Landscape


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DELI GROCERY

Landscape

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Introduction

Street trees provide significant benefits and should be planted wherever possible: W 95th Street, Manhattan (Credit: Parks)

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 OneNYC, DOT's NYC Plaza Program, and DEP's Green Infrastructure Plan.

The chapter is organized by planting location, except for tree beds and stormwater management practices as these should be pursued wherever conditions allow. See LANDSCAPE: TREE BEDS and LANDSCAPE: STORMWATER MANAGEMENT PRACTICES.

Benefits of Plantings in the ROW

Vegetation within the public ROW has been shown to provide significant environmental, health, and economic benefits. Generally, these benefits increase exponentially as the size of the planting 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 passive and/or active stormwater management
- dampen street noise, providing health and psychological benefits
- provide urban wildlife habitat opportunities; including for pollinator species if carefully selected
- 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
- improve pedestrian comfort by providing shade, cover from rain and/or protection from wind
- encourage outdoor activity

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 NYC Parks, 2011), *High Performance Infrastructure Guidelines* (Design Trust for Public Space and DDC, 2005), *Tree Planting Standards* (NYC Parks, 2016), *Native Species Planting Guide for New York City* (NYC Parks, 2019), *Standards for Green*

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

Infrastructure (DEP, 2017), the *Sustainable Urban Site Design Manual* (DDC Office of Sustainable Design, 2008), and *Design and Construction Excellence 2.0 Guiding Principles* (DDC, 2016).

Other resources include DEP's "NYC Green Infrastructure Program" website, NYC Parks' MillionTreesNYC website, the NYC Parks Interactive Tree Map, the New York State Stormwater Design Manual, the Cornell University Urban Horticulture Institute website, the New York Restoration Project website, EPA's "National Menu of Best Management Practices," and FHWA's *Roadside Best Management Practices that Benefit Pollinators*.

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. Non-standard treatments may also be pursued, but may require more extensive review depending on the complexity and scope of the project.

Reviews and Approvals

Installation of all plantings within the public ROW must be reviewed and approved by DOT and the agency that will be maintaining the plants. A tree-work permit from Parks is required to install new trees and for any work being performed within 50 feet of existing trees. Proposed stormwater management practices (also known as green infrastructure — see LANDSCAPE: STORMWATER MANAGEMENT PRACTICES) within the public ROW must be reviewed and approved by DEP, Parks, and DOT. New plantings may be subject to PDC or LPC review, particularly if they are part of a streetscape or open space project within their 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

Parks is responsible for the maintenance of all trees within the public ROW and of Greenstreets, including select Stormwater Greenstreets. DEP maintains all stormwater management practices in the ROW that have been funded and approved by DEP. DOT maintains median plantings installed as part of Vision Zero Great Streets projects. 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 **www1.nyc.gov/html/dot/html/contact/contact.shtml** or by calling 311.

NYC Parks still builds traditional Greenstreets in any community but only if they come with independent and full funding. For more information see Parks' website on 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

All projects that incorporate plantings should include appropriate team members such as a landscape architect, consulting arborist (CA), horticulturist, and/or soil specialist. These team members should be involved at the onset of the design process. Appropriate consultation with city and/or state agencies having jurisdiction should also occur early in the project.

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 that plantings are anticipated to need and receive. Plant specification should follow DOT and Parks standards, including Local Law 11 of 2013, 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 as well as the built fabric including the sidewalk, roadway, and buildings. Avoid species that NYSDEC and/or Parks have determined to be invasive or that are susceptible to diseases and pests (see DISEASES AND PESTS section in LANDSCAPE: GENERAL GUIDELINES). Select plants that are known to compete well with invasive species; when feasible, preference should be given to native plantings that mimic plant communities in the native environment most reflective of the site context. Given site conditions, designers should accommodate the collection of stormwater where possible and select plants that can withstand both periodic inundation and drought. All species selection must be approved by the appropriate city agency during the review process.

Soils

Soils are one of the most crucial considerations when proposing plants within the ROW. Soils that possess favorable horticultural characteristics (pH, nutrients,

NYC Parks maintains its own native plant nursery, the Greenbelt Native Plant Center (GNPC). The GNPC grows over 500 species of NYC native plants, some of which are appropriate to most urban design challenges. Qualified staff are available to consult on selecting appropriate species to meet design requirements and the Nursery is available to grow and provide plants from its stock of half a million trees, shrubs, ferns, grasses, and wildflowers (forbs). The GNPC also produces seed of over 65 native species for sowing operations.

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)

drainage, soil texture, etc.) will allow the greatest array of plant species to thrive and reduce maintenance costs. These characteristics must be carefully considered and balanced in context of proposed species, plant tolerances, and overall project goals. Soils that do not support selected plant species, or alternatively, selecting species that do not thrive in a particular soil will have significant impacts on plant survivability and the overall success of a proposed landscape.

NYC Parks works with two regional nurseries that grow street trees to NYC standards. The agency primarily uses these nurseries for its planting contracts for streets and parks. With this approach, quality and consistency of plant material has improved while the available palette of species has increased. This method of procurement allows NYC Parks to oversee the growing operations of its trees and dictate the types of trees it wants to procure. NYC Parks' tree nurseries are able to grow and deliver trees for other agency contracts provided those projects are planned with this mechanism in mind; NYC Parks Forestry and Horticulture staff can provide detailed specifications to include in contracts as needed.

It is particularly important that enough soil volume is provided for the proposed planting; this measure contemplates depth as well as the total area of soil. Limited soil volume will stunt plant growth and contribute to plant decline or death. As such, maximize soil volume and choose plants that will grow well in the available soil volume. As most roots grow within the top layer of soil, increasing the soil surface area is most beneficial. However, also provide appropriate soil depth: at least 18 inches for grass or ground cover, 18-24 inches for shrubs, and 24-36 inches for trees. The soil depth should also relate to the rootball depth at planting.

Where pavement is necessary next to trees or plantings, consider a suspended pavement system (i.e. structural soils or structural framing systems/cells) to provide greater rooting area. Suspended pavement systems support the engineering requirements of pavement, while still allowing plant roots to grow in the subbase below. In most cases, pavements must be able to withstand typical loading and compaction requirements (95% proctor density), with

some locations requiring truck loading (AASHTO HS-20) standards be met. The added growing medium can also serve to increase the area for stormwater capture or detention. Additionally, by encouraging root growth within the subbase, these systems typically reduce sidewalk heaving caused by tree roots and the associated maintenance burden.

In order to determine if an existing or proposed soil has the appropriate characteristics it must be examined by a qualified laboratory. Soils should be tested for texture, pH, organic content, permeability, salt content, nutrients, bulk density, and presence of contamination. New soils should meet appropriate DOT and Parks specifications, which may vary depending on project specific conditions. Existing soils may be amended to bring soil characteristics within acceptable ranges. Methods for amending soils include applying lime or sulfur to adjust pH, adding sand or silt/clay to adjust soil texture, adding organic matter to improve permeability and correct nutrient deficiencies, loosening compacted soil via mechanical or hand tools, and several other techniques. Qualified laboratories, following an examination, will provide recommendations for amending soils, if possible, to achieve optimal plant growth. If amendments cannot be made, the soil will need to be replaced to the required depth and width accordingly. Should there be contaminated soils on site, consult with the appropriate city or state agencies on the process for removal.

The following table describes generally desirable soil characteristics, however, soil must be examined and selected based on site-specific conditions and tailored to fit the needs of the project. It is important that proper sampling and testing methods are followed to ensure test results are accurate and represent the actual soil. A composite sample (taken from several locations within the area of interest, to a consistent depth, and at the same time) can provide an appropriate representative sample for testing purposes.

TABLE 6A: SOIL CHARACTERISTICS

Soil Characteristic	Preferred Range or Values	Testing Method
pH	5.5 to 7.2 (slightly acidic soils generally have the greatest nutrient availability to plants; higher pH soils will require careful plant selection to ensure survivability)	Standard pH test
Organic Matter	3-8% is generally preferred, but conditions may call for more or less organic matter	Loss on ignition of moisture-free samples (organic matter should be at least six months old)
Soil Texture	Sandy Loam to loam is typically preferred, but specific conditions may call for a higher clay content to increase water holding capacity or a higher sand content to facilitate infiltration; under no circumstances may clay content exceed 15-20%	Bouyoucos hydrometer or decantation method to determine clay content; USDA sieve analysis for sand and silt content Alt: ASTM D422
Salinity	< 1.0 millimhos per centimeter at 25 degrees Celsius	Saturated Soil Test Method in USDA Circular No. 982
Nutrients	Nitrogen = 25 parts per million Phosphorous = 5 parts per million Potassium = 20 parts per million	Check with Soil Lab
Permeability	Appropriate permeability ranges depend on desired use. High permeability is generally required for green infrastructure systems, very low permeability will negatively impact plant health	Permeability Test (See DEP Geotechnical Investigation Procedure)
Bulk Density	Bulk density greater than 1.4 grams per cubic centimeter will restrict root growth and negatively impact plant health	ASTM D7263

Many urban soils, including fill soils, possess mortar and concrete fragments that alter soil pH for extended periods. Applications of sulfur or other acidic amendments may only temporarily mitigate the situation. As such, this is a critical factor for plant selection and soil management throughout New York City.

Quality soil is necessary to ensure that healthy plants thrive: Beach 60th Street and Rockaway Beach Boulevard, Queens

Where possible, preserve existing soils that have supported or are capable of supporting plant growth. Care should be taken to manage existing weed seeds that are typically present in the top layer of urban soils; tarp stockpiled soil on site if it is to be reused later or if new soil is to sit idle for an extended time before being used. If time permits, techniques like solarization or steam sterilization can be employed to kill weeds. Do not work the soil if it is frozen or sodden. Use pneumatic excavation, or similar methods, under the supervision of a consulting arborist, to preserve tree roots. New soil should be installed in lifts so as to not unduly compact or negatively impact the soil

Soil amendments may be appropriate in certain circumstances, but should always be carefully considered. Organic matter degrades over time resulting in decreased benefits to plant health; additions of sand to improve drainage may result in poor or unusable soil, and most fertilizers only provide a temporary increase of nutrients. In general, make sure to select plants that are well-suited to the basic soil structure, ensure the soil is properly de-compacted after construction and keep heavy equipment off of newly placed soil.

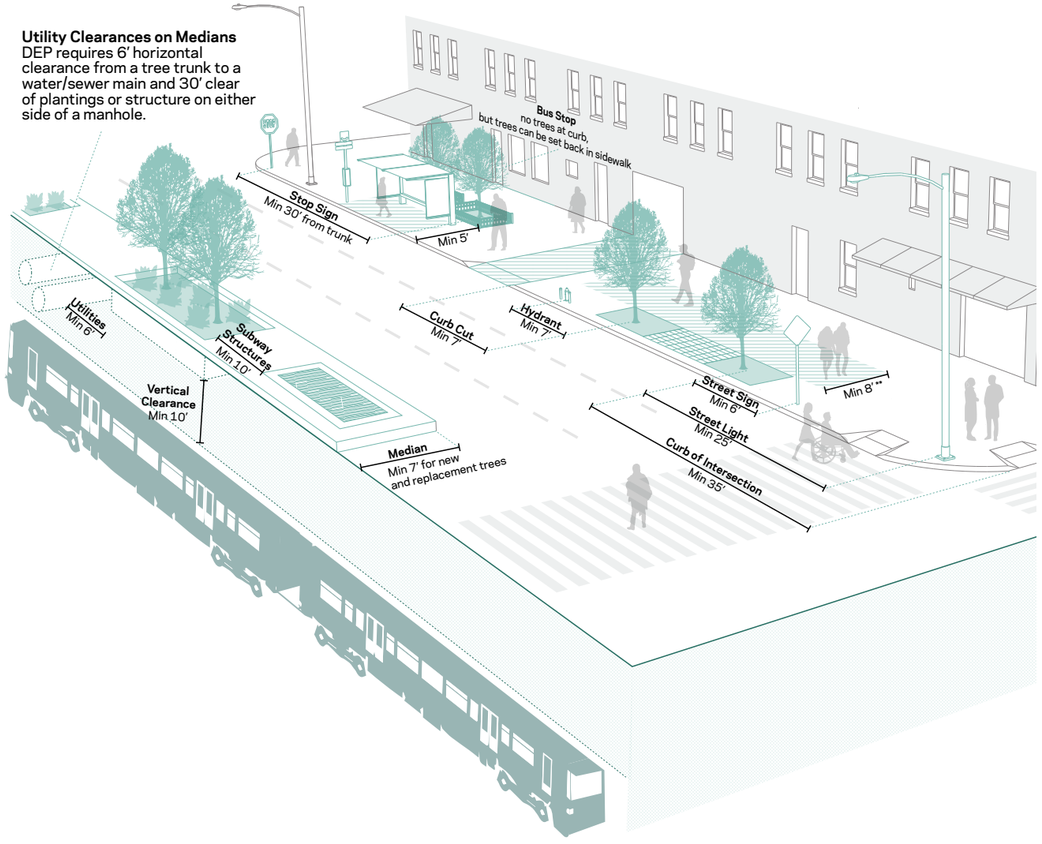
properties. For new soil, it is important that appropriate sampling and testing is conducted prior to delivery as well as prior to installation to ensure quality soil is being provided; soil tests should not be older than 6 months from the date of proposed delivery to the project site. Ultimately, soils are the foundation for a successful landscape and must be given special attention to ensure success.

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 falling within Zone 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.

Recent trends of more extreme temperature and weather due to climate change will also impact plant selection. These trends will have a varied effect depending on the particular microclimate. For example, coastal areas have experienced temperatures consistent with Zone 6 over the last several winters, which may require hardier plants be specified.

Clearance Diagram



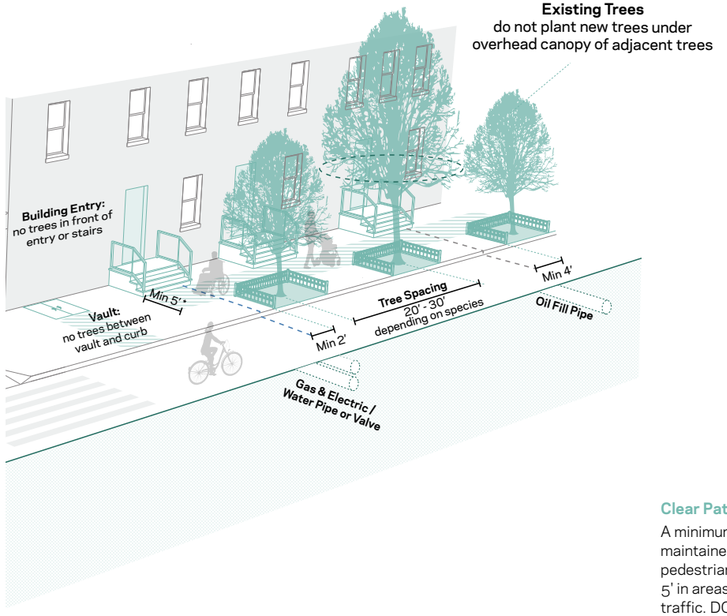
Spacing/Siting Requirements

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, DEP, DCP, Parks, 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 may impact sight lines 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. Trees on medians must be set back 35 feet from the curb at the end of the median.

DOT, Parks and DEP may approve exceptions to their respective requirements on a case-by-case basis and reserve the right to require stricter clearances if needed.



Clear Path

A minimum 8' must be maintained in areas with high pedestrian traffic and a minimum 5' in areas with low pedestrian traffic. DOT may require up to 15' in locations with particularly high pedestrian volumes. Exceptions may be approved by DOT and Parks 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 4'.

Distance*	Parallel clearance from:
40'	Traffic Signals
35'	Curb of Intersection
30'	Stop/Yield/Do Not Enter Signs Manhole on Median
25'	Street Lights Utility Poles
20'-30'	Tree Spacing (depending on species)
10' †	Subway Structures

Distance*	Parallel clearance from:
7'	Driveways Curb Cuts
6'	Street Sign Water/Sewer Main
5'	Hydrant From curb (tree bed behind Bus Stop)
4' ‡	Oil Fill Pipe
2' ‡	Gas & Electric/Water Pipe or Valve

* Distance is measured from tree trunk, unless noted.

† 10' of vertical clearance from subway structures is also required for tree plantings (or as low as 5' with an acceptable root barrier).

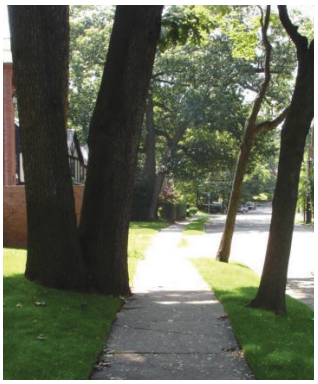
‡ Distance measured from edge of tree bed

Tree Preservation and Protection

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

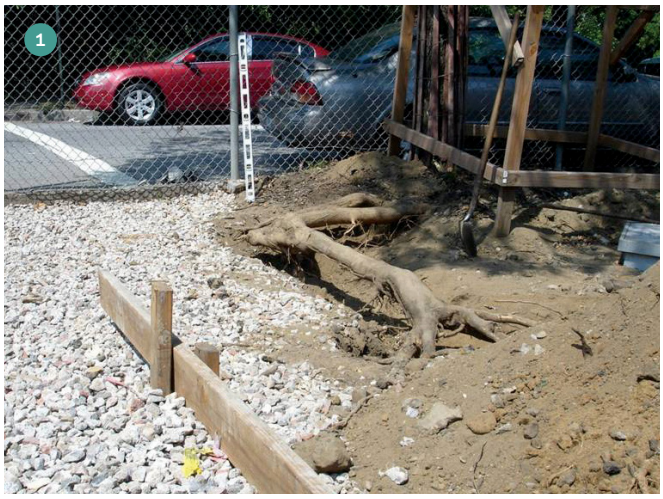
Under Section 18-107 of the Administrative Code of the City of New York and Chapter 5 of Title 56 of the Rules and Regulations of the City of New York, all construction work impacting trees within the public ROW must be approved and permitted by Parks. In addition, construction work must follow NYC Parks Tree Preservation Protocols and NYC Parks Forestry Protocol for Planned and Emergency Utility Work. Ultimately, if the removal of a healthy tree is necessary, it must be approved and permitted by Parks, and tree replacement will be required based on a valuation of the trees impacted. This typically involves planting new trees within the project area and/or paying a fee to cover the cost of Parks planting the necessary replacement trees.

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



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

1. Scope	2. Inventory and Assess Existing Tree Resources	3. Design with the Tree in Mind	4. Develop Tree Protection Plan	5. Enforce Tree Protection Plan in Construction
Include Parks' Borough Forestry Office in the Scope review to consider potential impacts to trees in siting project scope	Certified Arborist (CA) to inventory and assess all trees within and immediately adjacent to project limit lines	CA to identify potential tree impacts and necessary tree removals All tree removals must be approved by Parks' Borough Forestry Office	CA to advise and review designs for potential tree impacts CA to advise and develop tree protection plan 50% and 90% construction documents reviewed by Parks' Borough Forestry Office	Tree protection implemented and enforced by Parks' Borough Forestry Office and/or CA CA to perform initial inspection and approval of installed tree protection measures CA to supervise all work within and immediately adjacent to Tree Protection Areas



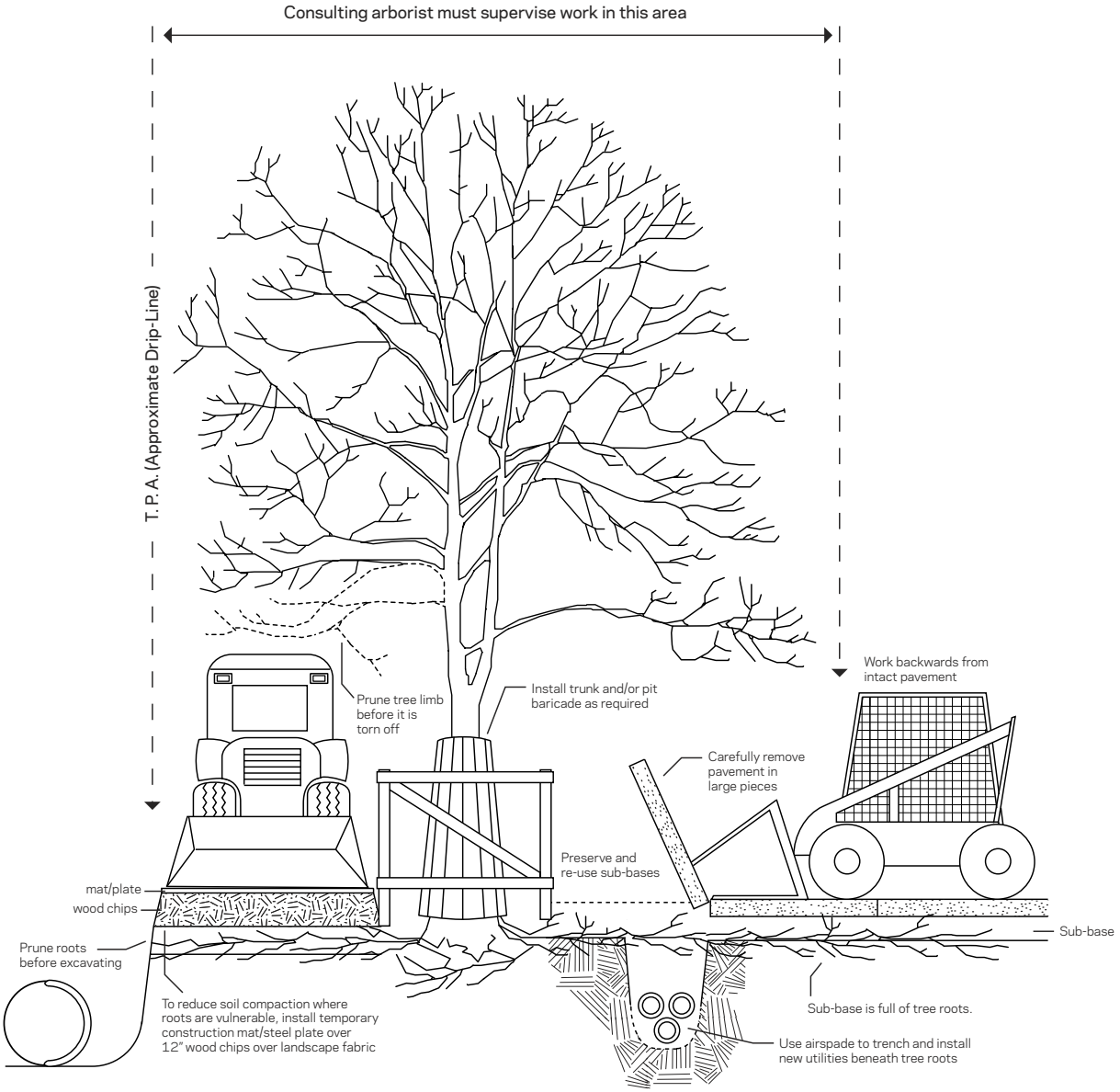
Photos 1, 2, and 3 above illustrate the process of root pinning, which saves trees and prevents sidewalk heaving: Black Locust Triangle, 123rd Street and N Conduit Avenue, Brooklyn (Credit: Parks)

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

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 area 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.

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 and Critical Root Zone Diagram below.) During construction, the TPA is typically established with a fence or barrier, with installation of thick sawdust, plywood sheets or metal panels beyond the barrier, if necessary, to further protect spreading roots. In circumstances where a majority of roots are growing beneath pavement, special methods should be utilized. The contractor will be

Tree Protection Area Diagram



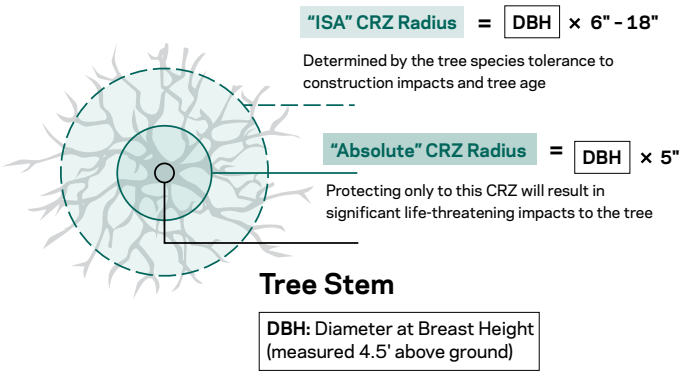
These diagrams provide guidance on tree protection during construction projects in an urban setting.

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

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

responsible for the care of protected trees during construction. No activity, including non-construction-related activities, may occur within the TPA without approval from Parks 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. All work within the TPA must be completed by hand.

Critical Root Zone Diagram



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. ALB (*Anoplophora glabripennis*) is an invasive beetle known to attack several species of trees. After 20 years of efforts to eradicate the beetle, New York City was declared ALB-free by the United States Department of Agriculture (USDA) in October 2019. 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, the planting of ash tree species is no longer permitted within the city.

NYSDEC and Cornell University both offer plant disease diagnostic services that may assist in the treatment of affected plants. For the latest information on diseases and pests please visit the UDSA's APHIS webpage on Plant Pest and Disease Programs or the US Forest Services webpage on Invasive Species, Pests, and Disease.

Application of pesticides (including herbicides, insecticides, and fungicides) is regulated by the federal EPA as well as by NYSDEC. 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 DOHMH webpage or call 311.

DOT and Rockaway Waterfront Alliance coordinated a volunteer planting event to activate a lot adjacent to the elevated A line: Beach 60th Street and Rockaway Beach Boulevard, Queens

Workers remove waste from raised median to maintain median plantings: Grand Concourse, Bronx

Plant Installation

All plants must be installed per DOT and/or Parks standards. See Parks' 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 appropriate planting time for 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 in the summer or 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. As per DOT/DDC standard specifications, the contractor will need to perform establishment period tasks, including but not limited to, watering, pruning, mulching, and weeding, throughout the first 18 months for understory plantings and 24 months for trees. Watering is the most essential task to perform during the establishment period (see WATERING section in LANDSCAPE: GENERAL GUIDELINES). Payment for the performance of these tasks is on a progress payment schedule whereby the contractor will only be paid when they perform the required tasks. Parks planting permits also require the contractor to water, perform regular care, and replace trees that die for the first two years. A maintenance plan should be submitted and approved prior to final acceptance of plant installation, after which the Period of Establishment will commence.

Consideration should be given to phased or multi-staged planting and establishment protocols whereby a design would establish intermediate, transitional plantings to out-compete invasive plants while giving way in succeeding plantings to those species intended as the final condition. This approach is highly effective for meadow establishment – using bulk seed or a combination of seed followed by a wider range of plant types – and could be equally effective for non-meadow plantings.

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. Stormwater management practices will have additional unique maintenance tasks necessary to maintain their function. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES. 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, Brooklyn

Watering

Watering is critical for plant survival, both during the establishment period and throughout the lifespan of the plant. Ideally, water should be applied early in the morning or late at night to avoid loss due to evaporation. The soil should be thoroughly soaked with minimal water applied to the leaves of plants as this may encourage fungus or disease. Do not overwater. In New York City, it is recommended plants receive approximately 1 inch of water per week in total, species and weather dependent. Tree watering bags provide an effective tool during establishment and should be refilled to ensure trees receive approximately 20 gallons of water per week. Watering must be carefully scheduled and adjusted based on anticipated and actual weather.

Irrigation systems are encouraged where appropriate maintenance of the system can be provided. The system, when properly maintained, can reduce the need for maintenance by ensuring the most frequently required task is automated. Newer systems also provide remote monitoring and scheduling, automatic weather adjustment, and maintenance notifications if the system needs repair. Design of the system is paramount; systems should not spray water onto the roadway or walking areas. Drip irrigation is most efficient, but prone to damage and breaks. Pop-up/spray heads may be preferred as long as they can be directed appropriately. In many cases, even if a full irrigation system cannot be accommodated, simply bringing a water source via a hose-bib connection will significantly reduce maintenance costs. All irrigation systems require yearly winterization and start-up maintenance. They also require appropriate backflow prevention, typically a reduced pressure zone or "RPZ" backflow device, and a water meter, which must be approved by DEP. The RPZ and meter will need to be carefully sited within the project area to minimize visual impact as they are large and obtrusive. Providing an irrigation system or water source will impact plant selection allowing a wider range of plants to be used, but only if maintenance for the irrigation system is also in place.

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 risks associated with urban forest management and maintenance. Visit the NYC Parks Website, the NYC Parks Interactive Tree Map and www.milliontreesnyc.org for more information.

Tree Bed

Street trees exist within tree beds all over the city and new trees should be installed wherever feasible if conditions allow. Tree beds are currently the only required design, however connected tree beds should be used wherever possible to provide improved tree health; stormwater management practices—those that take water from the roadway—should be considered wherever DEP Priority Areas are affected. See LANDSCAPE: CONNECTED TREE BED and LANDSCAPE: STORMWATER MANAGEMENT PRACTICES.

State Street, Manhattan

Park Avenue, Manhattan

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

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

Considerations

Tree beds are standard treatments that Parks installs and maintains. Other entities are also encouraged to pursue this treatment but require a permit from Parks and DOT

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

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

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 Parks Tree Planting Standards still apply

Install in all areas with full sidewalks, raised medians, pedestrian safety islands, pedestrian malls, triangles, and plazas. See LANDSCAPE: FULL SIDEWALK, LANDSCAPE: RAISED MEDIAN, GEOMETRY: PEDESTRIAN SAFETY ISLAND, LANDSCAPE: PEDESTRIAN MALL, LANDSCAPE: TRIANGLE, and LANDSCAPE: PLAZA PLANTINGS

Use connected tree beds rather than tree beds wherever possible to increase root space and stormwater detention capacity. See LANDSCAPE: CONNECTED TREE BED

Consider stormwater management practices in DEP Priority Areas where conditions are appropriate. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Design

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

A minimum 8-foot clear path must be maintained in areas with high pedestrian traffic and a 5-foot minimum clear path in areas with low pedestrian traffic. DOT may require a greater clear path, up to 15 feet, in locations with particularly high pedestrian volumes. Exceptions may be approved by DOT and Parks 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 4 feet

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

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, but should follow DOT and/or Parks specifications

Maximize exposed soil to allow more water and air to get to the roots of the tree; if necessary due to high pedestrian traffic or constrained sidewalk widths, use Parks-approved permeable surface treatments over the tree bed; consider a suspended pavement system adjacent to the tree bed to extend available rooting area

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

Tree-bed sizes may vary depending on site conditions and should be designed to be as large as possible; Parks typically requires a 5-foot by 10-foot opening with soil only

Tree-bed guards are recommended; one of Parks' standard tree-bed guards should be used; a permit is required

Park Avenue, Manhattan

W 53rd Street, Manhattan

A 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 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 quarter (1/4) inch above or below the adjacent sidewalk surface

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

Connected Tree Bed

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

Benefits

See benefits of LANDSCAPE: TREE BED

Provides greater space for tree roots than tree beds, improving tree health and longevity

In areas where a ribbon sidewalk is inappropriate, connected tree beds provide many of the same benefits. See LANDSCAPE: RIBBON SIDEWALK

Additional soil provides more stormwater detention capacity than tree beds

Considerations

See considerations for LANDSCAPE: TREE BED

Installation of a tree-bed guard requires a permit from Parks

Application

See application guidance for LANDSCAPE: TREE BED

Whenever possible in lieu of tree beds

Consider ribbon sidewalk as an alternative in areas of low-to-moderate land use density per its application guidance and zoning requirements. See LANDSCAPE: RIBBON SIDEWALK

Consider stormwater management practices in DEP Priority Areas where conditions are appropriate. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Hudson Street, Manhattan

Design

See design guidance for LANDSCAPE: TREE BED

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 Plant Database at **www.nycstreetdesign.info/search-plant**

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, pollution and physical damage from vehicles, and limited growing space. These all impact plant health and should guide design and plant selection.

Raised Median (Curb Height)

A median that is raised 6–7 inches above the roadbed and provides adequate width to allow for plantings. Raised medians (curb height) are utilized throughout the city. 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. Parks maintains many existing median plantings, pursuant to the Greenstreets agreement between Parks and DOT.

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

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Planted medians increase the traffic calming effect afforded by medians. See GEOMETRY: RAISED MEDIAN

Considerations

See LANDSCAPE: GENERAL GUIDELINES

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, pollution, road salt, garbage, vehicular damage, and compaction

A 12-24-inch raised median is preferred in higher traffic areas in order to prevent vehicular incursion into planted areas; see LANDSCAPE: RAISED MEDIAN (12-24 INCHES)

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

Typically, plantings are watered via a water truck; consider how maintenance workers will access the plantings to perform other regular maintenance activities; this may require a lane closure permit from DOT and should utilize appropriate safety equipment

Consider underground utility constraints as excavation beneath the roadbed will be necessary to provide adequate soil volume and positive drainage; a 12-24-inch raised median may allow for plantings where there are conflicts. See LANDSCAPE: RAISED MEDIAN (12-24 INCHES)

Existing medians that are at least 12 feet in width, with curbs present, may be designed for stormwater capture if sufficient drainage can be diverted to the median and other general criteria are met; See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Excluding trees, plantings in medians not covered under the Parks-DOT Greenstreets agreement or maintained by DOT require a maintenance agreement

Vanderbilt Avenue, Brooklyn

Design

See GEOMETRY: RAISED MEDIAN for geometric design guidance; all medians must include a paved area, free of vegetation or obstructions, for pedestrians to safely cross at the intersection

See DOT's Planted Raised Median Design Guidelines for further information

Where planting trees, see design guidance for LANDSCAPE: TREE BEDS

Planted medians should be a minimum of 7-feet 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 Parks on a case-by-case basis. Where conditions allow, a buffer around the perimeter of the planting bed is preferred to allow for maintenance access

Provide a minimum 24 inches depth of high-quality, well-draining soil; 30–36 inches is optimal – see LANDSCAPE: GENERAL GUIDELINES: SOILS

Positive drainage below the planting soil is essential. Any impermeable layers of concrete or asphalt must be removed or appropriately designed weep holes must be included

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 Parks

Consider the use of a suspended pavement system and connected tree beds. See LANDSCAPE: CONNECTED TREE BED

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 understory 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, and deter weeds, 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 Plant Database at **www.nycstreetdesign.info/search-plant**

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 higher-speed roadways.

Grand Concourse, Bronx

Adams Street and Boerum Place, Brooklyn

Benefits

See benefits of LANDSCAPE: RAISED MEDIAN (CURB HEIGHT)

Considerations

See LANDSCAPE: GENERAL GUIDELINES

See considerations of LANDSCAPE: RAISED MEDIAN (CURB HEIGHT)

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)

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, pollution, road salt, garbage, vehicular damage, and compaction

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

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

Typically, plantings are watered via a water truck; consider how maintenance workers will access the plantings to perform other regular maintenance activities; this may require a lane closure permit from DOT and should utilize appropriate safety equipment

Excluding trees, plantings in medians not covered under the Parks-DOT Greenstreets agreement or maintained by DOT require a maintenance agreement

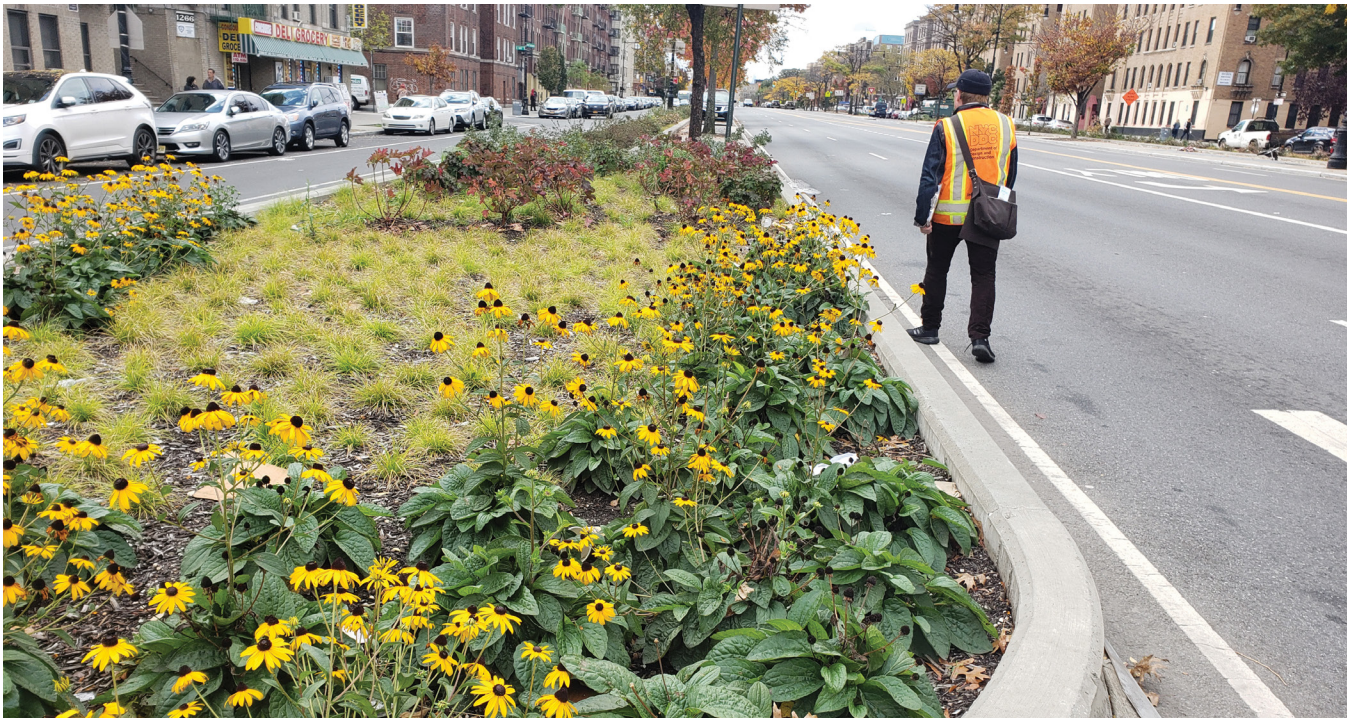
Design

See GEOMETRY: RAISED MEDIAN for geometric design guidance; all medians must include a paved area, free of vegetation or obstructions, for pedestrians to safely cross at the intersection

See DOT's Planted Raised Median Design Guidelines for further information

Where planting trees, see design guidance for LANDSCAPE: TREE BEDS

Planted medians should be a minimum of 7-feet 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 Parks on a case-by-case basis. Where conditions allow, a buffer around the perimeter of the planting bed is preferred for maintenance access



Grand Concourse, Bronx

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 is preferred; exceptions may be approved on a case-by-case basis

Provide a minimum 24 inches depth of high-quality, well-draining soil; 30–36 inches is optimal – see LANDSCAPE: GENERAL GUIDELINES: SOILS

Positive drainage below the planting soil is essential. Any impermeable layers of concrete or asphalt must be removed or appropriately designed weep holes must be included

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 Parks

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 (excluding trees) 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, and deter weeds, 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

In medians with trees, consider understory species that will tolerate varying light conditions as tree species mature and provide more shade

The roots of plants will be primarily within the top 12 inches of the surface, 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 Plant Database at **www.nycstreetdesign.info/search-plant**

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 Parks property and are maintained by Parks or by neighborhood groups through a maintenance agreement.

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 of LANDSCAPE: RAISED MEDIAN (CURB HEIGHT)

Considerations

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, pollution, road salt, garbage, vehicular damage, and compaction

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

Consider how maintenance workers will access the plantings to perform regular maintenance activities, especially watering

Consider pedestrian and bicycle circulation within the mall

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

Consider the collection of stormwater. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

In cases where the pedestrian mall is not Parks property or is not being maintained by the city, plantings, excluding trees, require a maintenance agreement

Design

See LANDSCAPE: GENERAL GUIDELINES

See GEOMETRY: RAISED MEDIAN for geometric design guidance; all medians must include a paved area, free of vegetation or obstructions, for pedestrians to safely cross at the intersection

Where planting trees, see design guidance for LANDSCAPE: TREE BEDS

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

Provide a minimum 24 inches depth of high-quality, well-draining soil; 30–36 inches is optimal – see LANDSCAPE: GENERAL GUIDELINES: SOILS

Positive drainage below the planting soil is essential. Any impermeable layers of concrete or asphalt must be removed or appropriately designed weep holes included

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 Parks

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

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

Plant densely to discourage weed growth and pedestrian access through the plantings, however, do not overcrowd, which can lead to poor air circulation and encourage the spread of pest and disease problems

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

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

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)

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)

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 Parks (through the Greenstreets agreement between DOT and Parks) or another entity, such as a neighborhood group through a maintenance agreement.

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: Parks)

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

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

Considerations

See LANDSCAPE: GENERAL GUIDELINES

May impact street drainage or require catch-basin relocation

Safe access to plantings for maintenance workers must be provided; this may require a lane closure permit from DOT and should utilize appropriate safety equipment

Excluding trees, plantings in triangles not covered under the Parks-DOT Greenstreets agreement require a maintenance agreement

Stormwater management practices not covered under the agreement between Parks, DEP, and DOT require a maintenance agreement. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Design

See LANDSCAPE: GENERAL GUIDELINES and LANDSCAPE: TREE BEDS

Design details should be determined on a site-specific basis with Parks, DOT, and, if applicable, 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

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

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

Use salt-tolerant, drought-tolerant species

Consider designing the area to capture stormwater runoff. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

Street End

The public space at the end of a street abutting a boardwalk or body of water. Pedestrian access to the water, boardwalk, or waterfront promenade must be maintained. In some cases, street ends are adjacent to waterfront public access areas where the city has required private development to build and maintain a waterfront promenade. These public access areas are generally created through the zoning resolution that regulate how the space is designed and maintained. PDC review is typically required for changes within the Street End and should be conducted in concert with DCP's review of a waterfront public access area, if applicable.

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

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

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Provides an opportunity to actively collect and manage stormwater

Considerations

See LANDSCAPE: GENERAL GUIDELINES

See considerations for LANDSCAPE: TRIANGLE

Consider maintaining clear view corridors to visual resources (i.e. bodies of water) from upland sidewalks

Physical and environmental stresses should be understood prior to plant selection; especially if near the coast or another body of water

Plantings not maintained by the city require a maintenance agreement with DOT

Certain Street Ends are subject to the DOT-Parks Street Ends MOU; these are typically built as part of a Waterfront Access Plan

Design

See LANDSCAPE: GENERAL GUIDELINES

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; a larger clear path, up to 15 feet, may be required if there are high pedestrian volumes

Consider the use of pedestrian amenities, such as street furniture, in conjunction with plantings. Non-standard elements will require a maintenance agreement

Consider the capture of stormwater runoff. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Consider the use of a barrier, such as a W-section guide rail or martello 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 Plant Database at **www.nycstreetdesign.info/search-plant**

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 – the area where most furnishings are installed and typically abutting the curb. 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; may include street trees, ornamental plantings, stormwater plantings, or other types of vegetation. Street trees should be planted wherever possible. While Parks 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. Stormwater management practices are generally installed on sidewalks in DEP Priority Areas to capture stormwater runoff from the roadway where conditions are appropriate. See GEOMETRY: FULL SIDEWALK and LANDSCAPE: STORMWATER MANAGEMENT PRACTICES.

A mix of understory plantings, an allée of trees, and a bioswale knit together the urban fabric of this Upper West Side neighborhood. Plantings maintained by the Columbus Avenue BID: Columbus Avenue, Manhattan

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

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Considerations

See LANDSCAPE: GENERAL GUIDELINES

See considerations for LANDSCAPE: TREE BEDS

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

Excluding trees, sidewalk plantings not covered under the Parks-DOT Greenstreets agreement require a maintenance agreement

Stormwater management practices not covered under the agreement between Parks, DEP, and DOT require a maintenance agreement. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Design

See design guidance for LANDSCAPE: TREE BEDS and GEOMETRY: FULL SIDEWALK

Meet minimum size and design requirements of Parks Tree Planting Standards

A minimum 8-foot clear path must be maintained in areas with high pedestrian traffic and a 5-foot minimum clear path in areas with low pedestrian traffic. DOT may require a greater clear path, up to 15 feet, in locations with particularly high pedestrian volumes. Exceptions may be approved by DOT on a case-by-case basis.

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

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 stormwater management practices. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

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 turf grass, 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, Staten Island (Credit: Parks)

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

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Considerations

See LANDSCAPE: GENERAL GUIDELINES

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 is not used. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

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

Design

See design guidance for LANDSCAPE: TREE BEDS

Groundcover other than turf grass is encouraged 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 LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

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

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

Curb Extension

A curb extension that is planted rather than paved. See GEOMETRY: CURB EXTENSION.

Christopher Street and Greenwich Street, Manhattan

W 11th Street and Seventh Avenue S, Manhattan

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Considerations

See LANDSCAPE: GENERAL GUIDELINES

May impact street drainage and require new catch basins

Excluding trees, plantings in curb extensions not covered under the Parks-DOT Greenstreets agreement require a maintenance agreement

Stormwater management practices not covered under the agreement between Parks, DEP, and DOT require a maintenance agreement. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Design

See design guidance for LANDSCAPE: RAISED MEDIAN (CURB HEIGHT)

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 LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

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 Plant Database at **www.nycstreetdesign.info/search-plant**

Permanent Planter

Planters are decorative containers, of a variety of sizes and shapes, which support small trees and understory plantings including shrubs, grasses, perennials and bulbs. Planters are only permitted where in-ground trees or plantings cannot be achieved. When sited appropriately and properly maintained, planters provide many of the same benefits as in-ground plantings. Any planter installed on public ROW needs to be reviewed and approved by DOT and will require a maintenance agreement.

168th Street, Manhattan

Greenwich Street, Manhattan

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Planters allow for vegetation where in-ground planting is not possible

Considerations

See LANDSCAPE: GENERAL GUIDELINES

Site planters so as to not displace legally operating street vendors

Planters should be contextually appropriate, and special care must be taken when sited near artwork. PDC review is required for planters sited within 75 feet of an artwork

Maintain pedestrian circulation and desire lines

Consider the impact of planter dimensions on the visual corridor and avoid contributing to visual clutter or blocking sight lines of major thoroughfares.

Consider integrating planters with adjacent privately-owned publicly-accessible space and look for opportunities to group planters together where spacing allows

Consider the environmental and physical stresses plants must endure. Litter/debris, vandalism, and theft are all common; plants will have to accommodate wider swings in temperature as the soil is exposed

Frequent watering is required to maintain healthy plants; ensure planters have proper drainage

Planters may only be installed if a maintenance plan has been submitted and approved by DOT and an agreement is in place

Application

Located only on sidewalks that cannot support standard street trees or in-ground planting; appropriate supporting documentation (utility plans, underground constraints, documentation from Parks, etc.) must be submitted to DOT with any application for planters

Design

Refer to DOT's Permanent Planter Design Guidelines for more information; planters that follow these guidelines do not require PDC approval

See FURNITURE: PLANTER for further guidance on the design of the container

Must be capable of providing suitable soil volume and drainage to allow small trees to thrive; planters should provide a minimum 54 cubic feet of soil volume and may vary in dimension, with a 3-foot height preferred and a maximum 4-foot height

8 feet or 50%, whichever is greater, of the sidewalk width must remain clear for 15 feet on either side of the planter

When feasible, planters shall occupy no more than 25% of the sidewalk width

Ensure a reveal on the bottom of the planter and design the planter to be moveable

Planters should allow for uneven or sloped sidewalks while remaining level

Provide positive drainage via appropriately designed weep holes or a similar method to prevent the accumulation of standing water

Permanent planters must include a small-canopy tree; exceptions may be made in certain circumstances

Ensure plants provide year-round interest or are rotated out each season so the planters are consistently filled; at no time should a planter be empty

Plants should be drought-tolerant and one to two USDA zones hardier to increase winter survival potential as soil is less insulated. Plants should also be tolerant of limited soil volume and selected so as to not obstruct sight lines

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

168th Street, Manhattan

Greenwich Street, Manhattan

Plaza Plantings

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

See GEOMETRY: PEDESTRIAN PLAZA 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 LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

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 LANDSCAPE: GENERAL GUIDELINES

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

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 worker access to the plantings for regular maintenance activities; access to a water source for irrigation should be provided

Any plantings not maintained by DOT, DEP, or Parks will require a maintenance agreement

Design

Plantings must be considered in context of the overall plaza design. See GEOMETRY: PEDESTRIAN PLAZA for design guidance

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; see SOILS in the LANDSCAPE: GENERAL GUIDELINES

Corona Plaza, National Street and Roosevelt Avenue, Queens

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 LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

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 Plant Database at **www.nycstreetdesign.info/search-plant**

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 LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW and LANDSCAPE: IN-GROUND PLANTING AREA

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 provide protection from winter salt spray

Considerations

See LANDSCAPE: GENERAL GUIDELINES

See considerations for LANDSCAPE: IN-GROUND PLANTING AREA

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 hardier to survive these conditions

Any plantings not maintained by DOT, DEP, or Parks will require a maintenance agreement

Design

See design guidance for LANDSCAPE: IN-GROUND PLANTING AREA

Consider the type of soil that will be used. Specify a soil with good water and nutrient holding capacity. See LANDSCAPE: GENERAL GUIDELINES: SOILS

Positive drainage below the planting soil is essential. Any impermeable layers of concrete or asphalt must be removed or appropriately designed weep holes must be included

Myrtle Avenue Plaza, Myrtle Avenue between Hall Street and Emerson Place, Brooklyn

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

Planting beds, as a general rule, should be limited in height and maintain visual and physical openness

Additional seating can be provided by utilizing the raised structure as a seat wall; avoid creating long walls that impede pedestrian circulation and take into consideration potential maintenance issues such as skateboard use

Raised planting areas can be designed to creatively accommodate or incorporate required security measures; consider impacts of security infrastructure (foundations, spacing requirements, etc.) on species selection

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

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. 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.

Plantings along an access ramp and bridge structure: Belt Parkway, Queens

New planting featuring various tree species: Brooklyn Queens Expressway, Brooklyn

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

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

Summer cooling, wind reduction, buffering of negative traffic perceptions, glare reduction, and enhanced aesthetics provide a more pleasant experience for motorists

May provide moderate stormwater capture

Considerations

See LANDSCAPE: GENERAL GUIDELINES

Plantings 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; maintenance typically consists of litter removal, lawn mowing, tree pruning for safety, and limited herbicide use along landscape edges

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

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

Consider use of a native plant seed mix combining grasses and forbs, particularly on slopes exceeding 3:1 where mowing may be difficult

Various tree species: Hutchinson River Parkway, Bronx

Any plantings not maintained by DOT or Parks 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 (an area clear of fixed objects, such as trees, hazardous to vehicles involuntarily leaving the roadway at high speed) 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

Use low-mow fescues or similar turf grass species to reduce mowing frequency where practical

Ensure turf species are well-suited to the site so as to be as vigorous and dense as possible for good erosion control and quick repair of physical damage

Asphalt mow strips, or similar treatments, are required around and under objects that mowers cannot pass over

Incorporate stormwater management practices where appropriate. Generally, restrictions on space do not apply, so such infrastructure can be much larger. See LANDSCAPE: STORMWATER MANAGEMENT PRACTICES

Mulch around trees, without covering the root flare or trunk, to reduce damage from tractor mowers and greatly improve tree health; a 3-foot minimum diameter mulch bed is required around new trees and a minimum 5-foot diameter is required around existing trees

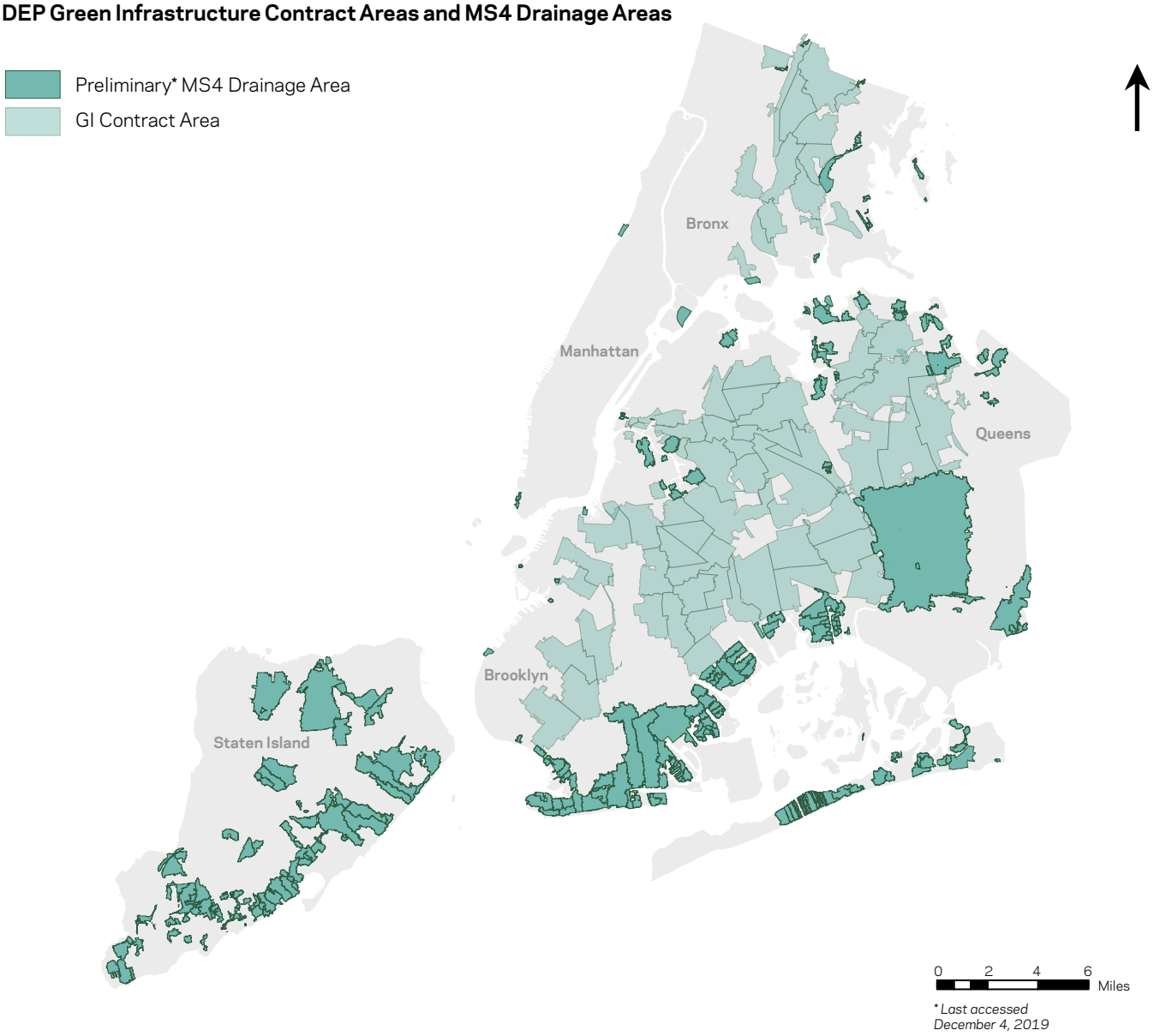
Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

Stormwater Management Practices

Stormwater management is necessary to reduce combined sewer overflow (CSO) in combined sewer areas of the city and reduce pollution in waterways in the municipal separate storm sewer system (MS4) areas of the city. New York City manages stormwater through "gray" infrastructure including tanks and pipes or "green" infrastructure (GI) practices which mimic the way the natural environment handles stormwater. GI practices typically manage stormwater via infiltration through soil and evaporation through vegetation. GI practices can also provide co-benefits such as reduced flooding, improved air quality, attractive streetscapes, traffic calming, and more.

DEP Green Infrastructure Contract Areas and MS4 Drainage Areas



Maps showing preliminary MS4 Drainage and GI Contract Areas are provided through the DEP website at www1.nyc.gov/site/dep/water/municipal-separate-storm-sewer-system.page (MS4) and www.nyc.gov/dep/gimap (GI Contract). (Credit: DEP)

Using natural components, such as plants, stones, and soils, to mitigate the impacts of stormwater runoff is an ecologically responsible and economical technique to employ within the public ROW. DEP, together with DOT, Parks, and DDC, developed standardized designs and protocols to site GI practices within the public ROW. These standards along with other helpful guidance can be found on DEP's website at **www.nyc.gov/dep/greeninfrastructure**.

The following sections describe specific city-led strategies for managing stormwater in targeted areas that have the greatest need. These practices will be built and maintained by the city within priority areas of combined- (CSO) and separately-sewered (MS4) areas.

The city will site the appropriate standard treatment based on visible site conditions (grading, location of catch basins, tributary drainage area, pedestrian volumes, built fabric context) as well as subsurface conditions (permeability, site contamination, water table, etc.).

Private entities or community groups are also encouraged to build green infrastructure, but those installations will require a maintenance agreement. Private entities may choose to build standard stormwater management practices or to pursue unique installations. Treatments other than city standards will require more intensive review, but are still encouraged.

Sidewalk Stormwater Management Practices

The most common type of Stormwater Management Practice is typically a planted area located along the curb of a sidewalk, graded to capture stormwater, and planted with an understory of shrubs and herbaceous material, and sometimes trees. Inlet structures such as curb cuts and grates allow for stormwater from the adjacent roadway to enter the planted area and overflow to exit. Consisting of ROW Rain Gardens, Bioswales, Greenstrips, and Infiltration Basins, the city will build and maintain these practices within DEP Priority Areas; see DEP Green Infrastructure Contract Areas and MS4 Drainage Areas map.

Dean Street, Brooklyn

Lafayette Avenue, Bronx

Benefits

See LANDSCAPE: BENEFITS OF PLANTINGS IN THE ROW

Reduced stormwater entering sewers during storms

Can help to improve water quality in local waterways

Healthier plants and greater survival rates when appropriate plants are used

Can improve street drainage and may reduce ponding on streets and/or sidewalks

Considerations

See LANDSCAPE: GENERAL GUIDELINES

Designers should perform environmental due diligence to ensure green infrastructure installations will not exacerbate preexisting subsurface contamination, including, but not limited to, researching current and past uses of the site, and reviewing publicly available local, state, and federal databases; additional environmental analysis, and potentially site remediation, may be necessary

Refer to DEP's latest Procedure Governing Limited Geotechnical Investigation for Green Infrastructure Practices, available at **www.nyc.gov/html/dep/pdf/green_infrastructure/ogi-geotech-procedure.pdf**. 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

Avoid in areas adjacent to retaining structures, structural foundations, critical infrastructure, or on roadways elevated atop a retaining wall structure; cannot be sited within 25 feet of above or below-ground MTA structures

Leaves, litter, and other material may clog inlets/outlets and could impact overall performance and aesthetics of the installation. Locations with heavy sediment or trash/debris loading will require frequent cleaning and should be avoided

Stormwater management practices funded and approved by DEP will be maintained by DEP, all other installations are encouraged, but will require a maintenance agreement

Application

Install in all areas with tree beds, roadway plantings, sidewalk plantings, plaza plantings, and limited-access arterial plantings. See LANDSCAPE: TREE BEDS, LANDSCAPE: ROADWAY PLANTINGS, LANDSCAPE: SIDEWALK PLANTINGS, LANDSCAPE: PLAZA PLANTINGS, and LANDSCAPE: LIMITED ACCESS ARTERIAL PLANTINGS

ROW Bioswales are the most frequently used and generally mimic the siting criteria used for tree beds. See LANDSCAPE: TREE BEDS

ROW Rain Gardens are typically used where there is shallow bedrock or groundwater and have the same siting criteria as Bioswales

ROW Greenstrips may be used where sidewalks are narrow, but are generally not preferred

ROW Infiltration Basins are used in areas with narrower sidewalks and/or higher pedestrian volumes where plants are not feasible or an existing grass strip should be maintained; they are not recommended for areas where vehicles frequently mount the sidewalk

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

Design

DEP Standards for the ROW Bioswale, Rain Garden, and Greenstrip are available on the DEP website at **www.nyc.gov/dep/greeninfrastructure**

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

Surface treatment may be plantings, lawn, or concrete depending on context and community feedback

A minimum 8-foot clear path must be maintained in areas with high pedestrian traffic and a 5-foot minimum clear path in areas with low pedestrian traffic. DOT may require a greater clear path, up to 15 feet, in locations with particularly high pedestrian volumes. Exceptions may be approved by DOT on a case-by-case basis

Installations should be sited at locations that receive adequate flow

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

Avoid locations in proximity to existing above-ground or subsurface utilities

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

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

Consider permeable pavement wherever safe and feasible. See MATERIALS: PERMEABLE INTERLOCKING CONCRETE PAVER (PICP) and MATERIALS: PERVIOUS CONCRETE in the SIDEWALKS section

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**

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. Stormwater Greenstreets are typically larger stormwater management practices installed and maintained by DEP, Parks, or another committed maintenance partner. They can be located anywhere in the city as conditions allow. It should be noted that these are not typical Greenstreets as defined in the Greenstreets agreement between DOT and Parks. For examples, visit DEP's webpage on Green Infrastructure.

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

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

Benefits

See benefits for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

Permit greater water capture than what is typical for a sidewalk stormwater management practice 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. See GEOMETRY: CURB EXTENSION

Considerations

See considerations for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

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 the practice is encouraged, but a maintenance agreement is required

Application

See application guidance for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

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

Design

See design guidance for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

DEP Guidelines for the Stormwater Greenstreets are available on the DEP website at **www.nyc.gov/dep/greeninfrastructure**

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 Plant Database at **www.nycstreetdesign.info/search-plant**

Median Stormwater Management Practices

Similar to DEP Rain Gardens and Stormwater Greenstreets, Median Stormwater Practices are installed within a median of a street.

Fieldston Road at Riverdale Avenue and W 236th Street, Bronx

Justice Avenue, Queens

Benefits

See benefits of LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

Considerations

See considerations for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

Raised medians, whether paved or planted, are more suitable for stormwater management than other types of medians such as barrier medians and painted medians

Median stormwater management practices should be a minimum of 12 feet in width and consideration should be given for maintenance vehicle access

Avoid in areas of with high sediment loads or other types of trash and debris

Application

In areas where sufficient drainage can be directed to the median

Design

See design guidance for LANDSCAPE: SIDEWALK STORMWATER MANAGEMENT PRACTICES

See design guidance for LANDSCAPE: RAISED MEDIAN (CURB HEIGHT) and LANDSCAPE: RAISED MEDIAN (12-24 INCHES)

Similar to stormwater greenstreets, median stormwater management practices require site-specific design and review. See LANDSCAPE: STORMWATER GREENSTREET

In locations where the roadway is pitched towards the median, curb cuts may be used to divert stormwater to the median stormwater management practice

For roadways that pitch away from the median, stormwater can be diverted to the median stormwater management practice through the installation of new or modified catch basins and subsurface piping, with DEP approval. Designers should consider the size of the impervious area that will be diverted to the practice as part of the cost analysis for this type of treatment

Large median stormwater management practices may be split into sections and hydraulically connected using underground pipes to avoid impacting surface programming or landscaping

For vegetated practices, a minimum ponding depth of 3 inches at the center of the median, with a maximum 3:1 side slope around the edges, is recommended

Consider permeable pavement wherever safe and feasible. See MATERIALS: PERMEABLE INTERLOCKING CONCRETE PAVER (PICP) and MATERIALS: PERVIOUS CONCRETE in the SIDEWALKS section

Plants

See Plant Database at **www.nycstreetdesign.info/search-plant**