Usage Categories

Streetlights and components are categorized as Standard, Distinctive, Historic, and Pilot. DOT maintains equipment in all four categories, and replaces damaged streetlights in kind. The installation of new streetlights as part of a streetscape project is included in that project's budget and implemented by the project contractor. For any such project, an additional 10% of the total number of streetlights in the project must be purchased; DOT stores these extra streetlights and uses them to replace damaged streetlights in the project area.

- **Standard**
  DOT routinely installs and maintains Standard streetlights. The current Standard cobra head luminaires are the 110W maximum Standard LED Luminaires for wider streets and commercial streets; 78W maximum Standard LED Luminaires for residential streets; and 75W maximum park type Standard LED Luminaires for pedestrian lighting. DOT will maintain and replace existing 100W and 150W HPS Cobra Head luminaires for street lighting and 70W and 100W HPS luminaires for pedestrian lighting, but will be replacing them over time with LED luminaires. For street and pedestrian lighting, the Standard light poles are the Davit, the Round, and the Octagonal. The M-2A and the S-1A signal poles are Standard for use at traffic signal locations.

  With DOT approval, modifications and alternate combinations of components are possible. Poles can be painted black, brown, or green; and alternate treatments for bases can be used. While such modifications are considered Standard, they typically require a maintenance agreement.

- **Distinctive**
  Any streetlights other than those that are listed as Standard or Historic are considered Distinctive; they are installed as part of streetscape projects — in which case they require Public Design Commission (PDC) approval — or as in-kind replacements for damaged streetlights. DOT is responsible for submitting Distinctive streetlight proposals to PDC on behalf of neighborhood associations and other groups that request the treatments. In preparation for these submittals, DOT works closely with applicants to develop consistent streetlighting plans that are sensitive to local contexts. DOT maintains Distinctive streetlight components unless otherwise stipulated in a maintenance agreement.

- **Historic**
  Historic poles can only be used in Landmarks Preservation Commission (LPC) designated historic districts or in neighborhoods with substantial, intact historic fabric — i.e., three or more contiguous blocks. They require approval for use in historic districts, and PDC approval for use in non-designated areas with substantial, intact historic fabric. The Historic streetlights are currently used with only the LED Teardrop and Shielded Teardrop luminaires, with a 150W LED lamp.

  The TBTA pole (4.1.3) is considered Historic when combined with the Teardrop or Shielded Teardrop luminaire. Accordingly, it requires LPC approval in historic districts and PDC approval in non-designated areas with substantial and intact historic fabric.

DOT has transitioned to IES's BUG rating system for streetlighting.

- **Pilot**
  Streetlights in this category are being tested by DOT and are not yet approved for wider use in New York City.

Universal Design

Streetlights and signals at corners must be sited so that they do not obstruct curb ramps, ensuring sufficient access to the sidewalk for all pedestrians, including those using mobility devices. At crossings, the height of Accessible Pedestrian Signals must be reachable by a person using a mobility device, at a preferred height of 42 inches and a maximum height of 48 inches (ADA Accessibility Guides, PROWAG).

Resiliency

Existing foundations at traffic signal locations in certain flood-vulnerable areas will be replaced with coastal storm foundations that incorporate a square concrete pedestal 9 inches in height and 24 inches in width. The 24 inch x 9 inch pedestal will be monolithically poured with the foundation. Raising the base of the traffic signals or street light poles prevents the electrical components of the poles from being submerged in salt water during future flooding events. Additionally, High Density Polyethylene (HDPE) conduit, a more cost-effective material that is not susceptible to corrosion from residual salt water after storm surge events, will replace galvanized steel for all signal and streetlight locations.

Specifications

For design criteria, technical information, finishes, and color specification, refer to DOT's Bureau of Traffic Division of Streetlighting specifications. The latest edition is available for purchase for $50 from the Office of the Agency Chief Contracting Officer, 55 Water Street, Ground Level, New York NY 10041. For further information, call (212) 839-9435.

BUG Ratings

DOT rates luminaires based on IES's BUG Ratings. The BUG (Backlight, Uplight, and Glare) rating describes the types of stray light escaping luminaires, based on zonal lumen calculations for secondary solid angles established by IES TM-15-11. The BUG system takes into account uplight shielding, glare shielding, and backlight shielding. This system replaces the previously-used IES cutoff rating classifications. **DOT recommends fixtures with a B2-U1-G2 BUG rating.**

Lighting Levels & Uniformity

DOT's lighting-levels and uniformity guidelines are based on those established by the IES Roadway Lighting standard RP-8-14. The current edition of the Illuminating Engineering Society of North America's IESNA Lighting Handbook should be referenced for applicable values of illuminance, luminance, contrast and glare criteria, and color temperatures.

All lighting designs must be reviewed and approved by DOT engineers.

	Average Illuminance	Illuminance Uniformity
Roadways		
Collector*	8-12 lux (.74-1.11 footcandles)	4:1
Local**	6-9 lux (.56-.84 footcandles)	6:1
Intersections		
Collector/Collector	16-24 lux (1.49-2.23 footcandles)	4:1
Collector/Local	14-20 lux (1.30-1.86 footcandles)	4:1
Local/Local	12-18 lux (1.11-1.67 footcandles)	4:1
Plazas, Walkways, & Bikeways	5-10 lux (.46-.93 footcandles)	6:1

**Collector roadways serve motor vehicle traffic between major and local roadways — major roadways being those that serve as the principal network for through traffic. DOT's Lighting Division generally classifies avenues and boulevards as collector roadways*
***Local roadways provide direct motor vehicle access to abutting properties. DOT's Lighting Division generally classifies cross streets as local roadways*

Luminaires	Standard Poles			Distinctive Poles	
	Davit	Octagonal	Round	Flatbush	TBTA
Standard LED	●	●	●		
Helm	●	●	●	●	
Stad	●	●	●	●	●
Teardrop				●	●
Shielded Teardrop					●

The table above illustrates what pole-luminaire combinations are allowed, though the Helm and Stad luminaires are only eligible for in-kind replacement. Integrated Streetlights are not included.

Notes and Symbols

CCMH	Compact Ceramic Metal Halide lamping. CCMH is a full-spectrum light that can be installed as part of a streetscape project, and is maintained by DOT.
HDG	Hot Dipped Galvanized Steel
HPS	High-Pressure Sodium
IES	Illuminating Engineering Society of North America
IES Type	IES classification of lighting based on its photometric properties. Five types are relevant to the city's streetlights: I, II, III, IV, and V.
LED	Light-Emitting Diode. DOT is phasing in LEDs that produce white, full-spectrum light.
SS	Standard Streetlight: Standard pole (Davit, Round, or Octagonal), standard luminaire (Standard LED Luminaire), or standard pole and luminaire (Standard LED Luminaire on Round, Octagonal, or Davit)
W	Watts
$	Costs: Shown for each pole or luminaire as a $ symbol, representing relative costs compared to the Standard Streetlight (SS). A scale of one to five $ symbols is used rather than specific monetary amounts because actual costs are subject to change.

Poles

Davit, Round, & Octagonal Poles

Usage: Standard

Each of the Standard poles, combined with the Standard LED Luminaire, constitutes a Standard Streetlight. The Standard poles can also hold other luminaires. The Davit is DOT's preferred Standard pole with the Round and Octagonal used for in-kind replacement.

Applications

Streetlight Pole:
- Streets and highways
- Single and twin mounting

Pedestrian Pole:
- Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways

Luminaires

Standard LED Luminaire (Standard)

HPS Cobra Head (being replaced by Standard LED Luminaire)

Helm (in-kind replacement only)

Stad (in-kind replacement only)

Material/Color

HDG Steel/silver (street)—black, brown, and green are also allowed but require a maintenance agreement

Aluminum/silver (highway)

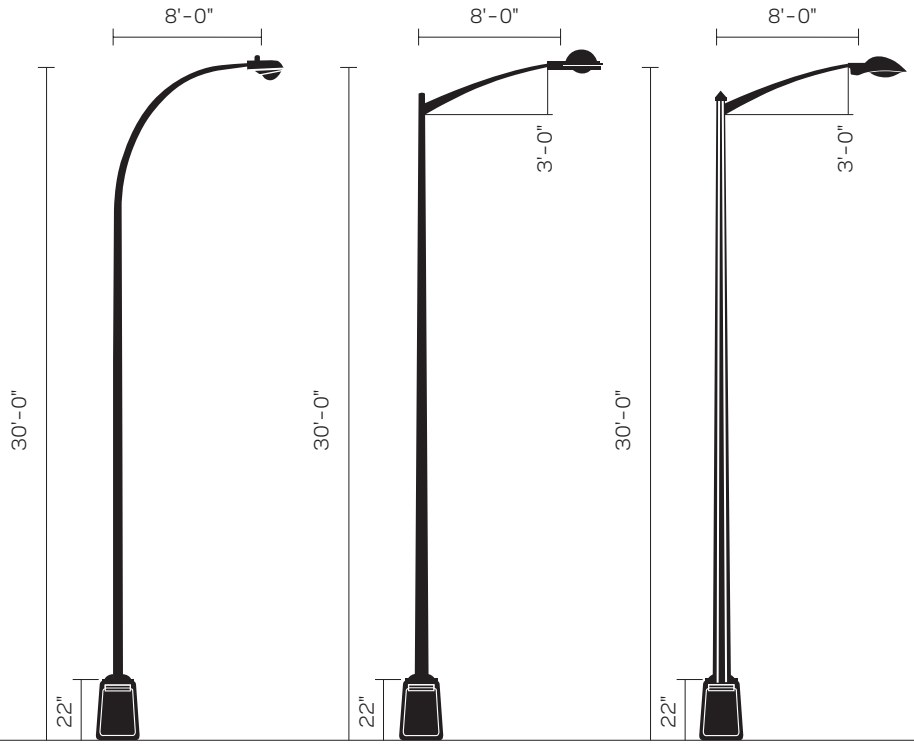
Cost Compared to SS

The Davit, Octagonal, and Round Poles are Standard poles

Octagonal pole with HPS Cobra Head luminaire: Pearl Street, Manhattan

Standard Poles with Various Luminaires

The three luminaires shown here are not being employed in new projects. The Helm and Stad luminaires are eligible for in-kind replacement, and may be considered in the future if versions with LED lamps become available.



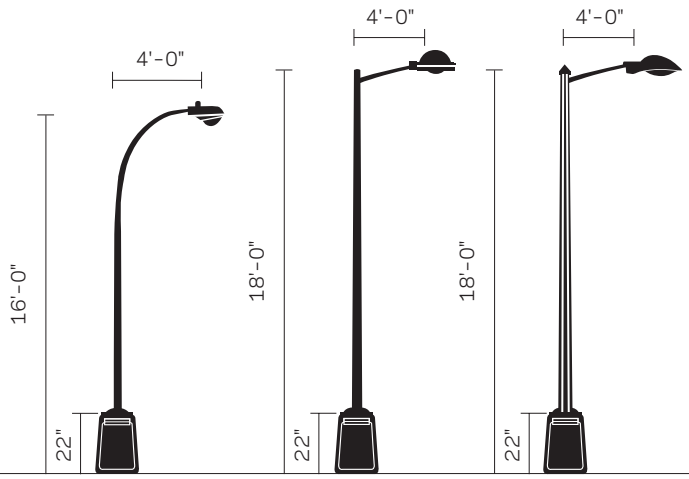
Davit Pole with HPS Cobra Head Luminaire

Round Pole with Stad Luminaire

Octagonal Pole with Helm Luminaire

Standard Pedestrian Poles with Various Luminaires

The three luminaires shown here are not being employed in new projects. The Helm and Stad luminaires are eligible for in-kind replacement, and may be considered in the future if versions with LED lamps become available.



Davit Pole with HPS Cobra Head Luminaire

Round Pole with Stad Luminaire

Octagonal Pole with Helm Luminaire

Flatbush Avenue Pole

The Flatbush Avenue pole was first installed in 1988 on Flatbush Avenue in Brooklyn. Its post-modern design is appropriate for areas with historic character.

Usage: Distinctive

Applications

Commercial and residential streets

Single or twin mounting (center medians)

Streets with roadway width of 36 feet or more

Luminaires

Teardrop (LED) and Shielded Teardrop (LED)

Helm (in-kind replacement only)

Stad (in-kind replacement only)

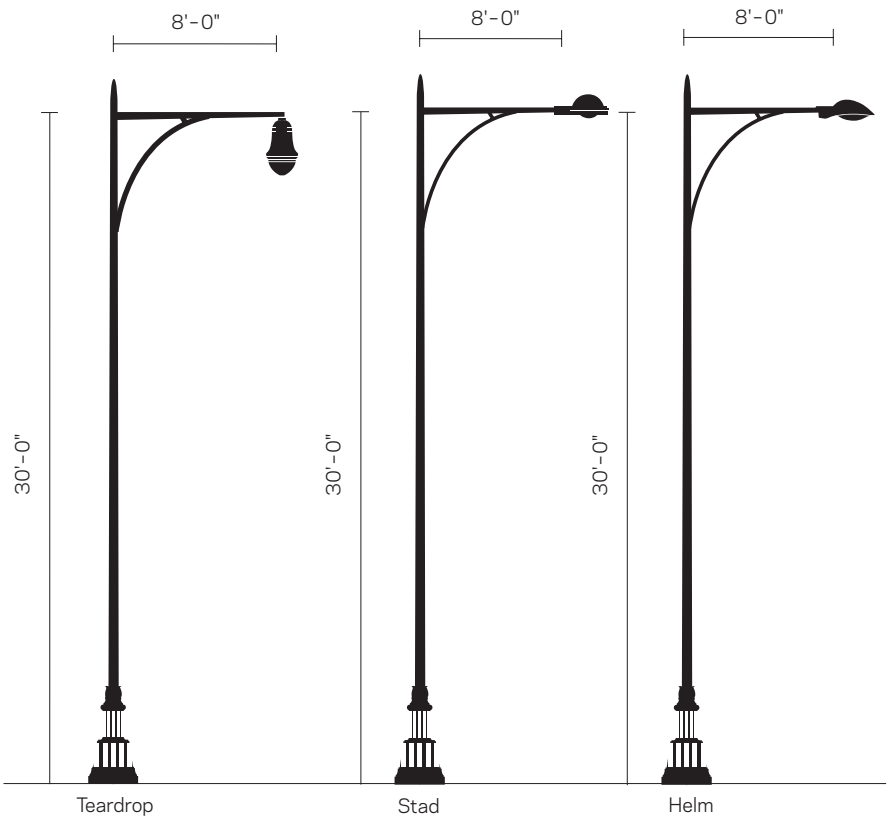
Material/Color

Fabricated steel pole/black, brown, and green

Cost Compared to SS

$$

Flatbush pole and Historic Teardrop luminaire: 49th Street, Queens



Flatbush Avenue Pole with Various Luminaires

The Teardrop (LED) and Shielded Teardrop (LED) are acceptable for combination with the Flatbush Avenue Pole. The Helm and Stad luminaires are eligible for in-kind replacement, and may be considered in the future if versions with LED lamps become available.

TBTA Pole

Usage: Distinctive

The TBTA (Triboro Bridge Tunnel Authority) pole was introduced in the 1950s for mid-twentieth-century bridge construction projects such as the Robert F. Kennedy Bridge (formerly the Triboro Bridge). The TBTA replaced wooden lamp posts that lit parkways during the 1920s and '30s. The Teardrop and Shielded Teardrop luminaires combine with the TBTA pole to produce a historic quality.

Applications

Streetlight Pole:

- Commercial and residential streets
- Single or twin mounting
- Streets with roadway width of 36 feet or more

Pedestrian Pole:

- Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways

Luminaires

Teardrop (LED) and Shielded Teardrop (LED) (historic districts only)

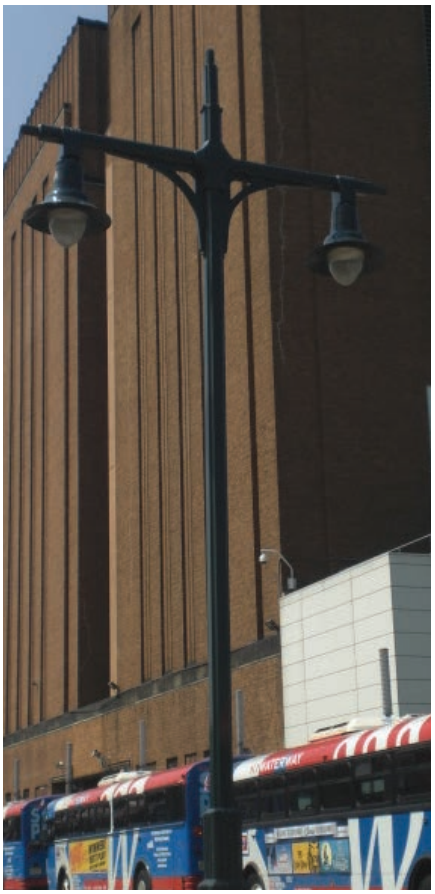
Stad (in-kind replacement only)

Material/Color

Fabricated steel pole/black, brown, and green

Cost Compared to SS

$$$$$

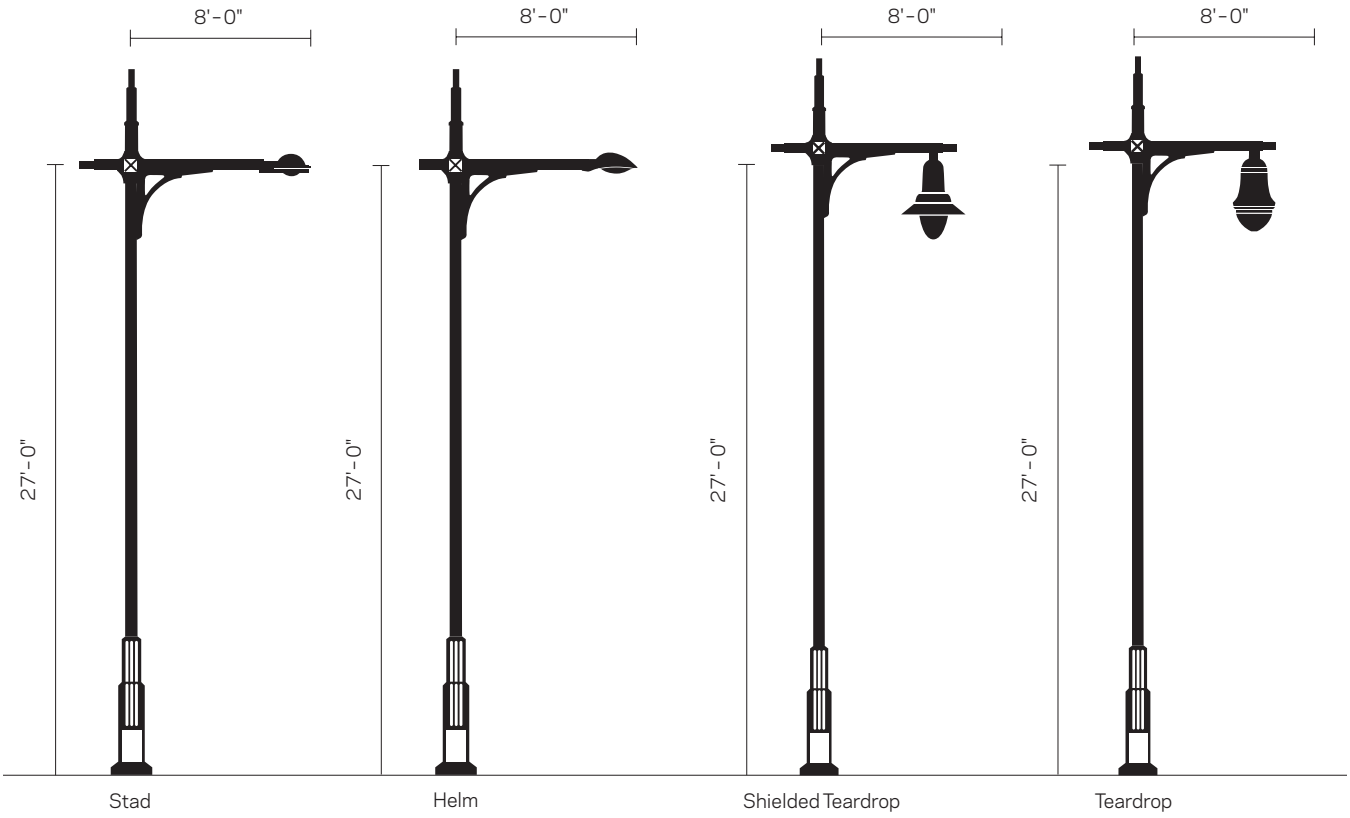


TBTA pole with Historic Shielded Teardrop luminaires: 40th Street, Manhattan

TBTA pole with Historic Shielded Teardrop luminaire: Hudson River Park, Manhattan

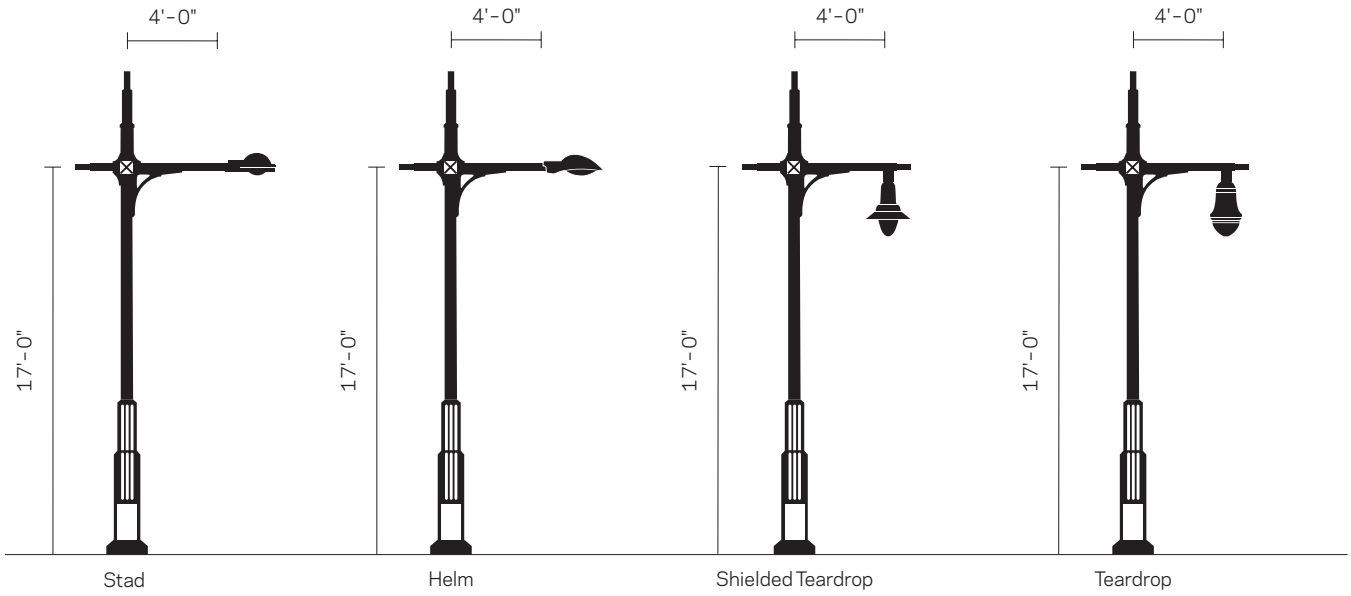
TBTA Pole with Various Luminaires

The Teardrop (LED) and Shielded Teardrop (LED) are acceptable for combination with the TBTA Pole. The Stad and Helm luminaires are eligible for in-kind replacement, and may be considered for new applications if versions with LED lamps become available.



TBTA Pedestrian Pole with Various Luminaires

The Teardrop (LED) and Shielded Teardrop (LED) are acceptable for combination with the TBTA Pedestrian Pole. The Stad and Helm luminaires are eligible for in-kind replacement, and may be considered for new applications if versions with LED lamps become available.



Luminaires

HPS Cobra Head

The HPS Cobra Head luminaire is being phased out and replaced by the Standard LED Luminaire, see STANDARD LED LUMINAIRE **(4.2.2)**

Usage: Discontinued

Applications

Street light: Streets and highways; single or twin mounting

Pedestrian light: Parks, esplanades, pedestrian bridges, walkways, ramps, under elevated trains, and bikeways; single mounting only

Lamp/Optics

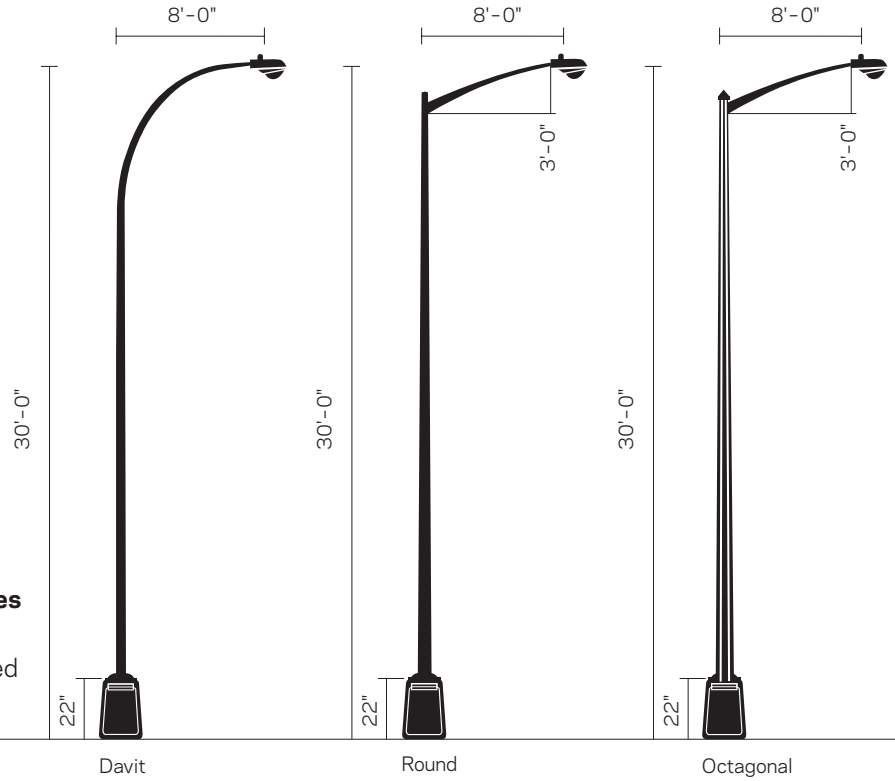
Road:
- 100W HPS, IES Type I
- 150W HPS, IES Type II

Pedestrian:
- 70W and 100W HPS, IES Type I

Cost Compared to SS

$

HPS Cobra Head luminaire on twin Davit pole: West Houston Street, Manhattan



HPS Cobra Head with Standard Poles
Poles shown here are the standard poles provided, tested, and maintained by DOT.

Standard LED Luminaire

Usage: Standard

DOT is phasing in the 110W and 78W Standard LED Luminaires for wide roadways and residential streets, respectively. Their full-spectrum, white light substantially improves visibility and clarity. The Standard LED Luminaire is considered to have a Cobra Head fixture.

Applications

Street light: Streets and highways; single or twin mounting

Pedestrian light: Parks, esplanades, pedestrian bridges, walkways, ramps, under elevated trains, and bikeways; single mounting only

Lamp/Optics

Wide Roadway/Commercial Area:
- 110W maximum LED
- IES Type I

Residential Street:
- 78W maximum LED
- IES Type I

Pedestrian:
- 75W maximum LED
- IES Type II or III

Cost Compared to SS

The Standard LED Luminaire is the SS

Standard LED Luminaire on Flushing Meadows Pole: Putnam Plaza, Brooklyn

Standard LED Luminaire on green Park Pole: Central Park, Manhattan

Helm Luminaire

An LED Helm luminaire is not currently available. The Helm luminaire is no longer permitted for new applications, but may be replaced in kind.

Usage: In-Kind Replacement

Applications

Commercial districts (in-kind replacement only)

Lamp/Optics

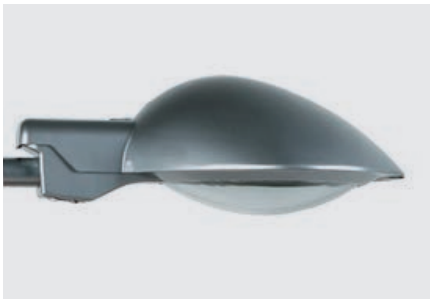
90W and 140W CCMH

Curved sag glass optics

IES Type II or III

Cost Compared to SS

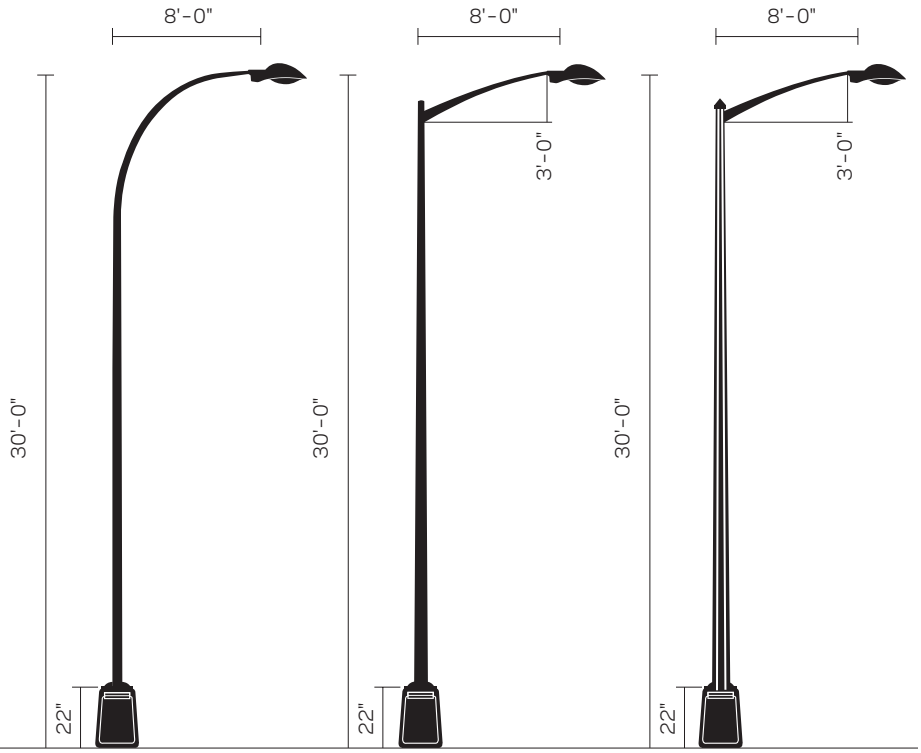
$$$$$



Helm luminaire on Davit pole: Flatbush Avenue, Brooklyn

Helm with Standard Poles
Standard poles are provided and maintained by DOT.

Helm luminaires on standard poles are eligible for in-kind replacement, and may be considered for new applications if a version of the luminaire using LED lamps becomes available.



Helm with Distinctive Poles
Distinctive poles require additional funding.

Helm luminaires on distinctive poles are eligible for in-kind replacement, and may be considered for new applications if a version of the luminaire using LED lamps becomes available.

Stad Luminaire

An LED Stad luminaire is not currently available. The Stad luminaire is no longer permitted for new applications, but may be replaced in kind.

Usage: In-Kind Replacement

Applications

Commercial districts (in-kind replacement only)

Pedestrian luminaires: Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways (in-kind replacement only)

Single or twin mounting

Lamp/Optics

Road: 90W and 140W CCMH

Pedestrian: 60W and 90W CCMH

Sag or flat lens optics

IES Type II or III

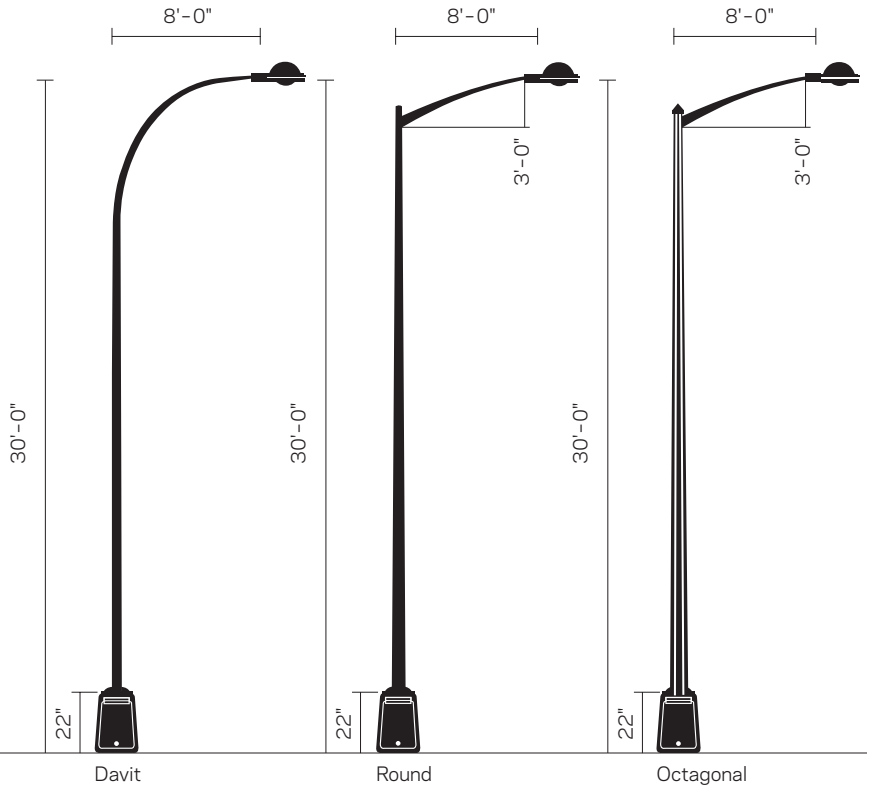
Cost Compared to SS

$$$$

Stad luminaires on TBTA pole: Robert F. Kennedy Bridge, Manhattan

Stad with Standard Poles
Standard poles are provided and maintained by DOT.

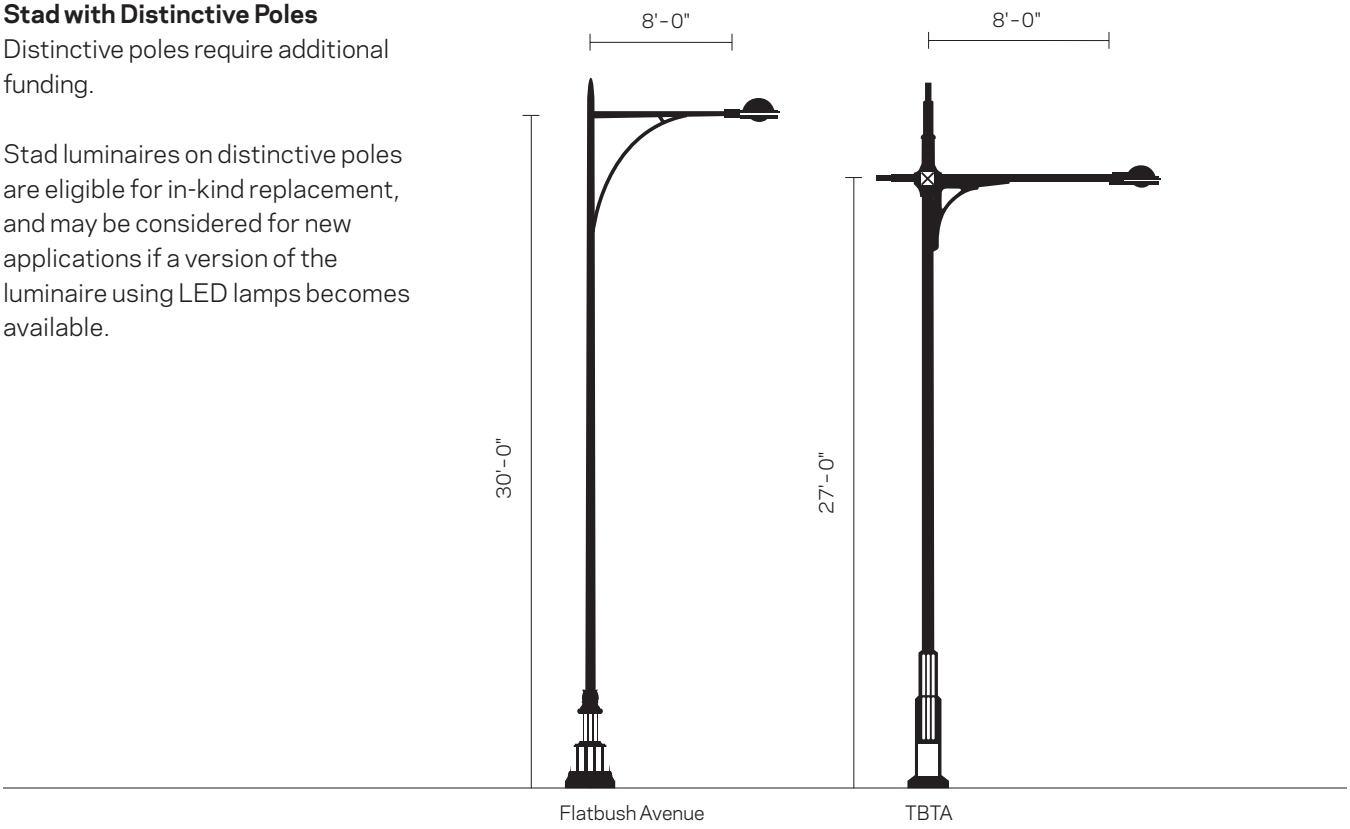
Stad luminaires on standard poles are eligible for in-kind replacement, are eligible for in-kind replacement, and may be considered for new applications if a version of the luminaire using LED lamps becomes available.



Stad with Distinctive Poles

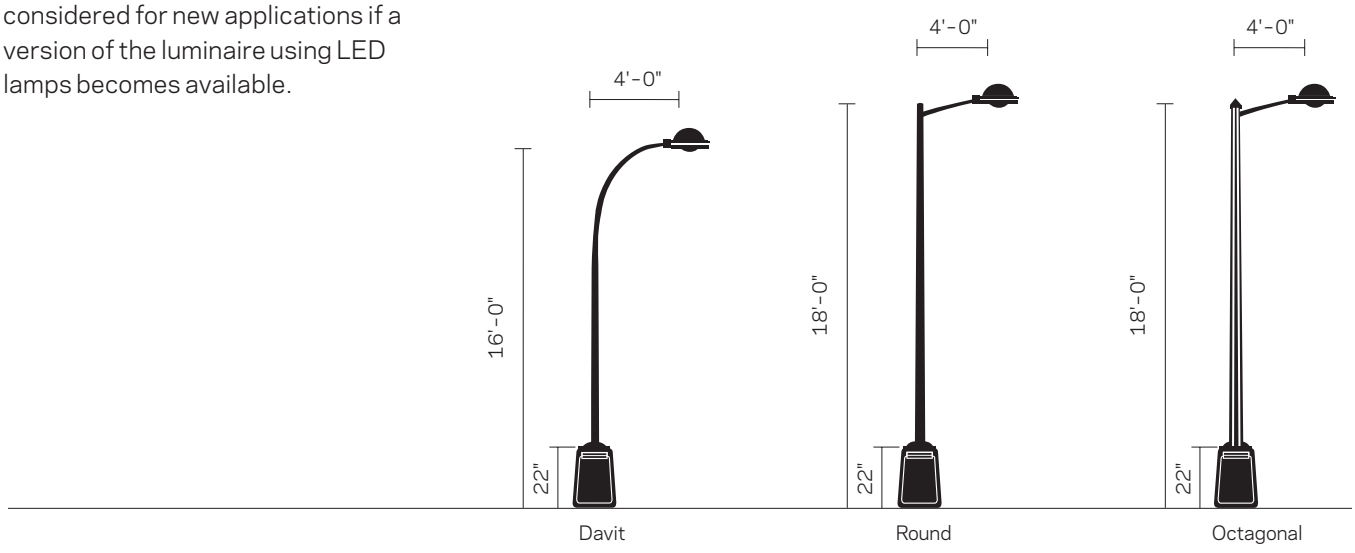
Distinctive poles require additional funding.

Stad luminaires on distinctive poles are eligible for in-kind replacement, and may be considered for new applications if a version of the luminaire using LED lamps becomes available.



Stad with Standard Pedestrian Poles

Stad luminaires on standard pedestrian poles are eligible for in-kind replacement, and may be considered for new applications if a version of the luminaire using LED lamps becomes available.



Teardrop & Shielded Teardrop Luminaires

The Teardrop and Shielded Teardrop luminaires are intended for use in historic districts and are allowed in areas with substantial, intact historic fabric. DOT is replacing existing 250W HPS Teardrops and Shielded Teardrops with 150W and 100W LED versions of these luminaires.

Usage: Historic

Applications

Selected historic districts

Lamp/Optics

150W or 100W LED

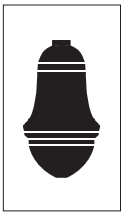
IES Type III or V

Cost Compared to SS

$$$$

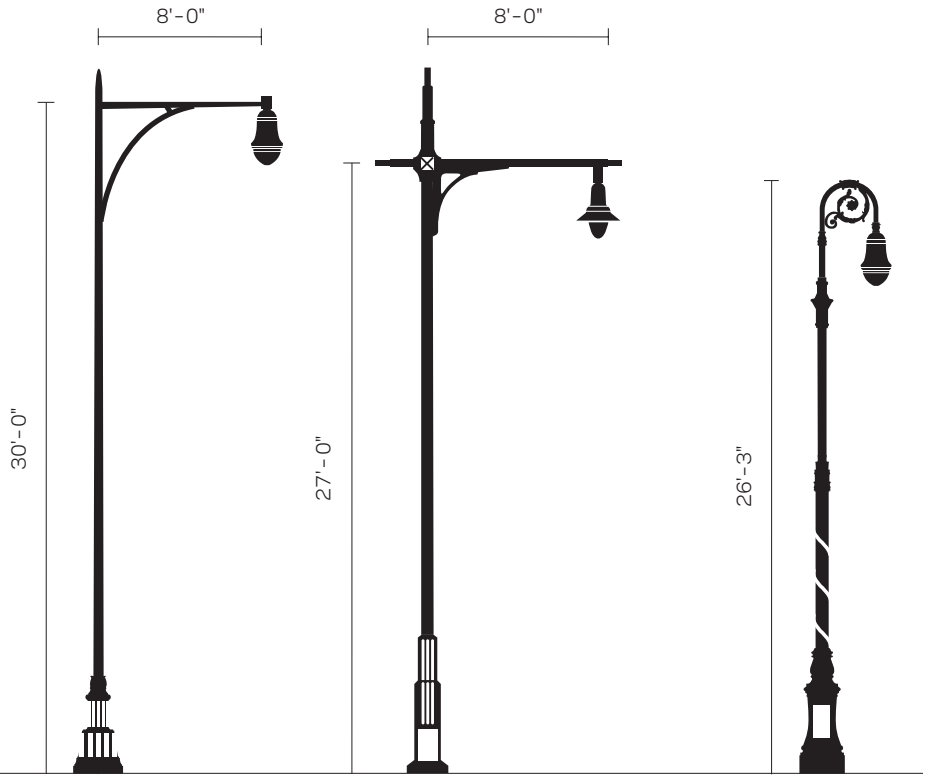
LED Teardrop Luminaire

Historic Luminaires with Various Poles



Teardrop

Shielded Teardrop



Integrated Streetlights

Alliance Luminaire & Pole

The Alliance streetlight was originally introduced in Lower Manhattan by the Downtown Alliance business improvement district. The streetlight is a contemporary alternative to the standard poles with the Standard LED Luminaire, at an additional cost.

Usage: Distinctive

Applications

Commercial districts

Roadways with widths of 36 feet or more

Lamp/Optics

100W and 150W HPS

IES Type II or III

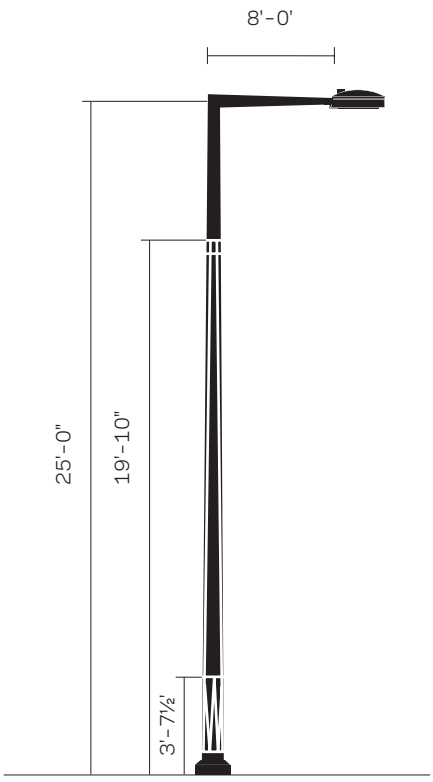
Material/Color

Steel/silver and black

Cost Compared to SS

$$$$$

Alliance luminaire and pole: Murray Street, Manhattan



Alliance Luminaire and Pole

Bishops Crook Luminaire & Pole

Usage: Historic

The Bishops Crook was the first of a number of decorative street lights to be introduced as early as 1900 on narrow city streets. Bracket versions of the Bishops Crook were also attached to the facades of buildings. The reproduction of the Bishops Crook was introduced in 1980 at Madison Avenue and 50th Street outside the Helmsley Palace Hotel (now the New York Palace Hotel).

Applications

Selected historic districts, per LPC approval

Streets with roadway width of 36 feet or less

Lamp/Optics

155W maximum LED Teardrop: IES Type III or V

155W maximum LED Shielded Teardrop: IES Type III or V

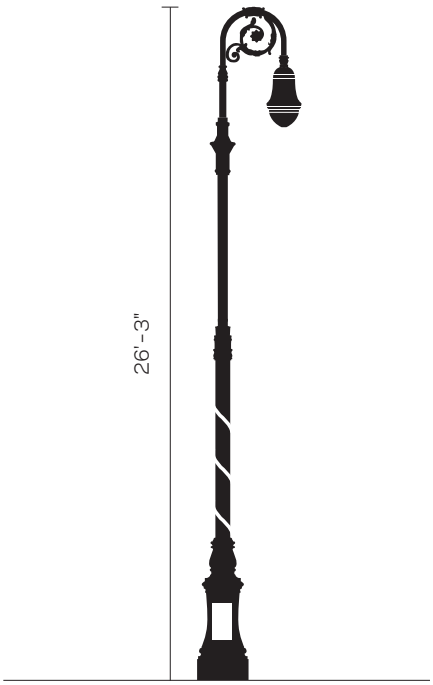
Material/Color

Ductile iron pole/black, brown, and green

Cost Compared to SS

$$$$$

Historic Bishops Crook luminaire and pole: Nassau Street, Manhattan



Bishops Crook Luminaire and Pole

City Light Luminaire & Pole

Usage: Distinctive

An international design competition to develop a new streetlight for New York City was held in 2004. The City Light design was selected as the winning entry. The City Light offers the most contemporary look in DOT's lighting catalogue.

Applications

Commercial or residential districts

Lamp/Optics

100W LED: IES Type II

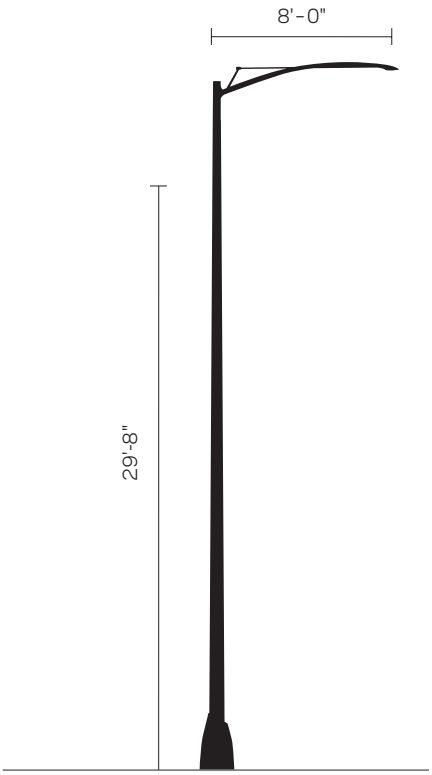
Material/Color

Aluminum/silver

Cost Compared to SS

$$$

City Light luminaire and pole: Warren Street, Manhattan



City Light Luminaire and Pole

Flushing Meadows Luminaire & Pole

Usage: Distinctive

The Flushing Meadows integrated pedestrian light was first installed in 2004 by the Department of Parks and Recreation in Canarsie Park in Brooklyn. The pole is now installed in many city parks, plazas, and along walkways and bikeways. DOT is currently testing this pole with other luminaires for pedestrian plazas.

Applications

Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways

Lamp/Optics

75W LED

IES Type III or V

Flushing Meadows Head

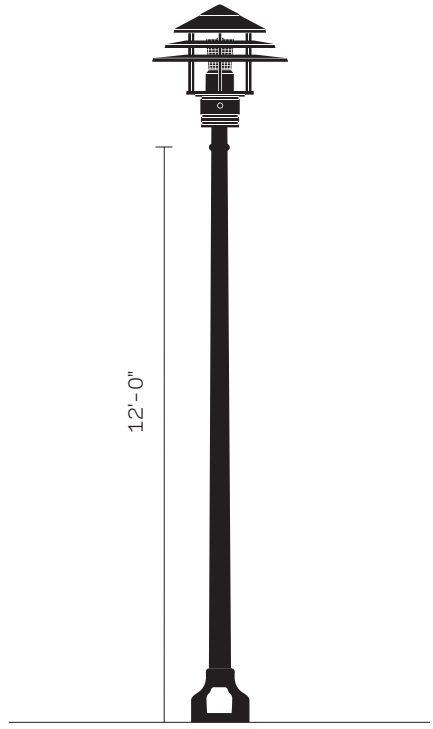
Material/Color

Steel/black, brown, green, and silver

Cost Compared to SS

$$

Flushing Meadows luminaire and pole: 46th Street, Queens



Flushing Meadows Luminaire and Pole

Type B Luminaire & Pole

Usage: Distinctive

The Type B integrated pedestrian light was originally introduced in 1911 by designer Henry Bacon for the Central Park Mall and later installed in other city parks. This version of the fixture was developed in the late twentieth century. Type B luminaires with HPS lamps are being phased out and replaced with LED luminaires. This pole is a more traditional design for pedestrian areas such as parks and plazas.

Applications

Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways

Lamp/Optics

75W LED

IES Type V

Material/Color

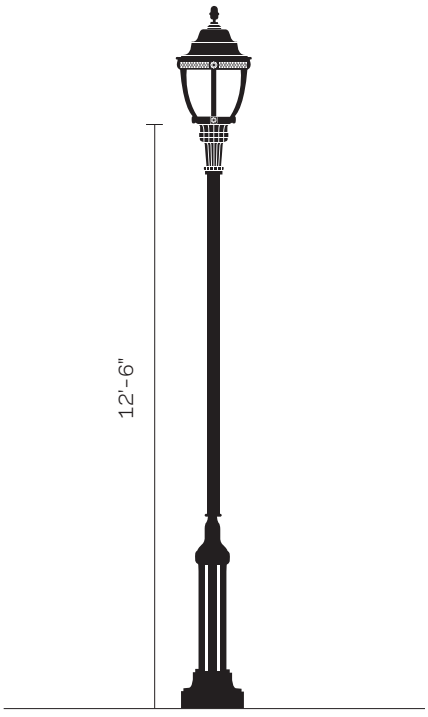
Ductile iron pole/black, brown, or green

Cost Compared to SS

$$

Type B luminaire and pole with LED lamp

Type B luminaire and pole with LED lamp



Type B Luminaire and Pole

Type F Luminaire & Pole

Usage: Historic

The Type F pole, originally known as the Reverse Scroll Bracket, was developed in 1913 and installed on narrow streets downtown on Seventh Avenue. Bracket versions of the Reverse Scroll were also attached to the facades of buildings. The reproduction of the Reverse Scroll was introduced in the late twentieth century as the Type F pole.

Applications

Selected historic districts

Streets with roadway width of 36 feet or less

Single or twin mounting

Lamp/Optics

100W LED Teardrop luminaire

IES Type III or V

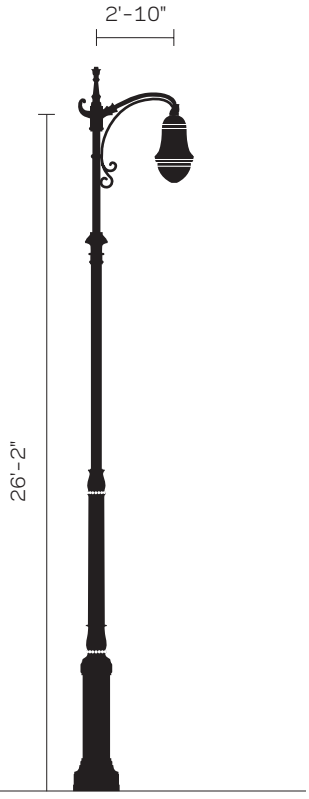
Material/Color

Ductile iron pole/black, brown, and green

Cost Compared to SS

$$$$$

Historic Type F luminaire and pole: East 8th Street, Manhattan



Historic Type F Luminaire and Pole

Type M Luminaire & Pole

Usage: Historic

The Type M pole, originally known as the Mast-Arm post, was introduced in 1908 for wide streets at corners on Broadway north of Columbus Circle and on Seventh Avenue north of Central Park. Bracket versions of the Mast-Arm were also attached to the facades of buildings. The reproduction of the Mast-Arm was introduced in the late twentieth century as the Type M pole.

Applications

Selected historic districts

Streets with roadway width of 36 feet or more

Single or twin mounting

Lamp/Optics

155W maximum LED Teardrop luminaire

IES Type III or V

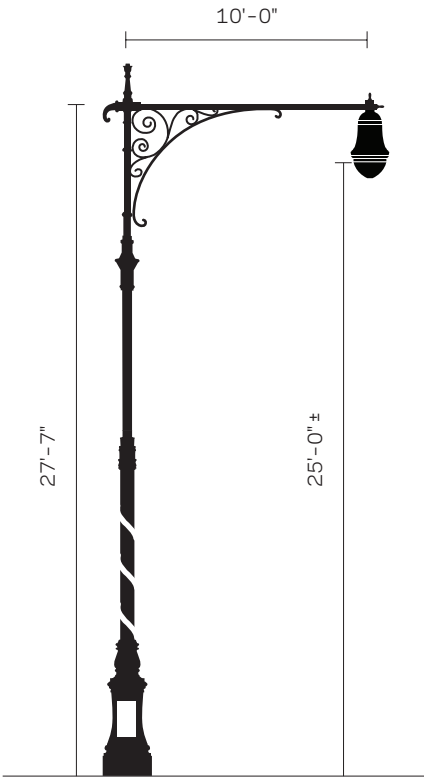
Material/Color

Ductile iron pole/black, brown, and green

Cost Compared to SS

$$$$$

Historic Type M luminaire and pole: West 11th Street, Manhattan



Historic Type M Luminaire and Pole

World's Fair Luminaire & Pole

The World's Fair pedestrian light was first installed in 1964 during the World's Fair held in Flushing Meadows Park in Queens. The pole is now installed in many city parks, in plazas, and along walkways and bikeways.

Usage: Distinctive

Applications

Parks, plazas, esplanades, pedestrian bridges, walkways, and bikeways

Lamp/Optics

Type 2085 fixture

75W LED

100W and 150W HPS

IES Type V

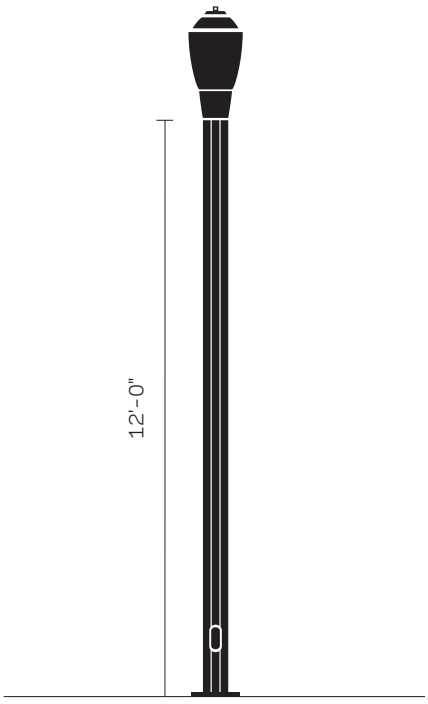
Material/Color

Steel/black, brown, or green

Cost Compared to SS

$

World's Fair luminaire and pole: Battery Park, Manhattan



World's Fair Luminaire and Pole

4.4 Signal Poles

Type M-2A Signal Pole

Usage: Standard

Introduced in 1964 as the M-2, the octagonal M-2A traffic signal pole is standard for use at all traffic signal locations. It can be mounted on a 9-inch concrete cylinder to provide necessary clearance or to avoid moisture in the base. A 5-foot mast-arm extension can be used to bring the signal farther out over the roadway, if necessary.

With a 5-foot 6-inch shaft extension, the M-2A can be used to hold a standard streetlight arm and a luminaire. It can also be made to resemble nearby Bishops Crook, Type F, or Type M poles when paired with the Type M skirt and a matching arm and luminaire.

Type M–2A signal pole with HPS Cobra Head luminaire: Murray Street, Manhattan

Applications

Holds signals and/or signs

Single or double mounting

Two M-2A poles per intersection, diagonally opposite from each other

Sometimes mounted on 9-inch concrete cylinder to provide necessary clearance or avoid moisture in the base

5-foot 6-inch shaft extension provides necessary clearance or holds a luminaire, if necessary

5-foot mast-arm extension to hold signal farther out over the roadway, if necessary

Can be retrofitted to resemble nearby Bishops Crook, Type F, or Type M light poles

Luminaires

Standard LED Luminaire (Standard)

Stad (Distinctive, in-kind replacement only)

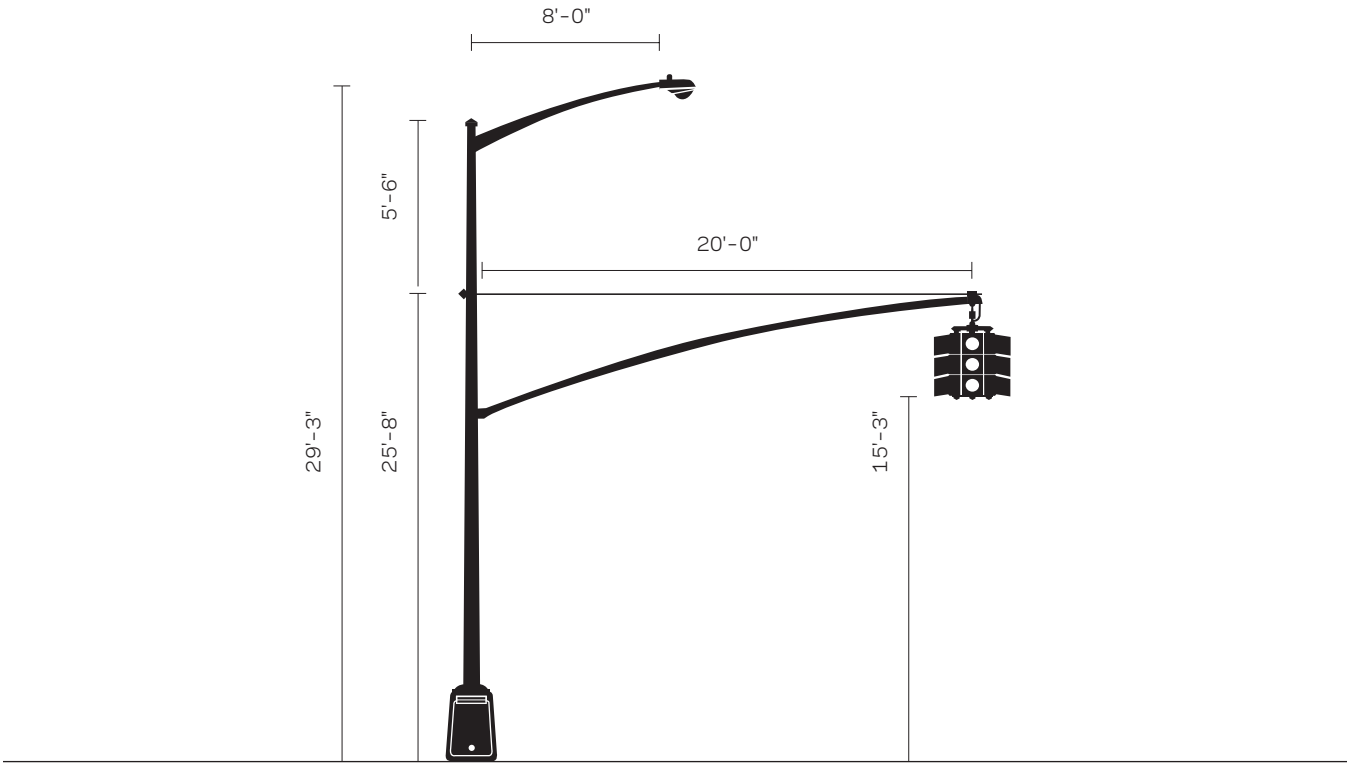
Helm (Distinctive, in-kind replacement only)

Teardrop (Historic)

Material/Color

H.D.G. Steel/silver, black, brown, or green

Type M-2A signal pole with Historic Bishops Crook arm: Foley Square, Manhattan



Type M-2A Signal Pole with HPS Cobra Head Luminaire

Type S-1A Signal Pole

Introduced as the S-1 in 1965, the round S-1A signal pole holds pedestrian signals at corners where an M-2A signal pole or a light pole is not necessary. It also holds traffic signals on medians and traffic islands.

Usage: Standard

Applications

Holds pedestrian and/or traffic signals

Luminaires

This pole does not hold a luminaire

Material/Color

H.D.G. Steel/silver, black, brown, or green

Type S-1A signal pole with a pedestrian signal: Hoyt Street, Brooklyn

Alliance Signal Pole

Usage: Distinctive

The Alliance streetlights were introduced in the Lower Manhattan financial district by the Alliance for Downtown New York business improvement district. The signal pole can be used as a contemporary alternative to the standard M-2A signal pole in conjunction with nearby Alliance streetlights, but at an additional cost.

Applications

Intersections

Lamp/Optics

100W HPS or 150W CCMH

Material/Color

H.D.G. steel/silver and black

Alliance signal pole and luminaire: Murray Street, Manhattan

Furniture

5

Introduction

CityBench on Court Street, Brooklyn.

About this Chapter

A wide range of elements are located on New York City's streets and plazas—everything from bus stop shelters to benches to banners. Some of these items perform utilitarian functions, while others serve as amenities. When well designed and installed in a coordinated manner, they enhance the on-the-street experience for New Yorkers and visitors. Chapter 5 describes the design and siting guidelines for street furniture.

General Guidelines

Clear Path
City regulations mandate that objects on sidewalks leave an unobstructed clear path. Revocable consent rules require that the greater of 8 feet or 50 percent of the sidewalk remain clear; DOT sites bus shelters such that they leave 7-foot clear paths, and newsstands must allow 9.5-foot clear paths. A clear path minimum of 5 feet is required to ensure two wheelchair users are able to pass each other or change direction. Most street furniture should be placed 18 inches from the curb to allow for motor vehicle access. To accommodate pedestrians with vision disabilities adequately, the lowest edge of any ground-level protruding object should be a maximum of 2.25 feet above the sidewalk, and the lowest edge of any suspended protruding object should be a minimum height of 6.7 feet.

Clutter
DOT generally discourages the installation of street furniture and other permanent objects on streets where they may restrict pedestrian circulation and degrade the visual quality of the street.

City policy restricts the placement of movable planters on sidewalks. DOT uses movable planters to delineate pedestrian areas within the roadway, such as interim plazas or sidewalk extensions.

Property Lines
The metes and bounds of private properties, although clearly described in deeds and other real property documents, may not be consistent with existing outdoor structures. As such, property owners must determine the exact locations of their property lines before installing any outdoor furniture by consulting the surveys provided to them upon purchase of their properties or by retaining licensed surveyors to prepare such surveys.

Design
Light poles, signs, seating, bike racks, bus shelters, and other fixed elements play a supporting role on New York City streets. Consistent design of those varied elements is an important consideration in their selection and siting.

Revocable Consents
The city grants a revocable consent to construct and use certain structures on, over, or under its inalienable property — in this case, city roadways and sidewalks. The city retains the right to revoke this consent at any time. For more information on revocable consents, visit www.nyc.gov/html/dot/html/permits/revconif.shtml.

Resiliency
Street furniture and other permanent objects should be constructed using resilient materials that can withstand periodic temporary inundation by both fresh and salt water.

Universal Design
Furniture should be designed to accommodate as wide a range of potential users as possible. Relevant considerations include interface height, amount of force that must be applied, color schemes and level of contrast with surrounding materials, and adjacent clear path.

Additionally, the city has begun installing accessible water fountains across the five boroughs, in order to enhance the comfort and health of all pedestrians using the public realm.

Security Structures
Security structures are fixed objects, such as bollards, installed around the perimeter of a building to reduce blast impacts from vehicle-born explosives. A property owner who wishes to install security structures must apply for a revocable consent from DOT. The application is forwarded to the New York City Police Department's (NYPD) Counterterrorism Division, which reviews security-related information provided by the property owner. If the NYPD determines that security structures are necessary, it works with the property owner's architect/engineer to develop a conceptual plan of an effective security perimeter.

DOT then works with the owner and architect/engineer to develop plans that will provide the security perimeter required by NYPD and will fit in with all other structures that are already in, under, and above the affected streets. DOT then coordinates an expedited interagency review of the plans. Plans are reviewed on a case-by-case basis to confirm that the structures are necessary and effective, have a minimum impact on pedestrian and vehicular traffic, and are aesthetically appropriate.

Art Display Case

DOT partners with local institutions to curate rotating, temporary exhibits in plazas and on large sidewalks around the city.

Description

7 feet-6 inches high x 3 feet-10 inches wide

Displays art on both sides

Siting

Public plazas and wide sidewalks with a limited number of street elements

Sites in close proximity to mass transit, retail, and residential corridors with a high density of foot traffic

Minimum clear path: 8 feet

Minimum of 18 inches from the curb

Installation

Suggestions for display sites can be sent to arts@dot.nyc.gov

DOT is responsible for the installation and removal of art display cases

For More Information

To learn more about the art display case, visit **www.nyc.gov/urbanart**

Art display cases are installed temporarily: Willoughby Plaza, Brooklyn

Automatic Public Toilet (APT)

In response to the lack of public restrooms in New York City, Cemusa, the Coordinated Street Furniture Franchisee, installs automatic public toilets (APTs). These state-of-the-art facilities offer comfort, hygiene, accessibility, and security to the public.

Description

6 feet-7 inches deep x 12 feet wide

Siting

On wide streets, only in commercial, manufacturing, or mixed use districts

On sidewalks or plazas adjacent to property owned or leased by a government agency or public authority, or under the jurisdiction of the Economic Development Corporation (EDC)

On traffic islands or public places bounded on all sides by mapped streets under the jurisdiction of DOT

On or adjacent to parks property or playgrounds, subject to the approval of the Department of Parks and Recreation

Close proximity to water, sewer, and electrical connections

Minimum clear path in front: 8 feet; all other sides: 5 feet

There must be no sub-surface infrastructure in the footprint

Other Clearances:

- 10 feet: fire hydrants, standpipes
- 5 feet: tree trunks, canopies
- 3 feet: streetlights, traffic signal poles
- 2 feet: ventilation, street signs, cellar doors

Madison Avenue at 23rd Street, Manhattan (Credit: Cemusa, Inc.)

Installation

DOT determines where to install APTs

Cemusa installs APTs at DOT's direction

For More Information:

To learn more about the Coordinated Street Furniture Franchise, call 311, visit **nyc.gov/dot**, or email streetfurniture@dot.nyc.gov

Bike Parking Shelter

Bicycle parking shelters enclose four stainless-steel bike racks. The design closely resembles the BUS STOP SHELTER (5.5), using the same high-quality materials. The side panels display the annual NYC Bike Map and public service campaigns.

Description

5 feet x 14 feet—equivalent to the "regular" size BUS STOP SHELTER (5.5)

NYC Bike Map and public service campaigns on side panel; clear glass on back

Siting

Minimum clear path: 7 feet

All shelters must allow a straight unobstructed path of a minimum of 3 feet between the shelter and the curb

Other Clearances:

- 6–8 inches: sub-surface
- 10 feet: fire hydrants, standpipes
- 5 feet: tree trunks, canopies
- 5 feet: tree pits, cellar doors
- 3 feet: streetlights, traffic signal poles
- 2 feet: ventilation, street signs

Installation

DOT determines where to install bike shelters

Cemusa installs bike shelters at DOT's direction

For More Information

To learn more about the Coordinated Street Furniture Franchise, call 311, visit **nyc.gov/dot**, or email streetfurniture@dot.nyc.gov

Jackson Avenue at 50th Avenue, Queens (Credit: Cemusa, Inc.)

Bike Share Station

New York City's bike share system provides access to a network of public bicycles intended for short, one-way trips. By 2017, the system will comprise 700 self-service docking stations for 12,000 bikes, available for use 24 hours a day throughout the year. With a few exceptions, stations hold 15 to 59 bicycle docks. Motivate will own, operate, and maintain the bike share system, with oversight from DOT. The station design complements many of the city's other street furniture elements.

Description

Includes a pedestrian wayfinding map that indicates locations of nearby bike share stations, transit connections, landmarks, etc.

Composed of 4-15 plates (40–150 feet long) with 15 to 59 docks

Three types of modular plates, all of which are 3 feet deep and 10 feet long without bikes:

- Standard: Four docks, approximately 6 feet deep (with bikes)
- Angled: Three docks, approximately 4 feet–6 inches deep (with bikes)
- Double-sided: Six docks, approximately 9 feet deep (with bikes)

Solar-powered and connected to a central computer via existing wireless networks; stations are not wired, trenched, bolted, or fixed into the ground

Plates can be non-contiguous, bridging obstacles such as tree beds with an 8-inch-wide connecting channel

Can be configured in a number of ways, including:

- Linear
- L-shaped (i.e., turning around a corner)
- Back-to-back

Bike share station: Park Avenue at East 42nd Street, Manhattan

Siting

Located in curb lanes of roadways, on sidewalks, in plazas, or on publicly accessible private property

Different siting guidelines apply for each type of location

For More Information

To learn more about bike share stations, visit nyc.gov/bikeshare

Bus Stop Shelter

Bus stop shelters are part of the Coordinated Street Furniture Franchise that was awarded to Cemusa, Inc., in 2006. The award-winning, stainless-steel and glass design provides seating and protection for bus users.

Description

Shelters are configured in five sizes:
- Regular: 5 feet x 14 feet
- Narrow: 3.5 feet x 14 feet
- Short: 5 feet x 10 feet
- Little: 3.5 feet x 10 feet
- Double: 5 feet x 26 feet

Advertising panels on sides; clear glass on back

Siting

Minimum clear path: 7 feet

All shelters must allow a straight unobstructed path of a minimum of 3 feet between the shelter and the curb

Other Clearances:
- 6–8 inches: sub-surface
- 10 feet: fire hydrants, standpipes
- 5 feet: tree trunks, canopies
- 5 feet: tree pits, cellar doors
- 3 feet: streetlights, traffic signal poles
- 2 feet: ventilation, street signs

Installation

Cemusa generally installs bus stop shelters at bus stops that meet clearances, upon request and at DOT's discretion

York Avenue at East 69th Street, Manhattan (Credit: Jennifer Yao)

For More Information

To learn more about the Coordinated Street Furniture Franchise, call 311, visit **nyc.gov/dot**, or email streetfurniture@dot.nyc.gov

CityBench

Through its CityBench program, DOT installs a standard street bench at bus stops without shelters and in commercial areas to support transit use and to encourage walking. In 2014, after analyzing feedback from a wide range of users, DOT updated the design of the arm rests to enhance usability for aging New Yorkers; the seat depth was also slightly decreased to improve comfort. Structural enhancements include more stable footings and a significant reduction in the number of separate pieces, extending the bench's lifespan and reducing its unit cost.

Description

Approximate dimensions: 7.5 feet long x 20.5 inches deep

Styles: backed and backless

Update:

Siting

Locations that meet DOT's strategic objectives—e.g., at bus stops without shelters and Access-A-Ride designated stops, near senior centers, in retail shopping corridors, and near cultural institutions

Benches adjacent and parallel to the building shall be installed no more than 6 inches from the building face

Benches adjacent and parallel to the curb must be placed 18– 24 inches from the curb

A bench that is not anchored to the sidewalk shall be placed against the building face during hours that the benefited property is open to the public and shall be stored inside the building when the building is closed

Minimum clear path: 8 feet

Updated CityBench Design with more ergonomic arm rests and seat depth (Credit: Ignacio Ciocchini)

Installation

New Yorkers can request the bench at nyc.gov/Citybench

DOT personnel installs CityBenches

Outside of the CityBench program, a revocable consent is necessary to install a bench on the sidewalk, and a maintenance agreement is required for benches installed in a plaza. For complete regulations regarding revocable consents, including siting requirements, refer to Rules of the City of New York, Title 34, Chapter 7 and on the web at: www.nyc.gov/html/dot/html/permits/revconif.shtml

CityRack

DOT installs CityRacks on sidewalks and, through its Bike Corral program, in clusters in the curbside lane of the roadway. In both cases, installations are driven by requests from the general public and business and property owners. The product of an international design competition held in 2009, the CityRack has been recognized for its combination of function and elegance, and has been added to the permanent collection of the Madsonian Museum of Industrial Design.

Bike corrals include multiple CityRacks: East 9th Street, Manhattan

Description

33.7-inch-diameter, cast-metal circle with a horizontal bar across the center

Bike Corral
- Buffered with reflective flexible delineators and either planters or wheel stops
- Generally takes up one car-parking space
- Planters are planted and cared for by maintenance partners

Siting

Must be installed on city-owned property

Sidewalk:
- 12-foot minimum sidewalk width
- Away from pedestrian flow, usually at the curb, and always away from crosswalks
- If installed at the curb, clearance from the curb must be a minimum of 18 inches
- Must not be installed on pavers, cobblestone, brick, stone/slate slabs, custom/patterned concrete, or metal grates

Bike Corral:
- Curb lane of roadway
- Locations where demand for bike parking outstrips the available sidewalk space

Other Clearances:
- 15 feet: fire hydrants, bus stops, taxi stand or hotel loading zones, franchise structures, subway entrances
- 10 feet: corner quadrants, driveways, building entrances (building line installations only)
- 5 feet: standpipes, above-ground structures (e.g., signs, meters, lights, mailboxes, planters, phones), building entrances (curb installations only)
- 3 feet: tree-bed edges, grates, utility covers

Installation

DOT installs CityRacks

Call 311 or visit **nyc.gov/dot** and fill out the online form to suggest a location for a CityRack

For More Information

For more information visit **www.nyc.gov/html/dot/html/bicyclists/bikerack.shtml**

Mini CityRack

DOT developed the Mini CityRack in 2011 to provide more bike parking cost-effectively and to repurpose parking meter poles that are rendered obsolete by new MuniMeters. The Mini CityRack will be the predominant bike rack on sidewalks.

Description

18-inch-diameter, cast-metal circle

Siting

On existing, retired parking meter poles

Installation

DOT installs Mini CityRacks on parking meter poles as they are retired

For More Information

For more information visit www.nyc.gov/html/dot/html/bicyclists/bikerack.shtml

Mini CityRack

Multirack

A multirack is a newsrack—a self-service newspaper dispenser—designed to hold two or more publications. DOT encourages the use of multiracks in lieu of standard newsracks because they help reduce streetscape clutter. Multiracks require registration with DOT, proof of insurance, and indemnification of the City of New York.

Description

Multiracks cannot exceed 5 feet in height, 7.5 feet in width, and 36 inches in depth

Advertising is not allowed on the outside of the multirack

Siting

Various clearance requirements apply. Section 19-128.1 of Chapter 1 of Title 19 of the Administrative Code of the City of New York (which was amended by Local Law 36 of 2004) together with Section 2-08 of Chapter 2 of Title 34 of the Rules of the City of New York specify how and where a newsrack can be placed as well as the registration and insurance requirements

Installation

Multiracks may be bolted if a DOT permit has been issued for that purpose

For installation on a distinctive sidewalk, written permission from the person or entity responsible for the maintenance of the distinctive sidewalk is required

For More Information

Please contact the Newsrack Unit
55 Water Street, 7th Floor
New York, NY 10041
T: (212) 839-8854
F: (212) 839-8867

Multirack: Lexington Avenue at East 68th Street, Manhattan

Newsstand

Newsstands are part of the Coordinated Street Furniture Franchise. They are fabricated from stainless steel and glass. The product displays can be customized by each operator from a standard kit of parts. All existing newsstands that were licensed by the Department of Consumer Affairs (DCA) as of July 13, 2006, will receive a replacement newsstand at no cost to the licensee.

Description

Newsstands are available in nine sizes:

- 4 x 8 feet, 4 x 10 feet, and 4 x 12 feet
- 5 x 8 feet, 5 x 10 feet, and 5 x 12 feet
- 6 x 8 feet, 6 x 10 feet, and 6 x 12 feet

Siting

Minimum clear path: 9.5 feet

Minimum of 18 inches from the curb

Other Clearances:

- 15 feet: subway entrances, curb cuts
- 10 feet: hydrants
- 5 feet: tree beds, canopies
- 3 feet: streetlights, traffic signal poles
- 2 feet: street signs, manholes, cellar doors, parking meters

For complete siting criteria, refer to DCA rules at: **www.nyc.gov/html/dca/html/licenses/024.shtml**

Installation

Businesses apply to the Department of Consumer Affairs (DCA) for licenses to operate newsstands in specific locations

Cemusa installs new newsstands at locations approved by DCA and PDC

For More Information

To learn more about the Coordinated Street Furniture Franchise, call 311, visit **nyc.gov/dot**, or email streetfurniture@dot.nyc.gov

6th Avenue at 39th Street, Manhattan (Credit: Jennifer Yao)

WalkNYC Wayfinding System

Walking accounts for 31% of all trips in the city and is a component of nearly all travel by public transit and many car journeys. DOT's comprehensive wayfinding system helps visitors and residents alike navigate the city's streets, further encouraging walking. In addition to the Area, Path and Neighborhood signs, DOT is installing Select Bus Service totems with real-time arrival information along current and future routes.

Description

Three map types serve different purposes:

Area:
- The standard size for the WalkNYC system
- Deployed at key intersections and select transit stations
- Panel is 8 feet–5 inches high x 34 inches wide x 5 inches deep

Path:
- Reinforces the Area sign along primary pedestrian routes
- Slender profile is also suited to narrow sidewalks and busy pedestrian areas
- Panel is 8 feet–7 inches high x 18 inches wide x 5 inches deep

Neighborhood:
- Provides a wide view of the surrounding area
- Typically located in plazas and open spaces
- Panel is 8 feet –3 inches high x 4 feet –2 inches wide x 5 inches deep

Select Bus Service:
- Deployed at stations along SBS routes
- Provides real-time SBS bus arrival information
- Includes map of bus route and transfer points
- Panel is 10 feet–1 inch high x 2 feet wide x 5 inches deep

Two maps on each side of the Area and Path maps:
- Focus map displays destinations and services within a 5-minute walk
- Overview map displays destinations and services within a 15-minute walk and is helpful for planning longer journeys using public transit

Maps are "heads-up" – they are oriented according to the direction the user is facing

Siting

Minimum clear path: 8 feet

Minimum 18 inches from the curb

Other Clearances:
- 15 feet: subway entrances
- 10 feet: hydrants, tree beds, phone booths
- Min 5 feet: canopies, street lights, traffic signals, signs, manholes, parking meters, cellar doors, building entrances

Maps are incorporated into bike share and Select Bus Service stations

Installation

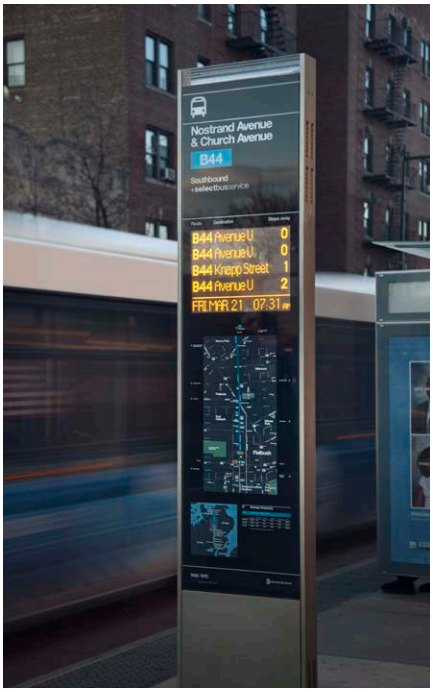
Panels require a 7-inch to 2-foot excavation, depending on sub-surface conditions

DOT is responsible for installation; DDC coordinates installation when it is part of a DDC capital project

For More Information

Visit **www.nyc.gov/walknyc** or email walknyc@dot.nyc.gov.

The local area map: Canal Street, Manhattan



The Select Bus Service Totem: Nostrand Avenue SBS Route at Church Avenue

Waste Receptacle

Among its other responsibilities, the Department of Sanitation (DSNY) services over 25,000 waste receptacles – known as "baskets" – that are placed on thoroughfares citywide. As part of the city's initiative to double the recycling rate to 30 percent by 2017, DSNY has ordered new recycling baskets that are consistent in design with other streetscape furniture. These will reduce the number of regular trash baskets.

Siting

Commercial areas, where they may be emptied as frequently as five times a day

Predominantly residential zones, where they can be serviced on residential refuse routes along with household trash two or three times a week

Sponsor-a-Basket Program

Sponsoring organizations, such as cultural institutions and Business Improvement Districts, can purchase the new receptacle shown at right. With DSNY approval, they may also purchase custom baskets as part of their branding identities. All basket designs must meet DSNY specifications. Sponsored waste baskets may bear the name or logo of the sponsoring organization, but cannot include advertising of any kind. Locations must be submitted for approval along with the Sponsor-a-Basket Letter of Intent.

For More Information

For more information, refer to Sanitation Rules and Regulations at **www.nyc.gov/html/dsny/html/rules_reg/digest.shtml** or in Rules of the City of New York, Title 16

To sponsor a waste receptacle, call 311

Prototype of DSNY's new 44-gallon recycling receptacle. A 32-gallon version is also available

Landscape

6

Introduction

About this Chapter

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

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

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

Benefits of Plantings in the ROW

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

All plantings:

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

Guidance Sources

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

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

Applicability and Exceptions

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

Usage Categories

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

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

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

Reviews & Approvals

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

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

Maintenance Agreements

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

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

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

General Guidelines

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

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

Project Team

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

Plant Selection

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

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

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

Soils

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

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

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

Microclimate

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

2013 Asian Longhorned Beetle (ALB) NYC Quarantine Map

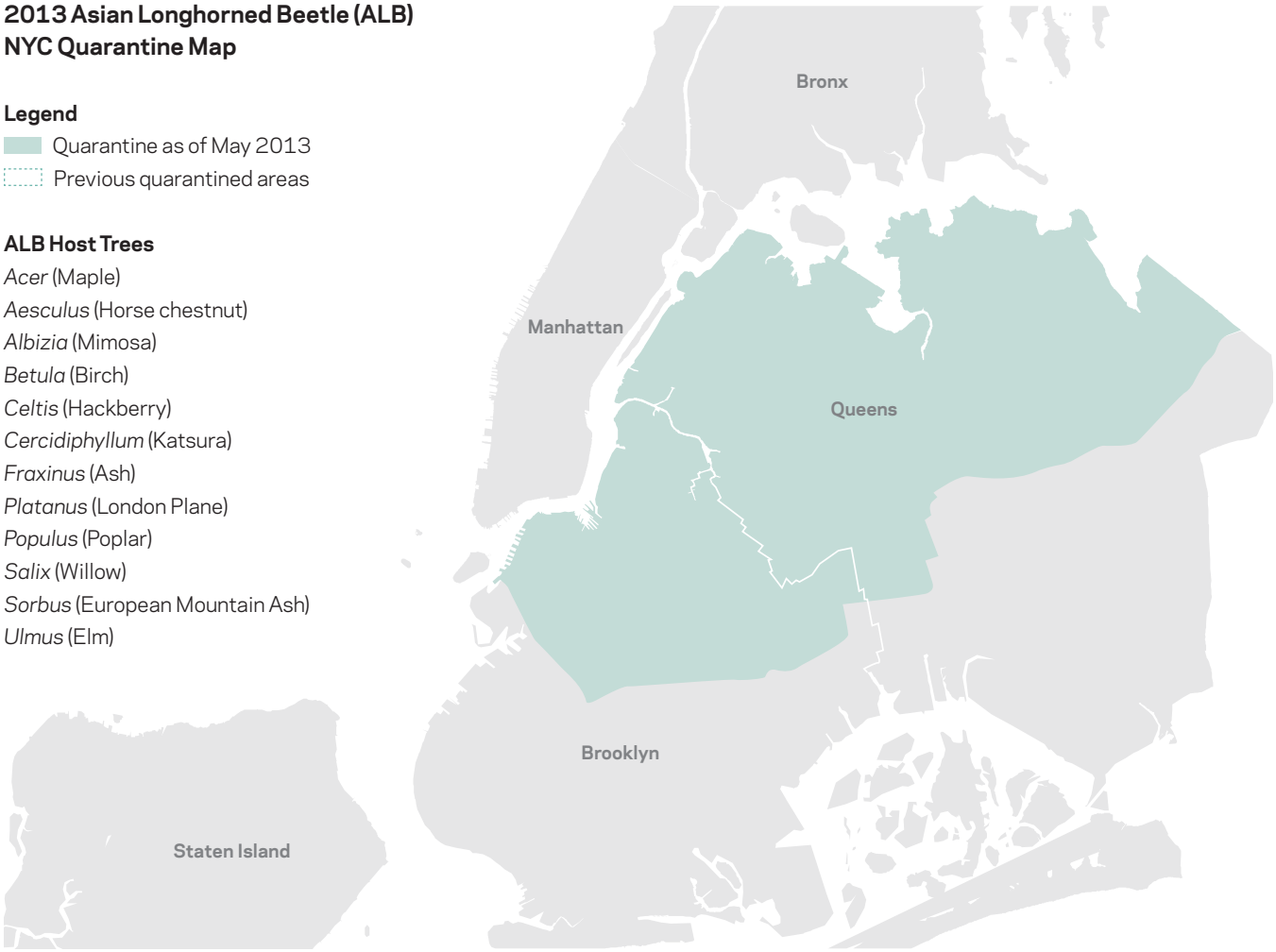
Legend

Quarantine as of May 2013

Previous quarantined areas

ALB Host Trees

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



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

Diseases and Pests

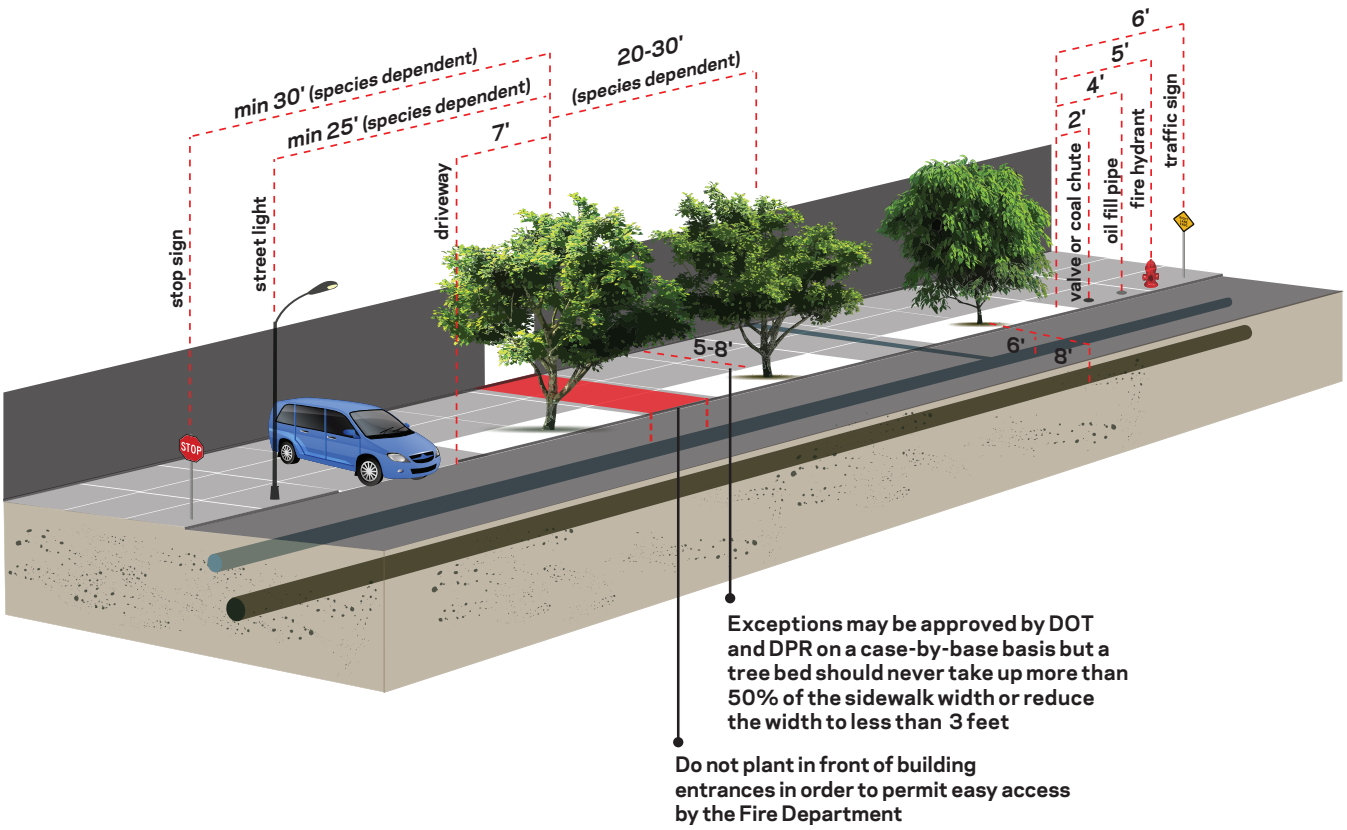
Diseases and pests can pose significant risks to plant health and survival. Plants should be selected that are resistant to common ailments, such as anthracnose (leaf spot), or that can withstand outbreaks.

Several pests affect trees in New York City. The two most damaging are the Asian Longhorned Beetle (ALB) and the Emerald Ash Borer (EAB). ALB (*Anoplophora glabripennis*) is an invasive beetle known to attack several species of trees. Currently the only effective means to control the beetle is to remove infested trees and destroy them by chipping or burning. For more information, visit the USDA's Animal and Plant Health Inspection Service webpage or the USDA's APHIS publication regarding ALB in New York.

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

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

Clearance Diagram



Spacing/Siting Requirements

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

Careful consideration must be given to above- and below-ground constraints; utilities, vaults, and other obstructions may limit the ability to plant. In particular, avoid planting trees directly over DEP water and sewer mains and near steam lines.

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

Corner Clearance Diagram

Tree Preservation and Protection

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

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

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

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

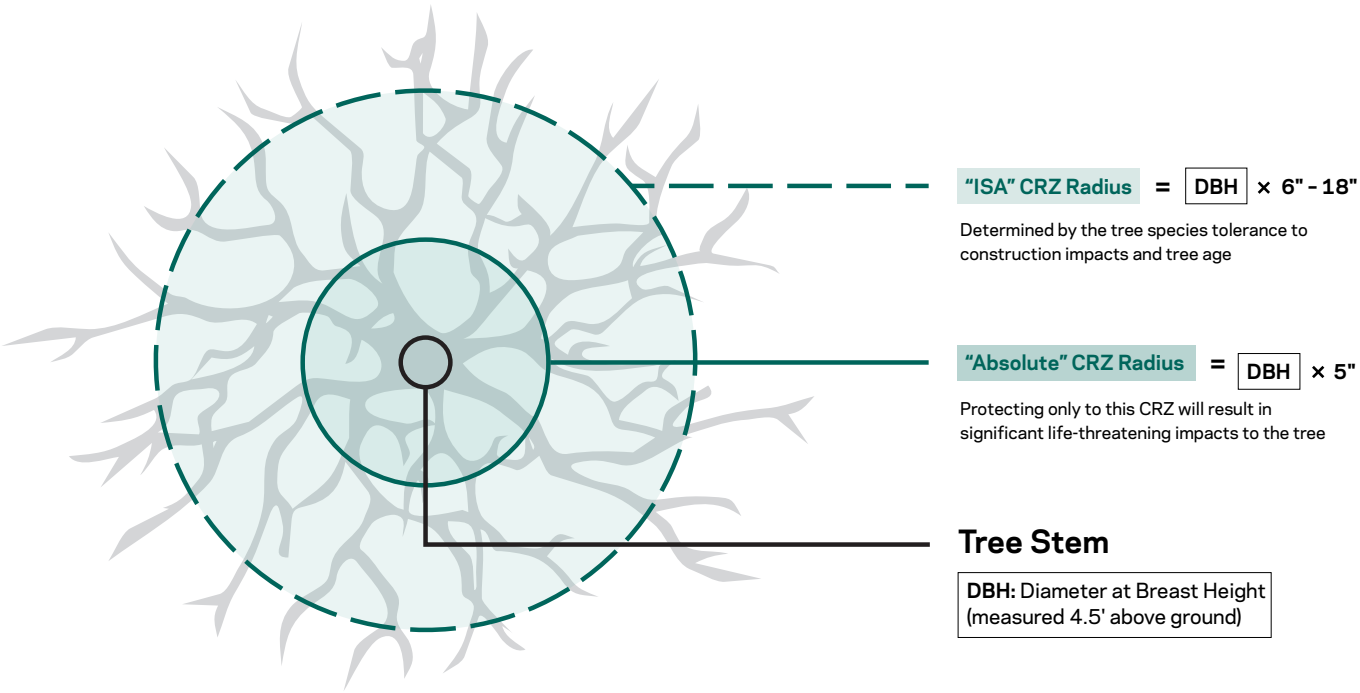
Reconfiguration of a sidewalk to promote tree health (before and after): Aberdeen Road, Queens (Credit: DPR)

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 DPR's 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 DPR's 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 DPR's Borough Forestry Office	Tree protection implemented and enforced by DPR's 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

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

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

Critical Root Zone Diagram



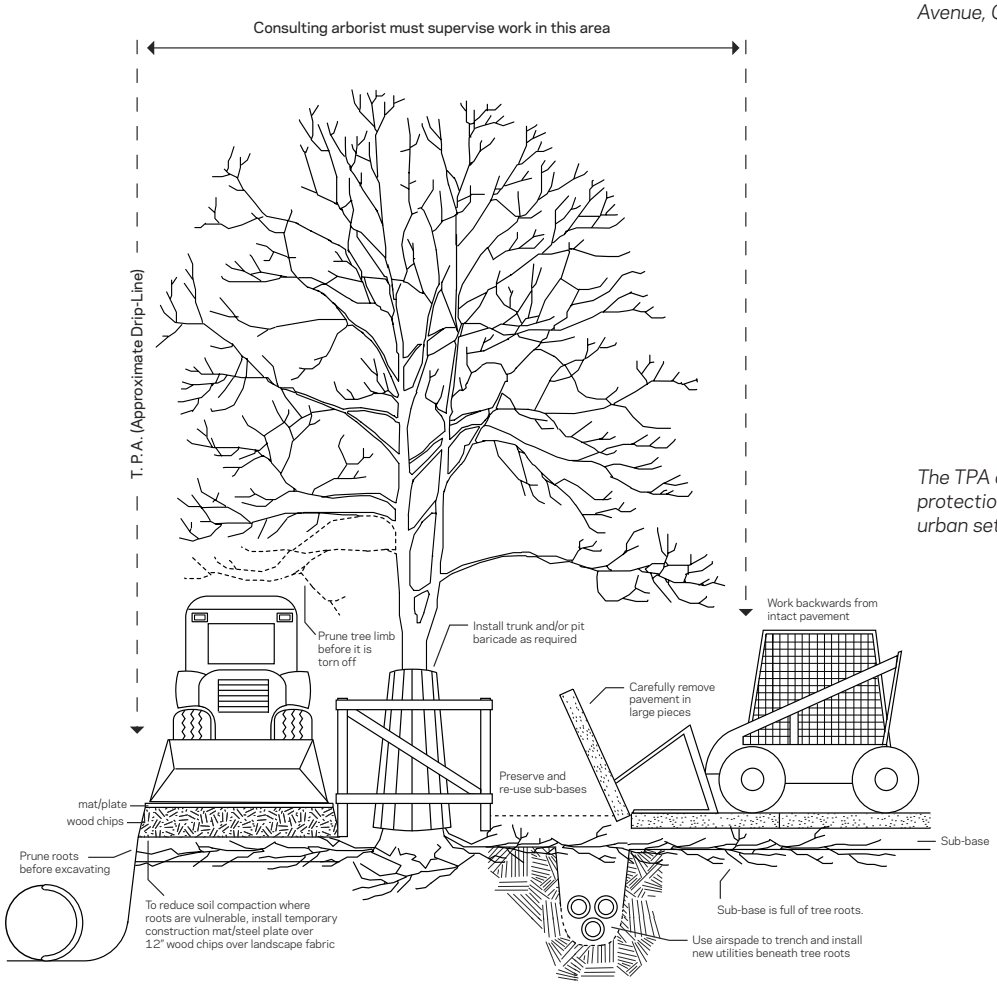
Tree Protection Area

The tree protection area (TPA) is the most important tool used in the preservation of existing trees. Generally, the TPA is developed in coordination with the CA during design and is defined by the canopy drip line of the tree. The TPA will always encompass the CRZ. (*See Tree Protection Area Diagram.)* During construction, the TPA is typically established with a fence or barrier. In circumstances where a majority of roots are growing beneath pavement, special methods should be utilized. (*See diagram*.) No activity, including non-construction-related activities, may occur within the TPA without approval from DPR and supervision by the CA. If construction work must occur within the TPA, the contractor must work with the CA to employ techniques, such as pneumatic excavation (air spading) to expose and preserve the roots in good condition.

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

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

Tree Protection Area Diagram



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

Plant Installation

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

Period of Establishment

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

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

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

Maintenance

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

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

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

Tree Beds

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

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

Tree Bed

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

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

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

Considerations

See GENERAL GUIDELINES (6.0.1)

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

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

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

Design

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

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

Tree-bed guards are recommended

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

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

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

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

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

Application

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

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

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

Plants

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

TREE BED

Individual Tree Bed

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

Benefits

See benefits of TREE BED (6.1.1)

Considerations

See considerations for TREE BED (6.1.1)

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

Application

See application guidance for TREE BED (6.1.1)

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

Design

See design guidance for TREE BED (6.1.1)

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

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

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

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

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

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

Plants

See Tree-Bed Planting Recommendations (Table 6A)

TREE BED

Connected Tree Bed

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

Benefits

See benefits of TREE BED (6.1.1)

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

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

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

Considerations

See considerations for TREE BED (6.1.1)

Application

See application guidance for TREE BED (6.1.1)

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

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

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

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

Design

See design guidance for TREE BED (6.1.1)

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

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

Plants

See Tree-Bed Planting Recommendations (Table 6A)

TABLE 6A

Tree-Bed Planting Recommendations

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

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

	Appearance				Tolerances				
	Height	Spread	Characteristics		Drought-Flood		Light	Salt	High pH
Groundcover									
Gaylussacia brachycerra Box Huckleberry	1.5'	3'	MAY JUN		✓		☀ ▶ ◐	◆	–
Rubus calycinoides 'Emerald Carpet' Ornamental Creeping Raspberry	.5'-1'	2'	MAY JUN		✓		☀ ▶ ◐	◆	–
Grasses/Grass-like Plants									
Miscanthus sinensis 'Little Kitten' Little Kitten Eulalia Grass	1"-3"	1'-1.5'	AUG FEB		✓	✓	☀ ▶ ◐	◆	◆
Festuca glauca 'Elijah Blue' Elijah Blue Fescue	.5'-1'	1'	JUN JUL		✓		☀	◆	◆
Carex morrowii 'Ice Dance' Ice Dance Sedge	.5'-1'	1'-2'	APR JUN		✓	✓	☀ ▶ ◐	◆	–
Perennials									
Echinacea purpurea 'Magnus' PowWow Wildberry Coneflower	2'-2.5'	1'-1.5'	JUN SEP		✓		☀	◆	◆
Heuchera villosa 'Miracle' Miracle Coral Bells	1'-1.5'	1'	JUL		✓	✓	☀ ▶ ◐	◆	◆
Hosta sieboldiana 'Frances Williams' Frances Williams Hosta	2'	3'-4'	JUL			✓	◐ ▶ ☀	◆	–
Lysimachia nummularia 'Goldilocks' Goldilocks Creeping Jenny	4"	1'-3'	JUN JUL			✓	☀ ▶ ◐	◆	◆
Phlox subulata 'Red Wings' Red Wings Creeping Phlox	6"	2'-3'	MAY			✓	☀	◆	◆
Rudbeckia 'City Garden' City Garden Black-Eyed Susan	.5'-1'	1'-1.5'	JUN SEP		✓	✓	☀	◆	◆
Sedum 'Abbeydore' Abbeydore Stonecrop	1.5'		AUG NOV		✓	✓	☀	◆	◆
Tiarella cordifolia 'Brandywine' Foam Flower	1'-1.5'	1'-2'	MAY			✓	◐ ▶ ☀	◆	◆
Bulbs									
Chionodoxa forbesii 'Pink Giant' Pink Giant Glory of the Snow	6"-9"	3"-6"	MAR		✓	✓	☀ ▶ ◐	◆	◆
Crocus vernus Dutch Crocus	6"	4"-6"	MAR APR		✓	✓	☀ ▶ ◐	◆	◆
Galanthus elwesii Giant Snowdrop	9"	6"	FEB MAR		✓	✓	◐ ▶ ☀	–	–
Narcissus 'Mondragon' Mondragon Daffodil	1'-1.5'	.5'-1'	MAR APR		✓	✓	☀ ▶ ◐	◆	◆

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

Roadway Plantings

Roadway plantings are trees, shrubs, groundcovers, perennials, and other vegetation located within the roadbed of a street. Generally, plantings are installed within raised medians or triangles that separate or channelize traffic. Roadway plantings must endure various stresses: salt, wind, drought, damage from vehicles, and limited growing space. These all impact plant health and should guide design and plant selection.

Raised Median

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

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

Considerations

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

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

Design

See GENERAL GUIDELINES (6.0.1)

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

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

Planted medians should be a minimum of 7–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 DPR on a case-by-case basis. Where conditions allow, an 18-inch–wide curb around the perimeter of the planting bed is preferred

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

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

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

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

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

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

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

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

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

Plants

See Roadway Planting Recommendations (Table 6B)

RAISED MEDIAN

Curb Height

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

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See considerations for RAISED MEDIAN (6.2.1)

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

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

Design

See design guidance for RAISED MEDIANS (6.2.1)

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

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

Plants

See Roadway Planting Recommendations (Table 6B)

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

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

RAISED MEDIAN

12–24 Inches

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

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

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

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for RAISED MEDIAN (6.2.1)

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

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

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

Design

See design guidance for RAISED MEDIAN (6.2.1)

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

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

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

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

Plants

See Roadway Planting Recommendations (Table 6B)

RAISED MEDIAN

Pedestrian Mall

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

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

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

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

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

Benefits

See benefits for RAISED MEDIAN (6.2.1)

Considerations

See considerations for RAISED MEDIAN (6.2.1)

Consider pedestrian and bicycle circulation within the mall

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

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

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

Design

See design guidance for RAISED MEDIAN (6.2.1)

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

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

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

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

Plants

See Roadway Planting Recommendations (Table 6B)

Triangle

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

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

Considerations

See GENERAL GUIDELINES (6.0.1)

May impact street drainage or require catch-basin relocation

Safe access to plantings for maintenance workers must be provided

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

Design

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

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

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

Use salt-tolerant, drought-tolerant species for plantings

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

Plants

See Roadway Planting Recommendations (Table 6B)

Street End

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Provides an opportunity to actively collect and manage stormwater

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for TRIANGLE (6.2.2)

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

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

Design

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

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

Plants

See Roadway Planting Recommendations (Table 6B)

TABLE 6B

Roadway Planting Recommendations

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

Trees

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

Shrubs

	Spread											
Hydrangea paniculata 'DVPinky' Pinky Winky Hydrangea	6'-8'	5'-6'	JUL SEP							✓	☀▶☀	◆	◆
Cornus sericea 'Farrow' Arctic Fire Red Twig Dogwood	3'-4'	3'-4'	MAY JUN			✓	✓			✓	☀▶☀	◆	◆
Rosa 'Radcor' Rainbow Knock Out Rose		4'-5'	MAY NOV	✓						✓	☀	◆	◆
Abelia x grandiflora 'Rose Creek' Rose Creek Glossy Abelia	<3'	3'-4'	MAY SEP		✓			✓	✓		☀▶☀	◆	–
Caryopteris x clandonensis 'Dark Knight' Dark Knight Blue Mist Shrub		1.5'-2'	JUL SEP		✓				✓		☀	◆	–
Juniperus chinensis var. sargentii 'Glauca' Blue Sargent Juniper		6'-9'		✓	✓			✓	✓	✓	☀	◆	◆
Lagerstroemia indica 'Gamad II' Razzle Dazzle Crepe Myrtle		3'-4'	JUL SEP			✓			✓	✓	☀	◆	◆
Potentilla fruticosa Shrubby Cinquefoil		3'-4'	JUN NOV						✓	✓	☀	◆	◆
Rhus aromatica 'Gro Low' Gro Low Sumac		6'-8'	APR		✓	✓	✓		✓	✓	☀▶☀	◆	◆
Spiraea x bumalda 'Goldmound' Goldmound Spirea		3'-4'	MAY		✓	✓			✓	✓	☀▶☀	◆	◆
Yucca filamentosa 'Color Guard' Color Guard Adam's Needle		2'-3'	JUN SEP		✓			✓	✓	✓	☀	◆	◆

Perennials

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

Grasses/Grass-like Plants

Chionodoxa forbesii 'Pink Giant' Pink Giant Glory of the Snow	3'-5'	1.5'-2.5'	JUN FEB		✓	✓			✓	✓	☀	◆	◆

Bulbs

Narcissus 'Improved King Alfred' Trumpet Daffodil	1'-2'	.5'-1'	APR MAY						✓	✓	☀▶☀	◆	◆
Allium 'Globemaster' Globemaster Ornamental Onion	1.5'-2.5'	1'-1.5'	JUN						✓	✓	☀	◆	◆

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

Sidewalk Plantings

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

Full Sidewalk

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for TREE BED (6.1.1)

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

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

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

Design

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

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

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

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

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

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

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

Consider the installation of DEP ROW BIOSWALE (6.6.1a)

Plants

See Sidewalk Planting Recommendations (Table 6C)

Ribbon Sidewalk

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

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

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Considerations

See GENERAL GUIDELINES (6.0.1)

May impact underground or overhead utilities

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

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

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

Design

See design guidance for TREE BED (6.1.1)

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

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

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

Plants

See Sidewalk Planting Recommendations (Table 6C)

Curb Extension

A CURB EXTENSION that is planted rather than paved.

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Considerations

See GENERAL GUIDELINES (6.0.1)

May impact street drainage and require new catch basins

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

Design

See design guidance for CURB EXTENSION (6.2.1)

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

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

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

Plants

See Sidewalk Planting Recommendations (Table 6C)

Curb extension with Greenstreet: Greenwich and Christopher Streets, Manhattan

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

TABLE 6C

Sidewalk Planting Recommendations

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

Scientific Name 'Cultivar' Trade Name Common Name	Appearance								Tolerances				
	Height	Shape	Characteristics						Drought-Flood		Light	Salt	High pH
Trees													
Quercus phellos * Willow Oak	50'-70'								✓			◆	◆
Metasequoia glyptostroboides Dawn Redwood	50'-70'								✓	✓		◆	◆
Zelkova serrata 'Village Green' * Village Green Japanese Zelkova	60'-70'								✓			◆	–
Eucommia ulmoides Hardy Rubber Tree	40'-60'								✓			◆	◆
Cercis canadensis * Eastern Redbud	20'-30'		APR						✓	✓		◆	–
Maackia amurensis Amur Maackia	20'-30'		JUN						✓			–	–
Shrubs		Spread											
Ilex crenata 'Helleri' Heller's Japanese Holly	2'-3'	5'-8'							✓	✓		◆	◆
Jasminum nudiflorum 'Nanum' Compact Winter Flowering Jasmine	2'-3'	3'-4'	FEB MAR						✓			◆	◆
Juniperus chinensis 'Old Gold' Old Gold Juniper	2'-3'	4'-5'							✓	✓		◆	◆
Rosa x 'Noatraum' Flower Carpet Pink™ Flower Carpet Rose	2'-2.5'	3'	MAY SEP						✓	✓		◆	◆
Juniperus conferta 'Blue Pacific' Blue Pacific Shore Juniper	.5'-1'	4'-6'							✓	✓		◆	◆
Grasses/Grass-like Plants													
Miscanthus sinensis 'Adagio' Adagio Eulalia Grass	2'-3'	2'	AUG FEB						✓	✓		◆	◆
Panicum virgatum 'Hot Rod' Hot Rod Switch Grass	3'	2'	AUG SEP						✓	✓		◆	–
Koeleria glauca 'Coolio' Coolio Blue Hair Grass	1'-1.5'	1'-1.5'	MAR JUL						✓			◆	◆
Carex elata 'Aurea' Bowles Golden Sedge	1'-1.5'	1.5'								✓		◆	–
Perennials													
Achillea millefolium 'Pretty Belinda' Pretty Belinda Fernleaf Yarrow	1'-2'	1.5'	JUN JUL						✓			◆	◆
Euphorbia 'Ascot Rainbow' Ascot Rainbow Variegated Spurge	1.5'-2'	1.5'	JUN						✓			◆	◆
Nepeta x faassenii 'Kit Cat' Kit Cat Catmint	1.5'	1'-2'	MAY SEP						✓	✓		◆	◆
Nipponanthemum nipponicum Montauk Daisy	2'-3'	2'-3'	AUG SEP						✓	✓		◆	–
Bulbs													
Allium christophii Star of Persia	1'-2'	.5'-1.5'	MAY						✓	✓		◆	◆

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

Plaza Plantings

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

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

In-Ground Planting Area

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

Plants add character to a plaza and provide secondary environmental benefits

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

Considerations

See GENERAL GUIDELINES (6.0.1)

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

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

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

Positive drainage must be established in all planting areas

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

Design

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

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

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

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

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

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

Plant densely to discourage littering, trampling and other improper uses

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

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

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

Plants

See PLAZA PLANTINGS (6.4): Plaza Planting Recommendations

Raised Planting Area

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

Benefits

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

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

Raising planters creates opportunities for planting where there are underground constraints

Raised planters create more substantial barriers from vehicles

Raised planters create protection from winter salt spray

Considerations

See GENERAL GUIDELINES (6.0.1)

See considerations for IN-GROUND PLANTING AREA (6.4.1)

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

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

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

Design

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

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

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

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

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

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

Plants

See Plaza Planting Recommendations (Table 6D)

TABLE 6D

Plaza Planting Recommendations

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

Trees

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

Shrubs

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

Perennials

Alchemilla mollis Lady's Mantle	1'-1.5'	1.5'-2.5'	MAY JUN							✓	☀▶◐	◆	◆
Amsonia hubrichtii Arkansas Blue Star	2'-3'	2'-3'	MAY						✓	✓	☀	◆	◆
Geranium macrorrhizum 'Bevan's Variety' Bevan's Variety Big-Root Geranium	1'	1'-1.5'	MAY						✓		☀▶◐	◆	◆
Helleborus x hybridus Lenten Rose	1'-1.5'	1'-1.5'	MAR MAY						✓	✓	◐▶●	◆	◆
Hemerocallis 'Happy Returns' Happy Returns Daylily	1'-1.5'	1'-1.5'	JUN OCT							✓	☀▶◐	◆	◆
Liriope muscari 'Big Blue' Big Blue Lilyturf	1'-2'	1'-2'	AUG SEP						✓	✓	☀▶◐	◆	◆
Nepeta x 'Walker's Low' Walker's Low Catmint	2'-2.5'	2'-3'	APR SEP						✓	✓	☀	◆	◆
Sedum Autumn Joy Autumn Joy Stonecrop	1.5'-2'	1.5'-2'	AUG NOV						✓	✓	☀	◆	◆

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

Limited-Access Arterial Plantings

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

Limited-Access Arterial Plantings

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

Benefits

See BENEFITS OF PLANTINGS IN THE ROW (6.0)

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

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

Reduction in glare and a more pleasant experience for motorists

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

Considerations

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

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

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

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

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

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

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

Design

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

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

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

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

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

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

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

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

Plants

See Limited-Access Planting Recommendations (Table 6E)

TABLE 6E

Limited-Access Arterial Planting Recommendations

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

Trees

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

Shrubs

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

Self-Clinging Vines

Parthenocissus tricuspidata Boston Ivy	30'-50'	5'-10'						✓		◆	◆

Turf Grass

Festuca arundinacea cultivars Turf-type Tall Fescue Grass	3"-4"	3"-4"						✓		◆	◆
Lolium perenne cultivars Turf-type Perennial Rye Grass	3"-4"	3"-4"						✓		◆	–

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

Stormwater Management Practices

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

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

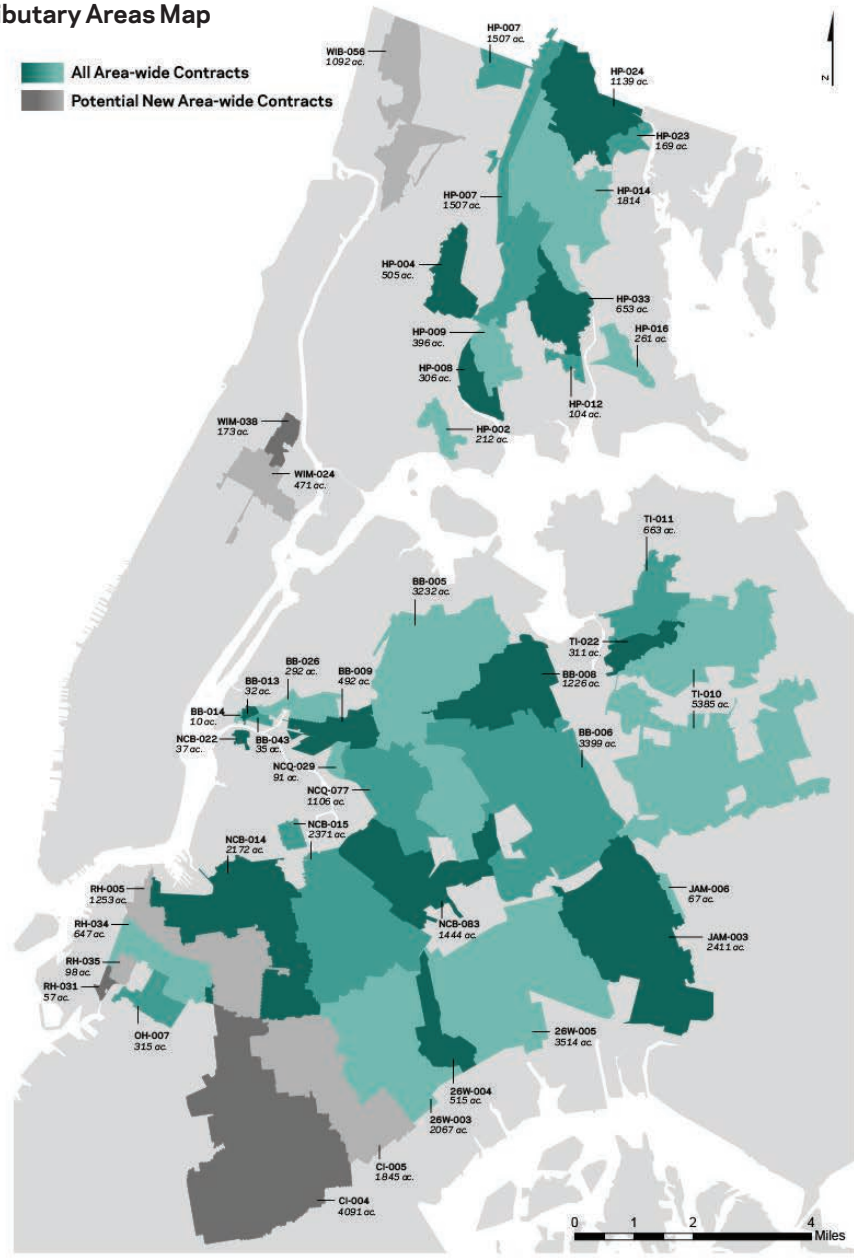
STORMWATER MANAGEMENT PRACTICES (6.6.1) describe general considerations and design principles typical of a green stormwater solution. These treatments can be employed citywide, where appropriate conditions allow.

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

Important Terms (NYS Stormwater Design Manual)

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

DEP Priority CSO Tributary Areas Map



(Credit DEP)

Stormwater Management Practices

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

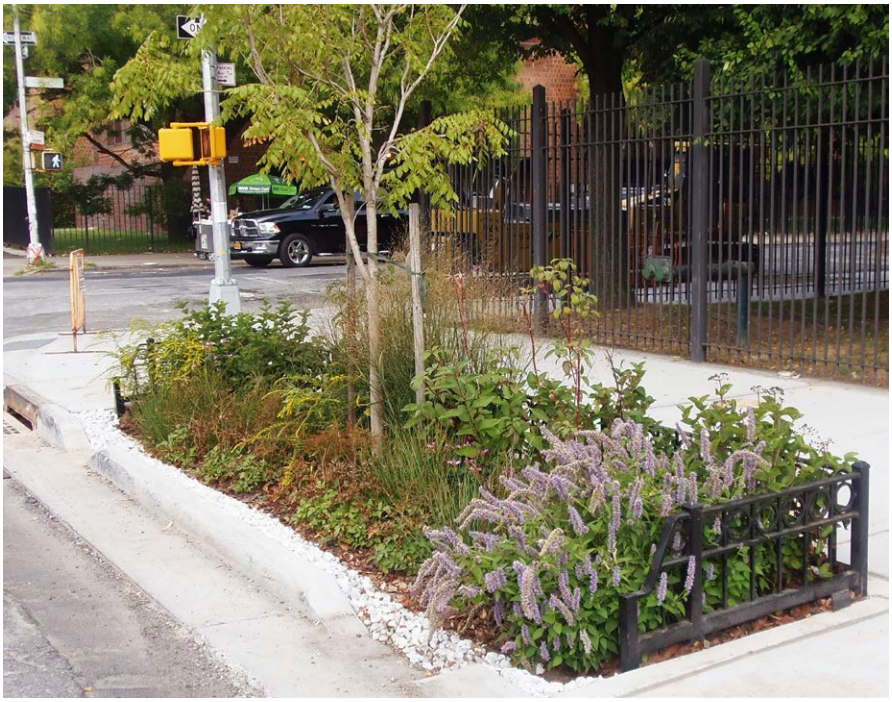
Benefits

See BENEFITS OF PLANTINGS IN THE ROW

Reduced stormwater entering sewers during storms

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

Healthier plants and greater survival rates when appropriate plants are used



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

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

Considerations

See GENERAL GUIDELINES (6.0.1)

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

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

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

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

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

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

STORMWATER MANAGEMENT PRACTICES will require a maintenance agreement

Application

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

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

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

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

Design

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

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

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

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

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

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

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

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

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

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

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

Plants

See Stormwater Management Practices Planting Recommendations (Table 6F)

DEP ROW Bioswale

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

Benefits

See benefits of STORMWATER MANAGEMENT PRACTICES (6.6.1)

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

Application

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

Outside DEP designated areas with a maintenance agreement

Considerations

See considerations for STORMWATER MANAGEMENT PRACTICES (6.6.1)

See considerations for TREE BEDS (6.1.1)

Consider parking regulations; curbside access must be preserved

Consider subsurface conditions

The underlying soils should have adequate infiltration rates

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

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

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

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

Design

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

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

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

Soil and design specifications must adhere to DEP standards

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

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

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

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

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

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

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

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

Plants

See Planting Recommendations (Table 6F)

Stormwater Greenstreet

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

Benefits

See benefits for STORMWATER MANAGEMENT PRACTICES (6.6.1)

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

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

Considerations

See considerations for STORMWATER MANAGEMENT PRACTICES (6.6.1)

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

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

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

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

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

Application

See application guidance for STORMWATER MANAGEMENT PRACTICES (6.6.1)

Design

See design guidance for STORMWATER MANAGEMENT PRACTICES (6.6.1)

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

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

Plants

See Planting Recommendations (Table 6F)

TABLE 6F

Stormwater Management Practices Planting Recommendations

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

Trees

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

Shrubs

		Spread											
Aronia melanocarpa Black Chokeberry	3'-6'	3'-6'	MAY						✓	✓		◆	◆
Ilex glabra 'Compacta' Compact Inkberry Holly	3'-6'	3'-6'								✓		◆	–
Itea virginica 'Sprich' Little Henry™ Little Henry Sweetspire	3'-5'	3'-5'	JUN							✓		◆	–
Cornus sericea 'Kelseyi' Kelseyi Red Twig Dogwood	2'-3'	2'-3'	JUN							✓		◆	◆

Perennials

Aster 'Wood's Pink' Hardy Aster	1'-1.5'	1.5'-2.5'	AUG SEP							✓		◆	◆
Echinacea purpurea Coneflower	2'-3'	2'-3'	JUN AUG						✓	✓		◆	◆
Epimedium grandiflorum 'Lilafee' Bishop's Hat	1'	1'-1.5'	MAY						✓			◆	◆
Eupatorium dubium 'Baby Joe' Baby Joe Pye Weed	1'-1.5'	1'-1.5'	JUL SEP						✓	✓		◆	◆
Hemerocallis (Dwarf Varieties) Daylilly	1'-1.5'	1'-1.5'								✓		◆	◆
Liriope spicata Creeping Lilyturf	1'-2'	1'-2'	AUG SEP						✓	✓		◆	◆
Rudbeckia fulgida Black Eyed Susan	2'-2.5'	2'-2.5'	JUN OCT						✓	✓		◆	◆
Solidago (Dwarf Varieties) Goldenrod	1.5'-2'	1.5'-2'	AUG SEP						✓	✓		◆	◆

Grasses/Grass-like Plants

Carex morrowii Sedge	1'-1.5'	1.5'-2'	APR JUL						✓	✓		◆	◆
Carex pennsylvanica Pennsylvania Sedge	.5'-1'	.5'-1'							✓	✓		◆	◆
Hakonechloa macra Golden Japanese Forest Grass	2'-2.5'	3'-4'							✓	✓		◆	◆
Juncus effusus Common Rush	2'-4'	2'-4'	JUN AUG							✓		◆	◆
Panicum virgatum Switchgrass	3'-6'	2'-3'	JUL FEB						✓	✓		◆	◆

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

Glossary

Common Terms

A

AASHTO (American Association of State Highway Transportation Officials)

A nonprofit, nonpartisan association representing highway and transportation departments in the fifty states, the District of Columbia, and Puerto Rico, representing all five transportation modes—air, highways, public transportation, rail, and water. AASHTO publishes numerous design guidance publications, including *A Policy on Geometric Design of Highways and Streets* ("Green Book"). www.transportation.org/?siteid=37&pageid=310

Accessibility

The design of facilities and public Rights-of-Way that is easy, safe, and intuitive to use for people with disabilities. Accessible environments provide for a person's ability to independently navigate the space.

ADA (Americans with Disabilities Act)

The Americans with Disabilities Act gives civil rights protections to individuals with disabilities, similar to those rights provided to individuals on the basis of race, color, sex, national origin, age, and religion. It guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications. www.ada.gov

ADT (Average Daily Traffic)

The average number of vehicles to pass a certain point or use a certain roadway per day. Sometimes referred to as VPD (Vehicles Per Day), this is the calculation of the total traffic volume during a given time (in whole days) divided by the number of days in that period. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

Albedo (Pavement Albedo)

Albedo is the ability of a surface material to reflect incident solar (short wave) radiation. It is expressed on a scale of 0 to 1, where a value of 0.0 indicates that a surface absorbs all solar radiation and an albedo value of 1.0 represents total reflectivity. Light-colored surfaces generally have higher albedos than dark-colored surfaces. Pavements with lower albedo absorb more sunlight and get hotter. Pavements with higher albedo absorb less sunlight and are therefore cooler, mitigating the urban heat island effect www.epa.gov/heatisland/resources/faq.html#7. Conventional asphalt has an albedo in the range 0.04 to 0.12, while concrete has an albedo of around 0.5. (*High Performance Infrastructure Guidelines*) Reflectance is also measured using Solar Reflectance Index (SRI) values.

Arterial Street

The part of the roadway system serving as the principal network of through-traffic flow. The routes connect areas of principal traffic generation and important rural highways entering the cities. (*Institute of Traffic Engineers Traffic Engineering Handbook*)

B

Bicycle
Every two- or three-wheeled device upon which a person or persons may ride, propelled by human power through a belt, a chain, or gears, with such wheels in a tandem or tricycle, except that it shall not include such a device having solid tires and intended for use only on a sidewalk by pre-teenage children. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 102 and Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Bicycle Facilities
A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically designated for bicycle use. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

Bicycle Lane/Bike Lane
A portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicycles. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 102-a)

Bicycle Path/Bike Path
A path physically separated from motorized vehicle traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way and which is intended for the use of bicycles. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 102-b)

Bicycle Route/Bike Route
A bikeway designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bike routes should establish a continuous routing, but may be a combination of any and all types of bikeways. (AASHTO: *Guide for the Development of Bicycle Facilities*) In New York City, bike routes are set forth in the New York City Cycling Map and come in three main categories: Bicycle Path, Class 1 (bridge, park, or separated on-street path); Bicycle Lane, Class 2 (on-street striped route); and Bicycle Route, Class 3 (on-street signed route).

BID (Business Improvement District)
A not-for-profit corporation made up of property owners and commercial tenants who are dedicated to promoting business development and improving an area's quality of life. BIDs deliver supplemental services such as sanitation and maintenance, public safety and visitor services, marketing and promotional programs, capital improvements, and beautification for the area—all funded by a special assessment paid by property owners within the district. **www.ci.nyc.ny.us/html/sbs/html/neighborhood/bid.shtml**

Bikeway
A generic term for any road, street, path, or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes. (AASHTO: *Guide for the Development of Bicycle Facilities*)

Bioswale
A depressed, planted area designed to convey, capture, and filter stormwater runoff and increase rainwater infiltration. These systems are linear. The term "street swale" is used throughout this Manual. (*Florida Field Guide to Low Impact Development*: **buildgreen.ufl.edu/Fact_sheet_Bioswales_Vegetated_Swales.pdf**)

BMP (Best Management Practices)
Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage, or leaks, sludge or waste disposal, or drainage from raw material storage. **www.epa.gov/npdes/pubs/cgp_appendixa.pdf**

BRT (Bus Rapid Transit)
A flexible, high-performance rapid transit mode that combines a variety of physical, operating, and system elements into a permanently integrated system with a quality image and unique identity. (Levinson et al., *Bus Rapid Transit: Implementation Guidelines, TCRP Report 90-Volume II*)

BRT (Bus Rapid Transit) Route
A road designed to improve the speed, reliability, and overall attractiveness of bus service, and that carries bus lines designated as "Select Bus Service" by MTA NYCT/MTA Bus and/or other services identified as BRT. This also includes roads that are designated for BRT service in the future, through the BRT Master Plan or other planning documents.

C

BUG (Backlight, Uplight, Glare) Rating
The BUG rating system, describes the types of stray light escaping from an outdoor lighting luminaire. The BUG system was developed by the Illuminating Engineering Society (IES) to make comparing and evaluating outdoor luminaires fast, easy and more complete than older systems www.aal.net/content/resources/files/BUG_rating.pdf

Bus
Every motor vehicle having a seating capacity of more than fifteen adults, in addition to the operator, and used for the transportation of persons, and every charter bus, interstate bus, intrastate bus, school bus, and sight-seeing bus, regardless of seating capacity. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Bus Route
A street that carries one or more regularly scheduled local, commuter, or intercity bus lines running on a published schedule.

Busway
A physically separated lane reserved for bus traffic.

Capital Project
A. A project that provides for the construction, reconstruction, acquisition, or installation of a physical public betterment or improvement that would be classified as a capital asset under generally accepted accounting principles for municipalities, or any preliminary studies and surveys relative thereto, or any underwriting or other costs incurred in connection with the financing thereof;
B. The acquisition of property of a permanent nature, including wharf property;
C. The acquisition of any furnishings, machinery, apparatus, or equipment for any public betterment or improvement when such betterment or improvement is first constructed or acquired;
D. Any public betterment involving either a physical improvement or the acquisition of real property for a physical improvement consisting in, including, or affecting (1) streets and parks, (2) bridges and tunnels, (3) receiving basins, inlets, and sewers, including intercepting sewers, plants or structures for the treatment, disposal or filtration of sewage, including grit chambers, sewer tunnels, and all necessary accessories thereof, or (4) the fencing of vacant lots and the filling of sunken lots;
E. Any other project allowed to be financed by the local finance law, with the approval of the mayor and the comptroller;
F. Any combination of the above. (New York City Charter Section 210.1)

Cast-in-Place
Term describing a paving material, such as concrete, that is poured into place on-site and set to harden

CEQR (City Environmental Quality Review)
A process by which agencies of the City of New York review proposed discretionary actions to identify the effects those actions may have on the environment. CEQR is New York City's process for implementing SEQRA (New York State Environmental Quality Review Act), which requires that state and local governmental agencies assess environmental effects of discretionary actions before undertaking, funding, or approving such actions, unless they fall within certain statutory or regulatory exemptions from the requirements for review. www.nyc.gov/html/oec/html/ceqr/ceqrfaq.shtml

Channelization
The separation or regulation of conflicting traffic movements into definite paths of travel by traffic islands or pavement marking to facilitate the orderly movements of both vehicles and pedestrians. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

Clear Path
A straight unobstructed path for pedestrian circulation on the sidewalk. (Rules of the City of New York, Title 34, Chapter 7, Section 7-06(c)(3)). (See also definition of clear path in DCA's rules and in the ADA.)

Coefficient of Friction
A value between 0 and 1 representing the ratio of the force of resistance between the horizontal motion of a body or object and a surface to the force pushing the body or object down on that surface. Surfaces with lower values, such as ice, are more slippery, while surfaces with higher values, such as concrete, are less slippery.

Collector Street
The collector street system provides both land access and traffic circulation within residential, commercial, and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. Conversely, the collector street also collects traffic from local streets in residential neighborhoods and channels it into the arterial system. In the central business district, and in other areas of like development and traffic density, the collector system may include the street grid, which forms a logical entity for traffic circulation. (FHWA: *Functional Classification Guidelines*)

Commercial District
A commercial district, designated by the letter C (C1-2, C3, C4-7, for example), is a zoning district in which commercial uses are allowed and residential uses may also be permitted, as described in the Zoning Resolution of the City of New York. **www.nyc.gov/html/dcp/html/subcats/zoning.shtml**

Community Facilities
As used in this manual, community facilities are elements of the streetscape that serve useful functions to street users beyond infrastructure and vehicular operations. Examples include street furniture (e.g., bike racks and newsstands), public and café seating, public art, and plantings. Their use is generally authorized through permits, revocable consents, and/or maintenance agreements.

Concession
A grant made by an agency for the private use of city-owned property for which the city receives compensation other than in the form of a fee to cover administrative costs, except that concessions shall not include franchises, revocable consents, and leases. (NYC Charter, Section 362(a); Rules of the City of New York, Title 12)

Controlled-Access Highway
Every highway, street, or roadway in respect to which owners or occupants of abutting lands and other persons have no legal right of access to or from the same except at such points only and in such manner as may be determined by the public authority having jurisdiction over such highway, street, or roadway.
(New York State Vehicle and Traffic Law, Title 1, Article 1, Section 109)

Crosswalk
A. That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway between the curbs or, in the absence of curbs, between the edges of the traversable roadway;
B. Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 110)

CSO (Combined Sewer Overflow)
A discharge of excess wastewater from a combined sewer system (sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe) directly into nearby streams, rivers, or other water bodies during periods of heavy rainfall or snowmelt when the wastewater volume exceeds the capacity of the sewer system or treatment plant.
cfpub.epa.gov/npdes/home.cfm?program_id=5

Cut-Through Traffic
Traffic using minor roadways, usually residential streets, as shortcuts to avoid congestion on major streets. (*U.S. Traffic Calming Manual, American Planning Association, 2009*)

Curb
A vertical or sloping member along the edge of a roadway clearly defining the pavement edge. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 111)

D

Design Speed
A selected speed used to determine the various geometric design features of the roadway. The assumed design speed should be a logical one with respect to the topography, anticipated operating speed, the adjacent land use, and the functional classification of highway. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

Design Vehicle
Selected vehicles, with representative weight, dimensions, and operating characteristics, which are used to establish highway design controls for accommodating vehicles of designated classes. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

Driver
Every person who operates or drives or is in actual physical control of a vehicle. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 113)

Driveway
Every entrance or exit authorized pursuant to applicable law and used by vehicular traffic to or from lands or buildings abutting a highway. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

E

Engineered Soil
A soil designed to achieve specific infiltration standards in a stormwater-capture installation.

F

Flag (sidewalk)
A flat slab of stone used as a paving material. (*American Heritage Dictionary of the English Language*, Fourth Edition)

Franchise
A grant by an agency of a right to occupy or use the inalienable property of the city (usually, streets or sidewalks) to provide a public service. (NYC Charter, Section 362(b))

Friction Coefficient
See "Coefficient of Friction"

Furnishing Zone
A multi-purpose area of the roadside. It serves as a buffer between the pedestrian travel way and the vehicular area of the thoroughfare within the curbs, and it provides space for roadside appurtenances such as street trees, planting strips, street furniture, utility poles, sidewalk cafés, sign poles, signal and electrical cabinets, phone booths, fire hydrants, bicycle racks, and bus stop shelters. (Institute of Transportation Engineers, *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities: An ITE Proposed Recommended Practice*)

G

Gateway
A combination of traffic-calming and visual measures used at the entrance to a low speed street to slow entering vehicles and discourage through-traffic.

Green Book
See *A Policy on Geometric Design of Highways and Streets*.

Green Infrastructure
An adaptable term used to describe an array of products, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility services. As a general principal, green infrastructure techniques use soils and vegetation to infiltrate, evapotranspirate, and/or detain stormwater runoff. When used as components of a stormwater management system, green infrastructure practices such as green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition, to effectively retain and infiltrate rainfall, these technologies can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits. water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm

Greenstreet
Paved traffic islands and medians converted into green spaces filled with shade trees, flowering trees, shrubs, and/or groundcover, pursuant to a program established in 1996 and as further referred to in a Master Agreement between DOT and DPR. Many of these installations are designed to capture street and sidewalk runoff to allow for stormwater infiltration, and are referred to as Stormwater Greenstreets. Both DPR and DEP currently construct Stormwater Greenstreets.

H

Highway
The entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 118)

High Water Table
The highest level of the groundwater in a given area, taking into account seasonal and periodic storm event fluctuations. This level can vary throughout the boroughs, and needs to be taken into consideration when designing stormwater management practices/green infrastructure.

Historic District
Any area which (1) contains improvements that have a special character or special historical or aesthetic interest or value; and represent one or more periods or styles of architecture typical of one or more eras in the history of the city; and cause such area, by reason of such factors, to constitute a distinct section of the city; and (2) has been designated as a historic district pursuant to Title 25 of the Administration Code of the City of New York. (Administrative Code of the City of New York, Title 25, Chapter 3, Section 25-302(h))

Horizontal Deflection
The horizontal (sideways) movement of moving vehicles compelled through physical and/or visual changes to the roadway alignment, for example a bend in the road.

HPS
A type of lamp which uses sodium gas to produce light. HPS lamps are being replaced by more-efficient LED lamps throughout the city.It is one of the most efficient sources of light.

I

IESNA
The Illuminating Engineering Society of North America is a professional organization of lighting engineers with a commitment to sharing their knowledge and expertise. IESNA has established recommended guidelines regarding levels of illumination for street and pedestrian lighting.

Inclusive Design
See Universal Design.

Intersection
The area contained within the grid created by extending the curblines of two or more streets at the point at which they cross each other. (Rules of the City of New York, Title 34, Chapter 2, Section 2-01)

L

LED
A light-emitting diode converts electricity to light through the movement of electrons. It does not have a filament and is more efficient than incandescent bulbs. It consumes less energy, is more compact, and lasts longer than traditional light sources.

Limited Use Street
A legally mapped street to be temporarily closed to motor vehicles by the Department of Transportation, in accordance with lawfully authorized signs or other traffic control devices. (Rules of the City of New York, Title 34, Chapter 4, Section 4-12(r)(4))

Local Street
The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through-traffic movement usually is deliberately discouraged. (FHWA: *Functional Classification Guidelines*)

Local Traffic
Vehicular traffic whose trip origin and/or destination are in the immediate area of a given street.

LOS (Level of Service)
A methodology for measuring traffic flow based on traveler delay and congestion, defined in the *Highway Capacity Manual* (HCM). Grades from A to F are used, from free flow to traffic jam conditions. Historically used primarily for motor vehicle traffic, LOS methodologies have also been devised for pedestrian, bicyclist, and transit operations.

M

Motor Vehicle
Every vehicle operated or driven upon a public highway which is propelled by any power other than muscular power, except as otherwise provided in Section 125 of the Vehicle and Traffic Law. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

MUTCD (Manual on Uniform Traffic Control Devices)
Defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets and highways. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F. mutcd.fhwa.dot.gov

N

NACTO (National Association of City Transportation Officials)
NACTO is a 501(c)(3) non-profit association that represents large cities on transportation issues of local, regional and national significance, and facilitates the exchange of ideas, data, and best practices. NACTO publishes numerous design guidance publications, including *Urban Street Design Guide*. www.nacto.org/about/

O

Operating Speed
The speed at which drivers are observed operating their vehicles during free-flow conditions. The 85th percentile of the distribution of observed speeds is the most frequently used measure of the operating speed associated with a particular location or geometric feature. (AASHTO: *A Policy on Geometric Design of Highways and Streets*)

P

Park

Parking
The standing of a vehicle, whether occupied or not, otherwise than temporarily for the purpose of and while actually engaged in loading or unloading property or passengers. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Peak Hour(s)
The hour or hours of greatest vehicular traffic volumes on a given street or intersection, usually defined for weekday AM, MD (mid-day) and PM, and Saturday MD peak periods. The peak hours, rather than entire day, are typically analyzed in a traffic analysis.

Pedestrian
Any person afoot or in a wheelchair. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 130)

Plaza
An area designated for use by pedestrians, which may vary in size and shape; which may abut a sidewalk and is located fully within the bed of a roadway; may be at the same level as the roadway or raised above the level of the roadway; may be physically separated from the roadway by curbing, bollards, or other separators; may be treated with special markings and materials; and may contain benches, tables, or other facilities for pedestrian use.

A Policy on Geometric Design of Highways and Streets
Often referred to as the "Green Book," this document is published by AASHTO and contains "design practices in universal use as the standard for highway geometric design." bookstore.transportation.org/item_details.aspx?ID=109

Private Road
Every way or place in private ownership and used for vehicular travel by the owner and those having express or implied permission from the owner, but not by other persons. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 133)

Public Highway
Any highway, road, street, avenue, alley, public place, public driveway, or any other public way. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 134)

R

Rain Garden
A planted depression that captures and absorbs rainwater that would otherwise flow into a storm drain. Infiltration and evapotranspiration are the primary means for water management in these systems. (*Florida Field Guide to Low Impact Development*: buildgreen.ufl.edu/Fact_sheet_Bioretention_Basins_Rain_Gardens.pdf)

Resiliency
The ability of people, the places where they live, and our infrastructure systems—such as transportation and energy—to withstand a stress or shock event, to recover, and emerge even stronger. (One New York)

Restricted Use Street
A legally mapped street to be permanently closed to motor vehicles by the Department of Transportation, and open to use by pedestrians. (Rules of the City of New York, Title 34, Chapter 4, Section 4-12(r)(4))

Revocable Consent
A grant by the city of a right, revocable at will…to an owner of real property or, with the consent of the owner, to a tenant of real property to use adjacent inalienable property (usually, streets or sidewalks) for such purposes as may be permitted by rules of DOT or DoITT. (For full definition see NYC Charter, Section 362(c)(2); Rules of the City of New York, Title 34, Chapter 7, Section 7-01)

Right of Way
The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian approaching under such circumstances of direction, speed, and proximity as to give rise to danger of collision unless one grants precedence to the other. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 139)

Right-of-Way
A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes. (AASHTO: *Guide for the Development of Bicycle Facilities*)

Road
An open way for the passage of vehicles, persons, or animals on land. (FHWA)

Roadbed
The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder. (FHWA)

Roadway
That portion of a street designed, improved, or ordinarily used for vehicular travel, exclusive of the shoulder and slope. (Rules of the City of New York, Title 34, Chapter 2, Section 2-01)

S

Scoring (concrete)
Marking the surface of concrete for visual or textural effect. "Tooled joint" scoring refers to concrete sidewalk flag joints finished with a hand-trowelled border. "Simulated saw-cut joint" scoring refers to concrete sidewalk flag joints finished using a spacer to simulate the appearance of joints cut with a masonry saw.

Shared Use Path
A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users. (AASHTO: *Guide for the Development of Bicycle Facilities*)

Sidewalk
That portion of a street, whether paved or unpaved, between the curb lines or the lateral lines of a roadway and the adjacent property lines intended for the use of pedestrians. Where it is not clear which section is intended for the use of pedestrians, the sidewalk will be deemed to be that portion of the street between the building line and the curb. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Simulated Saw-Cut Joint
See scoring (concrete)

Solar Reflectance Index (SRI)
SRI is a value that incorporates both solar reflectance and emittance in a single value to represent a material's temperature in the sun. SRI quantifies how hot a surface would get relative to standard black and standard white surfaces. It is calculated using equations based on previously measured values of solar reflectance and emittance as laid out in the American Society for Testing and Materials Standard E 1980. It is expressed as a fraction (0.0 to 1.0) or percentage (0% to 100%). (United States Environmental Protection Agency: www.epa.gov/heatisld/resources/glossary.htm)

Source Control
Action to prevent pollution where it originates. www.stormwaterauthority.org/glossary.aspx

Source Reduction
The technique of stopping and/or reducing pollutants at their point of generation so that they do not come into contact with stormwater. www.cabmphandbooks.com/Documents/Development/Section_7.pdf

Stand
Standing
The stopping of a vehicle, whether occupied or not, otherwise than temporarily for the purpose of and while actually engaged in receiving or discharging passengers. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 145 and Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Stop
Stopping
Any halting even momentarily of a vehicle, whether occupied or not. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Street

A street, avenue, road, alley, lane, highway, boulevard, concourse, parkway, driveway, culvert, sidewalk, crosswalk, boardwalk, and viaduct, and every class of public road, square and place, except marginal streets. (New York City Charter Section 210.7)

Street Tree
A tree growing in the public right-of-way. These trees provide a range of benefits, from increased property values to stormwater capture and urban heat island mitigation. www.nycgovparks.org/sub_your_park/trees_greenstreets/faq.html

Supplementary Cementitious Materials (SCM)
Industrial by-products such as coal fly ash, granulated blast furnace slag, and silica fume that are used as a partial replacement for portland cement in concrete. (Green In Practice 107—Supplementary Cementitious Materials, Portland Cement Association). SCM's are pre-consumer recycled materials that would otherwise have been disposed of in landfills, providing cost savings to concrete manufacturers and reducing environmental impact caused by averting disposal. (*High Performance Infrastructure Guidelines*).

Swale
See Bioswale

T

Target Speed
The speed at which vehicles should operate on a thoroughfare in a specific context, consistent with the level of multimodal activity generated by adjacent land uses, to provide both mobility for motor vehicles and a safe environment for pedestrians and bicyclists. The target speed is usually the posted speed limit. (ITE *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*)

Through Traffic
Vehicular traffic whose trip origin and destination are not in the immediate area of a given street.

Traffic
Pedestrians, ridden or herded animals, vehicles, bicycles, and other conveyances either singly or together while using any highway for purposes of travel. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 152)

Tooled Joint
See Scoring (concrete)

Traffic Calming
The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users. As opposed to traffic control devices that are regulatory and require enforcement, traffic calming measures are intended to be self-enforcing. (ITE: *Traffic Calming: State of the Practice*, 1999)

Traffic Control Device
All signs, signals, markings, and devices placed or erected by authority of a public body or official having jurisdiction for the purpose of regulating, warning or guiding traffic. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 153)

Transitway
Any roadway or series of roadways designated for the exclusive use of buses or taxis or such other designated high occupancy vehicles as may be permitted, during certain hours of the day, with access to such roadway(s) limited to one block thereof to other vehicles for the purpose of delivery of goods or services or the picking up or dropping off of passengers. (Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Truck
Except as otherwise specified in the Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b), a truck is defined as any vehicle or combination of vehicles designed for the transportation of property, which has either of the following characteristics two axles, and six tires; or three or more axles. (Rules of the City of New York, Title 34, Chapter 4, Section 4-13(a))

U

Unit Paver
Paving materials that are precast, such as hexagonal asphalt pavers, or individually hewn, such as granite blocks, such that each paver is a single unit that can be removed or replaced.

Universal Design
The process of creating convenient, safe, and accessible spaces for everyone. Accessibility is a critical component of universal design. Also referred to as "Inclusive Design."

Urban Heat Island
Many urban and suburban areas experience elevated temperatures compared to their outlying rural surroundings; this difference in temperature is what constitutes an urban heat island. The annual mean air temperature of a city with one million or more people can be 1.8 to 5.4 degrees F (1 to 3 degrees C) warmer than its surroundings, and on a clear, calm night, this temperature difference can be as much as 22 degrees F (12 degrees C). Even smaller cities and towns will produce heat islands, though the effect often decreases as city size decreases. (US EPA: *Reducing Urban Heat Islands: Compendium of Strategies*)

V

Vehicle
Every device in, upon, or by which any person or property is or may be transported or drawn upon a highway, except devices moved by human power or used exclusively upon stationary rails or tracks. (New York State Vehicle and Traffic Law, Title 1, Article 1, Section 159 and Rules of the City of New York, Title 34, Chapter 4, Section 4-01(b))

Vertical Deflection
The vertical (upward) displacement of moving vehicles by way of a raising of the roadbed surface, for example with a hump, table, or other raised element.

Appendices

Agency Roles on the City's Streets

This diagram summarizes the roles and responsibilities of city agencies and other entities related to the most visible aspects of the city's streets. It does not include all agencies with street-related roles and is not intended to be a literal representation of appropriate street furniture locations.

An expanded listing follows.

Permits for Construction on Sidewalk or in Roadway
DOT

Coordinated Street Furniture Franchise
DOT
DCA

Façades, Marquees, Awnings, Canopies, and Signage
DOB
DOT

Street Lighting, Traffic Controls, and Banners
DOT

Sidewalk Maintenance and Repair
Property Owners

Sidewalk Permits, Revocable Consents, Vaults, Curb Cuts, Cellar Doors, and Sidewalk Sheds
DOB
DOT

CityBench
DOT

Drainage, Sewers, and Catch Basins
DEP

Roadway Repairs
DOT

Utilities
Utility Companies

Street Tree Permits and Design Standards
DPR

Greenstreets
DPR
DOT

Stormwater Management Practices
DEP
DPR
DOT

Sidewalk Cafés
DCA

CityRack
DOT

The following are agencies, authorities, and other organizations that are frequently involved in the design of streets in New York City. This list is provided as a reference tool, for informational purposes only, and is not an exhaustive list.

Street Planning, Design & Construction

Street Capital Projects

DOT
(initiation, scoping, conceptual design) WDEP
(initiation, scoping) www.nyc.gov/dep

EDC
(initiation, scoping, conceptual design, final design, agency alignment & construction)
www.nycedc.com

DDC
(conceptual design, final design, agency alignment & construction)
www.nyc.gov/ddc

DPR
(parks, greenstreets)
www.nyc.gov/parks

NYS DOT
(state highways within New York City)
www.nysdot.gov

Other city, state, and federal agencies and authorities for individual, typically site-specific projects

Comprehensive Street Planning

DOT
(for most public streets)
www.nyc.gov/dot

DCP
(zoning, private streets, transportation studies)
www.nyc.gov/dcp

NYS DOT
(for state and federal routes)
www.nysdot.gov

Design of Stormwater Best Management Practices/ Source Controls

DDC www.nyc.gov/ddc

DEP www.nyc.gov/dep

DPR www.nyc.gov/parks

DOT www.nyc.gov/dot

Greenstreets

DPR www.nyc.gov/parks

DOT www.nyc.gov/dot

Land Acquisition

DCAS www.nyc.gov/dcas

DDC www.nyc.gov/ddc

SBS www.nyc.gov/sbs

Law Department
www.nyc.gov/law

DCP (ULURP) www.nyc.gov/dcp

Non-Capital Street Projects

DOT (design and implementation)
www.nyc.gov/dot

Universal Design

MOPD (Mayor's Office for People with Disabilities) www.nyc.gov/html/mopd/

Street Tree & Tree- Bed Design Standards

DPR www.nyc.gov/parks

Reviews, Approvals & Permits

Coastal Erosion Permits

NYS DEC www.dec.ny.gov

Construction on Sidewalk or in Roadway, Permits

DOT www.nyc.gov/dot

Curb Cut, Existing Cellar Door, Marquee & Awning Permits

DOB www.nyc.gov/html/dob

Environmental Review (CEQR/SEQRA/NEPA)

Lead agency and involved agencies vary by project

Emergency Vehicle Access Review

FDNY www.nyc.gov/fdny

Historic District Review

LPC www.nyc.gov/landmarks

Light Pole Banner Permits

DOT www.nyc.gov/dot

Newsracks

DOT www.nyc.gov/dot

Review of Works of Art and Structures (as defined in Chapter 37, Section 854 of the NYC Charter)

PDC www.nyc.gov/html/artcom

Revocable Consents

DOT www.nyc.gov/dot

DCA
(sidewalk cafés)
www.nyc.gov/consumers

DoITT
(telecommunications)
www.nyc.gov/doitt

Sewers, Catch Basins & Drainage Approval

DEP
www.nyc.gov/dep

Sidewalk Shed Permits

DOB
www.nyc.gov/html/dob

Sidewalk Work Permits

DOB
(Builder's Pavement Plan)
www.nyc.gov/html/dob

DOT
www.nyc.gov/dot

Special Event/Street Fair Permits

CECM www.nyc.gov/html/cecm/

NYPD www.nyc.gov/nypd

Street Tree Permits (including Tree Guards)

DPR
www.nyc.gov/parks

Street Vendor Permits

DCA
www.nyc.gov/consumers

DOHMH
www.nyc.gov/health

Vaults & Canopies: Permits

DOT
www.nyc.gov/dot

Water Quality Permits/Approvals

NYS DEC
www.dec.ny.gov

DEP
www.nyc.gov/dep

Wetlands Permits

United States Army Corps of Engineers www.usace.army.mil

NYS DEC
www.dec.ny.gov

Operation & Maintenance

Coordinated Street Furniture Franchise (bus stop shelters, newsstands, automatic public toilets, bike shelters)

DOT
www.nyc.gov/dot

DCA
www.nyc.gov/consumers

Greenstreets Maintenance

DPR
www.nyc.gov/parks

Roadway Maintenance and Repair

DOT
www.nyc.gov/dot

Roadway & Retaining Wall Inspection

DOT
www.nyc.gov/dot

DDC
www.nyc.gov/ddc

Sidewalk Maintenance and Repair

Property Owners

DOT
(in certain zoning districts or through prior notice) www.nyc.gov/dot

Street Cleaning, Snow Removal & Litter Removal

DSNY
www.nyc.gov/sanitation

DOT
www.nyc.gov/dot

DPR
www.nyc.gov/parks

BIDs
(Business Improvement Districts)
www.nyc.gov/html/sbs/html/neighborhood/bid.shtml

Street Operations (Street Lighting, Traffic Controls, etc.)

DOT
www.nyc.gov/dot

Supplementary Maintenance & Services, Street Furniture

SBS
www.nyc.gov/html/sbs

BIDs
(Business Improvement Districts)
www.nyc.gov/html/sbs/html/neighborhood/bid.shtml

Tree-Bed Maintenance

DPR
(first two years from planting)
www.nyc.gov/parks

Property owners
(after two years from planting)

Transit (Bus) Operations

MTA NYCT
www.mta.info/nyct

Utilities

DEP
www.nyc.gov/dep

Private Utilities

Empire City Subway
www.empirecitysubway.com

Enforcement

Enforcement of Construction Permits

DOT
www.nyc.gov/dot

Enforcement of Traffic Rules (including parking regulations)

NYPD
www.nyc.gov/nypd

Stoop Line Enforcement

DCA
www.nyc.gov/consumers

Legal & Design Guidance References

The following are laws, rules, regulations, and design guidance documents that may be relevant to the design of streets. This list is provided as a reference tool, for informational purposes only, and is not an exhaustive list. All public and private actions must comply with all applicable laws, rules, and regulations, not solely those listed below.

Federal Laws and Regulations

Code of Federal Regulations (CFR)
www.gpoaccess.gov/cfr/

Manual on Uniform Traffic Control Devices (MUTCD)
www.mutcd.fhwa.dot.gov/

United States Code (USC)
uscode.house.gov

Americans with Disabilities Act (ADA)
www.ada.gov/regs2010/2010ADA Standards/2010ADStandards_prt.pdf

Clean Air Act (CAA)
www.epa.gov/air/caa/

Clean Water Act (CWA)
www.epa.gov/oecaagct/lcwa.html

National Environmental Policy Act (NEPA)
www.epa.gov/Compliance/nepa/

State Laws and Regulations

New York State Code of Rules and Regulations
www.dos.state.ny.us/info/nycrr.htm

New York State Department of Environmental Conservation (Title 6)
www.dos.state.ny.us/info/nycrr.htm
New York State Environmental Quality Review Act (SEQRA)
www.dec.ny.gov/public/357.html

New York State Department of Transportation (Title 17)
www.dos.state.ny.us/info/nycrr.htm

New York State Environmental Conservation Law (ECL)
public.leginfo.state.ny.us/

New York State Highway Law
public.leginfo.state.ny.us/

New York State Transportation Law
public.leginfo.state.ny.us/

New York State Vehicle and Traffic Law (VTL)
public.leginfo.state.ny.us/

Local Laws and Regulations

New York City Charter (2004)
(www.nyc.gov/html/charter/)

City Planning (Chapter 8)

Department of Buildings (Chapter 26)

Department of Citywide Administrative Services (Chapter 35)

Department of Consumer Affairs (Chapter 64)

Department of Design and Construction (Chapter 55)

Department of Environmental Protection (Chapter 57)

Department of Health (Chapter 22)

Department of Parks and Recreation (Chapter 21)

Department of Sanitation (Chapter 31)

Department of Small Business Services (Chapter 56)

Department of Transportation (Chapter 71)

Fire Department (Chapter 19)

Franchises, Revocable Consents, and Concessions (Chapter 14)

Landmarks Preservation Commission (Chapter 74)

Police Department (Chapter 18)

Public Design Commission/Art Commission (Chapter 37)

Administrative Code of the City of New York
24.97.137.100/nyc/AdCode/entered.htm

Budget; Capital Projects (Title 5)
NYC Traffic Rules

Construction and Maintenance (Title 27)

Consumer Affairs (Title 20)

Contracts, Purchases and Franchises (Title 6)

Environmental Protection and Utilities (Title 24)

Local Laws and Regulations (cont.)

Fire Prevention and Control (Title 15)

Health (Title 17)

Housing and Buildings (Title 26)

Land Use (Title 25)

Parks (Title18)

Police (Title 14)

Sanitation (Title 16)

Transportation (Title 19)

Rules of the City of New York 24.97.137.100/nyc/rcny/entered.htm

City Planning (Title 62)

Community Assistance Unit (Tile 50)

Department of Buildings (Title 1)

Department of Citywide Administrative Services (Title 55)

Department of Environmental Protection (Title 15)
Rules Governing the Construction of Private Sewers
Rules Governing the Use of the Water Supply

Department of Consumer Affairs (Title 6)

Department of Health (Title 24)

Department of Parks and Recreation (Title 56)

Department of Sanitation (Title 16)

Department of Small Business Services (Title 66)

Department of Transportation (Title 34)
NYC Traffic Rules (Chapter 4)
NYC Highway Rules (Chapter 2)
Revocable Consents (Chapter 7)

Fire Department (Title 3)

Franchise and Concession Review Committee (Title 12)

Landmarks Preservation Commission (Title 63)

Police Department (Title 38)

Public Design Commission/Art Commission (Title 57)

Zoning Resolution of the City of New York www.nyc.gov/html/dcp/html/subcats/zoning.shtml

City Environmental Quality Review www.nyc.gov/html/oec/html/ceqr/ceqr.shtml

CEQR Technical Manual www.nyc.gov/html/oec/html/ceqr/ceqrpub.shtml

New York City Charter (Chapter 8)

Rules of the City of New York (Title 43 and 62)

National Design Guidance Sources

American Association of State Highway and Transportation officials (AASHTO) www.transportation.org/

A Policy on Geometric Design of Highways and Streets, 6th edition (AASHTO: 2011; www.bookstore.transportation.org/

A Guide for Achieving Flexibility in Highway Design (AASHTO: 2004; bookstore.transportation.org/

Guide for the Planning, Design, and Operation of Pedestrian Facilities (AASHTO: 2004; bookstore.transportation.org/

Guide for the Development of Bicycle Facilities, 4th edition (AASHTO: 2012; bookstore.transportation.org/

American Planning Association (APA)

U.S. Traffic Calming Manual (American Planning Association & American Society of Civil Engineers: 2009)

Federal Highway Administration (FHWA) www.fhwa.dot.gov/

BIKESAFE: Bicycle Countermeasure Selection System (FHWA: 2006; www.bicyclinginfo.org/bikesafe/)

PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System (FHWA: 2004; www.walkinginfo.org/pedsafe/)

Pedestrian Facilities Users Guide (FHWA: 2002; www.trb.org/news/blurb_detail.asp?id=1545)

Designing Sidewalks and Trails for Access (FHWA: 2001; www.fhwa.dot.gov/environment/sidewalks/)

Flexibility in Highway Design (FHWA: 1997; www.fhwa.dot.gov/environment/flex/)

Public Involvement Techniques for Transportation Decision-Making (FHWA/FTA: 1996; www.fhwa.dot.gov/reports/pittd/contents.htm)

MUTCD (Manual on Uniform Traffic Control Devices) mutcd.fhwa.dot.gov/

Institute of Transportation Engineers (ITE) www.ite.org/

Urban Street Geometric Design Handbook (ITE: 2008; www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=TB-018)

National Design Guidance Sources (cont.)

Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities: An ITE Proposed Recommended Practice (ITE: 2006; www.ite.org/css/)

Traffic Calming: State of the Practice (ITE & FHWA: 1999; www.ite.org/traffic/tcstate.asp#tcsop)

The Design and Safety of Pedestrian Facilities (ITE: 1998; www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=RP-026A)

National Association of City Transportation Officials (NACTO)
www.nacto.org

Urban Street Design Guide (NACTO: 2013; www.nacto.org/publication/urban-street-design-guide/)

United States Access Board
www.access-board.gov/

Accessible Public Rights-of-Way: Planning and Designing for Alterations (US Access Board: 2007; www.access-board.gov/prowac/alterations/guide.htm)

ADA and ABA Accessibility Guidelines (US Access Board: 2004; www.access-board.gov/ada-aba/)

The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (US Access Board: 2002; www.access-board.gov/adaag/html/adaag.htm)

Accessible Rights-of-Way: A Design Guide (US Access Board: 1999; www.access-board.gov/prowac/guide/PROWGuide.htm)

Local Design Guidance Sources

DCP
www.nyc.gov/planning

New York City Bicycle Master Plan (DCP & NYC DOT: 1997; www.nyc.gov/html/dcp/html/bike/mp.shtml)

DDC
www.nyc.gov/ddc

Active Design Guidelines: Promoting Physical Activity and Health in Design (DDC, DOHMH, DOT, DCP & OMB: 2010)

High Performance Infrastructure Guidelines: Best Practices for the Public Right-of-Way (DDC & Design Trust for Public Space: 2005)

Sustainable Urban Sites Design Manual (DDC: 2009; www.nyc.gov/html/ddc/html/desogm/reports.shtml)

DOT
www.nyc.gov/dot

Standard Highway Specifications Volume 1 (DOT: 2009; www.nyc.gov/html/dot/downloads/pdf/standard%20_highway_specs_vol%201.pdf)

Standard Highway Specifications Volume 2 (DOT: 2010; www.nyc.gov/html/ddc/downloads/pdf/pub_intra_std/_DOT/hwy_std_specs_101101_vol_2.pdf)

Standard Details of Construction (DOT: 2010; http://www.nyc.gov/html/ddc/downloads/pdf/pub_intra_std/_DOT/hwy_std_constr_details_100701.pdf)

Street Lighting Specifications and Standard Drawings (DOT: 1992; www.nyc.gov/html/dot/html/about/dotlibrary.shtml#spec)

Instructions for Filing Plans and Guidelines for the Design of Sidewalks, Curbs, Roadways and Other Infrastructure Components www.nyc.gov/html/dot/html/permits/stpermit.shtml#instructions

Specifications for Furnishing All Labor and Material Necessary and Required for the Installation, Removal or Relocation of Street Lighting Equipment in the City of New York (DOT: 1992; www.nyc.gov/html/dot/html/about/dotlibrary.shtml#spec)

Specifications for Furnishing All Labor and Material Necessary and Required for the Installation or Removal of Electrical Traffic Signal Equipment to Control Traffic in the City of New York (DOT: 1995; www.nyc.gov/html/dot/html/about/dotlibrary.shtml#spec)

School Safety Engineering Project: General Mitigation Measures Final Report (DOT: 2004; www.nyc.gov/html/dot/downloads/pdf/schoolsafetymitigation.pdf)

DPR
www.nyc.gov/parks

Tree Planting Standards (DPR: 2014; www.nycgovparks.org/pagefiles/53/Tree-Planting-Standards.pdf)

Tree Guards (DPR; www.nycgovparks.org/trees/tree-care/tree-guards)

Park Design for the 21st Century: High Performance Landscape Guidelines (DPR & the Design Trust for Public Space: 2011)

MOPD
www.nyc.gov/mopd

Inclusive Design Guidelines: New York City (MOPD, International Code Council: 2010)

Landscape Design Guidance Resources

Parks, Plants, and People: Beautifying the Urban Landscape (Lynden B. Miller: 2009)

Trees in the Urban Landscape: Site Assessment, Design, and Installation (Nina L. Bassuk and Peter J. Trowbridge: 2004)

Stormwater Source Control / Best Management Practices (BMP) Design Guidance Sources

PlaNYC Sustainable Stormwater Management Plan (NYC: 2008; **www.nyc.gov/html/planyc2030/html/stormwater/stormwater.shtml**)

State of New York Stormwater Management Design Manual (New York State Department of Environmental Conservation: 2008; **www.dec.ny.gov/chemical/29072.html**)

City of Chicago Stormwater Management Ordinance Manual (Chicago Department of Water Management: 2008)

City of Portland Stormwater Management Manual (Portland Bureau of Environmental Services: 2008; **www.portlandonline.com/bes/index.cfm?c=47952**)

City of Philadelphia Stormwater Management Guidance Manual (Philadelphia Water Department Office of Watersheds: 2008; **www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=StormwaterManual**)

Street Planning Resources

Downtown Brooklyn Traffic Calming Study (NYC DOT: 2004; **www.nyc.gov/html/dot/html/motorist/dntnbklyntraf.shtml**)

Project Development & Design Guide (Massachusetts Highway Department: 2006; **www.mhd.state.ma.us/default.asp?pgid=content/designGuide&sid=about**)

San Francisco Better Streets Plan–Draft for Public Review (City and County of San Francisco: June 2008; **www.sfbetterstreets.org**)

Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities (New Jersey DOT/Pennsylvania DOT: 2008; **www.smart-transportation.com/guidebook.html**)

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