

Landscape

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6

Introduction

About this Chapter

This chapter provides general guidelines for the selection, design, installation, and maintenance of plantings in the public right-of-way (ROW). It reflects current practices and initiatives such as PlaNYC, MillionTreesNYC, DOT's Plaza Program, and DEP's Green Infrastructure Plan.

The chapter is organized by the location of plantings, except for TREE BEDS (6.1) and STORMWATER MANAGEMENT PRACTICES (6.6) as these should be utilized wherever conditions allow.

Benefits of Plantings in the ROW

Vegetation within the public ROW has been shown to provide significant benefits. Generally, these benefits increase exponentially as the size of the plant increases; this is particularly true for trees.

All plantings:

- capture carbon dioxide and particles from the air
- reduce the urban heat-island effect, decreasing energy costs related to air temperatures
- allow for both passive and active stormwater management
- dampen street noise, providing health and psychological benefits
- provide urban wildlife habitat opportunities
- make streets appear narrower to drivers, thereby causing them to drive slower, and enhancing safety
- create a positive aesthetic that attracts customers to local businesses
- increase the value of adjacent properties
- make streets and neighborhoods more attractive



Street trees provide significant benefits and should be planted wherever possible: West 95th Street, Manhattan. (Credit: DPR)

Guidance Sources

More comprehensive guidance on the planning, design, installation, and maintenance of plantings within New York City is contained in sources such as *High Performance Landscape Guidelines: 21st Century Parks for NYC* (Design Trust for Public Space and DPR, 2011), *High Performance Infrastructure Guidelines* (Design Trust for Public Space and DDC, 2005), *Tree Planting Standards* (DPR, 2012), *Standards for Green Infrastructure* (DEP, 2016), and the *Sustainable Urban Site Design Manual* (DDC Office of Sustainable Design, 2008).

Other resources include DEP's "NYC Green Infrastructure Program" website, EPA's "National Menu of Best Management Practices," the New York State Stormwater Design Manual, Cornell University Urban Horticulture Institute website, New York Restoration Project and DPR's MillionTreesNYC webpage, and DPR's webpage on Trees and Greenstreets.

Applicability and Exceptions

All new projects that significantly impact public and private streets should follow these guidelines. DOT approval will be based on site-specific conditions and cost-effective engineering standards and judgment, with the safety of all street users being of paramount importance.

Usage Categories

This chapter does not apply usage categories to landscape treatments. Plantings are encouraged wherever site conditions allow and appropriate maintenance can be provided. Plants must always be chosen based on site-specific conditions.

There are certain treatments, noted throughout the chapter, that are considered standard. These treatments will be installed and maintained by the city. Other entities may also pursue these treatments and they will generally require less intensive review. Other treatments may also be pursued, but may require more extensive review depending on the complexity of the project.



Right-of-way projects can provide opportunities for plantings: St. Nicholas and Amsterdam Avenues, Manhattan

Reviews & Approvals

Installation of all plantings within the public ROW must be reviewed and approved by DPR and DOT. A forestry permit from DPR is required to install new trees and for any work being performed within 50 feet of existing trees. Proposed stormwater management landscape treatments within the public ROW must be reviewed and approved by DEP, DPR, and DOT. New plantings may be subject to PDC or LPC review, particularly if they are part of a larger streetscape or open space project within its purview.

Designs for planted areas and green infrastructure within the public ROW are still evolving and being tested. Because these treatments may ultimately be maintained by city agencies, the appropriate agencies must be consulted early in the design process so that all such treatments are technically viable and maintainable.

Maintenance Agreements

DPR is responsible for the maintenance of all trees within the public ROW and of Greenstreets, including select Stormwater Greenstreets. DEP maintains all green infrastructure practices in the ROW (See **STORMWATER MANAGEMENT PRACTICES (6.6.1)**) with the exception of the DPR Stormwater Greenstreets locations. Other plantings within the public ROW are encouraged but require coordination with appropriate agencies and a maintenance agreement with DOT.

For plantings requiring a maintenance agreement, proposals must be submitted to the appropriate DOT Borough Commissioner. Contact information for DOT Borough Commissioners can be found at nyc.gov/dotcontact or by calling 311.

DPR has shifted the focus of its Greenstreets program towards stormwater capture and has updated its criteria for evaluating Greenstreet requests. DPR still builds traditional Greenstreets in any community but only if they come with full independent funding for construction and maintenance. For more information see “Greenstreet Requests” at www.nycgovparks.org/greening/green-infrastructure.

General Guidelines



Appropriate plant selection includes a diversity of species with year-round interest: Park Avenue and 97th Street, Manhattan (Credit: Lynden B. Miller)

The following guidelines expand on the general policies and principles outlined in the Introduction, with more information pertaining to landscape planting design, installation, and maintenance.

Project Team

It is recommended that all projects have a consulting arborist (CA), horticulturist, soil specialist, and/or landscape architect on the project team. City and/or state agencies should be involved early on.

Plant Selection

A successful planting design will match plants with existing site conditions and anticipated site use to achieve an aesthetically pleasing, functional, and long-lived landscape. Species selection must be guided by a comprehensive site analysis of the natural and built environment as well as the maintenance plantings are anticipated to need and receive. Plant specification should follow DOT and DPR standards, and, whenever possible, plants should be sourced from a nursery within 200 miles of the project site.

Attention should be given to plants' color, form, foliage, and texture and how those elements can be combined to create year-round interest. Careful consideration should also be given to the forms and heights plants will reach at maturity and how they interact with other design elements, such as seating, signage, signals, and lighting. Avoid species that DPR has determined to be invasive and select plants that are known to compete well with invasive species. Where possible, given site conditions, designers should accommodate the collection of stormwater and select plants that can withstand both periodic inundation and drought. All species selection must be approved by DPR during the review process.



Willow Oaks planted at the same time with different available soil volumes. Note that the trees on the left, which have more soil than the trees on the right, are much larger: Pennsylvania Avenue, Washington, DC (Credit: Urban Horticulture Institute, Cornell University)

Soils

Soils are crucial to plant health and impact plant selection and project implementation. Adhere to the following guidelines:

- Determine soil quality by testing its texture, pH, organic content, permeability, nutrients, and bulk density
- Preserve existing soils that are capable of supporting healthy plants
- Do not work the soil if it is frozen or sodden
- Add organic matter and/or nutrients to poor-quality soils
- Loosen compacted soil (bulk density of >1.4 grams per cubic centimeter) with mechanical tools and/or by integrating compost. (Use pneumatic excavation within tree-protection areas to preserve roots)

- If new soil is required, construction specifications should include detailed information on desired soil characteristics

Soil volume also affects plant health. It is, therefore, important to maximize soil volume and choose plants that grow well in the available soil volume. Where pavement is necessary in close proximity to trees, consider incorporating a suspended pavement system to provide greater rooting volume.

Microclimate

According to the 2012 USDA Hardiness Zone map, most of New York City falls within Zone 7B, with portions of the Bronx and Staten Island within 7A. However, the site-specific environmental conditions such as sun exposure, wind patterns, and precipitation will ultimately create a unique growing environment for plants. This microclimate must be understood in order to select the most appropriate plants.

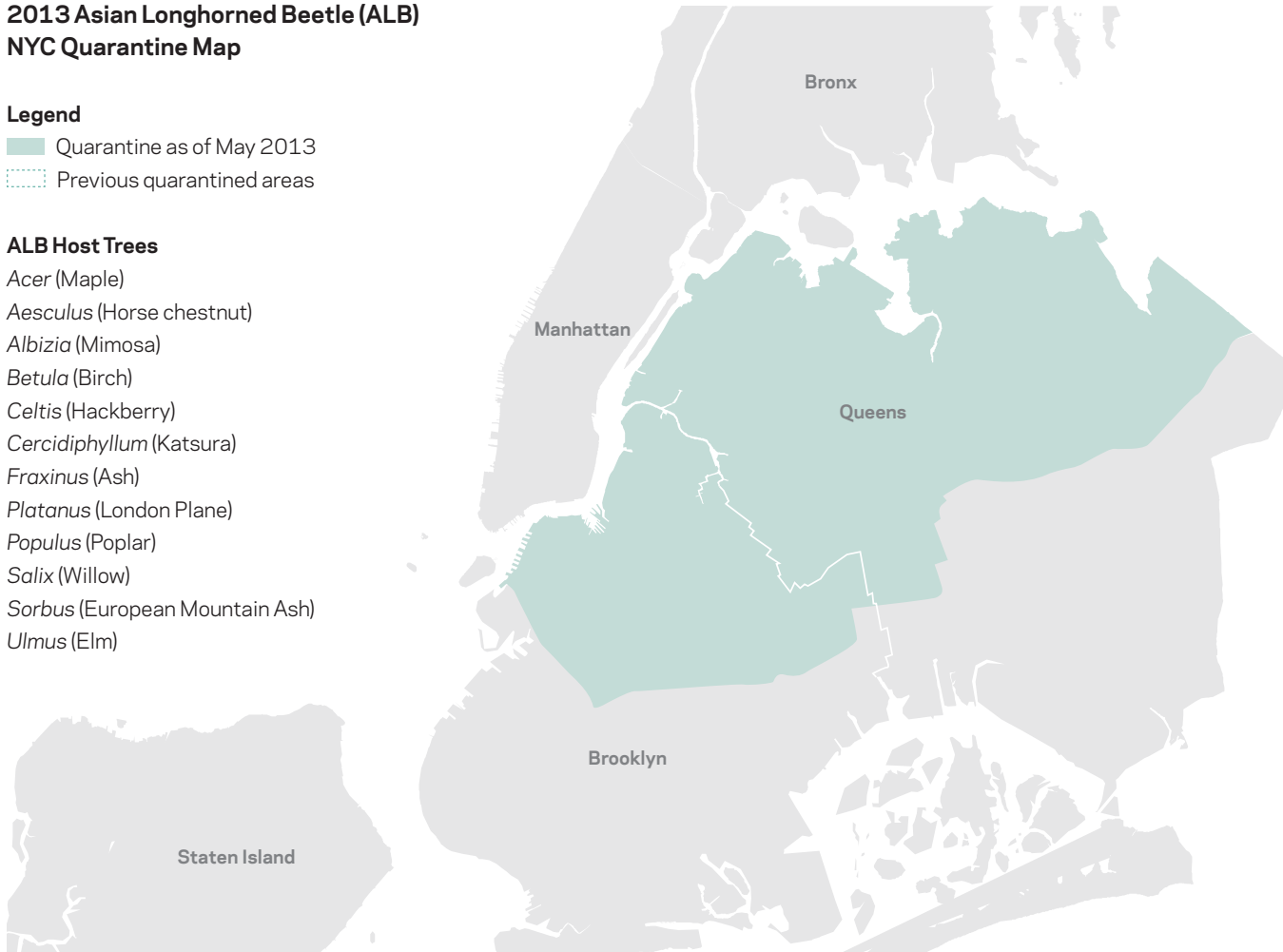
2013 Asian Longhorned Beetle (ALB) NYC Quarantine Map

Legend

- Quarantine as of May 2013
- Previous quarantined areas

ALB Host Trees

- Acer (Maple)
- Aesculus (Horse chestnut)
- Albizia (Mimosa)
- Betula (Birch)
- Celtis (Hackberry)
- Cercidiphyllum (Katsura)
- Fraxinus (Ash)
- Platanus (London Plane)
- Populus (Poplar)
- Salix (Willow)
- Sorbus (European Mountain Ash)
- Ulmus (Elm)



DPR tracks ALB infestation and updates the quarantine map regularly. For more information, visit <http://www.nycgovparks.org/trees/beetle-alert> (Credit: DPR)

Diseases and Pests

Diseases and pests can pose significant risks to plant health and survival. Plants should be selected that are resistant to common ailments, such as anthracnose (leaf spot), or that can withstand outbreaks.

Several pests affect trees in New York City. The two most damaging are the Asian Longhorned Beetle (ALB) and the Emerald Ash Borer (EAB). ALB (*Anoplophora glabripennis*) is an invasive beetle known to attack several species of trees. Currently the only effective means to control the beetle is to remove infested trees and

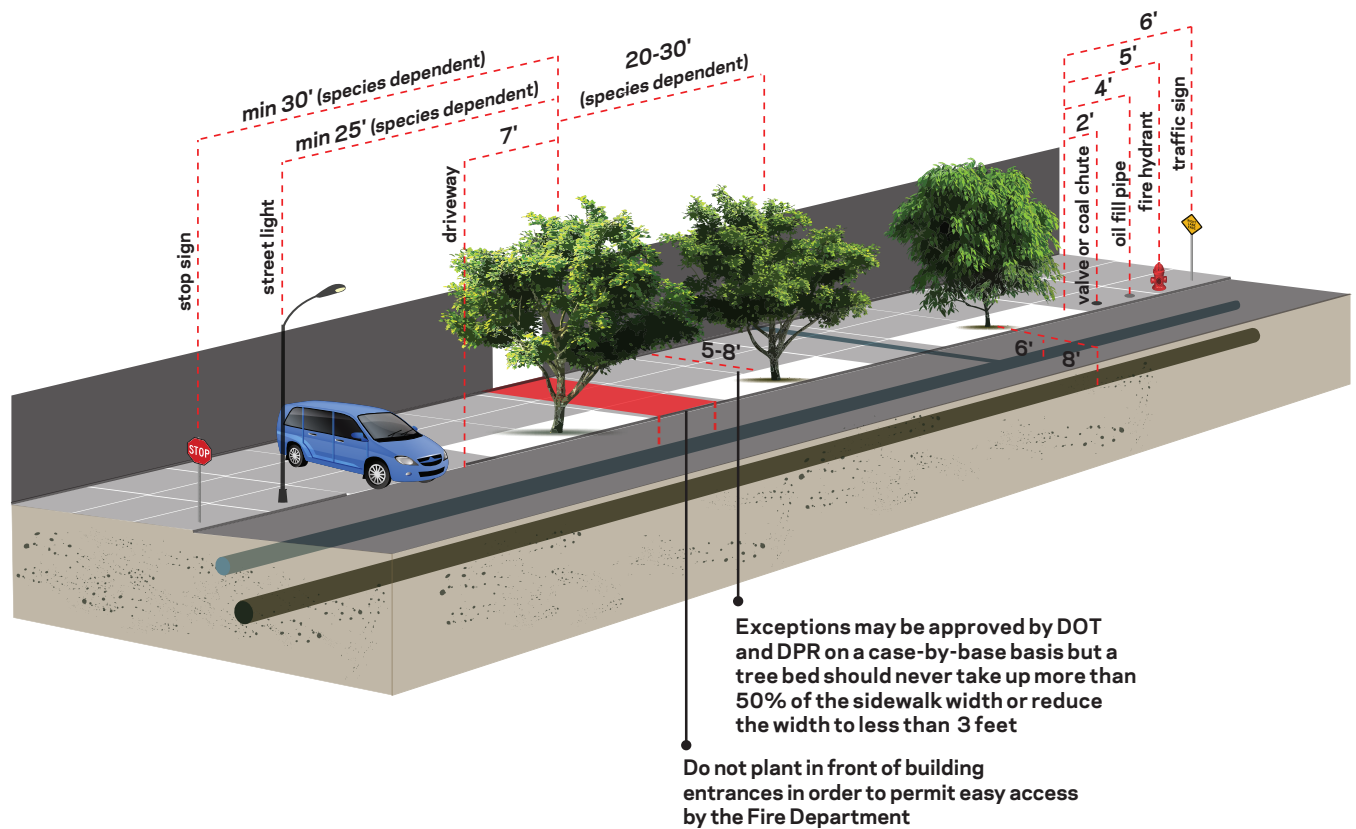
destroy them by chipping or burning. For more information, visit the USDA's Animal and Plant Health Inspection Service webpage or the USDA's APHIS publication regarding ALB in New York.

EAB (*Agrilus planipennis*) is an invasive beetle that is destroying ash populations across the Northeast and Midwest. As such, ash tree species are no longer being permitted within the city.

Application of pesticides (including herbicides, insecticides, and fungicides) is regulated by the federal EPA as well as New York

State Department of Environmental Conservation. Pesticides may only be applied by a NYSDEC Certified Commercial Pesticide Applicator or under the direct supervision of same. Additionally, pesticides applied to property owned or leased by the city must comply with Chapter 12 of Title 17 of the Administrative Code of the City of New York (Local Law 37 of 2005). Note that this law does not apply to private property. For more information on this law, visit the New York City Department of Health and Mental Hygiene webpage (a816-healthpsi.nyc.gov/ll37) or call 311.

Clearance Diagram



Spacing/Siting Requirements

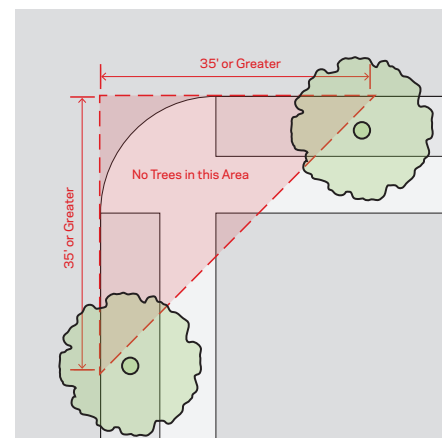
In the setting of streets, parkways, and expressways, the placement of trees and other plants has a direct bearing on safety and the cost of maintenance. Plants, excluding tree canopies, in the public ROW should not infringe upon the roadway or sidewalk beyond the planting bed. Ultimately, all plantings must follow MUTCD, AASHTO, NYSDOT, DPR, and DOT design standards and guidelines. (See *Clearance Diagram* above.)

Careful consideration must be given to above- and below-ground constraints; utilities, vaults, and other

obstructions may limit the ability to plant. In particular, avoid planting trees directly over DEP water and sewer mains and near steam lines.

Trees and other plantings must not block sight lines at intersections for drivers, cyclists, and pedestrians. At all intersections, trees and any plants that would naturally grow to greater than 2 feet in height must be placed no closer than 35 feet from the curb of the intersecting street and in a manner that does not block the signal or stop sign. (See *Corner Clearance Diagram, right*.) Trees on medians must be set back 35 feet from the curb at the end of the median.

Corner Clearance Diagram



Tree Preservation and Protection

Mature trees should be preserved during construction wherever possible because they provide significantly more benefits than newly planted trees. Such preservation can be complicated and should therefore be guided by a consulting arborist (CA) throughout the project. The following provides general information on how best to approach design with the preservation of existing trees in mind.

Under Section 18-107 of the Administrative Code of the City of New York and Chapter 5 of Title 56 of the Rules and Regulations of the City of New York, all construction work impacting trees within the public ROW must be approved and permitted by DPR. In addition, construction work must follow DPR Tree Preservation Protocols and DPR Forestry Protocol for Planned and Emergency Utility Work. Ultimately, if the removal of a tree is necessary, it must be approved by DPR, and

restitution may be required based on a valuation of the trees impacted. This typically involves planting new trees and/or paying a fee to cover the cost of DPR planting the necessary replacement trees.

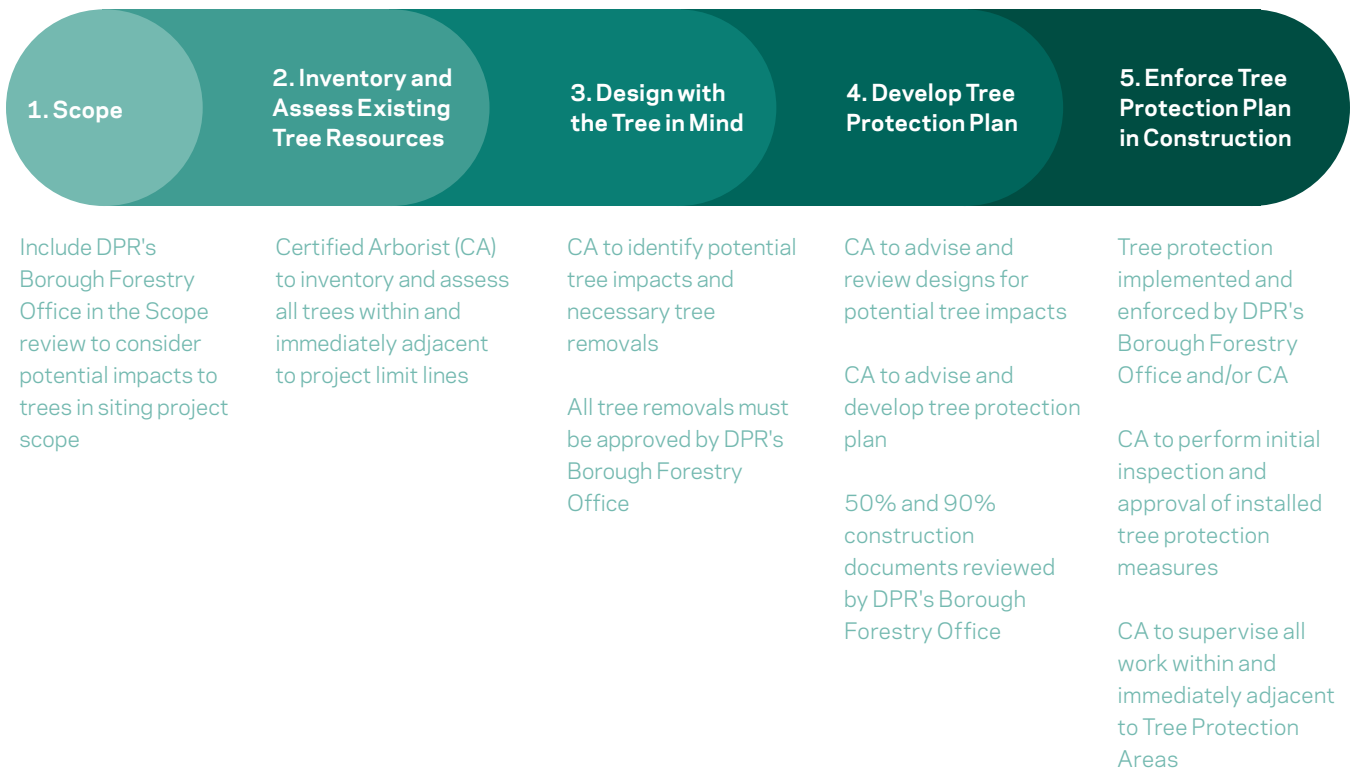
In order to preserve existing trees, their roots must be protected. Tree roots extend well beyond the visible canopy and are generally within the top three feet of soil. The minimum number of roots a tree needs to survive is called the critical root zone (CRZ) and will be determined by the CA using the International Society of Arboriculture’s *Best Management Practices for Managing Trees During Construction* (F. Kite, T. Smiley, 2008). The individual CRZ radii should be incorporated into all phases of design and reflected on a CRZ map. The goal is to preserve as many roots as possible beyond the CRZ through sensitive design and the use of best practices during construction.



DPR is expanding existing tree beds throughout the city to promote tree health and reduce potential trip hazards created by heaving: Devoe Street, Brooklyn (Credit: DPR)



Reconfiguration of a sidewalk to promote tree health (before and after): Aberdeen Road, Queens (Credit: DPR)



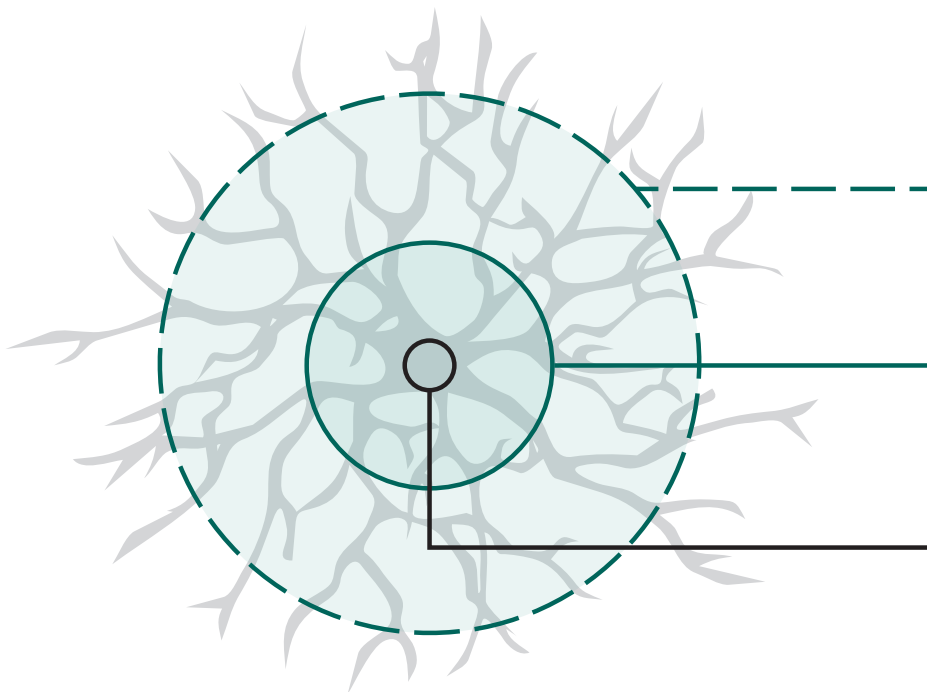


ABOVE: Root pinning resolves sidewalk heaving while preserving existing trees: Black Locust Triangle, 123rd Street and North Conduit Avenue, Brooklyn (Credit: DPR)

RIGHT: Removing soil from around a tree's roots through pneumatic excavation allows for work to be done without damaging the tree: **LEFT** - Fort Totten Park, Queens (Credit: DPR); **RIGHT** - 235th Street and 119th Avenue, Queens (Credit: Lisa Montana)



Critical Root Zone Diagram



"ISA" CRZ Radius = $\text{DBH} \times 6" - 18"$

Determined by the tree species tolerance to construction impacts and tree age

"Absolute" CRZ Radius = $\text{DBH} \times 5"$

Protecting only to this CRZ will result in significant life-threatening impacts to the tree

Tree Stem

DBH: Diameter at Breast Height (measured 4.5' above ground)

Tree Protection Area

The tree protection area (TPA) is the most important tool used in the preservation of existing trees. Generally, the TPA is developed in coordination with the CA during design and is defined by the canopy drip line of the tree. The TPA will always encompass the CRZ. (See *Tree Protection Area Diagram*.) During construction, the TPA is typically established with a fence or barrier. In circumstances where a majority of

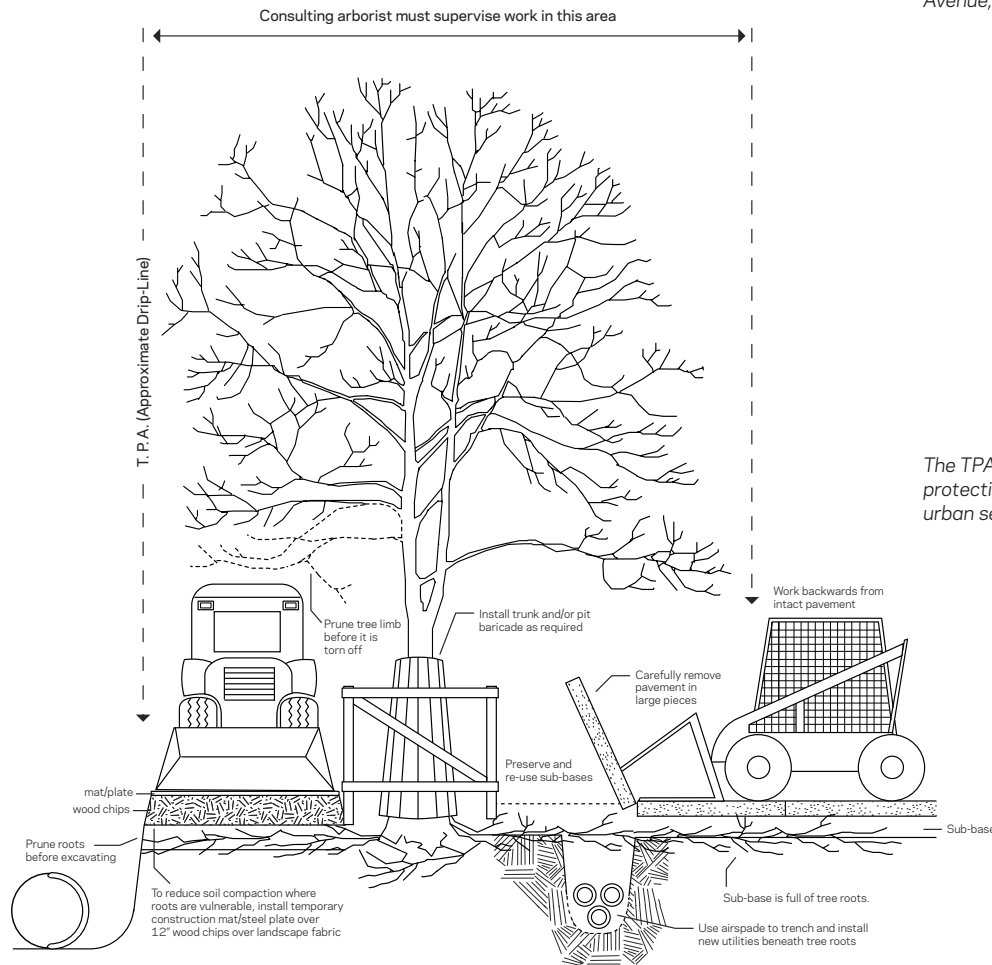
roots are growing beneath pavement, special methods should be utilized. (See *diagram*.) No activity, including non-construction-related activities, may occur within the TPA without approval from DPR and supervision by the CA. If construction work must occur within the TPA, the contractor must work with the CA to employ techniques, such as pneumatic excavation (air spading) to expose and preserve the roots in good condition.



TOP: Tree protection measures during reconstruction of the Allen Street Malls, Manhattan (Credit: DPR)

BOTTOM: Typical tree protection area (TPA) in a landscape setting; specialized treatments should be used in urban settings: Conduit Avenue, Queens

Tree Protection Area Diagram



The TPA diagram provides guidance on tree protection during construction projects in an urban setting

Plant Installation

All plants must be installed per DOT and/or DPR standards. See DPR's Planting Specification Checklist. In addition, contact DigNet or call 811 prior to installation to identify utilities and have them field-verified by proper authorities. The optimal time for planting trees, shrubs, and perennials is during the spring and fall, with some trees restricted to spring planting only. In New York City, this corresponds generally to March 1–May 31, and October 1–December 31, weather permitting. No plants should be installed once the ground has frozen.

Period of Establishment

Newly installed plants require consistent maintenance throughout the growing season in order to become established and thrive. Establishment periods vary, but under a DPR planting permit, the installer is required to water and provide regular care for the first two years.

Another strategy to promote successful establishment of plants is to include a progress payment schedule as part of the landscape portion of the contract. This is a mechanism whereby the landscape portion of the contract is paid in installments throughout the period of establishment only when the contractor performs required tasks such as watering. This incentivizes the contractor to perform regular maintenance instead of just replacing plants that have died at the end of the establishment period.



Combinations of plantings create interesting contrasts of texture and color: New York Botanical Garden, Bronx (Credit: Lynden B. Miller)

Maintenance

Site design and species selection should correspond to the anticipated level of maintenance a planting will receive following installation. Planting areas should be designed to provide sufficient space for personnel to maintain them. Such design considerations may include, among other things, paths within or surrounding the planting areas. The frequency of available maintenance and skill levels of those providing maintenance are important considerations that must be addressed during design.

Maintenance should include an appropriate level of watering, weeding, pruning, cultivating, and waste removal. Repair of minor washouts, mulching, soil replacement, plant replacement and other horticultural operations may also be necessary. Any existing invasive plants that cannot be removed or outbreaks of new invasive species will have to be managed through ongoing maintenance. Selecting plants that are drought tolerant, are disease

resistant, compete well, and have the appropriate form at maturity will reduce maintenance needs.



DOT's Adopt-a-Highway program provides opportunities for enhanced plantings and maintenance along limited-access arterials: Belt Parkway and East 12th Street, Brooklyn

Tree Beds

The city strives to build, permit, and manage as diverse an urban ecosystem as possible. A diverse ecosystem is ultimately more resilient and reduces the risk associated with urban forest management and maintenance. Visit DPR's webpage on tree care for more information.

In partnership with the New York Restoration Project, DPR will have planted 220,000 street trees (1,000,000 trees total) by 2017. Visit MillionTreesNYC.org for more information.

Tree Bed

Excavated pits that allow for the planting of street trees and other vegetation within the public ROW. This is a standard treatment that DPR installs and maintains. Other entities are also encouraged to pursue this treatment but require a permit from DOT and DPR.

Tree beds are used extensively all over the city and should be used wherever sidewalks exist if conditions allow. INDIVIDUAL TREE BEDS (6.1.1a) are currently the only required design, however CONNECTED TREE BEDS (6.1.1b) should be used wherever possible to provide improved tree health, and DEP ROW BIOSWALES (6.6.1a)—those that take water from the roadway—should be considered wherever DEP Priority CSO Tributary Areas are affected.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

For further information on the benefits of trees, see the United States Department of Agriculture's NYC *Municipal Forest Resource Analysis*

Considerations

See GENERAL GUIDELINES (6.0.1)

DOT and DPR permits are required to install trees. The permit holder must maintain and guarantee the tree and bed for two years

DPR contractors will maintain tree beds (individual or connected) planted by DPR for two years after planting, after which each individual property owner is responsible for maintaining the tree-bed(s), while DPR retains responsibility for and jurisdiction over the tree itself; see DPR's webpage on tree-bed care



Street trees along a sidewalk. Spacing is dependent on species. The open tree beds allow for water and air to get to the tree roots: Post Avenue, Manhattan (Credit: DPR)

Design

See **GENERAL GUIDELINES (6.0.1)**

Meet or exceed minimum size and design requirements of DPR's Tree Planting Standards contingent upon accommodation of pedestrian capacity and sub-surface constraints

An 8-foot clear path should be maintained in areas with high pedestrian traffic and a 5-foot clear path in areas with low pedestrian traffic. Exceptions may be approved by DOT and DPR on a case-by-case basis. In all cases, a tree bed should not take up more than 50% of the total sidewalk width or reduce the sidewalk width to less than 3 feet

Where feasible, use **CONNECTED TREE BEDS (6.1.1b)** instead of **INDIVIDUAL TREE BEDS (6.1.1a)** to increase root space and stormwater detention capacity

Diversify street tree species along a block to avoid species blight and plant the largest-canopy species that site conditions allow

Minimum center-to-center distance between trees is 25 feet, depending on tree species and local conditions, and can be as much as 40 feet if the canopy of an existing, neighboring tree is large. Slightly closer spacing may be appropriate if planting in continuous beds or using narrow growing species

Do not remove or add topsoil around the rooting area of established trees; mulch is preferred

Maximize exposed soil to allow more water and air to get to the roots of the tree; if necessary due to high pedestrian traffic, use DPR-approved permeable surface treatments over the tree bed

Tree-bed guards are recommended



Typical tree bed with standard tree-bed guard: Prospect Avenue, Brooklyn

Tree-bed grates that are flush with the sidewalk and vertical tree guards that enclose the tree trunk are not permitted

Do not install any plants within the area of the root ball of a new tree or within 3 feet of the trunk of an established tree

When planting beneath the canopies (within the driplines) of established trees, choose plants in containers no larger than 1 gallon each to minimize damage to trees

Consider the use of a suspended pavement system to increase available root space

Application

The New York City Zoning Resolution requires that one tree be provided for every 25 feet of curb frontage for new developments and major alterations; all other spacing requirements per DPR tree-planting standards still apply

All areas with **FULL SIDEWALKS (6.3.1)**, **RAISED MEDIANS (6.2.1)**, **PEDESTRIAN SAFETY ISLANDS (2.2.4)**, **PEDESTRIAN MALLS (6.2.1c)**, **TRIANGLES (6.2.2)**, and **PLAZAS (6.4)**

CONNECTED TREE BEDS (6.1.1b) should be utilized as an alternative to **INDIVIDUAL TREE BEDS (6.1.1a)** wherever feasible

Plants

See Tree-Bed Planting Recommendations (Table 6.A)

TREE BED

Individual Tree Bed

A tree bed within a sidewalk, median, triangle, or plaza, disconnected from other tree beds, where a tree is planted. This is a standard treatment that will be installed and maintained by the city.

Benefits

See benefits of TREE BED (6.1.1)

Considerations

See considerations for TREE BED (6.1.1)

The installation of a tree-bed guard requires a permit from DPR

Application

See application guidance for TREE BED (6.1.1)

Use CONNECTED TREE BEDS (6.1.1b) rather than INDIVIDUAL TREE BEDS (6.1.1a) wherever possible

Design

See design guidance for TREE BED (6.1.1)

Tree-bed sizes may vary depending on site conditions and should be designed to be as large as possible

One of DPR's eleven standard tree-bed guards should be used

Tree-bed guard should be a minimum of 18 inches high, with the lowest horizontal member no more than one inch above the sidewalk, and without any features extending outward beyond the tree bed border

In curbside tree beds, only three-sided tree-bed guards are permitted, with the open side at the curb, 18 inches from the curb face

Tree beds without tree-bed guards must have a flat surface without any tripping hazard and be no more than one inch above or below the adjacent sidewalk surface



Tree bed with standard tree-bed guard. While tree beds may vary in size, larger dimensions allow for more growth: Vanderbilt Avenue, Brooklyn

Plants

See Tree-Bed Planting Recommendations (Table 6A)

TREE BED

Connected Tree Bed

A series of tree beds connected with a continuous trench in order to provide increased root space and stormwater detention. This is a standard treatment that will be installed and maintained by the city.

Benefits

See benefits of TREE BED (6.1.1)

Provides greater space for tree roots than INDIVIDUAL TREE BED (6.1.1a), improving tree health and longevity

In areas where a RIBBON SIDEWALK (2.2.1b) is inappropriate, connected tree beds provide many of the same benefits

Additional soil provides more stormwater detention capacity than INDIVIDUAL TREE BEDS (6.1.1a)

Considerations

See considerations for TREE BED (6.1.1)

Application

See application guidance for TREE BED (6.1.1)

Whenever possible in lieu of INDIVIDUAL TREE BED (6.1.1a)

Consider RIBBON SIDEWALK (2.2.1b) as an alternative in areas of low-to-moderate land use density per its application guidance and zoning requirements

Consider DEP ROW BIOSWALES (6.6.1a) in DEP Priority CSO Tributary Areas where conditions are appropriate



Connected tree beds with permeable-paver-covered trench: Columbia Street, Brooklyn (Credit: DPR)

Design

See design guidance for TREE BED (6.1.1)

The trench of connected tree beds should be left uncovered (and, optionally, landscaped) to improve tree root health

Where pedestrian access is necessary (areas of high foot traffic, limited sidewalk space, or frequent curbside access), pavement can be bridged over the tree-bed trench using a suspended pavement system to increase soil volume

Plants

See Tree-Bed Planting Recommendations (Table 6A)

TABLE 6A

Tree-Bed Planting Recommendations

The DPR list of approved street trees can be found on its website. Tree species should always be selected based on site-specific conditions and approved by DPR.

The following list is a small sampling of perennials and groundcovers that have been successfully used in tree beds in New York City. Large plants or woody shrubs should not be planted in tree beds where there are existing trees. This list is not comprehensive and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site-specific conditions and approved by DPR.

Groundcover

Scientific Name 'Cultivar' Trade Name Common Name	Appearance						Tolerances					
	Height	Spread	Characteristics				Drought-Flood	Light	Salt	High pH		
<i>Gaylussacia brachycera</i> Box Huckleberry	1.5'	3'	MAY JUN					✓			◆	–
<i>Rubus calycinoides</i> 'Emerald Carpet' Ornamental Creeping Raspberry	.5'-1'	2'	MAY JUN					✓			◆	–

Grasses/Grass-like Plants

<i>Miscanthus sinensis</i> 'Little Kitten' Little Kitten Eulalia Grass	1"-3"	1'-1.5'	AUG FEB					✓	✓			◆	◆
<i>Festuca glauca</i> 'Elijah Blue' Elijah Blue Fescue	.5'-1'	1'	JUN JUL					✓			◆	◆	
<i>Carex morrowii</i> 'Ice Dance' Ice Dance Sedge	.5'-1'	1'-2'	APR JUN					✓	✓			◆	–

Perennials

<i>Echinacea purpurea</i> 'Magnus' PowWow Wildberry Coneflower	2'-2.5'	1'-1.5'	JUN SEP					✓			◆	◆	
<i>Heuchera villosa</i> 'Miracle' Miracle Coral Bells	1'-1.5'	1'	JUL					✓	✓			◆	◆
<i>Hosta sieboldiana</i> 'Frances Williams' Frances Williams Hosta	2'	3'-4'	JUL						✓			◆	–
<i>Lysimachia nummularia</i> 'Goldilocks' Goldilocks Creeping Jenny	4"	1'-3'	JUN JUL						✓			◆	◆
<i>Phlox subulata</i> 'Red Wings' Red Wings Creeping Phlox	6"	2'-3'	MAY						✓			◆	◆
<i>Rudbeckia</i> 'City Garden' City Garden Black-Eyed Susan	.5'-1'	1'-1.5'	JUN SEP					✓	✓			◆	◆
<i>Sedum</i> 'Abbeydore' Abbeydore Stonecrop	1.5'		AUG NOV					✓	✓			◆	◆
<i>Tiarella cordifolia</i> 'Brandywine' Foam Flower	1'-1.5'	1'-2'	MAY						✓			◆	◆

Bulbs

<i>Chionodoxa forbesii</i> 'Pink Giant' Pink Giant Glory of the Snow	6"-9"	3"-6"	MAR					✓	✓			◆	◆
<i>Crocus vernus</i> Dutch Crocus	6"	4"-6"	MAR APR					✓	✓			◆	◆
<i>Galanthus elwesii</i> Giant Snowdrop	9"	6"	FEB MAR					✓	✓			–	–
<i>Narcissus</i> 'Mondragon' Mondragon Daffodil	1'-1.5'	.5'-1'	MAR APR					✓	✓			◆	◆

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Roadway Plantings

Roadway plantings are trees, shrubs, groundcovers, perennials, and other vegetation located within the roadbed of a street. Generally, plantings are installed within raised medians or triangles that separate or channelize traffic.

Roadway plantings must endure various stresses: salt, wind, drought, damage from vehicles, and limited growing space.

These all impact plant health and should guide design and plant selection.

Raised Median

A RAISED MEDIAN (2.2.3) that provides an opportunity for planting. Medians can be 6–7 inches high (at curb height) or 12–24 inches high to provide additional growing medium as well as increased protection. Medians allow for various types of plantings due to their different sizes and lengths. Trees are typical; however, careful consideration must be given to the sight lines of drivers, cyclists, and pedestrians. DPR maintains many existing median plantings, pursuant to the Greenstreets agreement between DPR and DOT.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Planted medians increase the traffic-calming effect afforded by MEDIANS (2.2.3)

Considerations

See GENERAL GUIDELINES (6.0.1)

Allow adequate room for trucks and buses to make necessary turns without damaging plant material

Consider environmental and physical stresses plants must withstand, including drought/inundation, sun/shade, heat/cold, wind, road salt, garbage, vehicular damage, and compaction

Consider the lifespan and longevity of species, as plant replacement will be difficult and costly

Typically, plantings are watered via a water truck; however, consider how maintenance workers will access the plantings to perform other regular maintenance activities

Excluding trees, median plantings not covered under the DPR-DOT Greenstreets agreement require a maintenance agreement



Planted median. Low plantings are located near the intersection to allow better visibility. Contrasting colors and texture add interest: Adams Street, Brooklyn (Credit: DPR)



Curb-height median with tree beds. Select narrow species where there is limited space for canopies: Richmond Terrace and Nicholas Street, Staten Island (Credit: DPR)

Design

See **GENERAL GUIDELINES (6.0.1)**

See **RAISED MEDIAN (2.2.3)** for geometric design guidance; all medians must include an area, free of vegetation or obstructions, for pedestrians to safely cross at the intersection

Where planting trees, see design guidance for **TREE BED (6.1.1)**

Planted medians should be a minimum of 7-foot wide to allow for 6 feet of planting space with a 6-inch-wide curb on either side. Exceptions may be approved by DOT and DPR on a case-by-case basis. Where conditions allow, an 18-inch-wide curb around the perimeter of the planting bed is preferred

Provide a minimum 24 inches depth of organic, well-draining soil; 30–36 inches is optimal

Positive drainage below the planting soil is essential. Any impermeable layers of concrete or asphalt must be removed

Where conditions allow, medians should be planted with large-growing canopy trees

Tree spacing should be based on the appropriate mature width of the species chosen and must be approved by DPR

Minimum distance from the curb at the end of the median to the center of the tree trunk is 35 feet

Where truck and bus traffic is heavy, consider using columnar species to reduce damage to plants

Consider planting fewer species to provide continuity and reduce overall maintenance needs; select plants that will provide year-round ornamental interest

Space shrubs and other plants so as to encourage dense, full growth, however, do not overcrowd, which can lead to poor air circulation and encourage the spread of pest and disease problems

Use drought-tolerant, salt-tolerant species that require little to no pruning or deadheading to maintain their shape, size, vitality, and ornamental interest

Plants

See Roadway Planting Recommendations (Table 6B)

RAISED MEDIAN

Curb Height

A median that is raised 6–7 inches above the roadbed and provides adequate width to allow for plantings. RAISED MEDIAN (CURB HEIGHT) are utilized throughout the city. Trees and other ornamental plantings add to the traffic-calming effect provided by medians.

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See considerations for RAISED MEDIAN (6.2.1)

Consider underground utility constraints as excavation beneath the roadbed will be necessary to provide adequate soil volume and positive drainage

If the roadway can be regraded to a double crown, consider using the median to capture and detain stormwater; See STORMWATER MANAGEMENT PRACTICES (6.6.1)

Design

See design guidance for RAISED MEDIANS (6.2.1)

Consider the use of a suspended pavement system and CONNECTED TREE BEDS (6.1.1b)

Plantings must not protrude into the roadway; select plants that will grow densely within the planting bed

Plants

See Roadway Planting Recommendations (Table 6B)



Planted curb-height median: 253rd Street and 86th Avenue, Queens (Credit: DPR)



Curb-height median with plantings set back from the curb to allow for easier maintenance: Merrick Boulevard, Queens (Credit: DPR)

RAISED MEDIAN

12-24 Inches

A median, typically constructed of concrete or stone, 12-24 inches above the roadbed that provides above-ground soil volume for plantings. Generally employed where underground constraints prevent planting at grade and/or along high-speed roadways.



Raising medians to over 12 inches helps accommodate tree roots: West Houston Street, Manhattan (Credit: DPR)



Planted raised median: Canal Street, Manhattan (Credit: DPR)

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for RAISED MEDIAN (6.2.1)

Higher medians can encourage higher motor vehicle speeds; therefore, design the median to the minimum height necessary to accommodate appropriate soil depth

Consider visibility in relation to the overall height of mature plantings and the raised median (12 - 24 inches)

Existing trees at potential raised-median sites should be preserved if possible; consider installing the median around the trees to prevent excavation and change of soil grade

Design

See design guidance for RAISED MEDIAN (6.2.1)

Planting beds should be sufficiently wide and deep to provide adequate soil volume for plants: 6 feet minimum soil width (wall to wall) and 24 inches minimum soil depth

Always excavate through the entire roadbed so the bottom of the planting bed is open and will allow positive drainage

The roots of plants will be primarily above ground, and are thus more sensitive to freeze-thaw cycles in the winter. Carefully select species which are cold hardy to at least Zone 6A. For added insulation, provide adequate mulch (2 - 3 inches) at the time of planting and replenish as necessary

For perimeter plantings, choose plants that will not protrude beyond the edge of the raised wall; plants that cascade over the edge of the wall may be acceptable

Plants

See Roadway Planting Recommendations (Table 6B)

RAISED MEDIAN

Pedestrian Mall

A wide median that allows for pedestrian use and circulation in addition to plantings. Pedestrian malls, like the Allen Street Malls or the Park Avenue Mall at East 97th Street in Manhattan, provide a safe area for pedestrian use within the roadway. Typically, these malls are DPR property and are maintained by DPR or by neighborhood groups through a maintenance agreement.



Left: The same pedestrian mall in the summer, with plantings that provide shade while maintaining visual interest: Park Avenue and 97th Street, Manhattan (Credit: Lynden B. Miller)



ABOVE: Strategic tree and plant selection allows for year-round interest. Early flowering trees and bulbs add color in the spring: Park Avenue and 97th Street, Manhattan (Credit: Lynden B. Miller)



In the fall, this pedestrian mall features colorful foliage: Park Avenue and 97th Street, Manhattan (Credit: Lynden B. Miller)



Evergreens provide color in the winter: Park Avenue and 97th Street, Manhattan (Credit: Lynden B. Miller)

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See considerations for RAISED MEDIAN (6.2.1)

Consider pedestrian and bicycle circulation within the mall

Consider how the planting design will function with other elements, such as seating, lighting, and artwork

Consider the collection of stormwater. See STORMWATER MANAGEMENT PRACTICES (6.6.1)

Plantings, excluding trees, not maintained by DPR require a maintenance agreement

Design

See design guidance for RAISED MEDIAN (6.2.1)

Adequate access should be provided throughout the mall; planting areas should be designed to accommodate necessary circulation

A minimum of 8 feet must be provided for a pedestrian-only path, 8 feet for a two-way bicycle path, and 12-14 feet, depending on the volume of users, for a shared-use path

Plant densely to discourage weed growth and pedestrian access through the plantings

Consider the use of tree-bed guards around planting areas to discourage trampling of plant material

Plants

See Roadway Planting Recommendations (Table 6B)

Triangle

A planted area of any size and shape, not just a triangle, within the public ROW that generally separates and/or channelizes traffic. Typically, existing planted triangles are maintained by DPR (through the Greenstreets agreement between DOT and DPR) or another entity, such as a neighborhood group through a maintenance agreement.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Can incorporate community facilities such as seating or other furnishings to encourage social and recreational activities, depending on its size and capacity of the maintenance partner

Considerations

See GENERAL GUIDELINES (6.0.1)

May impact street drainage or require catch-basin relocation

Safe access to plantings for maintenance workers must be provided

Landscaping or stormwater source controls not covered under the agreements between DPR, DEP, and DOT require a maintenance agreement

Design

See GENERAL GUIDELINES (6.0.1)

Where planting trees, see design guidance for TREE BED (6.1.1)

Design details should be determined on a site-specific basis in consultation with DPR, DOT, and DEP

Consider pedestrian access and circulation; paths should be uninterrupted through triangles

Consider height and width of shrubs, grasses, and perennials at maturity, and, if necessary, keep taller plants towards the interior and use shorter plants along the exterior of triangle plantings. Choose dwarf species where visibility is a concern



Planted triangle. Clear paths are provided for pedestrian circulation: Grand Army Plaza, Brooklyn



Planted triangle. Shorter plants are located near the edge to maintain sightlines: Macombs Road and Grand Avenue, Bronx (Credit: DPR)



Planted triangle: Flushing Avenue and 59th Street, Queens (Credit: DPR)

Plants must not protrude into the roadway; plant densely within the planting bed to discourage weed growth and trampling

Use salt-tolerant, drought-tolerant species for plantings

Consider designing the area to capture stormwater runoff. See STORMWATER MANAGEMENT PRACTICES (6.6.1)

Plants

See Roadway Planting Recommendations (Table 6B)

Street End

The public space at the end of a street abutting a boardwalk or body of water. Pedestrian access to the waterfront or boardwalk must be maintained. In some cases, such as street ends in Greenpoint and Williamsburg in Brooklyn, the area is subject to a Waterfront Access Plan (WAP). This plan is created by DCP and outlines specific concerns regarding design, access, and maintenance.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Provides an opportunity to actively collect and manage stormwater

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for TRIANGLE (6.2.2)

Consider physical and environmental stresses when selecting plants; especially if near the coast or a river

If DPR will not maintain plantings, a maintenance agreement will be required

Design

See GENERAL GUIDELINES (6.0.1)

Consult DCP for Waterfront Public Access requirements for adjacent parcels and to allow for coordination with existing or future public access areas and continuous access along the shoreline where appropriate

A minimum 5-foot path for pedestrian access should be provided through a planted area if there is an accessible area beyond the plantings

If a maintenance partner can be identified, consider the use of community amenities, such as street furniture, in conjunction with plantings

Consider the capture of stormwater runoff. See STORMWATER MANAGEMENT PRACTICES (6.6.1)



Street closures can create opportunities for plantings: 73rd Avenue, Queens



Planted area in a street end. These hardy grasses are appropriate for the context; they can tolerate salt and a wide range of soil conditions and provide year-round interest: 73rd Avenue, Queens

Consider the use of a barrier, such as a W-section guide rail or bell bollard, to prevent vehicular access and damage to plantings; all barriers must be reviewed and approved by DOT and any non-standard barriers will require a maintenance agreement

Plants

See Roadway Planting Recommendations (Table 6B)

TABLE 6B

Roadway Planting Recommendations

Trees, shrubs, groundcovers, perennials, and other vegetation located within the roadbed of a street. Generally, plantings are installed within raised medians or triangles that separate or channelize traffic. This list is not comprehensive and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site-specific conditions and approved by DPR.

Trees

Scientific Name 'Cultivar' Trade Name Common Name	Appearance					Tolerances						
	Height	Shape	Characteristics			Drought-Flood	Light	Salt	High pH			
<i>Ulmus</i> 'New Harmony' ^ New Harmony Elm	>40'						✓	✓			◆	◆
<i>Ginkgo biloba</i> (Fruitless Cultivar Only) Ginkgo							✓	✓			◆	◆
<i>Juniperus chinensis</i> 'Keteleeri' * Keteleer Chinese Juniper	15'-40'						✓	✓			◆	◆
<i>Koelreuteria paniculata</i> Goldenrain Tree			AUG SEP				✓				◆	◆
<i>Prunus serrulata</i> 'Okame' * Okame Cherry			APR				✓				◆	—

Shrubs

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Appearance					Tolerances					
			Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Drought-Flood	Light	Salt	High pH		
<i>Hydrangea paniculata</i> 'DVPinky' Pinky Winky Hydrangea	6'-8'	5'-6'	JUL SEP						✓			◆	◆
<i>Cornus sericea</i> 'Farrow' Arctic Fire Red Twig Dogwood	3'-4'	3'-4'	MAY JUN						✓			◆	◆
<i>Rosa</i> 'Radcor' Rainbow Knock Out Rose		4'-5'	MAY NOV						✓			◆	◆
<i>Abelia x grandiflora</i> 'Rose Creek' Rose Creek Glossy Abelia	<3'	3'-4'	MAY SEP					✓				◆	—
<i>Caryopteris x clandonensis</i> 'Dark Knight' Dark Knight Blue Mist Shrub		1.5'-2'	JUL SEP					✓				◆	—
<i>Juniperus chinensis</i> var. <i>sargentii</i> 'Glauca' Blue Sargent Juniper		6'-9'						✓	✓			◆	◆
<i>Lagerstroemia indica</i> 'Gamad II' Razzle Dazzle Crepe Myrtle		3'-4'	JUL SEP					✓	✓			◆	◆
<i>Potentilla fruticosa</i> Shrubby Cinquefoil		3'-4'	JUN NOV					✓	✓			◆	◆
<i>Rhus aromatica</i> 'Gro Low' Gro Low Sumac		6'-8'	APR					✓	✓			◆	◆
<i>Spiraea x bumalda</i> 'Goldmound' Goldmound Spirea		3'-4'	MAY					✓	✓			◆	◆
<i>Yucca filamentosa</i> 'Color Guard' Color Guard Adam's Needle		2'-3'	JUN SEP					✓	✓			◆	◆

Perennials

<i>Liriope muscari</i> 'Big Blue' Big Blue Lilyturf	1'-2'	1'-2'	AUG SEP					✓	✓			◆	◆
<i>Nepeta x 'Walker's Low'</i> Walker's Low Catmint	2'-2.5'	2.5'-3'	AUG SEP					✓	✓			◆	◆
<i>Perovskia atriplicifolia</i> 'Little Spire' Little Spire Russian Sage	1.5'-2'	1.5'-2'	JUN NOV					✓	✓			◆	◆
<i>Echinacea purpurea</i> Coneflower	2'-3'	1.5'-2'	JUN AUG					✓	✓			◆	◆

Grasses/Grass-like Plants

<i>Chionodoxa forbesii</i> 'Pink Giant' Pink Giant Glory of the Snow	3'-5'	1.5'-2.5'	JUN FEB					✓	✓			◆	◆
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Bulbs

<i>Narcissus</i> 'Improved King Alfred' Trumpet Daffodil	1'-2'	.5'-1'	APR MAY					✓	✓			◆	◆
<i>Allium</i> 'Globemaster' Globemaster Ornamental Onion	1.5'-2.5'	1'-1.5'	JUN					✓	✓			◆	◆

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Sidewalk Plantings

Sidewalk plantings are trees, shrubs, groundcovers, perennials, and other vegetation located on the sidewalk. Generally, plantings are located within the sidewalk furnishing zone. Sidewalk plantings must endure limited growing space, compaction, salt, and damage from people, animals, and vehicles; these factors should guide plant selection.

Full Sidewalk

Any planting within the furnishing zone of a FULL SIDEWALK (2.2.1a); may include street trees, ornamental plantings, stormwater plantings, or other types of vegetation. Street trees should be planted wherever possible. While DPR is responsible for the maintenance of the city's street trees, other ornamental plantings, such as tree bed plantings, are encouraged but will require a maintenance agreement. DEP ROW BIOSWALES (6.6.1a) are generally installed on sidewalks in DEP Priority CSO Tributary Areas to capture stormwater runoff from the roadway where conditions are appropriate.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for TREE BED (6.1.1)

Adequate access from the street and to building entrances must be maintained

Consider environmental and physical stresses plants must withstand, including drought/inundation, sun/shade, heat/cold, wind, compaction, garbage, and animal damage

Plantings, other than trees, outside the DPR-DOT Greenstreets agreement will require a maintenance agreement

Design

See design guidance for TREE BED (6.1.1) and SIDEWALK (2.2.1)

Meet minimum size and design requirements of DPR's Tree Planting Standards

The New York City Zoning Resolution requires that one tree be provided for every 25 feet of curb frontage for new developments and major alterations



Plantings can be coordinated with benches and other amenities to create a welcoming streetscape: Columbus Avenue at 76th Street, Manhattan



Planted area in front of PS 234. Planted areas adjacent to schools can provide educational opportunities: Greenwich Street at Chambers Street, Manhattan (Credit: Lynden B. Miller)



A wide sidewalk can accommodate more expansive planted areas. Such installations are maintained by private partners or DPR: Greenwich Street at Warren Street, Manhattan

Maximize available soil volume and select plants with appropriate shape, form, and ultimate size to allow proper sight lines for pedestrian, bicycle, and vehicular traffic

Consider the installation of DEP ROW BIOSWALE (6.6.1a)

Plants

See Sidewalk Planting Recommendations (Table 6C)

Ribbon Sidewalk

RIBBON SIDEWALKS allow for planting along the curb. They typically occur in more residential areas with low-volume pedestrian traffic. The planting strip generally consists of trees and turfgrass, but can also provide an opportunity for enhanced ornamental plantings.



Ribbon sidewalk with turf grass and trees. Trees can be very large due to expanded rooting area afforded by adjacent lawns: Bancroft Avenue at Edison Street, Staten Island (Credit: DPR)



Ribbon sidewalk with lawn planting strip and trees. This configuration is common in lower-density residential areas and generally supports larger trees: Ocean Parkway at Avenue C, Brooklyn

Benefits

See **BENEFITS OF PLANTINGS IN THE ROW (6.0)**

Considerations

See **GENERAL GUIDELINES (6.0.1)**

May impact underground or overhead utilities

Consider environmental and physical stresses plants must withstand, including drought/inundation, sun/shade, heat/cold, wind, compaction, garbage, and animal damage

Planting strips adjacent to ribbon sidewalks must be planted with groundcover vegetation for erosion control if a **STORMWATER MANAGEMENT PRACTICE (6.6.1)** solution is not used

The adjacent property owner or other maintenance partner is responsible for maintenance of any plantings other than trees

Design

See design guidance for **TREE BED (6.1.1)**

Groundcover other than turfgrass is permitted as long as adequate access every 20 feet via walkable vegetation or another accessible surface is provided from the roadway

Consider the capture of stormwater runoff. See **STORMWATER MANAGEMENT PRACTICES (6.6.1)**

Select low-growing plants that will have year-round ornamental interest

Plants

See Sidewalk Planting Recommendations (Table 6C)

Curb Extension

A CURB EXTENSION that is planted rather than paved.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Considerations

See GENERAL GUIDELINES (6.0.1)

May impact street drainage and require new catch basins

Landscaping or stormwater source controls other than city-maintained ROW Bioswales, Greenstreets and Stormwater Greenstreets require a maintenance agreement

Design

See design guidance for CURB EXTENSION (6.2.1)

If located at a corner, maintain clear access to the crosswalk and the pedestrian ramp

Where possible, pitch sidewalks to direct water into the planting beds. Additionally, consider the capture of stormwater from the roadway. See STORMWATER MANAGEMENT PRACTICES (6.6.1)

Select low-growing plants that will have year-round ornamental interest and not block sight lines. Consider the use of tree-bed guards around planted areas

Plants

See Sidewalk Planting Recommendations (Table 6C)



Curb extension with Greenstreet: Greenwich and Christopher Streets, Manhattan



Curb extension with Greenstreet: West 11th Street at Seventh Avenue South, Manhattan

TABLE 6C

Sidewalk Planting Recommendations

Trees, shrubs, groundcovers, perennials, and other vegetation located on the sidewalk. Generally, plantings are located within the sidewalk furnishing zone; see SIDEWALKS (3.1). This list is intended for wide sidewalks and curb extensions that have ample room for planting. For a small sample of plantings acceptable in tree beds, see TREE BEDS (6.1). This list is not comprehensive and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site-specific conditions and approved by DPR.

Trees

Scientific Name 'Cultivar' Trade Name Common Name	Appearance						Tolerances			
	Height	Shape	Characteristics				Drought-Flood	Light	Salt	High pH
<i>Quercus phellos</i> * Willow Oak	50'-70'						✓		◆	◆
<i>Metasequoia glyptostroboides</i> Dawn Redwood	50'-70'						✓	✓	◆	◆
<i>Zelkova serrata</i> 'Village Green' * Village Green Japanese Zelkova	60'-70'						✓		◆	—
<i>Eucommia ulmoides</i> Hardy Rubber Tree	40'-60'						✓		◆	◆
<i>Cercis canadensis</i> * Eastern Redbud	20'-30'		APR				✓	✓	◆	—
<i>Maackia amurensis</i> Amur Maackia	20'-30'		JUN				✓		—	—

Shrubs

Scientific Name 'Cultivar' Trade Name Common Name	Spread		Characteristics				Tolerances				
	Height	Spread	Bloom/Showy Flowers	Showy Fruit	Distinct Foliage	Fall Color	Drought-Flood	Light	Salt	High pH	
<i>Ilex crenata</i> 'Helleri' Heller's Japanese Holly	2'-3'	5'-8'					✓	✓		◆	◆
<i>Jasminum nudiflorum</i> 'Nanum' Compact Winter Flowering Jasmine	2'-3'	3'-4'	FEB MAR				✓			◆	◆
<i>Juniperus chinensis</i> 'Old Gold' Old Gold Juniper	2'-3'	4'-5'					✓	✓		◆	◆
<i>Rosa</i> x 'Noatraum' Flower Carpet Pink™ Flower Carpet Rose	2'-2.5'	3'	MAY SEP				✓	✓		◆	◆
<i>Juniperus conferta</i> 'Blue Pacific' Blue Pacific Shore Juniper	.5'-1'	4'-6'					✓	✓		◆	◆

Grasses/Grass-like Plants

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Characteristics				Tolerances				
			Bloom/Showy Flowers	Showy Fruit	Distinct Foliage	Fall Color	Drought-Flood	Light	Salt	High pH	
<i>Miscanthus sinensis</i> 'Adagio' Adagio Eulalia Grass	2'-3'	2'	AUG FEB				✓	✓		◆	◆
<i>Panicum virgatum</i> 'Hot Rod' Hot Rod Switch Grass	3'	2'	AUG SEP				✓	✓		◆	—
<i>Koeleria glauca</i> 'Coolio' Coolio Blue Hair Grass	1'-1.5'	1'-1.5'	MAR JUL				✓			◆	◆
<i>Carex elata</i> 'Aurea' Bowles Golden Sedge	1'-1.5'	1.5'						✓		◆	—

Perennials

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Characteristics				Tolerances				
			Bloom/Showy Flowers	Showy Fruit	Distinct Foliage	Fall Color	Drought-Flood	Light	Salt	High pH	
<i>Achillea millefolium</i> 'Pretty Belinda' Pretty Belinda Fernleaf Yarrow	1'-2'	1.5'	JUN JUL				✓			◆	◆
<i>Euphorbia</i> 'Ascot Rainbow' Ascot Rainbow Variegated Spurge	1.5'-2'	1.5'	JUN				✓			◆	◆
<i>Nepeta</i> x <i>faassenii</i> 'Kit Cat' Kit Cat Catmint	1.5'	1'-2'	MAY SEP				✓	✓		◆	◆
<i>Nipponanthemum nipponicum</i> Montauk Daisy	2'-3'	2'-3'	AUG SEP				✓	✓		◆	—

Bulbs

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Characteristics				Tolerances				
			Bloom/Showy Flowers	Showy Fruit	Distinct Foliage	Fall Color	Drought-Flood	Light	Salt	High pH	
<i>Allium christophii</i> Star of Persia	1'-2'	.5'-1.5'	MAY				✓	✓		◆	◆

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Plaza Plantings

Although plazas tend to consist mostly of hardscape to facilitate pedestrian circulation, sitting, and programming, plantings can make them more inviting and can help define spaces within them. Plazas allow for more growth potential and greater diversity of plant species than is possible in more constrained areas such as raised medians and tree beds.

See [PLAZA \(2.1.4\)](#) and [PERMANENT PLAZA \(2.1.4a\)](#) for more information on general plaza design.

In-Ground Planting Area

Planting areas within plazas that are level with the surrounding grade. The size and shape of the area may vary, and it is typically employed where there are few underground constraints.

Benefits

See **BENEFITS OF PLANTINGS IN THE ROW (6.0)**

Plants add character to a plaza and provide secondary environmental benefits

Plazas provide more room for planting and allow for a greater diversity of plants

Considerations

See **GENERAL GUIDELINES (6.0.1)**

Account for existing and proposed pedestrian circulation, especially major desire lines to crosswalks, building entrances, and pedestrian generators such as transit connections

Plazas should maintain a feeling of openness; plantings should not block critical sight lines through the plaza

Proximity to vehicular traffic and pedestrian circulation will impact the size and shape of the planting areas

Positive drainage must be established in all planting areas

Consider how maintenance workers will access the plantings to perform regular maintenance activities; access to a water source for irrigation should be provided

Design

Plantings must be considered in context of the overall plaza design. See **PERMANENT PLAZA (2.1.4a)** for design guidance



The plantings in this plaza were selected based on the microclimate, which is mostly shady and windy: Hanover Square, Lower Manhattan (Credit: Lynden B. Miller)

Maintain a clear path for any major pedestrian desire lines or defined circulation paths; if the plaza is located in front of a building, provide an additional clear path adjacent to the building

Provide adequate soil volume/rooting area for plantings; a minimum 24-inch depth and 5-foot width of organic, well-draining soil

Design plantings in relation to seating areas or other areas of interest to create or define edges, to add visual interest, to provide shade, and/or to provide other protection for plaza users

Select plants that provide year-round interest; utilize combinations of plants that have contrasting textures, colors, and forms

Plant densely to discourage littering, trampling and other improper uses

Direct stormwater runoff into plantings wherever possible. See **STORMWATER MANAGEMENT PRACTICES (6.6.1)**



Plaza plantings should provide year-round interest and be appropriate for a given microclimate: Hanover Square, Lower Manhattan (Credit: Lynden B. Miller)

In heavily trafficked areas, consider the use of suspended paving systems to maximize circulation while preventing soil compaction. Consider the use of a tree-bed guard where feasible

Plants

See **PLAZA PLANTINGS (6.4): Plaza Planting Recommendations**

Raised Planting Area

Any planting area within a plaza that is raised above grade. The size and shape of the area may vary from site to site and is typically employed where there are underground constraints. The majority of the soil volume is contained within the above-ground structure.

Benefits

See **BENEFITS OF PLANTINGS IN THE ROW (6.0)** and **IN-GROUND PLANTING AREA (6.4.1)**

Above-ground planting structures allow the integration of other design elements such as seating and lighting

Raising planters creates opportunities for planting where there are underground constraints

Raised planters create more substantial barriers from vehicles

Raised planters create protection from winter salt spray

Considerations

See **GENERAL GUIDELINES (6.0.1)**

See considerations for **IN-GROUND PLANTING AREA (6.4.1)**

Plant selection should be sensitive to the limited amount of soil available for root growth in a raised planter. Due to the limited soil volume, plants should be more drought-tolerant and will need to be watered more often

Soil is less insulated in raised planting beds; freeze/thaw cycles will be more extreme in winter; select plants that are one to two USDA zones harder to survive these conditions



Raised plantings along a path can be visually appealing. These plantings provide year-round interest: subway station on Broadway at 96th Street, Manhattan (Credit: Lynden B. Miller)

Design

See design guidance for **IN-GROUND PLANTING AREA (6.4.1)**

Consider the type of soil that will be used within the raised bed. Specify a soil with good water and nutrient holding capacity.

Raised structures allow for greater variation in topography and a larger variety of seating options

Planting beds, as a general rule, should not exceed 18 inches in height and should maintain visual and physical openness

Raised planting areas can provide additional seating by utilizing the wall of the raised structure as a seat wall; avoid creating long walls that impede pedestrian circulation



Raised plantings in a plaza can help create a sense of enclosure: subway station on Broadway at 96th Street, Manhattan (Credit: Lynden B. Miller)

Plants

See Plaza Planting Recommendations (Table 6D)

TABLE 6D

Plaza Planting Recommendations

The following list provides a small sampling of plants that have been successfully employed in plazas within NYC. This list is not comprehensive and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site specific conditions and approved by DPR.

Trees

Scientific Name 'Cultivar' Trade Name Common Name	Appearance						Tolerances				
	Height	Shape	Characteristics				Drought-Flood	Light	Salt	High pH	
<i>Acer rubrum</i> (and cultivars) ^* Red Maple	>40'		MAR APR				✓	✓		◆	—
<i>Cornus kousa</i> * Kousa Dogwood	15'-30'		JUN							▶	◆
<i>Magnolia x soulangeana</i> * Saucer Magnolia			MAR							▶	—
<i>Ilex x aquipernyi</i> 'Meschick' Dragon Lady™ * Dragon Lady Holly	<15'						✓	✓		▶	◆
<i>Malus spp. and cultivars</i> Crabapple			APR MAY					✓	✓		◆

Shrubs

Scientific Name 'Cultivar' Trade Name Common Name	Spread	Height	Flowering	Appearance				Tolerances				
				Characteristics	Drought-Flood	Light	Salt	High pH				
<i>Hibiscus syriacus</i> 'Diana' Diana Rose of Sharron	>8'	4'-6'	JUL SEP				✓	✓		◆	◆	
<i>Vitex agnus-castus</i> * Chaste Tree		5'-8'	JUL AUG				✓			◆	◆	
<i>Prunus cistena</i> Purple Sand Cherry		5'-8'	APR				✓	✓		◆	◆	
<i>Cornus alba</i> 'Elegantissima' Red-Stemmed Variegated Dogwood	3'-8'	3'-5'	MAY JUN					✓		▶	◆	
<i>Hydrangea quercifolia</i> Oakleaf Hydrangea		6'-8'	JUL DEC							▶	◆	
<i>Prunus laurocerasus</i> 'Otto Luyken' Otto Luyken Dwarf Cherry Laurel	<3'	10'-12'	MAY				✓			▶	◆	
<i>Spiraea thunbergii</i> 'Ogon' Mellow Yellow® Golden Thunberg Spiraea		3'-5'	APR				✓			▶	◆	
<i>Euonymus fortunei</i> 'Coloratus' Purple-Leaf Wintercreeper		1'-3'					✓	✓		▶	◆	
<i>Juniperus squamata</i> 'Blue Star' Blue Star Juniper		1'-4'					✓			◆	◆	
<i>Rosa Knock Out® series</i> Knock Out Roses		3'-4'	MAY NOV					✓		◆	◆	
<i>Yucca filamentosa</i> 'Color Guard' Color Guard Adam's Needle		2'-3'	JUN SEP				✓	✓		◆	◆	
<i>Buxus</i> 'Green Velvet' Green Velvet Dwarf Boxwood		2'-4'					✓			▶	◆	

Perennials

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Flowering	Appearance				Tolerances				
				Characteristics	Drought-Flood	Light	Salt	High pH				
<i>Alchemilla mollis</i> Lady's Mantle	1'-1.5'	1.5'-2.5'	MAY JUN					✓		▶	◆	
<i>Amsonia hubrichtii</i> Arkansas Blue Star	2'-3'	2'-3'	MAY				✓	✓		◆	◆	
<i>Geranium macrorrhizum</i> 'Bevan's Variety' Bevan's Variety Big-Root Geranium	1'	1'-1.5'	MAY				✓			▶	◆	
<i>Helleborus x hybridus</i> Lenten Rose	1'-1.5'	1'-1.5'	MAR MAY				✓	✓		▶	◆	
<i>Hemerocallis</i> 'Happy Returns' Happy Returns Daylily	1'-1.5'	1'-1.5'	JUN OCT					✓		▶	◆	
<i>Liriope muscari</i> 'Big Blue' Big Blue Lilyturf	1'-2'	1'-2'	AUG SEP				✓	✓		▶	◆	
<i>Nepeta x 'Walker's Low'</i> Walker's Low Catmint	2'-2.5'	2'-3'	APR SEP				✓	✓		◆	◆	
<i>Sedum Autumn Joy</i> Autumn Joy Stonecrop	1.5'-2'	1.5'-2'	AUG NOV				✓	✓		◆	◆	

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Limited-Access Arterial Plantings

Landscapes along limited-access arterial highways feature shade and evergreen trees, understory plantings, and turf grass to provide a green buffer for adjacent communities and enhance the natural environment. These areas are typically much larger and allow for a greater diversity of plants than is possible elsewhere. However, irrigation is rarely provided, and plants must tolerate other urban stresses such as wind and salt.

Limited-Access Arterial Plantings

Limited-access arterial highways are high-speed roadways, such as expressways or parkways, with access ramps, no intersections with traffic control, and generally large areas for plantings. The most commonly used ground cover for limited-access arterial highways is turf grass. It has low installation costs, superior ability to control soil erosion, and minimal maintenance requirements. Arterial lawns are mowed about four times during the growing season. No fertilizers or pesticides are used, and there is never supplemental irrigation after establishment.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Limited-access arterial ROWs often contain large contiguous areas suitable for re-forestation, providing some of the benefits of natural woodland, including corridors for wildlife

Opportunities for greater diversity in trees and other species and preservation of native species where existing conditions are not unduly disturbed

Reduction in glare and a more pleasant experience for motorists

Summer cooling, wind reduction, buffering of negative traffic perceptions, and enhanced aesthetics

Considerations

See GENERAL GUIDELINES (6.0.1)

Planting must comply with DOT design standards and guidelines and NYSDOT guidelines if located within NYSDOT jurisdiction

Limited-access arterial highway landscapes typically receive limited maintenance; there is no weeding or invasive-species removal

Trees should not be planted closer than 20 feet apart to allow for mowing. Space should be provided for maintenance vehicles and crews

Plantings should not create hidden areas that facilitate illegal activities such as dumping or vandalism



Plantings along an access ramp and bridge structure: Belt Parkway at Guy R. Brewer Boulevard, Queens



A diverse array of newly planted trees: BQE at Prospect Street, Brooklyn



Limited-access arterial with various tree species: Hutchinson River Parkway, Bronx

Soil can be highly variable in texture, pH, and depth; compaction is typical and can greatly suppress root growth as well as cause drainage problems

Plants must be able to tolerate various stresses such as reflected heat, salt, drought, wind, and competition from invasive plants

Plants known to be susceptible to insect or disease problems should not be used

The Port Authority of New York and New Jersey prohibits plants with fruit that attracts birds near the airports

Any plantings not maintained by DOT or DPR will require a maintenance agreement; consider DOT's Adopt-a-Highway program for enhanced maintenance

Design

Limited-access arterial highways without curbside safety barriers must maintain 30-foot clear zones (recovery zones) on either side. Access ramps must have clear zones measuring at least 15 feet on either side. All clear zones must be approved by DOT

A minimum of 10 feet behind any safety barrier should be clear of trees and other fixed objects

Arterial landscapes are usually viewed by highway users at fast speeds. Plant large swathes of fewer types of species

Large-growing shade trees should be spaced to promote maximum growth, typical form, and sturdy structure; interplant large trees with smaller understory trees and/or shrubs to increase the density of plantings

A good highway plant palette includes hardy species known to thrive and other plants for diversity and interest

Asphalt mow strips are required around and under objects that mowers cannot pass over

Incorporate STORMWATER MANAGEMENT PRACTICES (6.6.1) where appropriate. Generally, restrictions on space do not apply, so such infrastructure can be much larger

Mulch around trees, without covering the root flare or trunk, to reduce damage from tractor mowers and greatly improve tree health

Plants

See Limited-Access Planting Recommendations (Table 6E)

TABLE 6E

Limited-Access Arterial Planting Recommendations

The following are plants that have been successfully employed along limited-access arterial roadways. This list is not comprehensive and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site-specific conditions and approved by DOT and DPR. In cases where NYS DOT has jurisdiction, NYS DOT must also approve the plants and overall design.

Trees

Scientific Name 'Cultivar' Trade Name Common Name	Appearance						Tolerances				
	Height	Shape	Characteristics				Drought-Flood	Light	Salt	High pH	
<i>Cedrus deodara</i> 'Shalimar' * Shalimar Hardy Deodar Cedar	>40'						✓	✓		◆	◆
<i>Gymnocladus dioica</i> Kentucky Coffee Tree			MAY				✓	✓		◆	◆
<i>Liquidambar styraciflua</i> * Sweet Gum							✓	✓		◆	—
<i>Pinus strobus</i> * Eastern White Pine							✓	✓		—	—
<i>Quercus alba</i> * White Oak							✓	✓		◆	—
<i>Quercus phellos</i> * Willow Oak							✓	✓		◆	—
<i>Styphnolobium (Sophora) japonicum</i> 'Regent' Regent Sophora Tree			JUL AUG				✓	✓		◆	◆
<i>Tilia tomentosa</i> 'Sterling' * Sterling Silver Linden			JUN JUL				✓	✓		◆	◆
<i>Zelkova serrata</i> 'Green Vase' * Green Vase Japanese Zelkova							✓	✓		◆	◆
<i>Ilex 'Nellie R. Stevens'</i> * Nellie R. Stevens Holly	15'-40'					✓	✓		◆	◆	
<i>Juniperus chinensis</i> 'Kaizuka' Hollywood Chinese Juniper							✓	✓		◆	◆
<i>Cercis canadensis</i> * Eastern Redbud			APR				✓	✓		◆	◆
<i>Cornus mas</i> 'Golden Glory' Golden Glory Cornelian Cherry	<15'		MAR APR			✓	✓		◆	◆	
<i>Lagerstroemia indica x faurei hybrids</i> * Hybrid Crape Myrtle			JUL SEP				✓	✓		◆	◆
<i>Malus 'Donald Wyman'</i> Donald Wyman Crabapple			APR MAY				✓	✓		◆	◆
<i>Syringa reticulata</i> 'Ivory Silk' Ivory Silk Japanese Tree Lilac			JUN				✓	✓		◆	◆

Shrubs

	Height	Spread	Characteristics				Tolerances				
<i>Viburnum rhytidophyllum</i> * Leatherleaf Viburnum	6'-10'	6'-10'	APR				✓	✓		◆	◆
<i>Forsythia x intermedia</i> cultivars Border Forsythia	8'-10'	10'-12'	APR				✓	✓		◆	◆
<i>Myrica pensylvanica</i> Northern Bayberry	5'-10'	5'-10'					✓	✓		◆	—
<i>Cornus racemosa</i> Gray Dogwood	10'-15'	10'-15'	MAY JUN				✓	✓		◆	◆
<i>Lonicera fragrantissima</i> Winter Honeysuckle	6'-10'	6'-10'	MAR APR				✓	✓		◆	◆

Self-Clinging Vines

<i>Parthenocissus tricuspidata</i> Boston Ivy	30'-50'	5'-10'					✓	✓		◆	◆
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Turf Grass

<i>Festuca arundinacea</i> cultivars Turf-type Tall Fescue Grass	3"-4"	3"-4"					✓	✓		◆	◆
<i>Lolium perenne</i> cultivars Turf-type Perennial Rye Grass	3"-4"	3"-4"					✓	✓		◆	—

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Stormwater Management Practices

Stormwater management practices are areas that may be planted with trees, shrubs, groundcovers, grasses, and perennials that are designed to collect and treat stormwater runoff from the city's streets. These treatments are also known as "green infrastructure." Plants are selected for their ability to endure periods of wet weather as well as drought, and in many cases to withstand the impacts of salt, sediment, and contaminants typically found in urban runoff. Using plants and soils to mitigate the impacts of stormwater runoff is an ecologically responsible and economical technique to employ within the public ROW.

The High Performance Infrastructure Guidelines (2005), the DEP Green Infrastructure Plan (2010) and the 2011 Plan Update, and the High Performance Landscape Guidelines (2011) outline strategies for sustainably managing stormwater in New York City.

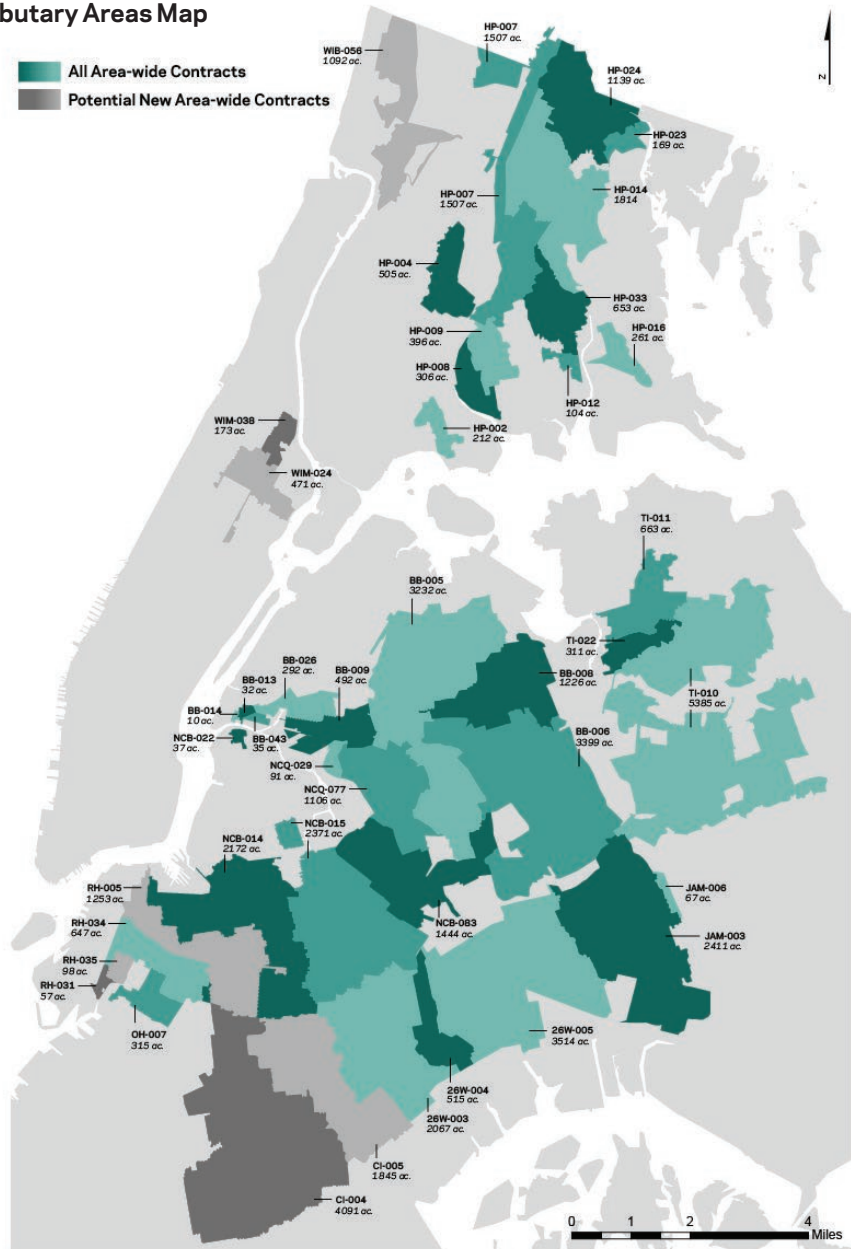
STORMWATER MANAGEMENT PRACTICES (6.6.1) describe general considerations and design principles typical of a green stormwater solution. These treatments can be employed citywide, where appropriate conditions allow.

DEP ROW BIOSWALE (6.6.1a) and STORMWATER GREENSTREET (6.6.1b), along with other DEP ROW Green Infrastructure treatments, are specific city-led strategies for managing stormwater in targeted areas that have the greatest need. These treatments will be built and maintained by the city within priority areas. See DEP Priority CSO Tributary Map. These treatments can be built by private entities but will require a maintenance agreement.

Important Terms (NYS Stormwater Design Manual)

- o **Detention:** The temporary storage of storm runoff in a stormwater management practice with the goals of controlling peak discharge rates and providing gravity settling of pollutants
- o **Retention:** The amount of precipitation on a drainage area that does not escape as runoff. It is the difference between total precipitation and total runoff

DEP Priority CSO Tributary Areas Map



(Credit DEP)

Stormwater Management Practices

Any area, typically planted, that is specifically designed to capture and treat stormwater runoff from the Right-of-Way (ROW). The primary purpose of these treatments is to reduce stress on the city's combined sewer infrastructure during rain storms. Practices can range from a single tree bed to a bioswale to a rain garden in a triangle or plaza. ROW green infrastructure practices include ROW Bioswales, ROW Stormwater Greenstreets, ROW Rain Gardens, ROW Greenstrips, ROW Permeable Pavement, and ROW Infiltration Basins.

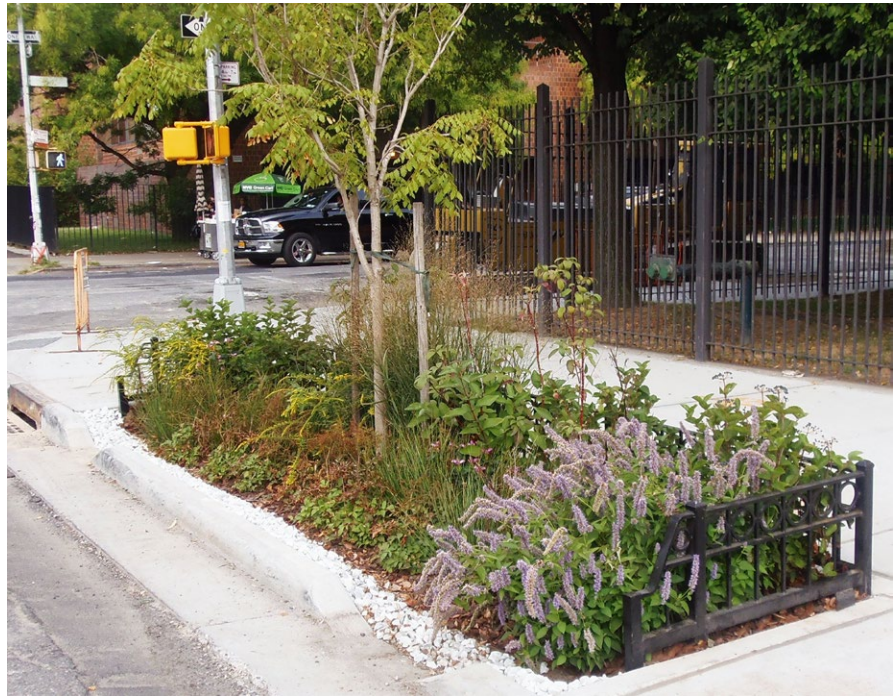
Benefits

See BENEFITS OF PLANTINGS IN THE ROW

Reduced stormwater entering sewers during storms

Can reduce the frequency and intensity of Combined Sewer Overflows (CSOs)

Healthier plants and greater survival rates when appropriate plants are used



Inlet design directs stormwater into DEP ROW Bioswale: Dean Street and 4th Avenue, Brooklyn (Credit: DEP)



DEP ROW Stormwater Greenstreet constructed in the roadway, modifying the street geometry: Powell Street and Belmont Avenue, Brooklyn (Credit: DEP)

Considerations

See GENERAL GUIDELINES (6.0.1)

Designers should consider environmental due diligence to ensure green infrastructure installations will not exacerbate preexisting subsurface contamination, including but not limited to a preliminary review of publicly available local, state, and federal databases.

Designer should reference DEP Office of Green Infrastructure's latest Procedure Governing Limited Geotechnical Investigation for Green Infrastructure Practices and coordinate with DEP on geotechnical results to ensure that stormwater control practices are appropriate for the proposed location

Retrofitting existing plantings may be feasible if there is limited grade change and in situ soils are appropriate; special care must be given to tree roots; existing species must be able to tolerate higher levels of water

Plants should tolerate salts, sediment, contamination, and highly variable levels of water availability

Due to existing grading and/or the crown of the road, stormwater installations along the gutter are ideal for stormwater capture, while installations in the center of the road will not capture significant volumes of water unless the road can be regraded

Leaves, litter, and other material may clog inlets/outlets and could impact overall performance of the

STORMWATER MANAGEMENT PRACTICES will require a maintenance agreement

Application

All areas with TREE BEDS (6.1), ROADWAY PLANTINGS (6.2), SIDEWALK PLANTINGS (6.3), PLAZA PLANTINGS (6.4), and LIMITED-ACCESS ARTERIAL PLANTINGS (6.5)

See DEP ROW BIOSWALE (6.6.1a) if in DEP Priority CSO Tributary Areas; see STORMWATER GREENSTREET (6.6.1b)

Installations can be pursued in partnership with DPR, DEP, or another maintenance partner

Unused or under-utilized roadway areas that can be re-purposed to collect stormwater

Design

Use canopy trees, low shrubs, and groundcover to maintain visibility

Maintain an 8-foot clear path in areas with high-volume pedestrian traffic and a 5-foot clear path in areas with low-volume pedestrian traffic

Installations must be sited at the low point of the street or paved ROW area and receive adequate flow

Locate treatments at least 7 feet from any below-ground vaults or basements to prevent water damage to these structures

Stormwater management areas should be sized in relation to the tributary drainage area to handle the volume of water entering into them; consult DEP Office of Green Infrastructure's latest Standards

Select soils that allow more rapid infiltration than typical horticultural soils and resist compaction while still supporting plant material

Direct runoff into planted areas via porous pavement, curb inlets, stormwater inlets with sub-surface pipes, or other methods approved by DEP

Utilize a pre-treatment system such as grates, a vegetative filter, or weirs to filter and collect sediment and floatables into a concentrated area; this system should be easy to clean out and will reduce the frequency of maintenance visits

Water entering the planted area should be detained and allowed to infiltrate into the soil; grade soil as a swale or depress the soil level below the inlet/outlet structures

Use gravel berms or concrete weirs to divide the planting bed and increase water detention and infiltration. This treatment also allows for greater manipulation of grades on steeper slopes while helping to concentrate litter that flows into the system

Overflow must be allowed to flow to an existing catch basin; consider the use of graded outlet structures or overflow drains to direct excess water from larger storms into the sewer system

Plants

See Stormwater Management Practices Planting Recommendations (Table 6F)

DEP ROW Bioswale

The most common type of Stormwater Management Practice, a DEP ROW Bioswale is a planted area located along the curb of a sidewalk, graded to capture stormwater, and planted with an understory of shrubs and herbaceous material. Curb cuts allow for stormwater from the adjacent roadway to enter the planted area and overflow to exit. DEP, together with DOT, DPR, and DDC, developed designs and protocols to site stormwater bioswales within the public ROW. The city will build and maintain DEP ROW BIOSWALES within DEP Priority CSO Tributary Areas, which are areas where CSO volumes are high, combined sewers frequently overflow, and the receiving water bodies need water quality improvements. See DEP Priority CSO Tributary Areas map.

Benefits

See benefits of STORMWATER MANAGEMENT PRACTICES (6.6.1)

Reduced stormwater flows and fewer CSO events in DEP Priority CSO Tributary Areas

Considerations

See considerations for STORMWATER MANAGEMENT PRACTICES (6.6.1)

See considerations for TREE BEDS (6.1.1)

Consider parking regulations; curbside access must be preserved

Consider subsurface conditions

The underlying soils should have adequate infiltration rates

Bedrock or groundwater level should be a minimum of 4 feet from the bottom of any DEP ROW Bioswale

Plants should tolerate salts, sediment, contamination, and highly variable levels of water

DEP, per the three party agreement, will install DEP ROW BIOSWALES within Priority CSO Tributary Areas

DEP ROW BIOSWALES may be installed outside of DEP priority areas but will require a maintenance agreement

Application

DEP Priority CSO Tributary Areas; see DEP Priority CSO Tributary Areas Map

Outside DEP designated areas with a maintenance agreement

Design

DEP ROW BIOSWALES should follow all DEP, DPR, and DOT bioswale siting criteria

Maintain an 8-foot clear path in areas of high-volume pedestrian traffic or heavy curbside activity and a 5-foot clear path in areas of low-volume pedestrian traffic

Install just upstream from existing catch basins to optimize stormwater capture prior to entering the combined sewer system

Soil and design specifications must adhere to DEP standards

Deviations from the latest DEP Standards for Green Infrastructure must be reviewed and approved by DOT, DPR, and DEP on a case-by-case basis

Use of 12 inches of open-graded stone located along the curb serves as a buffer from the roadway and increases infiltration and sediment capture



Typical DEP ROW Bioswale with tree: 62nd Drive and Junction Boulevard, Queens (Credit: DEP)



Stormwater entering DEP ROW Bioswale through inlet and overflow exiting from outlet: Dean Street and 4th Avenue, Brooklyn (Credit: DEP)

Curb cuts at both ends serve as an inlet and outlet for runoff, which slope from flush to the standard 6-7-inch reveal; other DEP-approved inlet/outlet structures may be employed based on slopes and runoff velocity

Concrete aprons outside the inlet and outlet direct runoff into and out of the bioswale

An approved DPR tree-bed guard is required to discourage foot traffic. The curb side should be open and fencing set back 18 inches from the curb to allow for people exiting from vehicles

Overflow must be allowed to flow to an existing catch basin; consider the use of graded outlet structures or overflow drains to direct excess water from larger storms into the sewer system

Plants

See Planting Recommendations (Table 6F)

Stormwater Greenstreet

Another common Stormwater Management Practice, a Stormwater Greenstreet is a planted area within the sidewalk or roadway, which extends beyond the standard street geometry, and collects and treats stormwater runoff. DEP ROW Stormwater Greenstreets and DPR Stormwater Greenstreets are typically larger stormwater management practices installed and maintained by DEP, DPR, or another committed maintenance partner. They can be located anywhere in the city as conditions allow. For examples, visit DEP's webpage on Green Infrastructure.

Benefits

See benefits for STORMWATER MANAGEMENT PRACTICES (6.6.1)

Permit greater water capture than what is typical for a DEP ROW BIOSWALE (6.6.1a) due to generally larger installations

Non-standard geometry (i.e., curb extension) enables the greenstreet to capture water and reduce runoff bypass by allowing water to enter directly while also providing the safety benefits typical of a CURB EXTENSION (2.2.2)

Considerations

See considerations for STORMWATER MANAGEMENT PRACTICES (6.6.1)

Avoid in areas of high foot traffic or curbside activity, including pedestrian desire lines that may be impacted

Within DEP priority areas, the city will construct and maintain STORMWATER GREENSTREETS. Outside of these areas, a maintenance agreement is required



Check dams can separate different levels of a planting area to allow for greater control of slopes and to increase detention: Westbourne Avenue at Bay 25th Street, Queens (Credit: DPR)



DPR has installed treatments of various sizes and shapes throughout the city: Westbourne Avenue at Bay 25th Street, Queens (Credit: DPR)



Water can be collected in a forebay, such as the triangular area shown on the right. This allows sediment and debris to settle before the water continues to the planting area: Westbourne Avenue at Bay 25th Street, Queens (Credit: DPR)

Application

See application guidance for STORMWATER MANAGEMENT PRACTICES (6.6.1)

Design

See design guidance for STORMWATER MANAGEMENT PRACTICES (6.6.1)

Overall dimension will be determined based on the catchment area, and geometries must be approved by DOT; generally, installations follow striped roadbed area or underused roadway width

Catch basins should be located on the downstream side of the overflow or outlet

Plants

See Planting Recommendations (Table 6F)

TABLE 6F

Stormwater Management Practices Planting Recommendations

The following plants have been successfully employed in areas that capture and treat stormwater runoff in New York City. In particular, species listed below can tolerate salts and wide fluctuations in soil moisture. This list is not comprehensive, and there is no guarantee that these plants will survive at a specific site. All plants within the public ROW must be selected based on site-specific conditions and approved by DPR.

Trees

Scientific Name 'Cultivar' Trade Name Common Name	Appearance					Tolerances						
	Height	Shape	Characteristics			Drought-Flood	Light	Salt	High pH			
<i>Taxodium distichum</i> 'Shawnee Brave' Shawnee Brave Baldcypress	>40'							✓	✓	☀️	◆	—
<i>Gleditsia triacanthos var inermis</i> 'Shademaster' Shademaster Honeylocust								✓	✓	☀️	◆	◆
<i>Quercus bicolor</i> * Swamp White Oak								✓	✓	☀️▶️🌑	◆	—
<i>Liquidambar styraciflua</i> * American Sweetgum								✓	✓	☀️	◆	—

Shrubs

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Appearance					Tolerances				
			Characteristics	Drought-Flood	Light	Salt	High pH					
<i>Aronia melanocarpa</i> Black Chokeberry	3'-6'	3'-6'	MAY					✓	✓	☀️	◆	◆
<i>Ilex glabra</i> 'Compacta' Compact Inkberry Holly	3'-6'	3'-6'							✓	☀️▶️🌑	◆	—
<i>Itea virginica</i> 'Sprich' Little Henry™ Little Henry Sweetpire	3'-5'	3'-5'	JUN						✓	☀️▶️🌑	◆	—
<i>Cornus sericea</i> 'Kelseyi' Kelseyi Red Twig Dogwood	2'-3'	2'-3'	JUN						✓	☀️▶️🌑	◆	◆

Perennials

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Appearance					Tolerances				
			Characteristics	Drought-Flood	Light	Salt	High pH					
<i>Aster</i> 'Wood's Pink' Hardy Aster	1'-1.5'	1.5'-2.5'	AUG SEP						✓	☀️▶️🌑	◆	◆
<i>Echinacea purpurea</i> Coneflower	2'-3'	2'-3'	JUN AUG					✓	✓	☀️	◆	◆
<i>Epimedium grandiflorum</i> 'Lilafee' Bishop's Hat	1'	1'-1.5'	MAY					✓		☀️▶️🌑	◆	◆
<i>Eupatorium dubium</i> 'Baby Joe' Baby Joe Pye Weed	1'-1.5'	1'-1.5'	JUL SEP					✓	✓	☀️▶️🌑	◆	◆
<i>Hemerocallis</i> (Dwarf Varieties) Daylily	1'-1.5'	1'-1.5'							✓	☀️▶️🌑	◆	◆
<i>Liriope spicata</i> Creeping Lilyturf	1'-2'	1'-2'	AUG SEP					✓	✓	☀️▶️🌑	◆	◆
<i>Rudbeckia fulgida</i> Black Eyed Susan	2'-2.5'	2'-2.5'	JUN OCT					✓	✓	☀️	◆	◆
<i>Solidago</i> (Dwarf Varieties) Goldenrod	1.5'-2'	1.5'-2'	AUG SEP					✓	✓	☀️	◆	◆

Grasses/Grass-like Plants

Scientific Name 'Cultivar' Trade Name Common Name	Height	Spread	Appearance					Tolerances				
			Characteristics	Drought-Flood	Light	Salt	High pH					
<i>Carex morrowii</i> Sedge	1'-1.5'	1.5'-2'	APR JUL					✓	✓	☀️▶️🌑	◆	◆
<i>Carex pennsylvanica</i> Pennsylvania Sedge	.5'-1'	.5'-1'						✓	✓	☀️▶️🌑	◆	◆
<i>Hakonechloa macra</i> Golden Japanese Forest Grass	2'-2.5'	3'-4'						✓	✓	☀️▶️🌑	◆	◆
<i>Juncus effusus</i> Common Rush	2'-4'	2'-4'	JUN AUG						✓	☀️	◆	◆
<i>Panicum virgatum</i> Switchgrass	3'-6'	2'-3'	JUL FEB					✓	✓	☀️▶️🌑	◆	◆

* Fall Dig Hazard ^ ALB Host Species 🌸 Bloom/Showy Flowers 🍂 Showy Fruit 🌿 Distinct Foliage 🍂 Fall Color 🌳 Distinctive Bark 🌲 Evergreen