

Street Design Manual

**New York City
Department of Transportation**

**2015
Updated Second Edition**



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Foreword from the Commissioner

I am pleased to present this updated Second Edition of the New York City Street Design Manual, which has become an essential reference for agencies, designers, engineers, and consultants working on our City streets and public spaces. Since its original release in 2009 and its republishing in 2013, the way we think about and design streets has progressed. DOT is working hard to make New York more sustainable, through major efforts like the citywide transition to LED lighting and the expansion of planted areas on medians in our roadways. Superstorm Sandy reinforced the importance of a resilient transportation network, and DOT has been working with its partner agencies to implement best practices. And through both his Vision Zero initiative and emphasis on equity, Mayor de Blasio has focused on the need to make the City's streets safer and more accessible for all New Yorkers, regardless of neighborhood or ability. This update to the Second Edition reflects many of these changes in street design.

As the population grows, it has become increasingly evident that the way we design our streets determines how people interact in our City. When we build spaces that make people of all ability levels feel comfortable and encourage people not only to move through, but to stay, we create a more vibrant public realm, with safety, health and economic benefits for all. Since 2013, DOT has refined some of the treatments featured in the Second Edition of the Street Design Manual. For example, the design of the award-winning CityBench was changed to make it easier to use for older New Yorkers, and public space designs now take into consideration navigation by people with impaired vision.

The lessons from Superstorm Sandy are clear: our street network will impact how the City withstands the next major storm surge—and how quickly it bounces back once it passes. Consideration of resiliency must be integral to our planning process. We must plan for water levels twenty years from now, and build green infrastructure that can absorb and store storm runoff to ease the stress on our sewer systems. As resiliency design measures develop, the Street Design Manual will be a critical resource in bringing them together.

This update continues the Manual's record as a living document. By the time you read this, DOT, our partner agencies, and industry professionals will be working toward publishing a Third Edition of the Manual in 2017—building on the strengths of previous versions and bringing together the latest successes and standards into a playbook ready for a rapidly changing future.

Like our City, the Manual is continuously evolving to serve the needs of our many communities in smarter, stronger and more effective ways.



Polly Trottenberg
Commissioner

Preface

This Updated Second Edition of the *Street Design Manual* infuses the document with a new emphasis on two critical principles, universal design and resiliency, and transmits the latest findings and standards on a broad range of street design elements and processes. It is a digital re-release; pages with new information are noted on the DOT webpage for the *Manual* (www.nyc.gov/html/dot/html/pedestrians/streetdesignmanual.shtml), and can be substituted directly into existing copies. Where feasible, DOT recommends saving the paper and referring directly to the digital document.

The update includes new content, based on feedback from users and comprehensive inter- and intra-agency review. Highlights include:

- Expanded focus on considerations and design practices related to universal design principles in chapter introductions and design treatments
- Additional content on resiliency measures in capital project origination section, chapter introductions and design treatments
- Revised Lighting Chapter representing citywide shift to LED streetlights and the adoption of the BUG rating system
- Updated Landscape Chapter reflecting evolution in the city's stormwater management practices since 2013

The following agencies participated in the creation of the *Manual's* Updated Second Edition: the Departments of Design and Construction (DDC), City Planning (DCP), Environmental Protection (DEP), Parks and Recreation (DPR), and Buildings (DOB), as well as the Economic Development Corporation (EDC), the Landmarks Preservation Commission (LPC), the Public Design Commission (PDC), and the Mayor's Office.

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DCAS

New York City Department of Citywide Administrative Services

DCP

New York City Department of City Planning

DDC

New York City Department of Design and Construction

DEC

New York State Department of Environmental Conservation

DEP

New York City Department of Environmental Protection

DOB

New York City Department of Buildings

DOHMH

New York City Department of Health and Mental Hygiene

DoITT

New York City Department of Information Technology and Telecommunications

DOT / NYC DOT

New York City Department of Transportation

DPR

New York City Department of Parks and Recreation

DSNY

New York City Department of Sanitation

EDC

New York City Economic Development Corporation

FDNY

New York City Fire Department

FEMA

Federal Emergency Management Agency

FHWA

Federal Highway Administration

LPC

New York City Landmarks Preservation Commission

MOPD

Mayor's Office for People with Disabilities

MOS

Mayor's Office of Sustainability

MTA

Metropolitan Transportation Authority

NYCT

New York City Transit, an MTA agency

NYPD

New York City Police Department

NYS DOT

New York State Department of Transportation

OCPD

Mayor's Office of Capital Project Development

OMB

Mayor's Office of Management and Budget

ORR

Mayor's Office of Recovery and Resiliency

PDC

New York City Public Design Commission

SAPO

The Street Activity Permit Office within the New York City Office of Citywide Event Coordination and Management

SBS

New York City Department of Small Business Services

US ACE

US Army Corps of Engineers

US DOT

US Department of Transportation

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Introduction



Streetscape enhancements on Columbus Avenue between West 76th and 77th Streets included CityBenches, planting areas bounded by re-used granite pavers, and new tree-bed guards: Manhattan

About this Chapter

The geometric design of streets is integral to their use; for instance, overly wide roadways and corners with large turning radii tend to invite speeding and create an environment that is uncomfortable for pedestrians. Pedestrian ramps improve transitions for users, particularly people with disabilities. Geometry also affects streets' economic, community, and environmental impacts.

This chapter establishes general guidelines for the geometric design of streets as well as a "toolbox" of geometric treatments that may be used to enhance safety, mobility, and sustainability.

The recommendations of this chapter supplement rather than replace existing sources of detailed engineering guidance and do not supersede any existing federal, state, or city laws, rules, and regulations. All projects remain subject to relevant statutes, such as the Zoning Resolution of the City of New York, City Environmental Quality Review (CEQR) and appropriate reviews and approvals of oversight agencies.

Guidance Sources

Guidance on the geometric design and operations of streets and roadways is contained in such sources as *A Policy on Geometric Design of Highways and Streets* (AASHTO, 2011), the *Manual of Uniform Traffic Control Devices* (FHWA, 2003), the *2010 ADA Standards for Accessible Design* (USDOJ, 2010), the *Urban Bikeway Design Guide* (NACTO, 2012), and the *Urban Street Geometric Design Handbook* (ITE, 2008).

Other resources include the *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (AASHTO, 2004), *Inclusive Design Guidelines* (MOPD, 2010), *Designing Walkable Urban Thoroughfares: Context Sensitive Approach* (ITE, 2010), the *Urban Street Design Guide* (NACTO, 2013), and *New York City's Active Design Guidelines* (2010). Readers should also refer to *DOT's Measuring the Street: New Metrics for 21st Century Streets* (2012) and the *New York City Pedestrian Safety and Action Plan* (2010). For additional references, see Appendix B.

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 and accessibility of all street users being of paramount importance.

Usage Categories

Geometric treatments are divided into three categories: Wide, Limited, and Pilot applications.

Wide

Geometric treatments of this type are in wide use throughout New York City. They constitute the basic set of elements that are typically found on city streets. Designs should incorporate them wherever appropriate. These treatments generally require less intensive review than limited or pilot treatments.

Limited

Geometric treatments of this type are currently in limited use in New York City. While the designs are well-established, their application is contingent on site-specific conditions. These treatments will require more in-depth review of appropriateness and feasibility.

Pilot

Geometric treatments of this type are currently in, at most, limited use in New York City, but have been employed successfully in other US and international cities. Appropriate design criteria are still under development for application in New York City. Proposals for pilot usage of these treatments are encouraged and will be evaluated on a case-by-case basis.

General Guidelines

The following guidelines expand on the general policies and principles outlined in the Introduction, with more detailed information specific to geometric street design.

Sustainable Street Design

Street reconstruction projects are, as a rule, designed to accommodate motor vehicle traffic that is forecasted for a certain year (the “design year”) in order to meet requirements of the Clean Air Act; and in many jurisdictions in the United States the forecast invariably calls for growth in motor vehicle traffic. For federally funded projects, the design year is 20 years after the project is completed (the “build year”). In New York City, consideration should be given to recent trends in traffic and mode choice — as documented in DOT’s Sustainable Streets Index — and their implication for traffic volumes in future years (e.g., five years after the build year). In most parts of the city, motor vehicle traffic volumes are stable or shrinking, while transit is growing; this is due to New York City’s heavy investments in the last two decades in subway, bus, pedestrian, and bicycle infrastructure. These investments have spurred rapid increases in non-auto travel, suggesting that there is a positive relationship between street design and mode choice: streets that prioritize the safety and movement of pedestrians, bus riders, and cyclists equally with the movement of cars will produce more sustainable outcomes.

As the New York State DOT’s *Project Development Manual* states, it is understood that, even for a federally funded project, it “...may not always be practicable to...fully accommodate design year traffic, or even to fully address existing traffic congestion.” Further, “...traffic forecasts alone do not dictate project scope. Forecasts are only one of many factors (safety needs, mobility needs, environmental issues, community needs, etc.) to be addressed.” (See p. 5–2 Design Year Traffic Forecasts section of the *Project Development Manual* for more information: www.dot.ny.gov/divisions/engineering/design/dqab/dqab-repository/pdmapp5.pdf.)

Vehicle Target Speed

Streets should be designed with target speeds (see Glossary) and speed limits appropriate to their surrounding uses and desired role in the vehicular network. The citywide speed limit is 25 mph, except where otherwise noted. New York State Vehicle & Traffic Law (VTL) Section 1642(a)(26)(a) currently allows speed limits below 25 mph, and as low as 15 mph in New York City if used in conjunction with traffic-calming measures. Slower target speeds and speed limits should be considered on

local streets, residential streets, and alleys; on streets adjacent to schools; in areas with higher populations of seniors or people with disabilities; and on waterfronts, in parks, or in and around other significant pedestrian destinations.

DOT applies design interventions as necessary to slow down fast and aggressive driving. These interventions, known as “traffic-calming” measures, include LANE NARROWING & LANE REMOVAL (2.3.1), SPEED CUSHIONS (2.3.2a), CURB EXTENSIONS (2.2.2), and RAISED CROSSWALKS (2.3.4), and sometimes are intended also to improve pedestrian comfort. As part of its efforts to enhance safety, DOT deploys traffic-calming devices in neighborhoods around schools and in areas with high numbers of crashes involving elderly pedestrians. Community groups can also request certain traffic-calming interventions at specific locations by requesting them from their DOT Borough Commissioners. Some traffic-calming treatments can be designed in such a way as also to enhance the public realm.



Wide roadways like Queens Boulevard can be mitigated with measures such as pedestrian facilities on medians: Queens

Roadway Width, Corner Radii, and Crossing Distance

The roadway — the portion of a street designed, enhanced, or ordinarily used for vehicular travel, exclusive of the sidewalk — should be designed to be the minimum possible width, with the minimum number of lanes, that safely and cost-effectively allows for the desired operations of motor vehicles, buses, and bicyclists. Narrower roadways minimize pedestrian crossing distances, encourage safe driving behavior, and reduce impermeable, heat-absorbing asphalt coverage.

Roadway reconstructions should be designed for traffic volumes expected in the actual build year. Additional consideration should be given to recent trends in traffic and mode choice — as documented in DOT’s *Sustainable Streets Index* — and their implication for traffic volumes in future years (e.g., five years after the build year). Excess width should be reallocated to provide walking, transit, and bicycling facilities, public open space, green cover, and/or stormwater source control measures. If financial limitations preclude final implementation of street retrofits (e.g., curbing, streetscaping, etc.), the reallocation of space should still proceed with temporary or least costly approaches such as restriping.

To reduce pedestrian crossing distances further and slow turning vehicles, all roadway corners should be designed with the smallest possible radius that still accommodates the design vehicle and emergency vehicles.

Pedestrian crossing distances should be minimized in all locations utilizing the above methods and other treatments, such as CURB



DOT upgraded the complex intersection of Melrose Avenue, Third Avenue, and East 149th Street — known as the Hub — in 2008. Bronx

EXTENSIONS (2.2.2) (neckdowns) and RAISED MEDIANS (2.2.3). Sidewalk narrowings and roadway widenings should be avoided.

Design Vehicles and Emergency Access

The design vehicle (see Glossary) used for geometric street designs, typically a 30-foot-long single-unit truck, should be appropriate to the predominant intended uses of the given street and should not include commercial vehicles larger than New York City’s maximum allowable length. In addition, all street designs must consider FDNY, other emergency-vehicle, and sanitation-vehicle-access needs (e.g., for street cleaning and snow clearing).

Complex Intersections

Multi-leg or skewed angle intersections should be redesigned (to the extent possible) to simplify operations and reduce or separate conflicts. This can include the removal of intersection legs and slip lanes that are unimportant to the traffic network, creation of right-angled intersection alignments, and simplified traffic patterns. Resulting pedestrian space should be consolidated into its most usable form to create new public open

space and shorter, more direct crossings. The use of slip lanes should generally be avoided unless they produce a conflict-free crosswalk from the island that can provide an important pedestrian-safety enhancement.

Universal Design

Projects must meet or exceed all applicable federal, state, and/or local accessibility standards for facilities and public rights-of-way, including minimum clear path widths, inclusion of ADA-compliant pedestrian ramps and detectable warning strips, and provision of accessible transit facilities.

Drainage

All modifications to street geometry should consider and avoid unintended changes in the direction and disposition of stormwater runoff so as not to create ponding or flooding issues. Minimize impervious paved areas and utilize permeable paving wherever possible. Include planted areas and stormwater source controls within the roadway wherever feasible. Stormwater control within the street network may offer opportunities for resiliency benefits in areas that experience frequent flooding.

Roadways & Lanes

Bike Lane & Path

A dedicated on-street lane or path for bicycles (see Glossary). Bikeways are typically designed as BIKE LANES within the roadway delineated with markings (2.1.1a, also known as Class 2 bike lanes) or as BIKE PATHS physically separated from traffic for most of their length (2.1.1b, also known as Class 1 bike lanes). Another typical design is the shared lane (Class 3 bike lane) described in Table 1. The shared lane is not covered by the Manual. Bikeways in parks, or in other places with heavy pedestrian traffic can also be designated by bike stamps.



ABOVE: Buffered bike lane: 9th Street, Brooklyn

LEFT: Two-way, parking-separated bike path: Prospect Park West, Brooklyn

Benefits

Provides dedicated space for bicyclists, enhancing safety, comfort, and mobility

Cumulative with other bikeways, provides a comprehensive network of recommended routes for bicyclists, thereby encouraging bicycling

Application

On streets with high current or anticipated bicycle volumes or that offer important linkages to destinations or between routes, or to calm overly-wide roads for cycling circulation

Considerations

Ensure sufficient outreach to people with vision disabilities and facilities serving this population to provide adequate notification of changes during the planning and implementation phases

Design

See Table 1 (following 2.1.1b) for a listing of typical bikeway designs and their respective spatial requirements, ideal applications, and advantages and disadvantages

Create connectivity with adjoining bikeways, bike parking, transit, and commercial or cultural destinations

Utilize permeable paving and/or paving with a high SRI value within BIKE LANE or BIKE PATH

Utilize recycled content in paving materials

BIKE LANE & PATH

Bike Lane

Usage: Wide

A portion of a roadway that has been designated by striping, signs, and pavement markings for the preferential or exclusive use of bicyclists. Also known as a Class 2 bike lane. Physical separation of bike lanes is desirable, but is not always possible due to physical or operational constraints designated by bike stamps.



ABOVE: Bike lane: 164th Street, Queens

LEFT: Bike lane: Montgomery Street, Manhattan

Benefits

See benefits of BIKE LANES & PATHS (2.1.1)

On-roadway bike lanes that narrow or replace motor vehicle lanes can calm traffic

Considerations

Without physical separation, vehicles can block bike lanes, making enforcement of violations more critical

Application

See application guidance for BIKE LANES & PATHS

Consider using a BIKE PATH (2.1.1b) rather than, or in addition to, a BIKE LANE where street conditions permit (e.g., street width, traffic volume, etc.)

Design

See design guidance for BIKE LANES & PATHS

BIKE LANES should be buffered when possible, typically with 3 feet of channelization

At intersections with complex traffic patterns — or when bike lanes are located immediately adjacent to the curb — bike lanes can be given visual emphasis through the application of green-colored pavement

BIKE LANE & PATH

Bike Path

Usage: Limited

A path intended for the use of bicycles that is physically separated from motorized vehicle traffic by an open space or barrier and either within the roadway or within an independent right-of-way. Also known as a Class 1 bike lane. Physical separation of bikeways can sometimes be preferable on wide or busy streets, on major bike routes, or along long, uninterrupted stretches. Separation can take the form of a painted buffer demarcating the bike lane behind a “floating” parking lane, a narrow curb or raised median, or a wider raised median with landscaping. An alternative form of separation is grade-separation, where the bike path is located at sidewalk grade or in between sidewalk and roadway grade.



Two-way bike path: Grand Army Plaza, Brooklyn



Two-way bike path located outside the sidewalk: Columbia Street, Brooklyn

Benefits

See benefits of BIKE LANES & PATHS (2.1.1)

Offers greatest bicyclist separation from motor vehicle traffic on mid-block sections

Reduces risk of “dooring” (a motor-vehicle occupant opening her door into the path of an oncoming bicyclist)

Reduces or eliminates blocking of the bike lane by motor vehicles and the swerving of bicyclists into mixed traffic

Encourages novice and less confident cyclists to opt for cycling

Considerations

Design consideration must be given to pedestrians with vision/mobility disabilities, emergency-vehicle and paratransit access to adjacent buildings, snow-clearing and street-sweeping needs, and commercial vehicles loading and unloading

Application

Where a BIKE LANE is appropriate and the street is an important bicycle network connection, or has high motor vehicle volumes or speeds or multiple moving lanes, or is along a park, waterfront, or other open space where cross streets and driveways are infrequent

Consider wherever a BIKE LANE is appropriate

Design

See design guidance for BIKE LANES & PATHS (2.1.1)

Care must be given to the design of bike paths at intersections and driveways to maintain visibility of the bicyclist to motorists (and vice-versa) and to reduce the risk of turning conflicts with motor vehicles

In some circumstances (e.g., long paths along open space or waterfront), paths can be designed for shared use by bicyclists, pedestrians, skaters, wheelchair users, and other non-motorized users (“a shared-use path”) rather than as a separate bike path and SIDEWALK (2.2.1)

If designed as a shared-use path, provide adequate space appropriate to anticipated volumes of low-speed users (pedestrians) and higher-speed users (bicyclists) so as to provide safe and comfortable accommodation of both and minimize conflicts between the two

Design RAISED MEDIANS that separate bike paths according to the RAISED MEDIAN section (2.2.3)

If a separated bike path uses raised medians, see the CURB-HEIGHT MEDIAN section (6.2.1a) or the RAISED MEDIAN section (6.2.1b) for information on plantings

TABLE 1

Guide to New York City On-Street Bicycle Facilities

Class 1: Bike Path (2.1.2b)

Signal-Protected Path

9th Avenue, West 59th to 16th Streets,
Manhattan



Protected Path with Mixing Zones

Grand Street, Manhattan



Space Required

14 feet

8 feet

Parking Loss

High

5-6 parking spaces/
turn bay (usually every other block)

High

4-5 parking spaces/mixing zone (usually
every other block)

Ideal Application

Commercial Avenues

- Wide one-way multilane street
- Excess road space
- High-speed vehicular traffic
- High potential for motor vehicle intrusion into standard lane

Commercial Cross-Streets

- One- or two-lane street
- Excess road space
- Low-speed vehicular traffic for safe mixing zone
- High potential for motor vehicle intrusion into standard lane

Advantages

- Full protection for cyclists
- Major enhancement to pedestrian safety and comfort

- Protection for cyclists mid-block
- Mixing zone to manage turning conflict
- Simpler implementation than Signal Protected Path
- Signal timing unchanged

Disadvantages

- Space needs
- Parking impacts
- Signal timing and loading activity increase delays
- Cyclist mobility
- Complex review and implementation
- Turn restrictions may be needed at complex intersections to maintain acceptable operations

- Parking impacts
- Cyclist mobility
- Unproven (Pilot)
- Complex review and implementation
- Challenging to regulate floating parking

Class 2: Bike Lane (2.1.2a)		Class 3: Bike Route (Not Included in Manual)	
<p>Buffered Lane DeKalb Avenue, Brooklyn</p>	<p>Standard Lane 21st Street, Manhattan</p>	<p>Shared Lane 48th Street, Queens</p>	<p>Signed Route</p>
			
8 feet	5 feet	None A wide (13-foot) travel lane is preferred	None A wide (13-foot) travel lane is preferred
Medium-Low Parking typically preserved unless space unavailable. Strict curb regulations sometimes needed	Medium-Low Parking typically preserved unless space unavailable. Strict curb regulations sometimes needed	Low Parking is typically preserved	None
<p>Residential Avenues</p> <ul style="list-style-type: none"> Wide multilane street Excess road space Low potential for intrusion into bicycle lane 	<p>Residential Cross-Streets</p> <ul style="list-style-type: none"> One- or two-lane street Excess road space Low potential for intrusion into bicycle lane 	<p>Narrow Streets</p> <ul style="list-style-type: none"> One- or two-lane street No excess road space Connected to other bicycle facilities 	<p>Limited Use</p> <ul style="list-style-type: none"> Interim treatment Connected to other bicycle facilities Indicates a preferred bicycle route Preserves curbside access
<ul style="list-style-type: none"> Dedicated cycling space Buffer zone enhances comfort for cyclists Preserves curbside access Simple implementation 	<ul style="list-style-type: none"> Dedicated roadway space for cycling Preserves curbside access Simple implementation 	<ul style="list-style-type: none"> Clear, easy to follow bicycle route Heightens driver awareness of cyclists Preserves curbside access Simple implementation 	<ul style="list-style-type: none"> Indicates a preferred bicycle route Preserves curbside access Simple implementation
<ul style="list-style-type: none"> Vehicular intrusion remains possible Width tempts motorists to intrude Perceived as less safe than protected paths 	<ul style="list-style-type: none"> Vehicular intrusion remains possible Cyclists have minimal separation from traffic Perceived as less safe than protected paths 	<ul style="list-style-type: none"> Does not provide dedicated roadway space for cycling Cyclists not separated from traffic 	<ul style="list-style-type: none"> Does not provide dedicated roadway space for cycling Cyclists not separated from traffic Sign placement critical, can be challenging

Bus Lane & Busway

A dedicated on-street facility for buses. BUS LANES are delineated within the roadway with markings (2.1.2a) while BUSWAYS are physically separated from traffic for most of their length (2.1.2b). Both facility types can either be designed to run along the median of the street or along the outside (curbside or offset from a parking lane) of the street. Select Bus Service (SBS) is a high-quality bus service operated by MTA New York City Transit that uses several techniques to improve the speed and reliability of bus service, including BUS LANES.

Benefits

Improves bus speeds and reliability by separating buses from potential congestion in mixed traffic and by reducing or eliminating their need to merge in and out of traffic at bus stops

SBS buses operate up to 20% more efficiently than the same bus models operating on other routes, thereby reducing emissions

Provides means for emergency vehicles to bypass traffic

Considerations

If curbside, may result in restriction of curbside parking/loading

Application

Streets with SBS or high bus volumes and moderate to high traffic congestion or excessive road space

Consider on all streets with high bus volumes or existing or planned SBS and adequate space, regardless of congestion

Avoid on streets where the roadway geometry prevents the safe operation of a BUS LANE or BUSWAY in conjunction with other necessary uses of the roadway



Red, curb-aligned, on-street busway with "soft separation" from traffic: First Avenue, Manhattan

Design

BUS LANES AND BUSWAYS can be located immediately adjacent to the curb (curb bus lane or busway), adjacent to the righthand parking lane (offset bus lane), or in the middle of a road with boarding island stations (median bus lane or busway)

ALL BUS LANE AND BUSWAY types can be one or two lanes per direction based on bus volume, operating characteristics, and road width; one lane per direction is a more common treatment

Use an offset bus lane where possible, particularly when parking needs to be maintained; stops can be made at the curb or at BUS BULBS (2.2.2b)

Use a curb-aligned bus lane or busway when right-of-way may be constrained and where parking impacts can be managed

For curb-aligned designs, curbside deliveries can be accommodated with loading windows, lay-bys, and/or reserved commercial loading around the corner

A median BUS LANE or BUSWAY should be considered on two-way streets when sufficient right-of-way is available to accommodate the bus facility and the associated boarding islands, and the operation of the busway (including pedestrian movements) can be safely managed

For median bus lane or busway designs, boarding platforms must be included for bus passengers at bus stops; these islands can also function as PEDESTRIAN SAFETY ISLANDS (2.2.4)

For median bus lane or busway designs, left turns across the bus facility should either be prohibited or provided a protected signal phase

All BUS LANE AND BUSWAY designs can accommodate one or two directions of bus traffic. Special care must be paid to the signalization and design of intersections so as to not introduce turning conflicts

Consider queue-jump lanes for buses where buses need to merge with mixed traffic, where the roadway width reduces (such as at the end of a bus lane, a roadway choke point, or a bridge or tunnel approach), and at turn priority locations

For improved roadway longevity, a concrete roadway should be considered for BUS LANES AND BUSWAYS when conditions permit

Utilize paving with a high SRI value within bus lane or busway unless red-colored pavement is to be used per 2.1.2a

Utilize recycled content in paving materials

BUS LANE & BUSWAY

Bus Lane

Usage: Limited

Benefits

See benefits of BUS LANES & BUSWAYS (2.1.2)

Considerations

See considerations for BUS LANES & BUSWAYS (2.1.2)

Application

See application guidance for BUS LANES & BUSWAYS (2.1.2)

Design

See design guidance for BUS LANES & BUSWAYS

Red-colored pavement can be considered for bus lanes that operate six or more hours per day

At intersections, the allowance or prohibition of turns from the bus lane should be clear, such as breaking the solid white line where cars can enter to make right turns

A portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of buses.

Physical separation of bus lanes is often inadvisable due to physical or operational constraints. Painted lanes, overhead signs, and soft barriers can minimize intrusion of other vehicles. Where land use and street width permit, full or partial physical separation can help enforce the lanes (see 2.1.2b).



Curb-aligned double bus lane: Madison Avenue, Manhattan



Red, curb-aligned bus lane: East Fordham Road, Bronx

BUS LANE & BUSWAY

Busway

Usage: Limited

A physically separated lane reserved for bus traffic. Busways are similar to BUS LANES (2.1.2a) in most respects, however full or partial physical separation (typically through a narrow curb or wider RAISED MEDIAN (2.2.3) further improves bus speeds by minimizing blocking of the bus lane by other vehicles.



ABOVE: Curb-aligned busway: Paris, France (Note: for illustrative purposes only)

LEFT: A short section of separated busway through a busy intersection: Willis Avenue, Bronx

Benefits

See benefits of BUS LANE & BUSWAY (2.1.2)

Reduces or eliminates blocking of BUS LANE (2.1.2a)

Considerations

Design consideration must be given to emergency vehicle access, deliveries and pick-up/drop-off to adjacent buildings, and to snow-clearing and street-sweeping needs

Attention should be given to accommodation of and navigation by people with vision disabilities

Application

See application guidance for BUS LANES & BUSWAYS

Consider where a BUS LANE is appropriate and the street is a high-volume bus route and has adequate right-of-way to accommodate a busway

Consider wherever a BUS LANE is appropriate

Design

See design guidance for BUS LANES & BUSWAYS

Busways should be designed to allow emergency vehicles to bypass traffic

On routes with multiple tiers of bus service, passing needs (e.g., express buses) should be accommodated

If a median busway design is not separated with a wide median, then the median must widen to provide boarding platforms for bus passengers at bus stops, which must meet ADA standards

Turns across busways need to be controlled for safety; bus-only signals may be needed

Crosswalks, detectable warning strips and traffic control devices should be used to signal transitions between pedestrian space and busways for people with vision disabilities

RAISED MEDIANS used to separate busway should be designed according to the RAISED MEDIAN section

Utilize paving with a high SRI value within busway, for example concrete

For median-separated busway, see the CURB-HEIGHT MEDIAN section (6.2.1a) for information on plantings

Shared Street

Usage: Pilot

Often referred to as a “pedestrian-priority street,” a shared street is a low-speed, typically curbsless roadway designed as a single surface shared among pedestrians, bicyclists, and low-speed motor vehicles.

Typically employed on low-vehicle-volume and/or high-pedestrian-volume streets, vehicles are slowed to very low speeds through a reduced speed limit, traffic calming, signage, and use of distinctive materials, furnishings, and other visual cues in the roadway that encourage drivers to travel with increased caution. Street users generally negotiate right-of-way cooperatively rather than relying on traffic controls, allowing pedestrians to dominate the street. The entire street thus effectively functions as a public space. Different forms of shared streets can be used in different contexts.



ABOVE: Shared street: Mainz, Germany
(Note: for illustrative purposes only)

LEFT: Shared street in a commercial area:
Brighton, UK (Credit: Gehl Architects)
(Note: for illustrative purposes only)

Benefits

Allows freer pedestrian movement within walking-oriented areas and to and from surrounding land uses and destinations

Reduces sidewalk crowding on narrow streets

Maintains bicycle, local vehicle, and delivery access while creating an exceptionally pedestrian-oriented street that accommodates recreational and social activities

Allows active land uses to spread into the surrounding street network, fostering a vibrant public realm

Comfortable, attractive environment encourages “staying” activities such as relaxing, shopping, eating, and socializing

Integrated design can incorporate art, street furniture, landscaping, and other innovative and attractive design elements

Encourages partnerships with the community in beautification, maintenance, and programming of street space

Considerations

Attention should be given to accommodation of and navigation by people with vision, hearing, and ambulatory disabilities

May impact street drainage or require catch basin relocation

May require loss of on-street parking

Any community facilities integrated into the design, such as street furniture or public art, will typically necessitate the presence of a maintenance partner and a permit or revocable consent from the city

Coordinate streetscape/utility work to minimize street cuts

Application

Consider on narrower streets (at most two moving lanes) or outer roadways of boulevard-type streets, with little or no through-traffic, and which are not major vehicular or bicyclist through-routes or designated truck routes

Consider on streets adjacent to major pedestrian destinations, where vehicle volumes are low and pedestrian desire lines are diffuse (i.e., pedestrians would like to cross the street in many places)

Consider on local residential streets whose design priority is to allow safe use of street space for recreational activities and green space, in partnership with residents or neighborhood groups

Consider on narrow, alley-type streets

Depending on the specific land uses, width, vehicle and pedestrian volumes, and other access and operational characteristics of the street, a shared street may not be appropriate, in which case consideration should be given to a standard roadway with alternative design options such as traditional traffic calming and/or a mid-block crossing

Consider as an alternative a fully pedestrianized street when pedestrian volumes are high, vehicle volumes are low, and vehicle access is not required during daytime hours

Design

Curbs should not be used, but pedestrian paths of travel alongside vehicle zones with guideways using tactile cues and maximum visual contrast should be included for people with vision disabilities

In the absence of curbs, special attention should be given to providing adequate drainage

Vehicle-free, accessible routes must be provided for the visually impaired

Design should utilize whatever horizontal, vertical, and material treatments are necessary to encourage vehicle speeds that are low (15 mph or lower) throughout, whether or not pedestrians are present

Use GATEWAY (2.3.3) or similar treatments and proper signage at entries to discourage through-traffic, indicate the change in street environment, and slow entering vehicles

Institute a reduced speed limit (New York State VTL Section 1642(a)(26) (a) currently allows as low as 15mph) along with the physical traffic-calming of the shared street

Attractive street materials, furnishings, and other objects within the street can be used to alert drivers and emphasize the pedestrian orientation of the space, subject to permits, maintenance agreements, or revocable consents as required

Include planted areas and stormwater source controls within the roadway wherever possible

Staggered sections of parking or loading zones can be used as a design option to constrict wider streets



Pedestrian-priority zone: Fordham Plaza, Bronx



Shared intersection: Seven Dials, London (Credit: Aaron Naparstek/streetsblog.org) (Note: for illustrative purposes only)

To maintain the streetscape elements required for creating a low-speed environment and fostering a vibrant public space, careful attention must be paid to proper programming and management of the space, with the participation of an active maintenance partner where appropriate

Minimize impervious paved areas and utilize permeable paving wherever possible

Maximize trees and other green cover. See TREE BEDS (6.1) and ROADWAY PLANTINGS (6.2)

Utilize stormwater source controls wherever feasible. See STORMWATER MANAGEMENT PRACTICES (6.6)

Increase SRI value of paved surfaces to reduce urban heat island impact

Utilize recycled content in paving materials

Plaza

An area located fully within the roadway that is designated by DOT for use by pedestrians. The space may contain benches, tables, or other facilities. DOT builds both interim and permanent plazas. Many plazas are built through DOT's Plaza Program, which aims to enhance the public realm. See Chapter 1: PROCESS for more information on how DOT projects are planned, designed, and implemented.



ABOVE: Fowler Square Plaza (interim), Brooklyn

LEFT: Willoughby Plaza (permanent), Brooklyn

Benefits

Promotes social interaction and builds neighborhood identity

Encourages pedestrian activity and associated health benefits

Catalyzes local economic development

Serves as a venue for a diverse range of community, cultural, and/or commercial events

Enhances safety by narrowing wide roadways and/or normalizing intersections

Considerations

The road segment's relevance to the traffic network

Open-space needs

Surrounding land uses and site appropriateness

Anyone can apply to the Street Activity Permit Office (SAPO) to stage events on DOT plazas. To learn more about the event permitting process, contact SAPO by phone at (212) 788-7567 or visit www.nyc.gov/cecm

Advertising is not permitted in plazas

Generally requires a maintenance agreement

Application

Under-utilized, DOT-owned road segments and other city property

Locations with high crash rates

Neighborhoods that support repurposing streets for plazas

Design

Plaza designs should support year-round events and programs

See design guidance for PERMANENT PLAZA (2.1.4a) and INTERIM PLAZA (2.1.4b)

Provide clear paths and tactile cues to accommodate people with disabilities

Furniture should accommodate people with disabilities; for example, providing space for knee clearance for people using mobility devices

PLAZA

Permanent Plaza

Usage: Limited

A plaza built with Capital funds to be maintained and managed by a local not-for-profit organization (Partner) or another entity, such as the Department of Parks & Recreation (DPR). Such a project completely reconstructs the street segment, in whole or in part.

Benefits

See benefits of PLAZA (2.1.4)

Considerations

See considerations for PLAZA (2.1.4)

Application

See application guidance for PLAZA (2.1.4)

Neighborhoods with active not-for-profit organizations that can serve as Partners to maintain and manage plazas

Areas with appropriate adjacent land uses, sufficient population density, proximity to transit, historic sites, significant view corridors



Completed in spring 2013, Willoughby Plaza features new trees and a flexible, open space that lends itself well to a wide range of events and programming, including the art displays shown here: Brooklyn

Design

Each permanent plaza is designed to reflect the character and context of its neighborhood. DOT and the Partner conduct a public process to develop an appropriate design that is responsive to the needs of the community

A consultant design team bases its plans on feedback from the public process

Sites smaller than 2,000 square feet are not encouraged

Plazas may include movable and/or formal and informal fixed seating; trees and plants (see TREE BEDS [6.1] and PLAZA PLANTINGS [6.4]); lighting; paving; information and wayfinding signage; subconcessions; public art (temporary and permanent); bicycle parking; and drinking-water fountains

Incorporate public art where feasible

All permanent public art must be coordinated through the Department of Cultural Affairs (DCA) Percent for Art Program and requires approval by the Public Design Commission (PDC). Permanent art may be completely integrated and functional (e.g., benches, tables, etc.), or it may be stand-alone art (e.g., a sculpture)

Temporary art can be installed as a one-time project or cycled through on a temporary basis at a designated space in the plaza. Temporary art must be coordinated through DOT's Urban Art Program. For guidelines and to apply to the Urban Art Program, visit www.nyc.gov/urbanart

Minimize impervious paved areas and utilize permeable paving wherever possible

Incorporate trees and other green cover. See TREE BEDS (6.1) and PLAZA PLANTINGS (6.4)

Utilize stormwater source controls wherever feasible

Increase SRI (solar reflective index) value of paved surfaces to reduce urban heat island impact

Utilize recycled content in paving materials

PLAZA

Interim Plaza

Usage: Wide

A plaza built with interim materials by DOT personnel and on-call contractors. The interim condition often precedes a permanent plaza. This type of plaza can be built quickly, allowing people to use it sooner.



ABOVE: Putnam Plaza, Brooklyn

LEFT: Plazas host multiple special events throughout the year: Corona Plaza, Queens

Benefits

See benefits of PLAZA (2.1.4)

Catalyzes community support for the space

DOT can study the interim plaza and incorporate its observations and feedback into the eventual capital design of the space

Tests maintenance partner's capacity to maintain and program the plaza

Epoxy gravel or paint creates a more reflective surface, making the space feel safer at night

Cheaper and faster to design and install than a PERMANENT PLAZA

Considerations

See considerations for PLAZA (2.1.4)

Maintenance partner replaces elements over time as needed

Attention should be given to accommodation of and navigation by people with vision disabilities

Application

See application guidance for PLAZA (2.1.4)

Typically the phase prior to a PERMANENT PLAZA (2.1.4a), delivering community benefits quickly, and generating feedback for permanent design

As requested by a community and/or where a safety project provides a public-space opportunity

Design

See design guidance for PLAZA (2.1.4)

Geometry is engineered by DOT and is typically delineated with roadway markings and flexible reflective bollards

Detectable warning strips are required at pedestrian access routes or crossings where the transition from pedestrian space to roadway is flush, and should include high color contrast from the plaza surface

In the absence of a curb, granite blocks are to be placed next to crosswalks when feasible to provide directional guidance for pedestrians with vision disabilities

DOT places edge objects, such as planters, granite blocks and flexible delineators in and around the space to create a consistent boundary and sense of enclosure, and to buffer it from motor vehicle traffic. DOT also applies epoxy gravel or paint to distinguish it visually from the adjacent roadway

DOT and/or Partners provide publicly accessible furniture, such as moveable chairs and tables

Incorporate temporary public art where feasible. See guidance for temporary art in PERMANENT PLAZA (2.1.4a)

Sidewalks & Raised Medians

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. In denser areas a FULL SIDEWALK (2.2.1a) reaching all the way to the curb is used, while in less built-up areas a RIBBON SIDEWALK (2.2.1b), with a vegetated or grass planting strip between the sidewalk and the roadway, can often be used.

Benefits

Provides infrastructure for the most widely used mode of travel in New York City—walking

Creates linkages to transit, connects neighborhood destinations, and allows trip chaining

Support mobility for the majority of New Yorkers

Facilitates straight and unobstructed pedestrian movement, free of vehicle conflicts except at intersections and driveways

With adequate width, can provide space for “staying” activities such as relaxing, shopping, eating, and socializing



Sidewalk with standard paving treatment: 11th Avenue, Manhattan

Considerations

Coordinate streetscape/utility work to minimize street cuts

Application

On both sides of all streets that are 22 feet wide or wider. Exceptions include SHARED STREETS (2.1.4), pedestrian-only, and streets in certain historic districts per LPC

Ribbon sidewalks are appropriate in R1-R6 zoning districts; full sidewalks are used elsewhere

Design

Sidewalks should always be provided on both sides of the street

See SIDEWALKS (3.1) in the Materials chapter for information on options for sidewalk materials

A park’s internal path located near a roadway does not substitute for a sidewalk

If the sidewalk is more than 25 feet wide, there should be a clear path adjacent to the building line and an 8-foot clear path adjacent to the curbside furnishing zone

Sidewalks (and planting strip, if applicable) should be as wide as possible appropriate to foot traffic and available street width

Sidewalks must conform to ADA requirements for minimum clear path width and provision of spaces where wheelchair users can pass one another or turn around

Provide an unobstructed clear path of 8 feet or one half the sidewalk width (whichever is greater) in commercial, high-density residential, and transit-adjacent areas

Sidewalks in low-rise residential areas should be at least 5 feet wide

Wherever possible, sidewalk cross-slope should not be greater than 2%

Sidewalks must meet load-bearing, friction, and other requirements per relevant standard specifications and regulations

ADA-compliant pedestrian ramps must be provided at all pedestrian crossings; separate ramps should be used aligned with each crosswalk and be centered on a continuation of the sidewalk

Color of detectable warning strip should contrast with surrounding pavement: dark gray in areas of light pavement and white in areas of dark pavement. See DOT Standard Details of Construction drawing H-1011

The area within 18 inches of the curb should be kept free of all obstructions

New York City Mayor's Executive Order No.22 of 1995 (the "Clear Corner Policy") states that to the maximum extent possible, structures and objects should not be placed in the corner quadrant

For recommended clearances between obstructions, see Revocable Consent Rules (Rules of the City of New York, Title 34, Chapter 7, Section 7-06(c)(5)), DOT Highway Rules (Rules of the City of New York, Title 34, Chapter 2, Section 2-10), DCA's rules regarding newsstands (Rules of the City of New York, Title 6, Chapter 2, Subchapter G), and Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way (US Access Board, 2011)

Include planted areas and stormwater source controls within sidewalks wherever possible when a maintenance partner is identified

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains

Minimize impervious paved areas and utilize permeable paving wherever possible

Maximize trees and other green cover wherever clearance allows. See TREE BEDS (6.1) and SIDEWALK PLANTINGS (6.3)

Utilize stormwater source controls wherever feasible

Increase SRI value of sidewalk materials to reduce urban heat island impact

Utilize recycled content in paving materials

SIDEWALK

Full Sidewalk

Usage: Wide

Benefits

See benefits of SIDEWALK (2.2.1)

Provides increased space for pedestrian movement and improved curbside access as compared to a RIBBON SIDEWALK (2.2.1b)

Application

See application guidance for SIDEWALK (2.2.1)

Design

See design guidance for SIDEWALK (2.2.1)

A full sidewalk accommodates both pedestrian traffic and a range of street furnishings and fixtures. The area of the sidewalk closest to the curb, where light poles, signs, fire hydrants, waste receptacles, telephone booths, newspaper boxes, etc., are typically located, is referred to as the “furnishing zone.”



Full sidewalk: Seventh Avenue, Brooklyn (Credit: DCP)



Sidewalk corner with pedestrian ramps: West 110th Street, Manhattan

SIDEWALK

Ribbon Sidewalk

Usage: Wide

Benefits

See benefits of SIDEWALK (2.2.1)

Provides greater space for tree roots than a FULL SIDEWALK (2.2.1a) with INDIVIDUAL TREE BEDS (6.1.1a), improving long-term tree health

Provides a modest improvement in stormwater detention from the sidewalk and/or roadway as compared to a FULL SIDEWALK

Provides a more attractive streetscape in areas of low- to moderate-density residential land use

Application

Areas within zoning districts R1 through R6

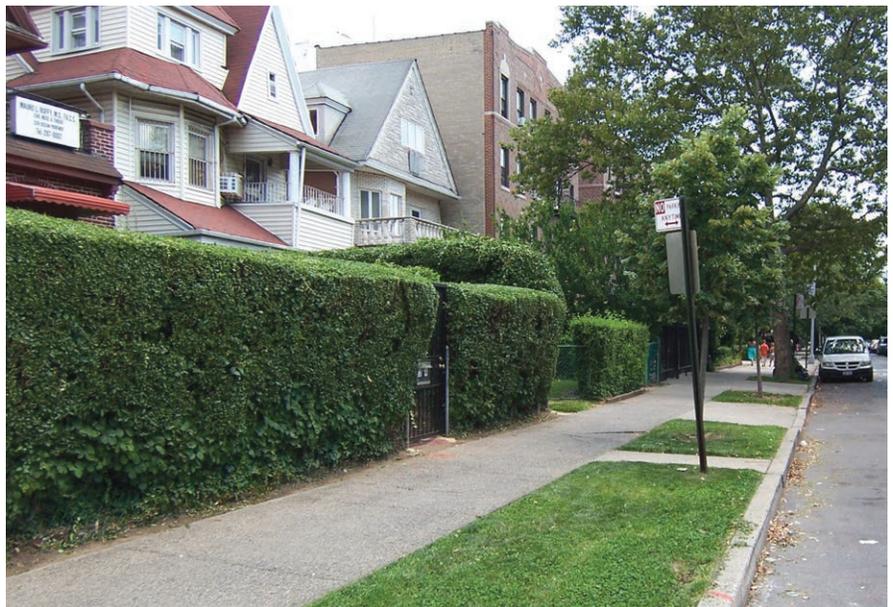
Consider wherever pedestrian volumes can be accommodated and curbside activity is low

Design

See geometric design guidance for SIDEWALK (2.2.1) and materials guidance for SIDEWALKS (3.1)

Ribbon sidewalks should be at least 5 feet wide or as required to match the existing ribbon width in the immediate neighborhood; they should be wider along arterials and collector roads

A sidewalk that is separated from the roadway by a continuous, unpaved planting strip. Most existing ribbon sidewalks in the city have a lawn planting strip, more sustainable landscaping options should be utilized whenever possible. Alternatively, planting strips can be designed as pilot STORMWATER MANAGEMENT PRACTICES (6.6.1) to help collect stormwater runoff.



Ribbon sidewalk with lawn planting strip: Ocean Parkway at Avenue C, Brooklyn

Planting strips adjacent to ribbon sidewalks must be planted with groundcover vegetation for erosion control if a STORMWATER MANAGEMENT PRACTICE (6.6) is not used; herbaceous plant material, preferably native or adapted species, should be used rather than grass wherever possible, as turf absorbs water from tree roots, has little benefit to habitat, and requires the use of pesticides, herbicides, fungicides, and lawnmowers that can potentially damage tree roots

Where there are fire hydrants in the planting strip adjacent to a ribbon sidewalk, a 5-foot-by-5-foot slab of 6-inch-thick concrete on 6-inch, crushed-stone base extending from the curb to the sidewalk is required

Similar considerations apply to other elements, such as lampposts and signal posts

Where feasible, utilize STORMWATER MANAGEMENT PRACTICE (6.6) within planting strip rather than groundcover vegetation alone to better manage stormwater

Curb Extension

An expansion of the curb line into the lane of the roadway adjacent to the curb (typically a parking lane) for a portion of a block either at a corner or mid-block. Also known as neckdowns, curb extensions can enhance pedestrian safety by reducing crossing distances, can relieve sidewalk crowding, and can provide space for functional elements such as seating, plantings, and furniture. In addition, two curb extensions can be located on either side of a street to create a MID-BLOCK NARROWING (2.2.2 c) or at an intersection to create a GATEWAY (2.3.3).



ABOVE: Curb extension: Seventh Avenue, Manhattan

RIGHT: Curb extension: Fifth Avenue, Brooklyn



Benefits

Calms traffic by physically and visually narrowing the roadway

At a corner, slows turning vehicles and emphasizes the right-of-way of crossing pedestrians

Shortens crossing distance, reducing pedestrian exposure and minimum required signal time for crossing

Improves the ability of crossing pedestrians and drivers to see each other

Makes the crosswalk more apparent to drivers, encouraging them to stop in advance of the crosswalk, and reduces illegal parking within crosswalk

Reinforces lane discipline through intersection, preventing vehicle passing maneuvers in parking lane

Provides additional pedestrian space and reduces crowding, particularly for queuing at crossings and bus stops or when located at a subway entrance or other protrusion

Creates space that may be used to locate street furniture, bike parking, bus stop, public seating, street vendors, etc., potentially reducing sidewalk clutter

Keeps fire hydrant zone clear when located in front of a hydrant

Defines the ends of angle parking

Can discourage truck turns onto streets with No Truck regulations (See Rules of the City of New York, Title 34, Chapter 4, Section 4-13)

Considerations

May impact street drainage or require catch basin relocation

May impact underground utilities

May require loss of curbside parking

May complicate delivery access and garbage removal

May impact snow plows and street sweepers

Application

Only applicable within a curbside parking lane

Corners with marked pedestrian crosswalks in retail districts, directly adjacent to schools, at intersections with demonstrated pedestrian safety issues, on wide streets, or in areas of high foot traffic

At school crosswalks

At mid-block crossings (see MID-BLOCK NARROWING 2.2.2c)

Intersections where a two-way road transitions to oncoming one-way operation so as to block wrong-way traffic from proceeding straight onto the one-way portion (a “blockbuster”)

Next to subway entrances or other sidewalk pinch points so as to increase pedestrian walking or queuing space

Near fire hydrants, to keep clear of parked vehicles

Consider at all corners and pedestrian crossings

Consider elongated curb extensions for some or most of a block (i.e., a widened sidewalk with lay-by areas) in areas where a full sidewalk widening would be desirable but some loading, drop-off, or parking access must be maintained

Cannot be used where curbside travel (including bus, bicycle, or general traffic) lane exists, such as those created through peak-period parking restrictions

Feasibility of curb extensions is evaluated based on engineer review of design-vehicle turning movements

Design

Curb extension width is typically two feet less than the width of the parking lane. Minimum curb extension length is typically equal to the full width of the crosswalk, however it can be longer when appropriate or necessary

A fire truck turning zone with a 50-foot outside radius should be maintained clear of physical obstructions (signs, planters, non-flexible bollards, trees)

When a curb extension conflicts with design vehicle turning movements, the curb extension should be reduced in size rather than eliminated wherever possible

At crossings that may have low pedestrian visibility, curb extension should be long enough to “daylight” the crossing, i.e., provide open sight-lines to the pedestrian crossing for approaching motorists; the additional curb extension space can be used to provide plantings (see CURB EXTENSION [6.3.3]) or community facilities such as bicycle parking as long as visibility is not hindered

The design and placement of street furniture, trees, and plantings on a curb extension must not impede pedestrian flow, obstruct clear path, or interfere with “daylighting” the intersection, emergency operations, or sight lines

Pedestrian ramps should be aligned such that they serve as a continuation of the sidewalk, rather than within the radius of the curb extension, to accommodate direct pedestrian path

Curb extension must be designed so as to maintain drainage of stormwater from the gutter and not cause ponding; depending on site-specific grading conditions, this might include properly locating catch basins or utilizing design treatments that channel water through, around, or in



Curb extensions shorten crossing distances. This is especially important for vulnerable users: Fifth Avenue, Brooklyn

between curb extension and the curbline

Where space permits, more functional curb extension designs, such as those with PLANTINGS (6.3), or COMMUNITY FACILITIES (2.2.2a), such as seating or bicycle parking, should be used whenever possible

Vertical elements should be used to alert drivers and snow plow operators to the presence of the curb extension

To reduce the cost and implementation time of curb extension, trench drains can be considered instead of catch-basin relocation if a maintenance partner exists to clean the trench drain

When curb extension is used at a fire hydrant, the length of the curb extension should be equal to or greater than the No Parking zone (typically 15 feet in either direction) and the hydrant should be moved onto the curb extension

Paving on curb extension should match that of the surrounding sidewalks

Locate trees and/or plantings within curb extension where appropriate. See TREE BEDS (6.1) and CURB EXTENSION (6.3.3)

Maximize permeable surface of curb extension

Where feasible, design planted areas within curb extension so as to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

CURB EXTENSION

Curb Extension: Community Facilities

Usage: Wide

A CURB EXTENSION that provides space for community facilities such as bicycle parking, seating, and other street furniture. In areas with inadequate sidewalk width to accommodate needed functional sidewalk elements for the community, the extra space provided by a curb extension can be used for bike parking, seating, public art, gardens, plantings, or trees, alone or in combination. Similarly, all paved curb extensions can also provide space for consolidating basic sidewalk furnishings such as trash cans, newspaper racks, newsstands, and light or signal poles, where foot traffic permits.



ABOVE: Curb extension with bike parking: North 7th Street, Brooklyn



RIGHT: Curb extension with trees and seating: 46th Street, Queens

Benefits

Provides safety and traffic calming benefits as described in CURB EXTENSION (2.2.2)

Provides space for functional sidewalk elements outside of the sidewalk clear path, freeing sidewalk space for movement

Improves the public realm and creates useful public space, particularly in areas where public open space is in short supply

Allows limited street space to serve multiple functions, thereby increasing the performance of street infrastructure

May encourage mode shift to walking by creating a more comfortable and enjoyable walking environment

Considerations

Permits, revocable consents, and/or maintenance agreements may be required for certain elements

Bike racks must be standard DOT design unless a permit is obtained from DOT

Application

See application guidance for CURB EXTENSION (2.2.2)

Areas without sidewalk crowding where demand exists for the community facilities and a committed partner is willing to maintain any elements that require maintenance, such as seating; a maintenance partner is not needed for a DOT bike rack

Design

See design guidance for CURB EXTENSION (2.2.2)

CURB EXTENSION

Bus Bulb

Usage: Wide

A CURB EXTENSION at a bus stop that avoids the need for buses to pull in and out of the moving lane to pick up and discharge passengers. Bus bulbs may also be designed to better support bus passengers through the inclusion of higher curbs, bus stop shelters, seating, pre-boarding payment equipment, and other bus-supportive facilities.

Benefits

Provides safety and traffic calming benefits as described in CURB EXTENSION (2.2.2)

Speeds bus movement on streets with traffic congestion by eliminating the need for buses to maneuver in and out of the moving lane

Speeds bus movement by reducing the likelihood of bus stops being blocked by stopped vehicles

Discourages non-bus encroachment into bus-only lanes

Can allow faster bus passenger boarding

Can provide comfort and convenience to bus riders through dedicated waiting space and inclusion of bus-related amenities

When utilized at a bus stop under an elevated train line, where the bus does not pull over to the sidewalk, provides a safer space for passengers to wait, as many currently stand in the roadway

Allows additional on-street parking as compared to a standard bus stop

Application

See application guidance for CURB EXTENSION (2.2.2)

At bus stops along bus routes where it has been determined by DOT and MTA NYCT that bus bulbs would enhance bus service



Bus bulb: First Avenue, Manhattan

Design

For detailed design guidance, see Select Bus Service Station Design Guidelines (DOT & MTA NYCT, 2009)

See additional design guidance for CURB EXTENSION (2.2.2)

Bus bulbs should be long enough to encompass the front and rear doors of the buses that will be using it, and should extend the length of the bus stop whenever possible

Design BUS BULBS with care to accommodate accessibility needs, taking into account the full range of buses that might be using the stop



A bus bulb under an "EI" (elevated subway): Jerome Avenue, Bronx

CURB EXTENSION

Mid-Block Narrowing

Usage: Wide

Two CURB EXTENSIONS that create a pinch point. A mid-block narrowing (also referred to as a “choker”) physically or visually constricts the roadway, thereby slowing vehicular traffic or alerting drivers to the presence of a mid-block crossing. The curb extensions themselves can be of any variety, for example with plantings or other functional elements. A mid-block narrowing is equivalent to a GATEWAY (2.3.3) located mid-block.



Mid-block narrowing: West 94th Street, Manhattan
(Note: use of walls is not recommended by this manual)

Benefits

Provides safety and traffic calming benefits as described in CURB EXTENSION (2.2.2)

Calms mid-block traffic speeds, particularly if vertical elements (e.g., bollards, trees, bicycle parking, etc.) are included in CURB EXTENSIONS (2.2.2)

Improves drivers' awareness of presence of crosswalk at mid-block crossing

Provides space for greening, community facilities, bicycle parking, and/or stormwater source control measures

Application

See application guidance for CURB EXTENSION (2.2.2)

Local streets with demonstrated speeding issues and/or a mid-block crossing

At mid-block crossings on two-way streets, it is generally preferable to include a RAISED MEDIAN (2.2.3) or PEDESTRIAN SAFETY ISLAND (2.2.4) rather than or in addition to a mid-block narrowing, when space allows

Design

See design guidance for CURB EXTENSION (2.2.2)

Reduce lane width at mid-block narrowing to impact vehicle speeds; on low-traffic residential streets, mid-block narrowing can be combined with other design treatments, including RAISED CROSSWALKS (2.3.4), RAISED SPEED REDUCERS (2.3.2), or vertical elements for maximum effectiveness

Locate trees and/or plantings within curb extensions of mid-block narrowing where appropriate. See TREE BEDS (6.1) and CURB EXTENSION (6.3.3)

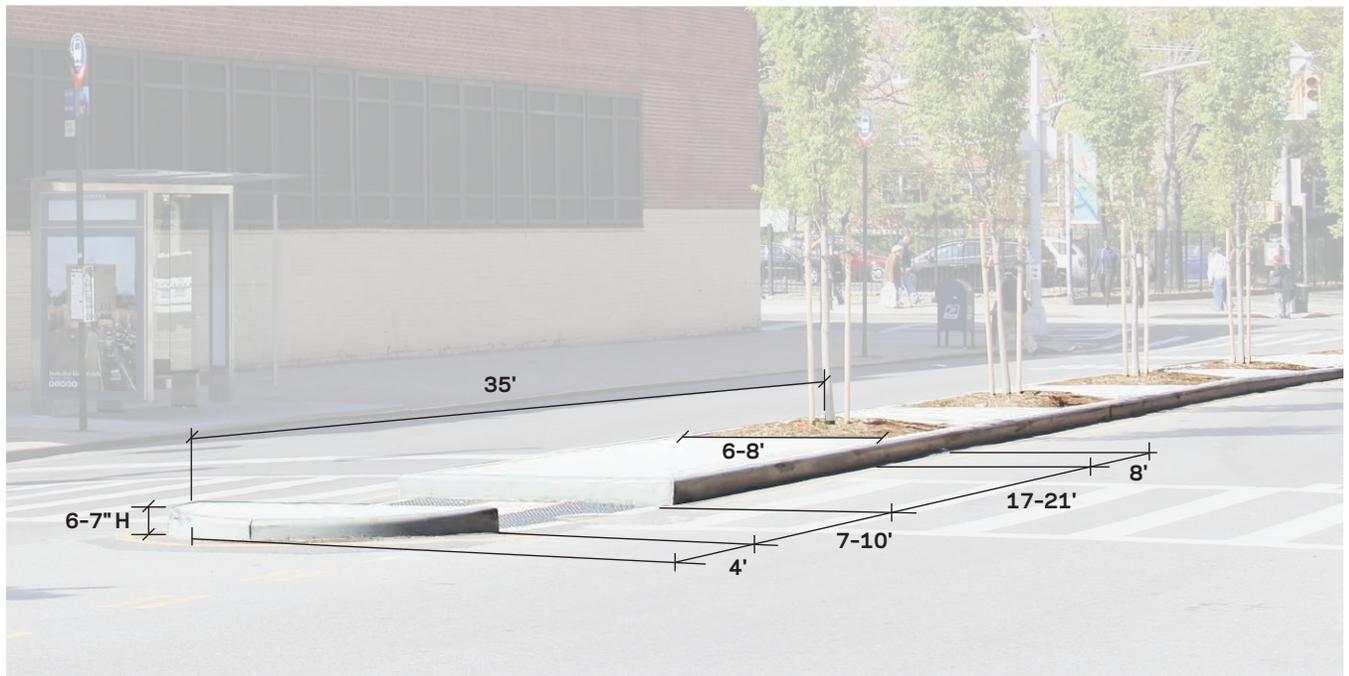
Maximize permeable surface of curb extension with vegetation, permeable paving, or both

Where feasible, design planted areas within mid-block curb extensions so as to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

Raised Median

Usage: Wide

A raised area separating different lanes, traffic directions, or roadways within a street. The raised median can be either curb height (6-7 inches) or, where appropriate, 12-24 inches high. The width as well as design of raised medians can vary widely. They can range from narrow raised concrete islands to tree-lined promenades to intensively landscaped boulevard medians. In contrast to PEDESTRIAN SAFETY ISLAND (2.2.4), raised medians extend for most or all of the street block.



Raised medians can enhance pedestrian safety: Fifth Avenue at East 138th Street, Manhattan

Benefits

- Reduces risk of left-turn and vehicle head-on collisions
- Calms traffic by narrowing roadway
- Enhances pedestrian safety and accessibility by reducing crossing distances and providing refuge for pedestrians to cross road in stages
- If designed for walking access, can provide additional pedestrian capacity
- Greens and beautifies the streetscape if it incorporates trees and/or plantings. See RAISED MEDIAN (6.2.1)
- Improves environmental quality and can incorporate stormwater source controls

Can provide space for a SIDEWALK (2.2.1) and/or SEPARATED BIKE PATH (2.1.1b), particularly as part of a boulevard treatment

Considerations

- May impact underground utilities
- Design must account for impact of raised median on emergency vehicle movement and access
- Landscaping or stormwater source controls require a partner for ongoing maintenance
- Changes in traffic circulation resulting from addition of raised median should be understood so as to not force drivers to travel on inappropriate routes or make U-turns
- If continuous, raised median may prevent left turns into driveways on opposite side of street

Application

Two-way streets with two or more roadway travel lanes in total

Consider on all two-way multilane streets

On streets of limited width, it may be preferable in some situations to include other treatments (e.g., expanded sidewalks or dedicated transit or bicycle facilities) rather than a raised median if there is not adequate room for all treatments and travel lanes

Design

Raised medians should be wide enough to provide refuge to pedestrians at crossings: 5 feet minimum, 6 feet or greater preferred; when planted, 6 feet minimum. See **RAISED MEDIANS (6.2.1)**

Raised medians should extend beyond the crosswalk at intersections wherever possible, while accommodating vehicle turning movements; the “nose” of the raised median should include bollards to protect pedestrians from wayward vehicles

Provide a walkable path across the raised median at crossings. When the median is less than 17 feet wide, an 8–10-foot-wide cut-through, flush with the roadway, is appropriate. On medians wider than 17 feet, pedestrian ramps (1:1.2 grade with 5-foot landing areas) can be used to provide access

Provide a large pedestrian storage area at crossings to permit groups of pedestrians to safely wait to cross

Provide tactile cues for pedestrians with vision disabilities to indicate the border between the pedestrian refuge area and the motorized travel lanes



Median with Greenstreet and sidewalk: Carlton Avenue, Brooklyn

Include street trees, plantings, and unpaved or permeable surfaces wherever safe and feasible, using structural soil where appropriate. See **TREE BEDS (6.1)**, **RAISED MEDIAN (6.2.1)**, and **POROUS CONCRETE (3.1.13)**

Grade roadways to direct stormwater towards raised medians if the raised medians include stormwater source controls, for example through the use of double or inverted roadway crown

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains; also consider visibility for motorists, cyclists, and pedestrians

Raised medians must be designed so as to maintain drainage of stormwater and not cause ponding

Locate trees and/or plantings within raised median. See **TREE BEDS (6.1)** and **RAISED MEDIAN (6.2.1)**

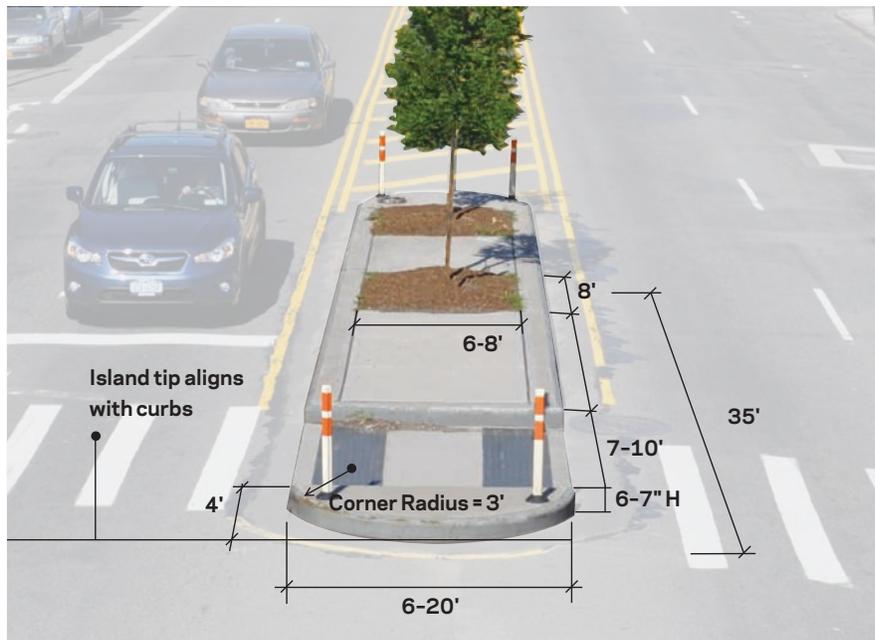
Maximize permeable surface of raised median

Where feasible, design planted areas within raised median so as to capture stormwater according to current standards. See **STORMWATER MANAGEMENT PRACTICES (6.6)**

Pedestrian Safety Island

Usage: Wide

A raised area located at crosswalks that serves as pedestrian refuge separating traffic lanes or directions, particularly on wide roadways. Also known as a “median refuge island” and “Green Refuge Island.” Used at pedestrian crossings when a full RAISED MEDIAN is not feasible. A pedestrian safety island confers most of the same benefits as full RAISED MEDIANS at pedestrian crossings. Full RAISED MEDIANS should be used rather than pedestrian safety islands wherever possible.



ABOVE: Pedestrian safety island: Hillside Avenue, Queens

LEFT: Pedestrian safety island: Crotona Avenue, Bronx

Benefits

Enhances pedestrian safety and accessibility by reducing crossing distances and providing refuge for pedestrians to cross road in stages

Calms traffic, especially left turns and through-movements, by narrowing roadway at intersection

Reduces risk of vehicle left-turn and head-on collisions at intersection

Can green and beautify the streetscape with trees and/or vegetation, potentially including stormwater source controls

Trees increase the visibility of the island, thereby usually improving safety

Considerations

May impact underground utilities

Landscaping or stormwater source controls require a partner for ongoing maintenance

Application

See application guidance for RAISED MEDIAN (2.2.3)

Design

See design guidance for RAISED MEDIAN (2.2.3)

Typical island accommodates two street trees and, where appropriate, bell bollards. See TREE BEDS (6.1) and RAISED MEDIAN (CURB HEIGHT) (6.2.1a)

Median Barrier

Usage: Limited

Benefits

Reduces or eliminates short-cut and cut-through traffic

When applied consistently to an area, reduces traffic speeds

Can green and beautify the streetscape with trees and/or vegetation, improving environmental quality and potentially incorporating stormwater source controls

Enhances safety at intersection by reducing potential vehicle movements and conflicts, particularly left turns

Reduces risk of vehicle head-on collisions

Reduces risk of motorists running a red light or stop sign when approaching from side street

Calms traffic on side street by requiring turn and on major street by narrowing roadway

Enhances pedestrian safety and accessibility by reducing crossing distances and providing refuge for pedestrians to cross the road in stages

Considerations

May impact street drainage or require catch basin relocation

May impact underground utilities

Emergency vehicle access needs must be accommodated

Landscaping or stormwater source controls require a partner for ongoing maintenance

A RAISED MEDIAN or PEDESTRIAN SAFETY ISLAND extended through an intersection to prevent left turns and through-movements to and from the intersecting street. Pedestrian access can be maintained with pedestrian refuges and bicycle access with gaps in the median. As with typical RAISED MEDIANS, trees or plantings can be included within the median barrier.



The raised median on Canal Street extends through the intersection with Washington Street: Manhattan.

If outfitted to capture stormwater, careful consideration must be given to design, overflow control, and plant species

Application

Consider on local streets with speeding or cut-through/short-cutting issues

One-way or two-way local streets at their intersections with two-way collector or arterial roadways

Design

Design traffic diversion devices to impact motor vehicle movement but not bicycle movement; utilize bike channels or similar design strategies to allow passage by bicyclists

Include planted areas and stormwater source controls within traffic diverters wherever possible when a maintenance partner is identified

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains

Locate trees and/or plantings within diverter when appropriate. See TREE BEDS (6.1) and RAISED MEDIAN (6.2.1)

Maximize permeable surface of diverter. See POROUS CONCRETE (3.1.13)

Design any planted areas within diverter so as to capture stormwater according to current standards

See additional design guidance for RAISED MEDIAN (2.2.3)

Traffic Calming

CURB EXTENSION

Lane Narrowing & Lane Removal

Usage: Wide

Benefits

Reduces opportunities for speeding and aggressive driving, thereby decreasing the severity and frequency of crashes

Organizes the roadway to provide clearer instruction to drivers, cyclists, and pedestrians

Provides space for pedestrian refuge islands, assigned turn lanes, angle parking, wide parking lanes, bus lanes, bicycle lanes, expanded sidewalks/ pedestrian space, or other uses

Considerations

Traffic conditions must be considered in planning lane removals; detailed analysis may be needed

Commercial loading and other uses should be considered in planning lane narrowing

Planned uses, such as bus lanes or bicycle lanes, should be taken into consideration

Effects of narrowings on turning movements should be tested

Application

Consider lane narrowings on corridors with excessively wide lanes

Multilane corridors with excess capacity (more traffic capacity than traffic volume) are excellent candidates for lane removal

Multi-lane corridors may be good candidates for lane removal in concert with other treatments, such as signal timing changes

Lane Narrowings remove excess width from existing moving lanes without changing the number of moving/traffic lanes. Lane Removals reassign underused traffic lanes to other functions. These design techniques, while not traffic-calming devices, have powerful traffic-calming benefits. Both may be accomplished by adding markings, turning lanes, pedestrian refuge islands, expanded pedestrian space, on-street or separated bicycle lanes, parking, or other functions.



Before: After two fatalities occurred at the same intersection in one year, DOT found that the roadway was over capacity: West 6th Street, Brooklyn



After: DOT installed a "road diet" in 2010, resulting in a 25% reduction in crashes

Lane narrowing and removal should be prioritized on corridors with safety or speeding concerns, or where prioritization of non-general traffic is desirable

Design Guidelines

Lane narrowings and removals should result in standard-width lanes

When other treatments are included in a lane narrowing/removal, see specific guidelines for those treatments

Raised Speed Reducer

Usage: Wide

Benefits

Compels drivers to travel at speeds no higher than the street's design speed

A speed table can be used to provide a raised mid-block crossing in conjunction with a stop control

Considerations

Impacts emergency vehicle movement

Snow plows must be given advance warning

May generate additional noise

Application

Must be requested by a community, with approval based on a DOT field study of the location using speed survey, geometric, and street operations criteria

Avoid on streets that have any of the following characteristics:

- designated as "local" or "through" truck routes
- on MTA bus routes, tour-bus routes, or routes of any other bus operator
- emergency-vehicle response or snow emergency routes
- Fire Department house located on the block
- more than one moving lane per direction
- wider than 44 feet

A raised area of a roadway that deflects both the wheels and frame of a traversing vehicle with the purpose of reducing vehicle speeds. The two basic types of raised speed reducers are speed humps and speed tables. Both are typically raised 3 to 4 inches above the level of the roadway, and both have a proven speed-reducing track record in New York City. While a speed hump is relatively short in length (e.g., 13 feet long), a speed table is longer (e.g., 22 to 30 feet long), with a flat section in the middle, sometimes including a RAISED CROSSWALK (2.3.4). SPEED CUSHION (2.3.2a) are a variation of speed humps designed to allow easier emergency vehicle, bus, or truck passage.



Speed hump: Bolton Avenue, Bronx

The location can be investigated by DOT for a "Reduced School Speed Zone" if a speed reducer is not feasible but the street has an 85th percentile speed of 25 mph or higher and is near an eligible school

Design

Space raised speed reducers to maintain desired operating speeds

Appropriate warning signs and roadway markings should accompany raised speed reducers

Locate raised speed reducers in the middle of the roadway, with the gutters kept clear for proper road drainage

Use signage or other methods to alert operators of snow-clearing vehicles to the presence of raised speed reducers

While raised speed reducers (humps, tables, cushions) are an effective method to retrofit existing streets to reduce motor vehicle speeds in lieu of street reconstruction, all newly reconstructed streets should be comprehensively designed to achieve desired speeds, e.g., using appropriate roadway width and alignment, horizontal deflection, traffic controls, trees, and other traffic calming treatments

Utilize recycled content in paving materials

RAISED SPEED REDUCER

Speed Cushion

Usage: Pilot

Narrow speed humps that reduce traffic speeds without causing vertical displacement of vehicles with wide wheel bases (trucks, buses, and emergency vehicles). Wide vehicles can travel over speed cushions at moderate speed after aligning properly, making them potentially appropriate for use on streets with low- to moderate-frequency emergency, truck, or bus routes.

Benefits

See benefits of RAISED SPEED REDUCERS (2.3.2)

Reduces motor vehicle speeds without hampering bus service or most commercial vehicles

Quieter than speed humps on commercial routes

Can be easily removed, relocated, or repositioned

Available as an off-the-shelf product

Considerations

Snow plows must be given advance warning

Application

See application guidance for RAISED SPEED REDUCERS (2.3.2)

Streets that qualify for RAISED SPEED REDUCERS, except for the presence of a truck, bus, or emergency vehicle route

Consider on non-arterial roadways with speeding concerns

Avoid on arterial roadways

Design

See design guidance for RAISED SPEED REDUCERS (2.3.2)

Spacing and dimensions of speed cushions are typically similar to those of other RAISED SPEED REDUCERS



Speed cushions showing impact on typical vehicles: Vancouver, Canada (Credit: Richard Drdul)
(Note: for illustrative purposes only)



Speed cushions showing ease of bus passage: Vancouver, Canada (Credit: Richard Drdul)
(Note: for illustrative purposes only)

Gateway

Usage: Limited

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. Useful at all roadway transitions to slower-speed environments, gateways are especially suited to entrances to residential side streets and SHARED STREETS. The design elements of a gateway can include CURB EXTENSIONS (2.2.2), a RAISED CROSSWALK (2.3.4) or driveway treatment, a RAISED MEDIAN (2.2.3), landscaping or trees, and community facilities such as seating and public art.



ABOVE: Gateway at transition from local residential street: Prospect Place, Brooklyn

LEFT: Gateway to residential street: West 11th Street at Seventh Avenue South, Manhattan

Benefits

Decreases vehicular speeds and discourages through-traffic without blocking or prohibiting vehicular access

Demarcates transitions to low-speed, SHARED STREET (2.1.3). or pedestrian-oriented areas

Provides pedestrians with priority movement across the treated leg of the intersection

Considerations

May impact street drainage or require catch basin relocation

May impact underground utilities

May require loss of curbside parking in some cases

Community facilities typically necessitate the presence of a maintenance partner

Many community facilities and sidewalk items require a permit or revocable consent from the city

If gateway includes a RAISED CROSSWALK (2.3.4), snow plows must be given advance warning

Application

Entrances to SHARED STREETS

Consider at entrances to streets with low vehicle volumes or speeds from streets with high vehicle volumes or speeds

Design

Include at a minimum CURB EXTENSIONS (2.2.2) to narrow the roadway; preferably, vertical deflection should also be created using a RAISED CROSSWALK or ramped driveway treatment; if the street is two-way, a RAISED MEDIAN (2.2.3) or PEDESTRIAN SAFETY ISLAND (2.2.4) can be included, space permitting

Other design elements can “narrow” a street visually, including plantings, public art, bicycle parking, and community facilities such as seating

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains

Where feasible, design planted areas within gateway so as to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

If gateway includes PLANTED CURB EXTENSIONS, see design guidance for PLANTED CURB EXTENSIONS (6.3.3)

Raised Crosswalk

Usage: Limited

A marked pedestrian crosswalk at an intersection or a mid-block location constructed at a higher elevation than the adjacent roadway. A raised crosswalk is essentially a speed table, with the full width of the crosswalk contained within the flat portion of the table, usually 10- to 15-foot wide. It combines the benefits of a RAISED SPEED REDUCER (2.3.2) with enhanced visibility for the pedestrian crossing.

Benefits

Compels drivers to travel at speeds no higher than the street's design speed

Improves drivers' awareness of presence of pedestrian crossing, particularly at mid-block crossing locations

Used at street GATEWAYS (2.3.3), can alert drivers that they are entering a slower-speed, pedestrian-oriented street environment

Allows convenient pedestrian circulation between high foot traffic destinations on opposite sides of a street

Considerations

May impact street drainage or require catch basin relocation

Attention should be given to accommodation of and navigation by people with vision disabilities

Application

Existing stop-controlled crosswalks or other locations where demand exists for a stop-controlled pedestrian crossing that also meet the criteria for RAISED SPEED REDUCERS (2.3.1)

Consider at areas of particularly high pedestrian crossing demand on narrower streets (maximum of two moving lanes), such as locations with pedestrian generators (e.g., major commercial or cultural destinations, transit entrances, parks) on opposite sides of the street



Raised crosswalk: Paris, France
(Note: for illustrative purposes only)

Consider as a more robust option for mid-block crossings

Consider on the outer roadways of multi-lane boulevards at crossings

Avoid on arterial roadways

Design

Appropriate warning signs and roadway markings should accompany raised crosswalk

Use signage or other methods to alert snow-clearing vehicle operators to the presence of raised crosswalk

Detectable warning strips with high color contrast from sidewalk surface should be provided at crosswalk location



Raised crosswalk: London, United Kingdom
(Note: for illustrative purposes only)

Use enhanced, high-visibility street materials to further draw attention to raised crosswalk

See design guidance for RAISED SPEED REDUCERS (2.3.2)

Utilize recycled content in paving materials

Chicane

Usage: Pilot

A serpentine roadway alignment or series of staggered CURB EXTENSIONS to encourage lower driving speeds through horizontal deflection.

Chicanes discourage or make it impossible for drivers to drive in a straight line. This can reduce vehicular speeds.



ABOVE: Chicane at entry to residential neighborhood: San Francisco, California (Credit: SF MTA) (Note: for illustrative purposes only)

LEFT: Chicane: Vancouver, Canada (Credit: Richard Drdul) (Note: for illustrative purposes only)

Benefits

Forces drivers to drive more slowly and with greater awareness, particularly at mid-block locations

Can green and beautify the streetscape with trees and/or vegetation, improving environmental quality and potentially incorporating stormwater source controls

Considerations

May impact street drainage or require catch basin relocation

May impact underground utilities

May require loss of curbside parking

Landscaping or stormwater source controls require a partner for ongoing maintenance

If outfitted to capture stormwater, careful consideration must be given to design, overflow control, and plant species

May impact snow plows and street sweepers

Application

Consider on narrower, low-volume, local streets (maximum of two moving lanes) with demonstrated speeding issues

Avoid on bus routes, truck routes, and major bicycle routes

Design

The simplest and most basic approach to create a chicane is to alternate on-street parking (parallel or angled) from one side to the other; in this case, CURB EXTENSIONS (2.2.2) at the beginning and end of each grouping of parking

If utilizing CURB EXTENSIONS, see CURB EXTENSION section for general design considerations

Use vertical elements to alert drivers and snow plow operators to presence of chicanes

Locate trees and/or plantings within chicane curb extensions when appropriate. See TREE BEDS (6.1) and ROADWAY PLANTINGS (6.2)

Maximize permeable surface of chicane curb extensions

Where feasible, design planted areas within chicane curb extensions to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

Neighborhood Traffic Circle

Usage: Pilot

Benefits

Reduces speeds and crash rates, particularly when applied consistently to an area

Eliminates possibility of vehicle head-on collisions

Can green and beautify the streetscape with trees and/or vegetation, improving environmental quality

Inclusion of plantings or art within the island creates an attractive focal point for the neighborhood

Considerations

May impact underground utilities

Landscaping requires a partner for ongoing maintenance

Attention should be given to accommodation of and navigation by people with vision and/or ambulatory disabilities

Application

Consider at existing stop-controlled intersections, particularly all-way stops

Consider at intersections of streets with low target speeds (25 mph or below) or low vehicle volumes

ROUNDBABOUT (2.3.7) should be used instead at high-volume or large intersections

A round traffic island in the center of a traditional intersection. Primarily applicable to lower-traffic intersections, neighborhood traffic circles can provide many of the advantages of full ROUNDBABOUTS, (2.3.7) but using much less space.



Neighborhood traffic circle with landscaping: Berkeley, California (Credit: John Allen)
(Note: for illustrative purposes only)

Design

Design speeds for movement around the circle should be 10 to 15 mph; exit speeds should be limited to 15 mph through the circle's design wherever possible

Use signs within the center island and reflective paint on the curb to improve center island visibility

Include street tree(s) wherever possible; include planted areas when a maintenance partner is identified

A protective apron of concrete or textured pavement may be provided around the circle to accommodate wide-turning vehicles; where extreme geometric constraints exist and truck volumes are low, trucks may be accommodated by use of a fully mountable roundabout island

Use small curb radii where right turns are made

Install "Keep Right" or similar signs directing drivers to proceed to the right around the circle through the intersection

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains

Minimize impervious paved areas and utilize permeable paving wherever possible

Locate trees and/or plantings within neighborhood traffic circle island. See TREE BEDS (6.1) and ROADWAY PLANTINGS (6.2)

Maximize permeable surface of neighborhood traffic circle island

Where feasible, design planted areas within neighborhood traffic circle island so as to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

Roundabout

Usage: Limited

Benefits

Reduces top vehicular speeds at signalized intersections, thereby decreasing the severity of crashes

Eliminates possibility of vehicle head-on collisions

Eliminates left turns, a primary cause of crashes

Enhances pedestrian safety when used at appropriate intersections

Allows simultaneous movement of crossing vehicular streams, often processing vehicular traffic more efficiently than signalization

When used in place of a stop- or signal-controlled intersection, may reduce vehicle emissions and travel times by reducing start-and-stop driving

Reduces need to widen streets approaching intersection to store vehicles under signalized operation

Can green and beautify the streetscape with trees and/or plantings, improving environmental quality and potentially incorporating stormwater source controls

Inclusion of public open space, vegetation or art within the roundabout island creates an attractive focal point for the neighborhood

An intersection with circular, one-way (counter-clockwise) traffic around a central circle in which entering traffic yields to traffic already in the roundabout. Roundabouts can vary in size (diameter) and number of lanes and can be designed as unsignalized or signalized intersections. Roundabouts are distinguished from “old-style” traffic circles/rotaries by their rules for yielding and key design features such as horizontal deflection at entries.



Roundabout with public art in residential neighborhood: Delft, Netherlands
(Note: for illustrative purposes only)



Recently installed roundabout: Intervale Avenue and Dawson Street, Bronx

Considerations

May require increased spatial footprint for intersection, but not approaches

May impact street drainage or require catch basin relocation

May impact underground utilities

May require loss of curbside parking

Landscaping or stormwater source controls require a partner for ongoing maintenance

If outfitted to capture stormwater, careful consideration must be given to design, overflow control, and plant species

Attention should be given to accommodation of and navigation by people with vision and/or ambulatory disabilities

Application

Intersections with 1) no more than 80–90% of volume on the main facility and 2) having at least three approaches, high vehicle-turning volumes or percentages, or speeding issues

Consider at locations with poor safety records, or where signalization has led or may lead to operational issues for pedestrians or bicyclists

As a gateway treatment for low-speed (25 mph speed limit or less) or SHARED STREETS (2.1.3)

Design

Deflection should be created for entering vehicles to reinforce yielding behavior; at two-way legs of the intersection, use splitter islands to provide deflection as well as to allow pedestrians to cross in two segments

Detectable warning strips should be provided at all crosswalk locations with high color contrast from the sidewalk surface

Limit entry and exit speeds through deflection and/or raised crosswalks

Curves should accommodate the design vehicle; use an apron of textured paving around the central island to slow motor vehicle movements while accommodating larger vehicles such as trucks

To improve center island visibility, use reflective signs within the center island and reflective paint on the curb

Include street tree(s) wherever possible; include planted areas and stormwater source controls when a maintenance partner is identified

If work includes tree planting, consider the location of utility infrastructure, including DEP sewers and water mains

Minimize impervious paved areas and utilize permeable paving wherever possible

Locate trees and/or plantings within roundabout islands. See TREE BEDS (6.1) and ROADWAY PLANTINGS (6.2)

Maximize permeable surface of roundabout islands

Where feasible, design planted areas within roundabout islands so as to capture stormwater according to current standards. See STORMWATER MANAGEMENT PRACTICES (6.6)

Raised Intersection

An entire intersection raised above the level of the surrounding roadways.
The intersection is typically raised to sidewalk height.

Usage: Pilot



ABOVE: Raised intersection: London, United Kingdom (Note: for illustrative purposes only)

LEFT: Raised intersection: Cambridge, Massachusetts (Credit: Cara Seiderman)

Benefits

Vertical deflection at entry to intersection encourages reduced vehicle speeds

Improves drivers' awareness of presence of crossings

Visually turns intersection into a pedestrian-oriented zone

Enhances access for people with disabilities

Considerations

May impact street drainage or require catch basin relocation

Snow plows must be given advance warning

Application

Stop-controlled intersections with a high volume of pedestrian crossings and low target vehicle speeds (e.g., 25 mph or below)

Stop-controlled intersections with a history of pedestrian crashes or speeding issues

Stop-controlled intersections where enhancing pedestrian movement is a major goal, such as transit stops or commercial areas

Avoid on truck routes and at other locations where RAISED SPEED REDUCERS (2.3.2) are not appropriate

Design

Slope of entrance ramps for motorized traffic can be steep or shallow, depending on target speeds

Use enhanced, high-visibility street materials to further draw attention to raised intersection

Minimize impervious paved areas and utilize permeable paving wherever possible

Increase SRI value of paved surfaces to reduce urban heat island impact

Utilize recycled content in paving materials

Coordinate streetscape/utility work to minimize street cuts

