long	90%	Yew, holly
Medium	Short	85%	Japanese snowdrop (<i>styrax</i>), Callery pear
Small	Medium	85%	Dogwood, hawthorn, goldenraintree, crabapple
Small	Short	80%	Flowering plum, cherry, hawthorn, redbud

Table 1. Sample Species Ratings

3. LOCATION

Location ratings balance the mutual benefits of the site to the tree and the tree to the site. For example, sometimes a tree is one of the only beneficial features in an otherwise undesirable area. In NYC, it is common to see a stately, mature pin oak or London plane tree growing in the sidewalk in front of a vacant lot, along a highway shoulder, or as the single magnificent tree on an otherwise treeless block. It is equally likely to see a tree and its surrounding neighborhood both struggling simultaneously, but neither struggle should devalue the other. Both the neighborhood and its trees, given time and care, may ultimately be successful. The Tree Valuation Protocol considers these two concepts separately as Site Rating and Placement Rating and combines the average of the two scores to generate the Location Factor.

$$\text{Location Factor} = \frac{\text{Site Rating} + \text{Placement Rating}}{2}$$

3a. Site Rating is a measure of how the site accommodates the tree. The rating considers two main factors:

- a) **Tolerance of Species to the Site** – this factor considers how well-suited the tree species is to its environment in terms of its biological, physical, and chemical (i.e., soil and nutrient) requirements.
- b) **Growing Conditions** – this factor considers the canopy and rooting space to evaluate the ability of the site to support successful tree growth, including soil quality and volume and overhead area.

The more suited a tree is to its growing environment and the more conducive the area is to tree growth, the higher the Site Rating. See Table 2 below for the range of criteria used to arrive at a Site Rating, along with examples.

Site Factors		Identify the <i>above- and below-ground growing condition</i>				
		Exceptional	Favorable	Adequate	Inadequate	Restrictive
Identify the <i>species to site relationship</i>	Ideal	90-100	90-100	80-90	80-90	60-80
	Well-Suited	90-100	80-90	80-90	60-80	60-80
	Tolerant	80-90	80-90	60-80	60-80	40-60
	Intolerant	80-90	60-80	60-80	40-60	10-40
	Very Intolerant	60-80	60-80	40-60	10-40	10-40

Example: A pin oak in a park, landscaped area, or along a street in a pit to Parks' standards and no apparent infrastructure conflicts exist

Example: A mature honeylocust growing in a smaller than Parks' standards tree pit with compacted soil conditions

Example: A ginkgo tree growing in a small tree pit within two feet of a building façade

Example: A Norway maple tree growing within the cracks of a retaining wall with limited soil availability

Table 2: Site Rating Factors

3b. Placement Rating is a measure of the tree's contribution to its surroundings. The rating considers two main factors:

- a) **Ecological Value** – this factor considers the ecological services the tree provides to its surroundings, including pollution reduction, stormwater mitigation, and promotion or inhibition of flora and fauna.
- b) **Aesthetic and Social Value** – this factor reflects a tree's aesthetic and social contribution to its surroundings, including the tree's form and structure, opportunities provided for recreation, and contributions to social cohesion and community revitalization.

The more services provided by the tree and the more significant the tree is to its surroundings in the context of landscape design and social impact, the higher the Placement Rating. See Table 3 below for the range of criteria used to arrive at a Placement Rating, along with examples.

Placement Factors		Identify the <i>ecological value</i> category				
		Highly Valuable	Valuable	Neutral	Harmful	Very Harmful
Identify the <i>aesthetic and social contribution</i> category	Highly Positive	90-100	90-100	80-90	80-90	60-80
	Positive	90-100	80-90	80-90	60-80	60-80
	Neutral	80-90	80-90	60-80	60-80	40-60
	Negative	80-90	60-80	60-80	40-60	10-40
	Highly Negative	60-80	60-80	40-60	10-40	10-40

Example: An oak tree that is the only mature tree on an entire block

Example: An over-mature tulip tree growing as part of a landscaped allée

Example: A Japanese pagoda tree providing partial shade to a bench and playground adjacent to a natural area

Example: A tree of heaven growing adjacent to or within a natural area

Table 3: Placement Rating Factors

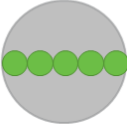


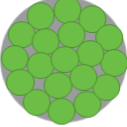
4. TREE VALUATION RESULTS – TRUNK AREA REPLACEMENT (TAR)

NYC’s Tree Valuation Protocol establishes the maximum value of a tree based on its size, and then depreciates that value based on the tree’s condition, species, and location per the methodology above. The value is expressed in a metric called Trunk Area Replacement (TAR), which is the amount of wood in square inches required to replace the wood lost because of the tree’s removal. The TAR value is then converted to a quantity of trees to be planted or the current cost equivalent.

In most cases, the TAR is determined by the NYC Tree Valuation Protocol. However, by law, NYC Parks cannot value a tree lower than its *caliper TAR*⁴ equivalent. Additionally, when a tree is lawfully removed in a specific zoning district (R1, R2 or R3), its value is capped at twice caliper TAR.

Figure 1 below provides an example of the different outcomes from each valuation method.

⁴ The area of wood accounting for the number of 3” trees that span the total caliper of the tree or trees removed.

Method	Explanation	Example*		
		TAR (in ²)	# Trees	
	Caliper	Mimumin standard	35.2	5
	Caliper x 2	Maximum standard for permitted removals in R1, R2, R3 districts	70.8	10
	NYC Protocol	NYC Parks standard protocol	92.3	13
	Basal Area	Wood for wood (undepreciated)	176.7	25

* based on one 15" diameter tree removal with 3" replacements. TAR = Trunk Area Replacement. Note it is possible for a tree to be assessed with little or no depreciations and valued at or close to Basal Area.

Drawings are not to scale. KEY  Cross section of tree to be removed  Cross section of 3" replacement tree

Figure 1: Example of Tree Replacement Calculations

Converting TAR to Trees and/or Cost to Plant

The goal of the NYC Tree Valuation Protocol is to compensate for the loss of trees through the planting of new ones. To do this, NYC Parks converts the TAR obligation into a quantity of three-inch caliper (standard size⁵) replacement trees or the cost to plant the same. The average cost to plant a three-inch caliper tree changes each fiscal year and varies by borough.

In fiscal year 2023, the cost to plant a tree varied by borough:

- Bronx – \$3,000
- Brooklyn – \$3,550
- Manhattan – \$3,500
- Queens – \$3,000
- Staten Island – \$2,600

NYC Parks forestry inspectors are trained to calculate the cost and number of replacement trees according to the NYC Valuation Protocol. Once finalized, a tree replacement or restitution letter will be sent to the appropriate entity, summarizing the valuation and obligation for tree replacement.

⁵ The Agency will consider other caliper size replacement trees where appropriate.

FREQUENTLY ASKED QUESTIONS

What is the difference between tree replacement and restitution?

Tree replacement is required for trees under NYC Parks' jurisdiction that are lawfully removed (i.e., the applicant has received a tree removal permit from NYC Parks). Tree restitution is required when a tree has been illegally damaged or destroyed.

How does NYC Parks approach tree replacement?

It is NYC Parks' priority to preserve existing trees. If an applicant or entity provides acceptable justification and no preservation options exist, then Parks will appraise the tree and issue a tree removal permit. If replacement trees are then approved, they should be planted as close as possible to the site where the tree was removed. Replacement tree species are chosen to maximize canopy potential.

How does Parks appraise a tree that has been removed without a permit?

If a tree is removed without NYC Parks' approval, it will be assumed to have been in perfect condition prior to removal (in the absence of official records to the contrary). In this case, the appraisal calculation is based on its size as measured by the cross-sectional (basal) area of the trunk – either extrapolated from the diameter of the remaining stump, or from existing Agency records. This formula yields the number of replacement trees required to compensate for the loss of the original tree. *The cost of planting the total number of replacement trees is the appraised value of the tree that was removed.* The standard size of a replacement tree is three (3) inches in diameter at breast height (DBH). The average planting cost assigned per replacement tree changes each fiscal year and may vary by borough.

How does Parks appraise a tree that is irreparably damaged or destroyed?

If a tree is damaged beyond recovery or to an extent that it poses an unacceptable risk to public safety, it must be removed. In the case of the tree pictured in Figure 3, the tree was appraised using its pre-damaged size and condition, with the remaining factors established via the NYC Tree Valuation Protocol.

How does Parks appraise a tree that is injured but not destroyed?

If a tree is damaged but not destroyed, a Parks forestry inspector will make two appraisals: one to account for the tree's condition before the injury, and another to account for its condition after the injury. *The difference between the two appraisals is the loss of value caused by the damage.*

Can one tell immediately how a tree injury will impact its health?

Damage to a tree's structure, including wounds to the roots, trunk, bark, or branches, can take a long time to manifest as signs of failing tree health or structural stability. Signs of declining tree health include discolored or withered leaves, dead or dying twigs and branches, peeling and/or decaying bark and wood, and the presence of fungal bodies on or near the tree. While some trees will have different responses based on their species profiles and overall health, *all wounding will negatively impact the health of a tree in some way over time.* Because of the usual gap in time between injury and resulting diminished tree health, *Parks' appraisal methodology assesses tree condition pre- and post-damage and may account for any long-term impacts, if warranted.*



Figure 2: This tree was irreparably damaged because of the basal cutting and required immediate removal.

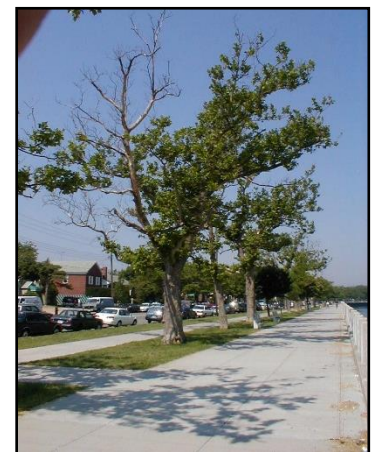


Figure 3: The branch and twig dieback were caused by root cutting years earlier when the sidewalk to the left of the tree was installed.

How does the loss of a branch damage a tree?

Removing living branches takes food from the tree. All the leaves of a tree (the canopy) capture sunlight through the process of photosynthesis to produce energy, enhance growth, and increase resistance to pests and disease. Nevertheless, some pruning is often necessary to improve a tree's shape, achieve clearance for pedestrians and vehicles, and remove dead wood from the tree. *Parks only allows pruning by qualified individuals who have obtained a permit.* Pruning must comply with standards set by the American National Standards Institute (ANSI). These standards safeguard the health of trees by detailing the best pruning techniques. For example, pruning cuts must be made at a specific position along the branch to allow the tree to compartmentalize (seal off) the wound and slow the movement of decay. Limbs that are improperly pruned, broken, ripped off, or otherwise removed from the tree expose the entire tree to irreversible infection and decay. The worst type of improper pruning occurs when most of the canopy is removed. Called "topping" or "heading back," this type of pruning leads to tree starvation shock, loss of structure and beauty, and rapid, over abundant growth of new twigs and leaves. Topping a tree will inevitably require its removal.

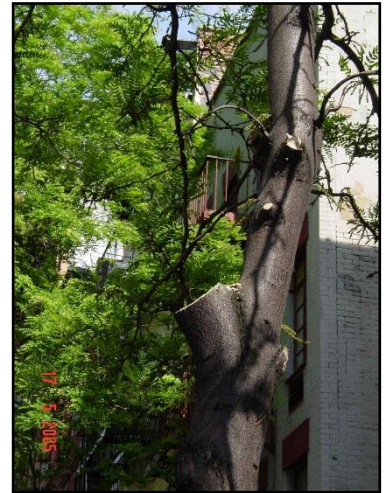


Figure 4: This tree lost half of its canopy from the unauthorized removal of this large limb.

How does root injury or root loss damage a tree?

Roots are crucial to a tree's ability to absorb water and nutrients. Most roots are shallow growing and generally occur within the top 24 inches (two feet) of soil. The loss of roots can weaken a tree and cause twig and branch dieback. Roots are also important for the tree's structural stability. Digging in the root zone of trees can physically tear the roots, which can lead to mechanical tree failure. Trenching, which accompanies the installation of underground utilities and curbs, will destroy tree roots unless it is done by hand, pneumatic excavation, or micro-tunneling.

How does soil compaction damage a tree?

Soil compaction is the physical compression of the earth over time, often caused by the passage of vehicles, placement of heavy equipment, or intense foot traffic. Soil compaction ruins soil structure and is difficult if not impossible to reverse. Compaction reduces the amount of oxygen, water, and nutrients available to trees, and tears small tree roots. Cement or asphalt over a tree pit can also damage roots by depriving them of oxygen.

How does nailing a sign to a tree cause damage?

Nailing signs to trees negatively impacts the cambium, or living tissues of the tree, located just under the outer protective bark layer. Damage to the cambium can limit the movement of water and nutrients within the tree and provide a potential entry point for harmful bacteria or fungus.