LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT (LFUCG)

COMPLETE STREETS DESIGN MANUAL

DRAFT 6/9/2026

LEXINGTON

TOOLE DESIGN

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LEXINGTON

1 Introduction

Lexington's streets are essential public spaces that support daily life, economic activity, and access to destinations for people of all ages and abilities. The street network is continually evolving and changing in response to growth, travel patterns, community goals and expectations. Expanding safe and reliable travel options has been a long-standing priority for Lexington and is reflected in the community's adopted plans and policies.

This Manual translates those priorities into clear, implementable design expectations. It establishes a consistent approach to street design that supports safe travel, appropriate vehicle speeds, and a connected multimodal network. By aligning design decisions with adopted community goals, this Manual ensures that streets function as integral components of Lexington's transportation system and as spaces that serve the needs of all users.

1.1 Purpose of the Manual

Lexington's **Complete Streets Design Manual** (CSDM), hereafter referred to as "the Manual," establishes the standards and requirements governing the design and construction of streets within Lexington-Fayette County. The Manual incorporates nationally recognized standards and best practices while adapting street design guidance to Lexington's local context.

1.2 Complete Streets & Vision Zero Policy Alignment

The **Complete Streets Design Manual** implements and advances two major policies adopted by the Lexington-Fayette Urban County Government (LFUCG):

Complete Streets Policy (2022)

LFUCG's Complete Streets Policy affirms that all streets within Lexington-Fayette County are public spaces that must serve all members of the community - whether they are traveling by foot, bicycle, transit, personal vehicle, micromobility device, or using a mobility aid. The policy calls for a connected, context-sensitive transportation network that supports the economic vitality of our city and ensures the health, safety, and mobility needs of all residents.

Vision Zero Policy (2025)

The Vision Zero Policy commits the LFUCG to the goal of eliminating traffic fatalities and serious injuries on all public roadways by applying a systems-based approach to roadway safety. This includes prioritizing safety-focused design strategies to reduce crash severity, manage vehicular speeds, minimize conflict points, and improve predictability for all users.

Together, these policies establish the foundation for the standards contained within this Manual.

1.3 Guiding Principles for Street Design

The standards and guidance within the **Complete Streets Design Manual** align with the following design principles.

Safety – Street design must prioritize the safety of all people across all modes of transportation, including the most vulnerable and underserved members of the community. This means reducing the likelihood and severity of crashes for all modes and minimizing conflicts between roadways users.

Accessibility – The public right of way must serve all members of the public regardless of age, ability, and socioeconomic background. True accessibility extends beyond minimum regulatory compliance. It removes barriers to travel and ensures all residents can independently use the transportation system to meet their daily life needs.

Livability – Streets are the largest allocation of public space within our community. As such, they should contribute to the character of our city and enhance public life by providing places for people to gather, socialize, engage with one another and with local businesses.

Sustainability – Streets should support broader community goals for environmental stewardship by providing green infrastructure and stormwater management, reducing emissions, improving air quality, encouraging alternative travel modes, and by using sustainable and durable materials.

Maintainability – Street design should consider long-term maintenance and daily operational needs to ensure the ongoing safety, quality, and function of the transportation system is achievable.

Transparency – Design decisions and tradeoffs should be clearly documented and evaluated based on the Manual's design principles, adopted LFUCG policies, and broader community goals.

1.4 Applicability

1.4.1 General

For the purposes of this Manual, the term "Street(s)" or "Roadway(s)" applies to any public street, private street, or access easement proving access to a property as defined by the **LFUCG Land Subdivision Regulations.**

The standards within this Manual apply to newly constructed streets and modified existing streets including:

- New streets constructed through private development
- Existing streets improved through private development
- Existing streets improved through public improvement projects
- Utility installations and utility work impacting the public right of way

1.4.2 New Development

All new streets constructed through private development shall comply with the applicable design and construction standards of this Manual. This includes private streets and streets proposed for public dedication on subdivision plans/plats, development plans, and infrastructure improvement plans.

Deviations to cross-sections and geometric design standards shall not be permitted for new streets except through an approved waiver granted by the Planning Commission in accordance with the **Land Subdivision Regulations.**

1.4.3 Infill and Redevelopment

Infill and redevelopment projects within established areas may encounter design constraints not typically present in greenfield development. In such cases:

- Where full compliance with this Manual is constrained due to existing conditions, the applicant may request a waiver as part of the development or subdivision plan. The geometric standards of this Manual shall apply unless a waiver is granted by the Planning Commission in accordance with the **Land Subdivision Regulations**.
- Per Section 6-8(e) of the LFUCG **Subdivision Regulations**, developers are required to complete half-street cross-section improvements in compliance with this Manual for any development proposing to subdivide an existing lot adjacent to a non-conforming roadway (e.g., streets lacking sidewalks, curb, or gutter),
- Where half-street improvements are required, the developer may elect to match an existing, approved cross-section within the same block to maintain visual and functional continuity along the corridor. The Manual's current standards shall apply to all other blocks and street frontage.
- For streets that are adjacent to or within developments that span one or more full blocks, the following requirements shall apply:
  - **Pedestrian infrastructure** shall be upgraded to meet the default sidewalk width for the applicable Street Type and land use.
  - **Bicycle infrastructure** shall be provided in accordance with the applicable Street Type.
  - **Traffic calming elements** such as bulb-outs, median islands, or chokers, shall be incorporated as part of the street retrofit.
  - Where existing public right-of-way is insufficient to accommodate the required improvements, the applicant shall dedicate right-of-way or provide public access easements sufficient to achieve the applicable Street Type standards.

1.4.4 Development Along Thoroughfares

While full half-street improvements along arterial, state-maintained roadways (i.e. Thoroughfares) are generally not required by the **LFUCG Land Subdivision Regulations**, developers shall provide pedestrian and bicycle infrastructure in accordance with the applicable Thoroughfare standards identified in Chapter 3 of this Manual.

Where existing sidewalks or bicycle facilities are present on adjacent parcels, the new development shall provide direct connections to extend and integrate the existing pedestrian and bicycle network.

If a bus stop exists along the project frontage, the developer shall install a bus pad and shelter that complies with the **U.S. Access Board Public Right-of-Way Accessibility Guidelines (PROWAG)** and Lextran requirements. The bus pad and shelter shall be connected to the sidewalk network.

All access points, intersections, and encroachments onto state-maintained roadways shall comply with Kentucky Transportation Cabinet (KYTC) permitting requirements, including encroachment and access permits.

1.4.5 LFUCG Improvement Projects

LFUCG capital improvement projects shall comply with the standards of this Manual. In retrofit conditions, full compliance may not always be feasible due to existing constraints such as right-of-way limitations, drainage conditions, or surrounding development. In such cases:

- The design shall meet standards to the greatest extent practicable
- Deviations shall be clearly documented
- Exceptions shall be reviewed and approved by the appropriate LFUCG authority

1.4.6 KYTC Improvement Projects

Projects led by the **Kentucky Transportation Cabinet (KYTC)** are governed by KYTC standards and regulations, but are typically required to demonstrate the following when utilizing federal funding sources:

- Coordination with the **LFUCG** and **Lexington Area Metropolitan Planning Organization** (MPO).
- Compliance with the **LFUCG** and **Lexington Area MPO's Complete Streets Policy and Vision Zero Policies.**
- Compliance with the design principles and guidance established in the **KYTC Complete Streets, Roads, and Highways Policy** and **KYTC Complete Streets, Road, and Highways Manual.**
- Compliance with the design principles and guidance established in the **LFUCG Complete Streets Design Manual** to the greatest extent practicable.

1.5 Reference Standards

1.5.1 LFUCG Standards

Applicable LFUCG standards, guidelines, regulations, and ordinances that govern the design, construction, operation, and maintenance of new and existing streets within Lexington-Fayette County include:

1.5.1.1 Complete Streets Design Manual

The **LFUCG Complete Streets Design Manual** supersedes the LFUCG Roadway Manual (2005) and Appendix 1 of the Neighborhood Traffic Management Program (NTMP) Guide. The CSDM applies to all streets designed and constructed by LFUCG and private developers.

1.5.1.2 Land Subdivision Regulations & Zoning Ordinance

All streets built by private developers to be dedicated to LFUCG for public use must comply with the **LFUCG Land Subdivision Regulations** and **Zoning Ordinance**.

1.5.1.3 Engineering Manuals & Standard Drawings

All streets built by private developers to be dedicated to LFUCG for public use must comply with the **LFUCG Engineering Manuals** as specified in Section 17-1 of the **LFUCG Code of Ordinances.**

LFUCG Engineering Manuals include:

- **Complete Streets Design Manual**
- Stormwater Manual
- Geotechnical Manual
- Structures Manual
- Construction Inspection Manual
- **Procedures Manual for Infrastructure Development**
- LFUCG **Standard Drawings**

1.5.2 KY Transportation Cabinet Standards

Roadways under KYTC jurisdiction shall comply with KYTC standards, including design manuals, standard drawings, and construction specifications.

Designers may reference KYTC standards when additional technical design guidance is needed for LFUCG roadways beyond what is provided by LFUCG.

1.5.3 National Guidance and Standards

Nationally recognized professional organizations develop and adopt design guidance which serve as a foundation for the standards and guidelines within this Manual. Designers shall consult these sources when additional technical guidance is required beyond what is provided by LFUCG:

National Association of City Transportation Officials (NACTO) Urban Street Design Guide: This guide provides modern, innovative street design solutions for urban areas, focusing on multi-modal safety and livability and is a supplemental resource to guide street design and operation in Lexington-Fayette County. NACTO provides additional guidance manuals specific to bikeways and transit facilities.

American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets (Green Book): This guide covers the fundamentals of roadway geometric design, including horizontal and vertical geometry, intersection layouts, and sight distance criteria. It allows for flexibility in design, recognizing that different environments and anticipated users require context-sensitive solutions and is the basis for the geometric design of streets in Lexington-Fayette County. AASHTO provides additional guidance manuals specific to pedestrian facilities and bicycle facilities.

Highway Capacity Manual (HCM): The HCM is a publication of the Transportation Research Board (TRB) and contains concepts, guidelines, procedures, and evaluation methods for highways, arterials, and intersections is the basis for evaluating traffic control operations for streets in Lexington-Fayette County.

Public Rights-of-Way Accessibility Guidelines (PROWAG): PROWAG describes the design requirements for sidewalks, curb ramps, crosswalks, and transit stops to ensure accessibility for all users. These guidelines have been adopted by the U.S. Department of Transportation (USDOT) and the Kentucky Transportation Cabinet is as the basis for ensuring all streets in Lexington-Fayette County are accessible.

Manual on Uniform Traffic Control Devices (MUTCD): The MUTCD establishes standards for traffic signals, signs, pavement markings, and other control devices to ensure uniformity and safety across the transportation network and is the basis for traffic control applications and designs for streets in Lexington-Fayette County.

1.6 Waivers and Variances

1.6.1 General

In cases where a constraint significantly limits adherence to the Manual's requirements, the process by which a waiver, variance, or other exception may be requested and granted is dependent upon whether the request applies to a geometric design standard or a construction specification. The following definitions apply to approval authority:

- **Geometric Design Standards –** define the physical layout and operational characteristics of the roadway
- **Construction Specifications –** define how the roadway is constructed

1.6.2 Geometric Design Standards

Geometric design standards govern elements that directly affect safety, accessibility, and multimodal performance.

Waivers or variances from these standards shall require approval by the **LFUCG Planning Commission** as part of a development or subdivision plan, in accordance with the applicable provisions of the **Land Subdivision Regulations.**

These include, but are not limited to:

- Street cross-sections (ROW width, pavement width, sidewalks, bicycle facilities)
- Intersection design and control (roundabouts, traffic circles, signals, turn lanes, etc.)
- Utility placement affecting roadway geometry
- Street trees and required streetscape elements

1.6.3 Pavement Design & Construction Specifications

Construction specifications govern materials, methods, and technical requirements necessary to construct the approved roadway to ensure the performance and durability of the infrastructure (e.g. specifications within Chapter 8 of this Manual, the LFUCG Stormwater Manual, Geotechnical Manual, etc.).

Deviations from these specifications require approval by the Director of the Division of Engineering (or designee) in accordance with the **LFUCG Procedures Manual for Infrastructure Development (Appendix B).**

Such approvals:

- Shall be limited to construction-related requirements
- Shall not modify geometric design standards
- Shall require appropriate engineering justification

1.7 Use of the Manual

Designers should consult the applicable chapters of the manual based on the design task at hand. In general, the Manual should be used in the preparation of the following:

- Development and subdivision plans
- Infrastructure improvement plans
- Capital project designs
- Corridor studies and conceptual layouts
- Street reconfiguration and restriping projects

1.8 Organization of the Manual

The Manual is organized to guide users from policy through planning, design and construction:

CHAPTER 1
INTRODUCTION

Establishes the purpose, policy framework, and applicability of the Manual and defines how and when its standards apply.

CHAPTER 2
STREET IMPROVEMENT PROCEDURES FOR PRIVATE DEVELOPMENT

Describes the procedures for plan review, design, construction, and acceptance of infrastructure associated with development.

CHAPTER 3
STREET TYPES AND TYPICAL CROSS-SECTIONS

Defines typical cross-sections based on street type and land use context as well as design controls associated with each street type such as target speed, design vehicle, and control vehicle.

CHAPTER 4
STREET CORRIDOR ELEMENTS

Details the design of individual corridor components, including pedestrian, bicycle, curbside, and roadway elements.

CHAPTER 5
INTERSECTION AND CROSSING ELEMENTS

Provides design guidance for intersections and crossings to improve safety, operations, and multimodal connectivity.

CHAPTER 6
SPEED MANAGEMENT

Identifies design strategies to achieve target speeds and improve safety through geometric design and traffic calming measures.

CHAPTER 7
STREET IMPROVEMENT PROCEDURES FOR PUBLIC PROJECTS

Outlines how the Manual is applied to LFUCG-led projects, including design expectations and coordination considerations.

CHAPTER 8
PAVEMENT DESIGN & CONSTRUCTION SPECIFICATIONS

Establishes pavement design criteria and construction requirements for public and private streets.

1.9 Acronyms

AASHTO: American Association of State Highway and Transportation Officials
ADA: Americans with Disabilities Act
APS: Accessible Pedestrian Signals
AADT: Average Annual Daily Traffic
ADT: Average Daily Traffic
DOT: Department of Transportation
FHWA: Federal Highway Administration
KYTC: Kentucky Transportation Cabinet
LFUCG: Lexington-Fayette Urban County Government
MUTCD: Manual on Uniform Traffic Control Devices
NACTO: National Association of City Transportation Officials
NTMP: Neighborhood Traffic Management Program
O&M: Operation and Maintenance
PAR: Pedestrian Access Route
PHB: Pedestrian Hybrid Beacon
PROWAG: Public Right-of-Way Accessibility Guidelines
RRFB: Rectangular Rapid-Flashing Beacon
ROW: Right-of-Way
SOP: Standard Operating Procedures
SUP: Shared Use Path
VPD: Vehicles Per Day
VRU: Vulnerable Roadway User

1.10 Major Definitions/Glossary

Accessible: Describes a facility in the public right-of-way that complies with the Americans with Disabilities Act (ADA) and this guide.

Accessible Pedestrian Signal: A device that communicates information about pedestrian signal timing in a non-visual format, such as audible tones, speech messages, and vibrating surfaces.

AADT (Average Annual Daily Traffic): Average number of vehicles passing a defined point over a year, divided by 365.

Average Daily Traffic: Average number of vehicles that pass a defined point during a 24-hour period.

Bicycle Facilities: A general term referring to improvements and provisions that accommodate or encourage bicycling, including bikeways, bicycle boulevards, bicycle detection, shared-lane markings, signed bicycle routes, and wayfinding, in addition to parking and storage facilities.

Clear Width: The width of a pedestrian or bicycle facility devoid of physical obstructions.

Complete Street: A street, road, or highway that is safe and accommodating for all expected users.

Crosswalk: The part of a roadway, either at an intersection or elsewhere, designated for pedestrian use. Further defined in the KRS 189.010, as (a) That part of a roadway at an intersection within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway; or (b) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Curb/Corner Radius: The radius of an intersection corner or curb.

Curb Ramp: A ramp that cuts through or is built up to the curb. Curb ramp types can be perpendicular or parallel, or a combination of parallel, perpendicular, and diagonal ramps.

Design/Posted/Target Speed: The speed at which people are expected to drive; the target speed should match the design speed and posted speed limit.

Design/Control Vehicle: A design vehicle contains representative dimensions and operating characteristics that are used to determine the geometric design features of a roadway, intersection, or facility. A control vehicle must use space outside of its designated travel lane, including across centerlines, but within the roadway, to navigate a turning movement as a function of its size.

Detectable Warning Surface: A standardized truncated dome grid surface built in, or applied to, walking surfaces to indicate the boundary between a pedestrian route and a vehicular route. Detectable warning systems are installed wherever there is a curb ramp or blended transition, including the edge of transit boarding platforms.

Developer: An individual, partnership, corporation, or other legal entity—or agent thereof—that undertakes the activities covered by regulations.

Engineering Judgment: The evaluation of available information pertinent to the safety and operational efficiency of all street users. Engineering judgment applies appropriate principles, provisions, and practices—as contained in the relevant design guide(s)—for the purpose of deciding the applicability, use, design, operation, or installation of design elements and traffic control devices.. Engineering judgment shall be exercised by a professional engineer with appropriate traffic engineering expertise, or by an individual working under the supervision of such an engineer, through the application of procedures and criteria established by the engineer. Documentation of Engineering Judgment should be used.

Functional Classification: Functional classification is the process of grouping roadways into a hierarchical system based on the type of travel provided. Lower classifications primarily handle short, local trips, while higher classifications support longer-distance regional and interstate travel. The following street classifications are established in this manual:

> **Interstate:** Controlled-access principal arterial routes officially designated as part of the Dwight D. Eisenhower National System of Interstate and Defense Highways. Interstates provide the highest level of mobility, serve long-distance and interstate travel, and connect major population centers, economic hubs, and regions.
>
> **Other Freeway / Expressway:** Freeways and expressways function similarly to interstates by emphasizing high mobility and limited access. These facilities typically feature divided directional roadways, full or partial access control, and grade-separated interchanges. Direct property access is generally prohibited. Freeways and expressways generally carry higher traffic volumes, require greater right-of-way widths, and permit higher travel speeds for longer-distance trips.
>
> **Arterial:** Arterials are intended to provide a high degree of mobility and serve the longest trips within and between urbanized areas. In urban contexts, arterials provide direct property access to major activity centers and some residential or commercial areas without penetrating neighborhood streets. In rural contexts, arterials serve as corridors for statewide or interstate travel, connecting cities, large towns, and major destinations. Arterials may be classified as principal or minor arterials.
>
> **Collector:** Collectors gather and distribute traffic between local streets and arterials while balancing land access and mobility. In urban contexts, collectors provide access and connectivity within residential, commercial, and industrial areas, distributing trips between local streets and arterials. In rural contexts, collectors provide land access and mobility to towns and activity centers, such as a consolidated school, not directly served by a higher speed and volume facility. Collectors are the most important intra-county travel corridors, as they connect rural-to-urban centers to arterials.
>
> **Local:** Typically used to refer to the remaining roadways not identified with a higher functional classification. In all contexts, local streets primarily provide direct land access and short-distance travel. Local streets generally distribute traffic to collector streets rather than accommodate through traffic movement.
>
> **Alley:** Alleys generally have two open ends, with each end connecting to different streets and the edges facing the backside of adjacent properties. Designed primarily to provide access to or from the rear or side of a property.

Green Infrastructure: A network of parks, open spaces, drainageways, and floodplains that help mitigate the environmental impacts caused by impervious (hard) surfaces. Site-specific green infrastructure refers to smaller, engineered, structural practices that mimic larger natural systems and use vegetation, soils, and roots to slow and filter stormwater runoff.

Intersection: The area where two or more user travel paths meet. Further defined in the KRS 189.010 (4), as (a) The area embraced within the prolongation or connection of the lateral curb lines, or, if none, then the lateral boundary lines of the roadways of two (2) highways which join one another, but do not necessarily continue, at approximately right angles, or the area within which vehicles traveling upon different highways joining at any other angle may come into conflict; or (b)

Where a highway includes two (2) roadways thirty (30) feet or more apart, then every crossing of each roadway of such divided highway by an intersecting highway shall be regarded as a separate intersection. If the intersecting highway also includes two (2) roadways thirty (30) feet or more apart, every crossing of two (2) roadways of the highways shall be regarded as a separate intersection. The junction of a private alley with a public street or highway shall not constitute an intersection.

Micromobility: Low-speed, single-person transport vehicles primarily consisting of bikeshare systems and electric scooters.

Pavement: The materials used to cover the ground surface along of a roadway or travelway for multimodal transportation, Pavement consists of a combination of granular base, base course, and surface course placed on a subgrade to support and distribute the traffic load to the roadbed. See Chapter 8.2.1.1 for layers.

Pedestrian: Any person afoot or in a wheelchair, as defined in KRS 189.010 (8).

Pedestrian Access Route: A continuous and unobstructed path of travel provided for pedestrians within or coinciding with sidewalks and walkways.

Pedestrian Facilities: A general term referring to a location where improvements and provisions have been made to accommodate or encourage pedestrian activity. Pedestrian facilities include, but are not limited to, accessible routes, sidewalks, crosswalks, crossing islands and medians, traffic control features, curb ramps, bus stops and other loading areas, shared-use paths, and stairs.

Pedestrian Realm: The zone within a street that includes the Frontage Zone, Sidewalk Zone, and Amenity Zone; see Chapter 3.

Physical Barrier: A physical object that prohibits pedestrian, bicyclist, or motorist movement. This could be a curb, guardrail, fence, street amenities such as benches or planters, etc.

Practitioner: An individual who is actively engaged in the profession of transportation study, review, and/ or design of transportation facilities for use by people driving, riding, walking, rolling, bicycling, and scooting.

Public Right-of-Way Accessibility Guidelines: Guidelines under the ADA and the Architectural Barriers Act (ABA) that address access to sidewalks and streets, crosswalks, curb ramps, pedestrian signals, on-street parking, and other components of public right-of-way.

Pushbutton: A button used to activate a crossing device or signal timing for pedestrians or bicyclists.

Right-of-Way: Land owned or granted by easement to a city for transportation or utility purposes; this term is often used to refer to the public land outside of the roadway, including the pedestrian realm. It is typically back of sidewalk to back of sidewalk in urban areas.

Shall: Also defined as "must." A mandatory condition. Where certain requirements in the design or application of this manual are described with the "shall" or the "must" stipulation, it is mandatory that the requirements be met.

Shared Street: A street that includes a shared zone where pedestrians, bicyclists, and motor vehicles mix in the same space. Motor vehicle speeds on shared streets are intended to be very low.

Should: A desirable advisory condition. Where the word "should" is used in this manual, it is advisable and usually recommended but not mandatory.

Sidepath/Shared Use Path: A shared use path is a bikeway within the right-of-way, physically separated from motor vehicle traffic by a buffer or barrier. Shared use paths may be used by pedestrians, skaters, wheelchair users, joggers, and other active transportation users. They are commonly referred to as trails, paths, or greenways. Sidepaths are a sub-category of shared use paths. They are located parallel to a roadway and are generally not directional. Sidepaths must meet pedestrian accessibility guidelines, as required of all Shared Use Paths per the latest AASHTO Bike Guide.

Sidewalk: A paved area within the street right-of-way or sidewalk easement, specifically designed for pedestrians.

Sight Distance: The distance visible to the driver of an automobile, measured along the normal path of roadway. The minimum sight distance available on a street should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path.

Street: A general term used to describe a right-of-way within the urban service. Streets provide a channel for the movement of people and goods by various modes, including pedestrians, bicyclists, transit users, and motor vehicles. It may also provide access to adjacent properties and space for the placement of underground and above-ground utilities. A street includes the full right-of-way, including pavement, sidewalks and/or bikeways, curb, and gutter. Streets function as corridors for multimodal movement and, secondarily, as drainage channels for stormwater. For the purposes of this manual, the terms "street" and "road" are used interchangeably. Included in this definition are:

> **Public Streets:** Streets dedicated for public use and maintained by the LFUCG.
>
> **Private Streets:** Streets owned, constructed, used, and maintained by a particular subdivision under the appropriate LFUCG subdivision regulations and the covenants of the particular subdivision.
>
> **Access Easements:** When permitted by the Lexington-Fayette Urban County Government as the sole means of vehicular access to a lot, access easements are a type of restricted street that may be used by the public, or privately, as designated by the LFUCG. Access easements are subject to the provisions of the Lexington-Fayette County subdivision regulations.

Street Type: A defined typology (existing or future) in Lexington that is used to describe the general design, function, and character of a street design; see Chapter 2 for additional details.

Vulnerable Roadway Users: Those who are most at risk of a serious injury or fatality in traffic; Vulnerable roadway users typically include people unprotected by a vehicle, including those who walk, roll, bicycle, scoot, and drive a motorcycle.

Walkway: A general term used to describe a paved or improved area for use by pedestrians. Walkways include sidewalks, shared use paths, curb ramps, blended transitions, etc.


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2 Street Improvement Procedures for Private Development

Private development projects that include new or improved streets and other public infrastructure must complete the development review process established by the LFUCG. The review and approval process may require zoning changes, development plans, subdivision plans, and infrastructure improvement plans.

2.1 Planning and Design Requirements

The **Complete Streets Design Manual** establishes design and construction standards for street infrastructure that is built or improved as part of new and redevelopment projects. The **Land Subdivision Regulations** govern the subdivision and development approval process, while the **Procedures Manual for Infrastructure Development** outlines the administrative procedures governing the review and approval of infrastructure improvement plans, permitting, construction inspection, infrastructure acceptance, warranties and surety release. Practitioners should refer to each source to confirm design requirements, construction standards, and procedures for acceptance of public infrastructure by LFUCG.

2.1.1 Major Subdivision Plans

New streets are reviewed and approved as part of Major Subdivision Plans as defined by the **LFUCG Land Subdivision Regulations**. All new public streets identified on a Major Subdivision Plan must conform to the applicable standards within the **Complete Streets Design Manual**, **LFUCG Engineering Manuals**, and **Standard Drawings**.

2.1.2 Zoning and Preliminary Development Plans

Development proposals may require a **Zoning Map Amendment** and approval of a Preliminary Development Plan prior to the submission of a **Preliminary Subdivision Plan** or **Final Development Plan**.

Preliminary Development Plans are submitted to the Division of Planning and reviewed in accordance with **Article 21 of the Zoning Ordinance.** If the zone change and related development plan are approved by the Planning Commission, the zoning recommendation is forwarded to the Urban County Council for consideration and approval.

Refer to the **Zoning Ordinance** and **Land Subdivision Regulations** to determine when **Preliminary Development Plans** or zoning actions are required.

2.1.3 Final Development Plans and Preliminary Subdivision Plans

Following zoning approval, development projects that include public infrastructure must submit a **Final Development Plan** and/or **Preliminary Subdivision Plan** in accordance with the **Land Subdivision Regulations**. Once these plans are approved and certified by LFUCG and/or the Planning Commission, applicants can prepare and submit Infrastructure Improvement Plans to LFUCG.

2.1.4 Infrastructure Improvement Plans and Permitting

After certification of the **Final Development Plan** or **Preliminary Subdivision Plan**, the Developer's Engineer may submit Infrastructure Improvement Plans to the Division of Engineering for review and approval.

Improvement Plans shall be prepared in accordance with the **Land Subdivision Regulations**, **Engineering Manuals**, **Standard Drawings**, and the design standards contained in this Manual.

Improvement plan submissions shall meet the requirements outlined in Appendix A of this Manual. The plans and permit applications may be submitted through the **LFUCG Accela Citizen Portal**. Following acceptance of the plans, the Division of Engineering may issue a **Land Disturbance Permit** authorizing construction of the proposed infrastructure.

The detailed procedures for plan submission, permitting, and project administration are provided in the **Procedures Manual for Infrastructure Development**.

2.2 Construction of Public Infrastructure

Construction of public infrastructure may begin once Infrastructure Improvement Plans have been accepted and permits have been issued. The Developer, Contractor, and Developer's Engineer are responsible for constructing infrastructure in accordance with the accepted plans and applicable engineering standards.

2.2.1 Construction Execution and Oversight

The roles and responsibilities for infrastructure construction and oversight include:

- The Contractor shall construct all infrastructure in accordance with the accepted Improvement Plans.
- The Developer's Engineer is responsible for on-site inspection and shall submit biweekly inspection reports in accordance with the Construction Inspection Manual.
- All required infrastructure testing and inspections shall be conducted by the Developer's Engineer in accordance with the Engineering Manuals.

2.2.2 Coordination and Notification

- The Developer's Engineer shall notify the Division of Engineering and Division of Traffic Engineering at least 72 hours prior to any construction affecting public streets or utilities.
- The Division of Engineering shall also be notified 72 hours prior to roadway material testing.

2.2.3 Field Changes and Dispute Resolution

- The Engineer may authorize minor field changes; however, major design changes must be submitted to the Division of Engineering for review.
- The Engineer shall update the Improvement Plans to reflect any approved field changes.
- Any disputes among the Engineer, Developer, Contractor, and Division of Engineering shall be resolved through the mediation process described in Appendix B of the **Procedures Manual for Infrastructure Development**.

2.3 Final Documentation and Infrastructure Acceptance

Following completion of construction, the Developer must submit final documentation required for LFUCG to review and accept the public infrastructure.

2.3.1 Required Final Documentation

Final documentation requirements are outlined in the **Procedures Manual for Infrastructure Development** and Article 4-7 of the **Land Subdivision Regulations**.

Required documentation may include, but is not limited to:

- Certification of Substantial Completion
- Record Drawings
- Construction inspection documentation
- CCTV inspection results
- Test results
- Final punch list

2.3.2 Final Subdivision Plat and Dedication

Once all required documentation has been submitted and accepted, a **Final Subdivision Plan** or **Record Plat** may be certified for the dedication of public infrastructure.

The Division of Planning verifies that all Planning Commission requirements have been satisfied prior to certification of the plat. Upon certification and recording of the plat, the infrastructure may be accepted for public operation and maintenance, subject to the conditions established in the **Land Subdivision Regulations**.

Approval and recording of the plat signifies:

- acceptance of the infrastructure for operation and maintenance by LFUCG, except where final pavement surface placement is pending;
- acknowledgment of the Developer's warranty period; and
- LFUCG's intent to assume ownership of the public facilities at the conclusion of the warranty period, provided the infrastructure complies with all applicable engineering standards.

2.4 Surety, Warranty, and Final Acceptance

Public infrastructure constructed as part of development is subject to surety and warranty requirements to ensure completion of improvements and correction of defects.

2.4.1 Performance and Warranty Surety

The Developer's Engineer shall submit a punch list identifying any remaining work required to complete the public improvements, along with a detailed estimate of the cost to complete the work. The Engineer shall certify that the punch list and cost estimate are accurate and complete.

The Developer shall provide a combined performance and warranty surety to guarantee completion of the remaining improvements and repair of defective infrastructure resulting from improper workmanship or materials.

Surety amounts shall be calculated in accordance with **Article 4-7(c)(9)** of the **Land Subdivision Regulations**. A surety calculation form is available through the Division of Engineering.

2.4.2 Warranty Inspections

During the warranty period, LFUCG conducts periodic inspections to verify the condition of the infrastructure and identify any deficiencies requiring correction.

If deficiencies are identified, the Developer shall correct the deficiencies in accordance with the schedule established during the surety process.

2.4.3 Release of Surety

Release of the performance and warranty surety is conducted in accordance with **Article 4-8(e)** of the **Land Subdivision Regulations**.

When the Division of Engineering determines that all improvements have been properly constructed in accordance with the **Subdivision Regulations**, **Zoning Ordinance**, **Engineering Manuals**, and **Standard Drawings**, the Urban County Engineer shall notify the Planning Commission in writing, and the surety may be released.

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3

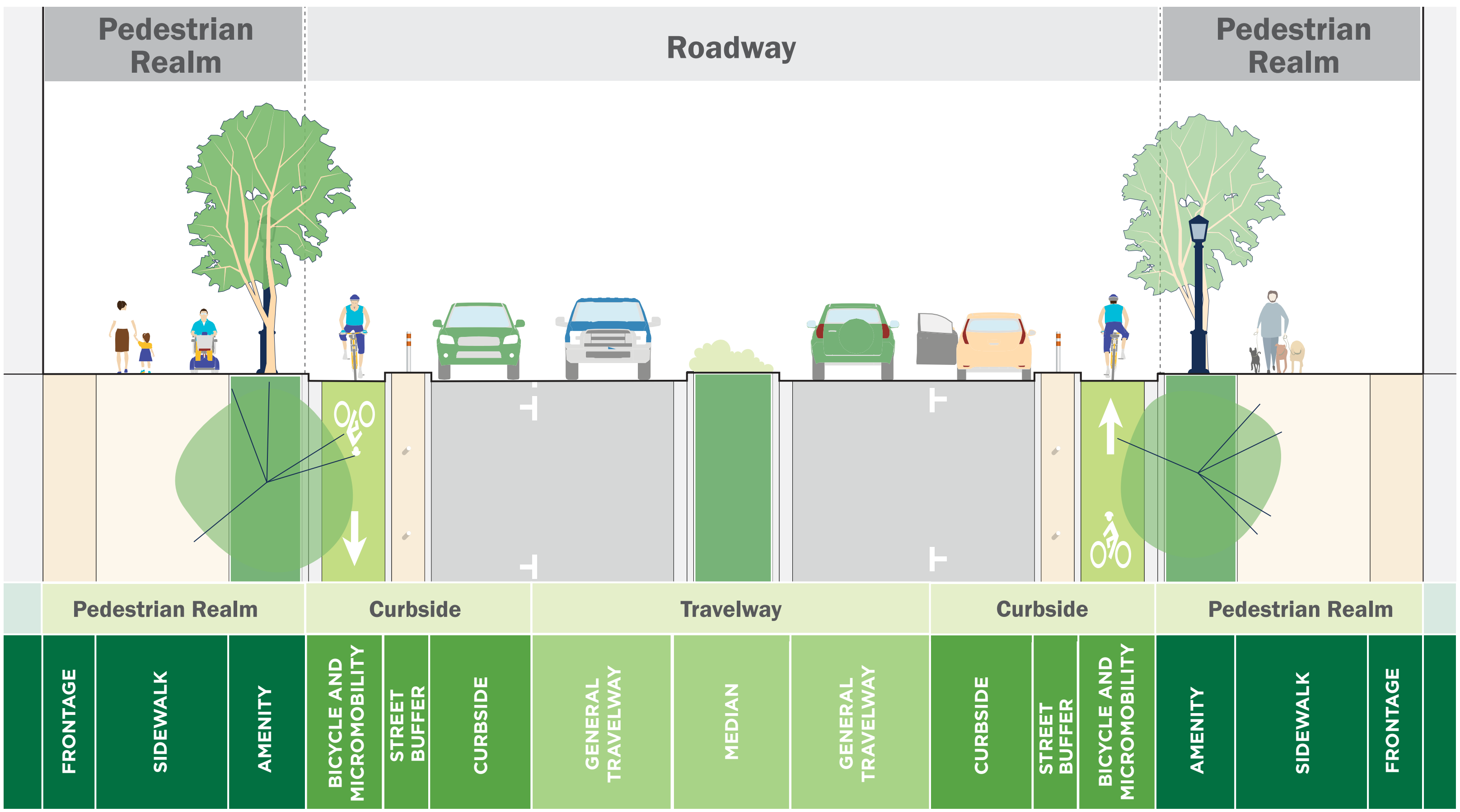
Street Types and Typical Cross-Sections

3.1 Complete Street Types

Every street can be broken into two broad zones: the pedestrian realm and the roadway. The dimension of each zone relates to the street type, adjacent land uses, and where it fits within the roadway network.

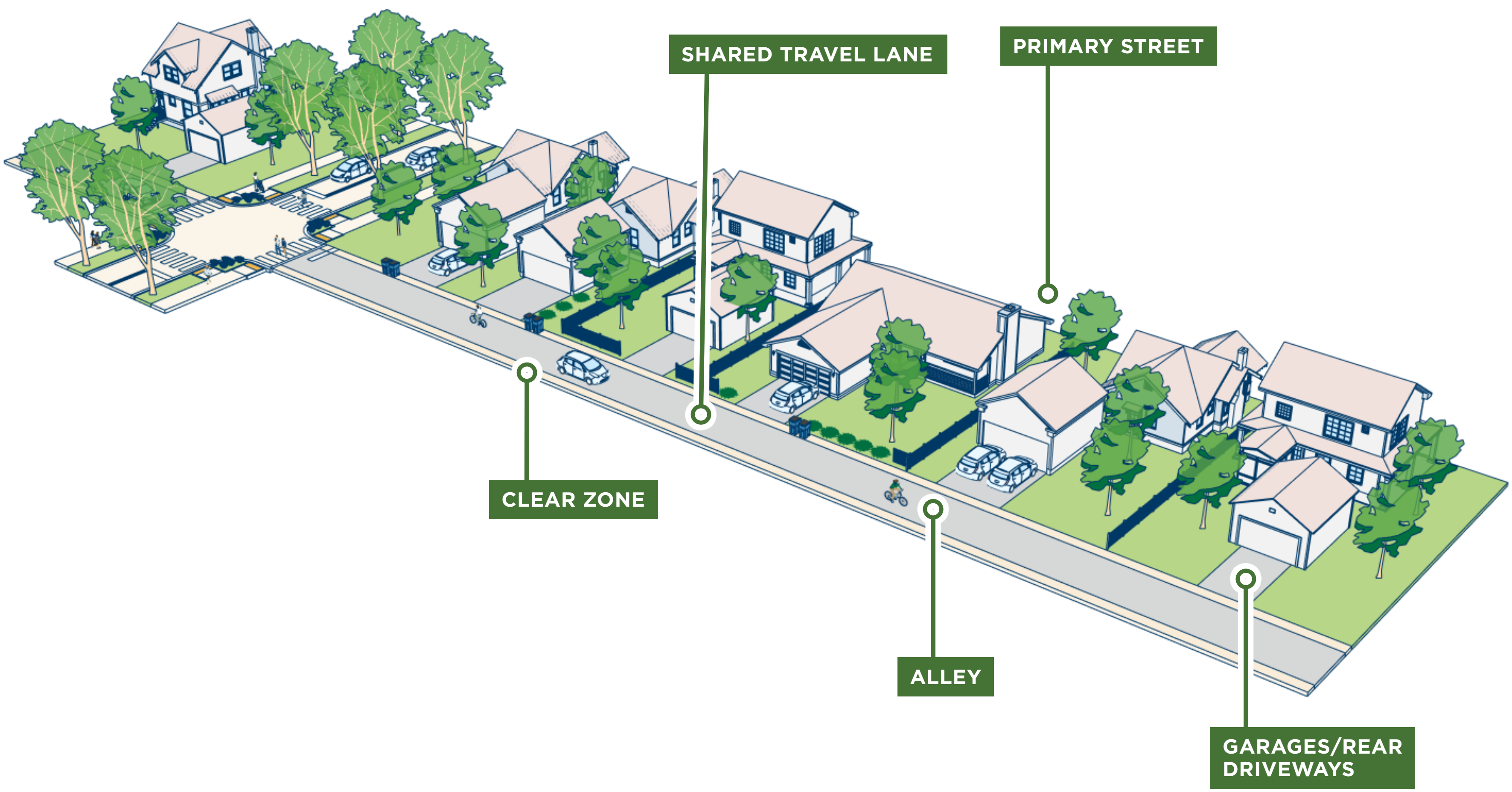
Each Street Type and Typical Cross-Section within this Chapter includes:

- A description of the street's desired design characteristics
- A description of the level of land use intensity it supports
- A cross-section graphic with labeled dimensions
- A plan view visualization
- Notes the design, target, and posted speed limit
- Notes the street type's modal emphasis (Section 3.3)
- Lists the most appropriate design elements (Chapter 4)



3.1.1 ALLEY

Alleys support a variety of land use types and intensities ranging from low density residential to medium- and high-density mixed-use areas. Alleys are desirable in all new developments given their many benefits. In residential areas, alleys eliminate the need for driveways along the street frontage which in turn eliminates potential crashes between backing vehicles and street users including pedestrians, bicyclists, and other drivers. Alleys also reduce visual clutter by providing space for utilities and trash collection. Additionally, alleys enhance public safety by providing a secondary point of access for fire and emergency responders. In commercial areas, alleys provide access for deliveries, loading, and unloading. Alley travelways are low-speed and are shared by all users.

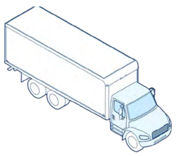


DESIGN SPEED

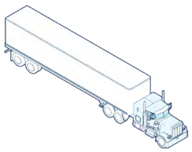
10 mph

ARTERIAL

DESIGN VEHICLE
SU-40

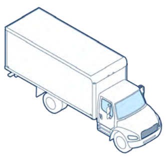


CONTROL VEHICLE
WB-50

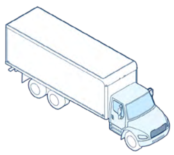


COLLECTOR

DESIGN VEHICLE
SU-30

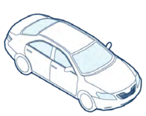


CONTROL VEHICLE
SU-40

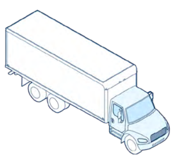


LOCAL

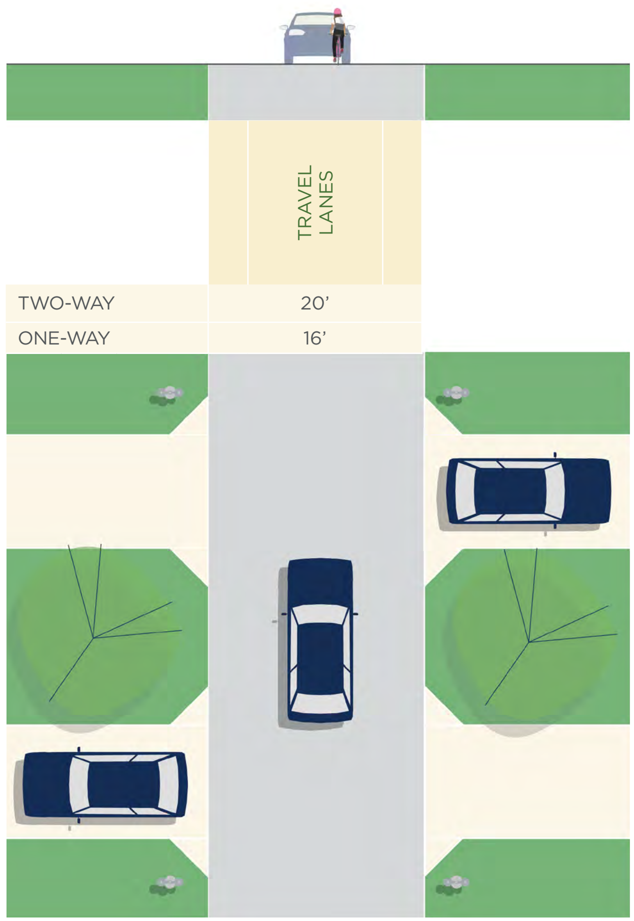
DESIGN VEHICLE
P



CONTROL VEHICLE
SU-40



3.1.1 ALLEY CROSS SECTION

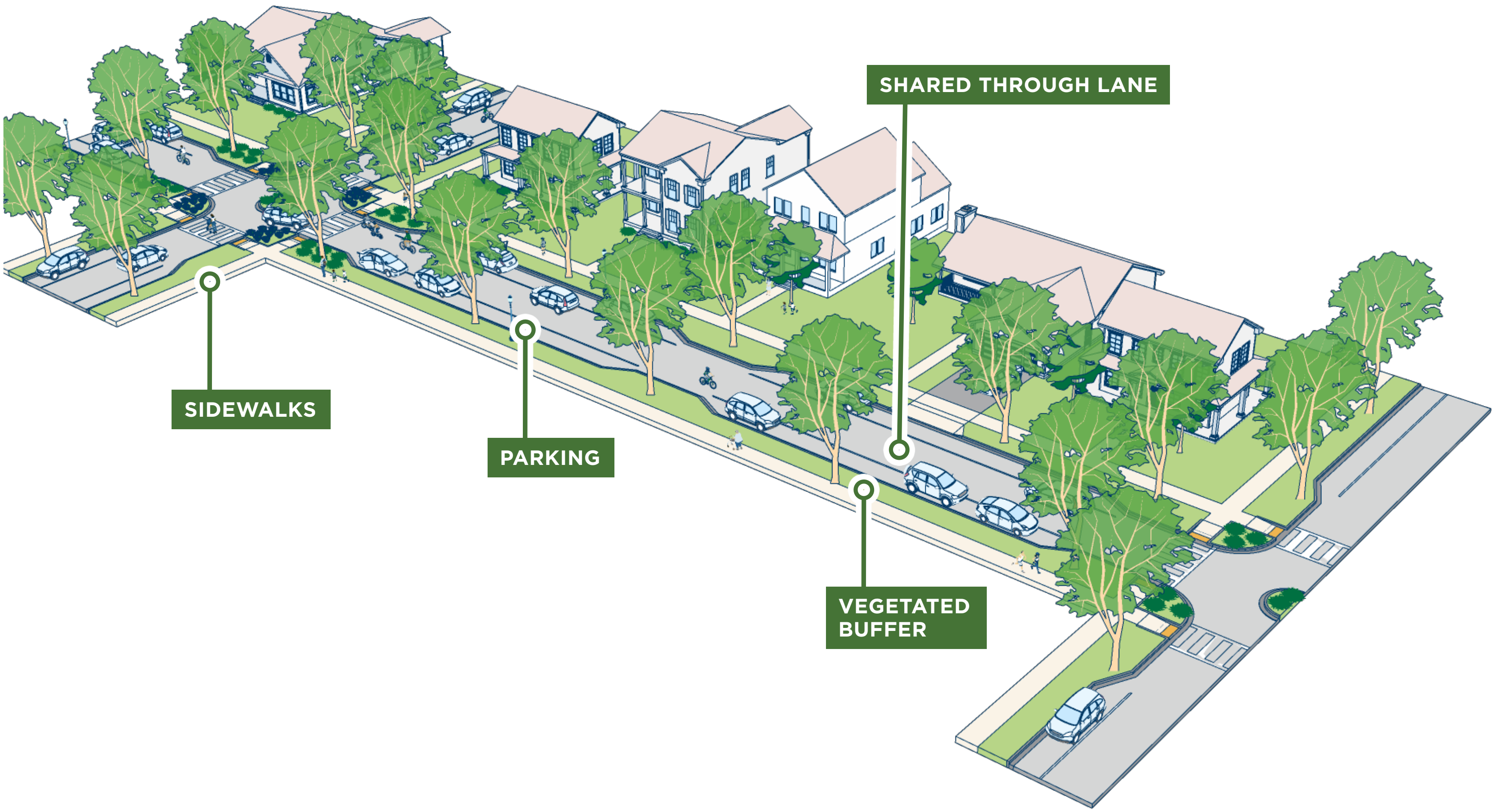


3.1.2 NEIGHBORHOOD STREET

All neighborhood streets have the following characteristics:

- Low traffic volumes
- Low vehicular speeds (target speed 20 MPH)
- Local access is prioritized over through vehicular movement
- Bicyclists and drivers share the travel way
- Sidewalks are provided on both sides of the street
- Planting strips with street trees are provided between sidewalks and vehicular travel ways
- On-street parking is permitted on one or both sides of the street. Parking may alternate sides of the street for chicane effect.
- Driveways may directly access neighborhood streets; however, rear alleys are encouraged
- Mid-block curb extensions are spaced every 250-300 feet to visually define parking areas, narrow the roadway, and encourage lower vehicle operating speeds
- Traffic circles and bulb-out intersections are typical intersection treatments

3.1.2.1 Low to Medium Intensity Context



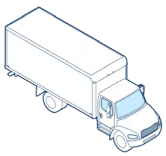
DESIGN SPEED

20 mph

LOCAL

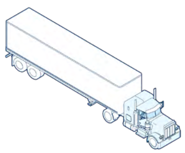
DESIGN VEHICLE

SU-30



CONTROL VEHICLE

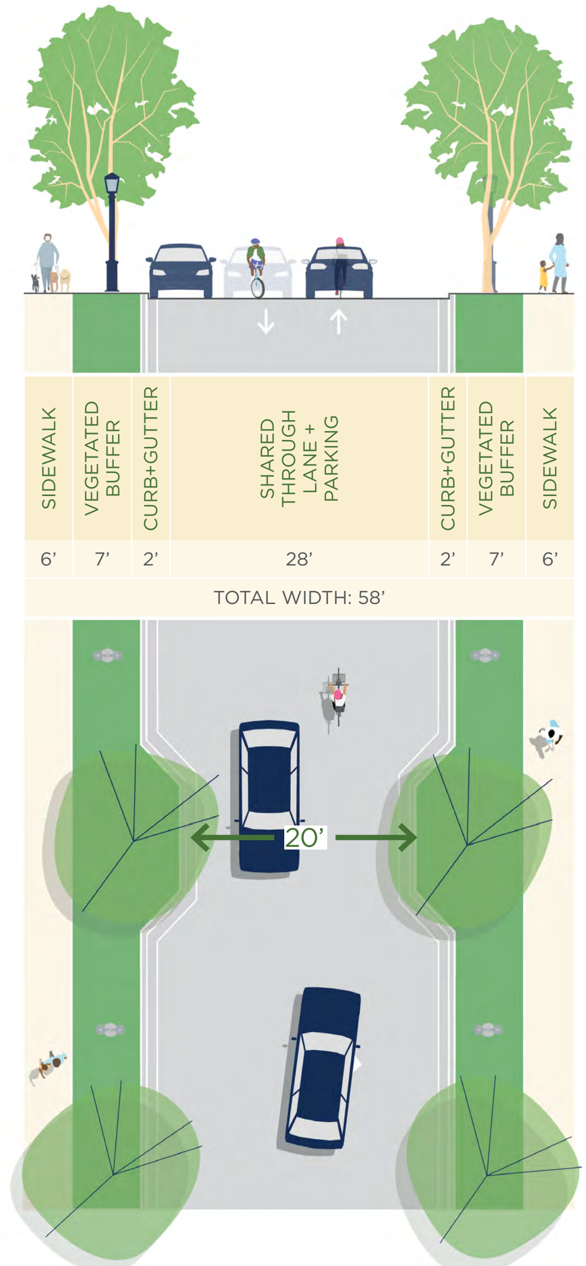
WB-40



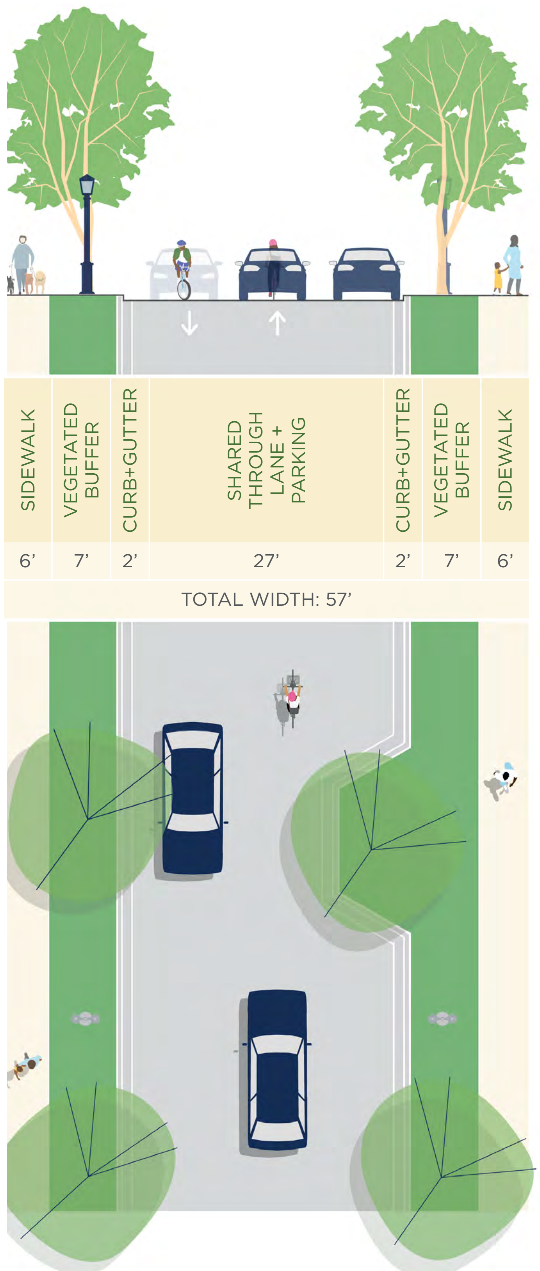
LOW TO MODERATE-INTENSITY LAND USE CONTEXTS

Neighborhood Streets in low to moderate-intensity land use contexts have a mix of single-family and multi-unit residential uses (duplex, quadraplex, etc). Neighborhood streets in these lower intensity contexts function as Yield Streets, where motor vehicles share an informal travel lane and yield to opposing traffic.

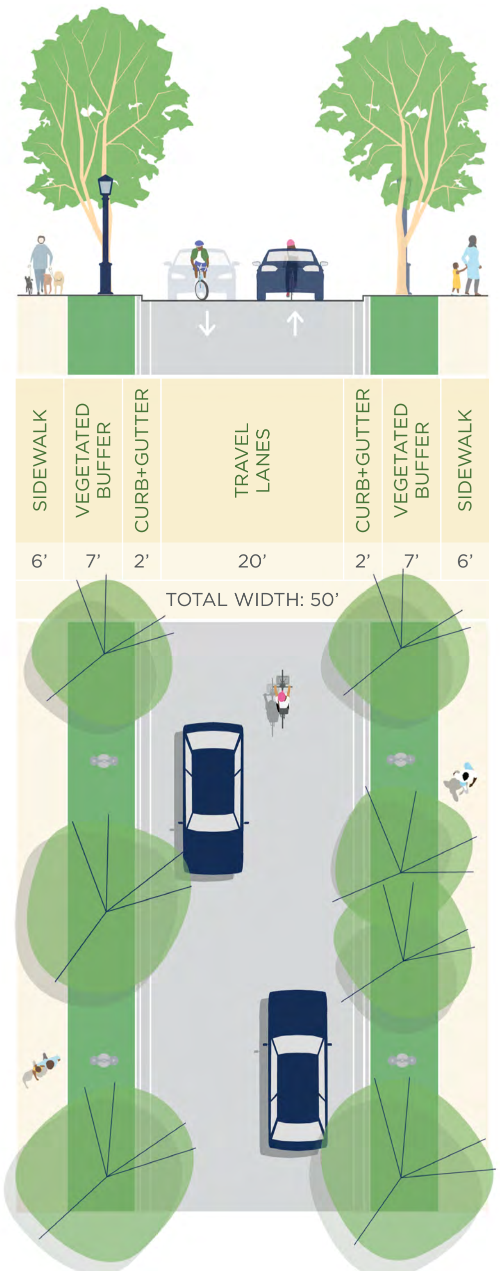
3.1.2.1 LOW TO MEDIUM INTENSITY CONTEXT (TYPICAL SECTION)



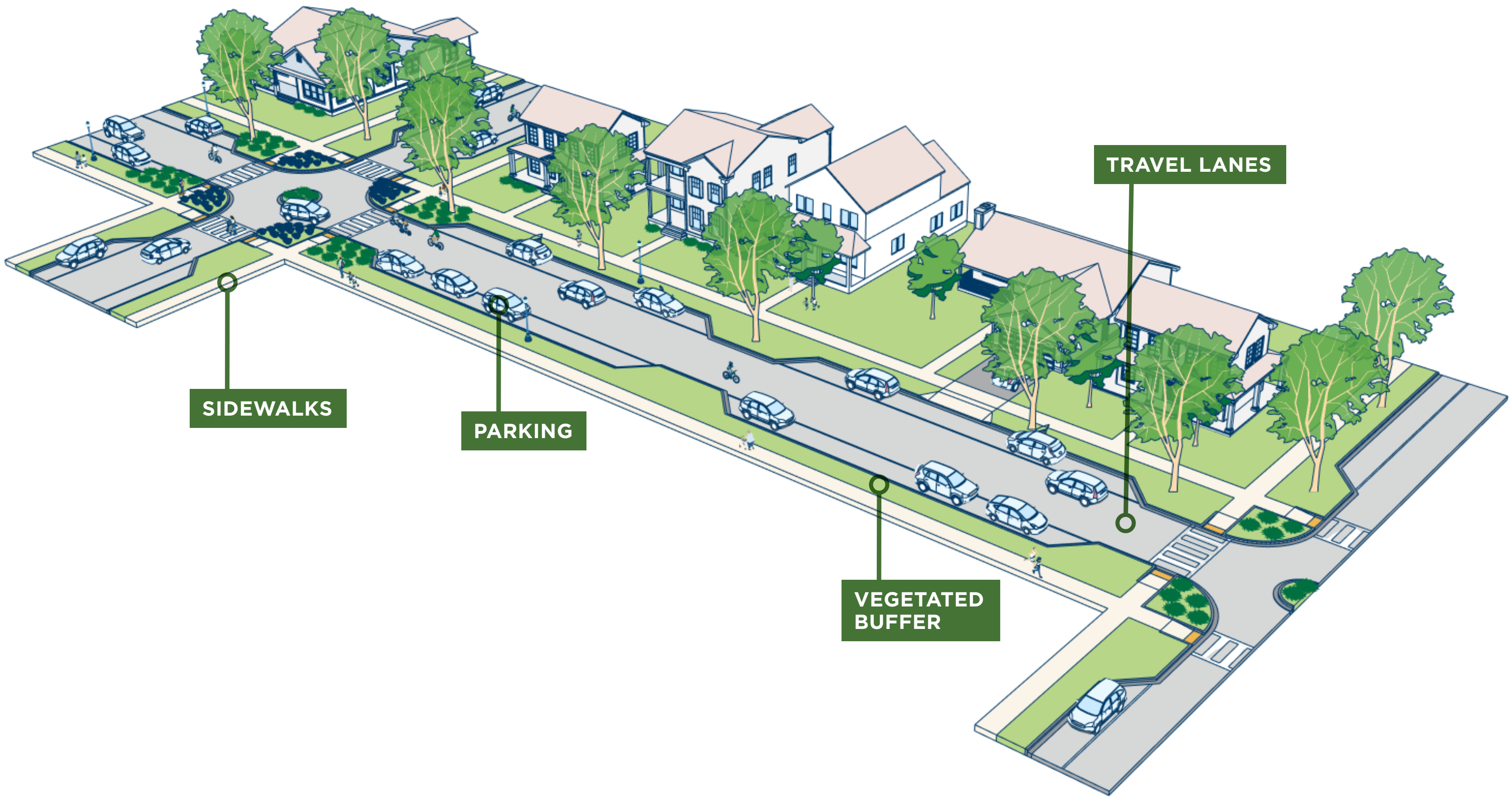
3.1.2.1.1 LOW TO MEDIUM INTENSITY CONTEXT SINGLE PARKING



3.1.2.1.2 LOW TO MEDIUM INTENSITY CONTEXT NO PARKING



3.1.2.2 High Intensity Context



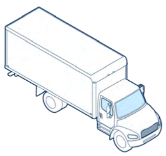
DESIGN SPEED

20 mph

LOCAL

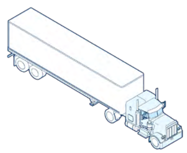
DESIGN VEHICLE

SU-30



CONTROL VEHICLE

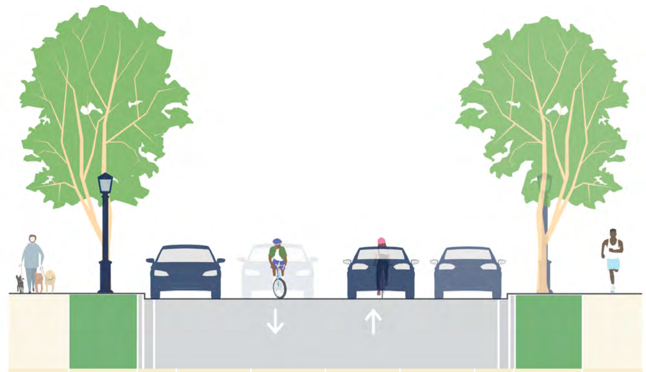
WB-40



HIGH-INTENSITY LAND USE CONTEXTS

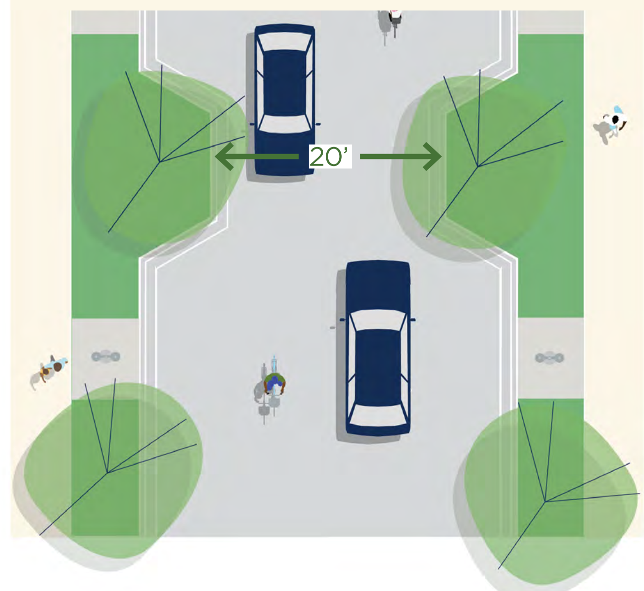
Neighborhood streets in higher intensity land use contexts have more dense residential uses (multi-family) or are mixed-use in character. They may support neighborhood-level commercial and civic uses, such as corner stores, schools and community centers. While traffic volumes may be higher, these streets are still low speed. The primary difference with higher intensity land uses is an increased demand for on street parking. This necessitates a wider travelway to ensure passenger and emergency vehicles that are traveling in opposite directions can pass unimpeded.

3.1.2.2 HIGH-INTENSITY CONTEXT (TYPICAL SECTION)



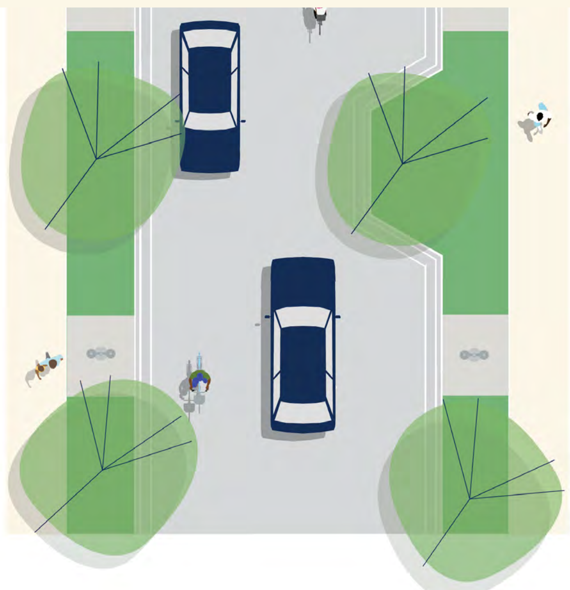
	SIDEWALK	VEGETATED BUFFER	CURB+GUTTER	PARKING	TRAVEL LANE	TRAVEL LANE	PARKING	CURB+GUTTER	VEGETATED BUFFER	SIDEWALK
RESIDENTIAL	6'									6'
MIXED-USE/PARKS	8'	7'	2'	7'	10'	10'	7'	2'	7'	8'
SCHOOLS	10'									10'

TOTAL WIDTH: MIN. 64'

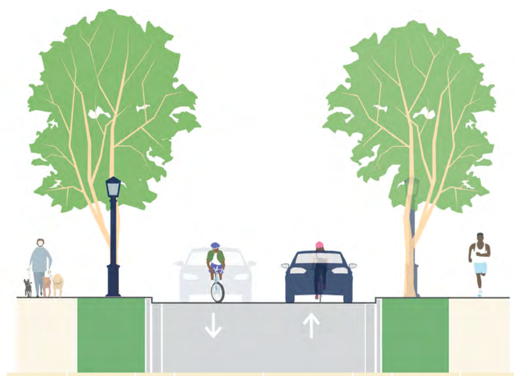


3.1.2.2.1 HIGH INTENSITY CONTEXT SINGLE PARKING

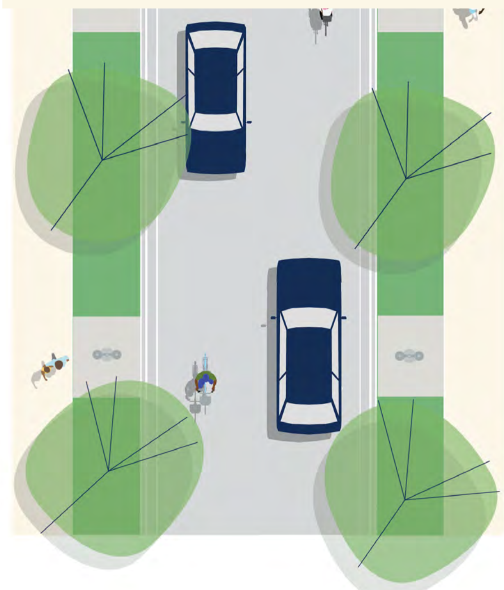
	SIDEWALK	VEGETATED BUFFER	CURB+GUTTER	TRAVEL LANE	TRAVEL LANE	PARKING	CURB+GUTTER	VEGETATED BUFFER	SIDEWALK
RESIDENTIAL	6’								6’
MIXED-USE/PARKS	8’	7’	2	10’	10’	7’	2	7’	8’
SCHOOLS	10’								10’
	TOTAL WIDTH: MIN. 57’								



3.1.2.2.2 HIGH INTENSITY CONTEXT NO PARKING



	SIDEWALK	VEGETATED BUFFER	CURB+GUTTER	TRAVEL LANE	TRAVEL LANE	CURB+GUTTER	VEGETATED BUFFER	SIDEWALK
RESIDENTIAL	6’							6’
MIXED-USE/PARKS	8’	7’	2’	10’	10’	2’	7’	8’
SCHOOLS	10’							10’
	TOTAL WIDTH: MIN. 50’							



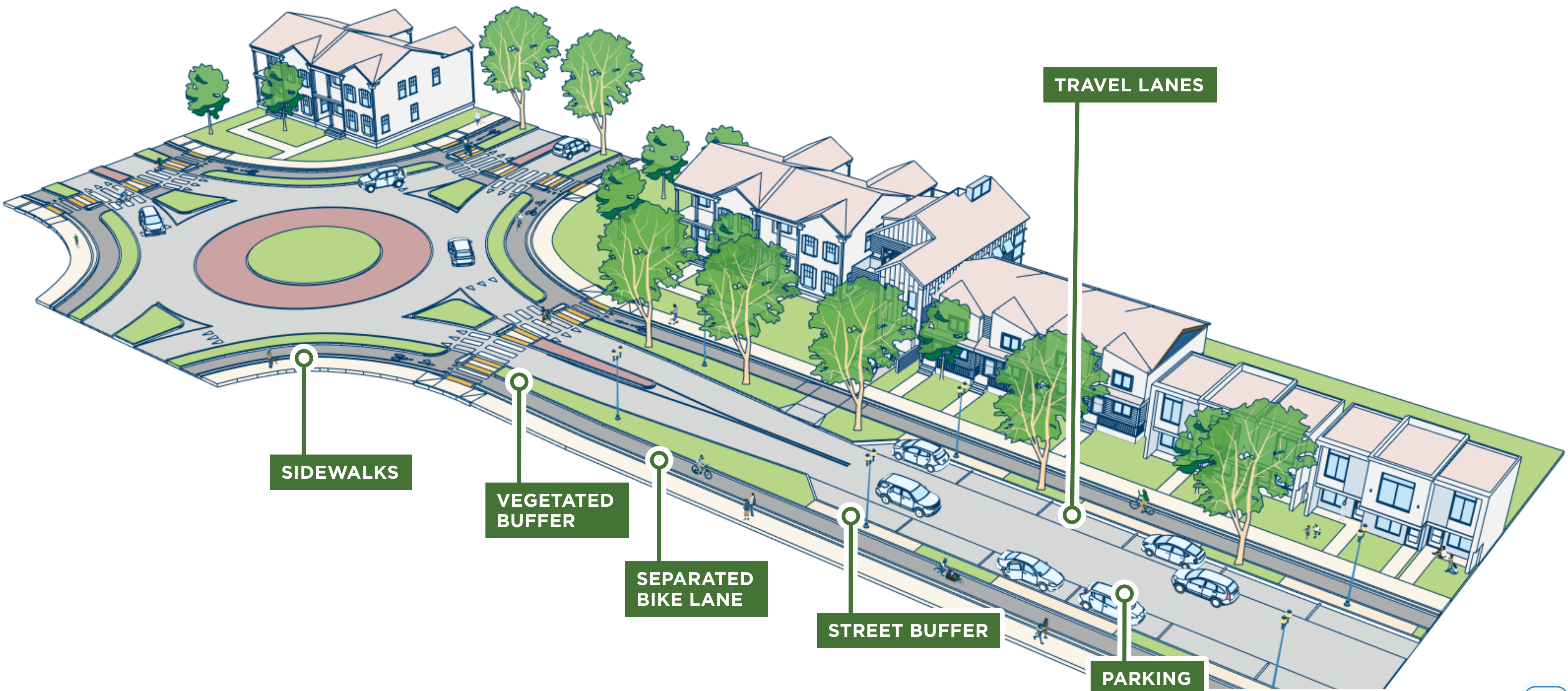
3.1.3 AVENUE

Avenues move higher volumes of traffic through and between neighborhoods and have a target speed of 25 mph.

All Avenues have the following characteristics:

- Low to moderate traffic volumes
- Low to moderate vehicular speeds
- Local access is balanced with through vehicular movement
- Bicyclists have a designated facility and do not share the travel way with drivers
- Motor vehicles traveling in opposite directions can pass one another unimpeded (i.e. non-yield condition)
- Sidewalks are provided on both sides of the street
- Planting strips with street trees are provided between sidewalks, bikeways, and vehicular travel ways
- On-street parking is permitted on one or both sides of the street
- Driveways may directly access Avenues, but with less frequency than Neighborhood Streets
- Rear alleys are encouraged
- Driveway frequency is reduced compared to neighborhood street access
- Mid-block curb extensions are spaced every 250-300 feet to visually define parking areas, narrow the roadway, and encourage lower vehicle operating speeds
- Bulb-out intersections and mini-roundabouts are typical intersection treatments

3.1.3.1 Low to Medium Intensity Context

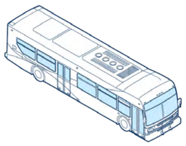


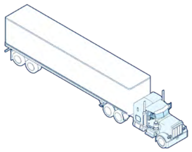
DESIGN SPEED
25 mph

ARTERIAL AND COLLECTOR

DESIGN VEHICLE
BUS-40

CONTROL VEHICLE
WB-50

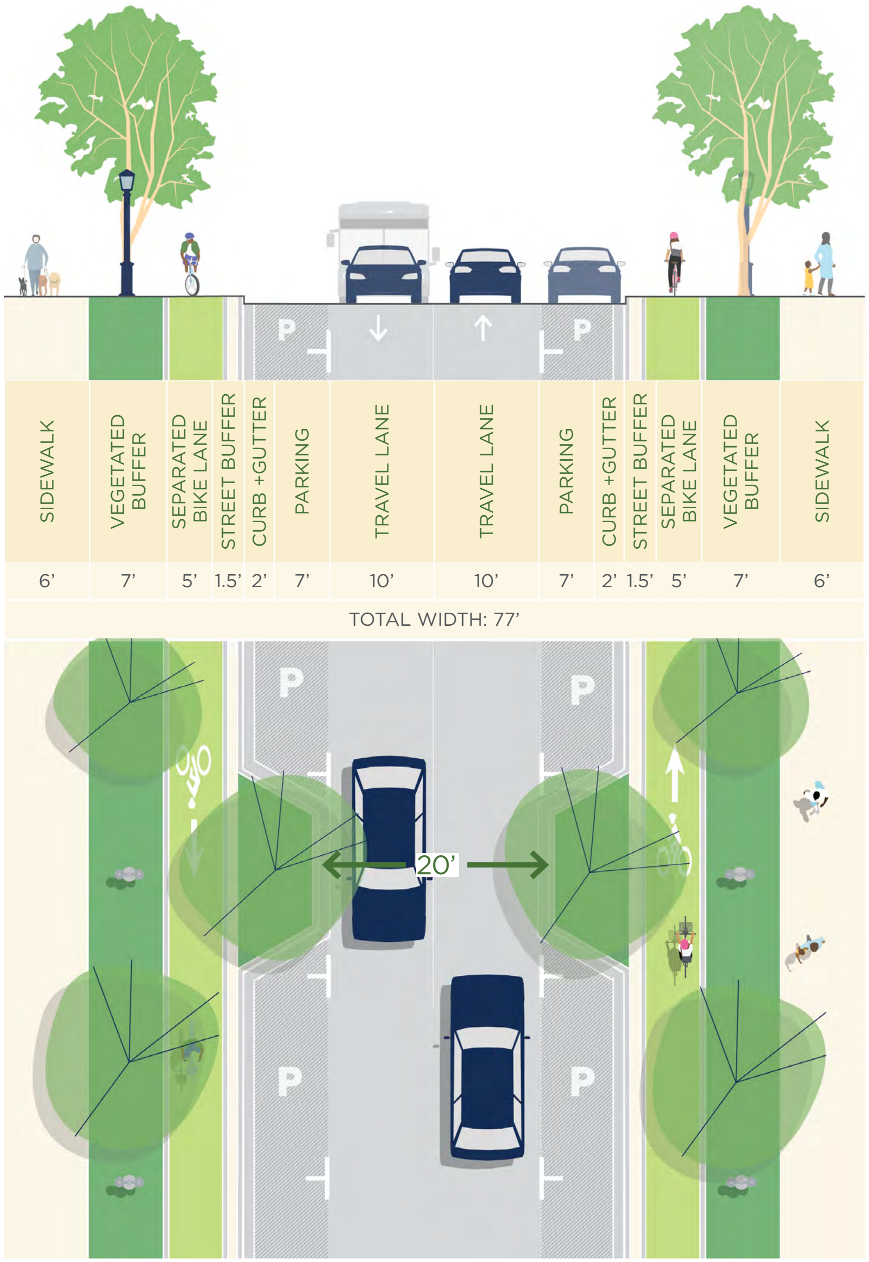




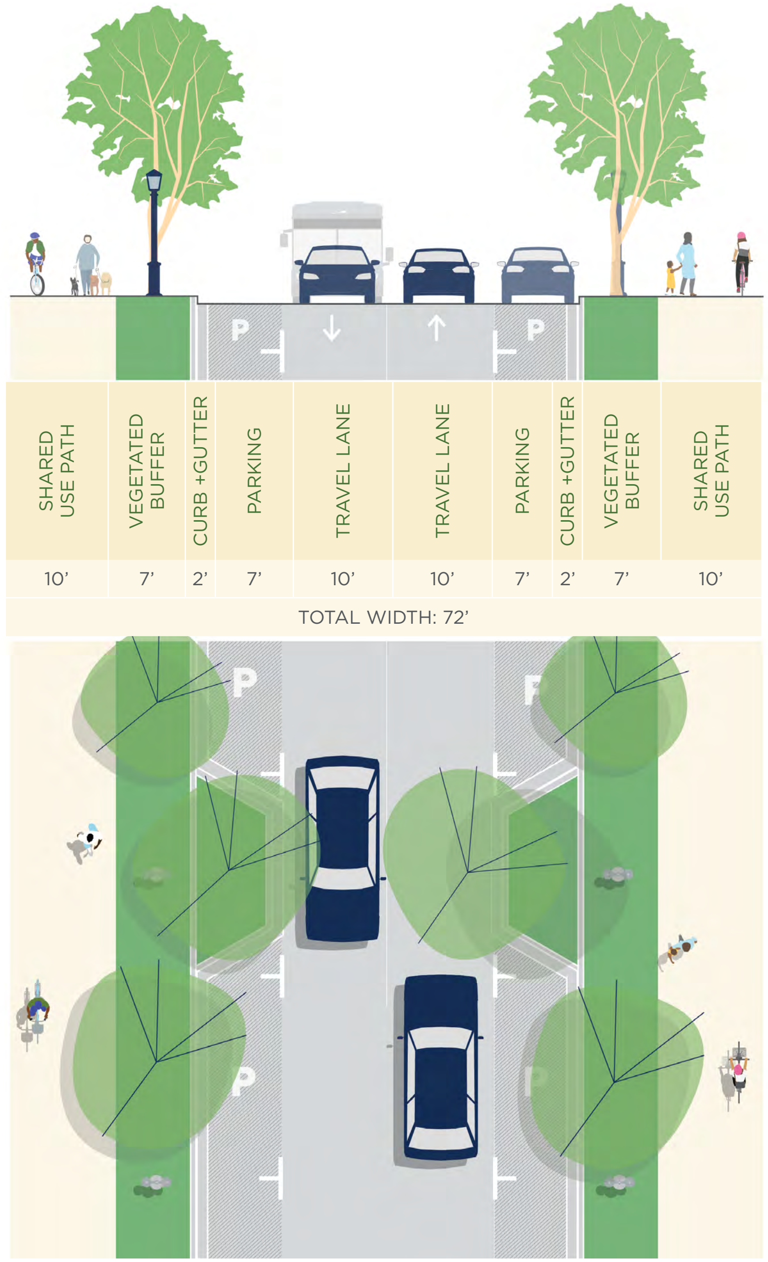
LOW TO MODERATE-INTENSITY LAND USE CONTEXTS

Avenues in low to moderate-intensity land use contexts have a mix of single-family and multi-unit residential uses (duplex, quadraplex, etc). Avenues in these lower intensity contexts must still ensure motor vehicles can pass one another unimpeded. Vehicular access to residential units is provided via consolidated driveways or rear alleys. On-street parking is typically provided to supplement parking for residents and visitors. Bicycle facilities are separated from both pedestrian and vehicular travel either by landscaping or hardscaped barriers. However, a combined shared use path is an option in lower-intensity contexts with infrequent driveways.

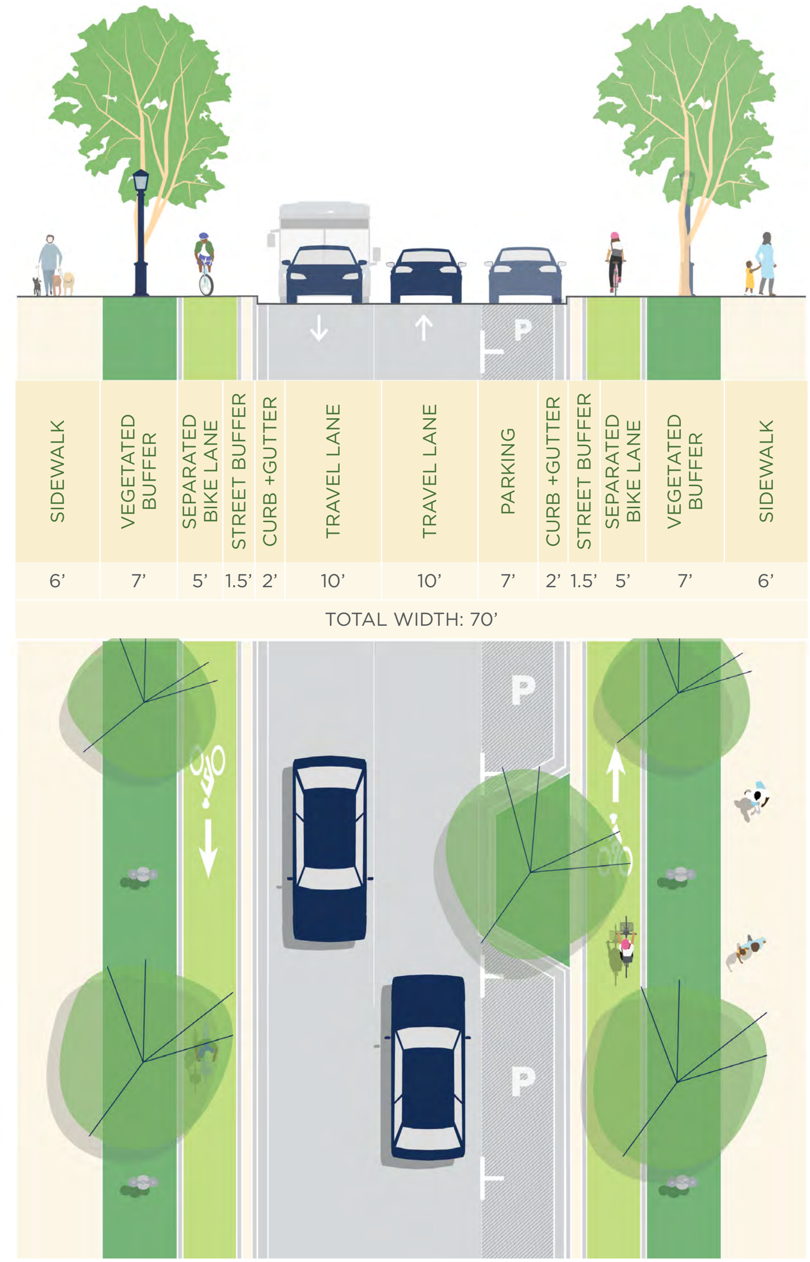
3.1.3.1 LOW TO MODERATE INTENSITY CONTEXT (TYPICAL SECTION)



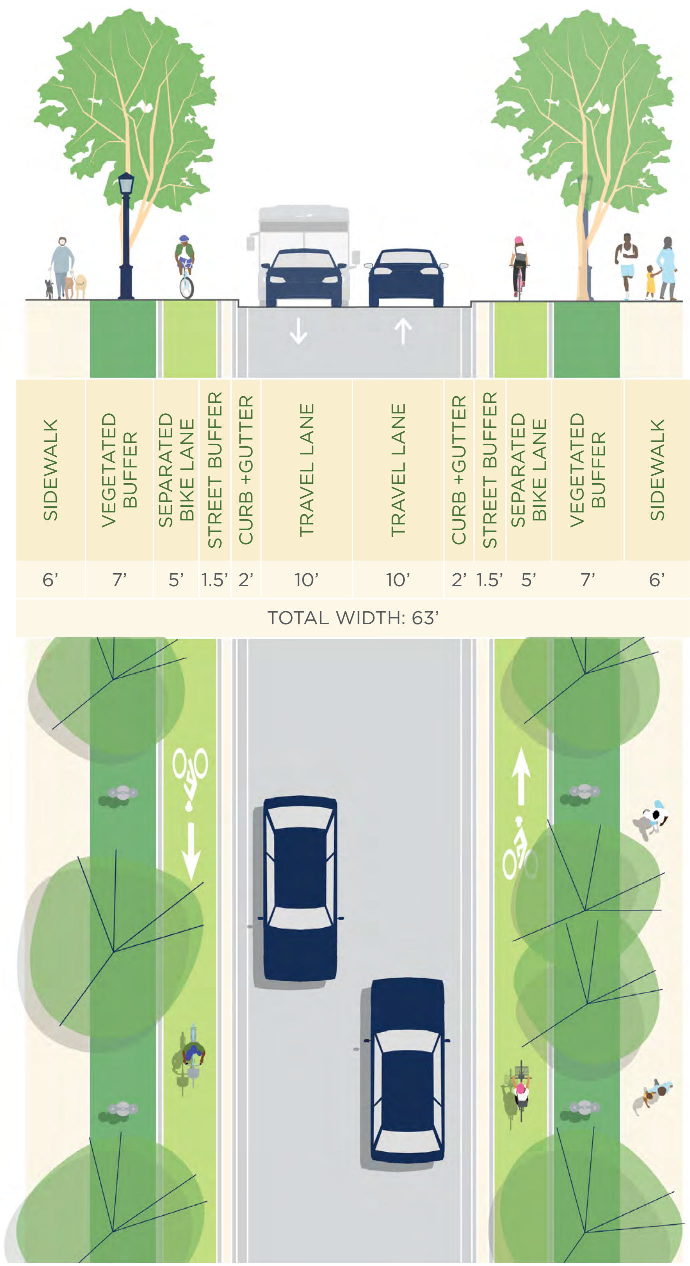
3.1.3.1.1 LOW TO MEDIUM INTENSITY CONTEXT SHARED USE PATH OPTION



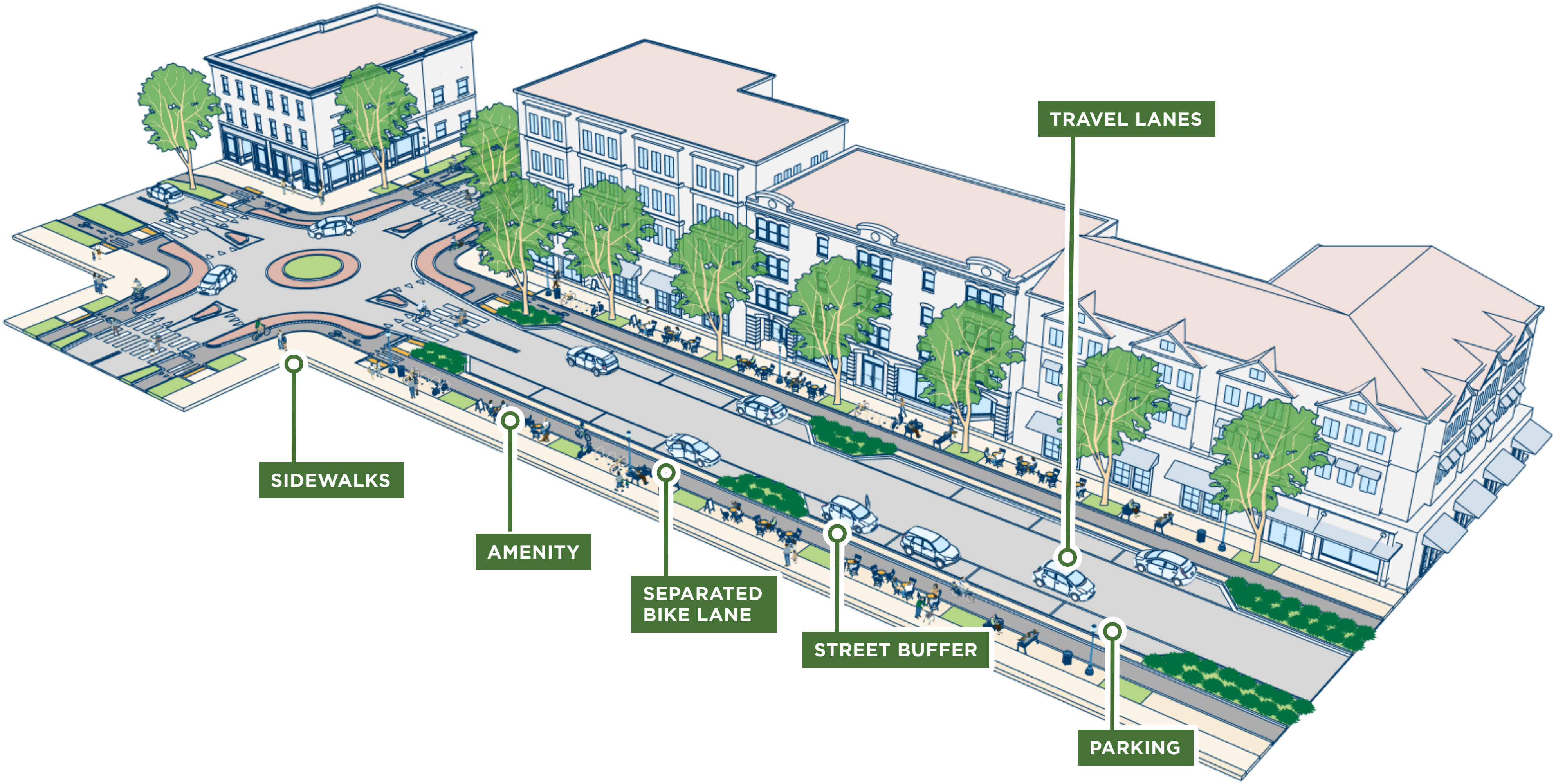
3.1.3.1.2 LOW TO MEDIUM INTENSITY CONTEXT SINGLE PARKING



3.1.3.1.3 LOW TO MEDIUM INTENSITY CONTEXT NO PARKING



3.1.3.2 High Intensity Context



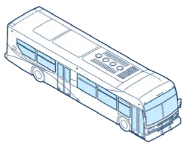
DESIGN SPEED

25 mph

ARTERIAL AND COLLECTOR

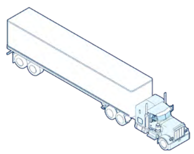
DESIGN VEHICLE

BUS-40



CONTROL VEHICLE

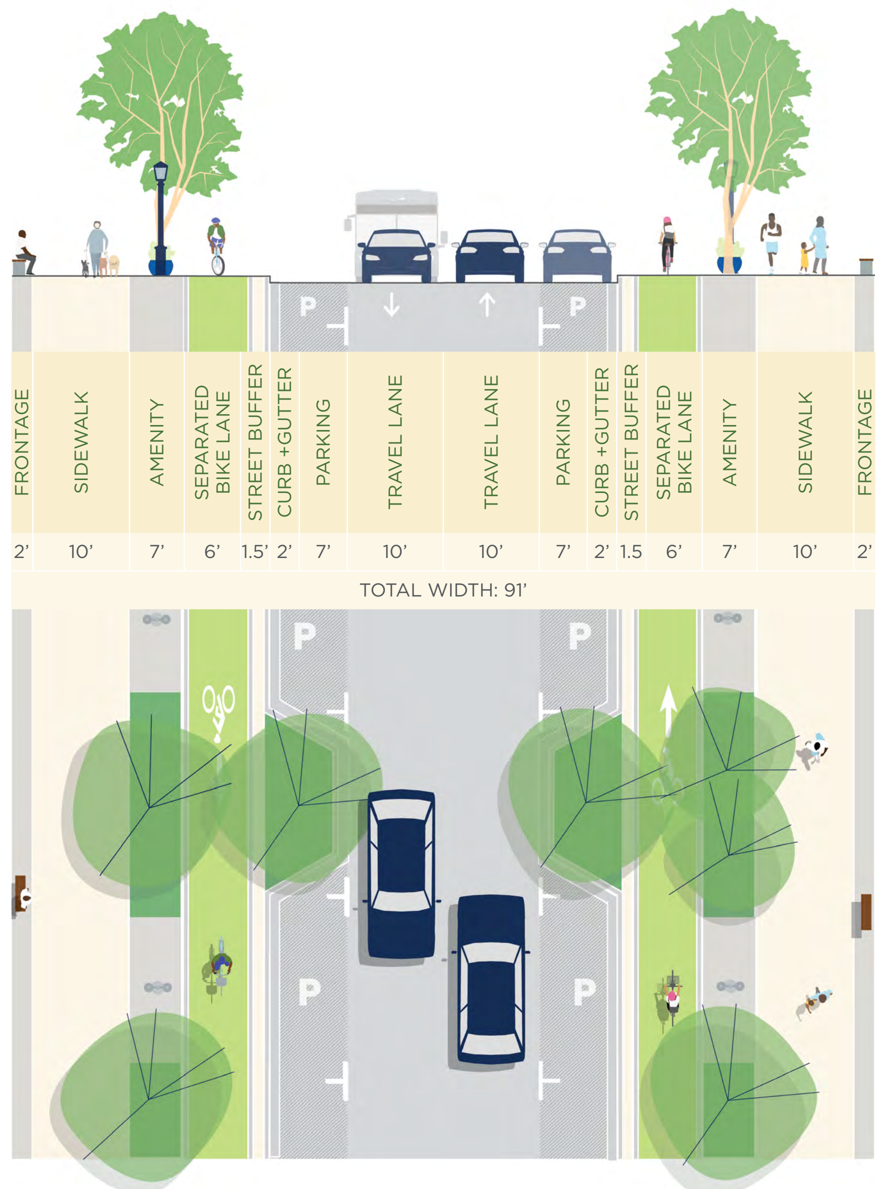
WB-50



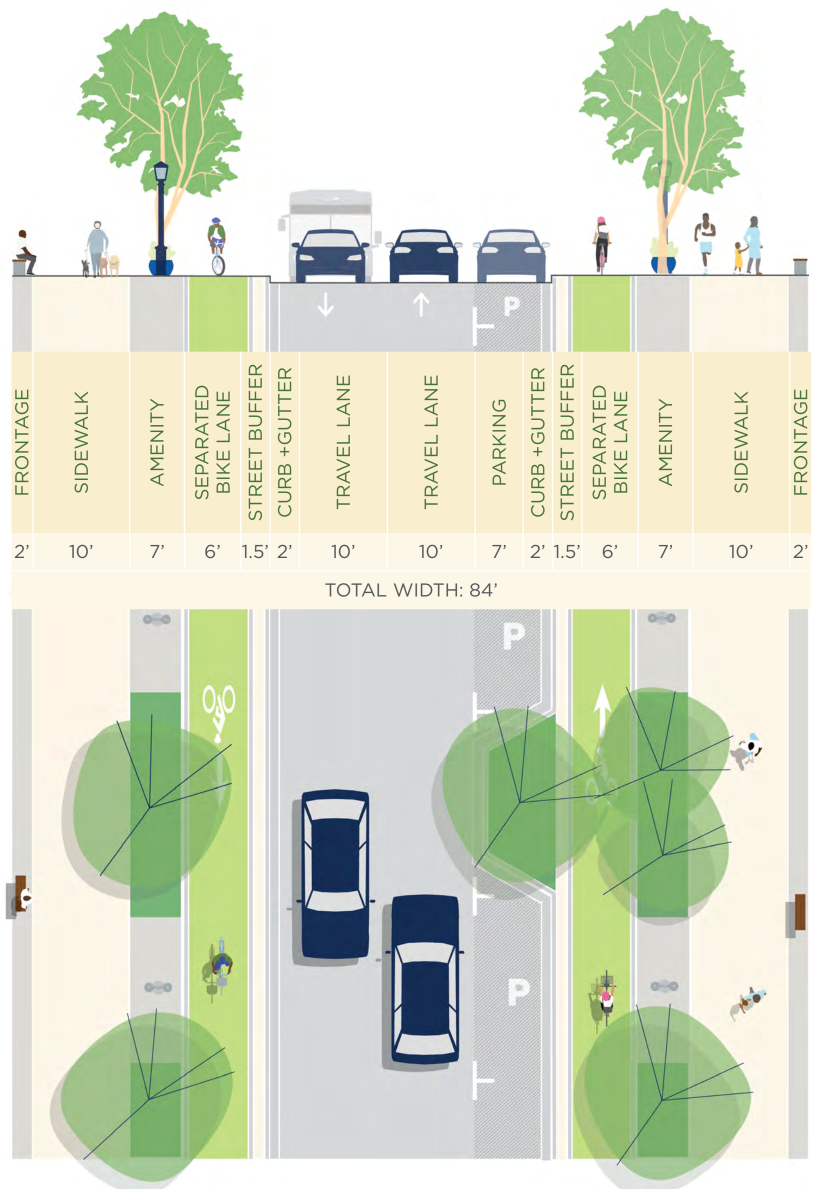
HIGH-INTENSITY LAND USE CONTEXTS

Avenues in higher intensity land use contexts are busy streets that feature mixed-use development, multi-family residential units, or robust commercial activity. Vehicular access to commercial developments is provided via consolidated driveways and rear access roads. On-street parking is provided to support commercial activity and to supplement parking for residents and their visitors. Bicycle facilities are separated from both pedestrian and vehicular travel either by landscaping or hardscaped barriers. Wider sidewalks with streetscape amenities provided in pedestrian frontage and/or amenity zones enhance pedestrian activity and walkability.

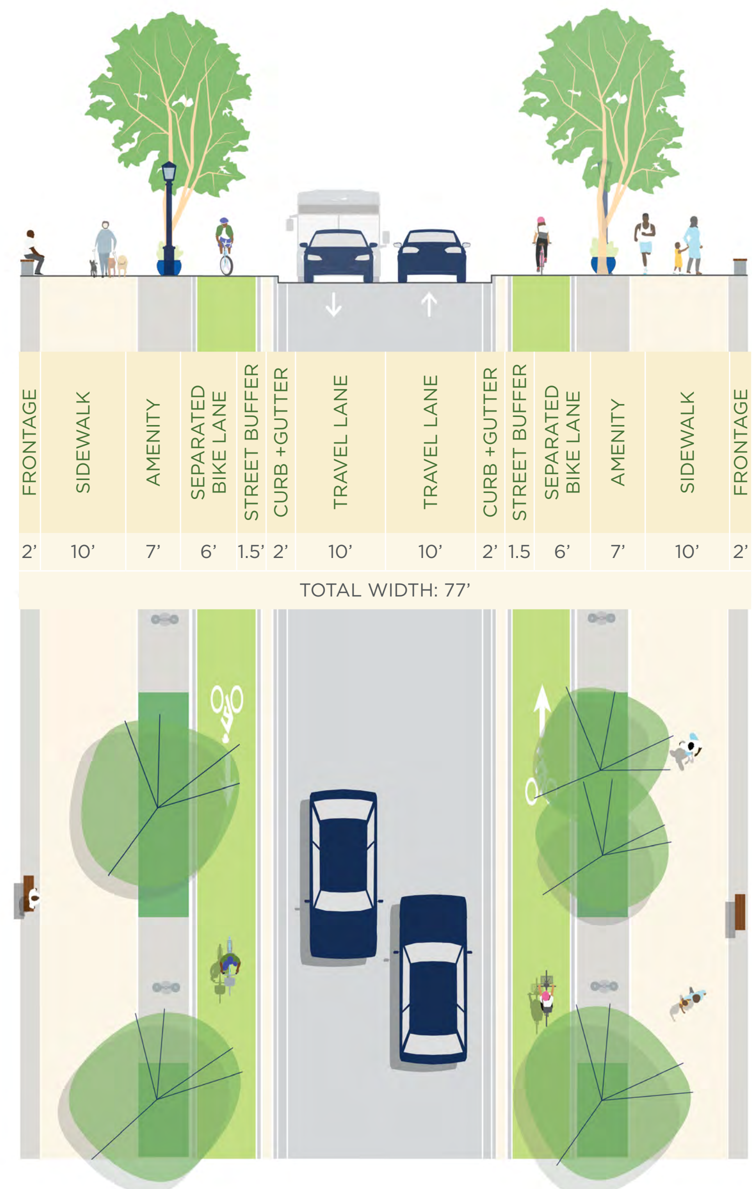
3.1.3.2 HIGH-INTENSITY CONTEXT (TYPICAL SECTION)



3.1.3.2.1 HIGH INTENSITY CONTEXT SINGLE LANE PARKING



3.1.3.2.2 HIGH INTENSITY CONTEXT NO PARKING



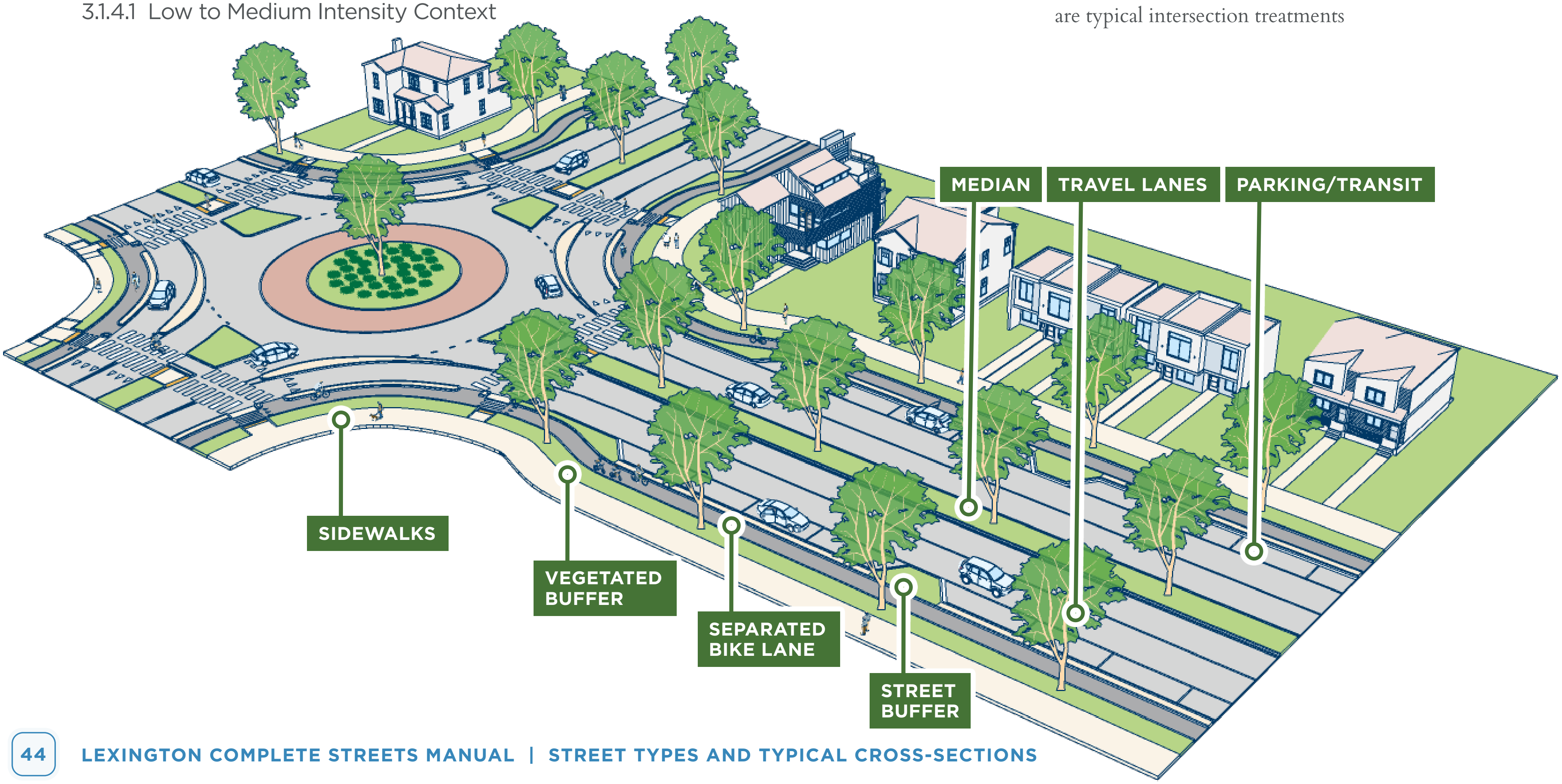
3.1.4 BOULEVARD

Boulevards move higher volumes of traffic through and between neighborhoods than Avenues and have a target speed of 25 to 30 mph.

All Boulevards have the following characteristics:

- Moderate traffic volumes
- Moderate vehicular speeds
- Vehicular movement along the street is prioritized over direct vehicular access to adjacent sites
- Bicyclists have a designated facility and do not share the travel way with drivers
- Sidewalks are provided on both sides of the street
- Planting strips with street trees are provided between sidewalks, bikeways, and vehicular travel ways
- On-street parking is permitted on one or both sides of the street
- Driveways do not directly access Boulevards
- Residential, commercial and mixed use developments front Boulevards
- Vehicular access is provided via alleys and/or public streets located to the rear of the site
- Mid-block curb extensions are spaced every 250-300 feet to visually define parking areas, narrow the roadway, and encourage lower vehicle operating speeds
- Mini-roundabouts and single-lane roundabouts are typical intersection treatments

3.1.4.1 Low to Medium Intensity Context



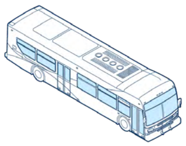
DESIGN SPEED

25-30 mph

ARTERIAL AND COLLECTOR

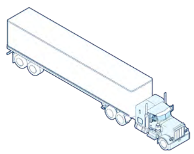
DESIGN VEHICLE

BUS-40



CONTROL VEHICLE

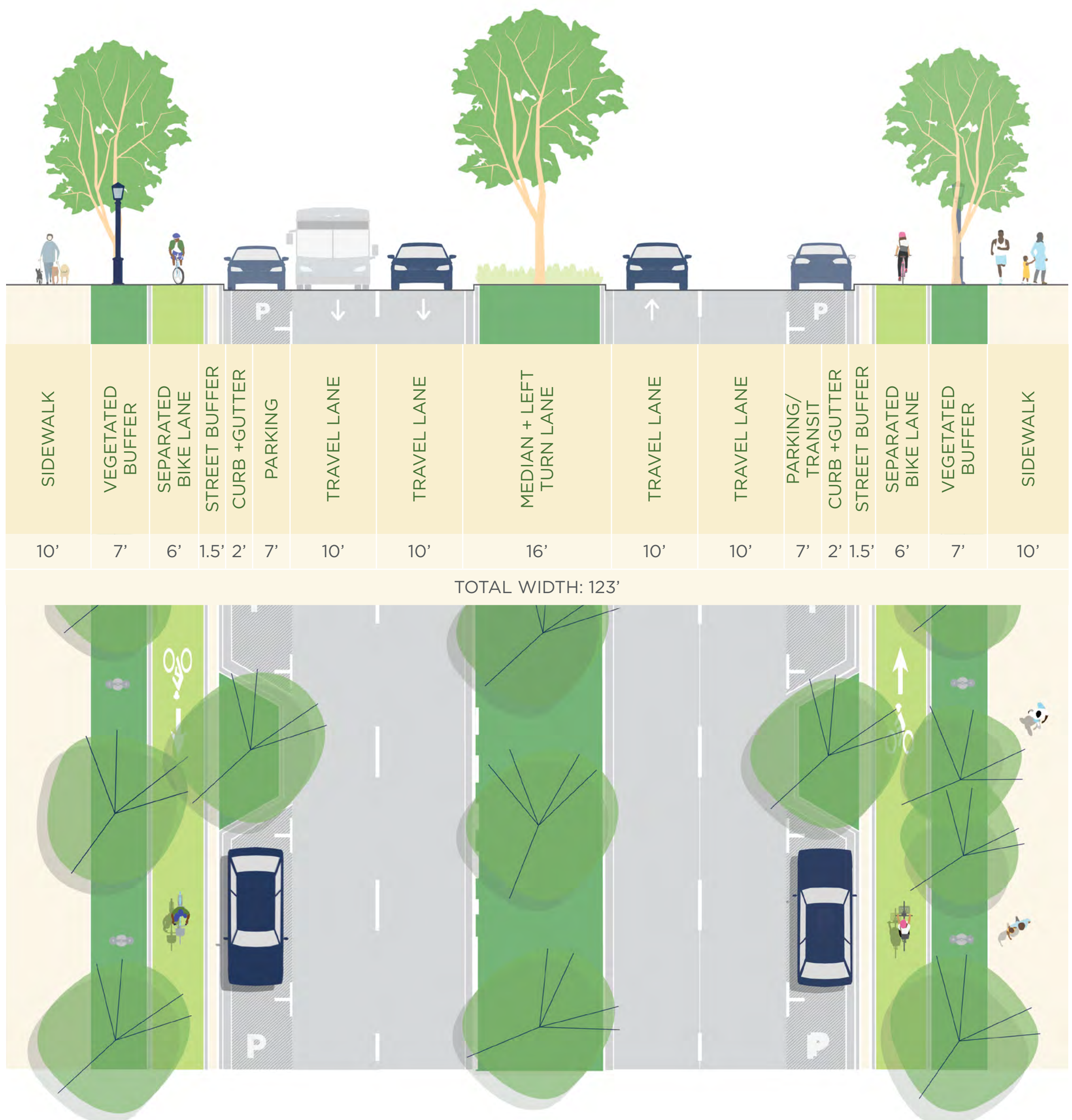
WB-50



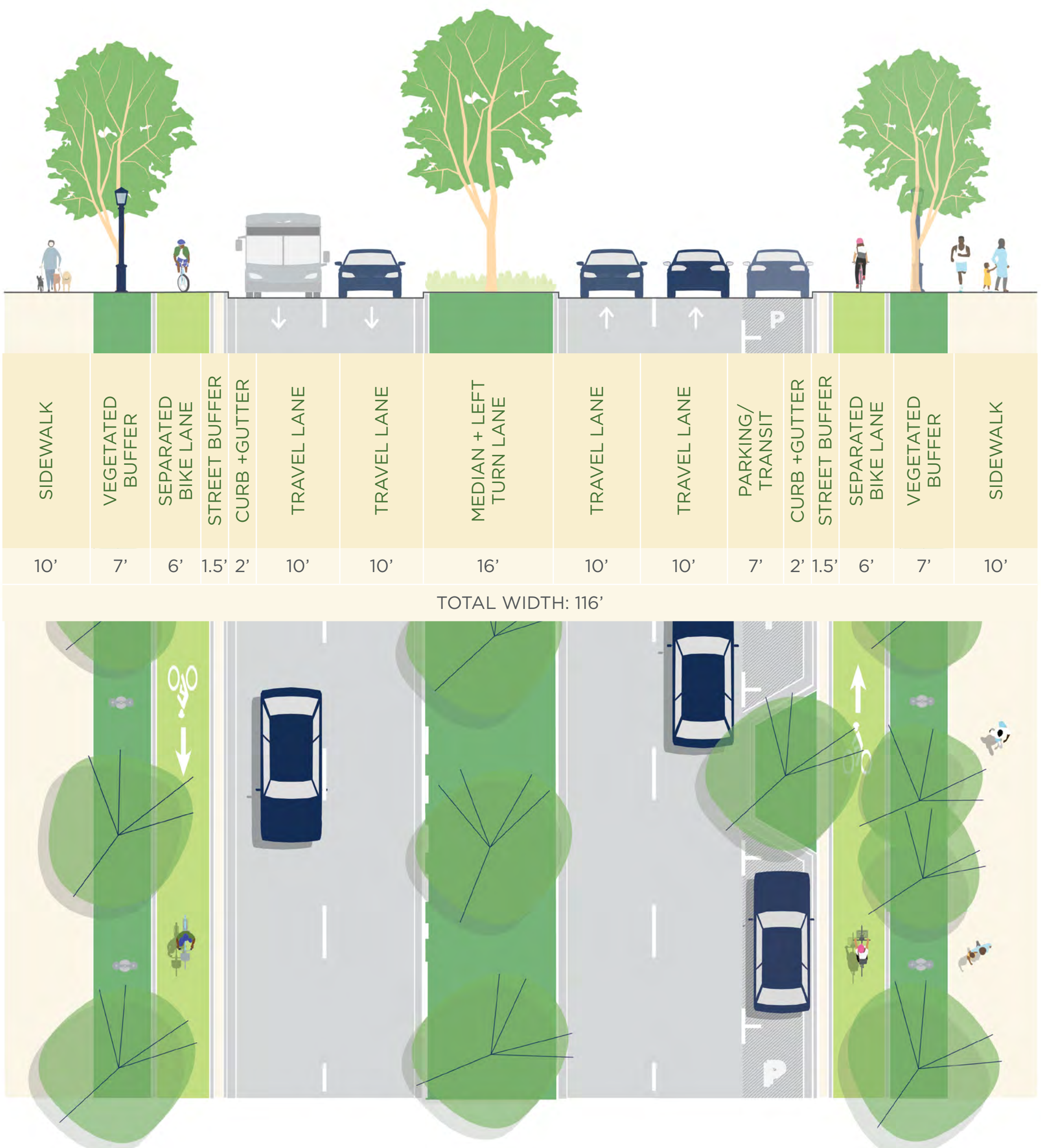
LOW-TO-MODERATE INTENSITY LAND USE CONTEXTS

Boulevards in low to moderate-intensity land use contexts are typically providing a transition between two higher intensity land uses (such as Village, Town or Regional Commercial Centers). Vehicular driveways along Boulevards is restricted. On-street parking in low intensity development may be provided, but is not required. Bicycle facilities are separated from both pedestrian and vehicular travel either by landscaping or hard-scaped barriers. A combined shared use path is an option in lower intensity contexts. Wider side-walks are provided, but a frontage and/or amenity zones for pedestrians is generally not provided.

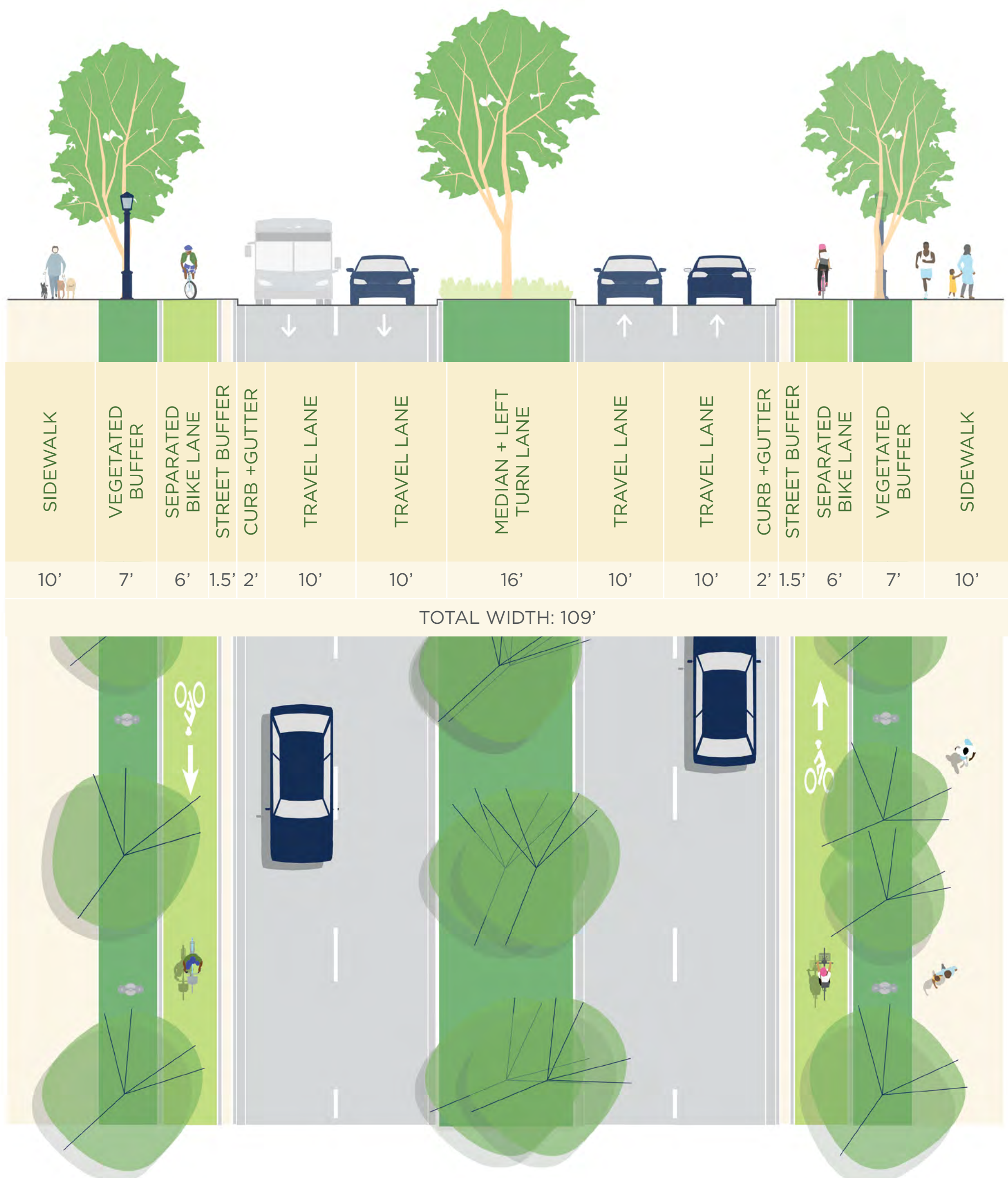
3.1.4.1 LOW-TO-MODERATE INTENSITY CONTEXT (TYPICAL SECTION)



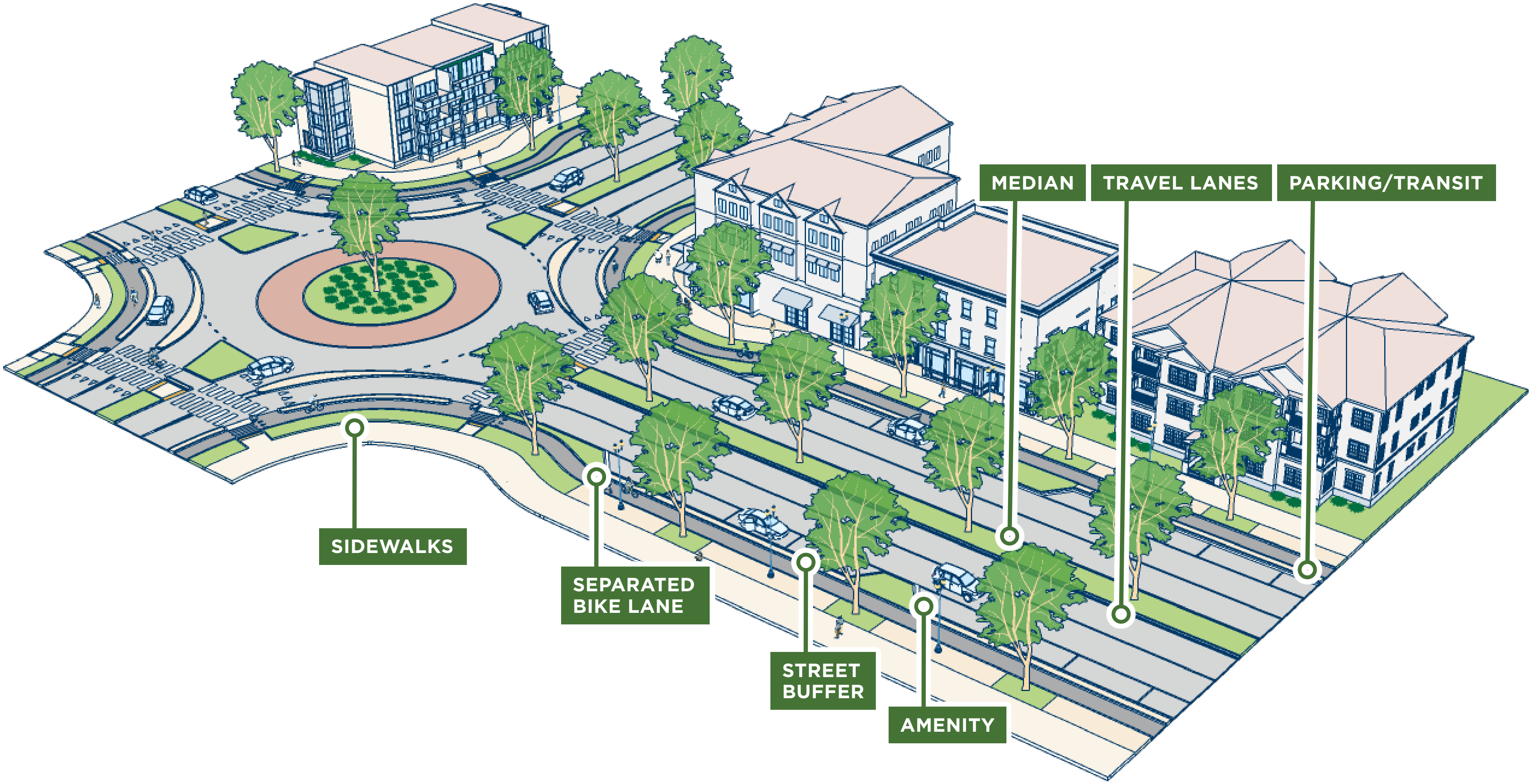
3.1.4.1.1 LOW TO MEDIUM INTENSITY CONTEXT SINGLE LANE PARKING



3.1.4.1.2 LOW TO MEDIUM INTENSITY CONTEXT NO PARKING



3.1.4.2 High Intensity Context

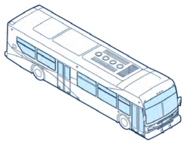


DESIGN SPEED

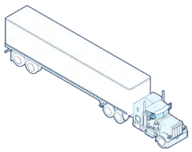
25 mph

ARTERIAL AND COLLECTOR

DESIGN VEHICLE
BUS-40



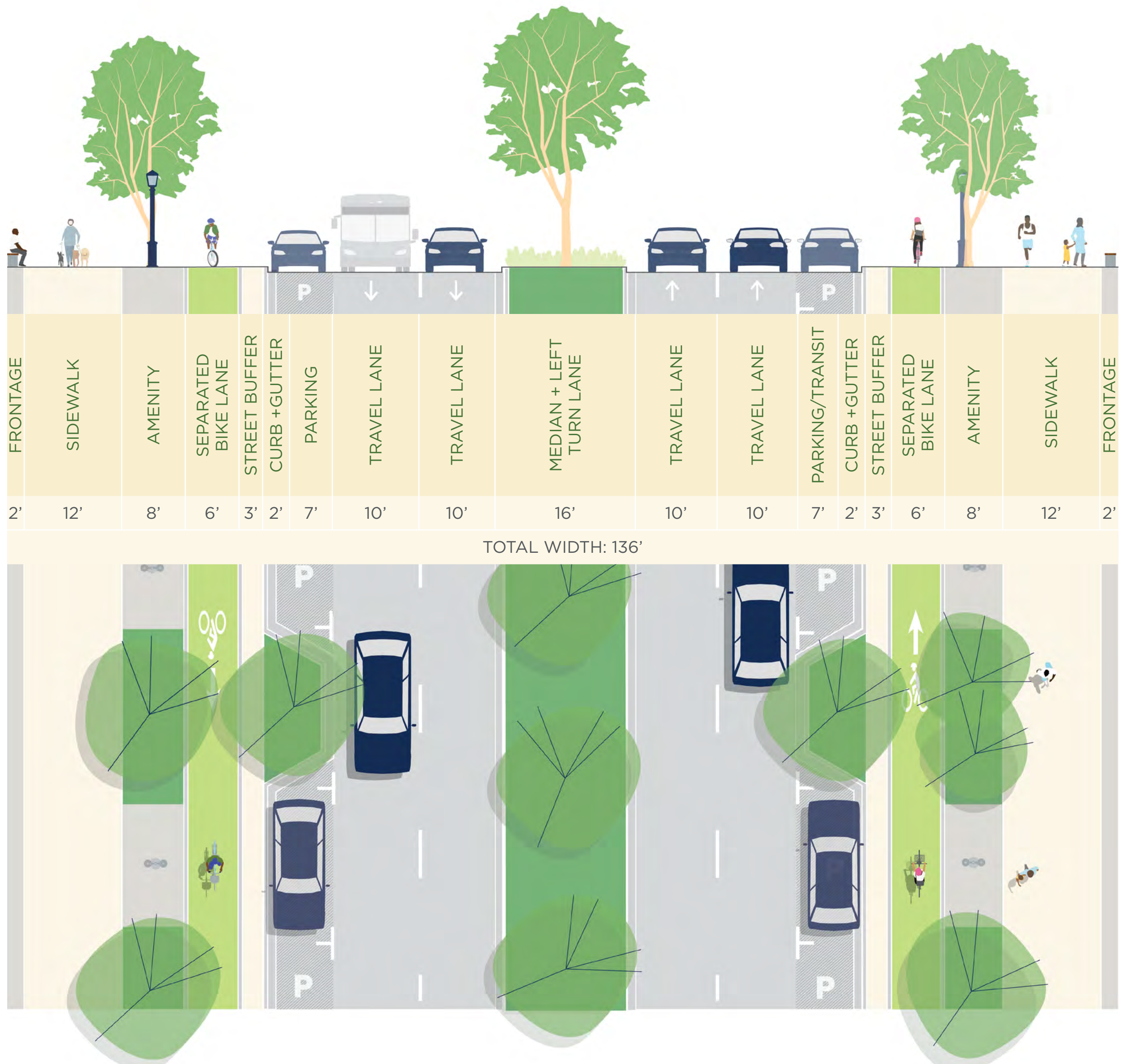
CONTROL VEHICLE
WB-50



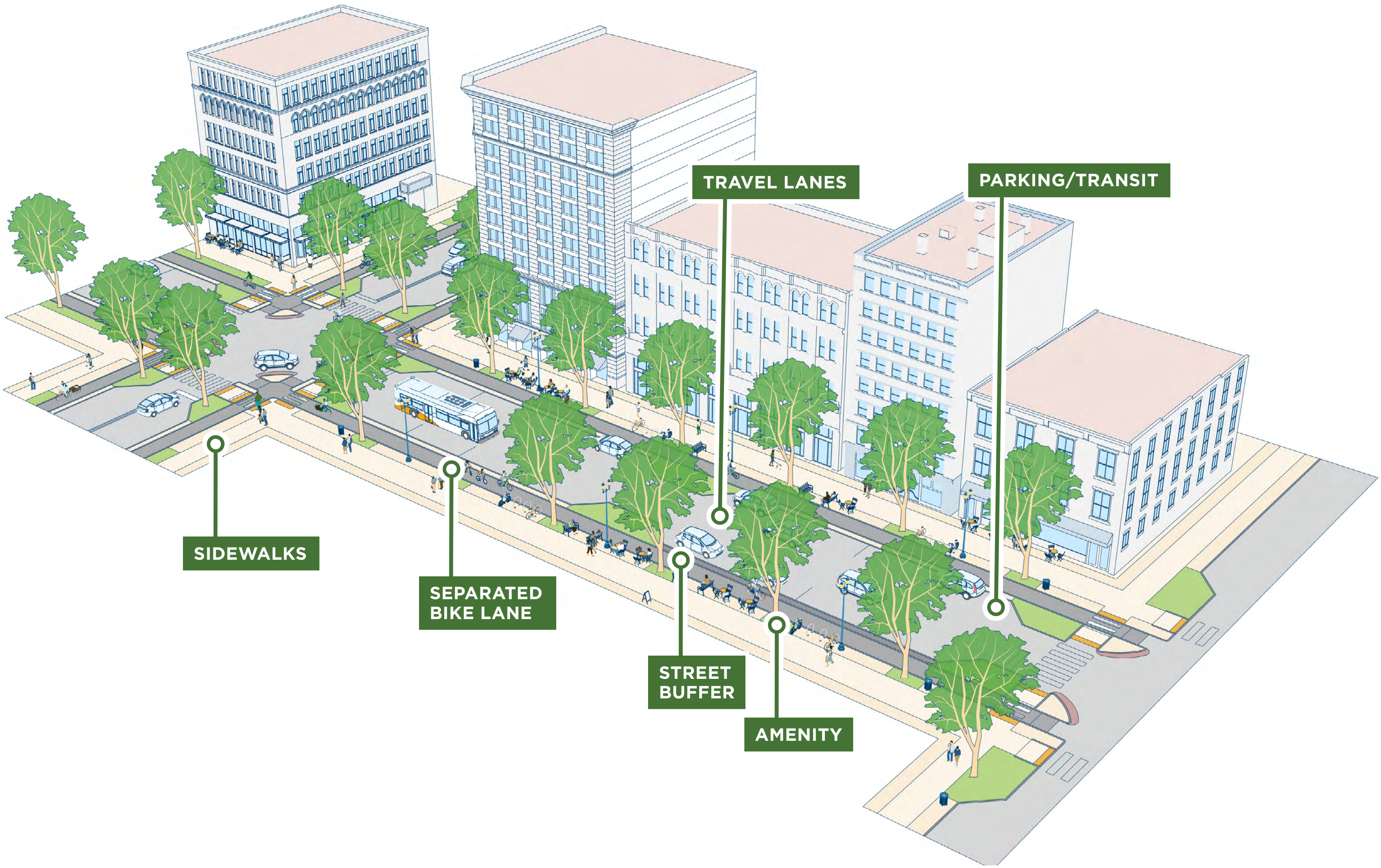
HIGH-INTENSITY LAND USE CONTEXTS

Boulevards in high-intensity land use contexts include high density residential, mixed-use, Village or Town Centers, parks and open space, or institutional uses. These streets support regional and local through trips and often serve as major transit routes. Driveways are not permitted. On-street parking may be provided to support commercial activity and supplement parking for residents and visitors. Bicycle facilities are separated from both pedestrian and vehicular travel either by landscaping or hardscaped barriers. Wider sidewalks with streetscape amenities and frontage zones are often warranted, particularly when adjacent to pedestrian-oriented land uses.

3.1.4.2 HIGH-INTENSITY CONTEXT (TYPICAL SECTION)



3.1.4.3 Main Street Context



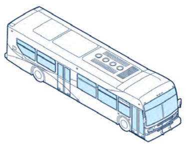
DESIGN SPEED

20-25 mph

ARTERIAL AND COLLECTOR

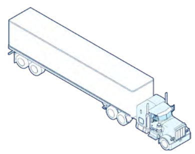
DESIGN VEHICLE

BUS-40



CONTROL VEHICLE

WB-50



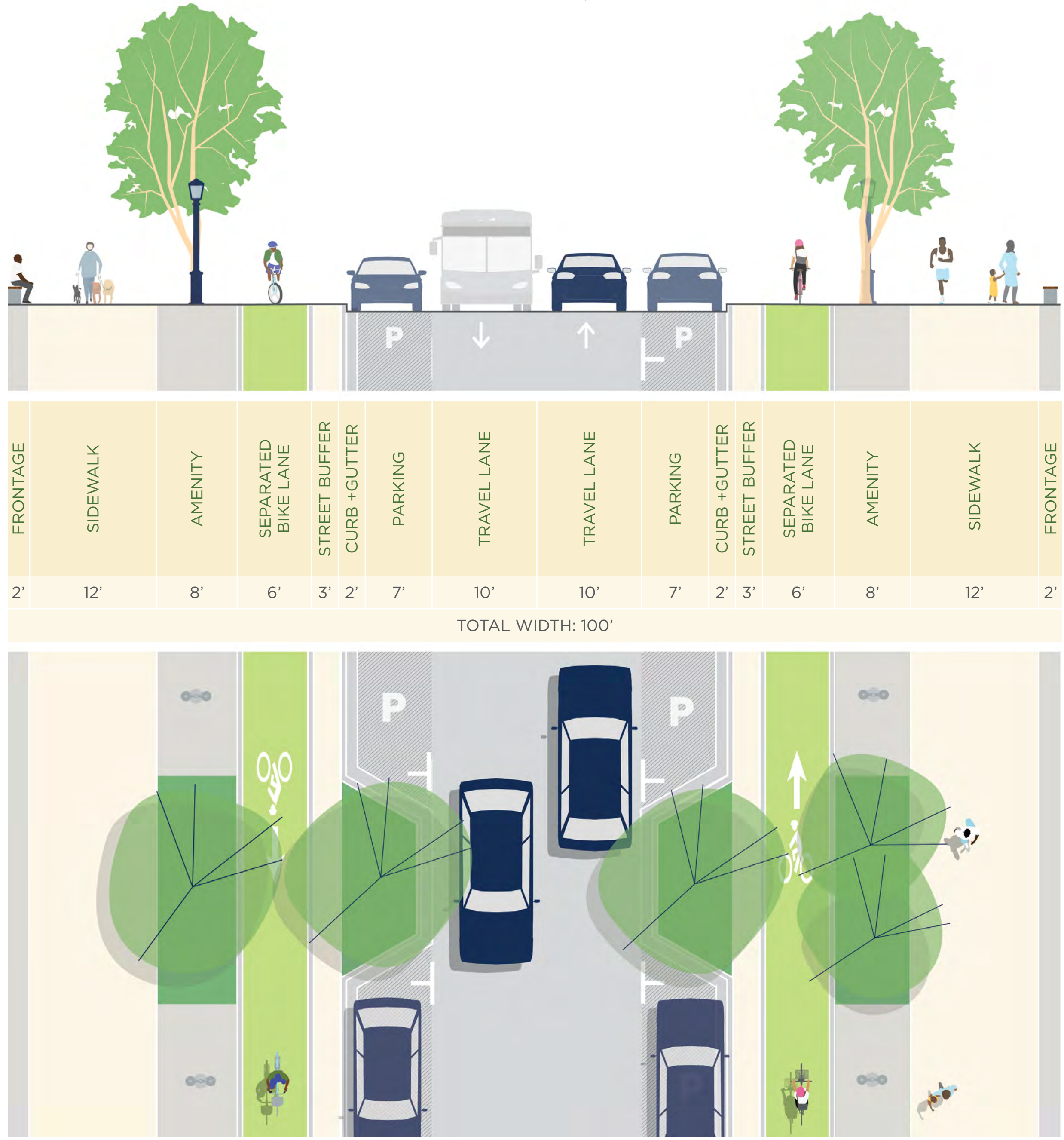
MAIN STREET LAND USE CONTEXTS

A Main Street is a subtype of Boulevard that can be found in a Town Center or Village Center context. These streets have a target speed of 20-25 mph.

All Main Streets have the following characteristics:

- Moderate to high traffic volumes
- Low vehicular speeds
- Pedestrian and bicycle movement and access is prioritized over direct vehicular access
- Wide sidewalks are provided on both sides of the street to accommodate a high volume of pedestrians
- Amenity zone includes pedestrian and bicycle amenities, and street trees
- On-street parking is provided on one or both sides of the street
- Diagonal parking is permitted
- Vehicle access is via alleys and/or public streets located to the rear or on perpendicular streets
- Development density is medium to high
- Bulb-out intersections and mini-roundabouts and single lane roundabouts are typical intersection treatments.

3.1.4.3 MAIN STREET CONTEXT (TYPICAL SECTION)

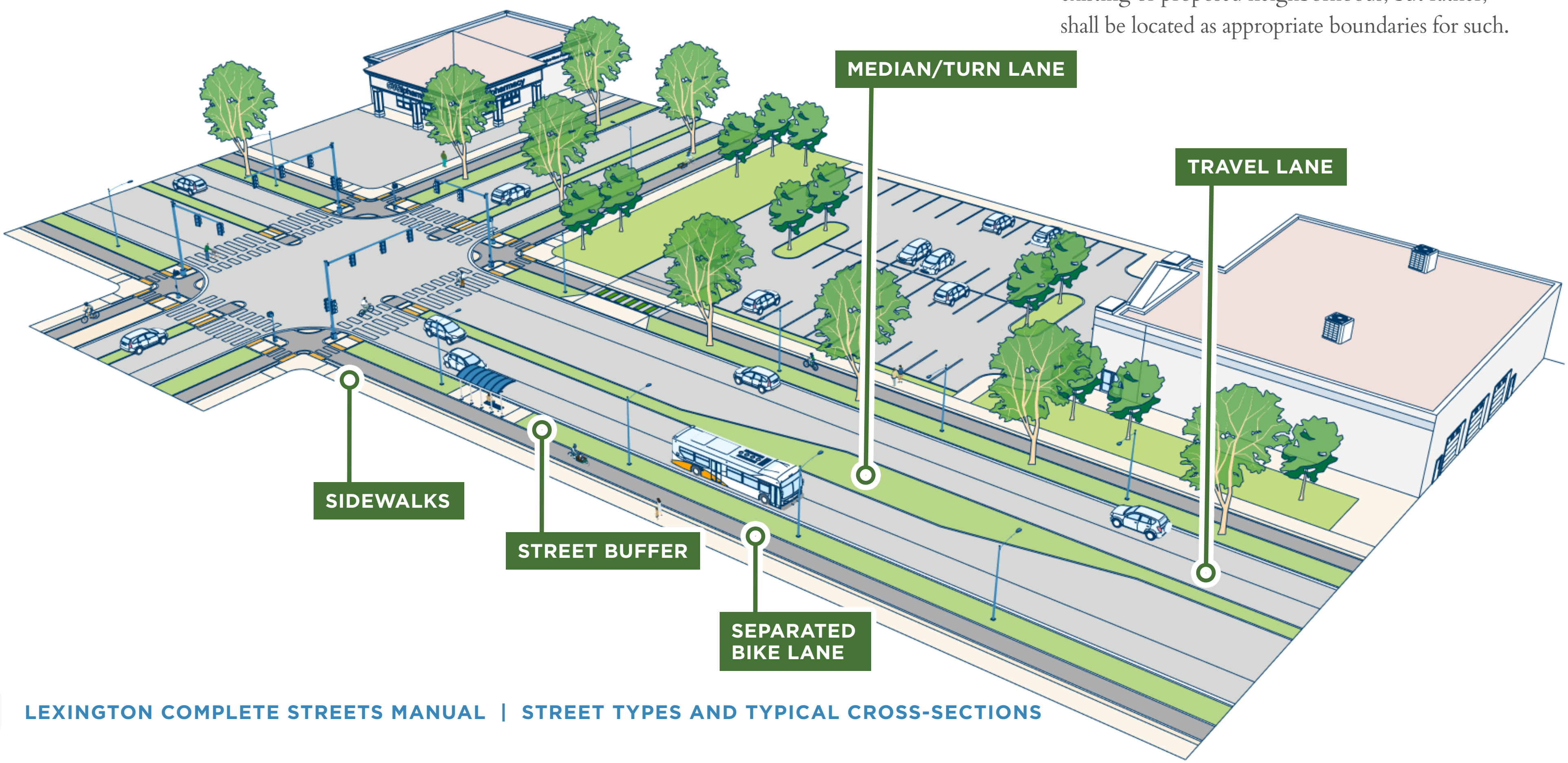


3.1.5 THOROUGHFARE

Thoroughfares move high volumes of traffic through and between regional centers and surrounding communities. Thoroughfares have a target speed of 35 mph.

All Thoroughfares have the following characteristics:

- Moderate to high traffic volumes
- Moderate vehicular speeds (target speed 30-35 MPH)
- Vehicular movement along the street is prioritized over direct vehicular access to adjacent sites
- Bicyclists have a designated facility and require a high degree of separation (vertical and horizontal) from vehicular traffic
- Sidewalks are provided on both sides of the street
- Planting strips with street trees are provided between sidewalks, bikeways, and vehicular travel ways
- On-street parking is typically not permitted
- Driveways do not directly access Thoroughfares
- Commercial developments typically front thoroughfares
- Vehicular access is restricted to intersections, cross streets, and access roads located along the rear of the property.
- Right-in / right-out access points may be permissible with proper justification
- Single-lane roundabouts, turbo roundabouts, and restricted-crossing U-turns are typical intersection treatments
- Thoroughfares that extend outside the Urban Service Area shall include a separated shared use path
- Thoroughfares shall not penetrate or bisect existing or proposed neighborhoods, but rather, shall be located as appropriate boundaries for such.



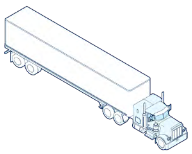
DESIGN SPEED

35 mph

ARTERIAL

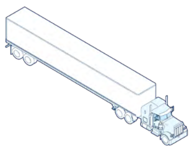
DESIGN VEHICLE

WB-50

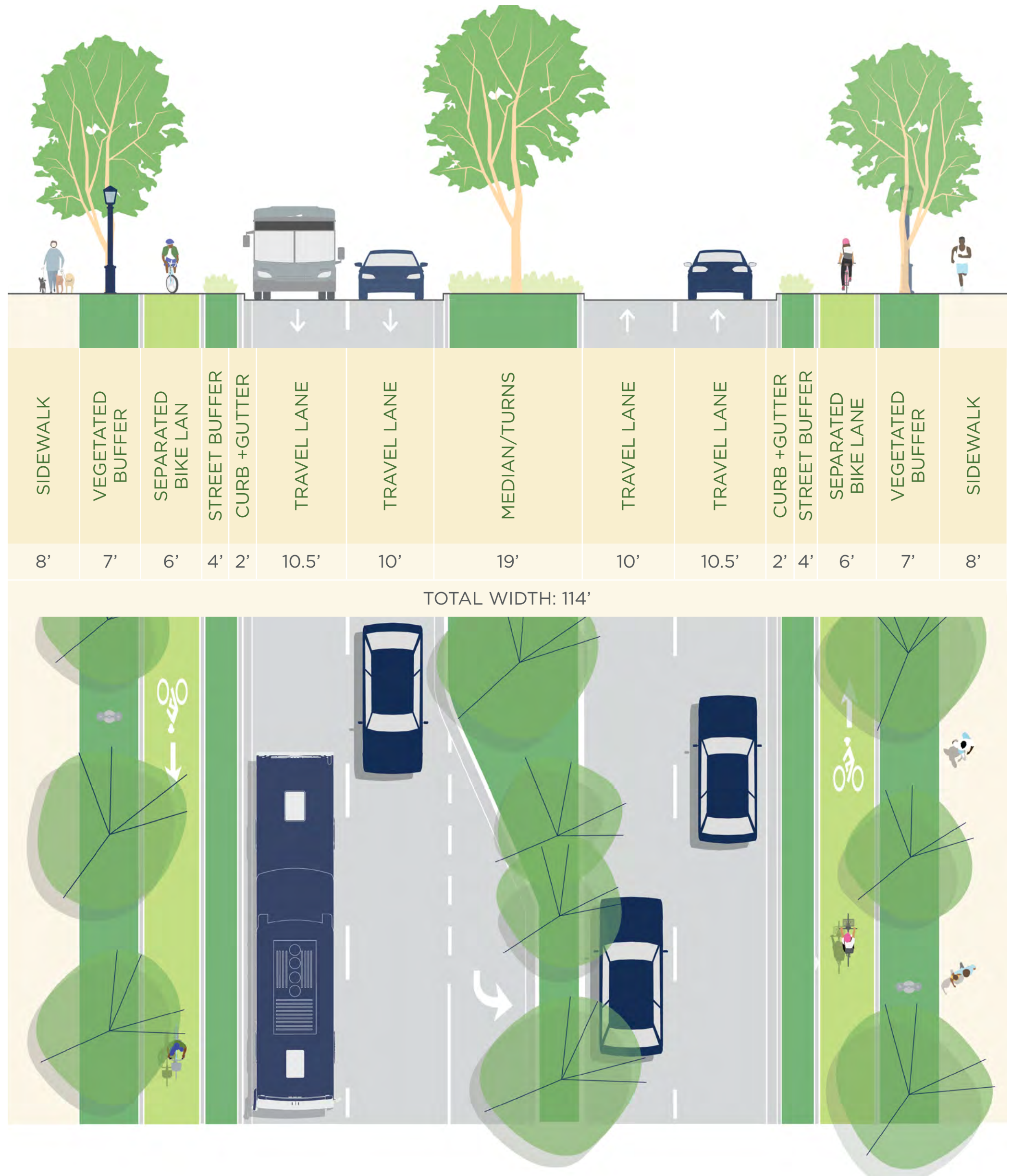


CONTROL VEHICLE

WB-67



3.1.5.1 THOROUGHFARE (TYPICAL SECTION)



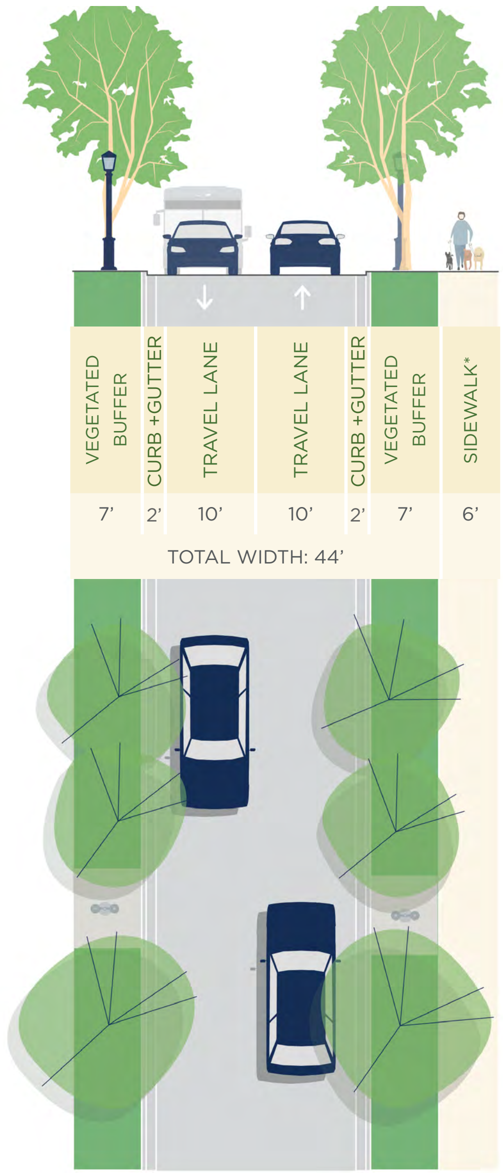
Additional requirements for Thoroughfares:

- Thoroughfares that extend outside the Urban Service Area shall include a barrier-separated shared use path with both vertical and horizontal separation.
- Thoroughfares shall not penetrate or bisect existing or proposed neighborhoods, but rather, shall be located as appropriate boundaries for such.
- Developments along Thoroughfares shall be required to maintain and/or improve the condition and continuity of any service road located within or along the development frontage.

3.1.5.1.1 FRONTAGE ROAD

Frontage Roads are parallel, low-speed roads that provide access from Thoroughfares. These roads have sidewalks on one side of the street adjacent to the active land use. They include a planting strip between the thoroughfare sidewalk and the frontage road. If on-street parking is provided, it is placed on the same side as the active land use.

THOROUGHFARE FRONTAGE ROAD (TYPICAL SECTION)



3.2 Selecting Street Types

Identifying the preferred Street Type, typical cross-section, and street elements is guided by land use intensity and modal priorities.

STEP 1: IDENTIFY THE EXISTING LAND USE, INTENSITY AND ACCESS PROVIDED

Why: Identify how the street supports current land uses and what access should be maintained.

Questions:

- What are the current land uses?
- What level of access should be provided to the adjacent land uses?
- Who uses the roadway to access those land uses?

STEP 2: IDENTIFY THE DESIRED FUTURE LAND USE, INTENSITY AND ACCESS NEEDS

Identify what changes may be needed to support future planned land uses.

Questions:

- What are the desired future land uses?
- What level of access may be needed for those future land uses?
- Are there roadway users that will require increased or different access given those future land uses?

STEP 3: IDENTIFY THE PREFERRED STREET TYPE

Identify the street type and preferred cross-section based on current and anticipated future land use intensity.

Complete Street Types:

- Alley, **Section 3.1.1**
- Neighborhood Street, **Section 3.1.2**
- Avenue, **Section 3.1.3**
- Boulevard, **Section 3.1.4**
- Thoroughfare, **Section 3.1.5**

STEP 4: IDENTIFY MODAL EMPHASIS AND/ OR ADDITIONAL CONSIDERATIONS

Review and consider existing plans and expected users that may warrant additional design considerations.

- Modal Emphasis Designations, **Section 3.3**
- Additional Considerations, Section 3.5

3.3 Modal Emphasis

Each Complete Street type design profile identifies the modal emphasis for that street type. This is a generalization informed by common land use and roadway demands. However, other planning initiatives—such as small area plans, corridor plans, multimodal transportation plans (i.e. bicycle, pedestrian or transit plans), congestion management plans, safety plans, trail and greenway plans, and feasibility studies may also inform whether specific modal priorities should be applied to certain street segments.

Designers should consult relevant plans and studies and apply modal emphasis considerations where appropriate to:

- Elevate the needs of priority users in retrofit decisions
- Select appropriate cross-section elements and dimensions from the design profiles
- Inform tradeoffs when space is limited

Refer to Sections **3.3.1** through **3.3.6** for detailed guidance on applying modal emphasis designations related to walking and rolling, bicycling and micromobility, high-injury network locations, transit, and freight and delivery access.

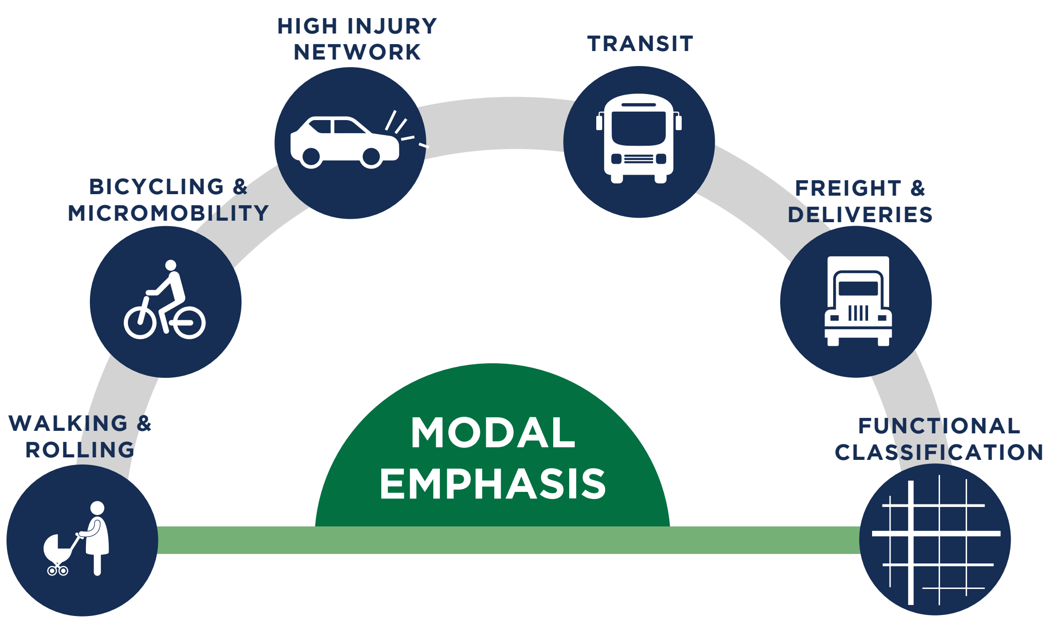


FIGURE 3-1 Modal Emphasis

3.3.1 Walking and Rolling

People walk or roll (use a wheelchair or electric mobility assistive device) at some point in nearly every trip and it is critical to provide basic pedestrian facilities along all streets. However, if a roadway segment travels through a pedestrian-oriented district, or is adjacent to high pedestrian generators such as schools, parks, and mixed use developments, practitioners should further prioritize high quality pedestrian facilities and amenities. This may include wider sidewalks, a wider vegetative buffer or amenity zone, providing street furniture, on-street parking, and ensuring traffic controls prioritize pedestrian convenience and safety at intersections and mid-block locations.

CRITICAL DESIGN ELEMENTS:

- Pedestrian Zone (**Section 4.1**)
- Sidewalk & Pedestrian Access Route Standards (**Section 4.1.2**)
- Frontage Zone (**Section 4.1.3**)
- Amenity Zone (**Section 4.1.4**)

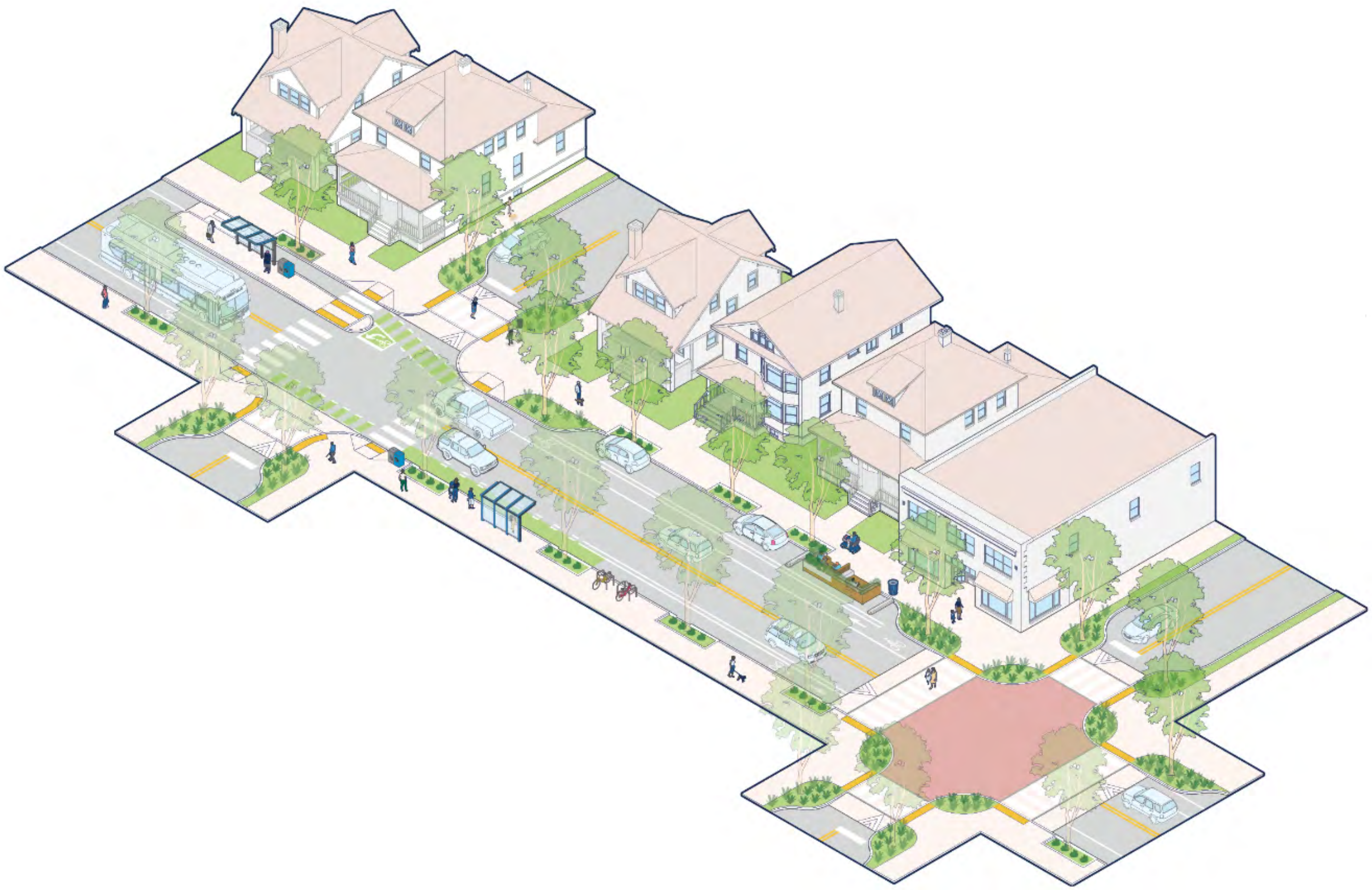


FIGURE 3-2 Roadway with Wider Sidewalks and Amenity Zone

3.3.2 Bicycling and Micromobility

Bicycles and other micromobility devices (e.g., scooters) are operated on all public streets; however, certain land uses, destinations, and corridors generate higher levels of bicycle and micromobility activity. Land uses include schools, parks, mixed-use developments, and retail centers. Roadway segments or corridors identified in the Lexington Area Bicycle and Pedestrian Master Plan, or otherwise identified as priority bicycle corridors should include high-quality bicycle facilities and amenities and design features that:

- Prioritize user comfort and safety by minimizing exposure to motor vehicle traffic and reducing conflicts with pedestrians.
- Increase bicycle facility width to accommodate higher volumes and passing movements
- Provide horizontal buffer space and vertical separation between bicyclists and motor vehicles
- Ensure intersection treatments improve visibility and provide physical or operational protection for bicyclists
- Clearly delineate pedestrian and bicycle space in high-activity areas for both uses.
- For locations with concerns or a history of unauthorized motor vehicle use on bicycle facilities, refer to **AASHTO Bike Guide Section 6.7.8** for guidance.

CRITICAL DESIGN ELEMENTS:

- Bicycle Facility Zone (**Section 4.2**)
- Curbside Zone (**Section 4.3.4**)
- Bicycle Facilities at Intersections (**Section 5.5**)

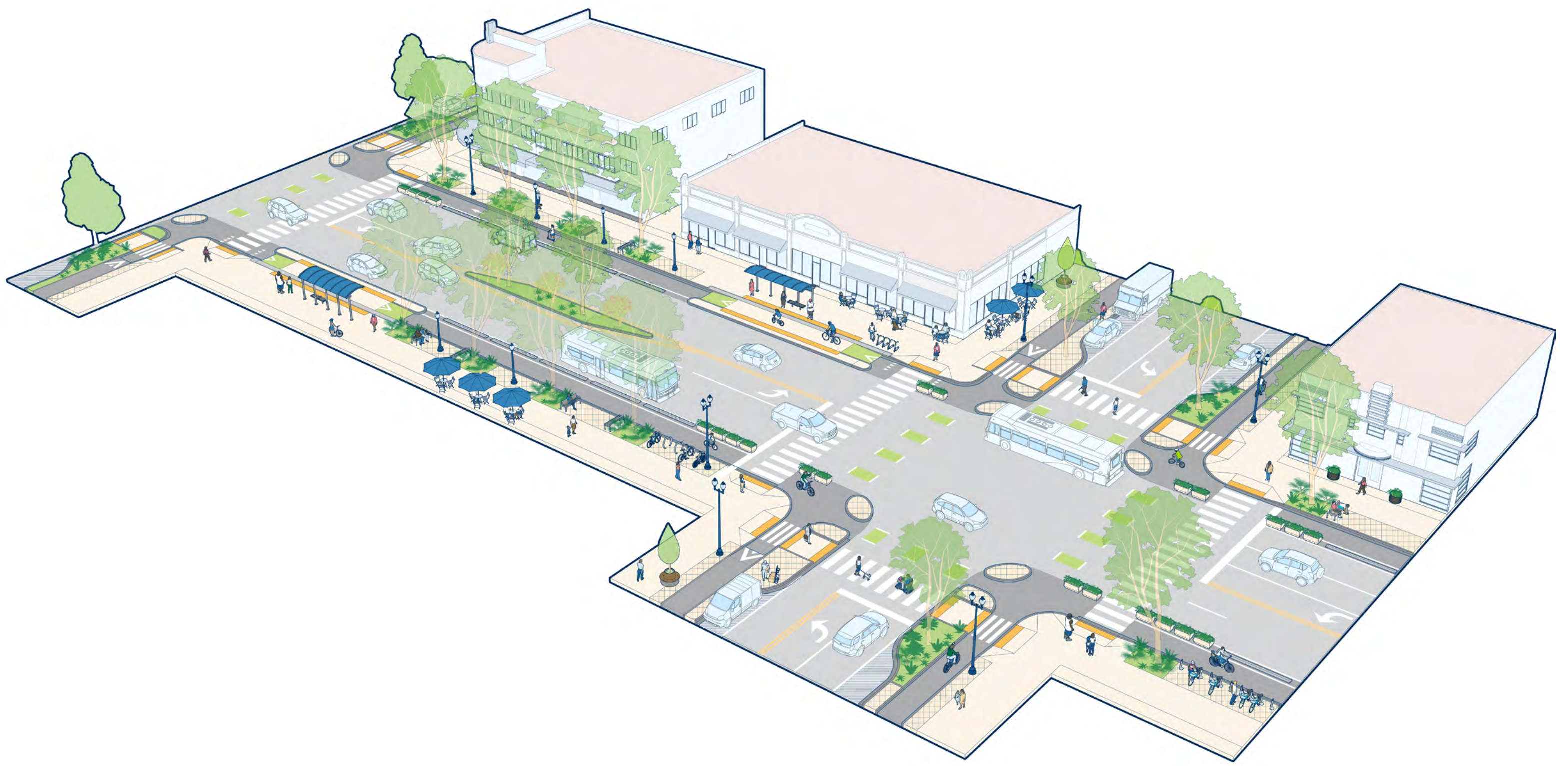


FIGURE 3-3 Roadway with Separated Bike Lanes and Protected Intersections

3.3.3 High-Injury Network

LFUCG aspires to eliminate traffic deaths and serious injuries on pubic roadways by 2050. A Safety Action Plan was completed in 2023 as part of that work, which lists corridors and intersections prioritized for safety improvements. Projects at these locations should take all possible steps to manage speeds, expand pedestrian and bicycle facilities, and protect vulnerable users within intersections.

CRITICAL DESIGN ELEMENTS:

- Speed Management (Chapter 6)
- Sidewalks (**Section 4.1.2**)
- Intersection and Crossing Elements (Chapter 5)
- Crosswalks (**Section 5.4.1**)
- Raised Crosswalks (**Section 6.3.2.3**)
- Crossing Islands/Median Refuge Islands (**Section 6.3.3.4**)

3.3.4 Transit

Lextran operates 25 routes throughout Fayette County and provides more than 12,000 trips per weekday; more than half of those are for people traveling to school and work. Providing quality infrastructure makes public transit a more attractive and efficient travel option.

- Coordinate with Lextran on pedestrian and transit accommodations on fixed-routes
- Ensure infrastructure on Avenues, Boulevards and Thoroughfares can support current or future transit routes.
- Plan for future bus rapid transit and transit-oriented development along thoroughfares

CRITICAL DESIGN ELEMENTS:

- Transit Elements (**Section 4.4**)

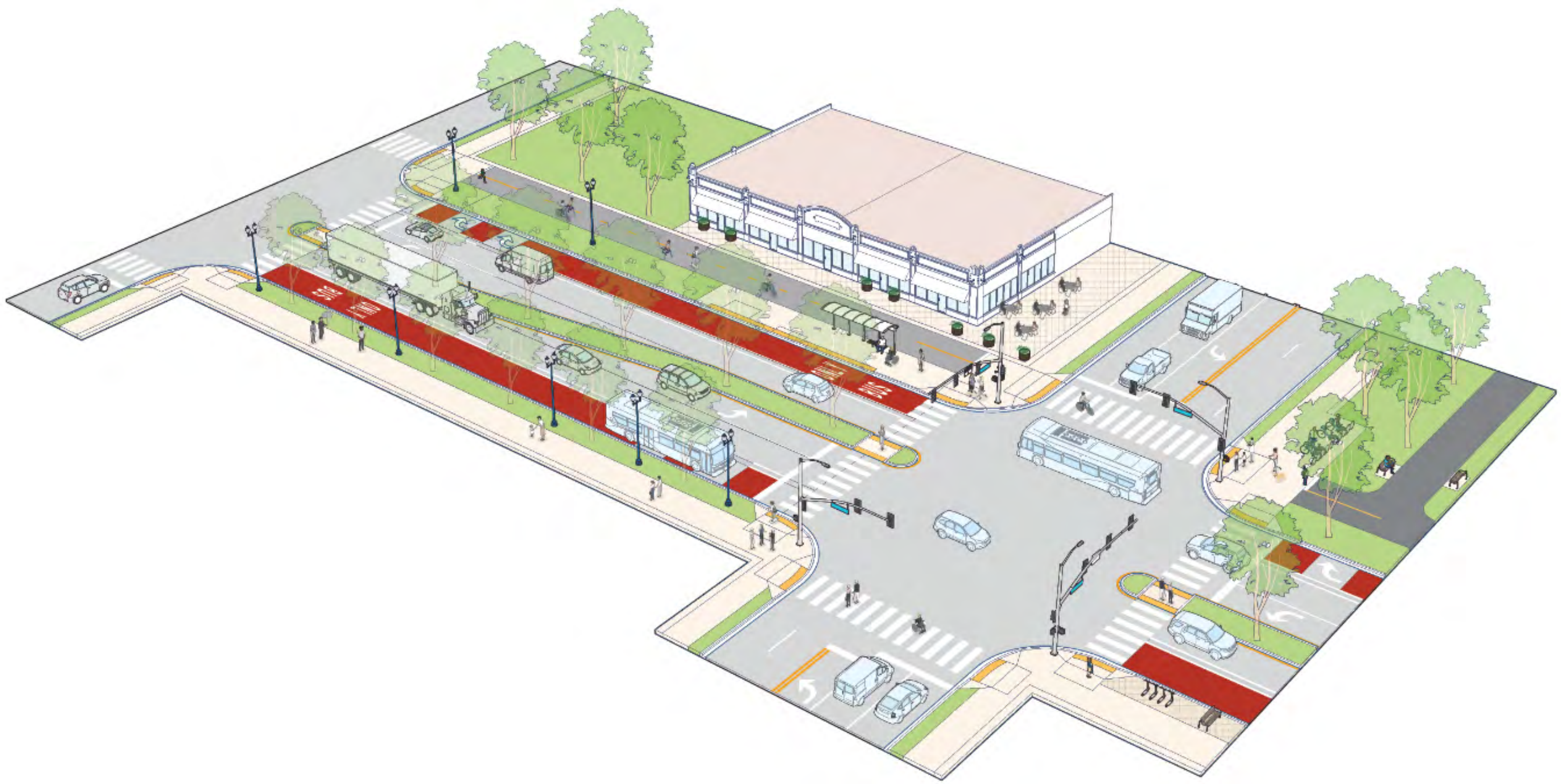


FIGURE 3-4 Roadway with Dedicated Transit Lanes

3.3.5 Freight and Deliveries

LFUCG and KYTC have designated certain major routes for freight movement to support commerce and the regional economy. The recommended design and control vehicles for each street type ensure the most common deign vehicle and occasional control vehicle can both travel along and turn across important roadway corridors.

Designated truck routes or freight corridors may require additional emphasis on freight movements.

In addition to regional freight movement, local deliveries are commonplace on nearly every street type. Curbside management, including the provision of loading zones where needed, should address delivery access based on street type, adjacent land uses, and development intensity.

CRITICAL DESIGN ELEMENTS:

- Design Vehicle (**Section 5.1.1.1**) and Control Vehicle (**Section 5.1.1.2**)
- Encroachment (**Section 5.1.3**)
- Mountable Curbs & Truck Aprons (**Section 5.1.3.2**)
- Curbside Zone (**Section 4.3.4**) and Commercial Loading Zones (**Section 4.3.4.2**)

FIGURE 3-5 Roadway With Commercial Loading Zones

3.3.6 Functional Classification

The roadway network is divided into a hierarchy of classes based on access and mobility that the street segment provides. Functional classification is also a key determinant of eligibility for federal-aid funding through the Federal-aid Highway Program and helps determine whether a roadway is included in the State Primary Road System (SPRS).

In Lexington-Fayette County, the following functional classifications are used:

- Interstate
- Freeway/Expressway
- Major arterial
- Minor arterial
- Collector
- Local
- Alley

See **Section 1.10** for definitions for each road classification.

The functional class of existing streets can be found in the LFUCG Street Centerlines GIS layer on the LFUCG Data Hub. For new streets, the Street Types defined in **Section 3.1** typically correspond with the following roadway classifications.

TABLE 3-1 Complete Street Types by Functional Classification

Road Classification	Street Type
Arterial	Alley, Avenue, Boulevard, Thoroughfare
Collector	Alley, Avenue, Boulevard
Local	Alley, Neighborhood Street

This Manual considers Functional Classification as one factor that impacts roadway design. It is used to:

- Identify appropriate design and control vehicles for a given street segment
- Understand the broader mobility role of the street (e.g., regional connectivity, freight movement, emergency access) in the Lexington street network

Designers should ensure that functional classification informs—but does not dictate—cross-section design, and that it complements modal emphasis designations to balance local and regional needs.

3.4 Evaluating Tradeoffs

The goal of Complete Streets is to create a safe, comfortable, and convenient transportation network for all users. However, when space is constrained and conflicting priorities exist, practitioners must use professional judgement to determine which mode or modes will take precedence, based on land use context, established goals, and policy. Safety for all modes should guide tradeoff decisions and design elements.

There are typically two ways to approach modification of design elements: from the inside of the cross-section out, and from the outside of the cross-section in. Each approach relies on a different set of assumptions about a street, its operations, and its surrounding land use needs. And each can dramatically alter project outcomes.

The **inside-out approach** is often recommended for constrained spaces and begins with vehicle travel lanes. As discussed in this Manual, creating a network of Complete Streets depends on reevaluating the space dedicated to moving motor vehicles. The inside-out approach could lead to a reallocation of space, but it often has the opposite effect of entrenching car-centric design or of simply preserving the status quo. This can limit opportunities to advance multimodal access and blunt a community's evolving roadway and land use goals.

THE INSIDE-OUT APPROACH:

- Begin at the centerline and work outward
- Evaluate the number and width of motor vehicle lanes
- Apply minimum lane widths and eliminate unnecessary turn lanes where feasible
- If on-street parking is necessary:
  - Use minimum widths
  - Explore off-street parking or consolidated parking off the corridor
  - Minimize buffer spaces or incorporate parking zones into buffers where needed

The outside-in approach is often recommended for unconstrained spaces but can be employed nearly everywhere. It begins with the needs of people walking, biking, and taking transit. The dimensions of sidewalks, frontage and amenity zones, and curbside uses are reoriented to support desired activity levels and land uses. The remaining space is divided into motor vehicle travel and parking. This approach more naturally supports Complete Street principles.

THE OUTSIDE-IN APPROACH:

- Begin at the edges and work inward
- Expand sidewalk widths and space dedicated to pedestrians
- This may include space for lighting, seating, or stormwater features
- Enhance bicycle infrastructure (see **Section 4.2.1** for bicycle facility selection)
- Broaden landscaped buffers and amenity zones to create a more inviting and comfortable environment

Neither the inside-out nor outside-in approach is inherently right or wrong, but the choice between them should be intentional. Practitioners must be aware that the selection of an approach advances different assumptions and drives outcomes.

In both cases, see Chapter 4: Street Corridor Design for detailed guidance on design element dimensions.

4 Street Corridor Elements

This chapter outlines standards for Street Corridor Elements applicable to various street types. For requirements applicable to intersections along street corridors, refer to Chapter 5 - Intersection and Crossing Elements).

4.1 Pedestrian Zone

The Pedestrian Zone consists of three primary sub-zones:

- **Amenity Zone –** The buffer space between the street and sidewalk, often referred to as the landscape buffer.
- **Sidewalk –** A dedicated clear space for continuous pedestrian movement.
- **Frontage Zone –** The interface between the sidewalk and adjacent private property or buildings; typically present in higher-density areas.

FIGURE 4-1 Pedestrian Realm Elements

The Pedestrian Zone may also include a separated bicycle lane, located either:

- Between the sidewalk and the amenity zone, or
- Between the amenity zone and the curb zone

FIGURE 4-2 Pedestrian Zone

TABLE 4-1 Pedestrian Zone Dimensions

STREET TYPE	DEVELOPMENT INTENSITY	Frontage Zone (ft)			Sidewalk (Ft)		Amenity Zone (Ft)		
		Default	Min	Max	Default	Min	Default	Min	Max
Neighborhood Street	Low/Medium/High	N/A	N/A	N/A	6'	5'	7'	5'	8'
Avenue	Low/Medium	N/A	N/A	N/A	6'	5'	7'	5'	8'
	High	2'	2'	6'	10'	5'	7'	5'	12'
Boulevard	Low/Medium	N/A	N/A	N/A	10'	5'	7'	5'	8'
	High	2'	2'	6'	12'	5'	8'	5'	8'
Thoroughfare	Medium to High	N/A	N/A	N/A	8'	5'	7'	5'	N/A
Alley	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4.1.1 Standards for New Development, Redevelopment and Street Retrofits

Dimensional requirements for the amenity zone, sidewalk, and frontage zone vary by Street Type and development intensity. The default standards for the pedestrian zone that are applicable to New Development and Redevelopment are provided in Chapter 3 and Table 4-1. All streets must adhere to the Sidewalk & Pedestrian Access Route Standards described in **Section 4.1.2, Sidewalk & Pedestrian Access Route Standards**, whereas only streets that include Frontage Zones (**Section 4.1.3**) and any Amenity Zone elements (listed under **Section 4.1.4**) must comply with the related element standards.

4.1.2 Sidewalk & Pedestrian Access Route Standards

The sidewalk is the designated clear space for pedestrian movement and accessibility. It is located between the Amenity Zone and the Frontage Zone. In certain contexts, the sidewalk may be replaced with a shared use path, as described in**Section 4.2.3.2**. All roadways shall comply with the Sidewalk & Pedestrian Access Route Standards within **Section 4.1.2**.

4.1.2.1 Pedestrian Access Route

The sidewalk contains the Pedestrian Access Route (PAR), a continuous, unobstructed path required for accessible pedestrian circulation. The PAR connects key elements of the pedestrian network, including building entrances, sidewalks, and street crossings.

4.1.2.2 Prohibited Encroachments

The following elements shall not be located within the PAR:

- Street furniture
- Trees, planters, or other vegetation
- Signposts, utility poles, signal cabinets, fire hydrants
- Temporary signs or movable objects
- Utility covers, grates, or any infrastructure that does not meet PROWAG standards

4.1.2.3 Sidewalk Location & Alignment

Sidewalks (or, where applicable, a shared use path) are required on both sides of all streets within the Lexington-Fayette County Urban Service Area, unless a formal exception is granted by the Planning Commission or LFUCG per Appendix 1 of the **Procedures Manual for Infrastructure Development**.

Sidewalks shall be designed with a straight alignment and shall only meander when necessary to mitigate slopes greater than 5%.

4.1.2.4 Sidewalk Widths

Sidewalk width shall be determined by surrounding land use context and anticipated pedestrian demand. Default sidewalk widths for each Street Type are provided in Table 4-1 and shall be used as:

- The required standard for all new streets
- The preferred standard for reconstructed corridors involving the full reconstruction of at least one block

4.1.2.5 Minimum Sidewalk Widths for Variances or Waivers

Where a variance or waiver is requested and approved by the Planning Commission or through the LFUCG **Procedures Manual for Infrastructure Development**, the following minimum widths shall apply:

- Sidewalk Width: 8 feet preferred, 6 feet minimum

  A reduced width of no less than 4 feet may be permitted only under the following conditions:
  - An immovable obstruction is present and cannot be avoided
  - The reduced-width segment is short (less than 100 feet in length)
  - All PROWAG requirements are met
  - The Division of Historic Preservation requires a 4-foot width (e.g., for federally funded retrofit projects)
- Sidewalks on Bridges: 8 feet preferred, 6 feet minimum, to provide adequate shy distance from adjacent traffic and bridge railings

4.1.2.6 Sidewalk Construction Standards

To ensure a continuous and accessible Pedestrian Access Route (PAR), sidewalks shall meet the following design and construction standards:

SURFACE REQUIREMENTS

- Surface shall be firm, stable, and slip-resistant
- The sidewalk shall always remain free of obstructions

CROSS SLOPE (PER PROWAG)

- Maximum cross slope: 2.1% (1:48)
- Minimum slope: 0.5% for drainage

RUNNING GRADE (PER PROWAG)

- When within roadway ROW, the sidewalk grade may match the roadway, even if it exceeds 5%.
- When outside of the roadway ROW, the maximum running slope shall be 5%. Grades exceeding 5% shall comply with ADA ramp requirements, including landings and handrails where applicable.

VERTICAL CLEARANCE

- Minimum sidewalk clearance: 8 feet to overhead obstructions (e.g., signage, awnings, vegetation)

STANDARD DRAWINGS

All sidewalk construction shall conform to the LFUCG Division of Engineering **Standard Drawings**, including but not limited to:

- Drawing 303
- Drawing 304
- Drawing 307-1
- Drawing 307-2

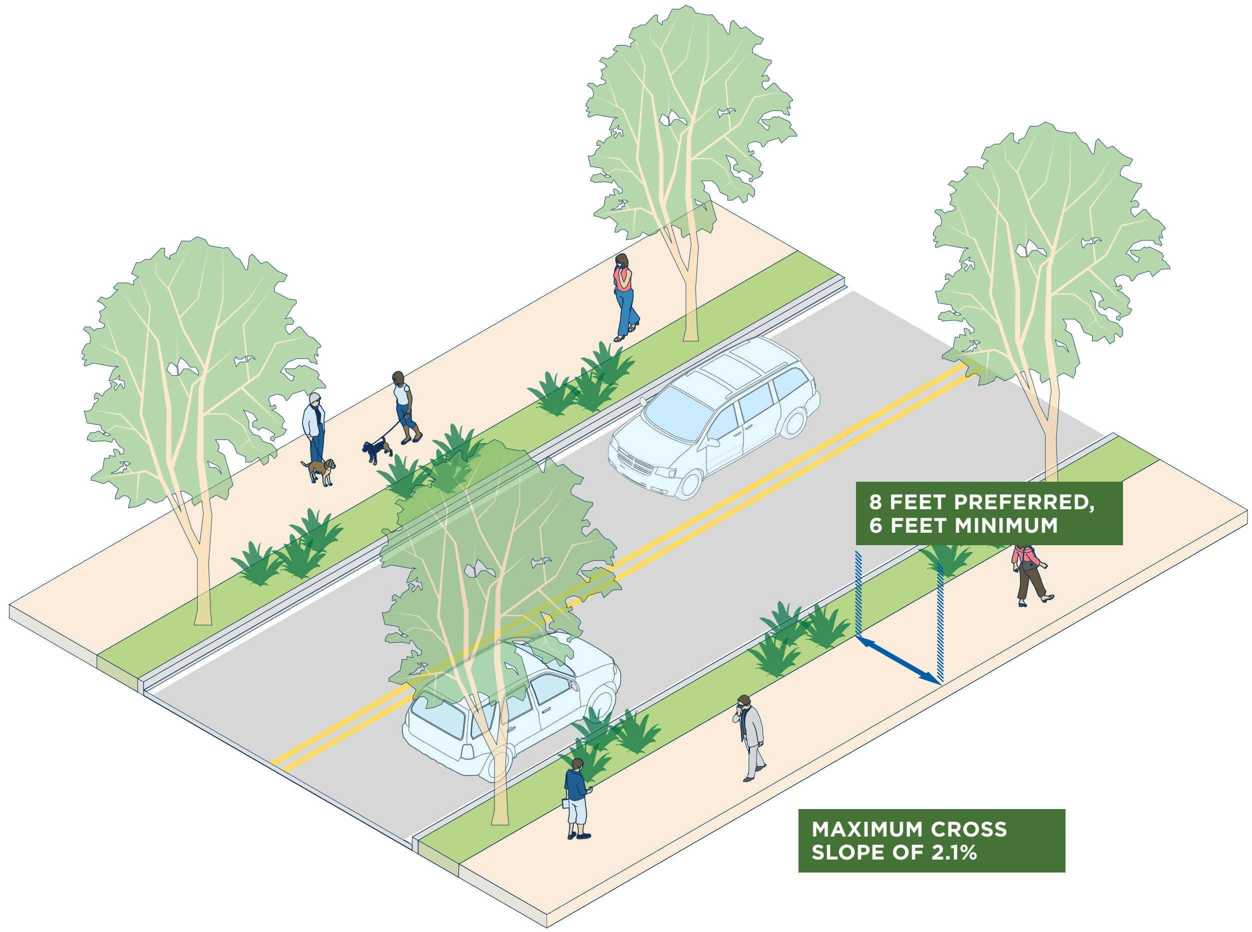


FIGURE 4-3 Sidewalk Construction Standards

4.1.3 Frontage Zone

The **Frontage Zone** is the area between the sidewalk and the right-of-way line or the front face of a building. This zone provides a buffer between pedestrians and vertical elements such as building facades, fences, hedges, or walls, and helps prevent conflicts with doors that swing open into the sidewalk.

When a frontage zone is present the following standards apply to all streets:

In high-pedestrian areas such as commercial, mixed-use, or dense urban contexts, the minimum frontage zone width shall be two (2) feet.

A minimum of one (1) additional foot shall be provided in areas with:

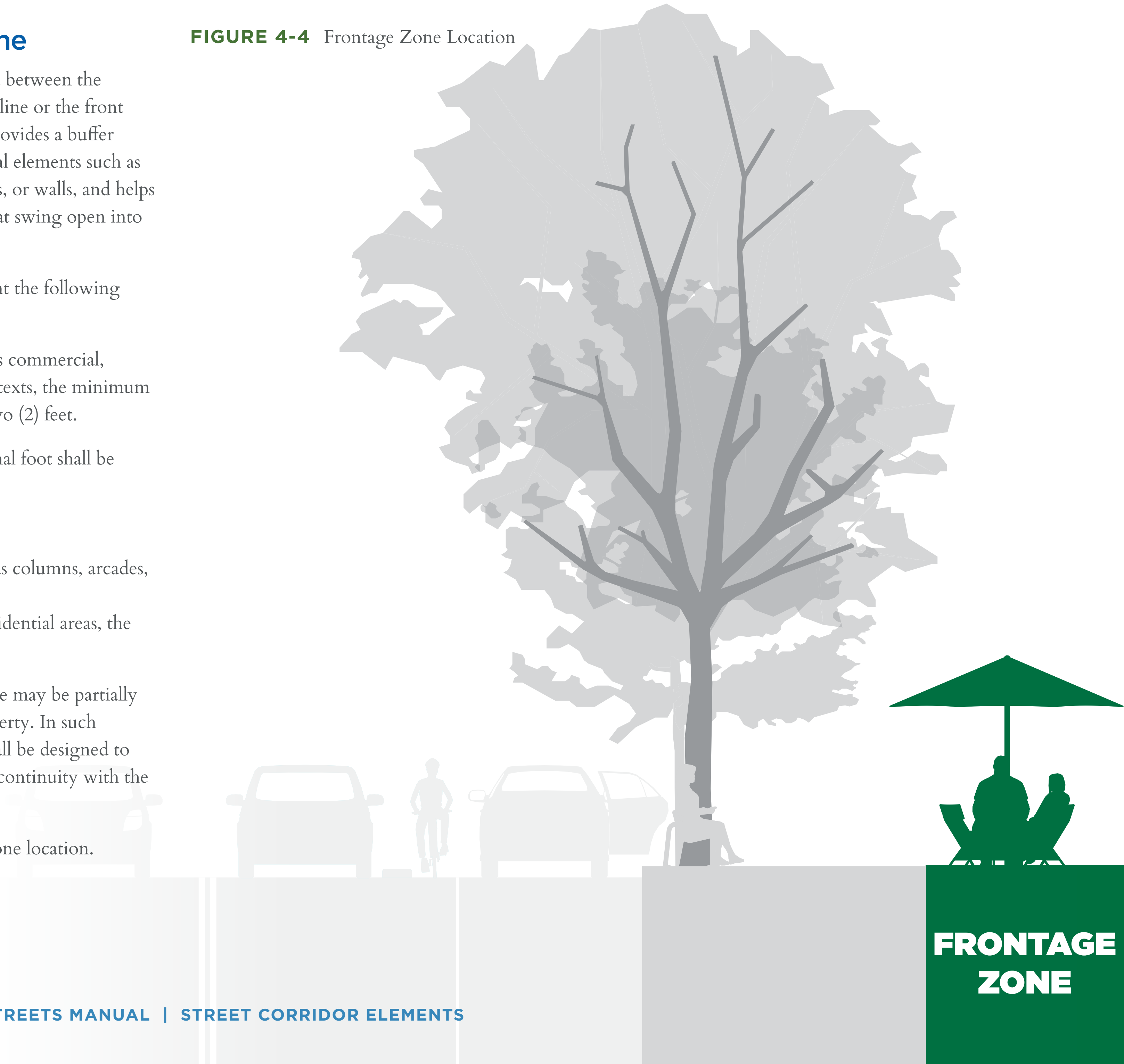
- Landscaping or planter beds
- Retail displays or signage
- Architectural elements such as columns, arcades, or awnings

In low-density or primarily residential areas, the frontage zone may be omitted.

In some cases, the frontage zone may be partially or fully located on private property. In such instances, the frontage zone shall be designed to maintain visual and functional continuity with the adjacent public right of way.

See Figure 4-4 for Frontage Zone location.

FIGURE 4-4 Frontage Zone Location



4.1.4 Amenity Zone

The **Amenity Zone** is located between the roadway and the sidewalk. This zone buffers pedestrians from moving vehicles and provides space for streetscape, landscaping, and placemaking elements. The Amenity Zone enhances both safety and the overall character of the streetscape.

Typical elements located in the Amenity Zone include:

- Street trees and vegetation
- Street furniture (benches, trash and recycling receptacles, bike racks)
- Signage (traffic and retail)
- Public art
- Sidewalk cafes
- Green infrastructure
- Bicycle and micromobility parking (when space is limited within the Curbside Zone)

The Amenity Zone is also the preferred location for:

- Pedestrian lighting
- Signal cabinets and traffic control devices
- Fire hydrants and certain utilities (above or below grade)
- Hardscaped connections to transit stops, parking, or bicycle facilities

In residential contexts, the amenity zone shall be landscaped with street trees. In higher-density and mixed-use areas, the Amenity Zone is typically paved to support active pedestrian and commercial use and shall include street wells per **Section 4.5.1**.

See Figure 4-12 for guidance on preferred features in the Amenity Zone by Street Type. Final design decisions shall be based on site-specific context. All elements outlined within **Section 4.1.4** are allowable within the Amenity Zone. **Section 4.1.4.1, Trees & Fixed Objects** is required. **Section 4.1.4.6, Bicycle Parking** is required when specified by the **Zoning Ordinance**.

4.1.4.1 Trees & Fixed Objects

On streets with target speeds ≤ 35 mph, street trees shall be planted in the Amenity Zone.

On streets with target speeds > 35 mph, the placement of street trees and fixed objects requires roadway owner approval who may require alternative locations within the right of way or easements for street trees.

For roads with posted speeds > 45 mph, refer to the AASHTO Roadside Design Guide for clear zone guidance.

Designers should balance the need for clear sight triangles with the provision of shade and amenities at intersections and driveways. Approaching drivers, bicyclists, and pedestrians must have adequate visibility of the conflict area, while shade can improve comfort for those waiting. Fixed objects with a diameter of 4 inches or less are not considered sight line obstructions. For street trees, evaluate potential obstruction using the anticipated trunk diameter at maturity. Assess sight lines to ensure that a series of objects does not create a continuous visual obstruction. See **Section 4.5** for additional guidance.

4.1.4.2 Pedestrian Lighting

Pedestrian-scale lighting enhances visibility, comfort and safety for people walking or rolling. Unlike roadway lighting, it is:

- Lower in height and lumen output
- Directed at the pedestrian zone
- More closely spaced

DESIGN GUIDANCE

Pedestrian lighting is desirable in these locations:

- streets within school zones
- at transit stops
- streets along parks
- at pedestrian crossings where nighttime pedestrian crossings are frequent (i.e., entertainment districts, bus stops, etc)

When present, pedestrian lighting should be coordinated with streetlights, street trees, and utilities. Pedestrian lighting may be located on the same pole as roadway lighting (**Section 4.3.3.3**) to reduce costs.

DESIGN REQUIREMENTS

Pedestrian lighting shall:

- use LED lights
- consider the specifics of the outdoor space when selecting lighting type and lumens
- ensure adequate space for transformers, solar-powered lighting, meters, and control boxes
- comply with Lexington's Outdoor Lighting code (see Article 30)

If a street is entirely private, street lighting fixtures and electrical costs are the responsibility of the developer and/or Homeowners Association.

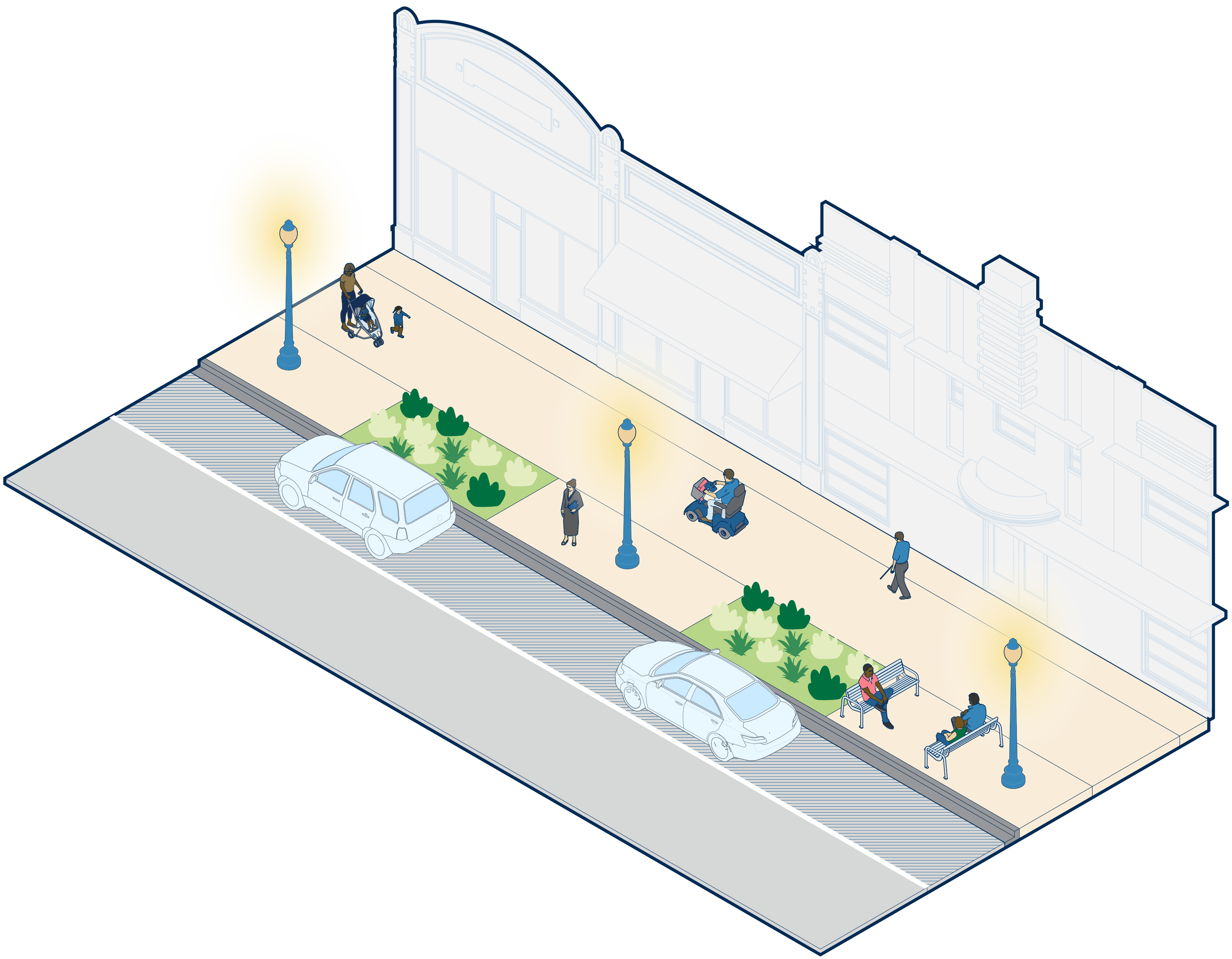


FIGURE 4-5 Pedestrian Lighting

4.1.4.3 Street Furniture

Street furniture increases the quality of the pedestrian experience and includes elements such as seating, transit shelters, trash/recycling bins, and decorative planters. All furniture placement shall comply with PROWAG and shall not encroach on the Pedestrian Access Route (PAR).

4.1.4.4 Seating

Types may include benches, movable chairs, ledges, walls, and raised planters

- Movable seating is permitted where maintenance and replacement responsibilities are clearly defined.
- Moveable seating is most appropriate for cafes, plazas and parklets
- Non-movable seating is typically heavy or secured to the pavement

SEATING CLEARANCE

Movable and non-movable seating shall not obstruct building entrances, fire exits, fire escape routes or loading zones. The minimum clearance for seating shall be:

- 2 ft from the Pedestrian Access Route
- 3 ft from walkable surfaces on either side of the seating
- 5 ft from fire hydrants
- 2 ft from above-ground utilities
- 1 ft from any wall, building, or vertical obstruction

DESIGN REQUIREMENTS

- Provide a 30" x 48" accessible space for wheelchairs adjacent to 50% of any grouping of benches (or no less than one) per PROWAG
- Seating at bus stops should typically face the street to ensure visibility between approaching bus operators and patrons

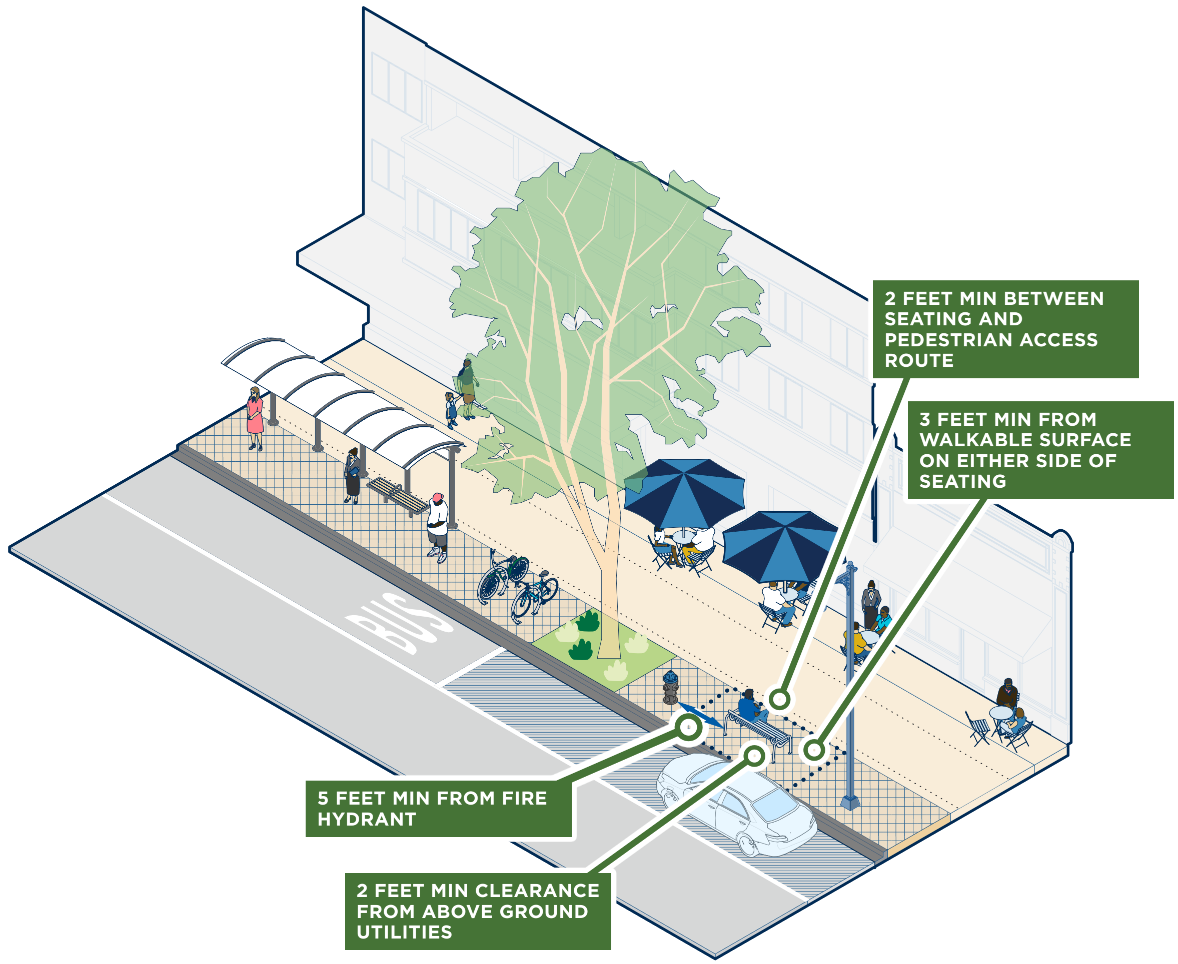


FIGURE 4-6 Seating Placement

4.1.4.5 Trash and Recycling Receptacles

- Trash and recycling receptacles should be available in areas with significant pedestrian and bicycle travel, such as high-use transit stops, plazas, schools, event centers, and parks.
- Should be placed in the Amenity Zone whenever possible
- If no street buffer is present, receptacles can be placed in the sidewalk, but a 5-foot clear Pedestrian Access Route shall be maintained.

FIGURE 4-7 Trash Receptacle Placement

4.1.4.6 Bicycle Parking

Providing places for people to securely lock their bicycles is key to supporting those modes. Requirements for the type and number of bicycle parking spaces are found in the LFUCG **Zoning Ordinance**. Bicycle parking should be provided in areas with higher levels of pedestrian activity (near schools, parks, mixed use and commercial areas). Parking may be provided on private property or in the public right of way.

Bicycle parking located within the public right of way shall comply with the following design and placement requirements.

LOCATION STANDARDS:

- Within the Amenity Zone (preferred)
- Within the Frontage Zone (minimum 6 ft width required)
- Within the Curbside Zone (e.g., bike corrals in parking spaces or in curb extensions in parking daylighting areas)
- 2 ft from curb (when parallel to street)
- 4 ft from curb (when perpendicular to street)
- 3 ft from buildings or tree grates
- 4 ft from building corners
- 10 ft from fire hydrants

DESIGN REQUIREMENTS:

- Bicycle racks shall be durable and anchored securely.
- Racks must allow two points of locking (frame + wheel) with standard U-lock.
- Minimum space per standard bicycle: 72" long x 18" wide x 85" tall
- 10% of racks shall accommodate cargo or non-standard bikes (120" long x 30" wide).
- Bike corrals shall include vertical elements (e.g., flex posts or barriers) to prevent vehicle encroachment.

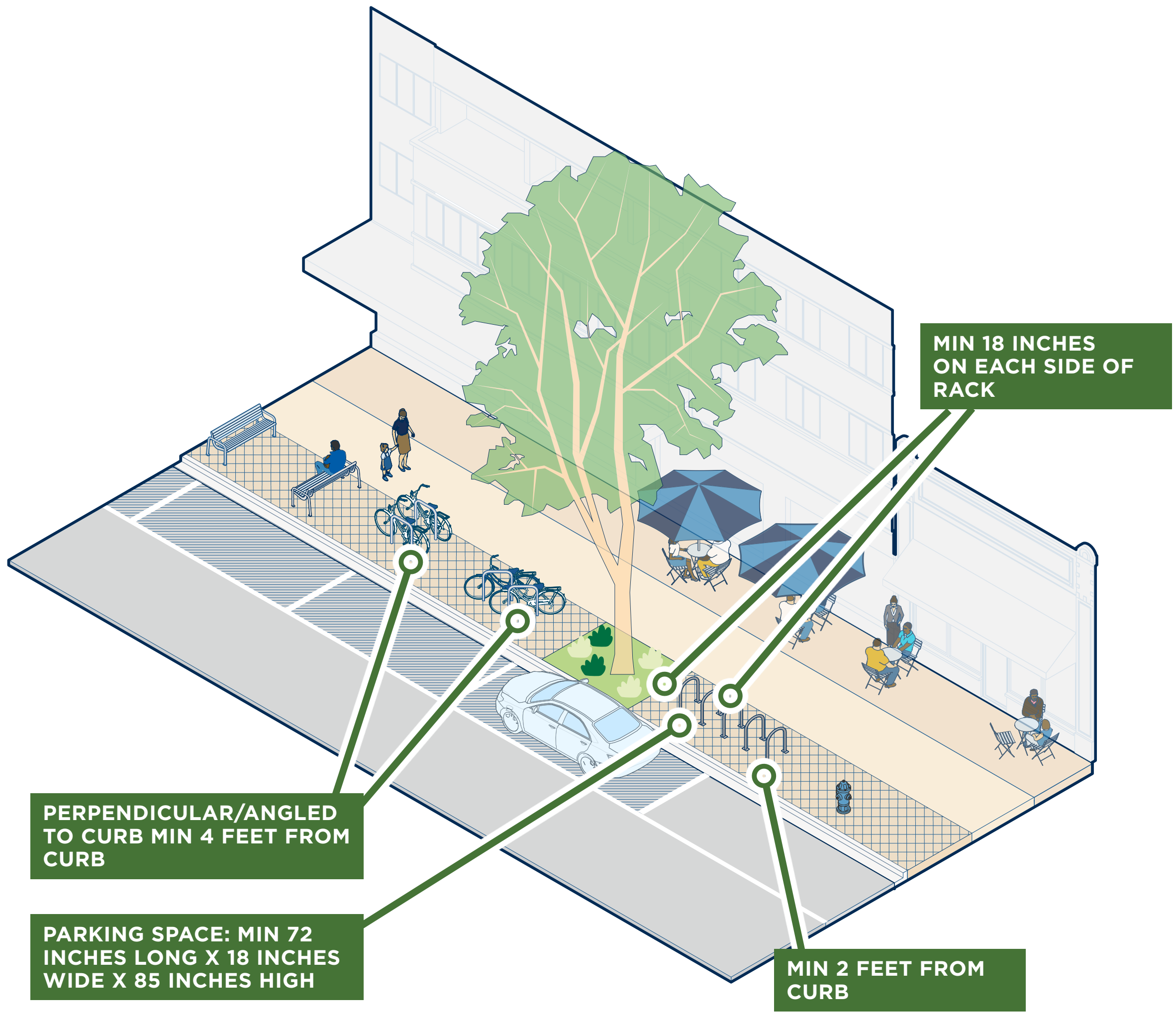


FIGURE 4-8 Bicycle Parking Placement

4.1.4.7 Dockless Micromobility Parking

Mobility choices are evolving, with new dockless and shared mobility options (e.g., electric scooters, electric-assist bikes, etc.) available in Lexington-Fayette County. Dockless options are typically reserved through a phone app. All new shared mobility programs require coordination and permitting from LFUCG.

DESIGN REQUIREMENTS:

- Minimum parking zone size: 6 ft x 10 ft (fits ~10 devices)
- Maximum number of dockless vehicles per zone: 10
- High-demand areas may require additional or grouped parking locations

LOCATION STANDARDS:

- Preferred in the Amenity Zone
- Shall not block:
    - Pedestrian Access Route – maintain a minimum of 5 feet clear
    - Bus stops or curb ramps
    - Crosswalks, driveways, or building entrances

FIGURE 4-9 Dockless Micromobility Parking

4.1.4.8 Sidewalk Cafes

Sidewalk cafes for outdoor dining allow restaurants and bars to expand onto the adjacent sidewalk. With proper design and management, sidewalk cafes add vitality to streets and commercial areas and promote economic activity.

LOCATION STANDARDS & DESIGN REQUIREMENTS:

- Cafes may be located in the Frontage or Amenity Zone
- Cafes require a minimum of 6-feet for seating and pedestrian circulation
- Cafes shall not encroach on the Pedestrian Access Route
- Cafes shall not be placed:
    - Within 10 feet of transit stops
    - Within 2 feet of bicycle amenities
    - Within 1 feet of above ground utilities
    - Within 18 inches of the roadway curb

PERMITTING REQUIREMENTS:

- Encroachment permits approved by the **Lexington-Fayette Parking Authority** are required per the **LFUCG Code of Ordinances – Chapter 17 §17-29.**
- Applicants must demonstrate that cafe seating:
    - Does not obstruct a 5-foot clear Pedestrian Access Route
    - Does not obstruct building entrances, fire exits, fire hydrants, or fire department connections
    - Is removable upon request for safety or accessibility

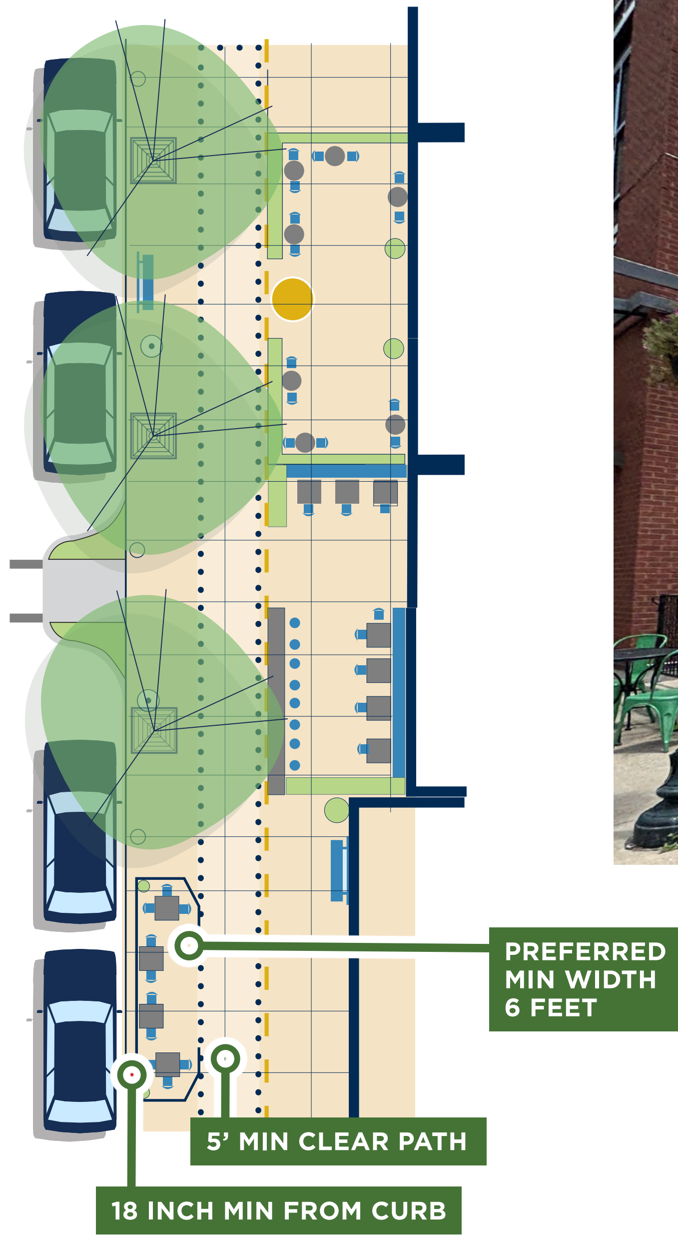


FIGURE 4-10 Sidewalk Cafes and Outdoor Seating

4.1.4.9 Public Art and Pop-Up Spaces

Public art and temporary pop-up spaces can make public spaces more attractive. They activate the street, create more vibrant public spaces, and help foster community identity.

PERMITTING REQUIREMENTS

Allowable uses that require an encroachment permit per **LFUCG Code of Ordinances – Chapter 17 §17-29** include:

- Sidewalk or street art and murals
- Traffic signal box wraps and artwork
- Play streets and temporary plazas
- Sidewalk cafes

Though not design elements, special events such as block parties, farmers markets, and festivals also enliven streets. These adaptive street treatments can be used to respond to activities that temporarily increase pedestrian volumes and allow streets to serve as large public spaces for community use.

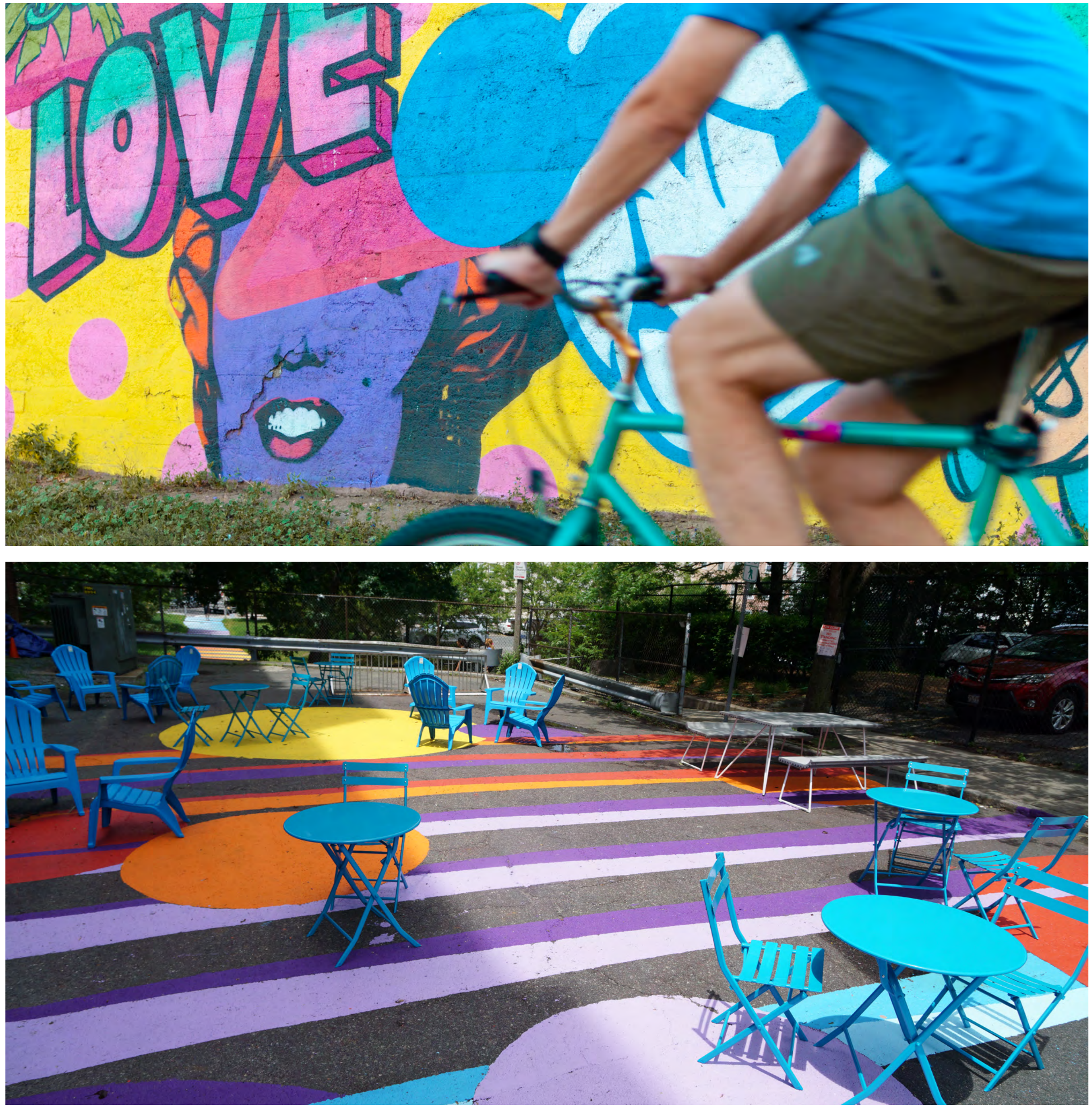


FIGURE 4-11 Public Art and Pop-Up Spaces

Legend
■ Required
● Recommended
○ Optional
✕ Not Permitted or N/A

	Neighborhood Street	Avenue	Boulevard	Thoroughfare	Alley	Page Reference
Trees	■	■	■	■	✕	71
Landscaping	●	●	●	●	✕	126
Green Infrastructure	○	○	○	○	○	128
Seating	●	●	●	○	✕	73
Bicycle/Micromobility Parking	●	■	■	●	○	75
Recycling/Trash Receptacles	●	●	●	●	○	74
Plazas/Parklets	○	○	○	✕	✕	107
Dockless Mobility	✕	○	○	○	✕	76
Pedestrian Scale Lighting	○	○	○	○	○	71
Pedestrian/Bicycle Wayfinding	●	●	●	●	✕	164
Sidewalk-Level Driveways	■	■	■	■	✕	86
Public Art/Pop-up Spaces	○	○	○	○	✕	78
Sidewalk Cafes	○	●	○	✕	✕	77

FIGURE 4-12 Preferred Amenities By Street Type

4.2 Bicycle Facility Zone

Lexington supports bicycling to advance public health, sustainability, and multimodal mobility goals. Bicycle infrastructure is recognized as an essential element of the overall transportation network.

A well-designed bicycle network enhances comfort, safety, and accessibility for users of all ages and abilities by providing dedicated space for bicyclists and micromobility users. Facilities may be:

- Barrier-separated from motor vehicle traffic, such as separated bike lanes or shared use paths; or
- Directly adjacent to motor vehicle traffic, such as striped bike lanes
- Integrated with motor vehicle traffic, such as shared lanes on low volume streets

4.2.1 Standards for New Development

Bicycle facilities for all new street construction shall conform to the default type and dimensions as outlined in Chapter 3.

Designers shall refer to the latest edition of the **LFUCG Traffic Engineering Manual** for guidance on signage and pavement markings.

4.2.2 Standards for Redevelopment and Street Retrofits

During redevelopment and street retrofits projects, designers shall strive to meet the preferred bicycle facility type and dimensions outlined in Chapter 3: to the greatest extent feasible, unless a documented constraint prevents full compliance.

In retrofits, where site constraints limit the ability to meet the default standard, the designer shall maximize the ability to meet the standard by:

- narrowing travel and parking lanes to minimum widths
- reallocating space within the right of way
- removing travel or parking lanes (if possible)
- widening the roadway (last resort)

If the default facility type cannot be achieved by applying these options, designers may provide minimum-width or alternative facilities, coupled with design strategies to manage vehicle speeds and reduce conflict points. When a minimum width bicycle facility must be used, it shall be used for only short distances within a constrained environment.

The **NACTO Urban Bikeway Design Guide** and **AASHTO Bicycle Design Guide** shall be the primary references used to evaluate the quality and safety of bicycle facility alternatives in these constrained environments (see **Section 4.2.5**).

Figure 4-13 presents each street type's default bicycle facility, as well as its required dimensions.

STREET TYPE	DEVELOPMENT INTENSITY	Parameter	Shared-Use Path or Side Path		One-way Separated Bike Lane		Two-way Separated Bike Lane		Buffered Bike Lane (2' min. buffer, 3.5' min. next to parking, dim below does not include buffer)	
			Default	Min	Default	Min	Default	Min	Default	Min
Neighborhood Street	All	Bikeway	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Street Buffer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Avenue	Low/Medium	Bikeway	10 (Both Sides)	10'	5'	5'	10'	10'	6'	6'
		Street Buffer	7'	3'	1.5'	1.5'	3'	1.5'	4'	2'
	High	Bikeway	N/A	10'	6'	5'	12'	10'	7'	6'
		Street Buffer	N/A	3'	1.5'	1.5'	3'	1.5'	4'	2'
Boulevard	Low/Medium	Bikeway	10' (Both Sides)	10'	6'	5'	10'	10'	N/A	N/A
		Street Buffer	7'	3'	1.5'	1.5'	3'	1.5'	N/A	N/A
	High	Bikeway	N/A	10'	6'	5'	12'	10'	N/A	N/A
		Street Buffer	N/A	3'	3'	1.5'	3'	1.5'	N/A	N/A
Thoroughfare	All	Bikeway	10'	10'	6'	6'	12'	10'	N/A	N/A
		Street Buffer	7'	7'	4'	4'	4'	1.5'	N/A	N/A
Alley	All	Bikeway	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Street Buffer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend: ☐ Default bike facility

FIGURE 4-13 Appropriate Bikeway By Street Type

4.2.3 Bicycle Facility Types

Selecting the appropriate bicycle facility is essential to ensuring a safe and functional multimodal transportation network. Facility type shall be determined based on target motor vehicle speed, traffic volumes, and surrounding context applying guidance from **Section 4.2.2**. The following sections describe the design requirements and recommendations for each bicycle facility.

4.2.3.1 Separated Bike Lanes

Separated Bike Lanes (SBLs), also referred to as protected bike lanes or cycle tracks, are dedicated bikeways that provide physical separation between bicyclists and motor vehicle traffic. SBLs are typically located either:

- At street level, within the curbside zone and separated by a buffer; or
- At sidewalk level, within the pedestrian realm but physically separated from the sidewalk itself.

SBLs are intended for the exclusive use of bicyclists and micromobility users. Pedestrian use is not permitted.

SBLs improve comfort, safety, and perceived security for users of all ages and abilities, particularly on streets with higher traffic volumes and vehicle speeds. They also support increased ridership by attracting a broader range of users than conventional striped bike lanes.

DESIGN GUIDANCE

To function effectively, SBLs must incorporate both:

- **Horizontal separation** (from adjacent travel lanes and sidewalks)
- **Vertical separation** (elevation change or vertical elements to define the space)

Additionally, SBLs must address:

- **Intersection Safety:** Protected Intersections are the preferred intersection design treatment for SBLs (**Section 5.5.2**).
- **Driveway Crossings:** Consistent pavement materials and bikeway elevation should be maintained at driveway crossings (i.e. raised if at sidewalk level)
- **Drainage & Maintenance:** Ensure clear paths for water runoff and access for maintenance
- **Street buffer at transit stop** locations should be reviewed as they may require wider widths (**Section 4.4**).

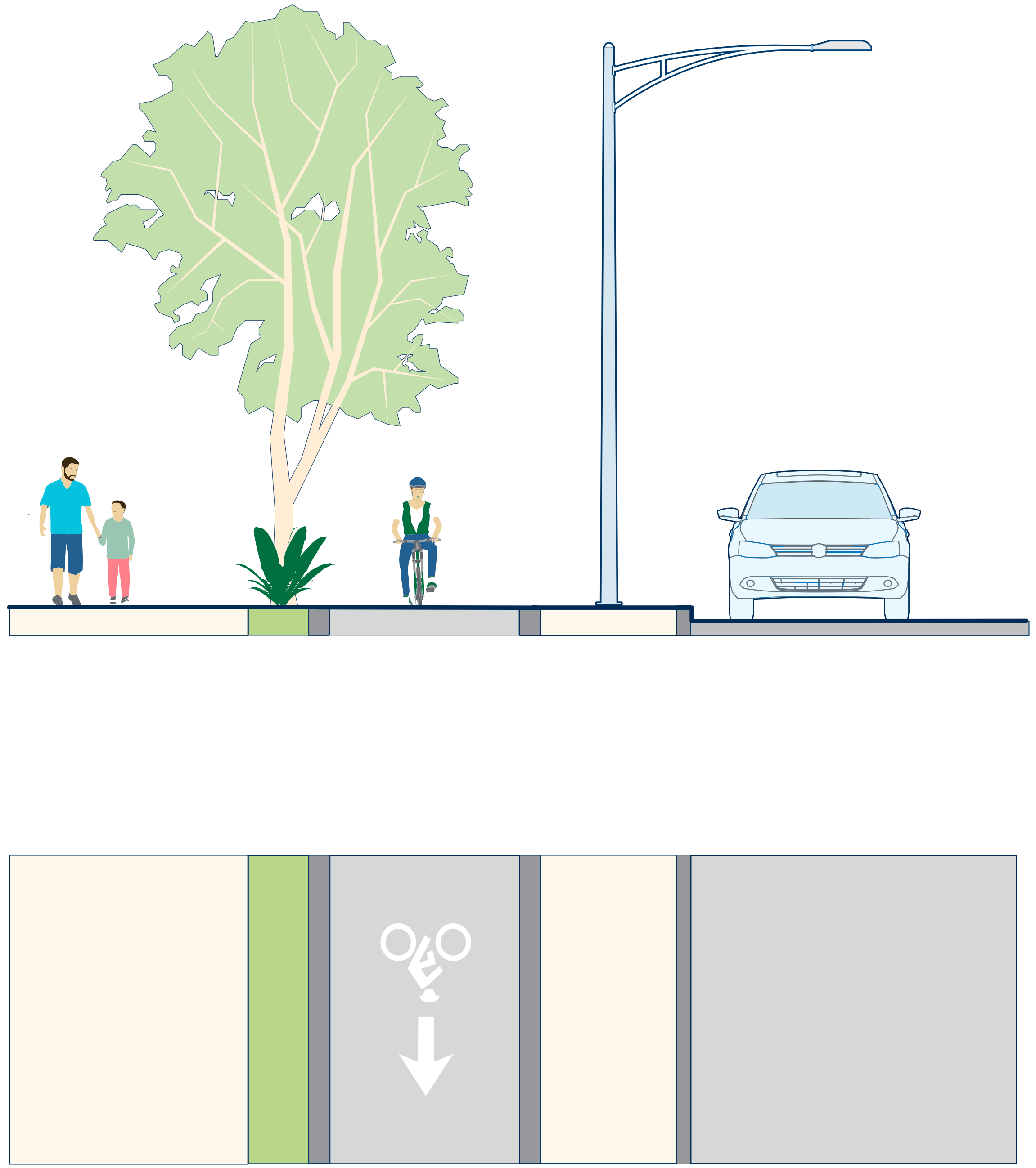


FIGURE 4-14 Separated Bike Lanes at Sidewalk Level

4.2.3.1.1 Elevation

For new street construction, Separated Bike Lanes (SBLs) shall be constructed at sidewalk level, distinct from both the roadway and the pedestrian sidewalk.

At intersections, SBLs may transition to street level to preserve visibility, maintain detectable edges, and ensure accessibility for pedestrians.

For redevelopment and retrofit conditions, SBLs may be constructed at either sidewalk level or street level, depending on site constraints and available right-of-way.

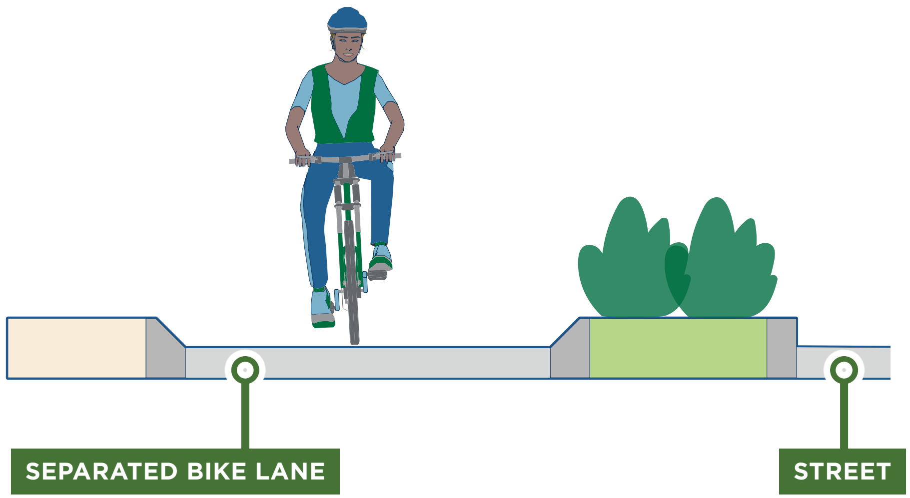


FIGURE 4-15 Separated Bike Lanes at Street Level

4.2.3.1.2 Pedestrian Separation

SBLs are intended for the exclusive use of bicyclists and micromobility users and shall not be used by pedestrians. The amenity zone provides horizontal separation from pedestrians. Street trees, planters, or other vertical elements provide vertical separation.

4.2.3.1.3 Vehicular Separation

The street buffer horizontally separates the SBL from adjacent motor vehicle traffic and is critical to rider comfort and perceived safety. This buffer shall also include vertical elements to reinforce the separation and reduce encroachment by vehicles.

- For new development and redevelopment
  - The buffer width shall comply with Chapter 3: Street Type Cross-Sections
  - Vertical barriers shall include raised curbs

- For street retrofits
  - The minimum buffer width shall be 1.5 feet
  - Where space permits, the buffer should be widened to provide additional separation
  - Vertical barriers with raised curbs are preferred
  - Other vertical barriers are permitted including flexible bollards or delineators, landscape planters, or modular curbs and barriers
  - Existing utility covers and grates must be installed and oriented to minimize bicycle wheel entrapment.
  - See Table 4-2 for guidance on appropriate vertical barriers based on the horizontal street buffer width

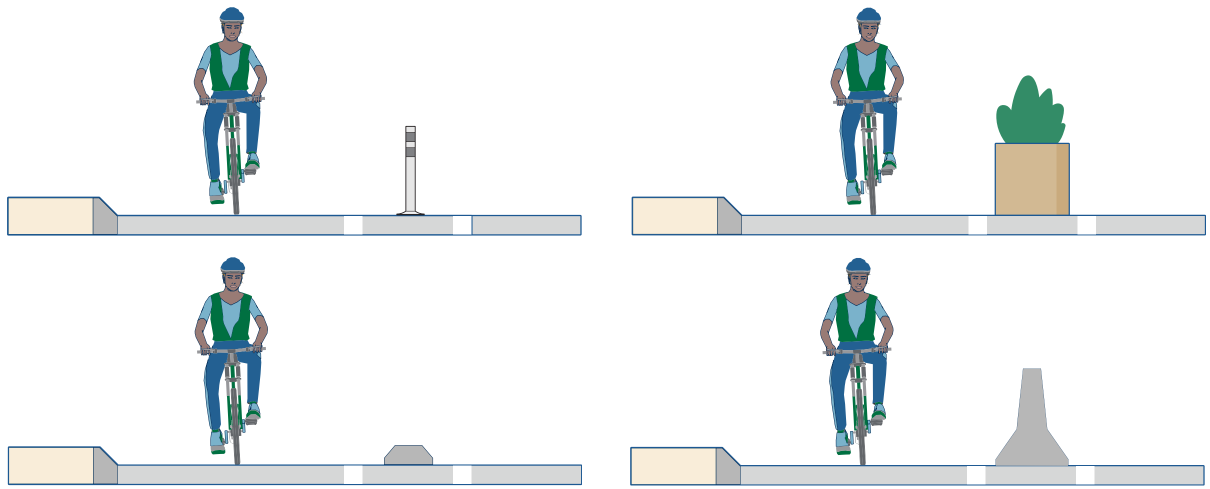


FIGURE 4-16 Vertical Barriers for Separated Bike Lanes

TABLE 4-2 Vertical Separation Treatments by Width Range

Treatment Type	Typical Horizontal Width Range	Notes
Concrete Islands	1.5' - 4'	Durable and effective for delineation and protection. Used in both retrofit and new construction.
Raised Medians	4' - 6'	6' is preferred for landscaped treatments; provides a strong physical barrier.
Planters or Concrete Barriers	2' - 4'	Preferred retrofit treatment where space allows. May double as landscaping features.
Temporary Curbs or Medians	1.5' - 2.5'	Acceptable for retrofits; may include modular curb systems or precast elements.
Flexible Delineator Posts (Flexposts)	0' - 1.5'	Allowed for retrofits; low-cost, but limited in protection and longevity. Should not be used as a standalone treatment where higher-speed traffic is present.

4.2.3.1.4 Transition to Shared Use Paths

A separated bike lane and sidewalk may transition to a shared use path where two conditions are met: 1) when adjacent to low density residential land uses (single family, townhome, duplex) and 2) the street frontage has no driveways or minimal driveways that serve multiple properties.

4.2.3.2 Shared Use Paths, Trails, and Greenways

Shared use paths – often referred to as trails, paths, or greenways – are either located within the pedestrian zone of a roadway (sidepaths) or are located within an independent alignment through a park, open space or greenway. They are designed for people walking, rolling, bicycling, and using micromobility devices. Separation from motor vehicles makes these paved, two-way facilities accessible and comfortable for a wide range of users.

DESIGN GUIDANCE

Shared use path geometry shall be designed based on appropriate design speed using the procedures outlined in the **AASHTO Guide for the Development of Bicycle Facilities.**

All shared use paths shall comply with the **Public Right-of-Way Accessibility Guidelines (PROWAG, 2023 Final Rule).** Including:

- A minimum clear width of 8 feet is required.
- Running slope may follow the adjacent roadway grade. If not adjacent, it shall not exceed 5% unless the path meets ramp criteria.
- Cross slope shall not exceed 2.1% at any point along the path.
- The surface must be firm, stable, and slip-resistant.
- A vertical clearance of at least 8 feet shall be maintained at all points.
- Curb ramps and detectable warning surfaces are required where the path intersects roadways or driveways.
- Smooth transitions are required between changes in path materials or elevation.
- Edge protection shall be provided where adjacent drop-offs or hazards are present.

Shared use path pavement requirements are detailed in **Section 8.2.3**.

Additionally, shared use paths must address:

- **Intersection Safety:** Protected Intersections are the preferred design for sidepath intersections with streets (**Section 5.5.2**).
- **Driveway Crossings:** Driveway crossings should be limited. A raised elevation of the shared use path shall be maintained through driveway crossings.
- **Transit Stops:** Where shared use paths are co-located with transit stops, maintain the full width of the path around the transit stop placing transit supportive infrastructure in the street buffer.

4.2.3.2.1 Shared Use Path Widths

Shared use path widths must support user comfort and provide safe travel for both pedestrians and bicyclists. Shared use path width requirements include:

- Ten feet shall be the default width for shared use paths in Lexington-Fayette County. Shared use paths that will be striped for two-way operation should be twelve feet minimum.
- In physically constrained locations, the shared use path may be reduced to a minimum width of 8 feet, only if all of the following conditions are met:
  - The segment is short in length
  - The constraint is physical and unavoidable
  - The design complies with PROWAG
  - A waiver is approved by the **LFUCG Planning Commission** and/or per Appendix 1 of the **LFUCG Procedures Manual for Infrastructure Development**
  - An evaluation by a licensed engineer shows the safety and operational functionality of the facility is not compromised
- In locations where path usage is expected to exceed 500 users per hour, and where pedestrians comprise more than 30% of total users, wider paths are recommended to reduce conflicts and enhance comfort. These treatments are especially appropriate in areas of higher demand including denser urban corridors, campuses and parks.
  - Path width should be increased to 14–16 feet
  - Visual or spatial separation between pedestrians and bicyclists is desirable using Centerline striping or contrasting pavement textures

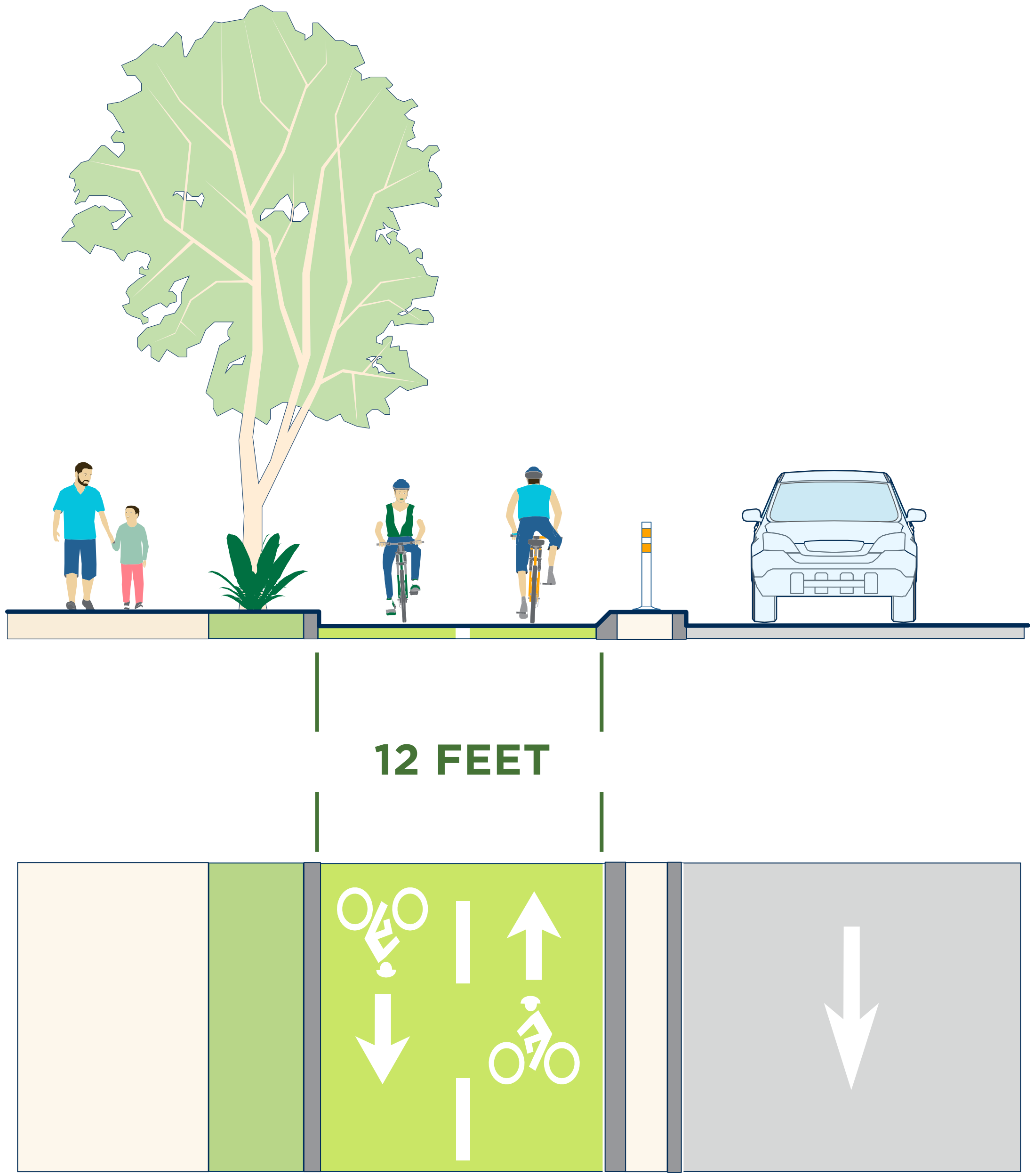


FIGURE 4-17 Shared Use Path Width

4.2.3.3 Buffered Bike Lanes

Buffered bike lanes are on-street bicycle facilities that use pavement striping to provide horizontal separation between bicyclists and motor vehicle traffic. Unlike separated bike lanes, they do not include vertical elements or physical barriers. Buffered bike lanes improve rider comfort through additional separation from motor vehicle traffic. They also allow for side-by-side riding and safe passing of other slower moving bike lane users.

Buffered bike lanes are often installed during routine maintenance activities, such as pavement resurfacing, or in constrained locations where major street reconstruction is otherwise unnecessary.

DESIGN GUIDANCE

4.2.3.3.1 Bike Lane Width

- Default width (exclusive of gutter pan): 6 feet
- Constrained Conditions: may be reduced to 5 feet, exclusive of gutter

4.2.3.3.2 Buffer Width

- Default width: 4 feet
- Buffers wider than 4 feet are not recommended
- Constrained Conditions (including an adjacent gutter): may be reduced to 2 feet to maintain the width of the bicycle lane. Existing utility covers and grates must be installed and oriented to minimize bicycle wheel entrapment.
- When adjacent to curbside parking, the buffer shall be a minimum of 3.5 feet

4.2.3.3.3 Buffer Treatments

- Buffered areas shall include high-visibility pavement markings to improve visibility and reinforce separation. Acceptable treatments include:
  - Diagonal hatching
  - Chevrons
  - Double solid or dashed lines

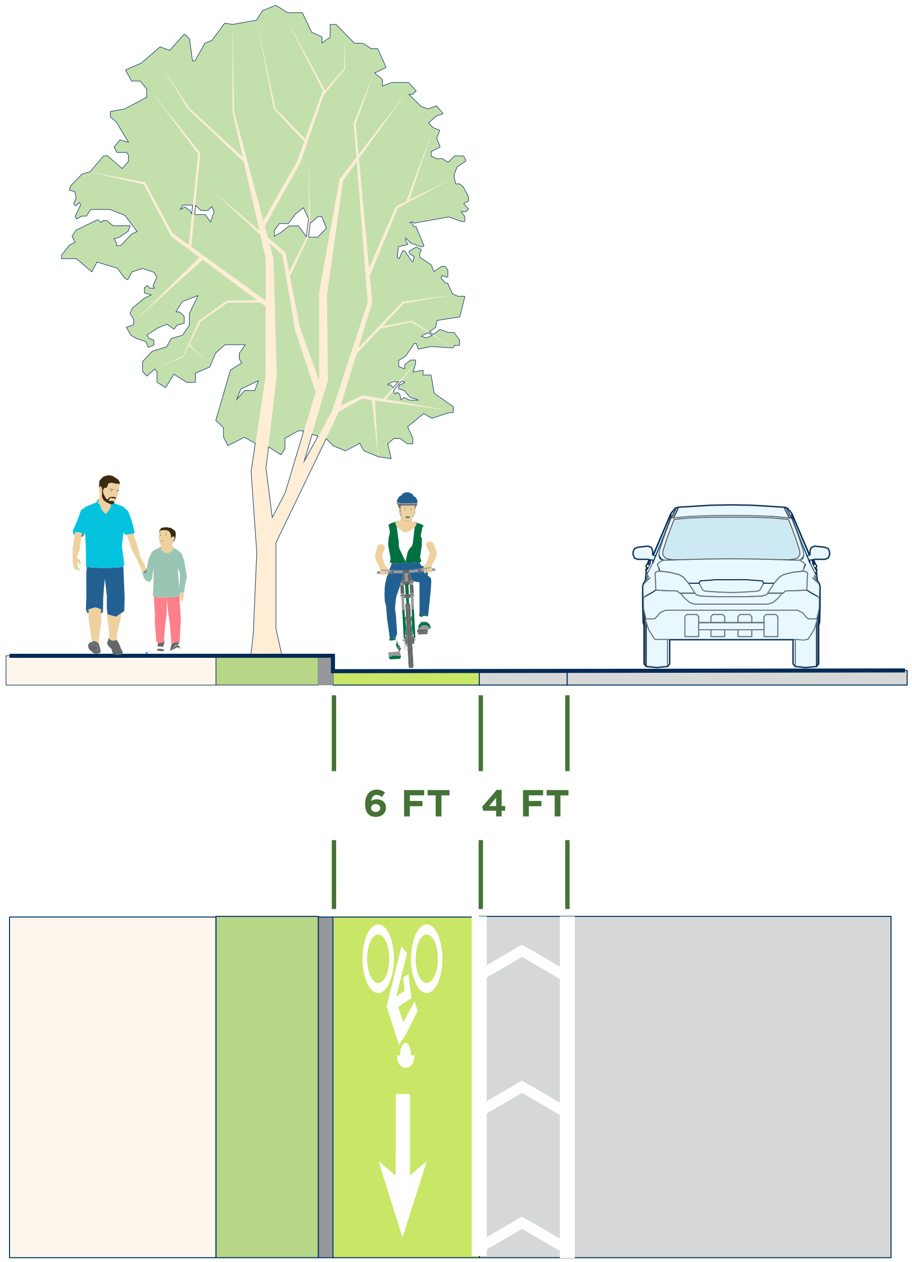


FIGURE 4-18 Buffered Bike Lane Dimensions

4.2.3.4 Striped Bike Lanes

Striped bike lanes are on-street bicycle facilities located immediately adjacent to motor vehicle travel lanes that do not provide additional horizontal or vertical separation. They are delineated with standard pavement striping and bicycle lane symbols.

These facilities are generally appropriate on streets with average daily traffic (ADT) under 6,000 vehicles and posted speed limits of 30 mph or lower.

Striped bike lanes may be implemented during routine maintenance activities, such as pavement resurfacing, to enhance bicycle comfort and visibility—particularly on corridors where major reconstruction is not anticipated in the near term.

DESIGN GUIDANCE

4.2.3.4.1 Bike Lane Width

- Default width (exclusive of gutter pan): 6 feet
- Constrained Conditions (including an adjacent gutter): may be reduced to 5 feet exclusive of gutter
- Existing utility covers and grates must be installed and oriented to minimize bicycle wheel entrapment.

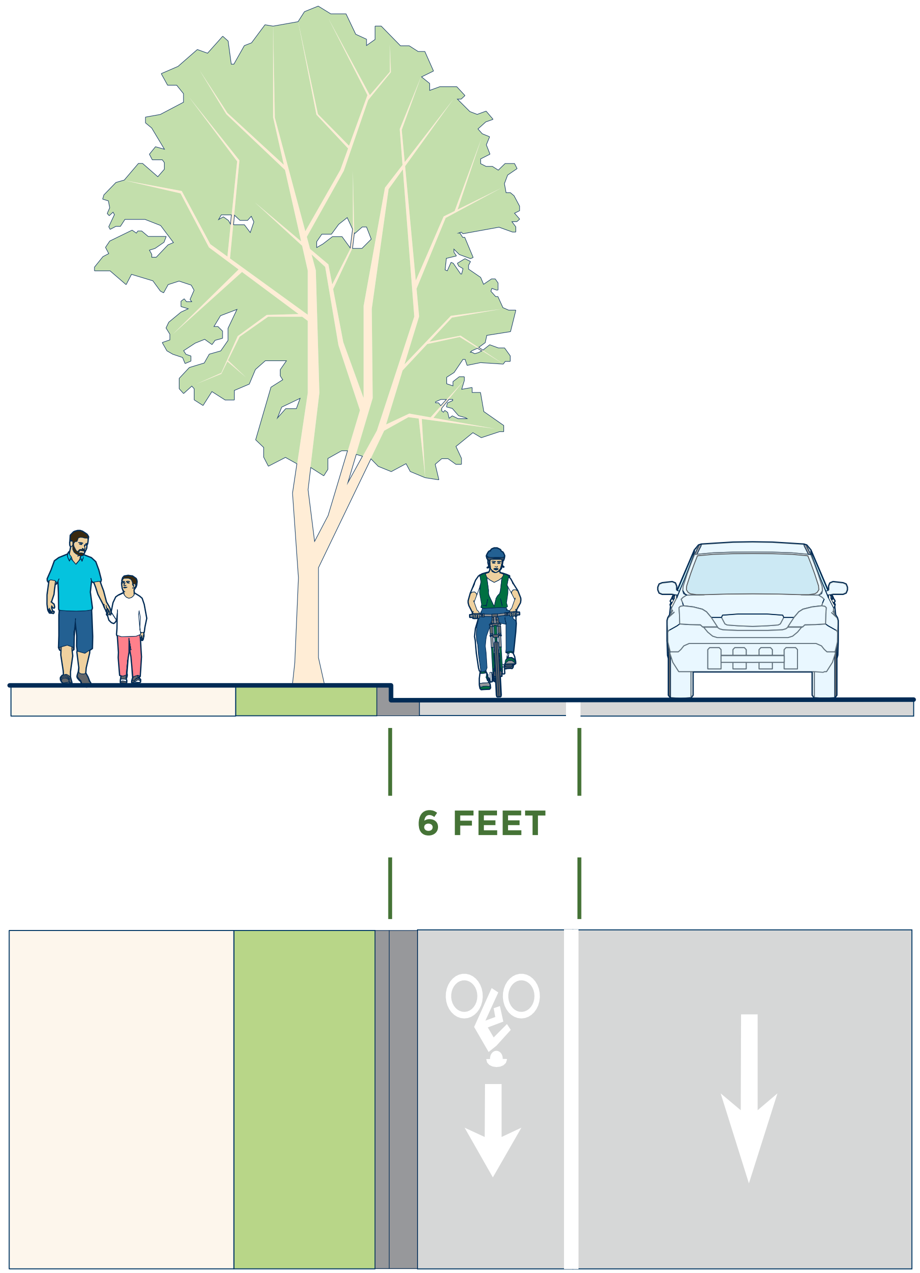


FIGURE 4-19 Striped Bike Lane Dimensions

4.2.3.5 Neighborhood Bikeway

Neighborhood bikeways are low-volume, low-speed local streets that are optimized for bicycle and micromobility travel. They provide safe, comfortable, low-stress routes through residential areas, away from high-traffic corridors. In doing so, they attract a broad range of users of varying confidence and skill levels.

Neighborhood bikeways should be comfortable and intuitive for users of all ages and abilities. Design treatments vary by context but typically include traffic calming measures to manage vehicle speeds and volumes, intersection enhancements to support safe crossings, and clear markings and signage to reinforce bicycle priority.

4.2.3.5.1 Location Standards

- Average Daily Traffic (ADT): Generally fewer than 1,500 vehicles per day
- Posted Speed Limit: 25 mph or lower (preferably 20 mph)
- Connectivity: Provides direct or parallel connections to higher-order bikeways, schools, parks, commercial centers, or transit stops

DESIGN GUIDANCE

The following elements should be provided on neighborhood bikeways:

- **Traffic calming measures** (e.g., speed humps, mini-circles, curb extensions, or chicanes) to reduce vehicle speeds and volumes
- **Shared lane markings** (sharrows) to indicate expected bicyclist positioning
- **Bicycle wayfinding signage** to guide users to key destinations or transitions within the bike network
- **Intersection improvements** such as high-visibility crosswalks, curb extensions, or bicycle crossing islands at major road crossings
- **Raised or tabled intersections** to slow turning vehicles and prioritize non-motorized users
- **Continuous bicycle movement** by minimizing stops for people biking

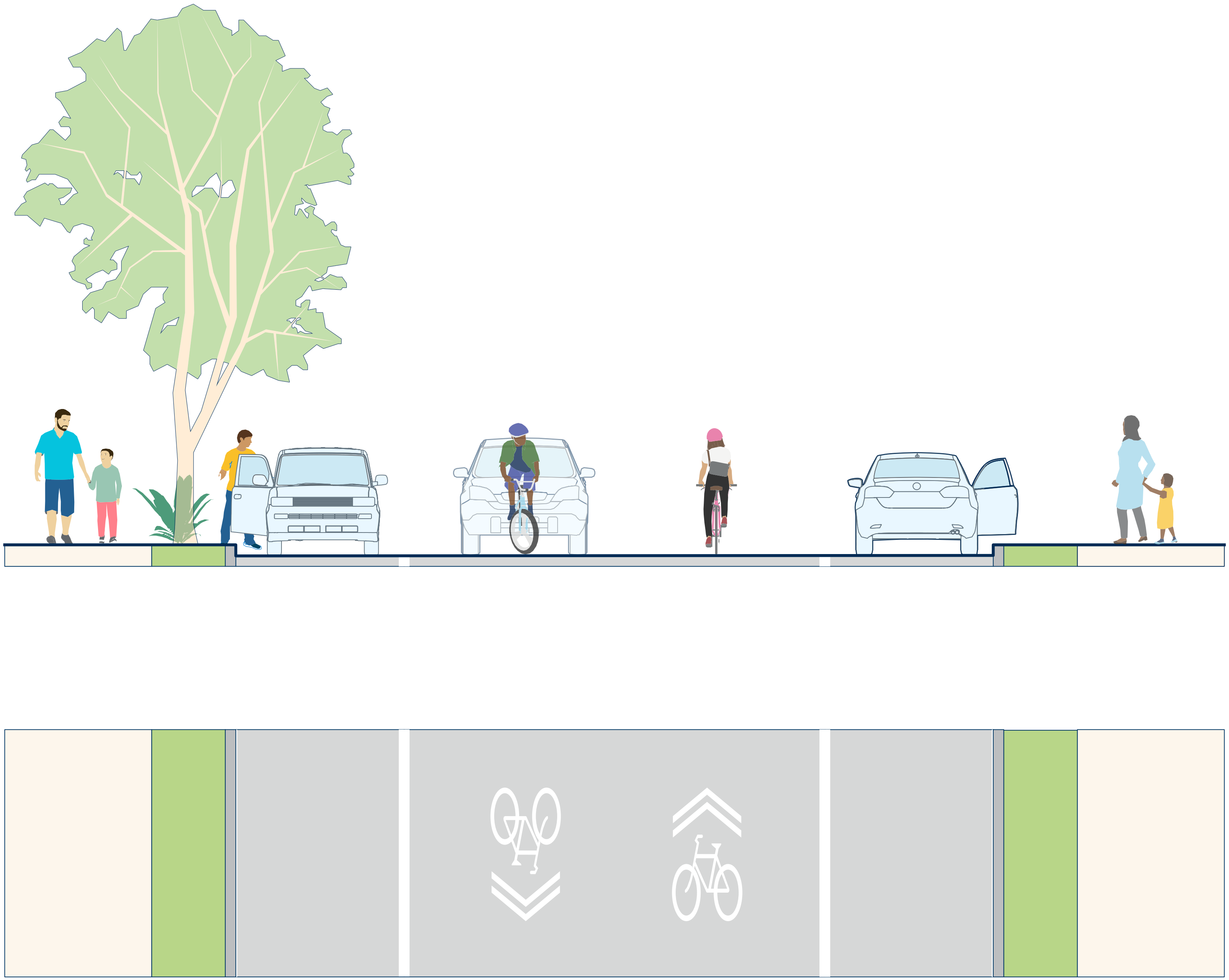


FIGURE 4-20 Neighborhood Bikeway

4.2.3.6 Shared Lanes

Shared lanes exist in all locations where bicyclists ride in mixed traffic with motor vehicles without designated bicycle facilities or separation. Most low volume, low speed neighborhood streets function as shared streets. Shared lanes on streets with traffic volumes less than 1,000 average annual daily traffic (AADT) and traffic speeds less than 25 mph are generally comfortable for most bicyclists of all ages and skill levels. Shared lanes on streets with traffic volumes up to 3,000 vehicles provide a moderate level of comfort for most adult bicyclists.

4.2.3.7 Bikeable Shoulders

Shoulders can improve comfort and safety for all users on rural roads, including pedestrians, bicyclists and motorists. A bikeable shoulder on uncurbed streets provides a separate space for bicycle travel when it is properly swept and maintained for bicycle use.

DESIGN REQUIREMENTS

While a separated shared use path is the default standard for rural roads with traffic volumes greater than 1,000 vehicles per day, when a paved shoulder is present in lieu of a shared use path, the following standards apply:

- Less than 10,000 vehicles per day: 6- to 8-foot shoulder
- More than 10,000 vehicles per day and/or heavy vehicles exceeding 10 percent AADT: 12-foot shoulder (default), 10-foot shoulder (minimum)

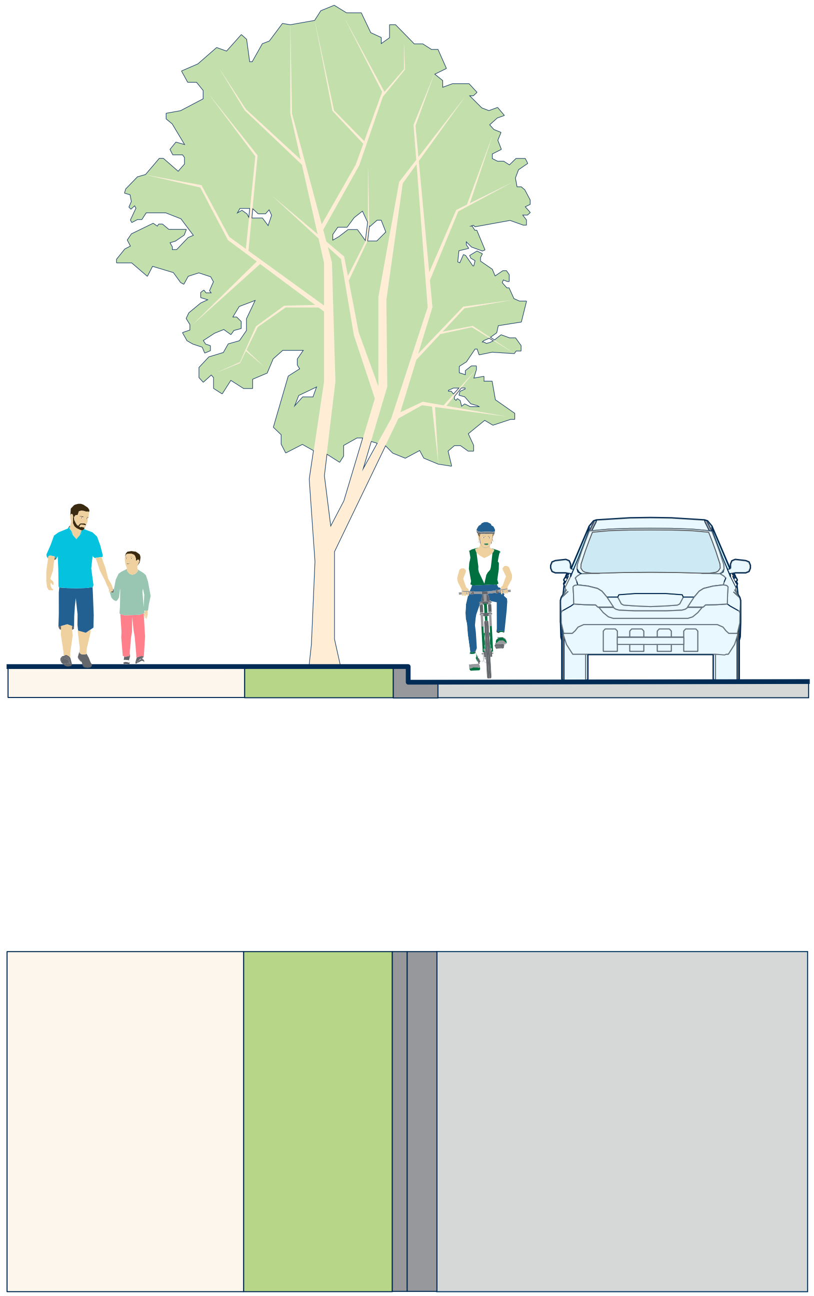


FIGURE 4-21 Shared Lanes

4.2.4 Bicycle Ramps

Bicycle ramps are required to transition a bikeway to a different elevation, such as from street-level to sidewalk-level or vice versa. Bicycle ramps may also be used where there is a change in bicycle facility type, for example, from a separated bike lane to a shared use path. They are also necessary at many intersections (see Chapter 5: Intersection and Crossing Elements).

LOCATION STANDARDS

Bicycle ramps are appropriate:

- To transition the bikeway to another elevation
- On the approaches to and departures from roundabouts
- Before interchange ramp crossings
- In high-conflict zones such as weaving areas
- Approaching pedestrian conflict areas or raised crossings
- To slow bicyclists prior to conflicts

DESIGN REQUIREMENTS

- It is preferable for bicycle ramps providing a transition between two bicycle facility types to align directly, however, conditions may require a more abrupt lateral shift.
- Bike ramps are intended for the exclusive use of bicyclists where pedestrian facilities are separated from bicycle facilities. Bicycle ramp grades are not required to meet pedestrian accessibility guidelines at these locations.
- When bike ramps connect directly to a sidewalk or shared use path, use a detectable warning surface is required at the top of the bike ramp.

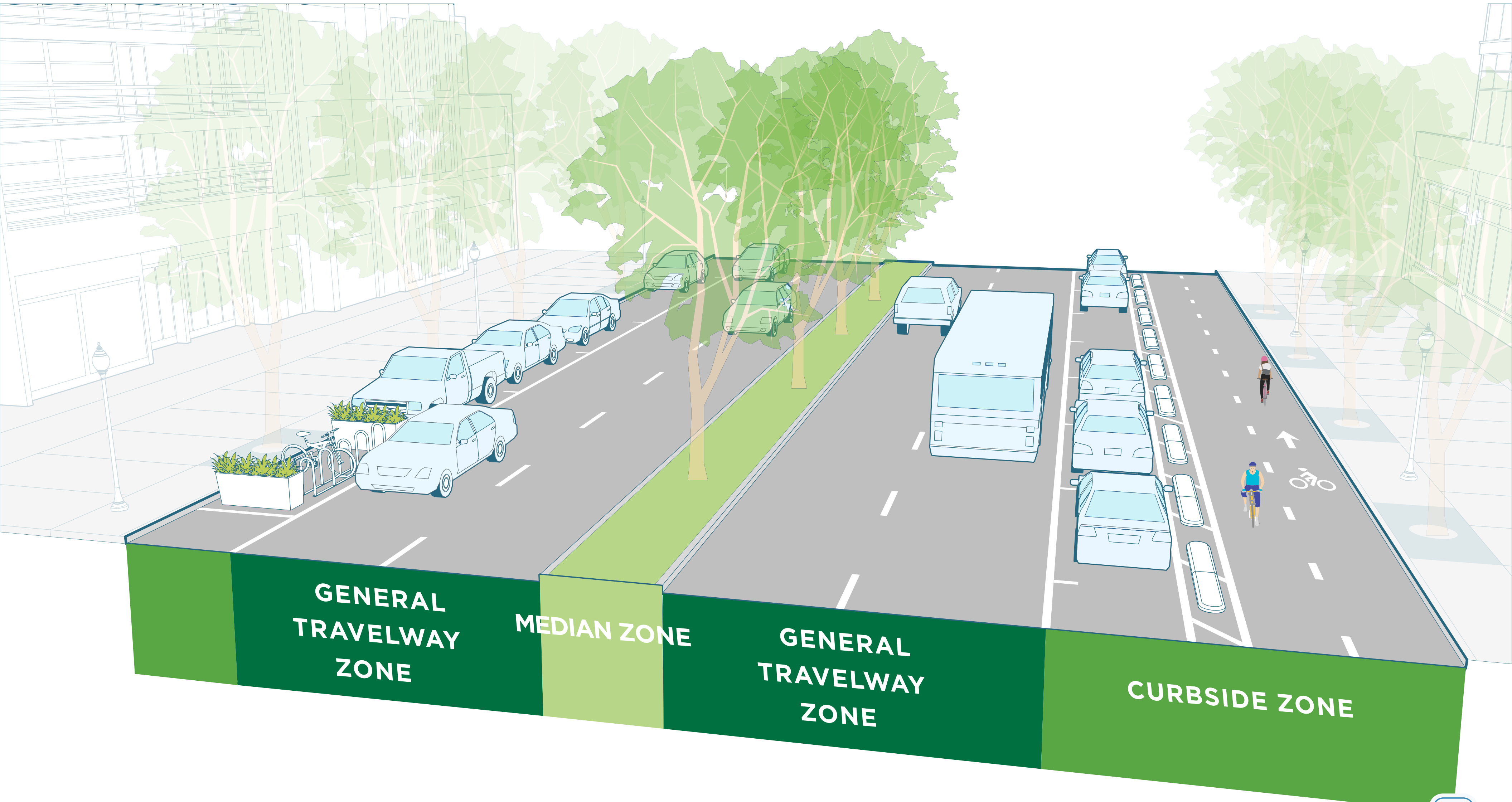
4.2.5 Bicycle Facility Design References

- For circumstances not addressed in the LFUCG **Complete Streets Design Manual**, designers should consult and comply with guidance provided in the **National Association of Cities and Transportation Officials (NACTO) Urban Bikeway Design Guide.**
- For circumstances not addressed in the National Association of Cities and Transportation Officials (NACTO) Urban Bikeway Design Guide, designers should consult and comply with guidance provided in the Second Edition of the **AASHTO Guide for the Development of Bicycle Facilities.**

4.3 Roadway Zone

The Roadway is composed of the general travelway, median, and curbside zones.

FIGURE 4-22 Roadway Zones



4.3.1 Geometric Design

Practitioners shall reference the most recent version of the **LFUCG Land Subdivision Regulations** for geometric design criteria within the City of Lexington and the **AASHTO Green Book—A Policy on the Geometric Design of Highways and Streets**—for technical and geometric street design specifications not covered by the LFUCG **Complete Streets Design Manual**:

- Horizontal alignment
- Vertical alignment
- Superelevation
- Sight distance (stopping and intersection)
- Turn lane design and taper lengths
- Median and median opening geometry
- Cross slopes
- Roadway clear zones

The Lexington **Complete Streets Design Manual** does not reproduce this guidance. Where discrepancies exist between the **Complete Streets Design Manual** and the **LFUCG Land Subdivision Regulations**, the provisions of the **Complete Streets Design Manual** shall govern.

4.3.2 Stormwater Management

All roadways within Lexington-Fayette County shall comply with the **LFUCG Stormwater Manual.** Additional stormwater management considerations and standards to ensure the functionality of streets for all travel modes include the following:

4.3.2.1 Drainage Considerations for Ramps & Raised Street Elements

- Prevent Ponding at Ramp Bases – To avoid water accumulation at the base of ramps, designers should incorporate surface inlets, slot drains, or trench drains immediately adjacent to the ramp transitions.
- Preserve Positive Drainage Flow – Maintain a consistent roadway cross slope to guide runoff toward the gutter or designated drainage feature. Transitions from raised elements must not create flat or reverse slopes that trap water.
- For raised crosswalks, inlets or slot drains shall be located at the low side of both approach and departure ramps, ensuring coverage across the full width of the gutter pan or behind the curb.
- For raised intersections, inlets or slot drains shall be located at each approach ramp and in strategic corners where runoff may concentrate.
- In retrofit circumstances, raised features may require modification of adjacent curb lines or gutter elevations to redirect flow toward existing or new inlets. Ensure that drainage elements do not interfere with curb ramps or pedestrian paths, per **PROWAG and ADA guidelines.**

4.3.3 Travelway

The Travelway is the portion of the roadway intended for the movement of vehicles.

4.3.3.1 Standards for New Development & Redevelopment

Lane widths shall meet the default values in Table 4-3. The **LFUCG Planning Commission** must approve any waivers to deviate from the default values. The lane widths in Table 4-3 are for straight segments of roadway. Roads with horizontal and vertical curvature may require wider travel lanes to accommodate vehicle tracking for larger vehicles.

All travel and turn lane widths shall be measured from the centerline of one pavement lane marking to the centerline of the adjacent marking, or from the centerline of the lane marking to the edge of the travel lane where markings are not provided. For double centerline markings, the lane width shall be measured to the midpoint between the two lines.

TABLE 4-3 Lane Width Dimensions by Street Type

	Outside Travel Lane **			Inside Travel Lane*			Left-Turn Lane			Two-Way Left Turn Lane ***		
STREET TYPE	Default	Min	Max	Default	Min	Max	Default	Min	Max	Default	Min	Max
Neighborhood Street	N/A	N/A	N/A	10'	7' ****	10'	N/A	N/A	N/A	N/A	N/A	N/A
Avenue	N/A	N/A	N/A	10'	10'	10'	N/A	N/A	N/A	N/A	N/A	N/A
Boulevard	10'	10'	11'	10'	10'	11'	10'	10'	11'	N/A	N/A	N/A
Thoroughfare	10.5'	10'	11'	10'	10'	11'	10'	10'	11'	11'	10'	13'
Alley	N/A	N/A	N/A	20' shared	20'	20'	N/A	N/A	N/A	N/A	N/A	N/A

*Includes lane against the centerline on undivided roads. All lane widths in chart are for typical tangent (straight) sections.

** If the outside lane is adjacent to a bike lane, the combined width (travel lane and bike lane) shall be no less than 16 feet.

*** Provided for existing conditions conformity and only for retrofits of four-lane roads to three lanes using a road diet as an allowable treatment. Not encouraged for new roads or reconstruction/widening.

**** Acounting for Neighborhood Streets that are yield streets.

4.3.3.2 Maximum Number of Vehicle Through Lanes

For new streets, Table 4-4 provides the maximum number of vehicle through lanes for each street type.

For retrofit projects, the number of through lanes shall be determined based on an engineering study that evaluates both operational needs and safety outcomes. Lane reductions shall be considered where feasible to improve safety, manage speeds, and enhance multimodal access.

TABLE 4-4 Maximum Number of Vehicle Through Lanes in Each Direction

Street Type	Max # of Vehicle Through Lanes in Each Direction
Neighborhood Street - Yield Condition	Shared
Neighborhood Street -Adjacent to Higher Intensity Uses	1
Avenue	1
Boulevard	2
Thoroughfare	2
Alley	Shared

4.3.3.3 Roadway Lighting

Lighting of the travelway improves safety and visibility for all users by reducing nighttime crashes and improving navigation. Roadway lighting can also be designed to serve the pedestrian realm where separate pedestrian-scale lighting is not provided.

Local utilities own and maintain public street roadway lighting, however, the LFUCG Division of Traffic Engineering oversees the design of roadway lighting within the Urban Service Area.

DESIGN REQUIREMENTS

- Roadway lighting shall comply with the **AASHTO Roadway Lighting Design Guide**.
- Designers should use tools such as AGi32, or other comparable photometric modeling tool, to ensure compliance with applicable lighting standards and to verify illumination levels, uniformity, and safety across all user zones.
- Dark Sky-compliant designs are required to minimize light pollution.
- Roadway lighting shall be mounted either in the median (preferred on divided streets using dual-arm poles for bi-directional coverage) or within the Amenity Zone, ensuring poles do not obstruct the Pedestrian Access Route (PAR) or conflict with ADA requirements.
- Adequate space for transformers, meters, and control boxes is required to keep the PAR clear.
- Any entity (HOA, developer, private company) seeking a deviation from the standard roadway lighting design requirements shall follow the process outlined in **Urban County Council Resolution 50-90.**

FIGURE 4-23 Roadway Lighting

4.3.4 Curbside Zone

The **Curbside Zone** is the portion of the right-of-way adjacent to the curb between the travel lane and pedestrian zone. The user demand and function of the curbside zone may vary by time of day, location, or adjacent land use (e.g., loading zones during the day, parking at night).

The Curbside Zone may include:

- On-street vehicle parking (parallel or angled)
- Passenger pick-up and drop-off (including ride-sharing, transit and paratransit)
- Commercial loading and delivery zones
- Transit stops and bus boarding areas
- Bicycle and micromobility parking or corrals
- Curb extensions
- Stormwater management features (e.g., curb inlets or bio-swales)

Design specifications for each curbside use are provided in the corresponding sections of this Manual.

4.3.4.1 On-Street Parking

On-street parking provides convenient access to adjacent land uses, reduces the need for off-street parking, and can enhance pedestrian comfort by creating a buffer from moving traffic. Surface textures may also be incorporated into parking areas to support placemaking, reinforce street character, and contribute to traffic calming, as described in **Section 6.3.4**. The demand for on-street parking varies by land use context and may be eliminated, provided one side of the street, or both sides of the street based on anticipated parking demand Standard on-street parking dimensions and whether parking stalls are marked or unmarked may vary by street type and street characteristics (e.g. types and mix of vehicular traffic, design speeds, parking turn-over rate, presence of bike lanes, transit stops, etc.)

4.3.4.1.1 Parallel Parking

- Parallel on-street parking is the default standard (versus angled or perpendicular parking).
- Unmarked (informal) on-street parking is the default standard.
- When marked, parallel parking shall be:
  - 7-8 feet wide inclusive of the gutter pan
  - 22 feet long (for all parking stalls within the block). Additional length may be needed for parallel parking on curved roadway segments.
  - A minimum of 20 feet long (for the first and last parking stall along the block)
- When restricted to one side of the street, parallel parking may alternate sides based on land use and anticipated parking demand, or to create chicane-like traffic calming features.

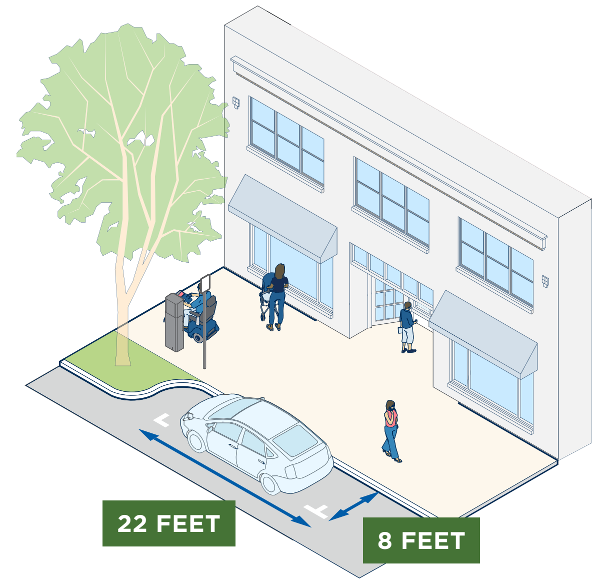


FIGURE 4-24 Parallel Parking Dimensions

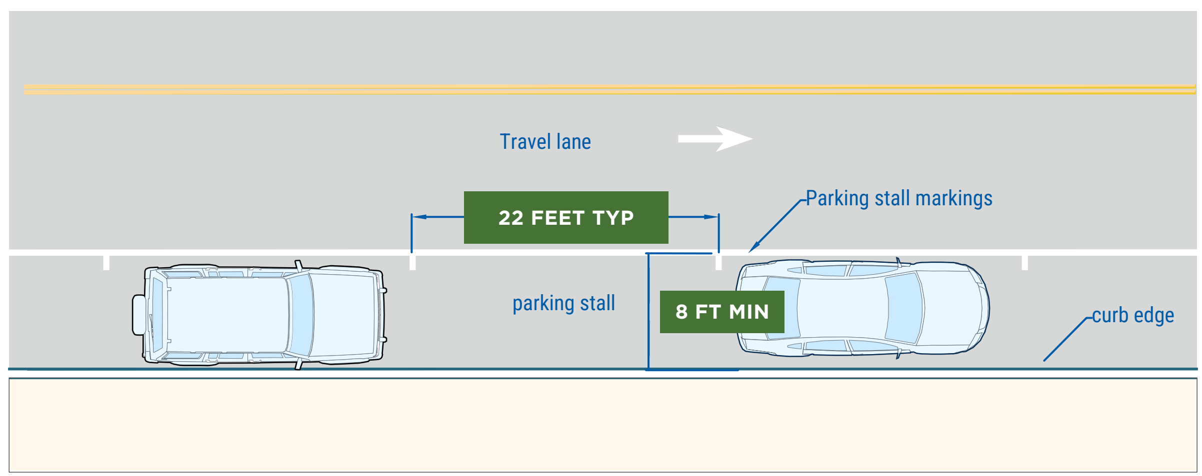


FIGURE 4-25 Parallel Parking Dimensions

4.3.4.1.2 Accessible Parking

- Minimum dimensions: 13 feet wide × 24 feet long
- Access aisle: 5 feet wide adjacent to the space
- Quantity: At least one van accessible space per 25 spaces along a block perimeter within a commercial district.

4.3.4.1.3 Angled Parking

LOCATION STANDARDS

- Angled parking is permitted in areas of high-pedestrian activity including Downtown, Village Centers, Town Centers and adjacent to parks, schools, or other public or community-serving facilities.
- Angled parking along Thoroughfares requires formal approval from the Lexington-Fayette Urban County Government (LFUCG) or the Kentucky Transportation Cabinet, as applicable.

DESIGN REQUIREMENTS

- Angled parking shall conform to the following design standards:
  - Stall angle, stall width, stall depth, overhang clearance, and adjacent travel lane width shall comply with the specifications illustrated in Table 4-5.
  - A minimum 2-foot buffer shall be provided between angled parking stalls and adjacent bicycle lanes or shared-use paths.
  - Curb extensions (bulb-outs) shall be installed at block ends to reduce pedestrian crossing distances, preserve sightlines, and reinforce compliance with designated parking orientation (pull-in or back-in).
- Drainage shall be designed to prevent runoff from flowing toward sidewalks or building frontages.
- Angled parking shall not obstruct the Pedestrian Access Route. Wheel stops shall be installed where vehicle overhang may encroach upon the PAR.
- Sight distance and turning movement impacts shall be evaluated when angled parking is proposed near intersections or driveways.
- All pavement markings shall comply with the LFUCG Traffic Engineering Manual.

4.3.4.1.4 Reverse-angled parking

- Reverse-angled (back-in) parking is allowed where one or more of the following conditions are present:
  - Enhanced sightlines are required for vehicles exiting parking spaces, particularly where bicycle lanes are present.
  - Passenger safety is improved by directing vehicle occupants to exit toward the sidewalk.
  - Rear cargo or trunk access is better aligned with the curb.

TABLE 4-5 Angled On-Street Parking Guidance

Angle (Degrees)	Stall Width	Stall Depth	Minimum With Of Adjacent Travel Lane Or Lanes	Head-In Angled Curb Overhang	Back-In Angled Curb Overhang
45	8'6" to 9'0"	17'8"	12'8"	1'9"	0'9"
50	8'6" to 9'0"	18'3"	13'3"	1'11"	0'11"
55	8'6" to 9'0"	18'8"	13'8"	2'1"	1'1"
60	8'6" to 9'0"	19'0"	14'6"	2'2"	1'2"
65	8'6" to 9'0"	19'2"	15'5"	2'3"	1'3"
70	8'6" to 9'0"	19'3"	16'6"	2'4"	1'4"
90	8'6" to 9'0"	18'0"	24'0"	2'6"	1'6"

Source: Dimensions of Parking, 4th Edition, Urban Land Institute

*Typical design vehicle dimensions: 6 feet 7 inches by 17 feet

4.3.4.1.5 On-street Parking Prohibitions

- In front of public or private driveways
- Within 20 feet of the driveway entrance to any fire station
- Within 75 feet on the side of a street opposite the entrance to any fire station, when properly signposted
- On crosswalks, sidewalks, bike lanes, medians, shared use paths, and trails
- Within 20 feet of a crosswalk at an intersection
- Within 50 feet of a flashing beacon, stop sign, or traffic signal located at the roadside
- Within 15 feet of a fire hydrant
- Upon any bridge or other elevated structure
- At locations where the curb is painted yellow or where signs prohibit parking
- On alleys

4.3.4.2 Commercial Loading Zones

Commercial loading zones support deliveries, freight movement, and business operations. They provide reliable access for service vehicles and goods delivery, particularly in commercial or mixed-use areas. Providing loading zones can reduce the incidence of delivery vehicles stopping or blocking travel lanes, improve traffic flow and traffic safety.

DESIGN GUIDANCE

- General loading zones should be 40 feet in length, sized for a SU-30 truck up to 10 feet in width.
- Loading zones should be clearly marked to discourage unauthorized parking.
- Locate loading zones near the beginning of the block, preferably far-side of an intersection, to improve visibility and reduce mid-block congestion.
- Avoid near-side placement at intersections to minimize conflicts with crosswalks, transit stops, and signals.
- Avoid mid-block placement, especially where bike lanes are present, unless no other alternatives exists.
- Do not place loading zones within or across high-volume bikeways. Use buffers or curb extensions to reduce conflicts with bikeways.

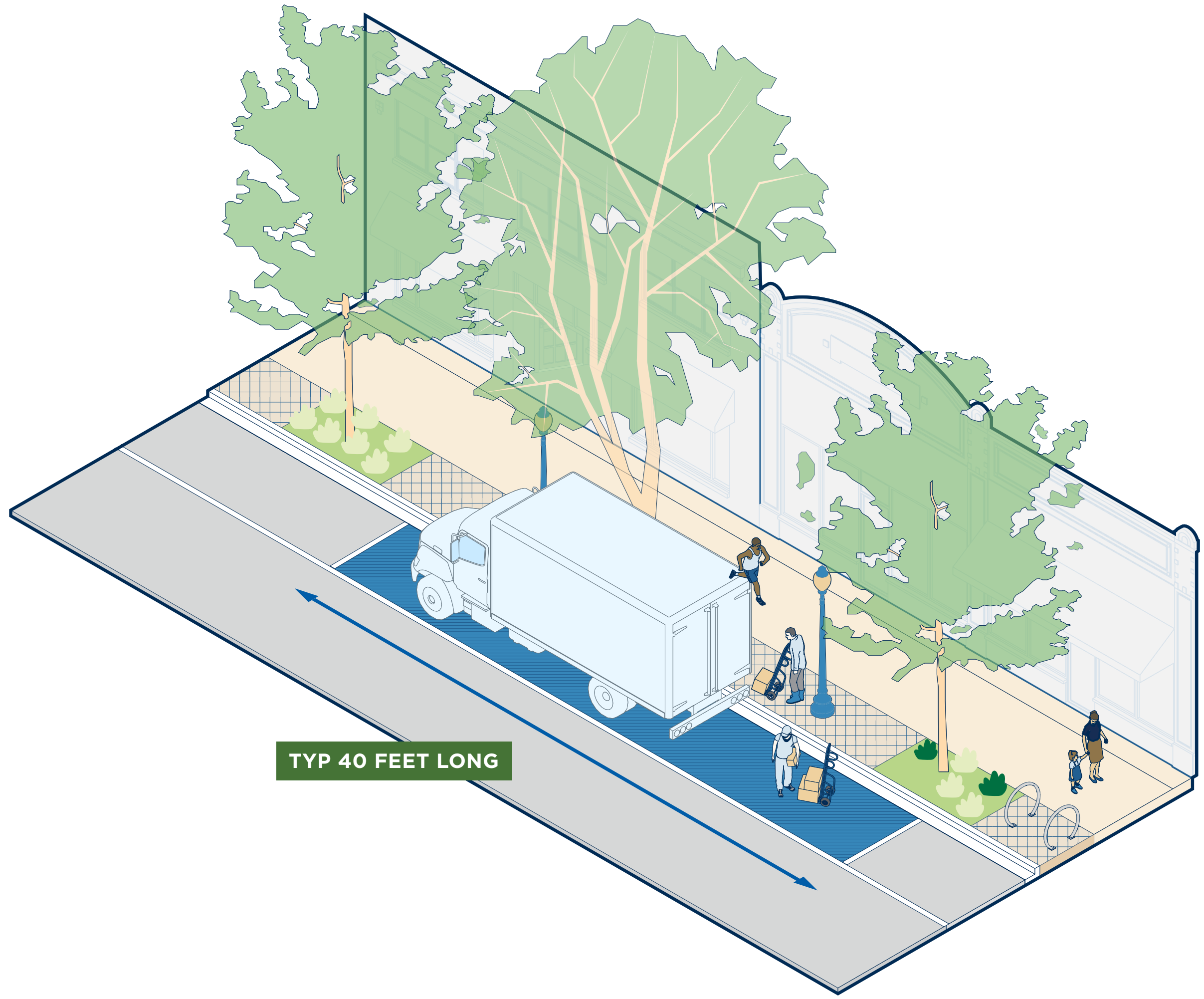


FIGURE 4-26 Commercial Loading Zone

4.3.4.3 Passenger Loading Zones

Passenger drop-off and pick-up zones, including for ride-hailing services (i.e., app-based rideshare companies), are appropriate in downtown, village centers, town centers, and entertainment districts to reduce conflicts and the incidence of double-parking and bike lane blockages.

DESIGN GUIDANCE

- Passenger loading and ride-hailing zones operate most efficiently at the beginning of a block, as shown in Figure 4-28.
- The minimum length is 22 feet long, but may be increased based on demand.
- The exiting distance required (C) is less than the entry distance (A), as shown in Figure 4-28.
- Zones should allow drop-offs without requiring reversing or other maneuvers.
- Designated commercial loading zones can also serve as ride-hailing zones.

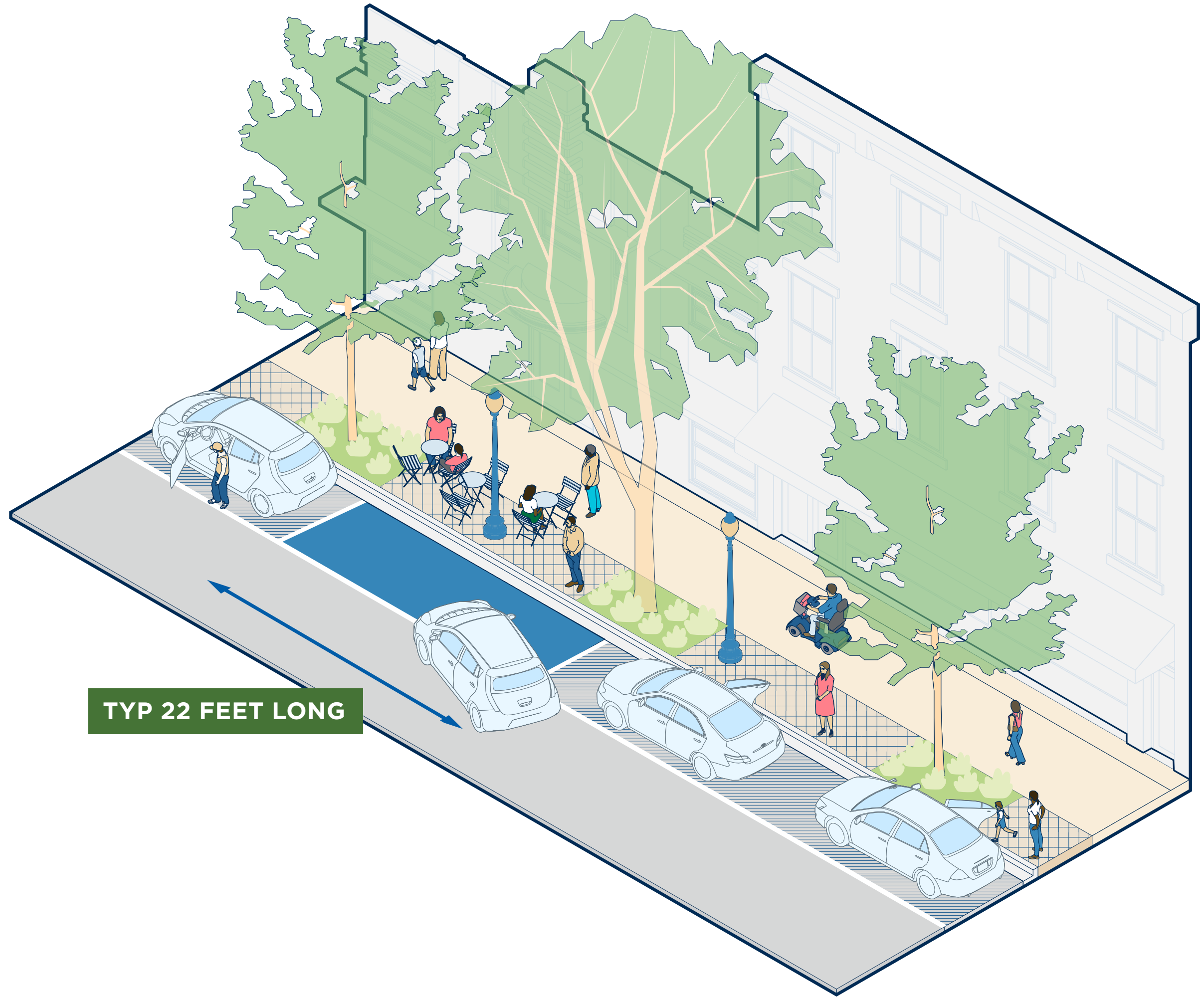


FIGURE 4-27 Passenger Loading Zone

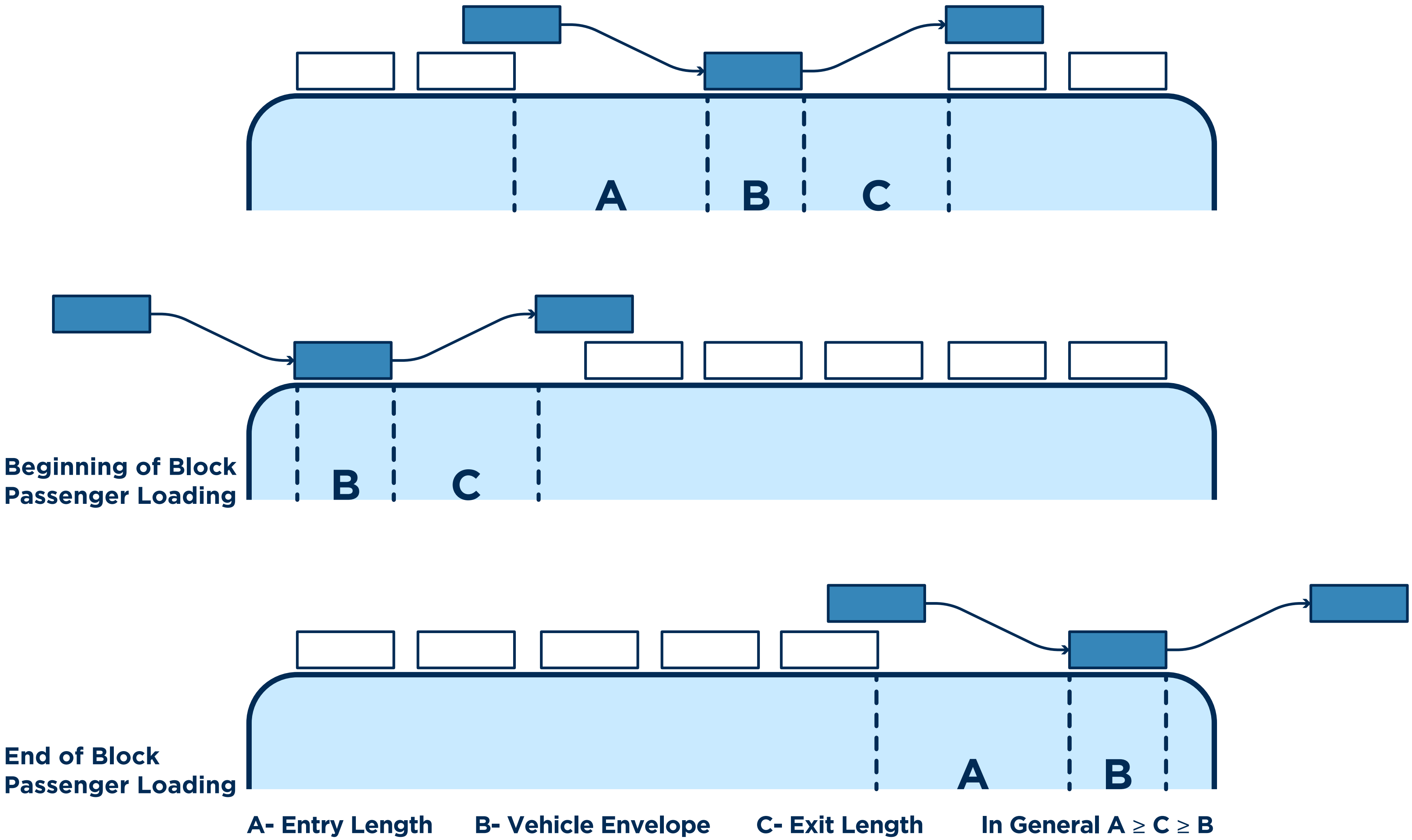


FIGURE 4-28 Rideshare Loading Zone Locations

4.3.4.4 Loading Zones and Bicycle Lanes

On streets with separated bike lanes and on street parking, commercial and passenger loading zones shall comply with Figure 4-29.

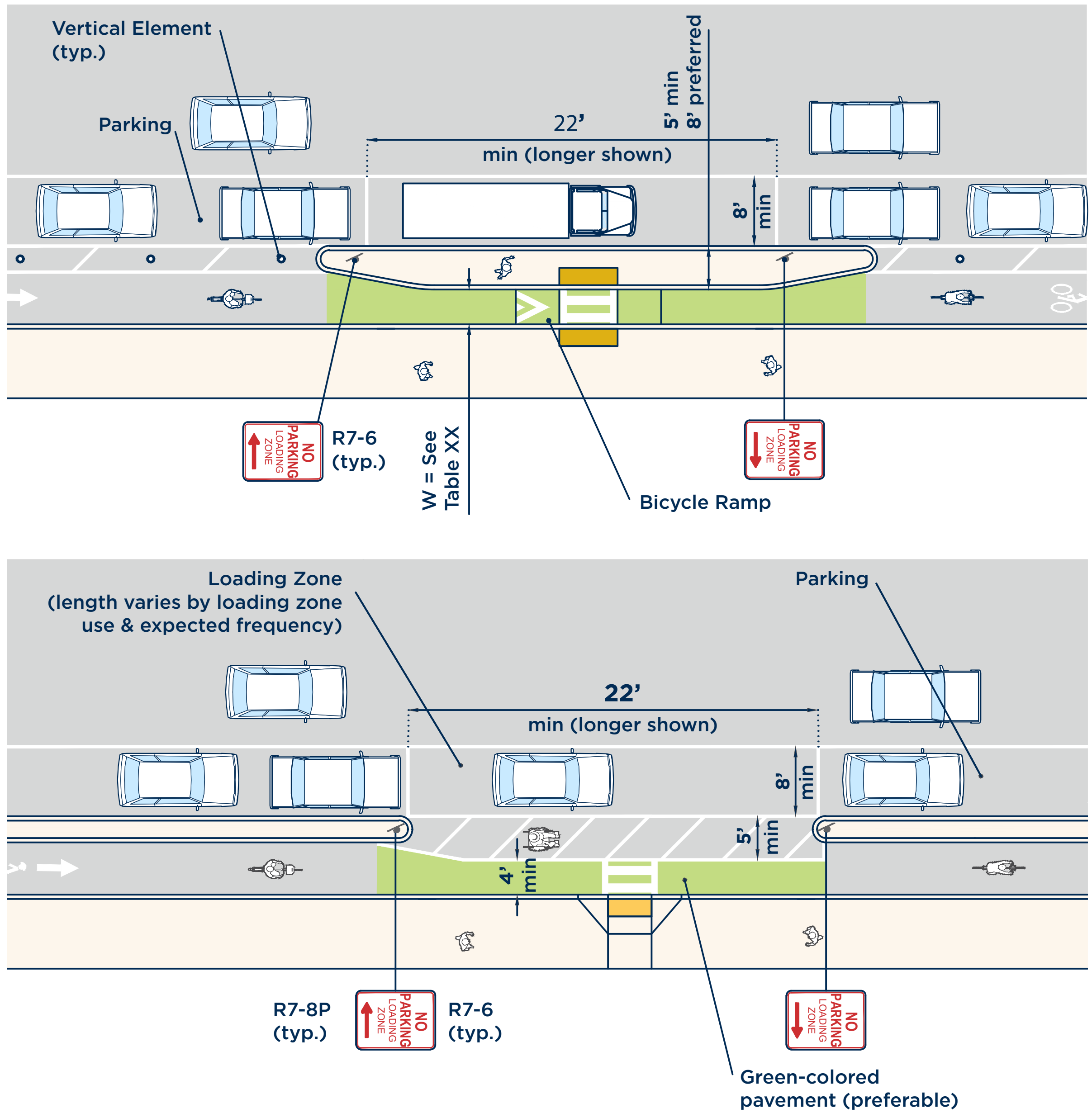


FIGURE 4-29 Loading Zones and Bicycle Lanes

4.3.4.5 Parklets

Parklets convert curbside parking spaces into public open space, often with seating, greenery, and other amenities. Parklets are often designed in coordination with local businesses and residents who then manage and maintain the spaces.

Parklets require an encroachment permit per LFUCG Code of Ordinances – Chapter 17 §17-29. LFUCG will base their approval or disapproval based upon the following guidance.

Parklets are appropriate in areas:

- with moderate to high pedestrian activity
- near restaurants and cafes
- where existing sidewalks are too narrow for seating
- on streets where vertical slope is 5% or less
- on streets with speed limits less than or equal to 25 MPH

DESIGN REQUIREMENTS

To ensure user safety, visibility, and integration with the surrounding street context, all parklet enclosures shall meet the following requirements:

- Provide a continuous perimeter barrier with a minimum height of 2 feet to separate users from adjacent vehicle traffic.
- Solid walls, planters, or other opaque enclosure elements shall not exceed 42 inches in height, as measured from the surface of the parklet platform.
- Decorative railings, screens, or fencing that are at least 50% open may extend up to a maximum height of 48 inches.
- Enclosures must maintain clear sightlines at intersections, alleys, and driveways.
- Shall include reflective or high-visibility elements when directly adjacent to a travel lane (excludes bike lanes).
- Enclosures shall be 1 foot narrower than the adjacent striped parking lane and offset from any bike facility by 1 foot.
- At least a 3 foot buffer shall be provided between the parklet and adjacent objects, parking stalls, driveways or crosswalks.
- Shall not obstruct loading zones, bus stops, hydrants, or curb ramps.
- Shall be capable of withstanding wind and minor vehicle impact (e.g., heavy-duty planters, metal railing, wood framing).
- Temporary or movable parklet elements must include provisions for removal and storage during winter maintenance, special events, or emergencies, as determined by LFUCG.

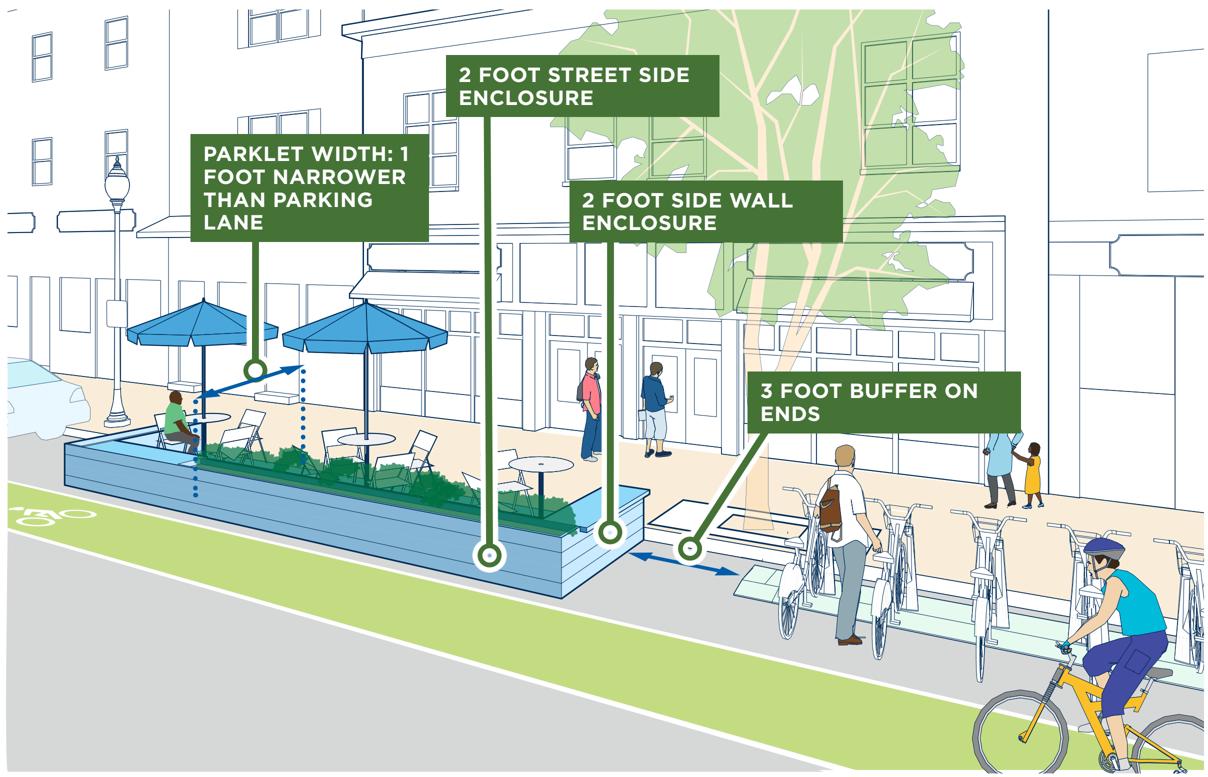


FIGURE 4-30 Parklets

FIGURE 4-30 Parklets

4.3.5 Median Zone

The Median Zone is the portion of the roadway that separates opposing directions of travel. It can include various design elements and serve various purposes such as:

- Provide space for landscaping, street trees, or gateway features that enhance identity and placemaking
- Offer a refuge area for pedestrians both at intersections and mid-block
- Reduce traffic conflicts by managing turning movements into and out of driveways
- Provide left-turn lanes
- Include street lighting, traffic signals, or signage
- Accommodate transit lanes or transit stations where applicable
- Contribute to a sense of enclosure
- Support green infrastructure for stormwater management
- Provide access management to reduce conflict points along the corridor

4.3.5.1 Standards for New Development

See Table 4-6 for minimum and maximum dimensions of a median by Street Type.

TABLE 4-6 Median Guidance by Street Type

Street Type	Center Median	Min (Ft)	Max (Ft)
Neighborhood Street	○	6'	10'
Avenue	○	6'	10'
Boulevard	■	6'	19'
Thoroughfare	■	6'	19'
Alley	✕	N/A	N/A

Legend

- ■ Required
- ● Recommended
- ○ Optional
- ✕ Not Permitted or N/A

4.3.5.2 Standards for Redevelopment & Street Retrofits

DESIGN REQUIREMENTS

Medians shall be provided on streets and at crossings that meet one or more of the following criteria:

- Four or more travel lanes
- Posted speeds of 35 mph or higher
- AADT greater than 15,000
- Crossing distance exceeds two lanes or 40 feet
- Crash history involving left turns
- Where an unsignalized crosswalk serves schools, senior centers, transit stops, or other high pedestrian generators
- Where medians are installed, fire hydrants shall be placed on both sides of the street.

DESIGN GUIDANCE

- Medians should include pedestrian crossing islands to support mid-block crossings where block lengths exceed 600 feet
- Medians should be designed to support landscaping, placemaking, and visual enclosure on streets serving Town Centers, Village Centers, or other walkable mixed-use areas
- Median width shall be a minimum of 6 feet if intended to serve as a pedestrian refuge, and 8 feet or more where street trees and fixed objects are located
- Two-Way Left-Turn Lanes (TWLTL) may be used instead of raised medians in lower speed commercial corridors where access flexibility is required, but should be limited to streets with AADT less than 15,000 and posted speeds ≤ 35 mph (see **Section 4.3.5.3**).
- For streets where the median will transition into a left-turn lane:
    - The median shall be wide enough to provide a 10-11 foot turn lane and an 8 foot pedestrian refuge. Left-turn lanes are not recommended on neighborhood streets or avenues.
    - In constrained locations, a minimum width of 16 feet is required to provide a 10-foot turn lane and a minimum 6-foot pedestrian refuge island.

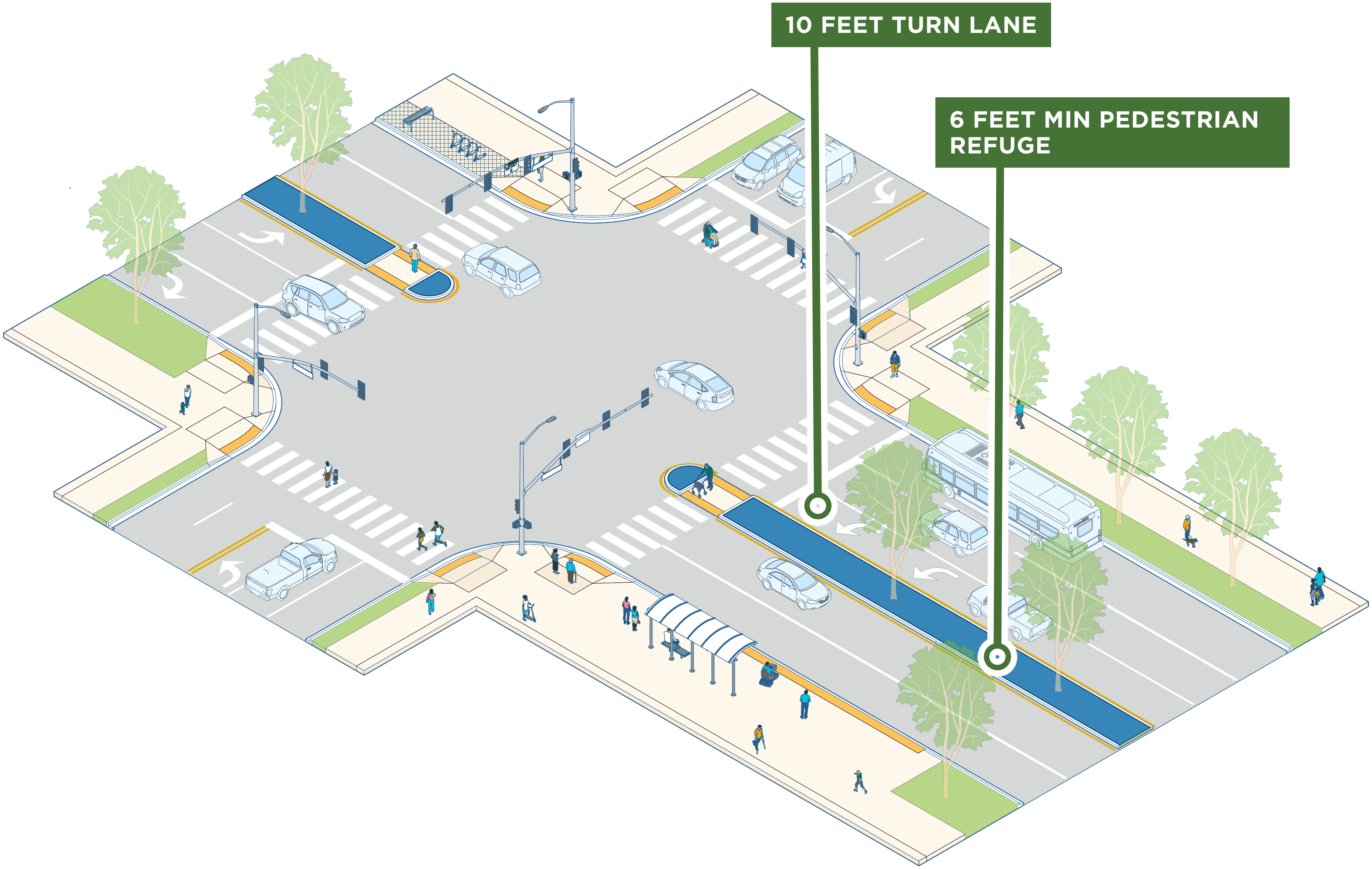


FIGURE 4-31 Medians and Turn Lanes for Redevelopment and Retrofits

4.3.5.3 Two-Way Left Turn Lanes

Two-Way Left Turn Lanes (TWLTLs) may be appropriate on undivided roadways where frequent left-turning traffic from both directions warrants dedicated turn storage and where full medians are not feasible.

4.3.5.3.1 Standards for New Development

Two-way left turn lanes are not permitted on new streets. Where turn lanes are warranted in areas of new development, medians with turn lane pockets shall be the standard.

4.3.5.3.2 Standards for Redevelopment & Street Retrofits

LOCATION STANDARDS

- Two-Way Left Turn Lanes (TWLTLs) may be appropriate design treatment on existing streets with these conditions:
  - Urban or suburban arterials (thoroughfares) and collectors (boulevards and avenues) with posted speeds of 35 mph or less
  - Roadways with 10,000–28,000 vehicles per day (ADT)
  - Frequent left-turn activity from both directions due to multiple closely spaced driveways or intersections
  - Corridor lacks space for a raised median with dedicated turn pockets
  - TWLTLs are not appropriate for rural roads or higher-speed roadways

DESIGN GUIDANCE

- Center lane must have sufficient sight distance for safe turning operations
- Standard lane width is 12 feet; may be reduced to 11 feet in constrained environments
- TWLTL should be continuous where left-turn demand is consistent
- Pedestrian refuge islands should be provided as frequently as possible to improve pedestrian safety

Practitioners should reference the **AASHTO Policy on Geometric Design of Highways and Streets, NACTO Urban Street Design Guide** and **MUTCD** for additional guidance.

4.4 Transit Elements

High-quality transit service is essential to a city's transportation system, offering a more space-efficient and cost-effective way to move large numbers of people, especially during peak travel periods. Transit improves access to jobs, services, and other essential destinations for all residents, including those who do not drive.

Complete streets along designated transit routes prioritize safe, reliable, and efficient transit operations. Accessible and well-designed facilities for transit riders are fundamental to providing quality transit service. This includes accessible waiting and boarding areas, connections to sidewalks, and amenities that improve comfort and security. Additional infrastructure—such as dedicated bus lanes, queue-jump lanes, and transit signal priority—supports more efficient operations and reduces delays. Together, these elements increase ridership, reduce congestion, and expand mobility options throughout the transportation network.

4.4.1 Transit Stops

Transit stops are the primary interface between passengers and transit service. Transit stops provide a designated waiting area for passengers in addition to a boarding and alighting area to allow people to access the transit vehicle. Their placement and design must ensure safe, accessible boarding for all users, in compliance with the Americans with Disabilities Act (ADA) and Public Rights-of-Way Accessibility Guidelines (PROWAG).

4.4.1.1 Standards for New Development, Redevelopment & Street Retrofits

When a street includes a designated transit route the following standards and design guidance shall apply to ensure transit vehicles can operate efficiently, that passengers can safely access transit stops, and appropriate amenities are provided. These elements are critical to the overall reliability, comfort, and usability of the transit system.

4.4.1.1.1 Boarding and Alighting Areas

The boarding and alighting area is the designated space at a transit stop where passengers enter and exit transit vehicles. This area ensures that people using mobility devices such as wheelchairs and walkers can board independently and safely. If necessary, it may overlap with the sidewalk, waiting area, or amenity zone.

Boarding and alighting areas must comply with PROWAG (Section R308) which requires the area to be:

- At least 8 feet deep (measured perpendicular to the curb or roadway)
- At least 5 feet wide (measured parallel to the curb or roadway)
- Firm, stable, and slip-resistant
- Free of obstructions
- Flush with the curb or transit vehicle entry point
- Connected to a compliant Pedestrian Access Route (PAR)

4.4.1.1.2 Waiting Areas

While pedestrians may be able to wait on a sidewalk or shared use path, it is preferable to provide a separate waiting area, allowing the sidewalk or path to remain unobstructed, especially in high pedestrian activity areas. Standards for waiting areas include:

- Waiting areas should be positioned near the front of the stop to align with bus boarding doors.
- The waiting area must be sized to accommodate typical ridership demand.
- Surface must be firm, stable, and slip-resistant with a cross-slope no greater than 2%.
- A minimum 5-foot Pedestrian Access Route (PAR) must be maintained.
- Amenities such as benches, trash/recycling receptacles, shelters, and ticket machines must not obstruct the PAR or the boarding and alighting area.
- Clear visibility between waiting passengers and approaching buses is essential; lighting should be provided where needed and vegetation should be pruned to maintain sightlines.
- Maintain a minimum of 10 feet clearance behind crosswalks or curb returns to allow full bus clearance when stopped.
- Where appropriate, co-locate bike parking to support multimodal connectivity.
- On high-ridership routes, consider real-time arrival displays and other rider information systems to improve user experience.

4.4.1.1.3 Transit Shelters and Amenities

Bus shelters improve transit service by making stops more comfortable, safe, and visible. They offer weather protection, seating, and improve the overall passenger experience. They should be prioritized at high-ridership stops and locations serving vulnerable users (e.g., older adults, students, people with disabilities).

SHELTER DESIGN REQUIREMENTS

- Follow PROWAG R309 for accessibility standards
- Must include a 30" x 48" clear floor space that is firm, stable, and slip-resistant, located within or next to the shelter
- Must connect to the accessible boarding area via a compliant route
- Maintain a 5-foot wide pedestrian access path behind the shelter
- At least one side must be open and unobstructed for accessible entry/exit
- Must not block the boarding area or Pedestrian Access Route (PAR)

DESIGN CONSIDERATIONS

- Avoid conflicts with trees, utilities, and street elements
- Coordinate with local transit guidelines for siting and maintenance
- Use transparent shelter walls for visibility
- Provide nighttime lighting to eliminate dark areas
- Orient the open side of the shelter toward the curb when possible

RECOMMENDED AMENITIES

- Seating
- Trash and recycling bins
- Lighting
- Real-time arrival information
- Bike parking (where appropriate)

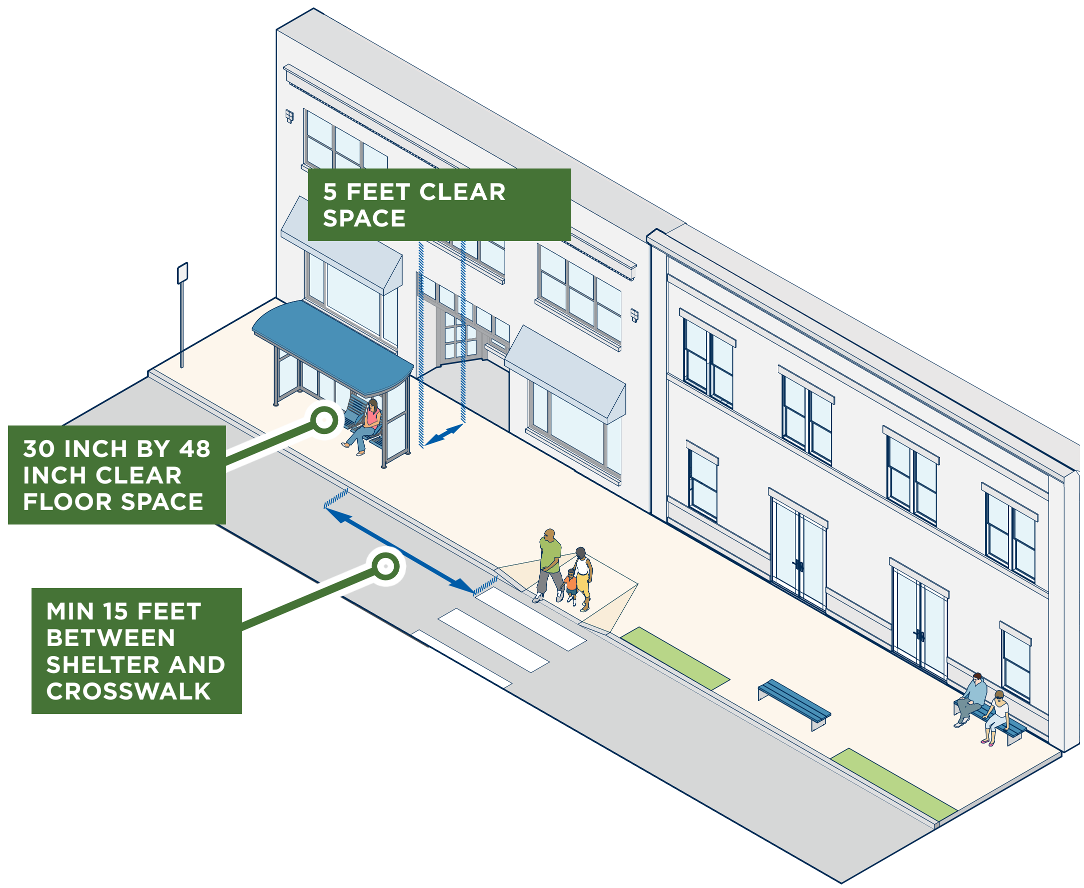


FIGURE 4-32 Shelter Placement Guidelines

4.4.2 Transit Stop Placement

Transit stop placement — whether mid-block or on the near or far-side of an intersection — affects transit operations, pedestrian access, and overall safety. Each option has trade-offs. Selecting the appropriate stop type depends on roadway conditions, intersection design, and surrounding land uses. Designers should consult with Lextran, LFUCG and KYTC (on state routes) to determine preferred bus stop locations.

4.4.2.1 Near Side Stop

Near-Side Stops are located immediately before an intersection. Benefits and drawbacks include:

- Easier pedestrian access to crossings because passengers exit the vehicle closer to crosswalks and can cross the street more easily.
- May cause delays due to queuing at intersections since buses may be blocked by queued vehicles, or get stuck at red lights after servicing the stop.
- Potential conflicts with right-turning vehicles. Buses stopped at near-side locations can obstruct visibility or movement for vehicles turning right, which can pose safety and operational challenges.

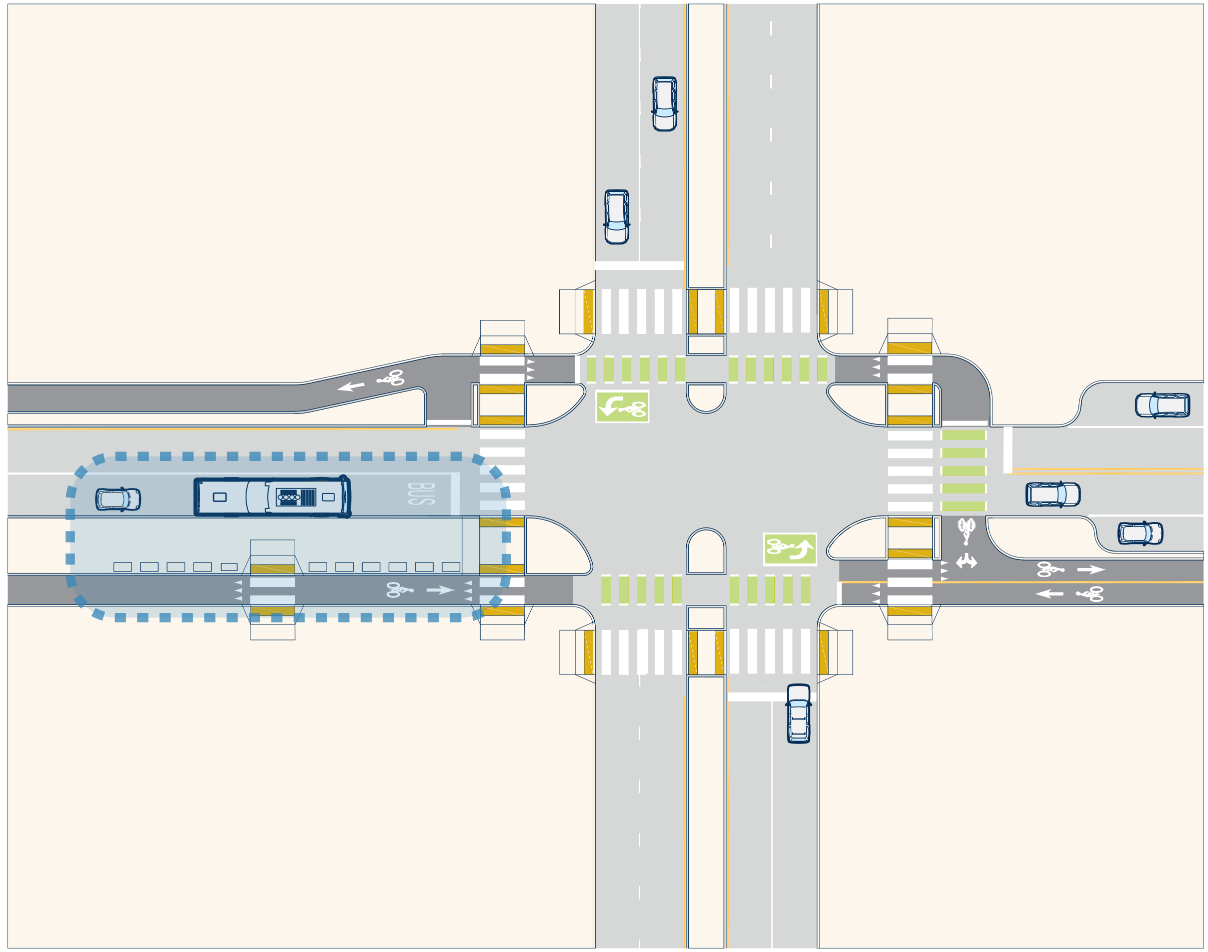


FIGURE 4-33 Near-Side Stop Placement

4.4.2.2 Far-Side Stop

Far side stops are located just after an intersection. They are generally preferred on streets with a single travel lane. Benefits and drawbacks include:

- Reduced conflicts with right-turning vehicles – By placing the stop after the intersection, turning movements occur before the bus stop, minimizing interaction between buses and right-turning vehicles.
- Enhanced efficiency with transit signal priority -- Buses can benefit from green lights before stopping, reducing signal delay and improving schedule adherence.
- Requires space for signal clearance – Sufficient distance is needed between the intersection and the stop to prevent buses from blocking cross-walks or intersections when stopped.
- Risk of queuing through intersections – If traffic is heavy stopped buses may cause queues that extend into the intersection, creating operational and safety risks.

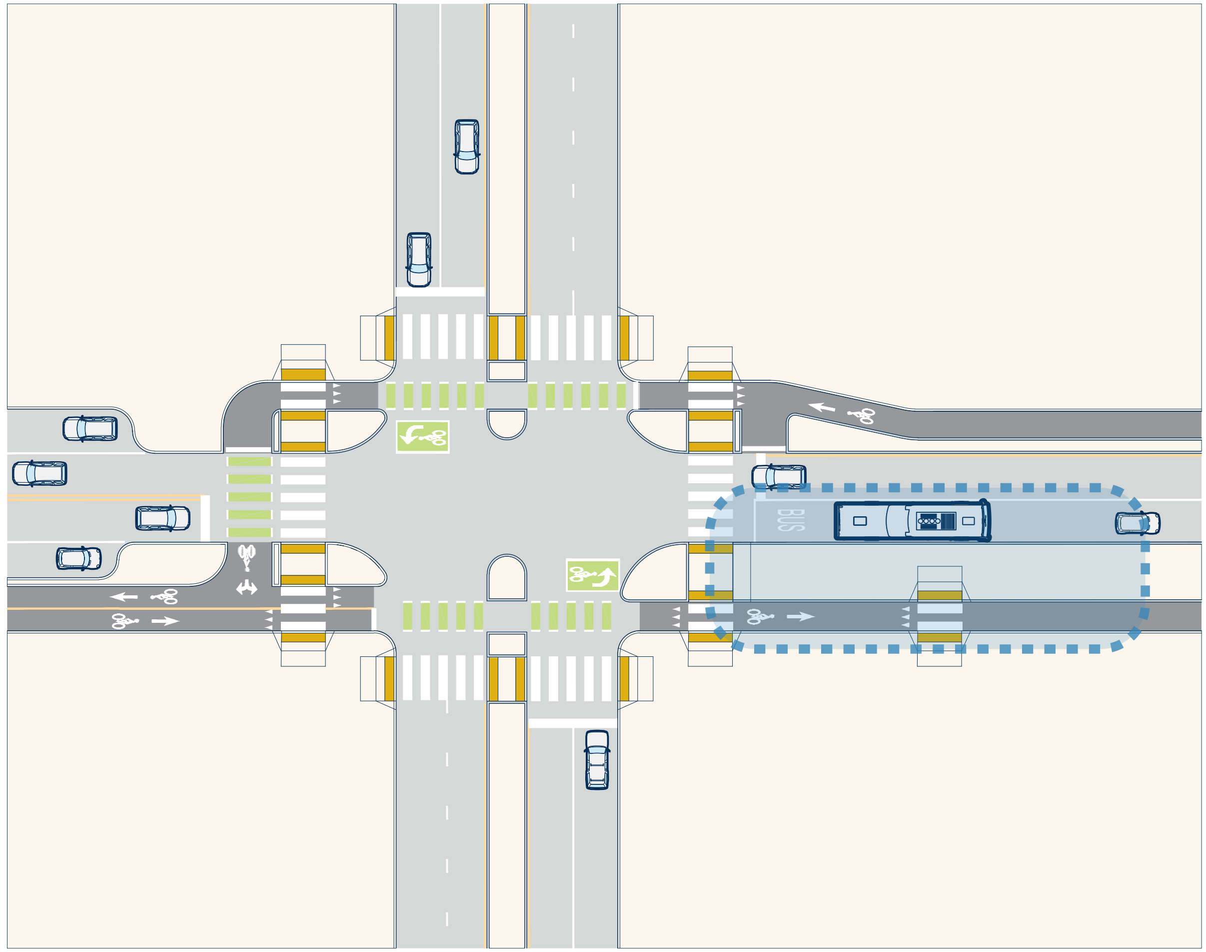


FIGURE 4-34 Far-Side Stop Placement

4.4.2.3 Mid-block Stop

Mid-block stops are located away from intersections, typically in the middle of a block. Benefits and drawbacks include:

- Providing more direct access – Serving a major destination located mid-block to reduce walking distances (school campus, shopping center, apartment complex)
- Safe pedestrian crossing challenges –– Pedestrians may be more likely to cross mid-block, rather than at signalized crossings and intersections.

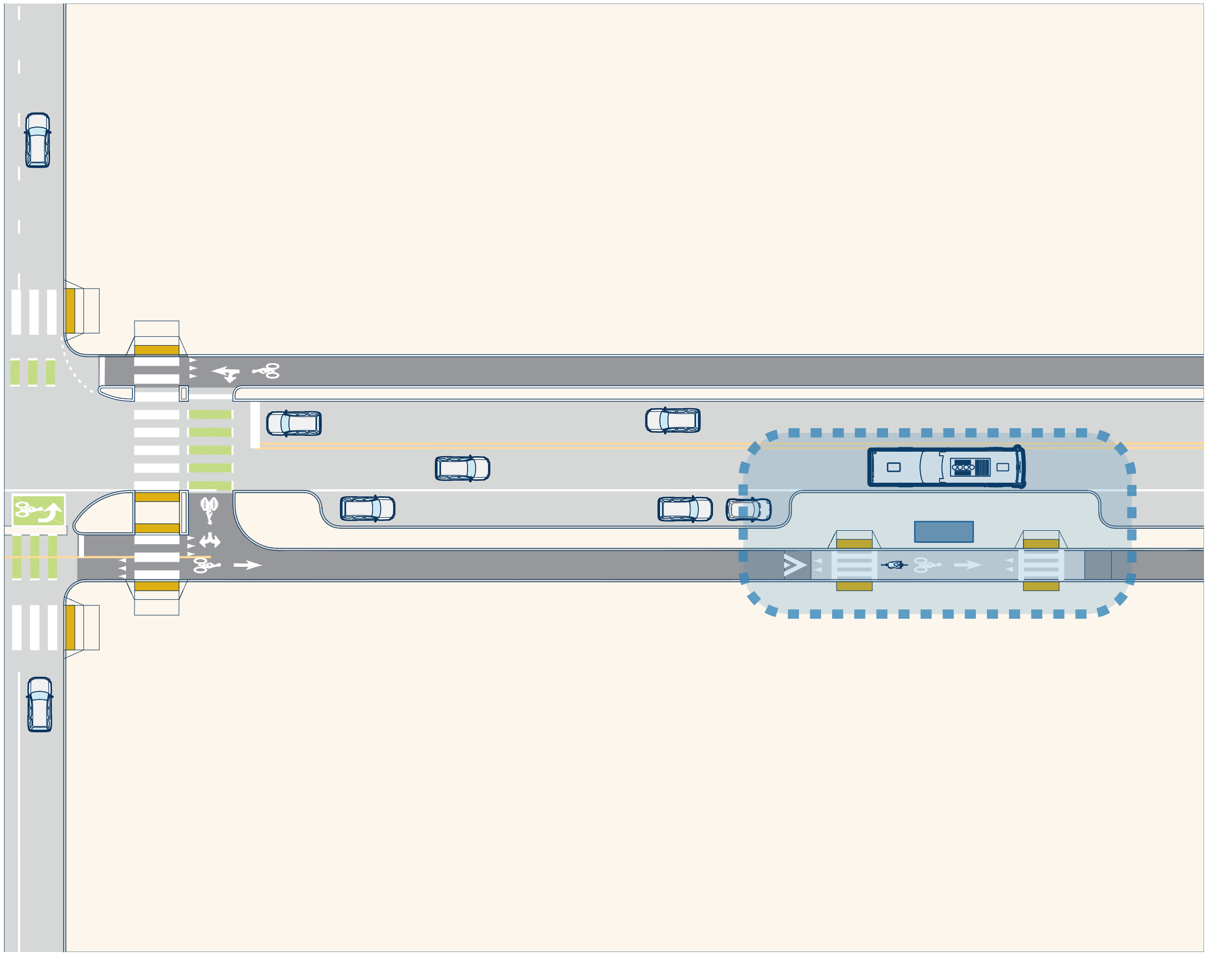


FIGURE 4-35 Mid-Block Stop Placement

4.4.3 Bus Stop Types

The design and placement of transit stops affects transit operations, passenger comfort, and safety for all users. Selecting the appropriate bus stop type depends on multiple factors including land use context, available right-of-way, multimodal demands, traffic speed and traffic volumes.

4.4.3.1 In-Lane vs Pull-Out Bus Stops

Bus stops are placed either within the travel lane or in pull-out lanes. There are several trade-offs associated with each type.

BENEFITS OF IN-LANE BUS STOPS:

- Improves transit efficiency: Buses remain in the travel lane, reducing delay associated with merging back into traffic. This improves transit travel times, reliability, and on-time performance.
- Supports transit priority: In-lane stops help reinforce transit as a priority mode, especially when paired with dedicated lanes or signal priority.
- Requires less curb space: Compared to pull-outs, in-lane stops often take up less linear space, which is beneficial in constrained or built-out environments.

DRAWBACKS OF IN-LANE BUS STOPS:

- Temporarily delays following vehicles: Stopped buses may block through traffic, especially on single-lane streets without passing opportunities.
- Requires coordination: Placement must avoid causing traffic to queue through intersections or block turn lanes.
- May generate driver frustration: On higher-speed or higher-volume streets, stopping in-lane can lead to aggressive driving behaviors.

BENEFITS OF PULL-OUT BUS STOPS:

- Reduces traffic disruption: Buses pull out of the travel lane, allowing vehicles to continue moving, especially on high-speed or high-volume streets.
- Improves safety in some contexts: By removing stopped buses from the flow of traffic, they may reduce rear-end collision risk on fast-moving roads.
- Can enhance pedestrian safety: In some cases, passengers boarding and alighting are separated from active travel lanes.

DRAWBACKS OF PULL-OUT BUS STOPS:

- Delays for buses: Re-entering traffic can be difficult, especially without signal priority or gaps in traffic flow, reducing transit reliability.
- Enforcement challenges: These zones are often blocked by illegally parked vehicles, which can make the stop unusable for buses.
- Takes up more space: Requires longer curb lengths to allow safe deceleration, stopping, and merging, which can be a challenge in constrained corridors.

Table 4-7 summarizes the main bus stop types, followed by design requirements by stop type.

TABLE 4-7 Design Considerations by Bus Stop Type

Stop Type	Lane Type	Recommended Context	Key Benefits	Challenges / Considerations	Accessibility Needs
Floating Bus Stop	In-Lane (Island)	High-volume multimodal corridors where separated bike lanes are preferable	Separates bike-bus conflicts; no merging delay; improves bike safety; shortens crossings	Requires dedicated bike lane and 8 ft minimum raised island; curb ramps needed; creates additional pedestrian crossings	Must include accessible connection from island to sidewalk;
Bus Bulb	In-Lane	Constrained rights-of-way; pedestrian-priority areas, higher volume pedestrian corridors	Shortens crossings; improves visibility; adds passenger space	Requires coordination with drainage and curbside uses (e.g., loading zones, parking, bicycle facilities)	Creates space for bus stop amenities without encroaching on sidewalks
Sidewalk Stop	In-Lane	Lower-speed streets, lower volume pedestrian corridors or moderate transit frequency routes;	Minimal ROW impact; default condition for most stops	May interfere with curbside uses; shelters may not fit available space	Ensure accessible boarding pad; maintain sidewalk continuity
Pull-Out Stop	Pull-Out / Parking or Transit Lane	Higher-speed arterials; tran-sit-supportive corridors	Minimizes traffic impacts; may improve safety in some cases	Merging delay; illegal motorist stopping or parking requires enforcement	Extended length platform; enforce clear zone;
Median Transit Stop	Center-Running	Dedicated transit lanes; Bus Rapid Transit Corridor	High visibility; supports BRT identity; generous passenger space	Requires dual-door vehicles and safe crossings; higher capital cost	Raised island with accessi-ble path; pedestrian access controls

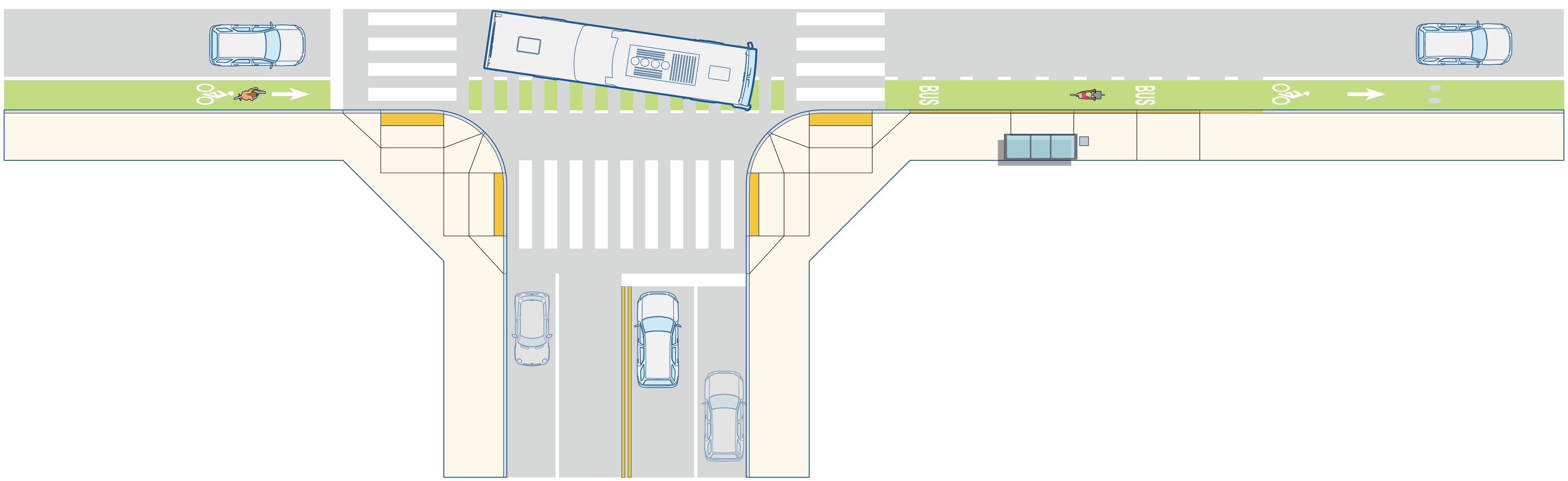
4.4.3.2 Sidewalk Stop (Curbside or Pull-Out)

Sidewalk stops occur where buses stop adjacent to the curb, either in the through lane or within a turn lane, bike lane, shoulder or parking lane. This is the most common bus stop configuration.

DESIGN REQUIREMENTS

- Boarding and alighting areas shall comply with PROWAG Section R308.
- The area must be a minimum of 5 feet long (along the curb) and 8 feet deep (perpendicular to the curb).
- The surface must be firm, stable, and slip-resistant, with a maximum cross slope of 2%.
- A minimum 5-foot-wide Pedestrian Access Route (PAR) shall be maintained behind any transit furniture (e.g., benches, shelters).
- Boarding area shall be connected to the surrounding pedestrian network via an ADA-compliant accessible route, including curb ramps and detectable warning surfaces.

FIGURE 4-36 Sidewalk Stop



4.4.3.3 Bus Bulb (In Lane)

A bus bulb is a curb extension that projects into the travel lane, allowing the bus to stop without leaving the lane and providing added space for waiting passengers. It also reduces pedestrian crossing distances.

DESIGN REQUIREMENTS:

- Curb lines shall extend by 6–8 feet and maintain alignment with adjacent parking lanes
- Stormwater drainage strategies shall be used to manage flow around the bulb
- Bulb length shall accommodate all clearance requirements for boarding, alighting, shelters, signage, and amenities without obstructing crosswalks or driveways
- Bulb corner radius shall be design to maintain safe turning vehicle speeds (Chapter 6)

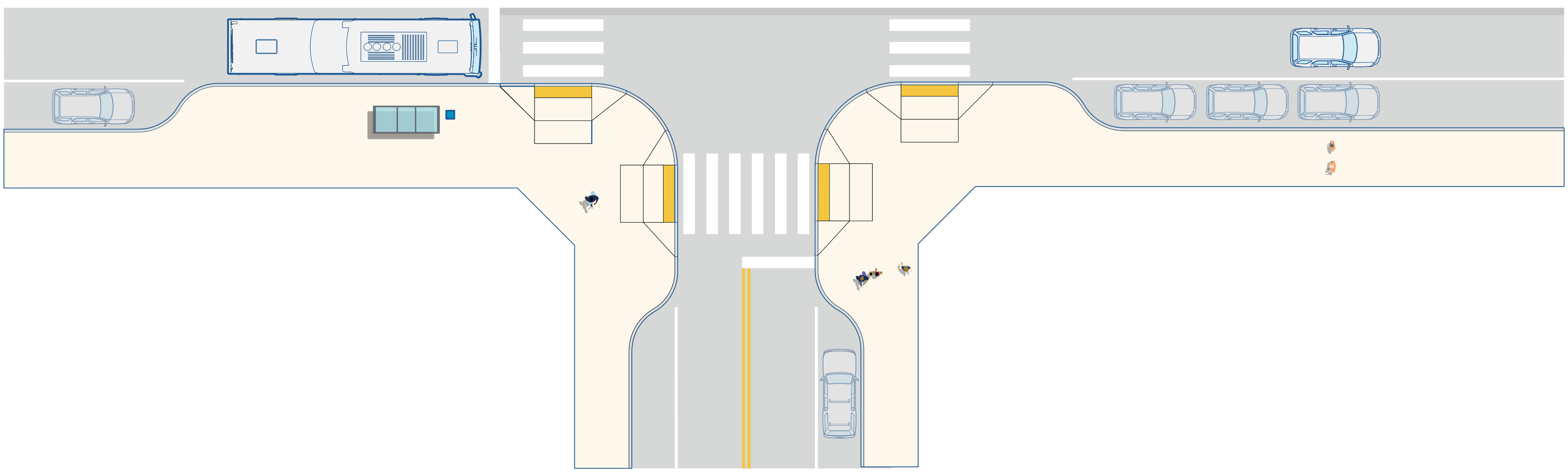


FIGURE 4-37 Bus Bulb (In Lane Stop)

4.4.3.4 Floating Bus Stop (In Lane)

Floating bus stops separate bicycle and bus operations by locating the stop on a raised platform island between the outside travel lane and a protected bicycle lane. The bike lane runs between the sidewalk and the stop, allowing cyclists to continue through, while the bus is stopped in the vehicular through lane.

DESIGN REQUIREMENTS

- Floating bus stop islands shall provide a minimum clear width of 8 feet to accommodate boarding and alighting areas, shelters, and signage.
- A boarding and alighting area shall be provided on the island and shall comply with PROWAG Section R308, including all dimensional and slope requirements.
- An ADA-compliant accessible route shall be provided between the floating island and the sidewalk, using a curb ramp, raised crosswalk, or other approved accessible crossing treatment.
- Detectable warning surfaces shall be installed at all pedestrian crossing points where pedestrians cross the bicycle lane to access the island.
- Pedestrian crossings between the sidewalk and island shall be clearly marked and visually emphasized to encourage yielding by bicyclists.
- The bicycle lane adjacent to the island shall be visually and physically separated from pedestrian space using vertical separation, curbing, and/or colored pavement treatments.
- Floating bus stop designs shall be coordinated with Lextran and LFUCG engineering staff during project development to ensure compatibility with vehicle operations, shelter placement, accessibility requirements, and multimodal safety.

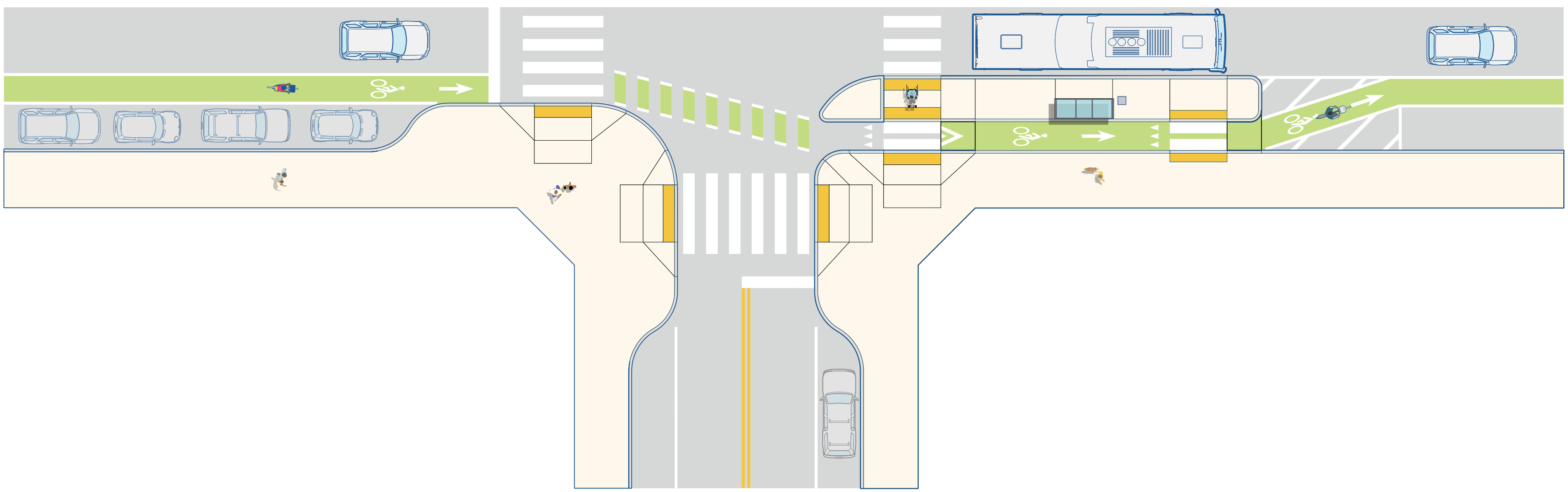


FIGURE 4-38 Floating Bus Stop (In Lane)

4.4.3.5 Parking/Transit Lane Stop (Pull-Out)

Pull-out stops are located in a recessed area off the main travel lane, typically in the parking or shoulder lane. This allows buses to move out of traffic while serving passengers. While pull-out transit stops can benefit transit operations or pedestrian safety in some cases, pull-out stops primarily support vehicular through traffic.

DESIGN REQUIREMENTS

- Bus pull-out stops shall provide a minimum pull-out length of 100 feet, inclusive of deceleration and acceleration tapers. Pull-out length shall be adjusted based on posted speed and design vehicle requirements.
- A boarding and alighting area shall be provided that is continuous with the sidewalk and fully compliant with ADA and PROWAG requirements.
- Curb radii and roadway geometry shall be designed to facilitate safe and efficient bus re-entry into the travel lane.
- Pavement markings and regulatory signage shall be installed to discourage stopping or parking within the designated bus pull-out area.
- Transit stop amenities, including shelters, benches, and trash receptacles, shall be located to avoid obstruction of the boarding and alighting area, the Pedestrian Access Route (PAR), or general pedestrian circulation.
- Where enforcement is necessary to maintain clear access to the pull-out area, designs shall support visibility and enforceability through clear delineation of the bus zone.

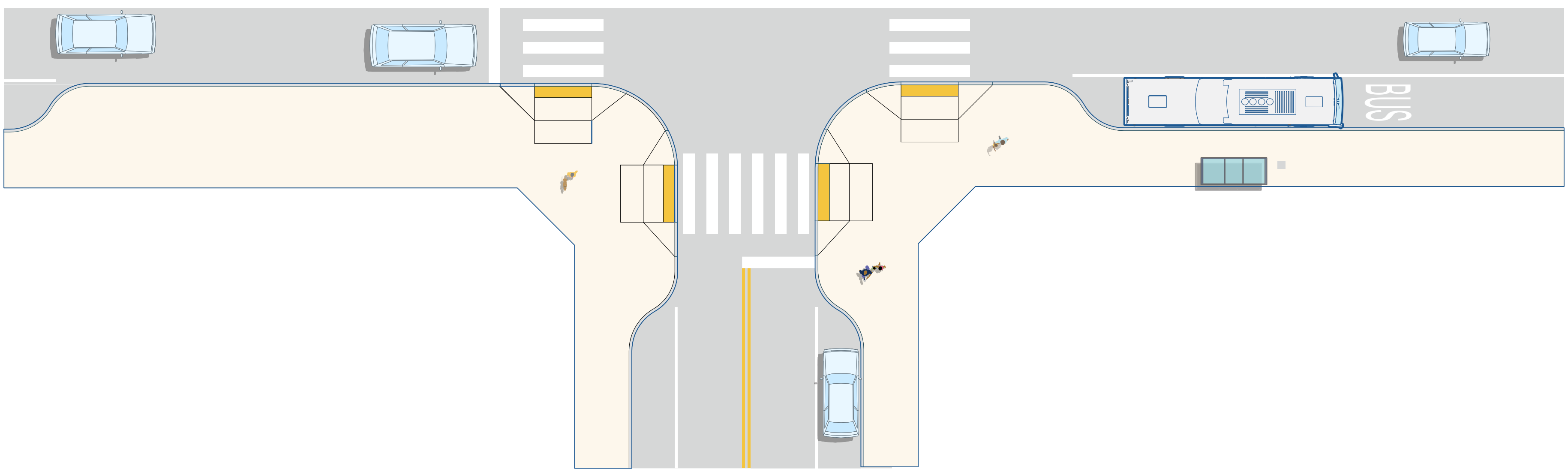


FIGURE 4-39 Parking/Transit Lane Stop

4.4.3.6 Median Transit Lane Stop (Center-Running)

Median transit stops are located in the center of the roadway and serve center-running transit lanes. While they may have higher capital costs, they enhance transit reliability, visibility, and identity, particularly for high-frequency or Bus Rapid Transit (BRT) routes.

DESIGN REQUIREMENTS

- Median transit stops shall be located at signalized intersections to maximize pedestrian safety and ensure controlled access to the stop.
- Far-side placement is required to support signal priority and reduce conflicts with turning vehicles, unless bi-directional service requires a shared center platform.
- Transit platforms shall be raised to match vehicle boarding height, typically 10–13 inches above street level, to enable level boarding where possible.
- The stop length shall accommodate the full design vehicle length, with a minimum of 10 feet of clearance to adjacent crosswalks.
- Shelters, signage, and other amenities shall not be located directly in front of vehicle doors or otherwise obstruct boarding and alighting operations.
- Safe pedestrian access from crosswalks shall be provided, including ADA-compliant connections from the median to the sidewalk with appropriate signalization and protection.
- Median stops are permitted only where transit vehicles are equipped with doors on both sides to enable boarding from the center platform.

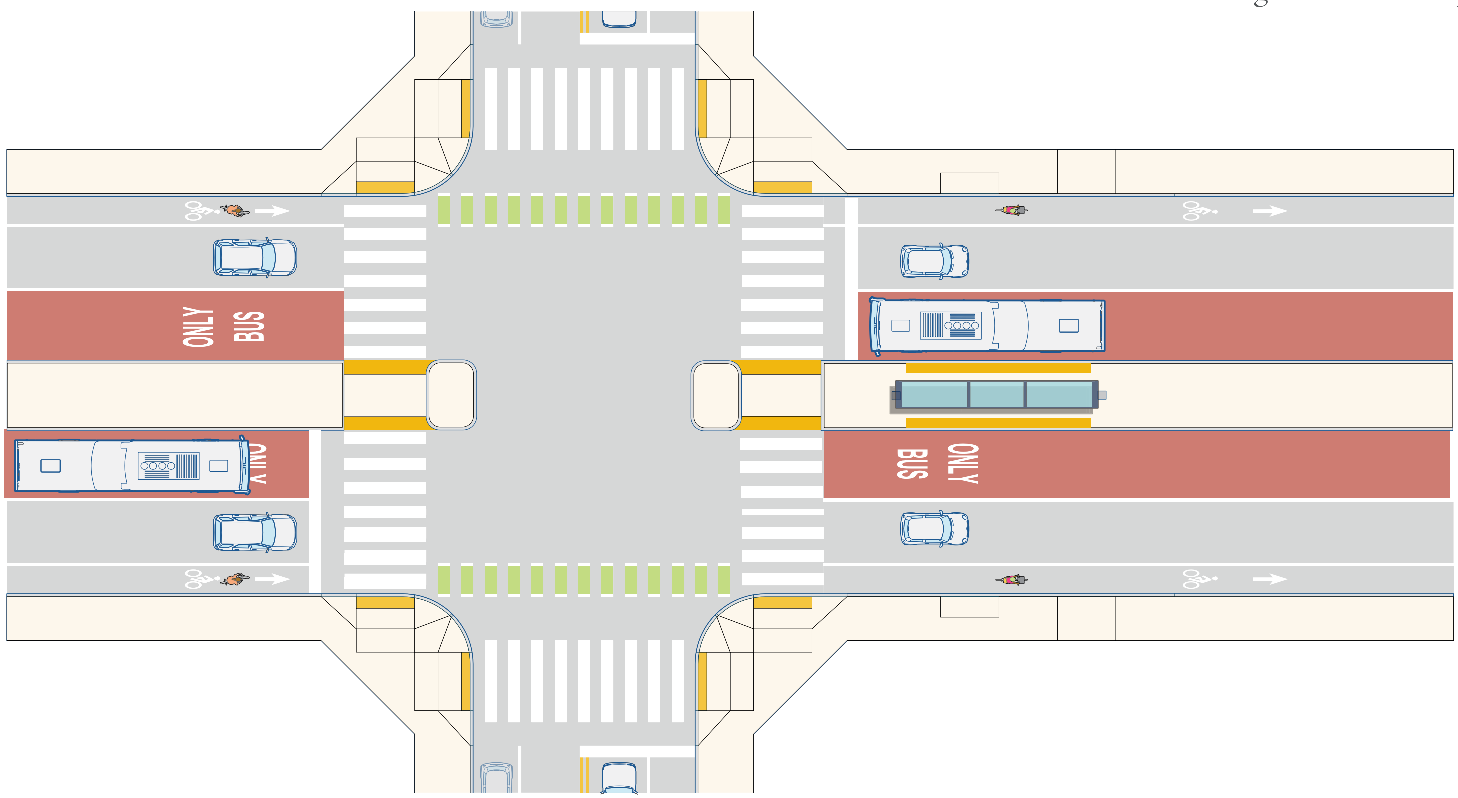


FIGURE 4-40 Median Transit Lane Stop

4.4.4 Dedicated Transit Lanes

Converting general-purpose travel lanes to transit lanes increases the total number of people that can be carried through a corridor. There are a variety of transit lanes:

- Permanent (24 hours a day, 7 days a week) transit lanes
- Business access transit lanes
- Peak-hour transit lanes

Pavement within these lanes may be painted red to indicate bus-only segments of the roadway and prevent motor vehicle encroachment

To increase efficiency, transit lanes may also be paired with queue jumps (**Section 4.4.6**) and transit signal priority (**Section 4.4.5**).

4.4.5 Transit Signal Priority

Transit signal priority improves transit efficiency by modifying traffic signals in response to the presence of transit vehicles. It extends green lights, or provides early green phases, for approaching transit vehicles, often in combination with queue-jump lanes. This can be achieved using a single signal or a two-signal setup.

4.4.6 Queue-Jump Lanes

Queue-jump lanes allow buses to move ahead of other vehicles at intersections. They are generally outside travel lanes, paired with transit signal priority. These two design elements improve transit on-time performance and reliability.

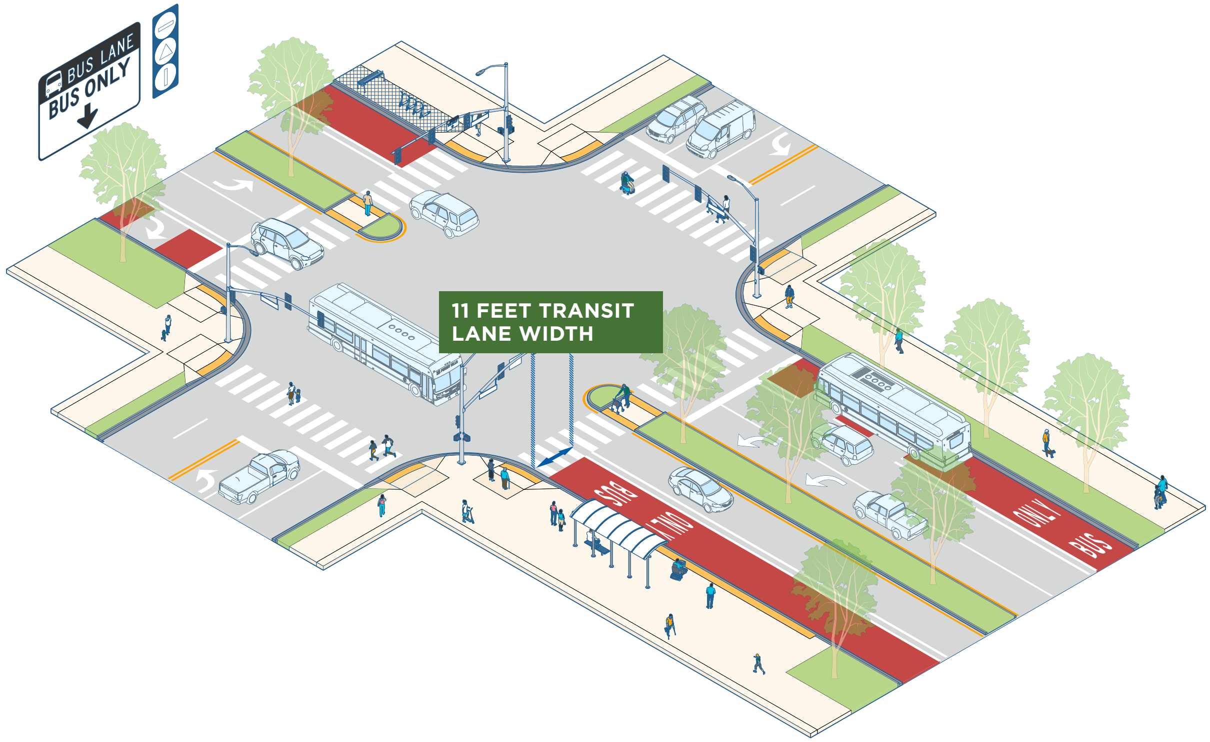


FIGURE 4-41 Dedicated Transit Lanes

4.5 Landscaping & Greenspace Elements

Greenscape and landscaping elements, including trees, shrubs, grasses, and other plantings, play a vital role in creating streets that are comfortable, inviting, and sustainable while also contributing to human health, safety and ecological performance. These elements also serve as effective stormwater management features by capturing, filtering, infiltrating, and slowing runoff before it enters the drainage system. Features such as bioretention areas, vegetated swales, and enhanced planting areas help reduce flooding, improve water quality, support groundwater recharge, and increase resilience to more frequent and intense storm events.

DESIGN CONSIDERATIONS

- Green infrastructure stress factors can include soil compaction, inadequate root space, poor soil quality, road salt, temperature fluctuations, physical damage, air pollution, and litter.
- Limited tree well size and planting strip widths can impact tree and vegetation health and growth. Providing adequate soil volume is critical to tree health and longevity.
- Streetscapes in high pedestrian activity areas may warrant underground structures such as soil cells beneath the sidewalk to support healthy root growth. This allows trees to access the soil, air, and water they need while maintaining the strength of sidewalks and streets above. This also supports stormwater management and pavement longevity.
- Plant height, width, density, and placement near intersections, interchanges, and entrances must ensure good sight visibility is maintained during all seasons.
- Vegetation shall not occlude traffic controls, street lighting, and potential conflict areas at intersections and driveways.
- All vegetation within planting strips, except trees, must be maintained to a height of 18 inches or less.
- Early consideration of long-term maintenance is essential during the design process.
- See Table 1-7 of the **LFUGC Stormwater Manual** for runoff reduction criteria of landscaping and greenspace elements.

4.5.1 Street Trees and Shade

Street trees are central to Complete Streets design, offering environmental, social, and economic benefits. They provide shade, mitigate the urban heat island effect, improve pedestrian and cyclist comfort, absorb stormwater, and contribute to neighborhood identity.

DESIGN GUIDANCE

- Prioritize native and climate-resilient tree species to reduce reliance on a limited set of species and increase resilience against pests, diseases, and climate extremes.
- Maintain species diversity targets: no more than 25% of any single species and no more than 30% of any one family on each street.
- Consider stormwater integration: tree trenches and bioretention systems can both manage runoff and support vegetation.

Planting Recommendations

Typical planting recommendations, including placement and species selection, will vary widely based on site specific constraints, land use context, soil composition, and the presence of water. Green spaces, particularly shade trees, are important to the character of the corridor, improve comfort of pedestrians, bicyclists, and/or other micromobility users, and may also help reduce urban heat island effects."

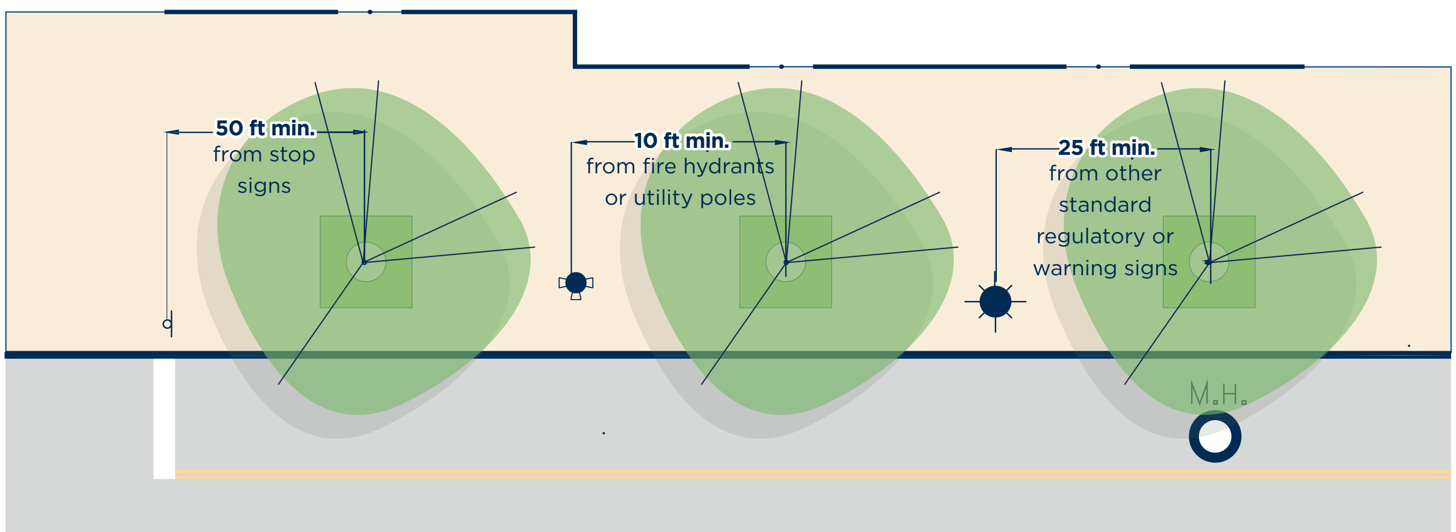
- Complete Streets, Roads, and Highways Manual, Kentucky Transportation Cabinet

4.5.1.1 Standards for New Development, Redevelopment and Street Retrofits

DESIGN REQUIREMENTS

Street tree management and maintenance are governed by Section 17B of the LFUCG Code of Ordinances, **Land Subdivision Regulations**, and **Zoning Ordinance**.

- Trees must be selected from the LFUCG List of Approved Street Trees
- Property owners are required to obtain a permit from LFUCG before removing or planting street trees
- Adequate rooting space and soil volume (structural soil, soil cells, or continuous planting strips) must be provided to ensure long-term tree health
- Trees planted as part of LFUCG Capital I mprovement Projects and by those participating in LFUCG's Hazardous Street Tree Replacement Program shall be a minimum of ten feet in height or a caliper of 1.75 inches at installation
- Evergreen trees planted within medians shall be a minimum of five feet in height or a caliper of 1.5 inches at installation
- Clearance and setback requirements:
  - Trees shall not occlude traffic controls or street lighting and shall be:
    - at least 50 feet in advance of stop or yield signs
    - at least 25 feet in advance of other regulatory or warning signs
    - at least 10 feet from fire hydrants or utility poles
    - small street trees shall be used where overhead utility lines are located
  - Minimum vertical clearance shall be:
    - 7 feet above sidewalks
    - 12 feet above all streets
    - 14 feet above truck routes



4.5.2 Plants and Materials

Plants used in the public right-of-way must be resilient, non-invasive, and appropriate for Lexington's climate and soil. Refer to the LFUCG Planting Manual for all relevant requirements.

DESIGN REQUIREMENTS

- Invasive species and bare-root trees are prohibited
- Bare root shrubs, hedges, vines and ground covers are permitted
- Shrubs and hedges are required to be a minimum 2 feet tall when initially planted
- Ground cover shall have a maximum spacing of 15 inches on center and a minimum coverage of 75 percent within two growing seasons
- Rocks & pebbles are permissible as supplemental ground cover on tree islands, and in some cases, as ground cover, but are not permitted elsewhere
- Artificial materials shall not count toward landscaping requirements

DESIGN GUIDANCE

- Common lawn varieties in Fayette County include Fescus (Gramineak) or Bluegrass (Poaceae)
- Use pollinator-friendly species where appropriate and feasible
- Favor perennial groundcovers over high-maintenance turf in small areas
- Mulch should be 2 to 4 inches deep around trees, shrubs, and plantings and shall be 1 to 2 inches away from tree trunks
- "Volcano mulching" is prohibited (piling mulch against stems or trunks)
- Incorporate living mulch (low-growing native plants) to improve biodiversity and reduce maintenance

4.5.3 Green Infrastructure

Green infrastructure features include permeable pavements, pavers, bioswales, and infiltration basins, often paired with street trees or other plantings. Per LFUCG's zoning ordinance, developers can decrease the size of required vegetated areas on sites under three acres by using approved green infrastructure practices.

Designers should collaborate with landscape architects and ISA Certified Arborists to ensure appropriate species are selected for site-specific conditions. Additionally, maintenance agreements must be established with agencies responsible for maintenance.

Additional guidance for the planning, design, permitting, and management of green infrastructure:

- LFUCG Stormwater Manual
- KYTC Drainage Manual
- NACTO Urban Street Stormwater Guide
- NCHRP 20-68A, Scan 16-02: Leading Landscape Design Practices for Cost-Effective Roadside Water Management

FIGURE 4-42 Green Infrastructure

4.6 Utilities

Utilities provide critical services for daily life. Utility conveyance is provided within private utility access easements or within the public right of way. When located within the public right of way, utilities should not conflict with the safe, accessible, and efficient use of the roadway by the traveling public.

Utilities are categorized as wet (water, sewer, and gas) and dry (electric, telephone, cable, and fiber-optic). A consistent utility placement strategy is necessary to:

- Reduced streetscape clutter
- Minimize pedestrian conflicts and improve access
- Minimize impacts on trees and plantings
- Lower maintenance conflicts and costs

4.6.1 Standards for New Development

Figure 4-43 denotes required utility placements for new development. Shared utility corridors or trenches for dry utilities are permissible.

- Dry utilities shall be located underground within the Alley, Sidewalk Zone, Amenity Zone, or Frontage Zone.
- Dry utilities may be located outside the Sidewalk Zone if additional right-of-way is dedicated or utility easements are denoted on applicable subdivision plans, development plans, and final record plats.
- Above-ground dry utility equipment is permissible but shall be located within utility easements adjacent to buildings to minimize visual clutter within and directly adjacent to the public right of way.
- Shared dry utility trenches are encouraged.
- Fire hydrants must be placed within 12 feet of a fire access road, including all streets and shared use paths greater than 12 feet wide.

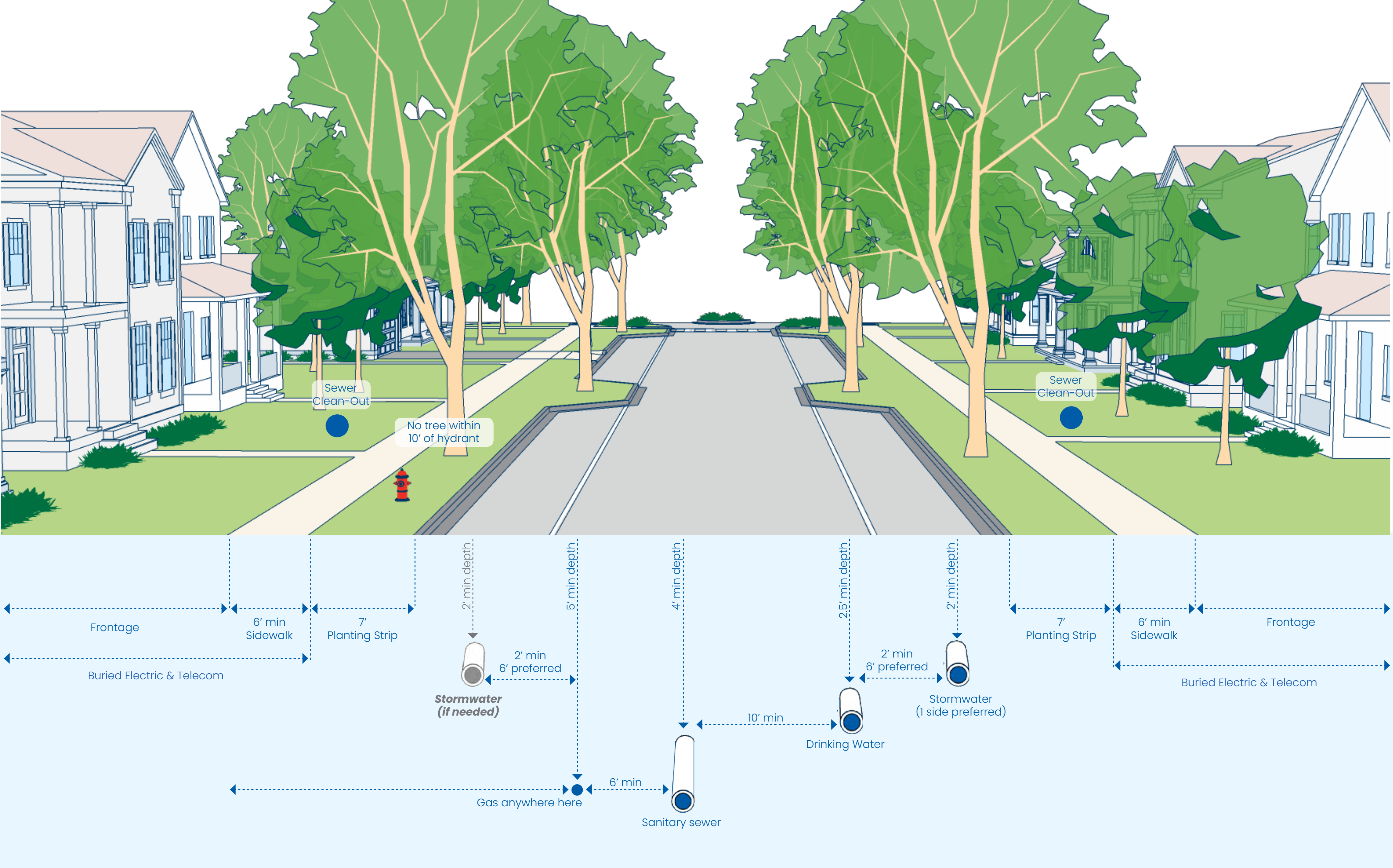


FIGURE 4-43 Utility Placement for New Developments

4.6.2 Standards for Redevelopment & Street Retrofits

Figure 4-43 denotes preferred utility locations for redevelopment and street improvement projects, however existing conditions and site constraints may require alternative placements as determined in consultation with the LFUCG Urban County Engineer, KY Transportation Cabinet, and utility providers. Designers should take into account additional clearance and space for placement and maintenance of above ground utility equipment.

DESIGN GUIDANCE

- Utility providers shall be engaged early in the design process to obtain utility maps or subsurface surveys and should be confirmed through site visits.
- Street reconstruction and resurfacing projects shall be coordinated with affected utilities to ensure that subsurface work is completed prior to paving. Placement of utilities for these types of projects will generally follow the existing arrangement with the utility provider.
- Utilities and supportive structures, such as grates, poles, and covers must not obstruct the Pedestrian Access Route.
- Utilities shall be underground to the greatest extent feasible, with the exception of large transmission lines.
- The following utility clearance requirements shall be adhered to the greatest extent practical in redevelopment and street retrofit scenarios:
- Water lines:
  - Provide 10 feet of horizontal separation from sewers, structures, and trees. If 10 feet of horizontal separation cannot be met in constrained locations, provide a minimum of 18 inches of vertical separation from sanitary or storm sewers.
  - Provide 5 feet of horizontal separation and 1 foot of vertical separation from other utilities
  - Fire hydrants must be placed within 12 feet of a fire access road, including all streets and shared use paths greater than 12 feet wide.
- Other underground utilities:
  - Provide 10 feet of horizontal separation from trees where feasible to reduce conflicts. Where this separation cannot be achieved, consider strategies such as root barriers, structural soils, suspended pavement systems, or appropriate tree species selection to minimize impacts.
  - Provide 5 feet of horizontal separation and 1 foot of vertical separation from other utilities and underground obstructions.
- Overhead utilities:
  - Provide 17-foot clearance above vehicular travel lane
  - Provide 12-foot clearance above any sidewalk, sidepath, or separated bike lane
  - Provide 15-foot clearance above any commercial driveway

4.7 Additional Design Resources

Below is a list of additional design resources to complement the Lexington **Complete Streets Design Manual** and support practitioners in making informed decisions throughout the design process.

- American Association of State Highway and Transportation Officials *Guide for the Planning, Design, and Operation of Pedestrian Facilities*
- American Association of State Highway and Transportation Officials *Guide for the Development of Bicycle Facilities*
- American Society of Landscape Architects: *Universal Design: Streets*
- U.S. Environmental Protection Agency – *Heat Island Resources*
- Federal Highway Administration *Pedestrian Lighting Primer*
- Federal Highway Administration *Accessible Shared Streets Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities*
- Federal Highway Administration *Access Management Guide*
- Federal Highway Administration *Manual on Uniform Traffic Control Devices for Streets and Highways*
- Federal Highway Administration *Road Diet Informational Guide*
- Institute of Transportation Engineers *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*
- Institute of Transportation Engineers *Curbside Management Practitioner's Guide*
- Kentucky Administrative Regulation Title 401 Chapter 005 Regulation 005 (401KAR 005)
- Lexington – Fayette Urban County *Engineering Standard Drawings & Engineering Manuals*
- National Association of City Transportation Officials *Urban Street Design Guide*
- National Association of City Transportation Officials *Curb Appeal: Curbside Management Strategies for Improving Transit Reliability and Access*
- National Association of City Transportation Officials *Urban Bikeway Design Guide*
- National Association of City Transportation Officials *Transit Street Design Guide*
- Portland Bureau of Transportation *Outdoor Dining Program Design Guidelines*
- U.S. Access Board *Public Rights-of-Way Accessibility Guidelines (PROWAG)*

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5 Intersection and Crossing Elements

Intersections play a central role in realizing Lexington's Complete Streets Policy and advancing the Safe System approach to street design. They serve as decision points, where conflicts between users can occur, therefore, their design significantly affects the overall safety and accessibility of the transportation network.

GUIDING PRINCIPLES FOR INTERSECTION DESIGN

PRIORITIZE SAFETY AND REDUCE CONFLICT POINTS

Intersection design must reduce the risk of severe crashes by minimizing high-speed or complex movements. This includes favoring compact geometries and designs that reduce the number of potential conflict points.

DESIGN FOR ALL USERS

Intersections should be safe, intuitive, and comfortable for people of all ages and abilities, including those walking, biking, using assistive devices, or accessing transit.

EMPHASIZE SELF-ENFORCING DESIGN

Intersection geometry and context-sensitive features should naturally slow speeds, encourage yielding, and reduce the need for enforcement. Examples include tighter curb radii, raised crossings, and mini-roundabouts.

SUPPORT THE SAFE SYSTEM APPROACH

Intersection design should eliminate or control high-risk vehicle maneuvers, rather than relying solely on signage or signalization. Examples include restricting left-turns or using protected intersection treatments.

ALIGN WITH LONG-TERM MAINTENANCE

Design materials and treatments should reflect Lexington's operational capacity and maintenance resources.

5.1 Intersection Geometric Design

Intersection design shall prioritize safety for all modes. Key safety strategies include 1) compact intersections that reduce pedestrian crossing distances and exposure and 2) designs that require slower vehicle turning movements to reduce the severity of potential crashes. These strategies are influenced by three inter-related factors.

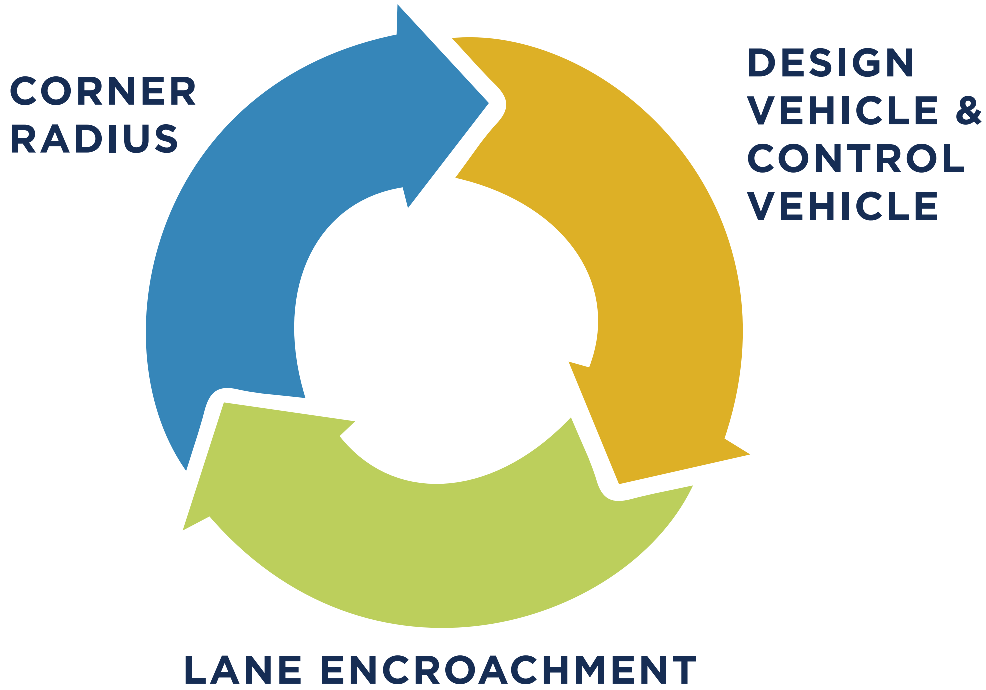


FIGURE 5-1 Factors Influencing Intersection Design

The selection of a Design Vehicle and Control Vehicle directly influences key geometric elements at intersections, particularly Corner Radius and the need for Lane Encroachment. The Design Vehicle—typically a passenger car or single-unit truck—must be able to complete turning movements within the confines of a single travel lane. The Control Vehicle, often a larger vehicle such as a fire truck or delivery truck, may require additional space and is allowed limited encroachment into adjacent lanes, provided it occurs infrequently and does not compromise safety. Corner radius is determined by the turning path of these vehicles and must balance large-vehicle accommodation with pedestrian safety—larger radii ease truck turns but encourage higher vehicle speeds. Effective intersection design requires careful coordination of these elements to ensure safe, functional operation for all users without oversizing geometry unnecessarily.

5.1.1 Design & Control Vehicle

Intersection design must account for the different types, sizes, and turning movements of vehicles that will use the street. Practitioners shall determine the appropriate intersection geometry, turning radii, and curb return design based on which vehicles are expected to routinely use the roadway versus those which are expected to occasionally use the roadway.

5.1.1.1 Design Vehicle

The **design vehicle** is the largest vehicle to routinely navigate the intersection. The following design guidance shall be applied when selecting the design vehicle:

The smallest feasible design vehicle that meets operational needs should be used to reduce intersection size, avoid overdesign, maintain safe turning speeds, and support pedestrian safety.

Design vehicles should be able to complete turning movements using one incoming and one receiving lane without encroaching into adjacent lanes or onto mountable elements.

Where a design vehicle larger than SU-30 is selected, truck aprons or mountable centerline hardening shall be used in the street design to maintain safe vehicle turning speeds for smaller vehicles. Larger design vehicles include WB-40, WB-50, or WB-67.

A bus representative of the local fleet (e.g., BUS-40) may be used as the design vehicle if the intersection includes a transit or school bus route that requires the vehicle to turn at that intersection. If the route passes straight through without turning, the bus may be used as the control vehicle.

5.1.1.2 Control Vehicle

The **control vehicle** is an infrequent but necessary user of the street, such as a delivery truck or emergency response vehicle. Control vehicles may turn over mountable elements and may encroach into approach or departure lanes as needed to complete a turn. See **Section 5.1.3** for guidance on vehicle encroachment.

5.1.1.3 Standards for New Development, Redevelopment and Street Retrofits

Table 5-1 denotes the default standard for design and control vehicles based on functional classification and street type.

TABLE 5-1 Design and Control Vehicles by Street Type

	Arterial		Collector		Local	
STREET TYPE	Design Vehicle	Control Vehicle	Design Vehicle	Control Vehicle	Design Vehicle	Control Vehicle
Neighborhood Street	N/A	N/A	N/A	N/A	SU-30	WB-40
Avenue	BUS-40	WB-50	BUS-40	WB-50	N/A	N/A
Boulevard	BUS-40	WB-50	BUS-40	WB-50	N/A	N/A
Thoroughfare	WB-50	WB-67	N/A	N/A	N/A	N/A
Alley	SU-40	WB-50	SU-30	SU-40	P	SU-40

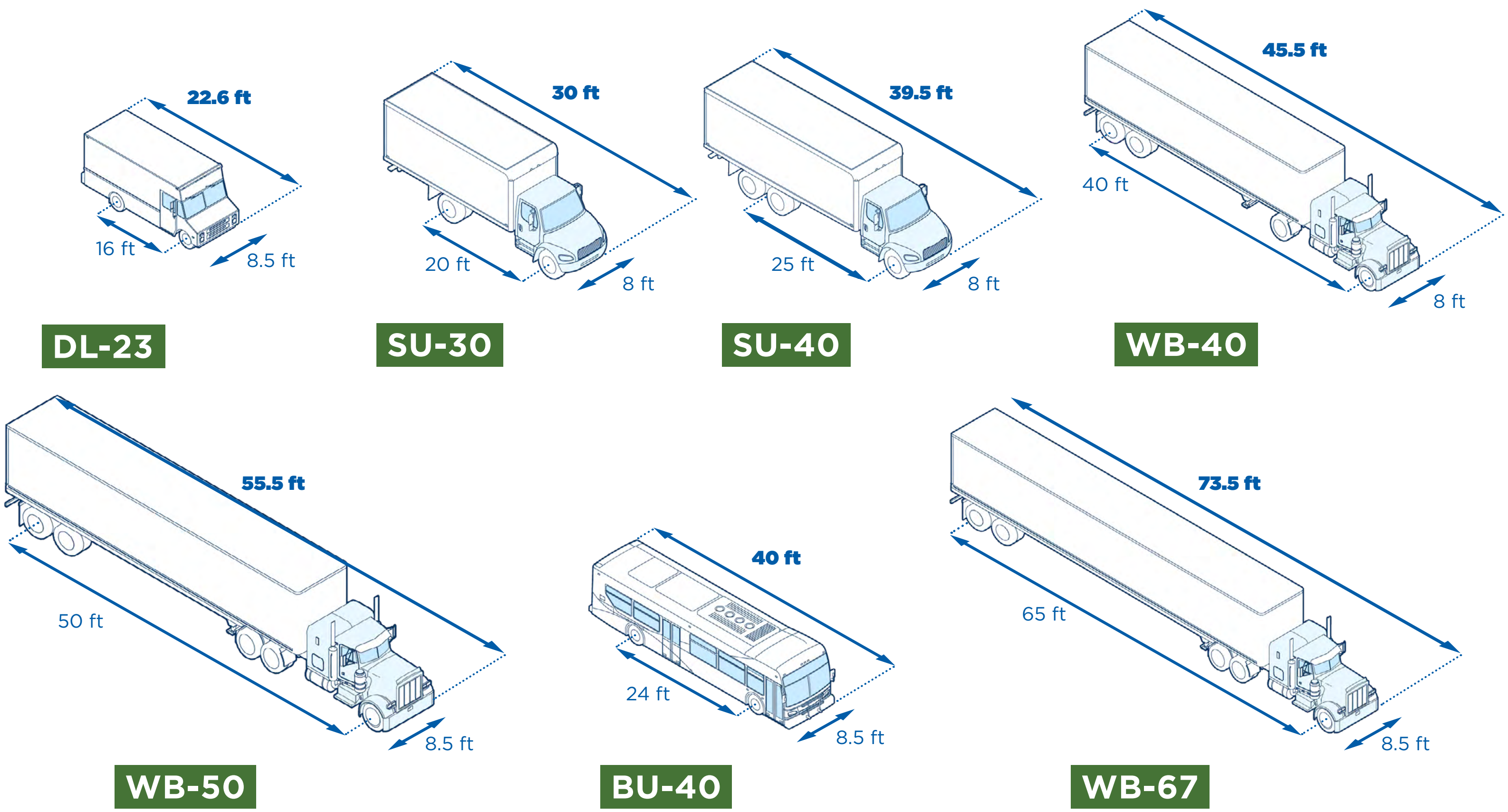


FIGURE 5-2 Design and Control Vehicles

Any variance to these standards for new and private redevelopments must be approved by the **LFUCG Urban County Engineer** per Appendix 1 of the **Procedures Manual for Infrastructure Development**. The request for a variance must include an analysis using the following criteria:

- Local traffic patterns and turning movement counts
- Vehicle classification data
- Presence of transit or freight routes
- Emergency response needs and access routing
- Maximum 10 mph turning speed for passenger cars
- Maximum 5 mph turning speed for all other vehicles

LFUCG may require a swept path analysis to demonstrate the design and control vehicles in Table 5-1 can navigate the proposed roadway geometry. Supporting documentation shall note which design strategies (outlined in Chapter 5) will be used to allow control vehicles (e.g. buses, fire trucks, semi-trailers) to make necessary turning movements without requiring a large corner radius. Altering the design and/or control vehicle will not be accepted if encroachment strategies have not been explored.

5.1.2 Turning Radius

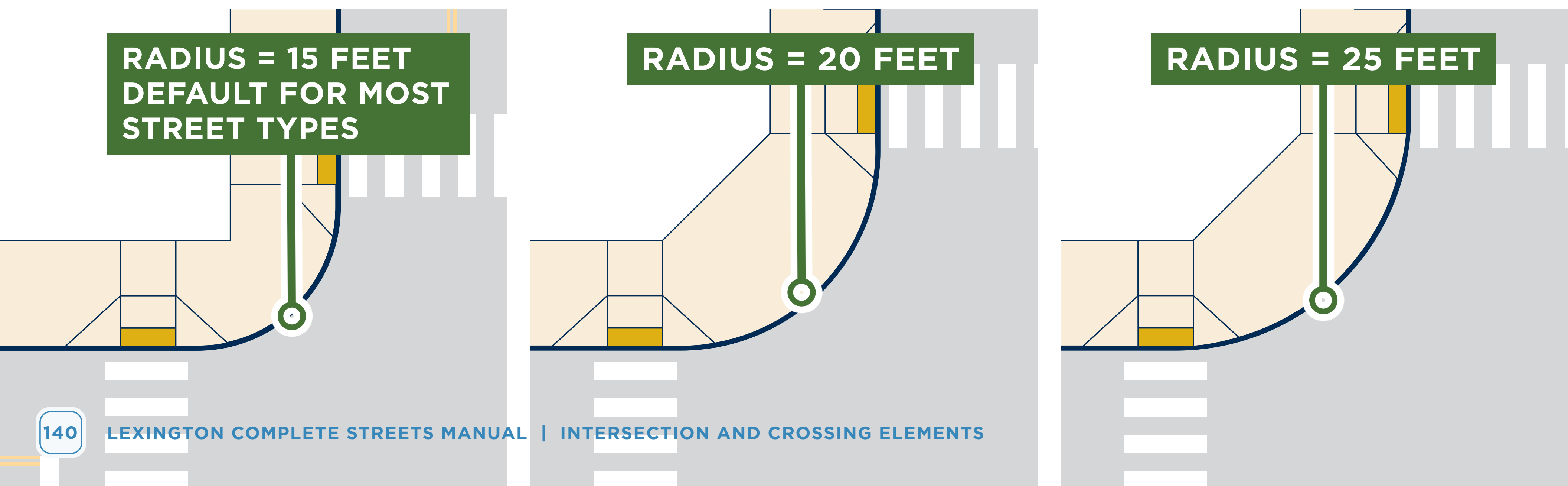
Corner radius dimensions influence vehicular turning speeds and pedestrian crossing distances. Smaller corner radii improve pedestrian safety by requiring vehicles to turn more slowly and by reducing pedestrian crossing distances. The objective is to use the smallest corner radius that will accommodate the turning movements of the design vehicle given the effective turning radius that is provided.

5.1.2.1 Corner Radius

The corner radius is the actual physical radius of the curb return or edge of pavement at an intersection that connects two intersecting street edges.

- A larger corner radius allows for higher-speed turns and accommodates larger vehicles more easily — but can also create longer crossing distances for pedestrians and reduce safety.
- A smaller corner radius slows vehicle turning speeds, shortens pedestrian crossings, and improves safety — but may require design accommodations for larger vehicles.
- Figure 5-3 depicts several corner radii dimensions that may be found in urban areas.

FIGURE 5-3 Common Corner Radius Dimensions



5.1.2.2 Effective Turning Radius

The effective turning radius is the functional radius that a vehicle can travel when making a turn. Even when the corner radius is small, the effective turning radius may be wider depending on other roadway features including:

- Lane widths
- Presence of on-street parking
- Presence of bike lanes
- Setback of stop bars or crosswalks

Designers should use the smallest actual corner radius while still ensuring turning function through a larger effective radius. This balance supports pedestrian safety without sacrificing large vehicle access, especially when large trucks or emergency vehicles are only occasional users of the route. Verification of turning movements using vehicle-turning software, such as AutoTURN, is recommended as a best practice.

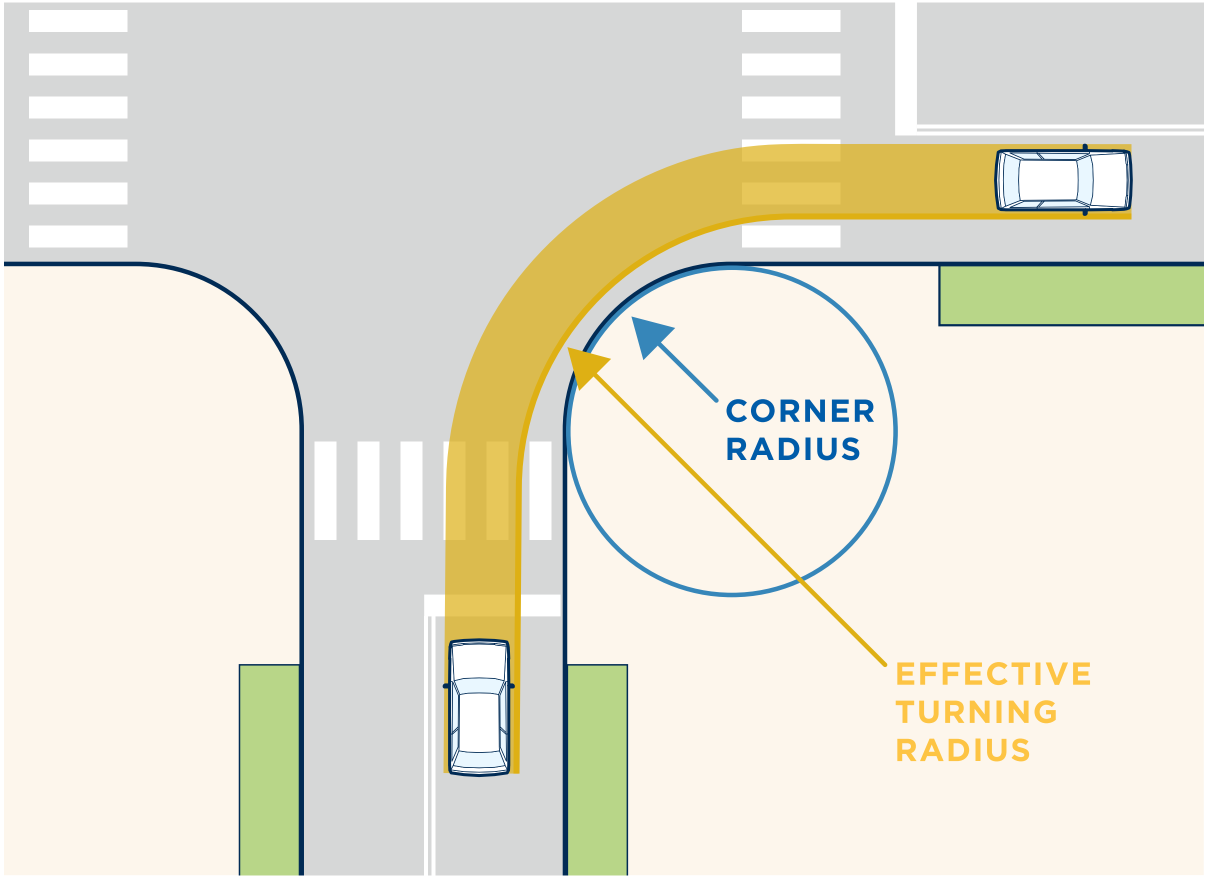


FIGURE 5-4 Corner Radius vs. Effective Turning Radius

5.1.2.3 Standards for New Development, Redevelopment and Street Retrofits

Table 5-2 provides the default corner radius standards based on the two intersecting street types.

TABLE 5-2 Corner Radii At Intersecting Streets

Street Type Intersections	Neighborhood Street	Avenue	Boulevard	Thoroughfare	Alley
Neighborhood Street	15	15	15	N/A	10
Avenue		15	15	15	15
Boulevard			15	25	15
Thoroughfare				25	N/A
Alley					10

5.1.3 Encroachment

Encroachment occurs when a vehicle uses roadway space outside its designated travel lane to complete a turn. Allowing large vehicles to encroach on adjacent travel lanes makes it possible to design intersections with smaller curb radii, thereby reducing turning speeds and shortening pedestrian crossing distances.

DESIGN GUIDANCE

- Encroachment is permissible on single-lane and multilane streets
- Encroachment does not include tracking over curbs, bikeways, or onto sidewalks
- Encroachment by the design vehicle is not permissible
- Encroachment by control vehicles is allowable and is preferred over enlarging curb radius
- Encroachment must occur at low speeds
- Pavement markings, signage, and curb geometry should visually reinforce expected vehicle paths
- Lane encroachment should be evaluated through turning movement analysis and documented in the design process
- The preferred design strategies to accommodate encroachment are summarized in Table 5-3.

TABLE 5-3 Design Strategies for Control Vehicle Encroachment

Strategy	Description
Allow lane encroachment	Permit control vehicles to use adjacent lanes during turns when traffic volumes and conditions allow.
Use mountable curbs or aprons	Install truck aprons that are navigable by large vehicles but discourage use by passenger cars.
Set back stop bars and crosswalks	Increase distance between intersection and crosswalk/stop bar to give turning vehicles more maneuvering space.
Parking restrictions	Remove parking near corners to allow large vehicles to swing wide or track into parking lanes without encountering parked cars.

5.1.3.1 Lane Encroachment

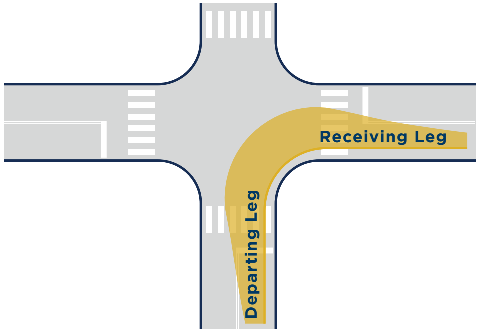
Lane encroachment allows larger control vehicles to momentarily enter adjacent travel lanes. Encroachment may occur in opposing or same-direction lanes. This allows for tighter, safer intersections for everyday users while still accommodating occasional large vehicle movements.

Encroachment occurs in either the **departure leg** (the street the vehicle is turning from) or the **receiving leg** (the street the vehicle is turning into), or both, depending on intersection geometry and vehicle type.

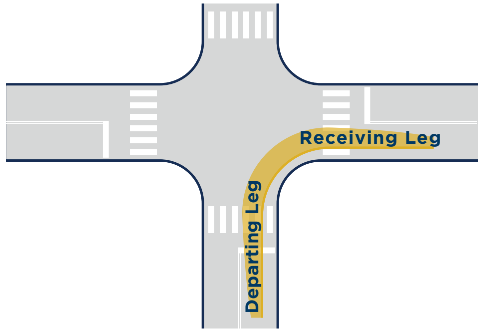
FIGURE 5-5 Degrees of Encroachment

Type A Streets: Neighborhood Street, Neighborhood Yield Street, Rural Local, Shared Street, Single Loaded Street

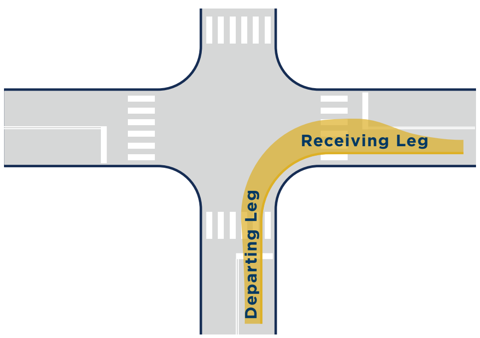
Type B Streets: Urban Core and Downtown Street, Urban Mixed Use Avenue, Avenue, Boulevard, Town Center, Thoroughfare, Industrial, Rural Main Street, Rural Thoroughfare



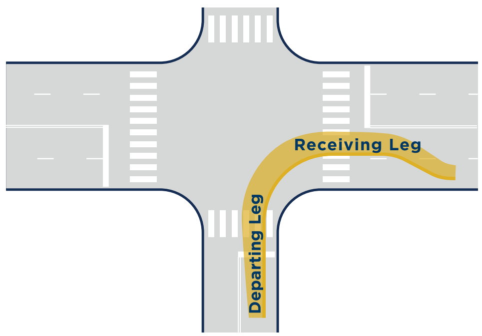
Full Encroachment (2-lane roads): Vehicles encroach upon opposing lane in both the departure and receiving leg of the intersection. Allowable: By large vehicles (e.g., school bus, transit bus) where all intersecting streets are A streets.



No Encroachment (2-lane roads): Required for a typical passenger vehicle on all street types. Desired by larger vehicles where all legs are Type B streets (except control vehicle – see next section).

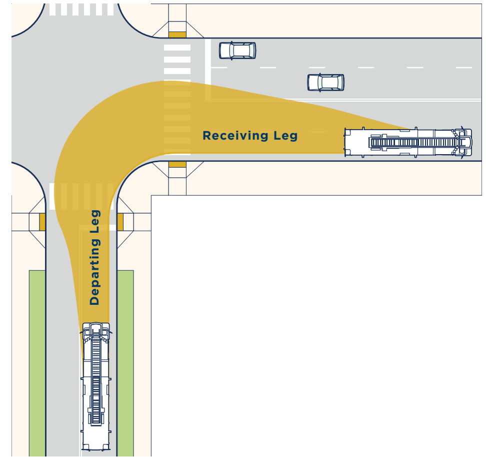


Receiving Lane Full Encroachment (2-lane roads): Vehicles encroach upon opposing lanes in receiving leg only. Allowable: By large vehicles where the receiving leg is a Type A street, and the departure leg is a Type B Street.



Multilane Encroachment (multilane roads): Vehicles encroach upon non-opposing (same direction) lanes of both the departure and receiving leg of the intersection. Allowable by larger vehicles on all applicable street types.

FIGURE 5-6 Degrees of Encroachment



Full Encroachment: The control vehicle, a fire truck (MM-100) can be assumed to use full encroachment at all intersections. It may use all traversable parts of an intersection, including across centerlines.

5.1.3.2 Mountable Curbs & Truck Aprons

A truck apron is a mountable surface that allows larger vehicles to complete turns that exceed the corner geometry.

LOCATION STANDARDS

Truck aprons are appropriate in these contexts:

- Urban intersections where compact curb radii are desired for pedestrian safety
- Raised islands within protected intersections
- Roundabout circular islands
- Channelized turn lanes

DESIGN REQUIREMENTS

Truck aprons shall:

- Be mountable and clearly differentiate from the adjacent travel lane
- Be constructed of durable materials capable of supporting the weight of heavy vehicles
- Be constructed 2 to 4 inches above the adjacent roadway surface
- Maintain a shallow slope (2%–5%) to allow wheel tracking without compromising drainage
- Have a width of 5 to 15 feet, based on intersection geometry and control vehicle requirements
- Not impede or alter the grade of accessible pedestrian routes or curb ramps
- Be designed to ensure stormwater drainage without ponding

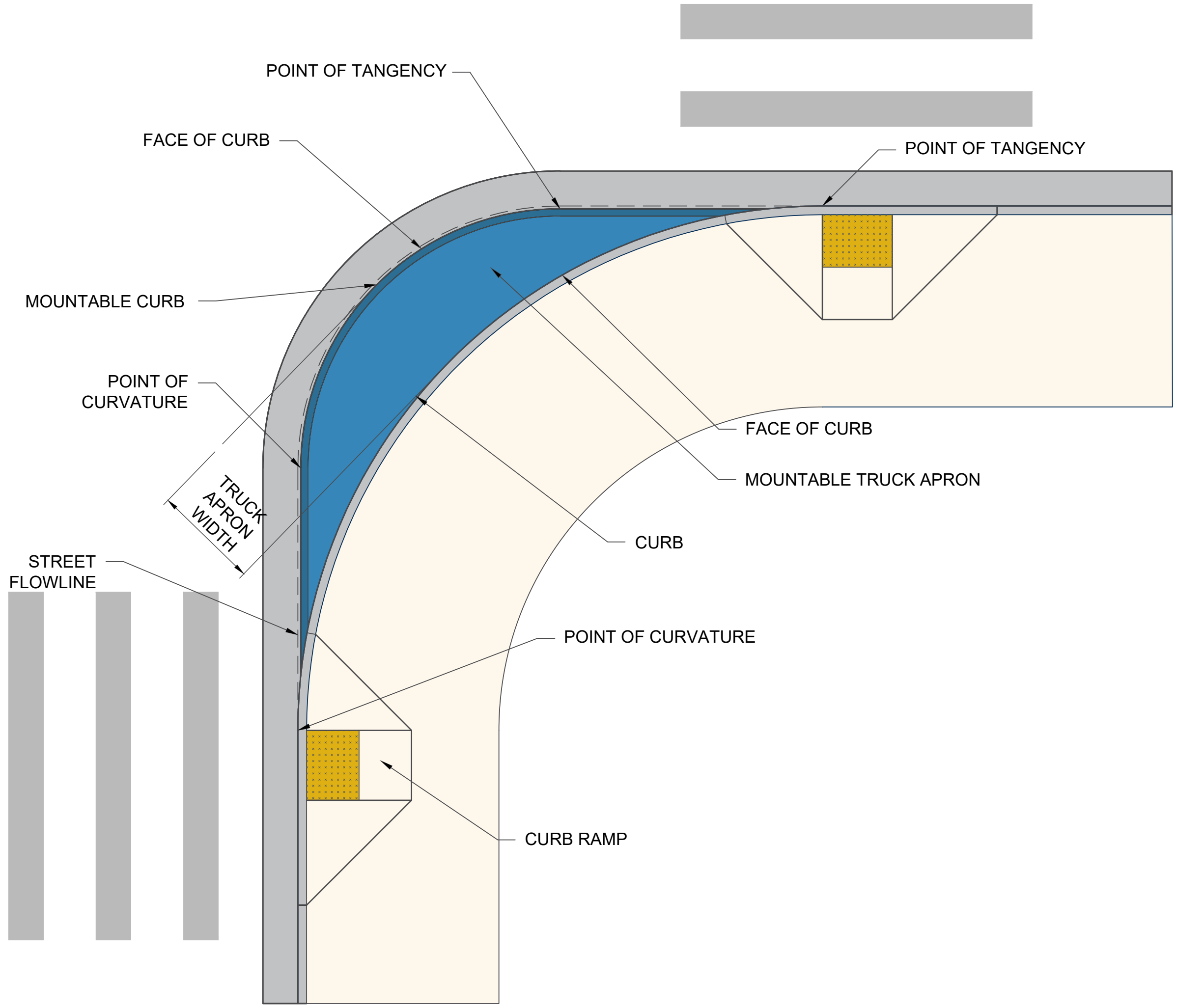


FIGURE 5-7 Truck Apron

5.1.3.3 Recessed Stop Bar

Recessed stop bars allow large vehicles to track through the intersection without mounting curbs or striking corner elements.

LOCATION STANDARDS

- Recessed stop bar placement should be informed by a turning template analysis for the appropriate design and control vehicle, per AASHTO guidance
- Stop bar setbacks typically range from 4 to 10 feet in advance of the crosswalk
- Setbacks up to 20 to 30 feet may be necessary along very narrow streets

DESIGN REQUIREMENTS

- Stop signs and signals must be visible from the recessed position
- Supplemental signage (e.g., “STOP HERE ON RED”) may be needed
- Advanced detection loops or video/radar detection should be adjusted to the recessed location
- Use high-visibility thermoplastic stop bars, typically 12 to 24 inches wide per MUTCD

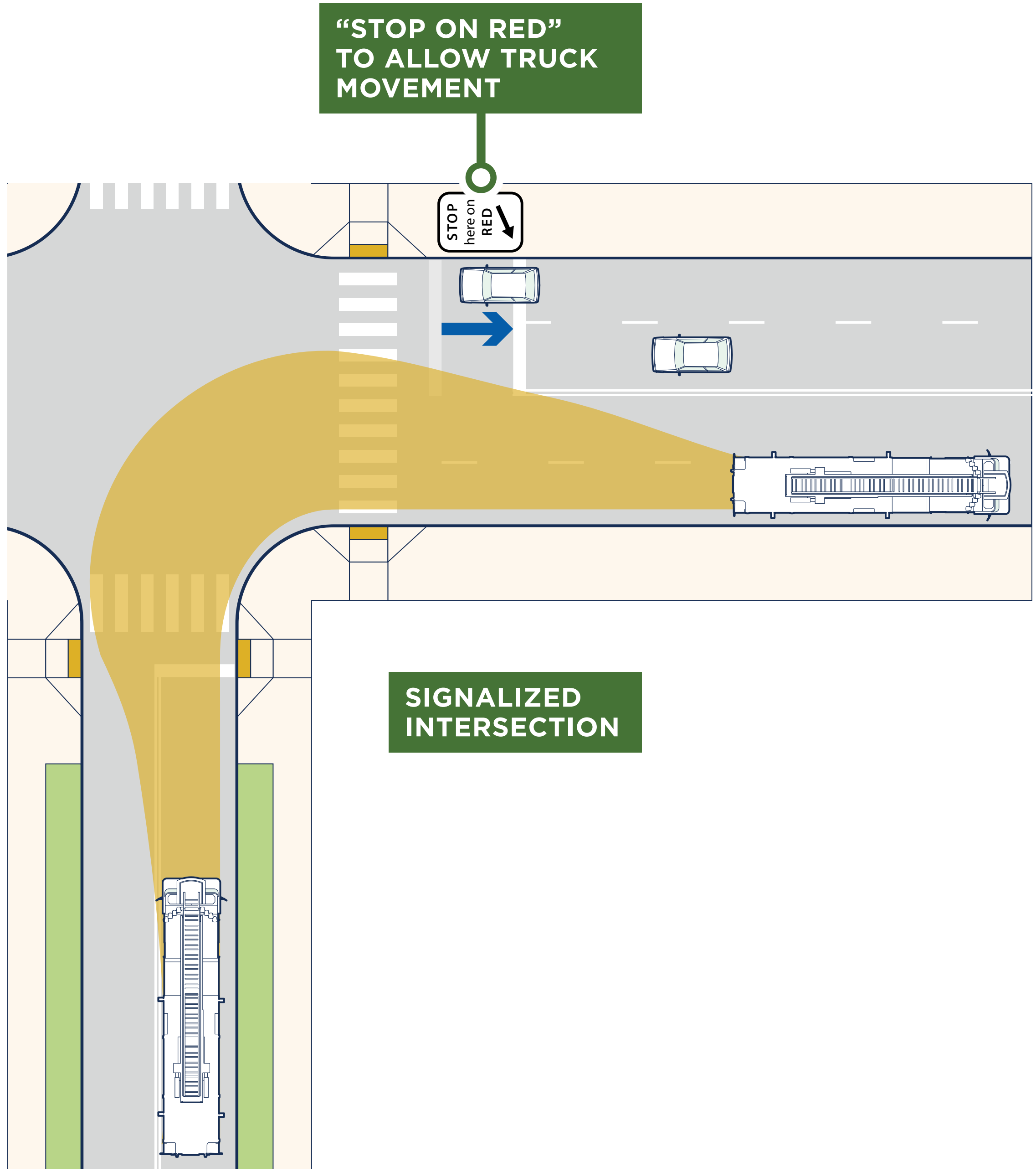


FIGURE 5-8 Recessed stop bar

5.1.3.4 Recessed On-Street Parking

Removing or recessing parking at intersections allows encroachment by larger vehicles, improves sight lines, and increases pedestrian visibility.

LOCATION STANDARDS

Parking setbacks should be evaluated at intersections that include or are adjacent to:

- Tight curb radii (≤15–20 feet)
- Neighborhood commercial areas
- Freight corridors
- Protected bike lanes and intersections
- Curb extensions / bulb outs
- Crossing islands

DESIGN REQUIREMENTS

- The typical parking setback is 20 feet from the crosswalk and 30 feet from the curb return
- Setback distances may be adjusted based on turning path analysis for design/control vehicle
- Combine recessed parking treatments with recessed stop bars and/or truck aprons
- New construction shall not place driveways through curb bulb-outs

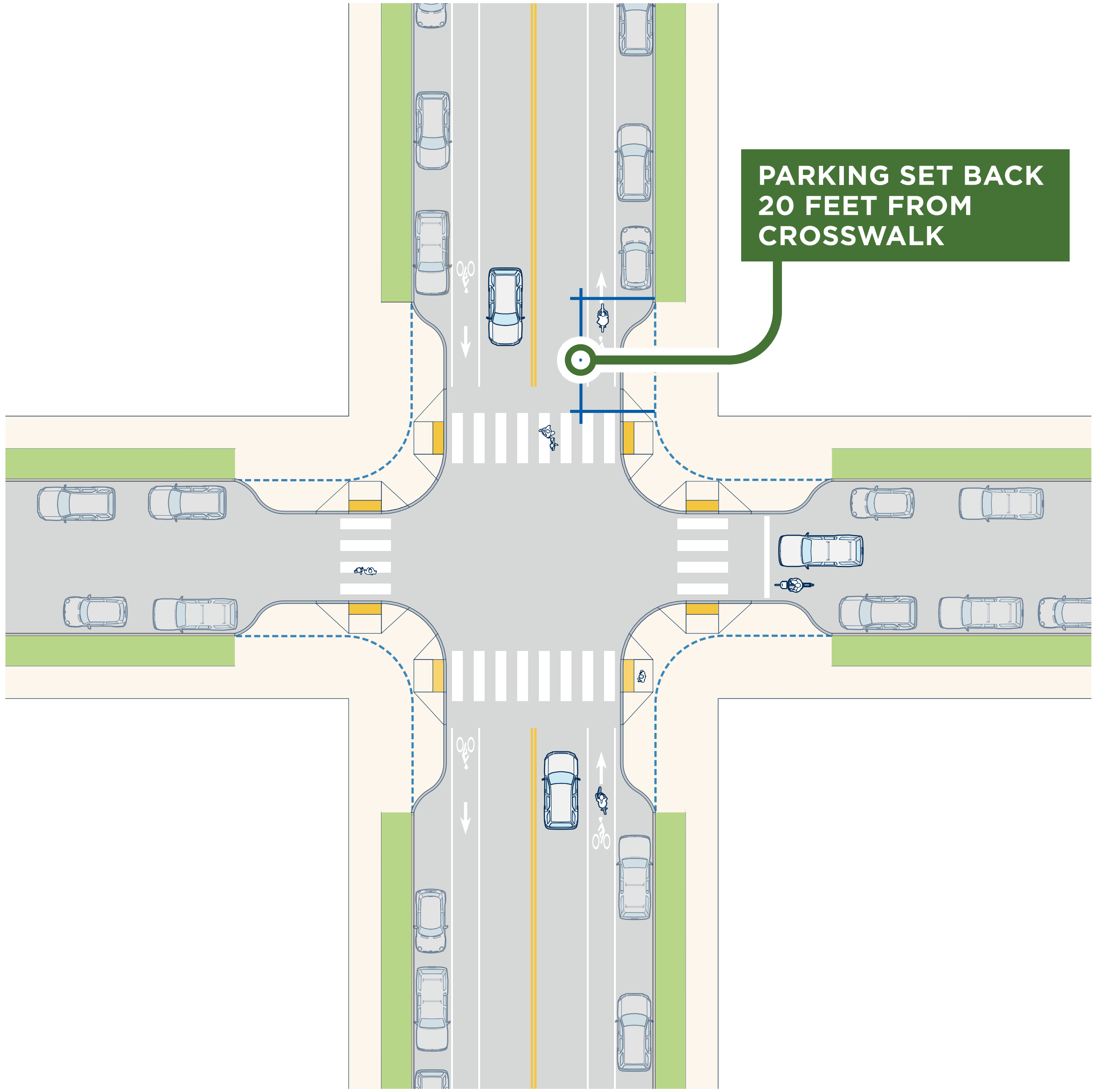


FIGURE 5-9 Recessed On-Street Parking

5.1.3.5 Hardened Centerlines

Hardened centerlines use vertical elements such as mountable curbs or flex posts to prevent left-turning vehicles from encroaching into opposing travel lanes at intersections. They improve safety by physically guiding vehicle turning paths, reducing turning speeds, and increasing protection for people walking, biking, and rolling.

LOCATION STANDARDS

The use of hardened centerlines is beneficial at intersections with:

- Left-turns at signalized intersections, particularly where there is a history of left-turn crashes
- Where motor vehicles frequently turn across double-yellow centerline markings at high speeds
- Locations with high volumes of people walking, rolling, and biking across the street
- On streets with curb extensions or protected bike lanes

DESIGN REQUIREMENTS

- Turning radii and lane width must be evaluated to avoid impeding fire trucks or buses
- Consider the implications of street sweeping operations
- Material height and width should discourage passenger vehicle encroachment but allow control vehicle overrun
- Use elements such as paint, signage, curb stops, bulb-outs, or other vertical delineators to visually and physically reinforce no-parking zones

MATERIAL REQUIREMENTS

Hardened centerlines provided within new and reconstructed intersections shall use durable materials such as concrete. Street retrofits that do not involve major reconstruction may use a range of materials based on context, design speed, and intersection geometry. Retrofit using non-durable materials shall be utilized only with written agreement from the Division of Traffic Engineering.

Acceptable retrofit materials include:

- Materials that are highly visible, reflective, and crash forgiving
- **Plastic curbing:** Modular and cost-effective; provides visual and physical deterrence
- **Rubber speed bumps:** Often used to create a “nose” element at the intersection entry to force sharper turns
- **Flexible delineator posts (flex posts):** Provide vertical definition while remaining forgiving for emergency vehicles
- In locations where heavy vehicles are frequent, the hardened centerline should be constructed with:
  - Interstate grade curb systems
  - Heavy-duty modular rubber speed bumps
  - Cast-in-place, mountable concrete wedge

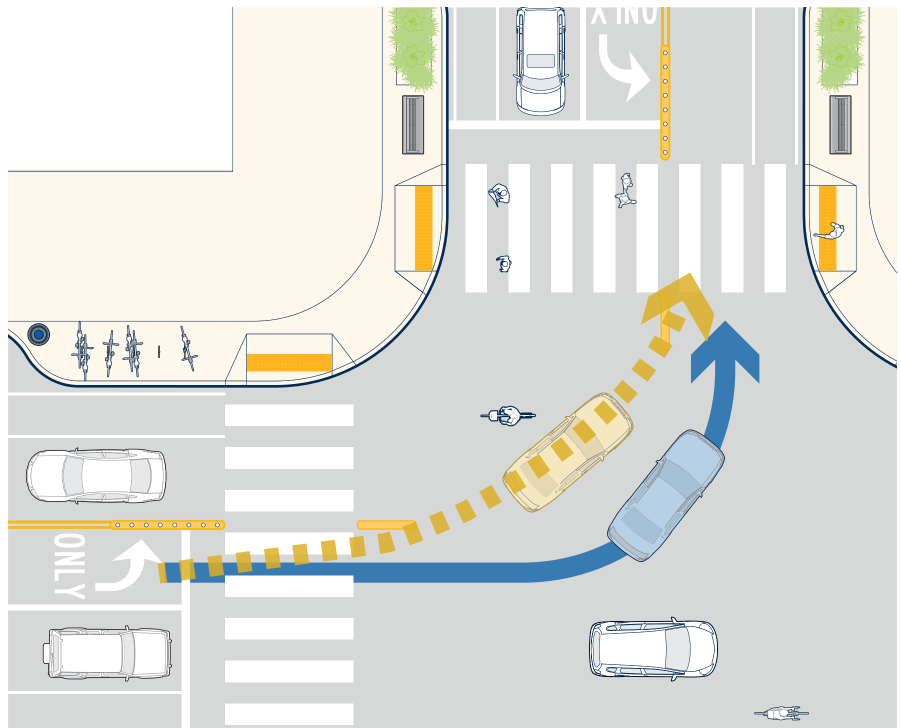


FIGURE 5-10 Hardened Centerlines

5.1.4 Vehicular Turn Lanes

Turn lane selection and design shall balance operational needs with safety, accessibility, and multimodal priorities. The introduction or expansion of turn lanes results in tradeoffs that affect pedestrian comfort, bicyclist safety, and overall street function, and therefore should be evaluated in the context of land use and the safety of all roadway users.

5.1.4.1 Right-Turn Lanes

Right turn lanes are exclusive lanes at intersections (or driveways) that allow vehicles to turn right without impeding through traffic. In many locations, right-turn lanes were added to increase vehicular capacity and minimize delay at intersections. However, turn lanes also widen intersections, increase pedestrian crossing distances, and encourage higher-speed turning movements. Practitioners must carefully consider both the benefits and drawbacks to right turn lanes and must also consider local context (such as the presence of pedestrian generators).

Benefits of right-turn lanes:

- Reduce delay to through traffic
- Improve vehicle queue management at intersections
- Accommodate high right-turn volumes
- Can reduce rear-end crashes related to turning vehicles
- May improve transit operations where buses remain in through lanes

Drawbacks of right-turn lanes:

- Increases pedestrian crossing distance and exposure
- Encourages higher turning speeds, increasing conflict severity
- Creates additional conflict points with bicyclists and pedestrians
- Often degrades pedestrian comfort and accessibility

DESIGN GUIDANCE

- Right turn lanes must be justified by turning volumes and safety analysis and follow the following design guidance:
- Should not be provided in pedestrian-oriented contexts
- Should not compromise pedestrian safety or accessibility
- Should include design features that control turning speeds (e.g., reduced corner radii, channelization)
- Should include signals, stops, or yield controls to minimize conflicts between turning vehicles, pedestrians and bicyclists

5.1.4.2 Channelized Right Turn Lanes

Channelized right turn lanes, often called slip lanes, encourage the uncontrolled flow of right turns at fast speeds. They are not recommended in urban settings, and their removal should be considered during road reconstruction projects.

Where right-turn slip lanes are provided, designers should prioritize pedestrian safety and speed management, rather than free-flow vehicle movement. This should be accomplished through geometry, vertical deflection, and clear assignment of right-of-way. The goal of these design interventions is to slow turning speeds, shorten crossing distances, and reinforce yielding behavior, rather than maximizing vehicle throughput.

DESIGN GUIDANCE

- Avoid slip lanes entirely in pedestrian-oriented areas where safety and comfort are a priority.
- Replace slip lanes with tighter corner geometry or signalized right turns where feasible.
- Evaluate slip lane removal during retrofit or reconstruction projects, especially where pedestrian activity is high.

DESIGN REQUIREMENTS

Where right-turn slip lanes are provided, practitioners shall employ one or more of the following strategies to maintain safe vehicle turning speeds and ensure pedestrian safety, convenience, and comfort:

- Reduce curb return radii to the minimum feasible dimension to limit turning speed

- Tighten slip lane curvature by shifting the slip lane closer to the intersection or reducing entry angle
- Realign slip lanes to increase deflection and discourage high-speed merges
- Convert channelized slip lanes to signal-controlled right turns where yield compliance is poor
- Shorten crossing distances using curb extensions or median refuge islands
- Provide raised crosswalks across slip lanes to reinforce yielding and manage speeds
- Align crossings perpendicular to vehicle travel paths to improve visibility and reduce crossing time
- Set crossings back from the main intersection where appropriate to improve driver reaction time
- Use textured or contrasting pavement (e.g., concrete, unit pavers, colored asphalt) to signal a pedestrian-priority zone
- Eliminate excessive tapering that encourages acceleration through the turn
- Assign clear pedestrian priority using yield or stop control at the slip lane crossing
- Install pedestrian-activated signals (e.g., PHBs) where pedestrian volumes or crash history indicate a need for enhanced crossing safety.
- Maintain clear sight lines between drivers and pedestrians approaching the crossing
- Restrict parking and curbside uses near slip lane crossings that could block visibility
- Use pedestrian-scale lighting to improve night-time visibility

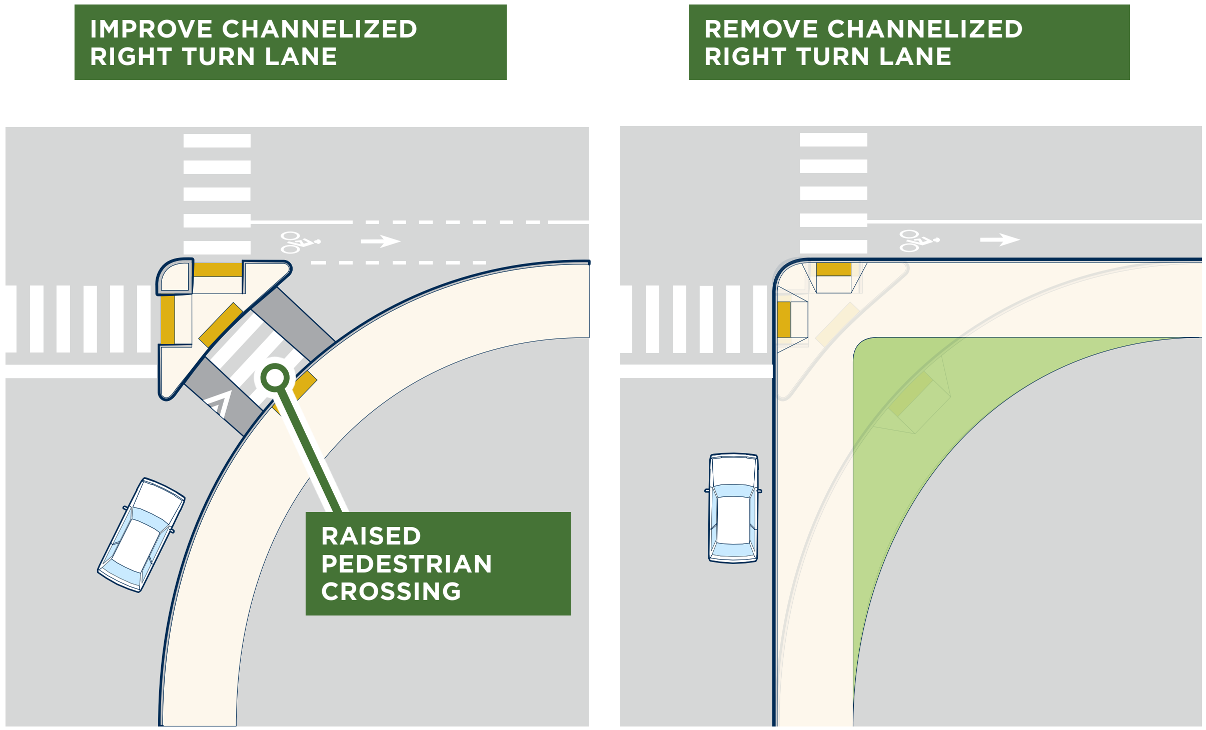


FIGURE 5-11 Channelized Right Turn Lane Improvement and Removal

5.1.4.3 Left-Turn Lanes

A left-turn lane is an exclusive lane provided for vehicles turning left at an intersection, separating turning traffic from through traffic.

Benefits of left-turn lanes:

- Reduce rear-end and angle crashes
- Improve intersection operations where left-turn demand is significant
- Provide storage for queued left-turning vehicles
- Reduce intersection delay

Drawbacks of left-turn lanes:

- Increases roadway width and pedestrian crossing distance
- May reduce space available for bike lanes, medians, or sidewalks
- Can increase overall intersection footprint and impervious area

DESIGN GUIDANCE

- Minimize left-turn lane length where possible to reduce roadway width or to provide raised medians
- Consider signal phasing or access management as alternatives to adding lanes
- Coordinate left-turn lane design with pedestrian refuge opportunities

DESIGN REQUIREMENTS

- Left-turn lanes shall be provided only where justified by traffic volumes, crash history, or signal phasing requirements
- Storage length shall not be excessive based on observed or projected demand
- Left-turn lanes shall not be over-designed in a manner that increases vehicle speeds

5.1.4.4 Dual Left-Turn Lanes

Dual left-turn lanes consist of two parallel lanes that allow vehicles to turn left simultaneously from the same approach.

Benefits of dual left-turn lanes:

- Increase intersection capacity under constrained signal timing
- Can reduce left-turn delay at high-volume intersections
- May reduce queue spillback into through lanes
- Drawbacks of dual left-turn lanes:
- Significantly increases intersection complexity
- Increases pedestrian crossing distance and exposure
- Creates challenging conditions for bicyclists
- Higher risk of lane-use confusion and sideswipe crashes

DESIGN GUIDANCE

- Demand management, access control, or intersection reconfiguration are preferred alternatives to dual turn lanes
- Where dual left-turn lanes are used, protected phasing and pedestrian refuge islands or hardened centerlines should be used to manage speeds and improve safety at crossings
- Evaluate whether existing dual left-turn lanes can be converted to a single left-turn lane in pedestrian-priority areas

DESIGN REQUIREMENTS

- Dual left-turn lanes shall be provided only where supported by detailed traffic analysis demonstrating necessity
- Dual left-turn lanes shall not be used in pedestrian-oriented or neighborhood contexts
- Clear lane assignment, pavement markings, and signal indications shall be provided

5.1.4.5 Two-Way Left-turn Lanes (TWLTLs)

A two-way left-turn lane (TWLTL) is a lane located along the centerline of a roadway (the median zone) that allows vehicles from either direction to make left-turns into or out of adjacent driveways or minor streets. See **Section 4.3.5.3** for guidance on the application of TWLTLs.

5.2 Traffic Control Devices

Traffic control devices are signs, signals, markings, and other devices placed on or adjacent to streets to regulate, warn, or guide roadway users.

Traffic control devices should be selected and applied to advance Complete Streets objectives for safety and accessibility and to promote clear, predictable behavior by all roadway users.

5.2.1 Traffic Signals & Stop Control

Traffic signal and stop control design must follow the procedures and criteria outlined in the Manual on Uniform Traffic Control Devices (MUTCD) including applicable signal warrant analyses and stop control guidance.

DESIGN GUIDANCE

The application of signal and stop control warrants should not rely solely on motor vehicle volumes and delay. In the context of Complete Streets and the Safe Systems approach, practitioners must also:

- Consider vulnerable users when assessing need (e.g., pedestrians, bicyclists, school children, and people with disabilities)
- Consider site conditions and land use context (commercial activity, major civic or community destinations, pedestrian activity, transit access or stop usage)
- Consider safety risk and crash history, even where traffic volumes may not meet prescriptive thresholds
- Coordinate with Lextran to determine if signalization may benefit transit operations or access

DESIGN REQUIREMENTS

All traffic control devices must conform to the standards established in the **Manual on Uniform Traffic Control Devices (MUTCD),** the **LFUCG Traffic Engineering Manual** and all applicable KYTC requirements for state-maintained roadways. Consistent with the MUTCD, the selection and application of traffic control devices should be informed by engineering judgment, which considers the available data, roadway context, user needs, operational characteristics, and safety objectives. While MUTCD warrants and criteria identify conditions under which specific treatments may be appropriate, they do not prohibit the implementation of traffic control devices or safety treatments based on engineering judgment. Designers are encouraged to consider proactive safety improvements, particularly for pedestrians, bicyclists, and other vulnerable roadway users, where site conditions, anticipated demand, network connectivity, or safety goals indicate a potential benefit.

Refer to **Section 5.4.4** (**Controlled Pedestrian Crossings**) for design guidance and requirements for traffic control devices applicable to pedestrian-related crossings.

5.2.2 Signalization for Speed Management

Traffic signal operations are a critical speed-management tool and should be designed to reinforce target speeds and reduce the likelihood and severity of crashes rather than simply maximizing throughput. This is particularly important during off-peak periods when speeding is more common.

DESIGN GUIDANCE

Signal-related speed management strategies include:

- **Rest-on-red operation** to discourage high-speed approaches during low-volume periods.
- **Short cycle lengths** in pedestrian-oriented areas to reduce delay and aggressive driving.
- **Signal coordination** that prioritizes safety over progression at higher speeds.
- **Pedestrian priority treatments** to increase yielding and awareness at crossings.
- Coordinating signal operation with **compact intersection design,** reduced corner radii, and other physical speed-management measures.

Practitioners should consult the following sources for additional guidance on signalization strategies to reinforce safe speeds:

- **FHWA Signal Timing Manual**
- **FHWA Proven Safety Countermeasures**
- **ITE Traffic Signal Timing Manual**
- **NACTO Urban Street Design Guide**

5.2.3 Pedestrian-Supportive Signalization

Traffic signal operations should provide for the orderly, safe, and efficient movement of all roadway users. Vehicular movements should not be optimized at the expense of pedestrian and bicyclist safety, accessibility, or convenience. In a Complete Streets context, signalization should:

- Reduce conflicts with turning vehicles
- Minimize unnecessary delay for pedestrians and bicyclists
- Provide clear, predictable crossing opportunities for users of all ages and abilities

Pedestrian-supportive signal strategies should be selected based on land use context, pedestrian demand, traffic speeds and volumes, and documented safety concerns.

DESIGN GUIDANCE

The following pedestrian-supportive signal strategies shall be considered, as appropriate:

- **Rest-in-Walk Operation**
  Rest-in-walk operation may be used to allow pedestrian signals to default to WALK when no conflicting vehicular movements are present. This strategy should be considered in pedestrian-oriented, low-speed contexts and during off-peak periods to reduce pedestrian delay and reinforce pedestrian priority.
- **Leading Pedestrian Intervals (LPIs)**
  LPIs should be provided where turning vehicle conflicts with pedestrians are present. LPIs shall provide pedestrians with a head start before turning vehicles receive a green indication in order to improve visibility and yielding behavior.
- **Exclusive Pedestrian Phases (Pedestrian Scrambles / Barnes Dance)**
  Exclusive pedestrian phases may be used at complex intersections, locations with high pedestrian volumes, or where turning conflicts present elevated safety risk. When provided, these phases shall stop all vehicular movements during pedestrian crossings.
- **Pedestrian Recall (Automatic WALK)**
  Pedestrian recall should be used at locations with consistent pedestrian activity to reduce delay and eliminate the need for pushbutton activation.
- **Adequate and Context-Sensitive Crossing Time**
  Pedestrian signal timing shall accommodate users of all ages and abilities and shall not require pedestrians to rush to complete crossings. Crossing times should reflect surrounding land use and the presence of vulnerable users.
- **Accessible Pedestrian Signals (APS)**
  APS shall be provided where required to ensure pedestrian signals are accessible and understandable to people with vision disabilities and others who rely on non-visual cues.
- **Shorter Signal Cycle Lengths in Pedestrian-Oriented Areas**
  Shorter cycle lengths should be used in pedestrian-oriented areas to reduce wait times, discourage noncompliant crossings, and improve pedestrian comfort.

DESIGN REQUIREMENTS

Pedestrian signal strategies shall be coordinated with intersection geometry, curb radii, crosswalk placement, and speed management measures to reinforce safe and predictable behavior. Signal operations shall clearly assign right-of-way and should minimize conflicts between pedestrians and turning vehicles. Where pedestrian safety or compliance concerns are identified, signal operations should be monitored and may be adjusted as needed.

Practitioners shall consult the following sources for more detailed guidance on pedestrian signal indications, timing, accessibility, and traffic control:

- **Manual on Uniform Traffic Control Devices (MUTCD)**
- **FHWA Signal Timing Manual**
- **FHWA Proven Safety Countermeasures**
- **NACTO Urban Street Design Guide**
- **Public Rights-of-Way Accessibility Guidelines (PROWAG) and ADA Standards**

5.3 Roundabouts & Traffic Circles

Roundabouts are intersections that direct vehicles counterclockwise around a central island. Compared with conventional signalized intersections, roundabouts reduce conflict points and crash severity, encourage slower speeds, and eliminate the need to operate and maintain traffic signals.

The design of roundabouts is highly contextual, but some features and characteristics are shared by most roundabouts, such as:

- **Center Island –** an area in the center of the roundabout, delineated by paint or curbs, which traffic circulates around
- **Splitter Islands –** may provide shelter for pedestrians, control vehicular speeds, and guide vehicles into and out of the roundabout. These are also delineated by paint, curbs, or a combination of the two
- **Signage –** warns users that they are approaching a roundabout and shows how to use it. Signs that can be used for any roundabout include YIELD signs at the entrances (required), roundabout warning signs at all approaches (optional), and pedestrian crossing warning signs at crosswalks (optional)
- **Inscribed Circle Diameter (ICD) –** the distance across the circle inscribed by the outer edge of the circular roadway. This characteristic, along with the diameter of the center island is dictated by the design vehicle which will be accommodated by the roundabout.

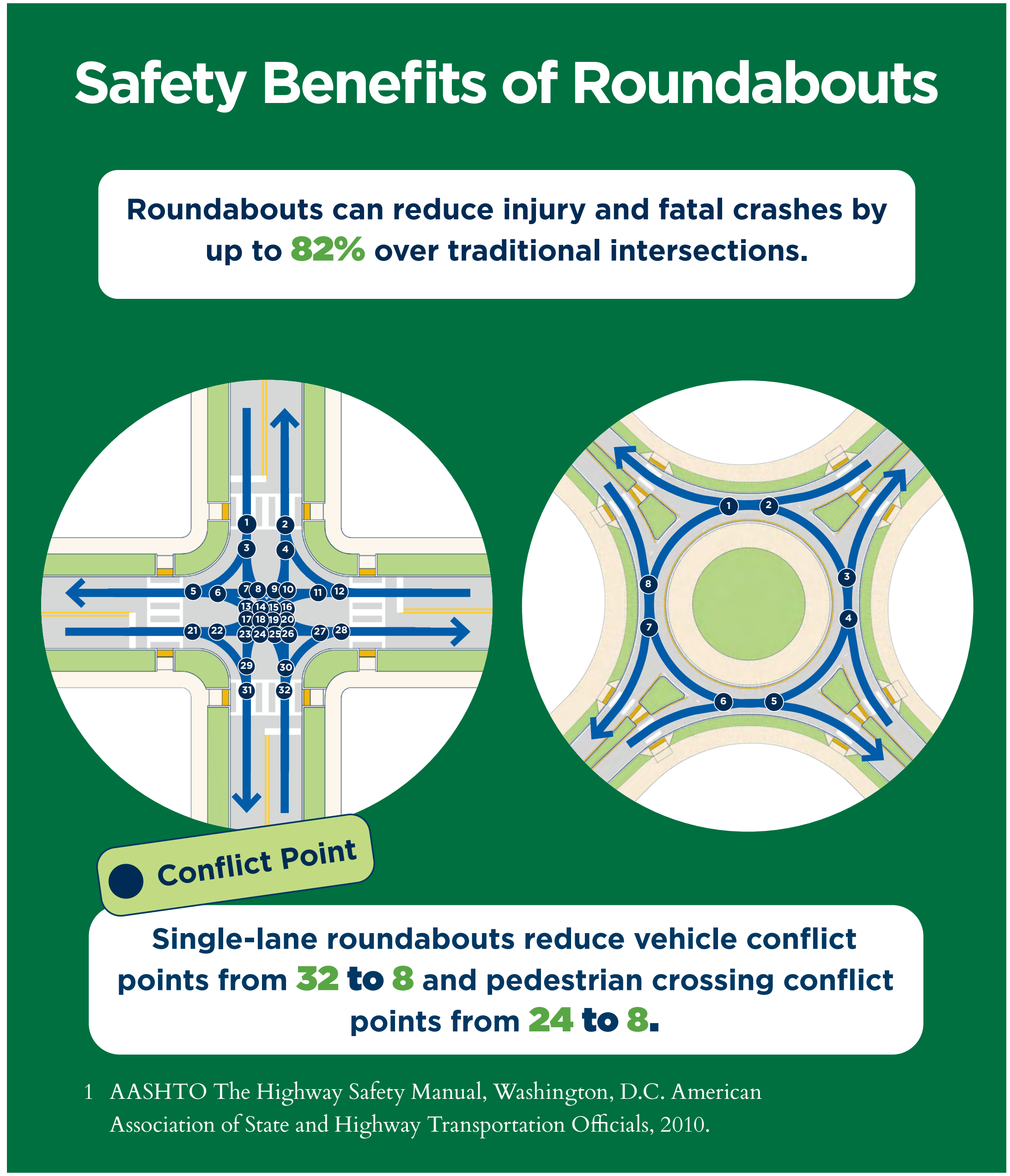


FIGURE 5-12 Safety Benefits of Roundabouts

5.3.1 Roundabout Types

Roundabouts vary in type based on their size, design features, and operational characteristics, as summarized in Table 5-4. The table identifies five types of circular intersections or roundabouts and their typical characteristics. These characteristics can help inform the selection of appropriate roundabout types for new construction as well as for retrofitting existing intersections. These values are not definitive, as various factors influence the selection and design of circular intersection types.

Practitioners should consult the NCHRP Roundabout Guide Reports 1043 for further guidance on roundabout types, design considerations, and design features depending on the anticipated traffic volumes, adjacent land uses, and intersecting street widths.

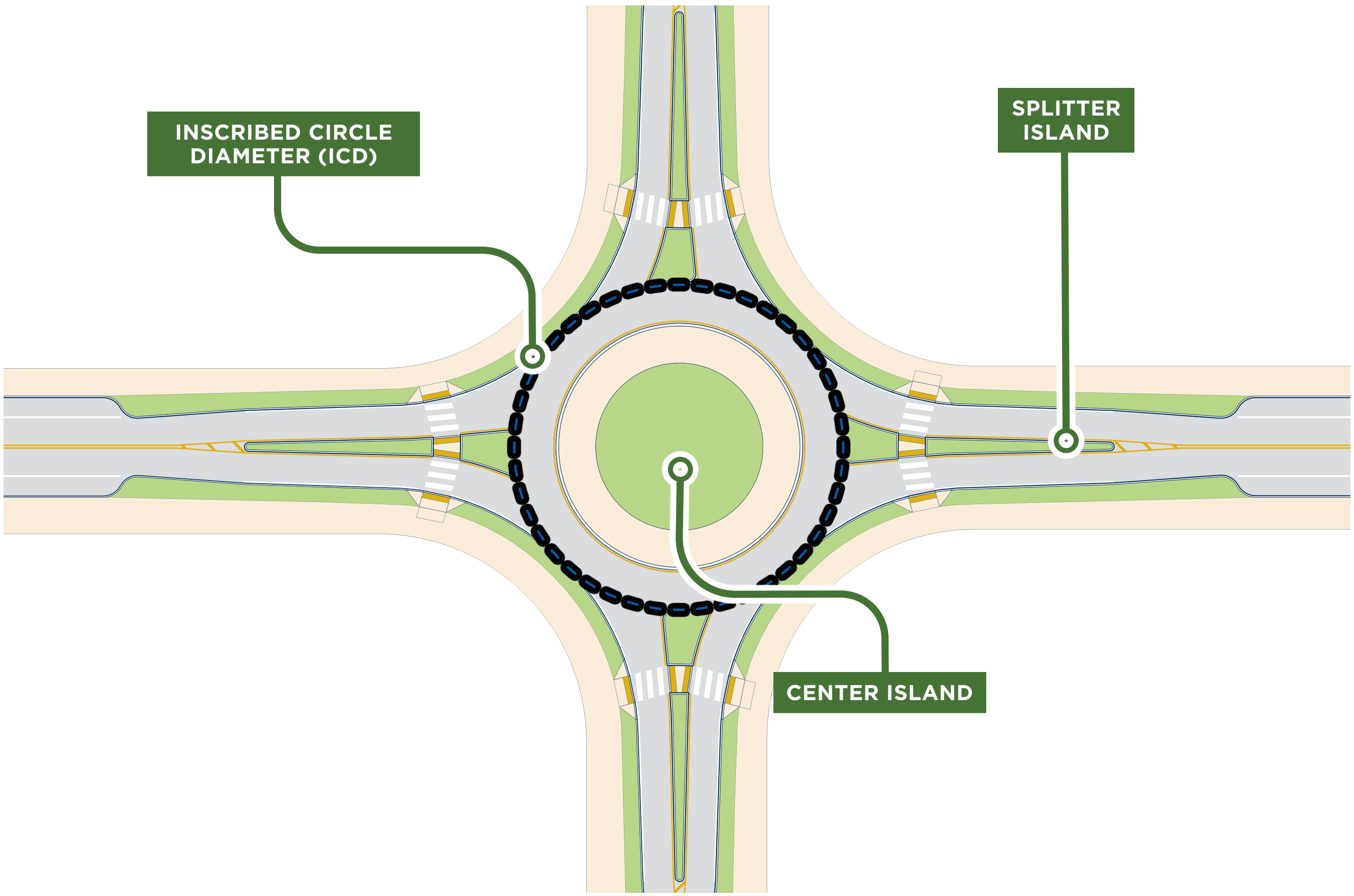


FIGURE 5-13 Typical Roundabout Features

TABLE 5-4 Circular Intersection Types and Characteristics

Roundabout Or Intersection Type	Target Circulating Speed	Context Description	Number Of Proposed Vehicle Circulating Lanes	Maximum Daily Service Volumes	Center Island
Neighborhood Traffic Circles[2]	10 MPH	Low-speed neighborhood streets. Used primarily for traffic calming.[2]	1	6,000	May be traversable
Compact Roundabouts	15 MPH	Low-speed, space-constrained intersections outside neighborhood context. Pedestrian friendly due to short, perpendicular crossings. 2	1	15,000	Traversible
Single Lane Roundabouts	20 MPH (Urban) 25 MPH (Rural)	Higher capacity boulevard and/or avenue intersection. Designed for consistent entry and circulating speeds.	1	20,000	Non-traversable but typically includes truck apron
Multilane Roundabouts	25 MPH (Urban) 30 MPH (Rural)	High-capacity thoroughfare intersection	2+	30,000	Non-traversable but typically includes truck apron
Turbo Roundabouts	25 MPH	Highest capacity thoroughfare intersection	2+	45,000	Non-traversable but typically includes truck apron

Splitter Islands	Bicycle Facility Type	Inscribed Circle Diameter[1]	Additional Considerations	Examples
Traversible with one-stage pedestrian crossing (may not have splitter islands)	Mixed traffic	30 ft to 80 ft	May include entry channelization. If yield-control, evaluate wheel paths for encroachment into parallel pedestrian crossings. Marked crossings may be used to delineate pedestrian routes.	• SE Woodward St / SE 58th Ave (Portland, OR) (Stop-controlled) • NE 47th St / 9th Ave (Seattle, WA) (Yield control)
May be traversible with one-stage pedestrian crossing	Mixed traffic or separated bike facility	80 ft to 100 ft	If the SU-30 is expected to be accommodated with regular frequency, the center island should be fully traversible.	• S Tollgate Rd / • W MacPhail Rd • (Bel Air, MD)
Non-traversible with one-stage or two-stage pedestrian crossing, depending on dimensions of pedestrian refuge	Separated bike facility	100 ft to 130 ft (Urban) 115 ft to 130 ft (Rural)	Space intensive	• Alumni Dr / • University Dr (Lexington, KY)
Non-traversible with two-stage pedestrian crossing	Separated bike facility	150 ft to 180 ft (Urban) 180 ft to 200 ft (Rural)	Space intensive	• Carmel Dr / • Rangeline Rd • (Carmel, IN)
Non-traversible with two-stage pedestrian crossing	Separated bike facility	150 ft to 200 ft	Space intensive. Requires clear wayfinding.	• University Blvd / Merrill Rd / Dolphin Dr (Jacksonville, FL)

NOTES

1 ICD values should not be used as design constraints or targets. All roundabout designs must be tested with the appropriate design vehicle template(s) to ensure adequate movement is possible.

2 Commonly implemented in retrofit projects.

DEFINITIONS

- **Retrofit:** No changes to existing hardscape
- **Traversable Elements:** Elements that act as channelization for a design vehicle but are able to be driven over by larger vehicles
- **Non-traversable Elements:** Elements that act as channelization for all vehicles and which cannot be driven over.
- **One-Stage Pedestrian Crossing:** Pedestrian crossing where the splitter island does not provide adequate refuge for the user to cross each direction of traffic in its own stage
- **Two-Stage Pedestrian Crossing:** Pedestrian crossing where the splitter island provides adequate refuge for the user to cross each direction of traffic in its own stage
- **Inscribed Circle Diameter (ICD):** The distance across the circle inscribed by the outer edge of the circulatory roadway
- **Separated Bike Facility:** A bike facility which is separated from vehicular traffic. Separation can be achieved by vertical elements such as curbs or barriers and/or hardscape elements such as buffers or tactile directional surfaces.

5.3.2 Neighborhood Traffic Circles

Neighborhood traffic circles combine intersection control with traffic calming, typically along lower-volume neighborhood streets. They help to manage vehicle speeds, minimize conflicts and crash severity, and discourage cut-through traffic. They require drivers on all legs of the intersection to manage speeds (both on the primary and secondary street) and can be installed retroactively within the existing curb line. Neighborhood traffic circles often incorporate landscaping and neighborhood identity features.

DESIGN GUIDANCE

- Neighborhood traffic circles are preferred on residential streets with average daily traffic volumes below 6,000 vehicles per day.
- Traffic circles are most effective when implemented at the corridor-level, rather than as isolated treatments.
- Traffic circles shall be fully mountable.

DESIGN REQUIREMENTS

- A minimum clearance of 16 feet shall be provided between each intersection corner curb return and the edge of the center island.
- The center island shall be sized and shaped to require horizontal deflection of all vehicle movements, reinforcing low operating speeds.
- Neighborhood traffic circles shall use mountable curbs for the center island to allow encroachment by large design vehicles.
- Traffic control shall be MUTCD-compliant including appropriate advance warning signage and yield control.
- Directional signing and pavement markings shall be installed in accordance with MUTCD requirements for circular intersections.

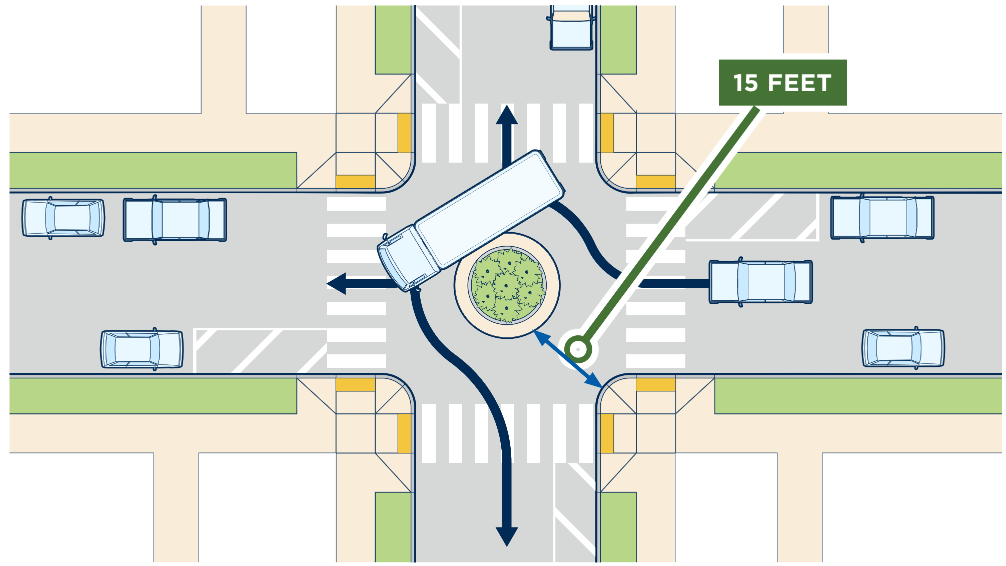


FIGURE 5-14 Neighborhood Traffic Circle

5.3.3 Compact Roundabouts

Compact roundabouts share many of the safety and operational characteristics of single-lane roundabouts but are more compact in size. Their smaller footprint is made possible by providing fully traversable center islands and splitter islands to accommodate design and control vehicles in tighter conditions. Their primary applications include lower-volume urban and residential streets where space limitations make single lane roundabouts infeasible.

DESIGN GUIDANCE

- Compact roundabouts are suitable for intersections with up to 15,000 vehicles per day (VPD).
- Entry and circulating speeds should be designed for approximately 15 mph.
- Inscribed Circle Diameter (ICD) may range from 80 to 100 feet.
- Crosswalk setbacks should be at least 20 feet from the yield line for visibility.
- Cyclists are expected to merge with vehicle traffic in the circulating lane.

DESIGN REQUIREMENTS

- A minimum clearance of 16 feet shall be provided between each intersection corner curb return and the edge of the center island.
- Center islands may be painted, textured, or slightly raised and shall not contain vertical obstructions. Center islands shall include reflective materials and be adequately illuminated to ensure nighttime visibility.
- Splitter islands may be traversable, with one-stage pedestrian crossings. Traversable splitter islands, or non-traversable splitter islands less than six feet in width, shall not be used for pedestrian refuge.
- Directional signing and pavement markings shall comply with MUTCD requirements

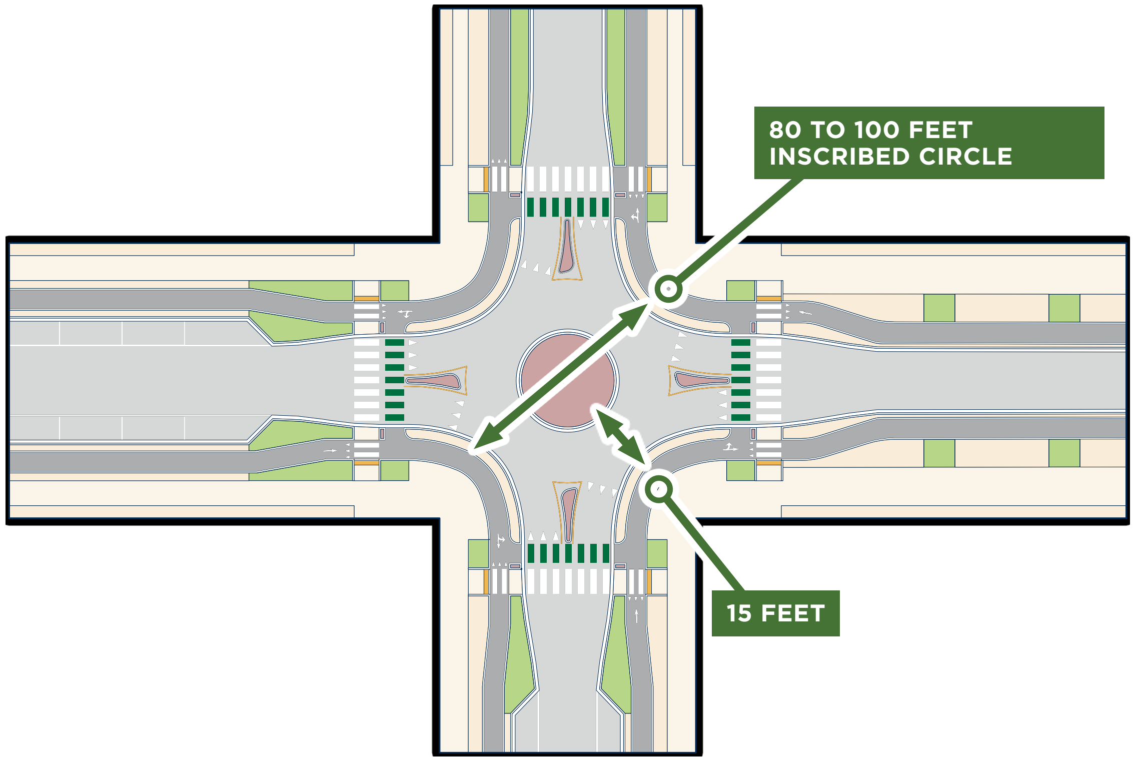


FIGURE 5-15 Typical Compact Roundabout

5.3.4 Single-LaneRoundabouts

Single-lane roundabouts have one entry lane and one circulating lane on each approach. These full-size roundabouts include non-traversable center islands and splitter islands to control speeds and provide refuge for pedestrians. Their larger footprint accommodates moderate traffic volumes and larger vehicles, and they are suitable in both urban and suburban settings.

DESIGN GUIDANCE

- Single-lane roundabouts can accommodate intersecting street volumes up to 20,000 vehicles per day
- The inscribed circle diameter (ICD) typically ranges from:
- 100 to 130 feet in urban settings
- 115 to 130 feet in rural settings
- Generally, movements for large design vehicles should be verified using vehicle turning templates or vehicle tracking software
- Locations that cannot accommodate the ICD of a single-lane roundabout may consider the compact roundabouts (see Section 5.3.3).

DESIGN REQUIREMENTS

- One entry lane and one circulating lane shall be provided per approach.
- Center islands shall be non-traversable, except for truck aprons where necessary for control vehicles.
- Center island landscaping shall not obstruct sight lines.
- Splitter islands shall be raised, non-traversable, and provide a minimum pedestrian refuge of 6 feet (8 feet preferred)
- Entry speed shall not exceed 25 mph, with circulatory speed not to exceed 20 mph, and exit speed not to exceed 25 mph, per NCHRP Report 1043
- Traffic control devices shall conform to the MUTCD
- Pedestrian facilities shall comply with PROWAG and ADA
- Pedestrian crossings shall be located 20–25 feet from vehicular yield lines for added visibility
- Sidepaths for bicyclists shall be located outside of the circulating vehicle lanes
- Sight distance and deflection angle criteria shall be met to ensure that vehicles yield at entry and circulate at low speeds

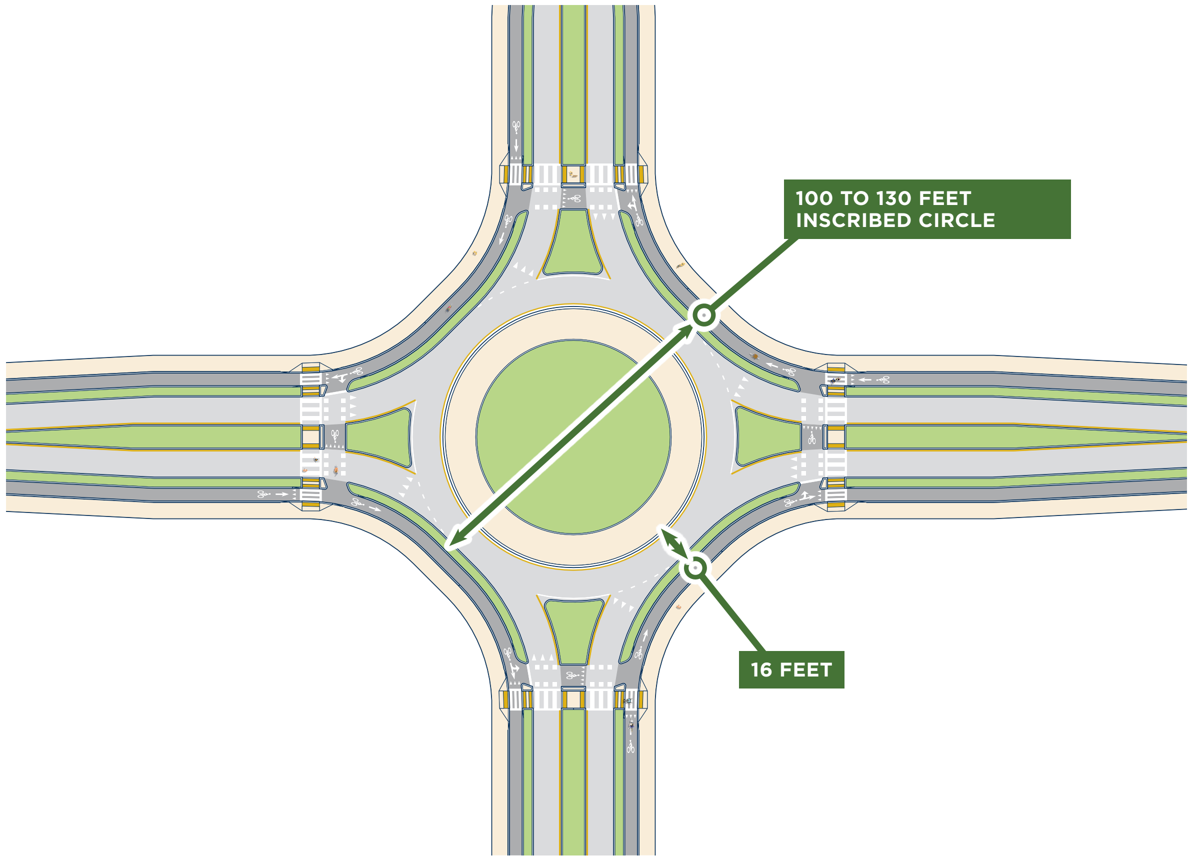


FIGURE 5-16 Typical Single-Lane Roundabout

5.3.5 Multilane Roundabouts

Multilane roundabouts with two or more circulating lanes are designed to accommodate larger traffic volumes and/or greater turn demands than single-lane roundabouts. Their entrances are wider than single lane roundabouts and they generally have higher circulating speeds. Their larger size and complexity requires additional considerations for providing safe routes for bicyclists and accessible crossings for pedestrians. Proper design, signage, and lane markings are essential to maintain lane discipline and reduce conflict points between users.

DESIGN GUIDANCE

- Multilane roundabouts are suitable for intersections with volumes up to 30,000 vehicles per day (VPD). In some cases, simulation modeling may demonstrate capacity for higher volumes.
- The inscribed circle diameter (ICD) typically ranges from:
  - 150 to 180 feet in urban environments
  - 180 to 200 feet in rural environments
- Entry and circulating speeds should generally be designed for:
  - ≤ 25 mph in urban areas
  - ≤ 30 mph in rural areas
- Lane guidance and assignment signage (in accordance with the MUTCD) should be installed in advance of the roundabout to direct drivers into the correct lane prior to entry.
- Spiral markings may be used within the circulating lanes to reinforce proper lane behavior and minimize weaving.
- Turbo roundabouts, a subtype of multilane roundabout with spiral lane geometry and physical separators (e.g., raised curbs), may be used where greater capacity or lane discipline is needed (see **Section 5.3.6**).
- Pedestrian crossings must account for longer crossing distances and multi-lane exposure to vehicles. Enhanced crossing treatments should be considered including:
  - Raised crossings
  - Rectangular Rapid Flashing Beacons (RRFBs)
  - Pedestrian Hybrid Beacons (PHBs)
  - Signalization or stop control
- Bicyclists should be accommodated via separate facilities (e.g., shared-use paths or protected bike lanes) with signage and pavement markings providing guidance in advance of any bicycle facility transitions.

DESIGN REQUIREMENTS

- Multilane roundabouts have two or more circulating lanes shall provide entry geometry designed to promote speed control and safety.
- The roundabout shall accommodate large design vehicles, verified through turning templates and swept path analysis.
- Splitter islands shall be non-traversable, providing minimum pedestrian refuge of 6 feet (8 feet preferred), and aligned with ADA-compliant curb ramps and detectable warnings.
- The central island shall include a truck apron with mountable curbs, designed to support semi-trailer off-tracking while discouraging use by passenger vehicles.
- Traffic control and lane assignment signage shall comply with MUTCD, including:
  - Advance lane use signs
  - Pavement arrows and spiral markings within circulating lanes
  - Yield signs and Roundabout Circulation plaques (R6-5P) at each entry
- All pedestrian facilities shall comply with PROWAG and ADA requirements, including:
  - A continuous accessible route with detectable warnings
  - Sufficient crossing time, where signals are used
- Roundabout lighting shall meet AASHTO illumination standards to ensure nighttime visibility of all crossings and circulating movements.

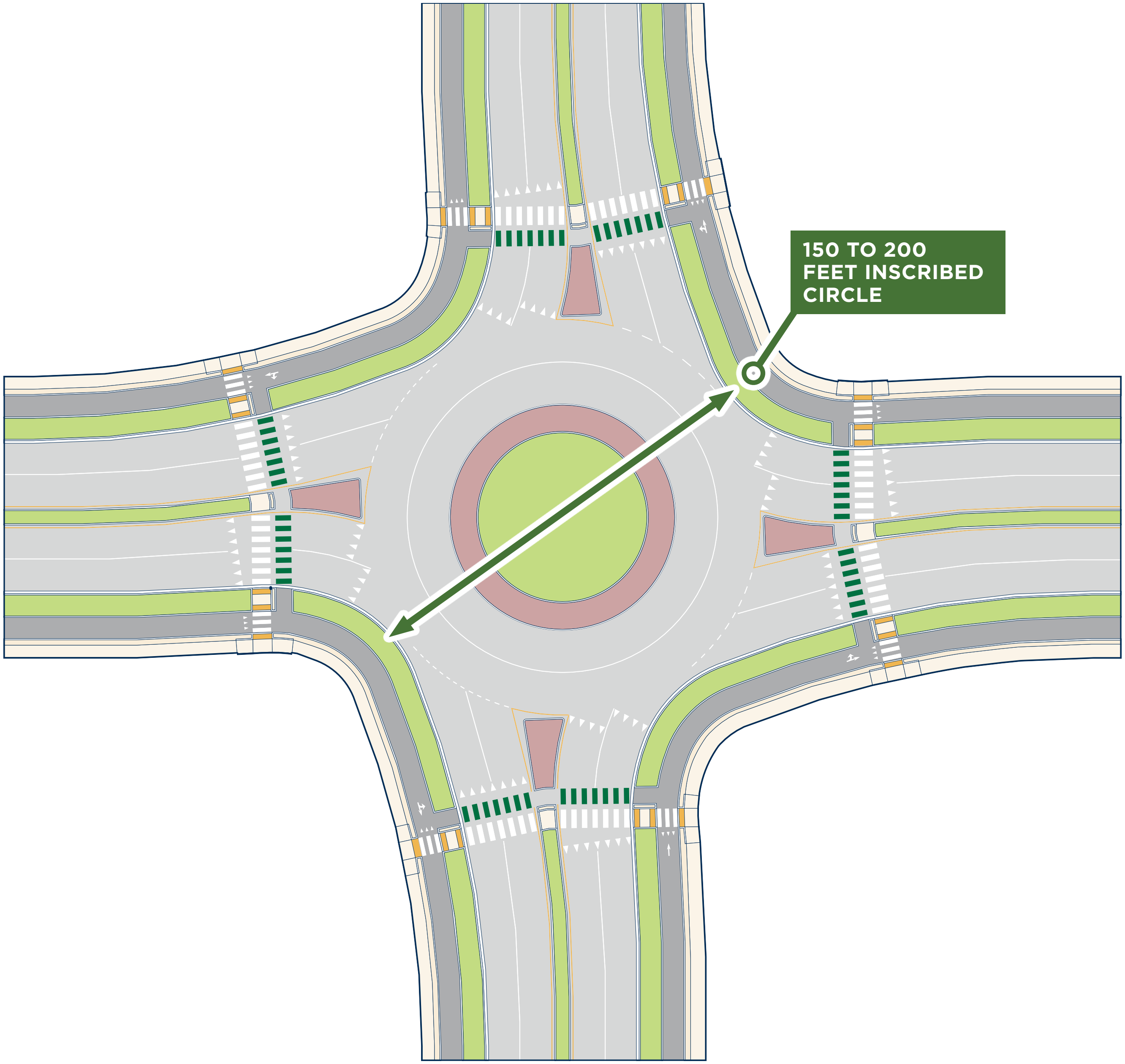


FIGURE 5-17 Typical Multilane Roundabout

5.3.6 Turbo Roundabouts

Turbo roundabouts are multilane roundabouts that use spiral lane geometry and physical channelization (e.g. raised curbs within the circle) to eliminate lane changing and reinforce proper usage. Drivers are assigned to a specific lane in advance of entry and are guided directly to their intended exit. This design reduces weaving conflicts, improves operational efficiency, and increases vehicular capacity compared to conventional multilane roundabouts. Turbo roundabouts are most appropriate at higher-volume intersections where right-of-way is available and where maintaining lane discipline is critical to safety and performance.

DESIGN GUIDANCE

- Turbo roundabouts are generally appropriate for intersections with traffic volumes up to approximately 45,000 vehicles per day (VPD), subject to operational analysis.
- Inscribed Circle Diameter (ICD) typically ranges from 150 to 200 feet, depending on approach geometry, lane configuration, and design vehicle requirements.
- Entry and circulating speeds should be designed for approximately 25 mph to balance safety and operational efficiency.

DESIGN REQUIREMENTS

- Turbo roundabouts shall use raised, mountable lane dividers within the circle to prevent lane changes.
- A mountable truck apron shall be provided to accommodate off-tracking by large vehicles, verified using turning templates and swept path analysis, while discouraging use by passenger vehicles.
- Spiral lane geometry must guide vehicles continuously from entry to exit, minimizing driver decision points within the roundabout.
- Advance lane assignment signage and pavement markings shall be used to clearly direct drivers into the correct lane prior to entry.
- Splitter islands shall be raised and non-traversable, providing a minimum 6-foot pedestrian refuge (8 feet preferred).
- The following shall comply with the MUTCD:
    - Advance warning signs
    - Lane assignment signs
    - Pavement markings
    - Yield signs and roundabout circulation plaques
- Enhanced pedestrian crossing treatments are required due to longer crossing distances and multi-lane exposure to vehicles. These may include:
    - Raised crossings
    - Rectangular Rapid Flashing Beacons (RRFBs)
    - Pedestrian Hybrid Beacons (PHBs)
    - Signalization or stop control
- All pedestrian facilities shall comply with ADA and PROWAG requirements, including accessible curb ramps, detectable warnings, and continuous accessible routes.
- Bicyclists shall be accommodated via separate facilities (e.g., shared use paths or protected bike lanes) with signage and pavement markings providing guidance in advance of any bicycle facility transitions.
- Roundabout lighting shall meet AASHTO roadway illumination standards to ensure visibility of lane dividers, crossings, and circulating traffic.

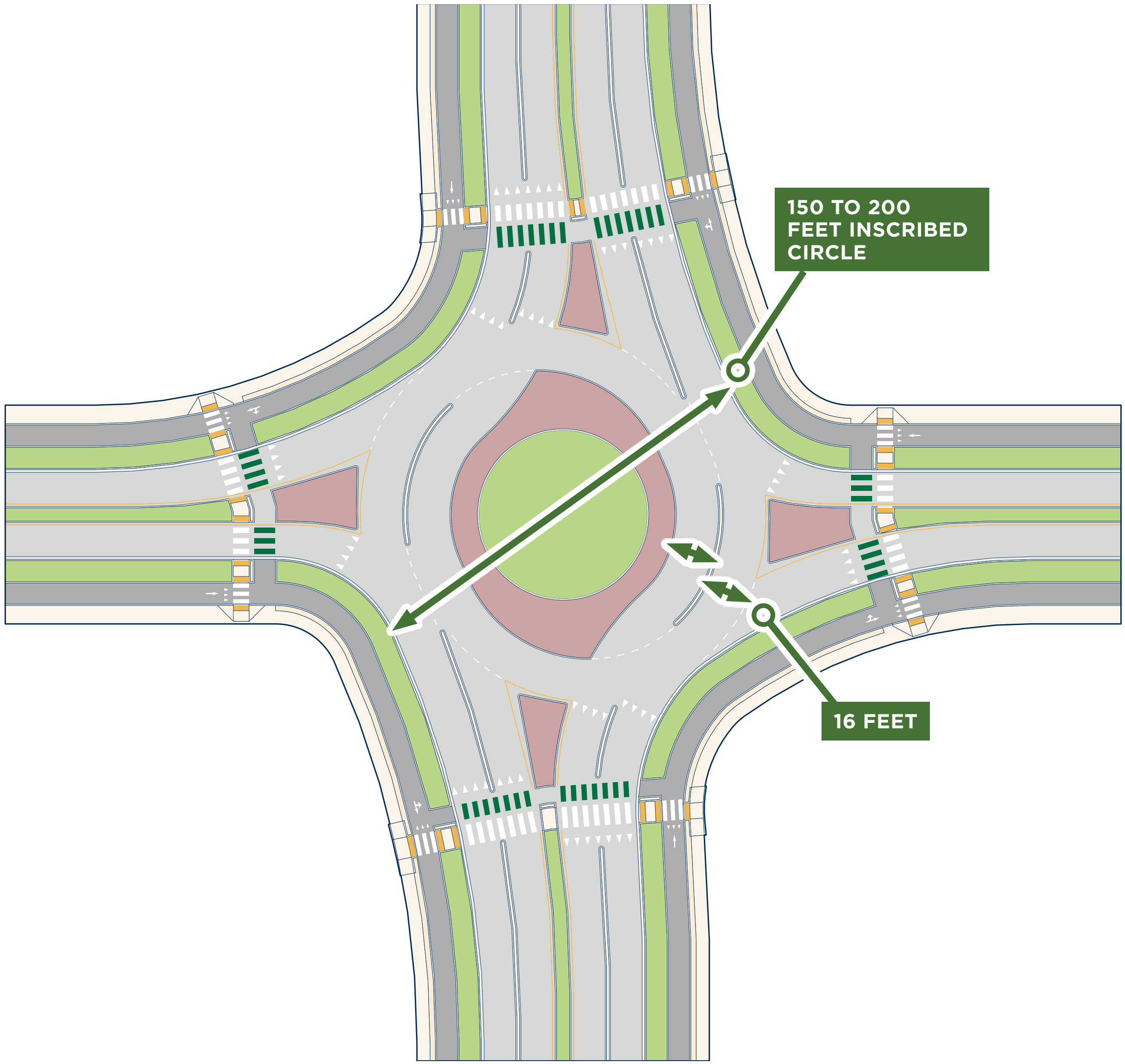


FIGURE 5-18 Typical Turbo Roundabout

5.3.7 Pedestrian and Bicycle Considerations

Roundabouts and traffic circles improve safety for pedestrians and bicyclists by reducing vehicle speeds and eliminating high-severity crash types that are more common at traditional intersections. For example, roundabouts with splitter-islands allow pedestrians to cross one direction of traffic at a time, a proven design strategy to reduce pedestrian crashes. However, circular intersections can present some challenges for pedestrians, such as finding an adequate crossing gap when there are higher traffic volumes. Pedestrians with vision impairments, who rely on audible stop-and-go traffic cues, may also have trouble discerning when it is clear and safe to cross. Bicyclists can likewise experience discomfort if vehicular speeds within roundabouts are too high, if there are multiple circulating travel lanes, or if vehicular weaving between lanes is frequent. Therefore, roundabout design must carefully consider bicycle and pedestrian movements while simultaneously reinforcing predictable, low speed vehicular movements.

DESIGN REQUIREMENTS

- Designers shall select bicycle and pedestrian treatments that minimize conflicts, reinforce low operating speeds, and provide predictable, accessible crossings.
- Roundabouts shall meet ADA and other applicable accessibility requirements.
- People with vision disabilities often rely on audible cues from vehicles starting and stopping; these cues are less distinct at roundabouts. Thus, roundabouts shall include applicable design features to improve pedestrian predictability, alignment, and detection at crossings, including the following:
  - Approach and exit geometry shall be designed to achieve low operating speeds and improve yielding behavior.
  - Pedestrian crossings shall be well-defined and located at perpendicular crossing angles where practicable.
  - Crosswalks should be set back from the yield line to reduce conflicts with circulating traffic and improve driver yielding.
  - If splitter islands provide a pedestrian refuge, they shall include accessible connections between ramps and the refuge area.
  - Walkway edges shall be continuous and clearly defined to support wayfinding and discourage informal crossing paths.
  - Detectable warning surfaces shall be provided at curb ramps and crossing points.
  - High-visibility crosswalk markings shall be provided at all pedestrian crossings.
  - Pedestrian-scale lighting should be provided where nighttime pedestrian activity is expected or where visibility is a concern.
  - Design shall discourage unpredictable pedestrian crossing locations by using consistent sidewalk alignments and, where needed, physical cues such as landscaping, fencing, railings, or other edge treatments.
  - Where crossings cannot be aligned perpendicular due to constraints, curbing or other alignment cues should be used to reinforce the intended crossing direction.
- Bicycle accommodation shall be based on the roundabout type and operating speed:
  - At mini roundabouts, bicyclists are typically expected to merge and circulate with motor vehicles.
  - At single-lane roundabouts, bicyclists may circulate in-lane at low speeds; where separated facilities are provided, bicycle transitions shall be clearly signed and marked.
  - At multilane and turbo roundabouts, bicyclists shall be accommodated on a separate facility (e.g., shared use path or separated bikeway) with clear transitions in advance of the roundabout.

5.3.8 General Requirements

5.3.8.1 Standards for New Development

Roundabouts and traffic circles are the default intersection treatments for all new streets, as outlined in Table 5-5, with the following exception:

- A stop-controlled intersection with **Curb Extensions** (see **Section 6.3.3.1**) or stop-controlled **Raised Intersection** (see **Section 6.3.2.4**) are permitted where two **Neighborhood Streets** intersect provided that a **Neighborhood Traffic Circle** is provided at a minimum of every third intersection.

Where multiple roundabout types are listed in Table 5.B, practitioners shall reference Table 5.A and consult the **NCHRP Roundabout Guide Report 1043** (or newer) to select the most appropriate roundabout type based on anticipated traffic volumes, adjacent land uses, and intersecting street width.

TABLE 5-5 Default Intersection by Street Type

Stree Type Intersections	Neighborhood	Avenue	Boulevard	Thoroughfare	Alley
Neighborhood	Neighborhood Traffic Circle, Compact Roundabout, Stop Controlled with Curb Extension, Raised Intersection	Compact Roundabout, Single-lane Roundabout	Single-lane Roundabout, Multi-lane Roundabout, Turbo Roundabout	N/A	Stop Controlled with Curb Extension
Avenue		Single-lane Roundabout	Single-lane Roundabout, Multi-lane Roundabout, Turbo Roundabout	Turbo Roundabout	Stop Controlled with Curb Extension
Boulevard			Single-lane Roundabout, Multi-lane Roundabout, Turbo Roundabout	Turbo Roundabout	N/A
Thoroughfare				Turbo Roundabout	N/A
Alley					Stop Controlled with Curb Extension

5.3.8.2 Standards for Redevelopment and Street Retrofits

- Roundabouts and traffic circles are the default intersection type for all existing streets improved through redevelopment or capital improvement projects if site conditions and traffic volumes meet the criteria for roundabout implementation.

5.3.8.3 Design Requirements

- Roundabout design shall meet **NCHRP Roundabout Guide Report** 1043 (or newer) guidelines. Design calculations shall be documented and approved by the **Division of Engineering**.
- Refer to the **AASHTO Green Book, AASHTO Guide for the Development of Bicycle Facilities,** and **NACTO Urban Street Design Guide** for additional guidance on roundabout design.
- Controlling vehicular speeds through the roundabout is critical. The center island and turning radius of roundabouts must be sized to promote slower speeds while still accommodating the design and control vehicles. Fastest path calculations should be performed during the design phase to ensure that entry and circulating speeds fall within the desired range.

5.4 Pedestrian Crossing Elements

5.4.1 Crosswalks

Crosswalks are essential to a safe, pedestrian-friendly street network. They provide designated spaces for pedestrians to cross streets at intersections, midblock locations, and high-volume driveways. Marked crosswalks alert drivers to the presence of pedestrians, reinforce legal crossing priority, and support safer, slower turning movements. Crosswalks may be paired with additional treatments (e.g., curb extensions, median refuges, or pedestrian signals) to further improve visibility and to reduce pedestrian exposure and potential conflicts.

Crosswalk marking types include:

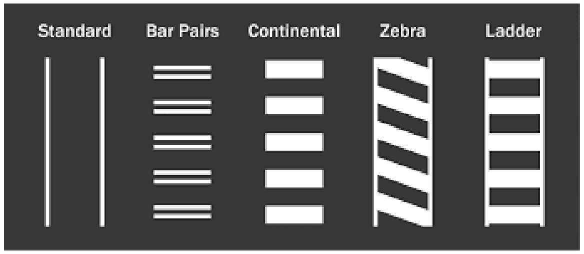


FIGURE 5-19 Crosswalk Marking Types

DESIGN REQUIREMENTS

- Continental crosswalk markings are the default crosswalk treatment for local and state roadways within Lexington.
- Crosswalks and corresponding ramp construction shall conform to both the MUTCD and PROWAG.
- Crosswalks shall be a minimum of 6 feet in width in residential zones and a minimum of 8 feet in commercial, industrial or mixed-use zones.
- High visibility (i.e. enhanced crosswalk) markings shall be used in all locations with the exception of decorative crosswalks made of alternative materials such as brick pavers.
- Stop bars shall be placed a minimum of 4 feet in advance of crosswalks.
- Motor vehicle parking shall be restricted within 20 feet of crosswalks to provide adequate sight distance.
- Signage, paint, curb extensions or other strategies may be used to daylight crosswalks, depending on the context.

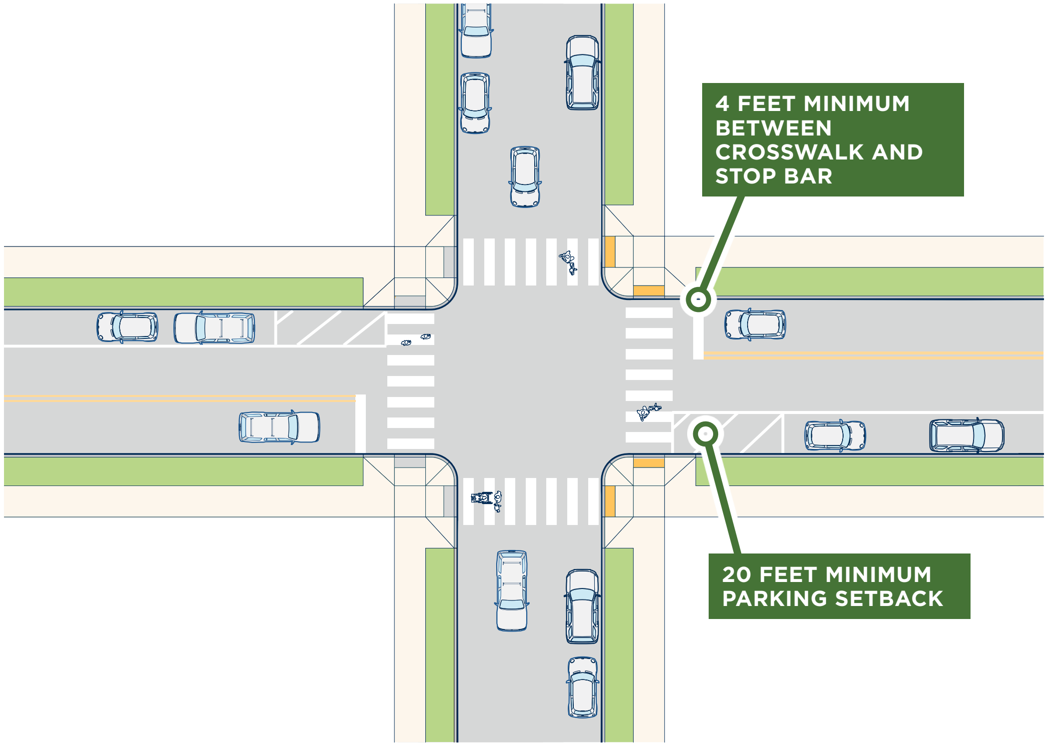


FIGURE 5-20 Crosswalk Placement

5.4.2 Curb Ramps

Curb ramps along sidewalks and at intersections are required to provide accessible travel routes for all people, including people with physical disabilities. They also benefit people who are pushing strollers, small children riding bikes and trikes, or people pulling suitcases and other objects with wheels.

DESIGN REQUIREMENTS

- ADA-compliant curb ramps are required wherever there are vertical changes along a Pedestrian Access Route (PAR) including at intersections, at midblock crossings, and where sidewalks cross driveways at street level.
- Curb ramp design shall comply with PROWAG and the MUTCD for all design elements.
- Curb ramps that are perpendicular to pedestrian crossings are required along all new and retrofitted streets.
- Curb ramp widths shall match sidewalks widths to the greatest extent possible and shall be a minimum of 5 feet.

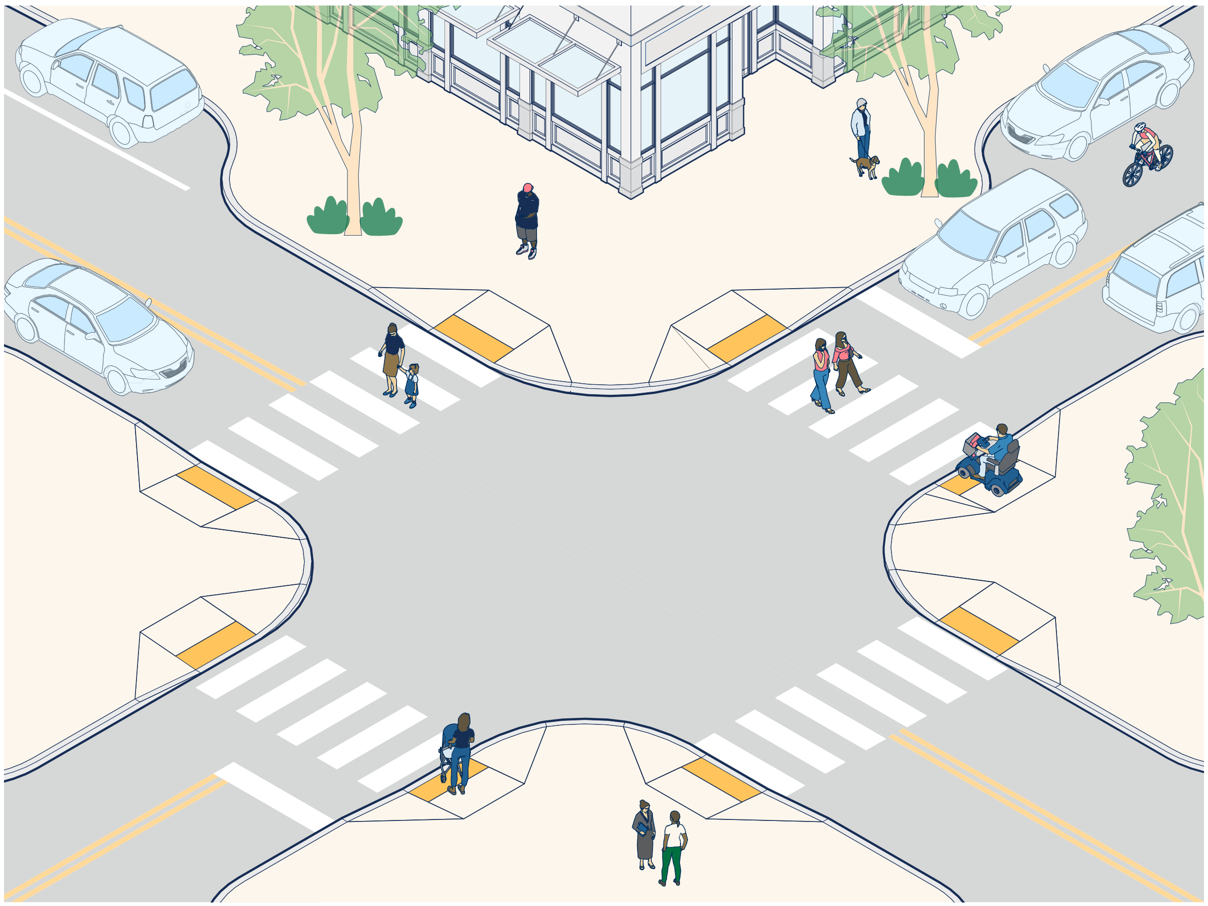


FIGURE 5-21 Curb Ramps

5.4.3 Uncontrolled Pedestrian Crossings

Uncontrolled crossings do not have traffic control devices that require vehicles to stop in advance of pedestrian crossings (i.e. traffic signals or stop signs). Uncontrolled crossings may be present at intersections with marked crosswalks (with painted crosswalk lines) or unmarked crosswalks (legal crossings with no painted crosswalk lines). Uncontrolled crossings may also occur where marked crosswalks are provided mid-block without stop control devices. Under Kentucky law, both marked crosswalks and unmarked crosswalks at intersections are legal places for pedestrians to cross the roadway, and drivers are required to yield to pedestrians in these crossings.

5.4.3.1 Uncontrolled Crossing Enhancements

Uncontrolled crossings do not inherently pose a safety risk. Many function safely due to low traffic volumes, low vehicle speeds, and high driver yielding behavior. However, uncontrolled crossings should be periodically monitored especially when traffic conditions, adjacent land uses, or pedestrian volumes change.

Additional treatments such as enhanced signage, markings, or pedestrian-activated devices may be warranted at uncontrolled crossings with:

- Lower rates of yielding or stopping compliance by motorists
- Poor sight lines for both pedestrians and motorists
- Excessive vehicle speeds
- Absence of crossing infrastructure (e.g. markings, refuge islands)
- Pedestrians having to cross multiple lanes of traffic

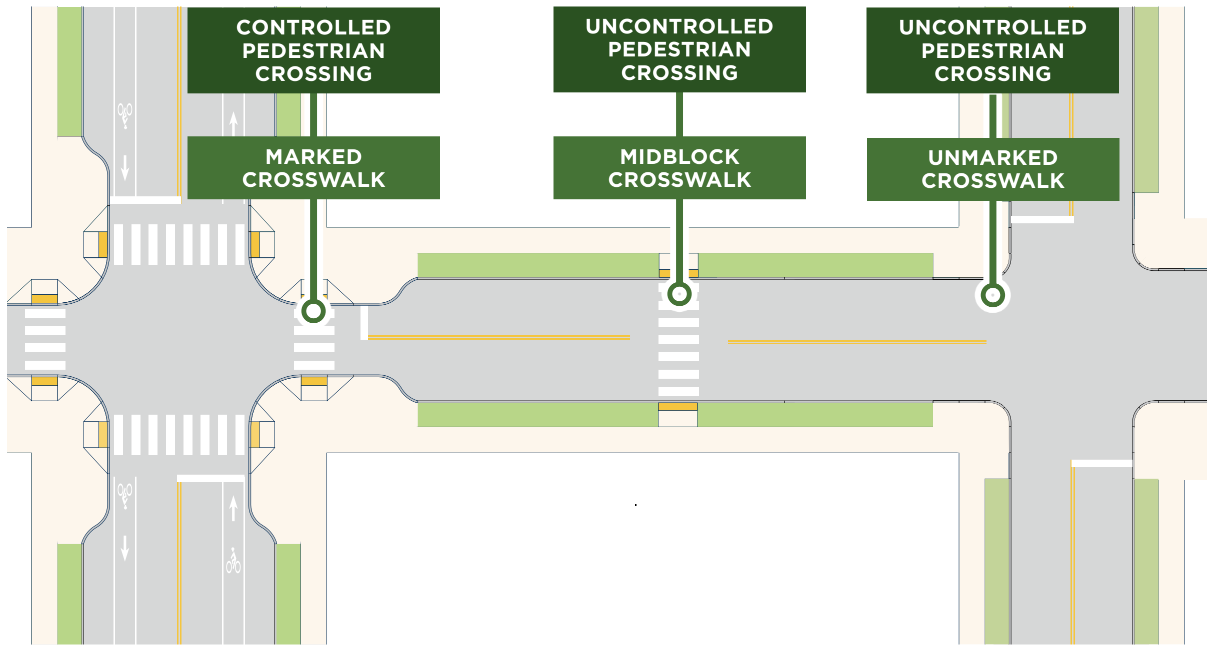


FIGURE 5-22 Controlled vs. Uncontrolled Crossings

DESIGN REQUIREMENTS

Engineering judgement and crash data should inform whether one or more of the following interventions are warranted. Practitioners should consult the FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations for additional guidance.

- Improve crosswalk visibility (pavement markings, signage, lighting) – See MUTCD
- Raised crosswalks - Section 6.3.2.3
- Raised intersections - Section 6.3.2.4
- Speed management techniques - Chapter 6
- Daylight crossings (parking restrictions, curb extensions) - Section 6.3.3.1
- Rectangular Rapid Flashing Beacons – Section 5.4.3.2
- Consider stop control treatments – Section 5.2.1

5.4.3.2 RectangularRapidFlashingBeacons (RRFBs)

- A Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian-activated, high-intensity flashing beacon designed to increase driver awareness and yielding at unsignalized marked crosswalks. RRFBs are characterized by their unique rectangular shape, high brightness, and rapid flashing pattern.

LOCATION STANDARDS

- Should be used at unsignalized, marked crossings where added visibility is needed such as trail crossings, school zones, and mid-block crossings.
- Not permitted at locations already controlled by stop signs, yield signs, or traffic signals.
- Required at multilane roundabout crossings, per MUTCD guidance.

DESIGN REQUIREMENTS

- Must be installed on both sides of the roadway, directly below the pedestrian crossing sign (W11-2) and above the downward arrow plaque (W16-7P)
- Must be placed on medians if a refuge island is present (instead of the far side of the crossing)
- Must provide pedestrian-activation or automated detection and must remain dark when not in use
- Shall be ADA-compliant, including audible and tactile indicators for visually impaired users
- Shall include high-visibility crosswalk markings
- Refer to the MUTCD for complete installation, activation, and design requirements

FIGURE 5-23 Rectangular Rapid Flashing Beacon (RRFB)

5.4.4 Controlled Pedestrian Crossings

Controlled pedestrian crossings are governed by a traffic control device such as a stop sign, traffic signal, or pedestrian hybrid beacon (PHB).

Evaluations of controlled pedestrian crossings should follow criteria established in the MUTCD including pedestrian volumes, roadway speed and width, traffic volumes, and documented safety concerns.

However, traffic signal warrants contained in the MUTCD represent minimum thresholds and shall not be interpreted as the sole basis for signalization decisions. Engineering judgment, safety performance, pedestrian access needs, land use context, and equity considerations should be evaluated using additional guidance from FHWA, NACTO, ITE, and other nationally recognized sources.

DESIGN GUIDANCE

In the context of Complete Streets and multimodal safety goals, local practitioners should also:

- Consider pedestrian demand and desire lines (including observed and latent demand), especially near transit stops, schools, parks, senior housing, and civic institutions.
- Consider barrier effects of wide or high-speed streets that limit safe crossings for pedestrians and people using mobility devices.
- Prioritize connectivity and ensure crossings are spaced to provide direct access and minimize out of direction travel to reach safe crossings.
- Review safety history and risk factors, including vehicle speeds, yielding behavior, and visibility constraints – even if minimum volume thresholds are not met.
- Apply engineering judgment to select appropriate treatments ranging from enhanced markings to RRFBs, PHBs, or full signalization.
- Coordinate with Lextran when pedestrian crossings improve access to high-ridership stops and destinations.

LOCATION STANDARDS

Controlled pedestrian crossing infrastructure shall be provided:

- At all signalized intersections
- At stop-controlled approaches where pedestrian activity is expected
- Mid-block locations as warranted by high pedestrian volumes, site conditions, prior crash history, or anticipated crash risk
- In areas of high pedestrian demand and where vulnerable populations are present (e.g., near schools, senior centers)
- At locations on multilane roads with posted speeds greater than 35 mph
- Where high vehicle speeds or volumes warrant

DESIGN REQUIREMENTS

One or more of the following design features shall be provided at controlled crossings to improve pedestrian visibility and reinforce driver yielding. Practitioners should consult the LFUCG Traffic Engineering Design Manual and the MUTCD for additional guidance.

- **High-visibility crosswalk markings** (e.g., ladder or continental)
- **Countdown pedestrian signals** at signalized intersections
- **Pedestrian Hybrid Beacons (PHBs)** for mid-block crossings on high-volume streets
- **Curb extensions or bulb-outs** to shorten crossing distance and improve visibility
- **Median refuge islands** to facilitate two-stage crossings on wider roads
- **Accessible pedestrian signals (APS)** for visually impaired users
- **Pedestrian-scaled lighting** to improve night-time visibility
- **Leading pedestrian intervals (LPIs)** to give pedestrians a head start before vehicles move
- **Signal phasing** that minimizes conflicts with turning vehicles (e.g., protected turn phases)
- **No-turn-on-red** restrictions where turning vehicles pose a hazard to crossing pedestrians

5.4.4.1 Pedestrian Hybrid Beacon (PHB)

Pedestrian Hybrid Beacons (PHBs) are pedestrian-activated signals located at unsignalized, marked crossings to increase driver awareness and reduce crash risk. When a pedestrian presses the button, the PHB displays a sequence of flashing and steady lights directing drivers to stop.

LOCATION STANDARDS

PHBs are appropriate when a full traffic signal is not warranted, but enhanced pedestrian protection is needed because:

- The roadway has two or more travel lanes
- Posted speeds are 35 mph or higher
- Additional driver awareness is warranted due to nearby schools, parks, trails, or other high pedestrian activity areas
- Design Requirements
- PHB installations shall include the elements listed below. Practitioners should refer to the MUTCD for additional design standards and operational requirements.
- Overhead beacon heads
- "CROSSWALK STOP ON RED" regulatory signage
- High-visibility marked crosswalks
- Pedestrian countdown signals
- Pushbutton detectors in accessible locations

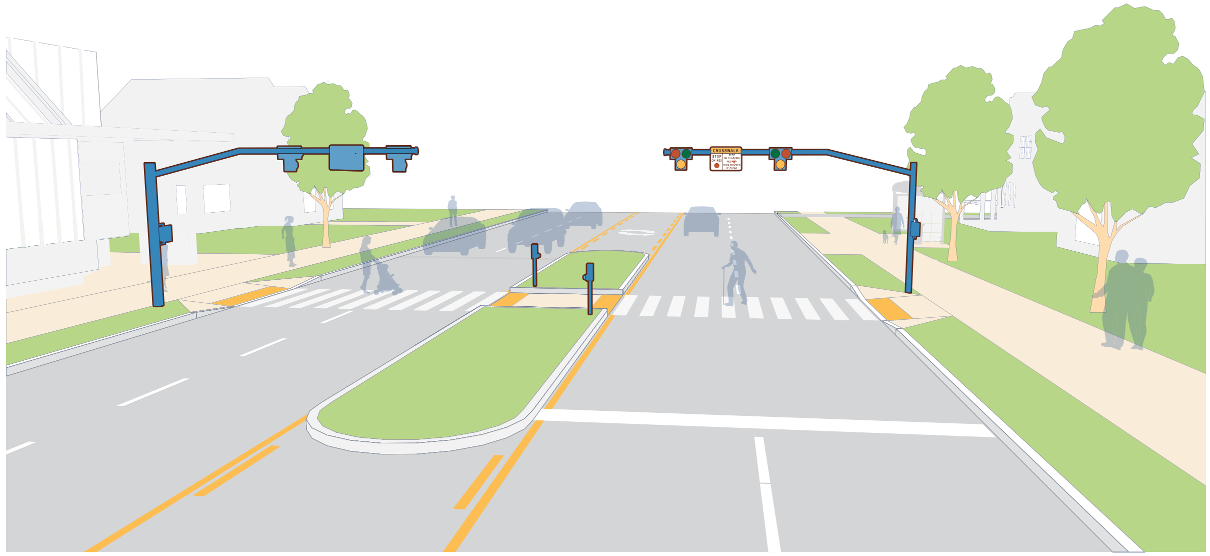


FIGURE 5-24 Pedestrian Hybrid Beacon (PHB)

5.4.4.2 Diagonal Crossings (Pedestrian Scramble / Barnes Dance)

Signalized diagonal crossings, also known as Barnes Dance crossings or pedestrian scrambles, are intersection treatments that stop all vehicular traffic during a dedicated pedestrian phase and allow pedestrians to cross in any direction, including diagonally. They improve pedestrian convenience and reduce pedestrian delay, particularly where high volumes of people are crossing between multiple intersection legs.

LOCATION STANDARDS

Diagonal crossings are most appropriate at the following locations:

- Intersections with high pedestrian volumes and high vehicle volumes—especially where heavy turning movements pose safety risks to pedestrians.
- Downtowns or major activity centers (e.g. universities) with dense pedestrian activity and multi-leg crossings.
- Intersections with frequent conflicts between turning vehicles and pedestrians.
- Locations where pedestrian delay or safety is a known concern.

DESIGN REQUIREMENTS

- Practitioners should refer to the MUTCD for additional design guidance, standards and operational requirements.
- An exclusive pedestrian signal phase must restrict all vehicle movements, including for right turns on red.
- Signage and pavement markings should reinforce the legality of diagonal crossing.
- Pedestrian clearance intervals must be timed to accommodate the longest possible crossing (the diagonal path).
- Accessible Pedestrian Signals (APS) and pushbuttons are required to help pedestrians with visual disabilities navigate the exclusive phase.

FIGURE 5-25 Diagonal Crossing

5.5 Bicycle Facilities at Intersections

Intersections are critical to providing connected bicycle facilities that serve riders of all ages and abilities. Bicycle facility and intersection design should follow three key principles for safe operations:

- Motor vehicle speed minimization at conflict points
- Visibility of all users
- Separation of roadway users

Selecting the preferred intersection treatment for bicycle safety and comfort depends on:

- How an intersection is controlled
- The presence of adjacent parking
- The presence of a dedicated turn lane
- Bikeway configuration (one-way or two-way)

DESIGN REQUIREMENTS

- Bicycle accommodations at intersections shall provide a continuous, predictable, and low-stress route through the intersection.
- Intersection designs shall minimize conflicts between bicyclists and turning vehicles through appropriate geometry, traffic control, and clear assignment of right-of-way.
- Protected intersection elements (Section 5.5.2) should be used wherever feasible to reduce bicyclist exposure to motor vehicles and slow turning movements.
- Bicycle facilities shall not terminate abruptly at intersections; signed and marked transitions shall be provided, and bicyclists shall be guided through intersections using MUTCD-compliant pavement markings and signage.
- Where bicyclists are expected to turn, designs should incorporate bicycle boxes or two-stage turn queue boxes to provide clear and safe staging areas for turning movements.
- Where bicycle movements cross vehicle turning paths, designs shall include measures to maintain safe turning speeds, improve yielding behavior, and enhance visibility. Appropriate treatments include protected intersection geometry, setback crossings, raised crossings, or signal phasing that reduces or eliminates conflicts.
- Bicycle signal heads or phase separation should be considered where turning vehicle volumes crossing a bikeway exceed 150 vehicles per hour and bicycle volumes exceed 50 bicycles per hour.
- Signalized intersections shall provide reliable bicycle detection so bicyclists are not required to dismount or leave the bikeway to receive a green indication

5.5.1 Visibility

DESIGN REQUIREMENTS

- Adequate sight lines shall be provided between all roadway users approaching an intersection, including bicyclists, pedestrians, and motorists. A minimum 20-foot daylighting zone should be maintained in all directions at intersections to improve sight lines and visibility for all users.
- Protected intersection design elements shall be provided where feasible to improve visibility and reduce conflicts (see Section 5.5.2).
- An approach clear space (visibility zone) shall be established in advance of each conflict point to allow all users sufficient time to see one another and yield.
- The length of the approach clear space shall be based on motor vehicle turning speeds, as specified in Table 5-6.
- Within the required approach clear space:
    - On-street parking shall be restricted.
    - Bicycle corrals, micromobility parking, and curbside uses shall not obstruct sight lines.
    - Vegetation, street furniture, utilities, and other vertical elements shall be managed or prohibited to maintain clear visibility.
- Bicycle crossings shall be positioned within the driver's expected field of view.
- Intersection geometry shall minimize corner radii to maintain safe turning speeds.
- Where additional features are needed to reinforce low-speed turning movements:
- Use truck aprons to allow smaller curb radii.
- Use raised crossings or raised intersections.
- Signal equipment, street trees, lighting, signs, and other vertical objects shall not be placed in locations that block sight lines between bicyclists, pedestrians, and motorists.
- Intersection lighting should be provided where bicycle facilities are present to ensure visibility during nighttime and low-light conditions.

TABLE 5-6 Approach Clear Space

Effective Turn Radius	Turn Speed	Clear Space (ft)
<18 ft	<10 mph	20 ft
18 ft - 24 ft	10 mph	40 ft
25 ft - 29 ft	15 mph	50 ft
30 ft - 49 ft	20 mph	60 ft
>50 ft	25 mph	70 ft

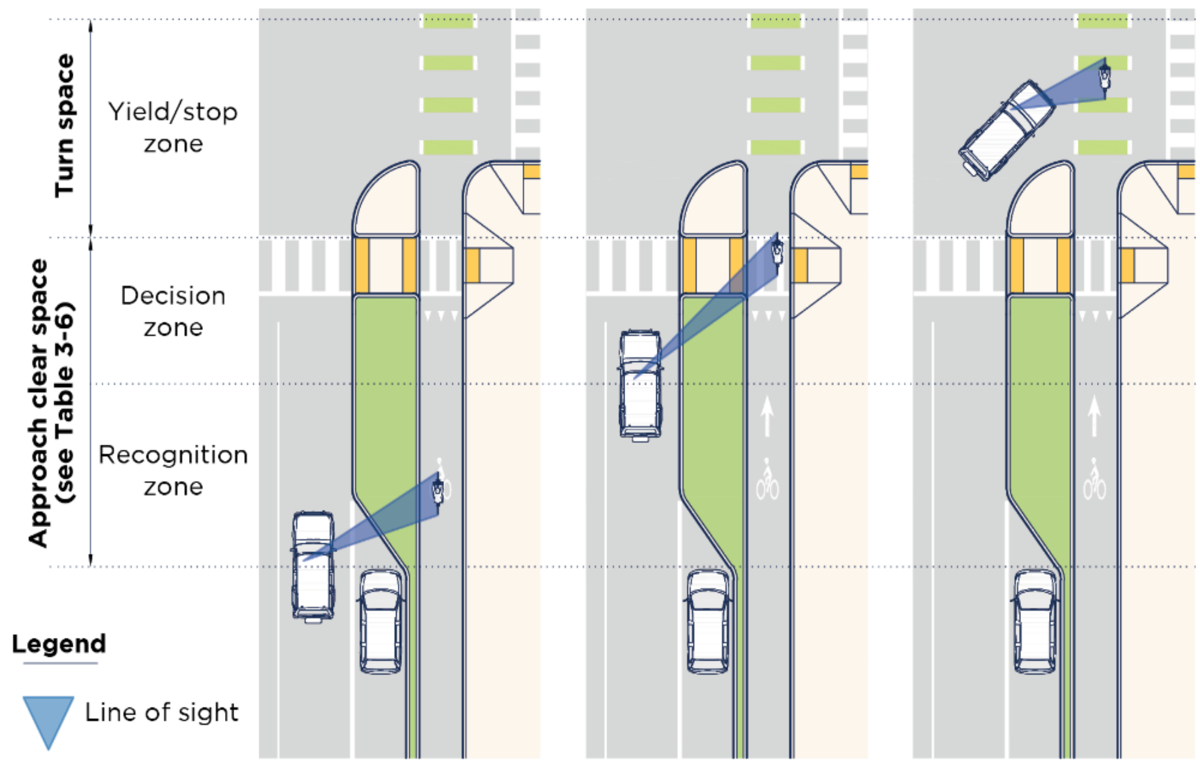


FIGURE 5-26 Approach Clear Space and Turn Space

5.5.2 Protected Intersections

A protected intersection provides physical separation between bicyclists and motor vehicles on intersection approaches.

DESIGN GUIDANCE

- Protected intersections include corner islands designed to:
    - slow turning vehicles
    - improve the visibility of cyclists
    - providing a queuing area for bicyclists
    - separate bicyclists from motorists

- Corner Island Design Requirements:
    - Corner radii at protected intersections should be minimized, with a target range of 10–15 feet in urban settings. Truck aprons may be used to achieve smaller radii
    - Corner islands should be at least 6 inches above pavement, preferably concrete.
    - Flexible delineators or other temporary materials may be used as an interim or retrofit treatment.

Examples of protected intersections are shown in Figure 5-27 and Figure 5-28.

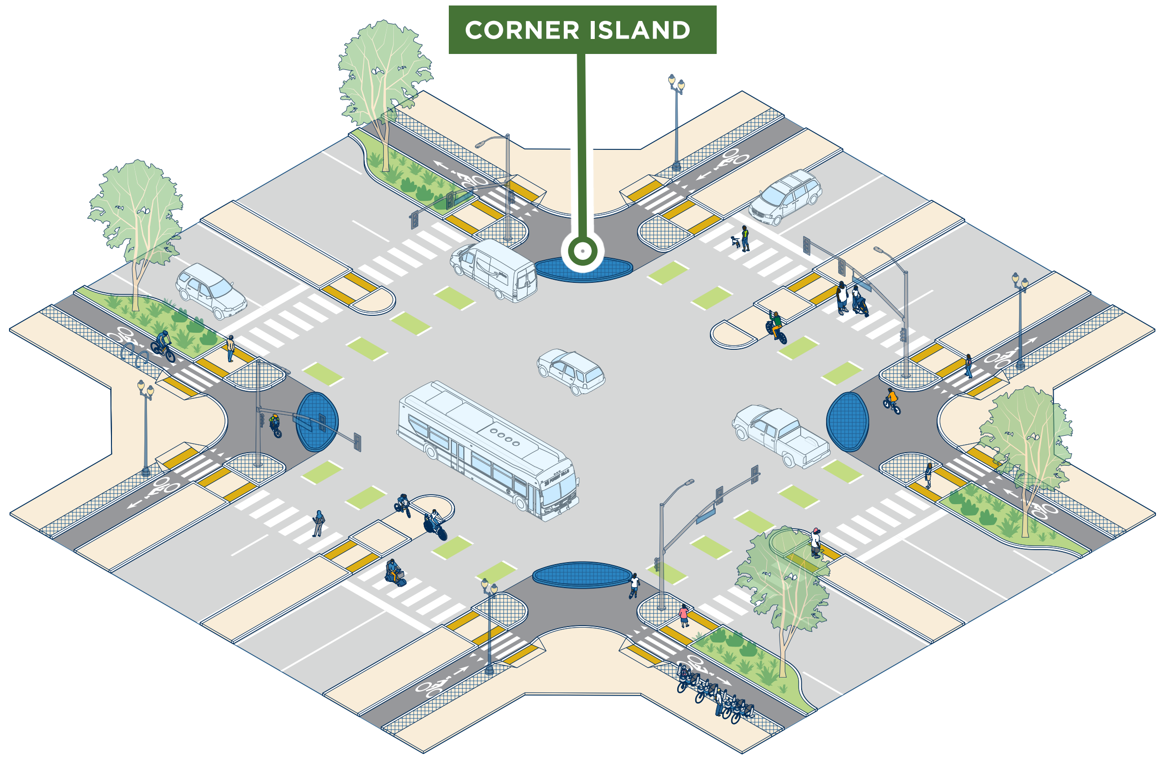


FIGURE 5-27 Corner Islands at Protected Intersection

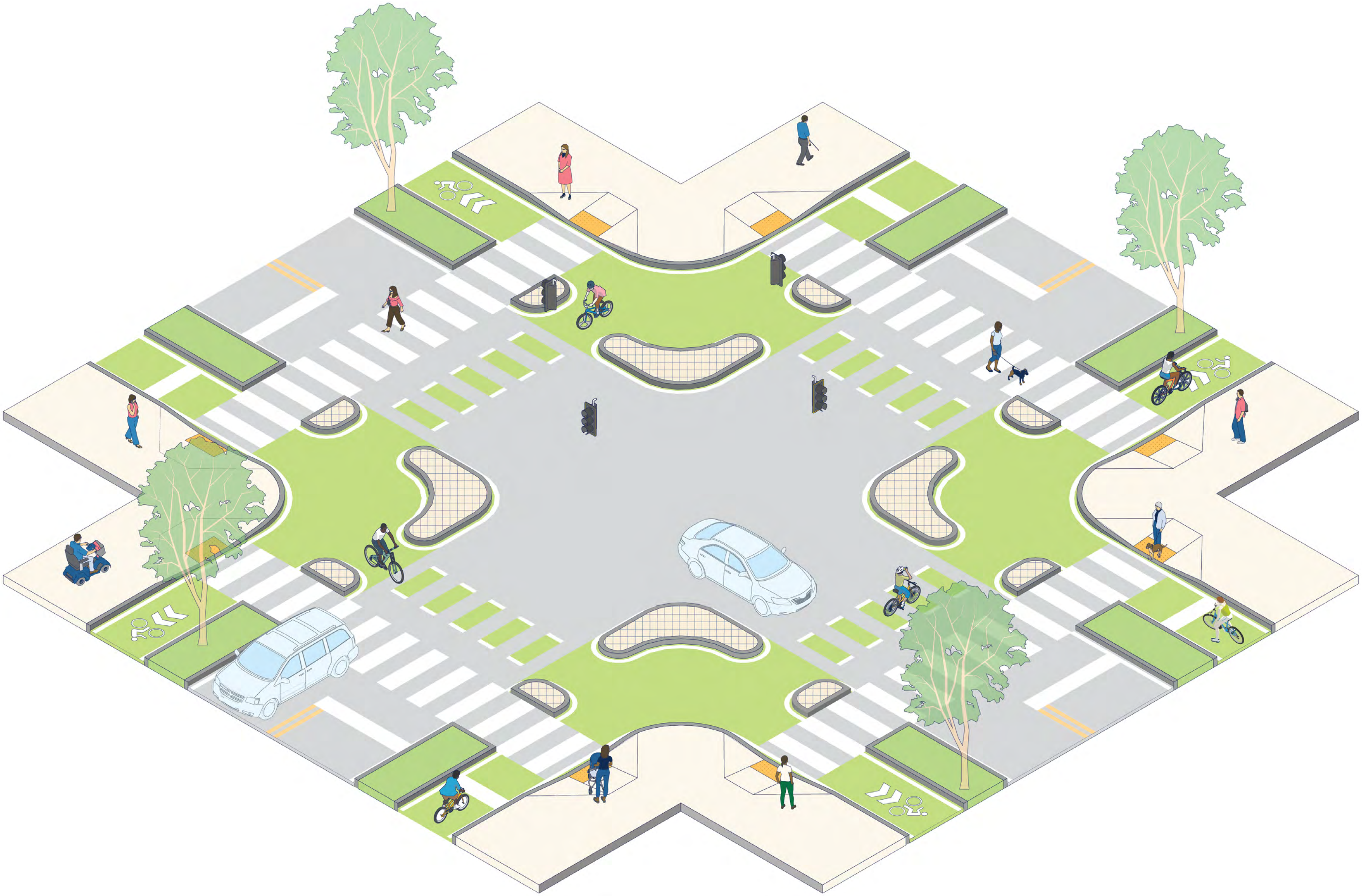


FIGURE 5-28 Protected Intersection with Conflict Zone Striping

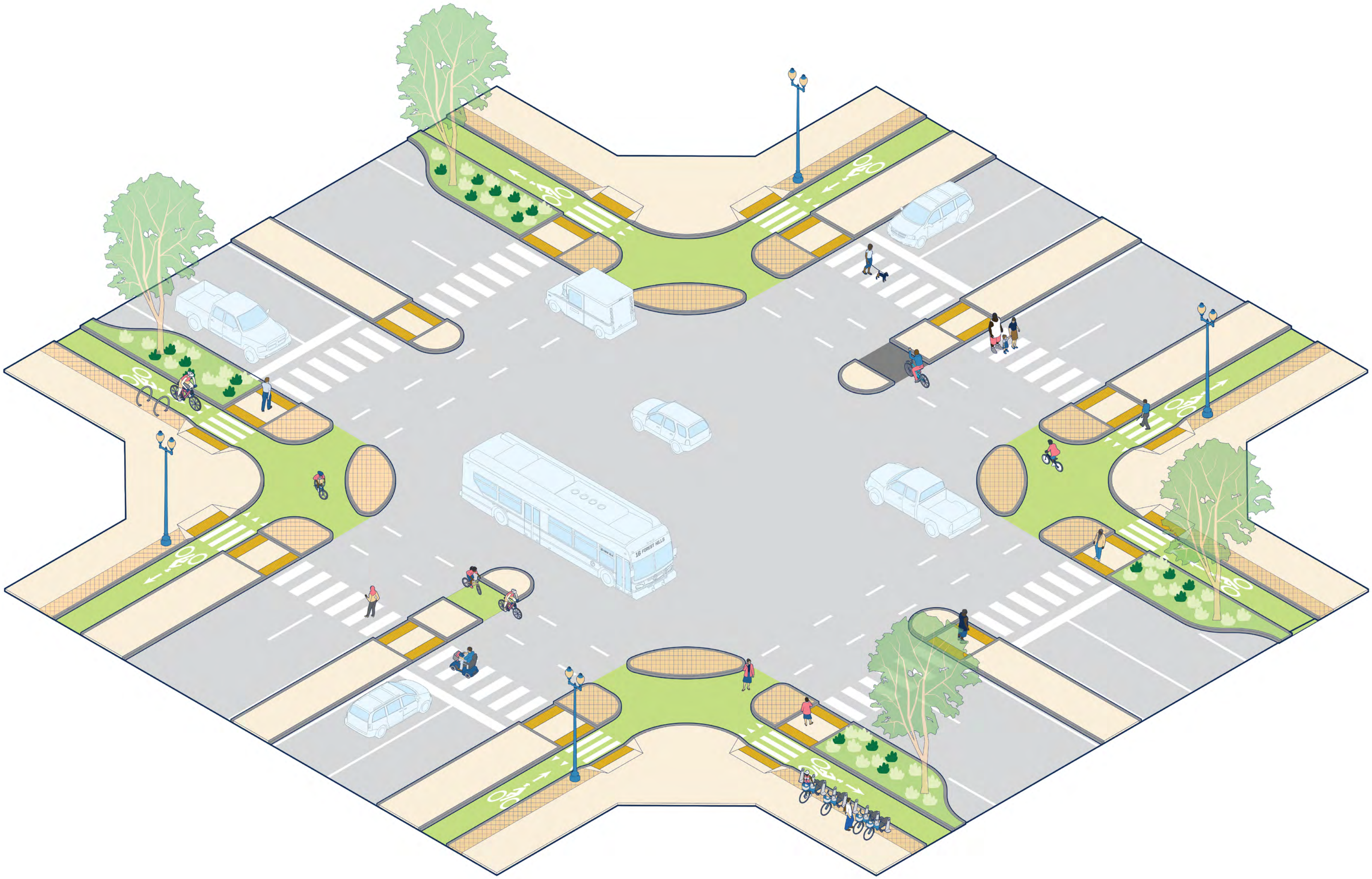
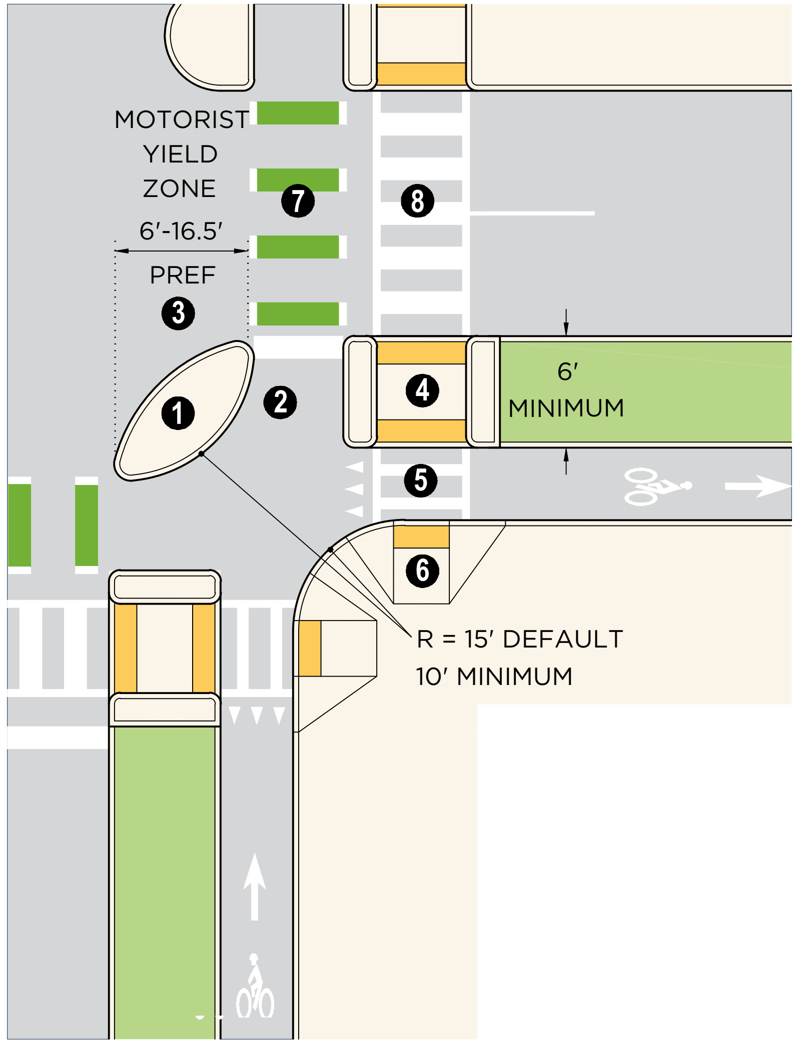


FIGURE 5-29 Protected Intersection

PROTECTED BIKEWAY CROSSINGS

- Protected bikeway crossings shall be set back from the parallel vehicle travel lane by 6 to 16 feet to provide space for turning vehicles to yield.
- Bicycle crossing width shall match or exceed the width of the approaching bikeway:
  - Minimum 5–8 feet for one-way bikeways.
  - Minimum 10–12 feet for two-way bikeways.
- Green-colored pavement, dashed bicycle lane lines, and bicycle symbols shall be used to clearly delineate bikeway crossings through the intersection.
- Regulatory or warning signage may be installed where necessary to reinforce yielding behavior by turning motorists at bicycle crossings.



1. CORNER ISLAND
2. FORWARD BICYCLE QUEUING AREA
3. MOTORIST YIELD ZONE
4. PEDESTRIAN REFUGE ISLAND
5. PEDESTRIAN CROSSING OF SEPARATED BIKE LANE
6. PEDESTRIAN CURB RAMP
7. BICYCLE CROSSING OF TRAVEL LANES
8. PEDESTRIAN CROSSING OF TRAVEL LANES

FIGURE 5-30 Protected Bikeway Crossings

5.5.3 Two-Stage Turn Box

A two-stage turn box is the preferred method to accommodate bicycle left-turns at multi-lane signalized intersections without protected intersections. However, they may be used in any location to simplify turns from a bike facility.

DESIGN REQUIREMENTS

- Locate the queue box in the intersection, fully within the crosswalk extension and/or between the bikeway and the pedestrian crosswalk
- Position the box so it is clear of vehicle turning paths and does not block pedestrian movement
- Avoid placement where stopped vehicles or motorists passing left-turning motorists on the right may enter the queue box
- Minimum width: 6 feet (parallel to cross street)
- Minimum depth: 6 feet (in the direction of travel; 10 feet preferred for higher-volume locations or where multiple riders are expected)
- Ensure the box is fully within the protected area between the bikeway and the crosswalk; do not place in active travel lanes
- Signs & Markings: Use white solid lines to outline the box, with bike symbols and turn arrow markings inside
- Consider green-colored pavement to increase visibility

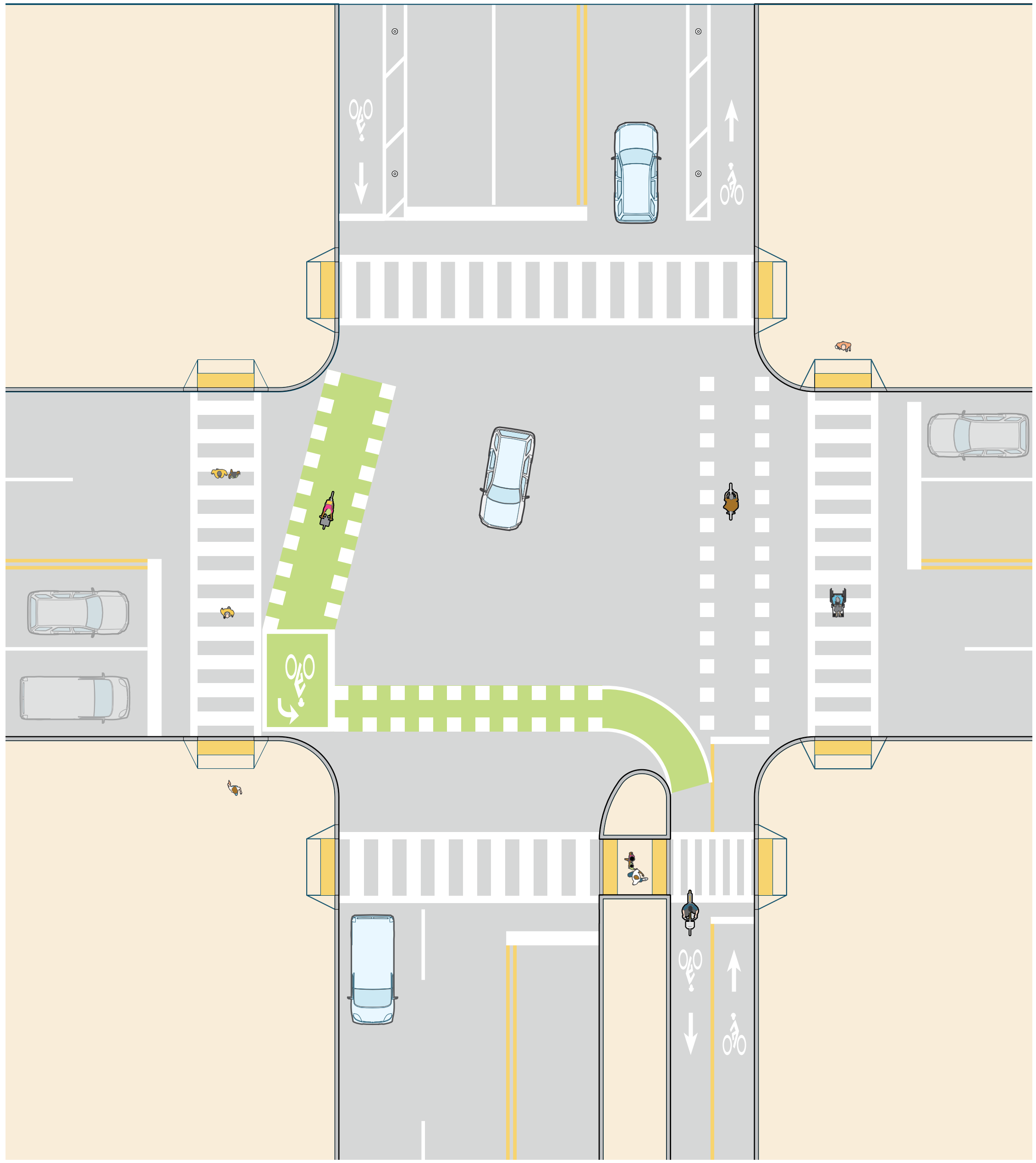


FIGURE 5-31 Two-Stage Turn Box

5.5.4 Bike Boxes

Bike boxes position people biking ahead of vehicular traffic at an intersection. This helps to improve visibility and safety. They are most effective where high bicycle volumes are present or where conflicts between right-turning vehicles and through bicyclists are a concern. Bike boxes can be used on one-way or two-way streets with bike lanes where right turn lanes are not provided.

DESIGN REQUIREMENTS

- Place the bike box at the head of a signalized intersection, between the motor vehicle stop line and the crosswalk.
- Bike boxes are for through- and right-turning cyclists and should not extend beyond one travel lane.
- Depth: 10 to 16 feet (measured from the crosswalk to the vehicle stop line; 10 feet minimum per NACTO, 16 feet preferred in high-volume or multi-lane locations).
- Width: Match the full width of the approach lane or lanes intended for bicyclist use (typically 10–12 feet per lane).
- Markings and Signage:
    - The vehicle stop line should be 10–16 feet behind the crosswalk, matching the depth of the bike box.
    - Place a bicycle stop line at the rear edge of the bike box.
    - Use green-colored pavement for the entire bike box area for maximum visibility.
    - Apply a white bicycle symbol and directional arrow(s) inside the box.
- Use a white solid line to outline the bike box and vehicle stop line.
- Install "Stop Here on Red" (MUTCD R10-6) signs at the motor vehicle stop line and consider "No Turn on Red" (MUTCD R10-11) signs to reduce conflicts.

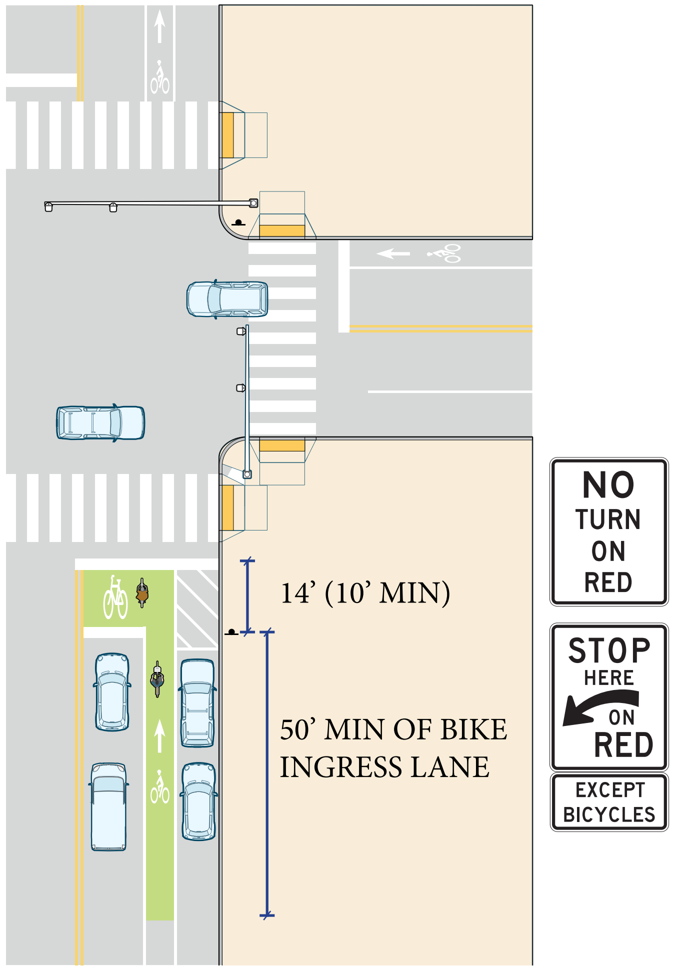


FIGURE 5-32 Bike Box

5.5.5 Conflict Zone Striping (Bikeway Crossings)

DESIGN REQUIREMENTS

- Conflict zone pavement markings should be used where bikeways cross streets, alleys, and driveways.
- Match or exceed the width of the bikeway approach.
- Include green-colored pavement to provide a distinction with pedestrian crossings.
- When marking conflict zones for two-way bikeways, include a centerline stripe.

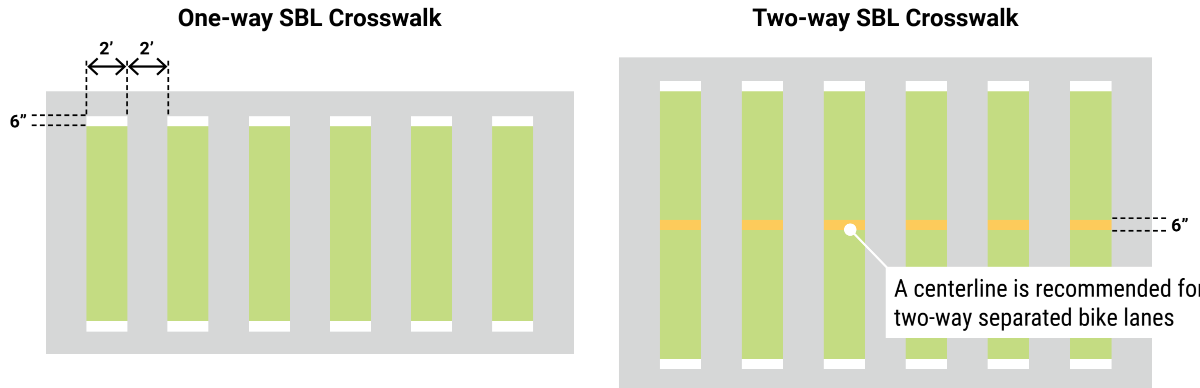


FIGURE 5-33 Conflict Zone Striping

5.5.6 Intersection Transitions

Transitions between bicycle facility types often occur at intersections where bicyclists and motorists must cross paths, merge, or shift their position on the roadway. Examples include:

- Bike lanes transitioning to shared lanes (due to intersection constraints).
- Separated bikeways transitioning to standard bike lanes.
- Shared use paths and sidepaths transitioning to on-street facilities.

Transitions should be intuitive to reduce hesitation, confusion, or unexpected maneuvers. Desired behaviors should be reinforced through intersection geometry, pavement markings, signage, and/or speed management.

The specific design of transitions will vary depending on the location and surrounding conditions. Figure 5-34 to Figure 5-41 provide example treatments for several transition scenarios. Practitioners should consult the following resources for best practice guidance:

- **NACTO Urban Bikeway Design Guide**
- **FHWA Separated Bike Lane Planning and Design Guide**
- **AASHTO Guide for the Development of Bicycle Facilities**
- **MUTCD**

Where guidance differs, the treatment that provides greater separation, lower speeds, and clearer priority shall be favored.

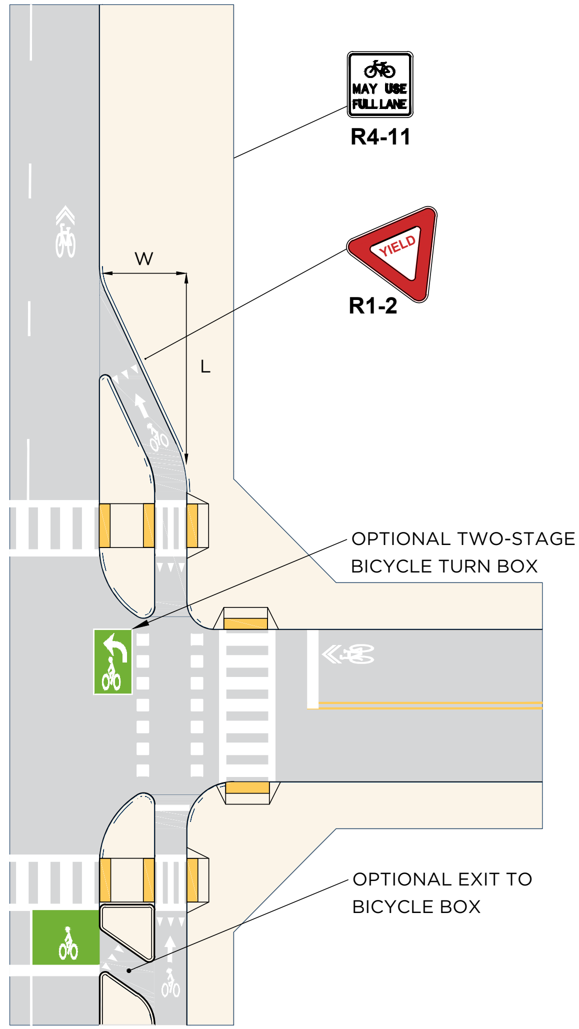


FIGURE 5-34 Intersection Design with Motorist Mixing Zones

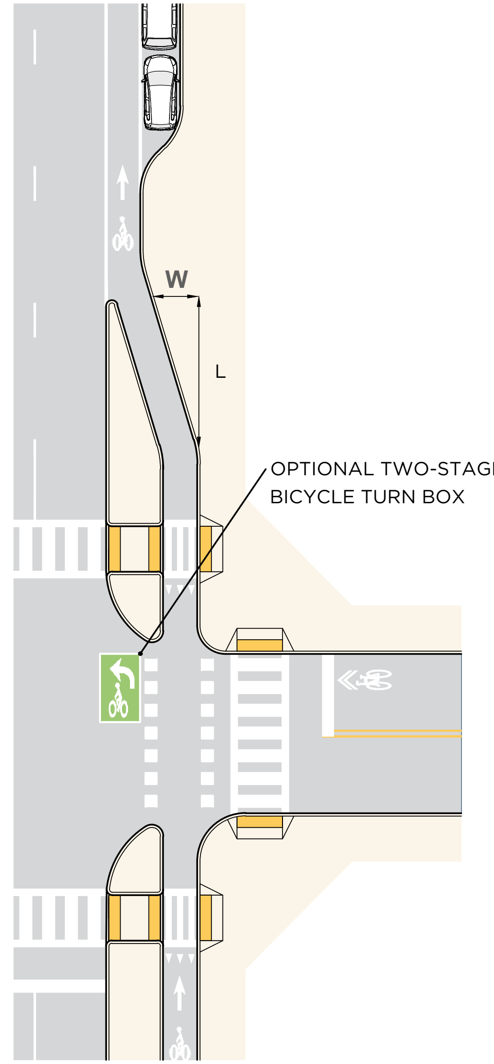


FIGURE 5-35 Separated Bike Lane Transition To Striped Bike Lane

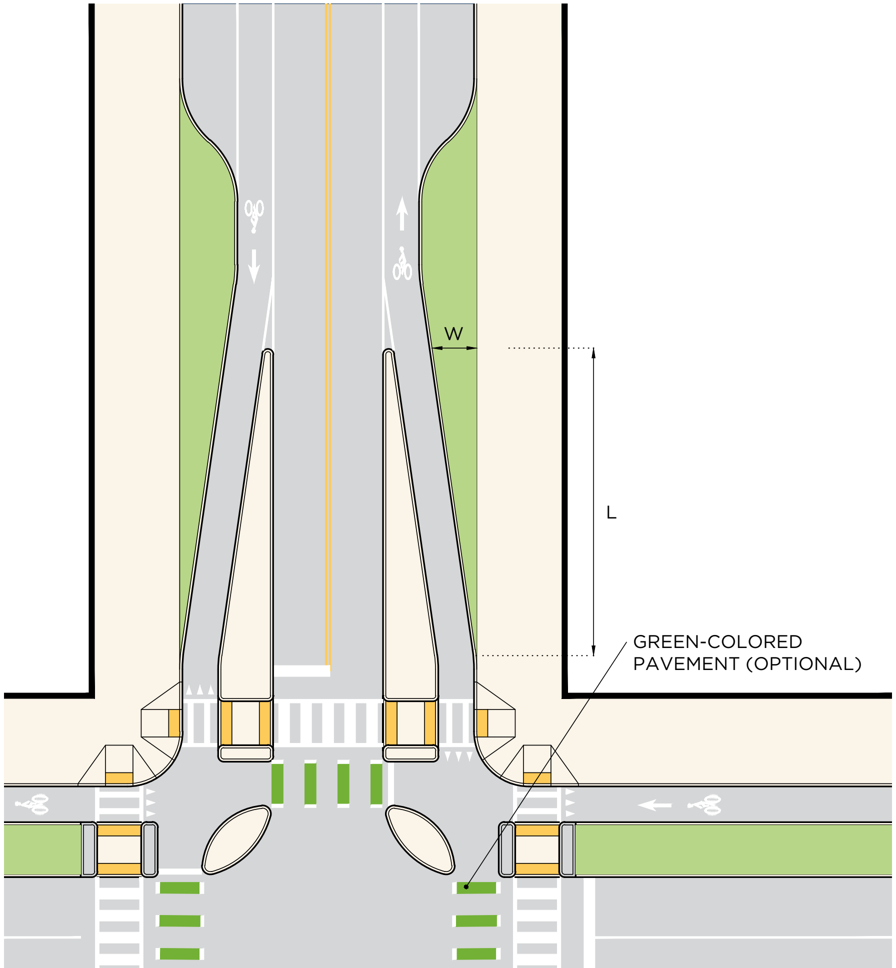


FIGURE 5-36 Striped Bike Lane To Separated Bike Lane On Intersecting Street

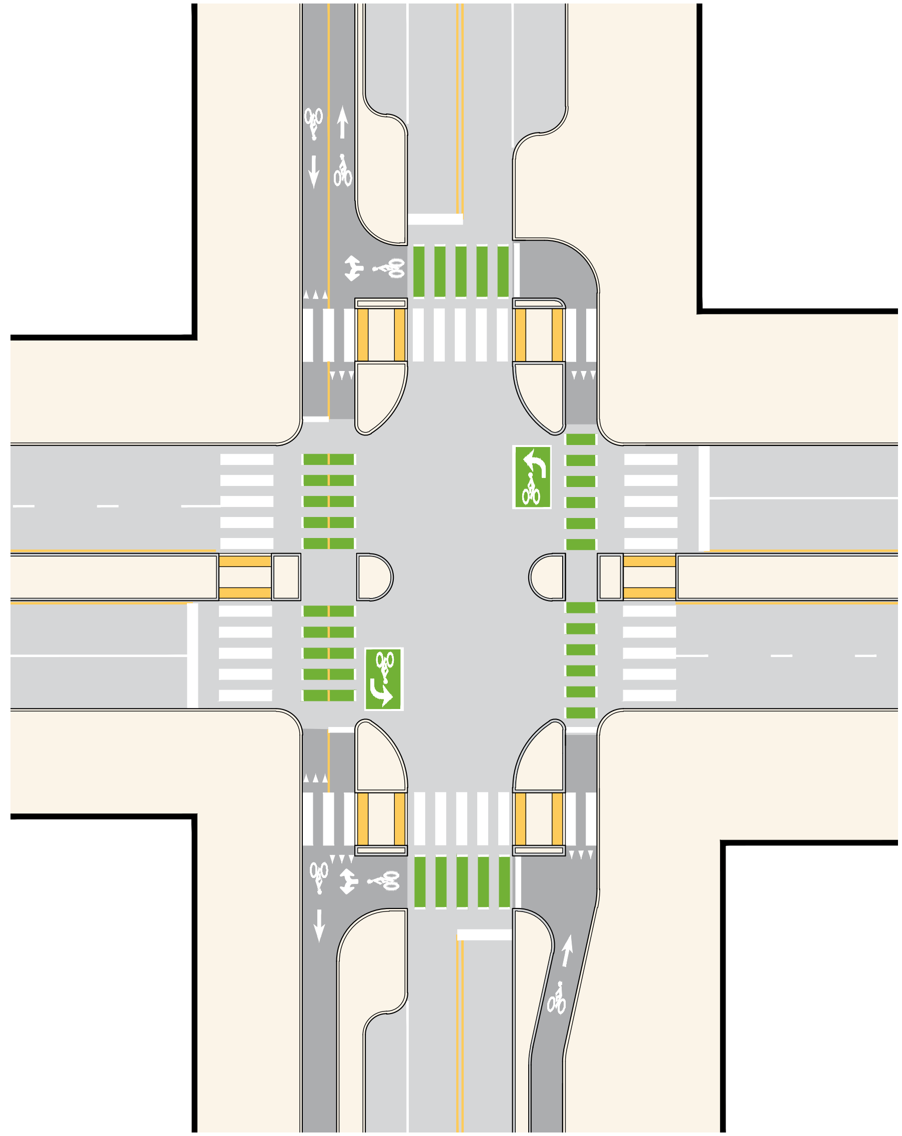


FIGURE 5-37 Two-Way To One-Way Separated Bike Lane Transition

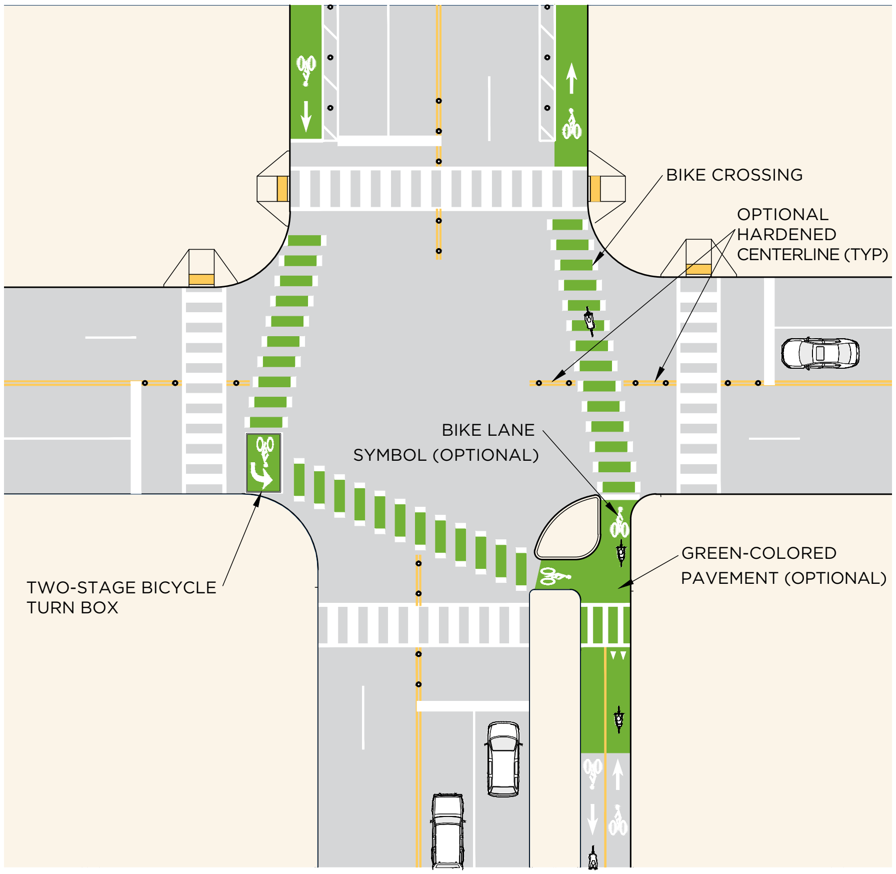


FIGURE 5-38 Transition From One-Way To Two-Way Separated Bike Lanes With Two-Stage Turn Box

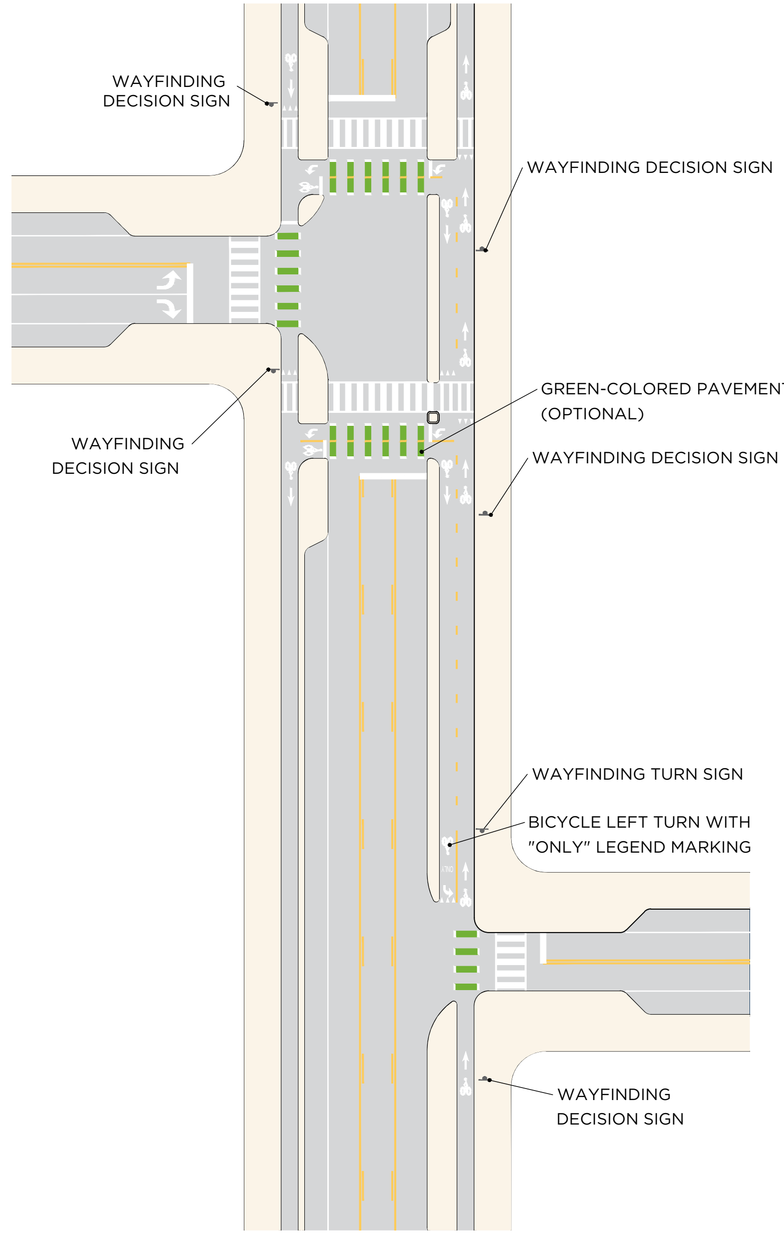


FIGURE 5-39 Transitions Between Offset Intersections With Two-Way Separated Bike Lanes

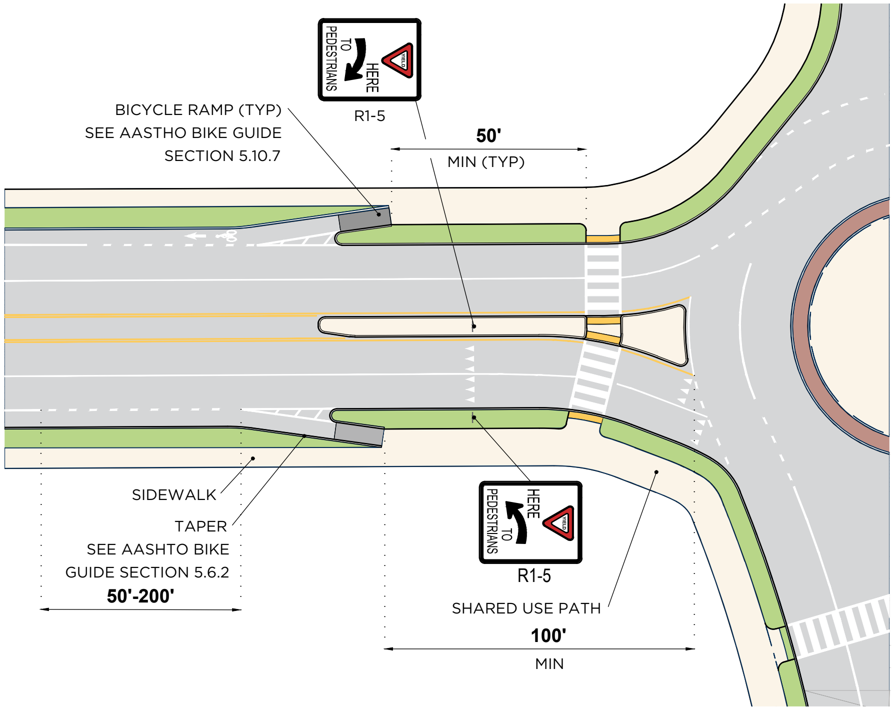


FIGURE 5-40 Bicycle Lane Transition to Shared-Use Path at Roundabout

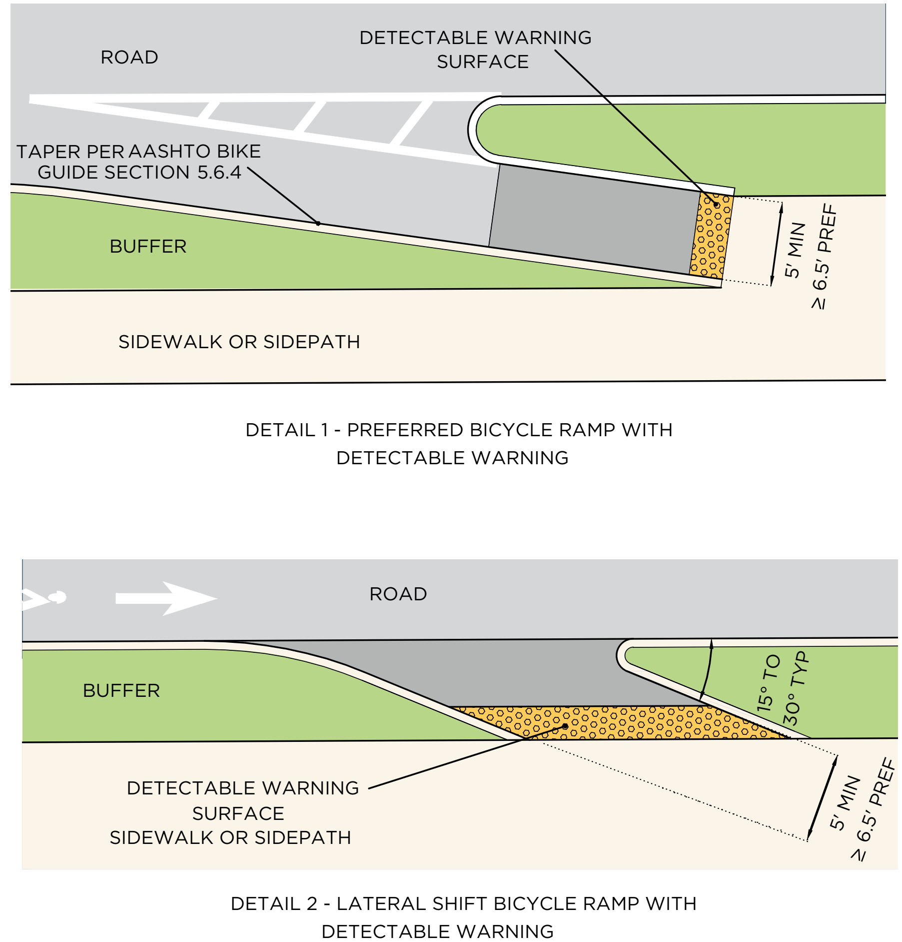


FIGURE 5-41 Transition from On-Road to Off-Road Facility Using Bicycle Ramps

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6

Speed Management

LFUCG supports speed management as a primary design strategy to achieve safety and comfort for all roadway users. Speed management design tools within this chapter shall apply to all new and reconstructed roadways within Lexington-Fayette County. Where applicable, practitioners shall consult other sections of this Manual for additional design requirements relevant to each treatment.

6.1 Speed and Crash Severity

Vehicle speed significantly influences both the likelihood of a crash occurring and the severity of crashes when they do occur. Higher vehicle speeds directly correlate to:

- **Crash likelihood –** Higher speeds reduce the time available for drivers to perceive and respond to hazards, which increases stopping distances, and makes crashes more likely.
- **Crash and injury severity –** Higher speeds increase the kinetic forces involved in a collision. The greater the force, the more likely a crash results in severe injury or death, both for vehicle occupants and more vulnerable roadway users.
- **Higher risks for vulnerable roadway users –** The rate of severe injury or death for pedestrians and other vulnerable roadway users substantially increases with vehicles speeds. The risk of death or severe injury for a pedestrian struck at 20 mph is 13%. This risk increases to 40% at speeds of 30 mph and 73% at speeds of 40 mph.

Because human bodies have limited tolerance to crash forces, managing vehicle speeds is one of the most effective strategies for reducing traffic fatalities and serious injuries and is a central principle of the Safe Systems approach.

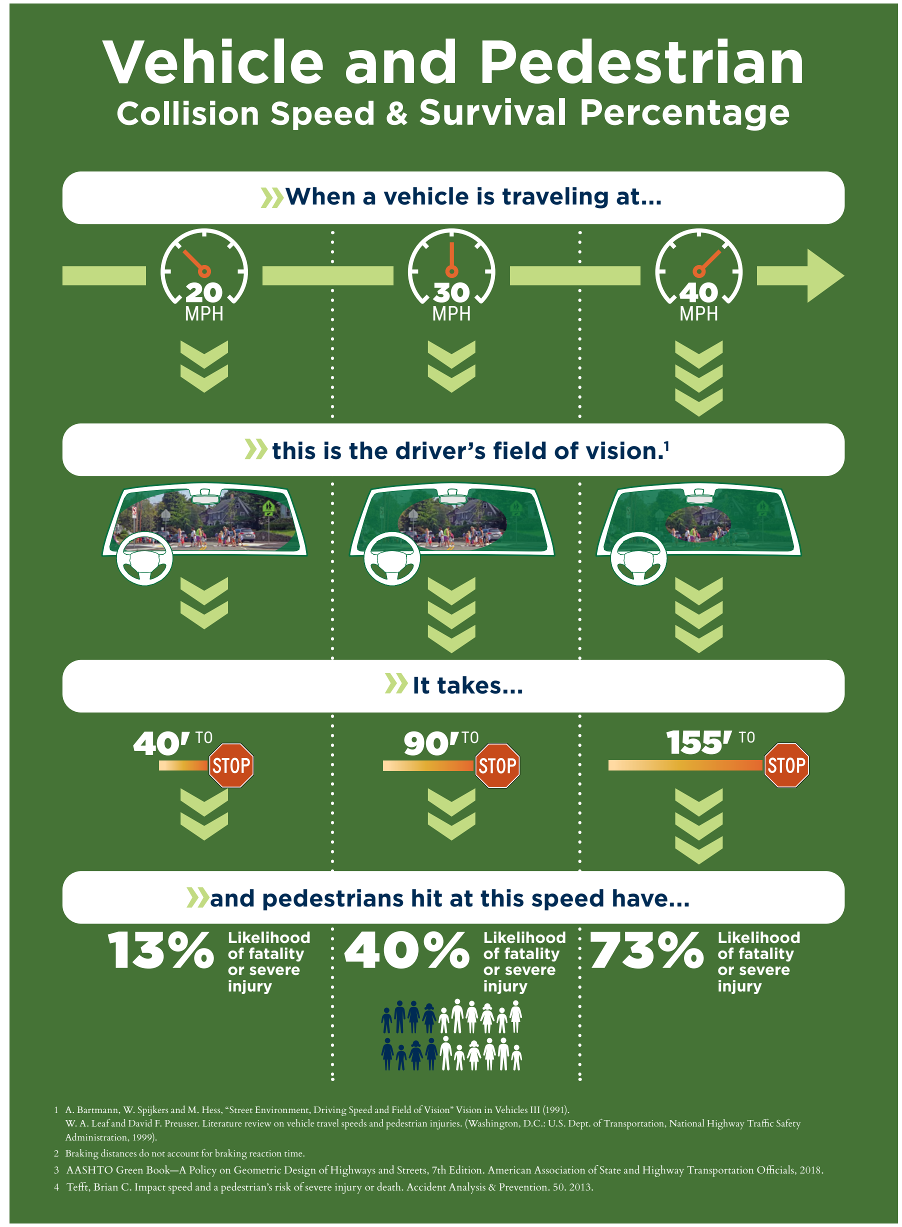


FIGURE 6-1 Collision Speed and Pedestrian Survival Percentage

6.2 Achieving Target Speed

Streets should be designed so that desired vehicle speeds are self-enforcing – whether through roadway geometry, roadside elements (such as trees, landscaping, and street furniture), signal operations, and/or traffic calming measures. Acknowledging the relationship between design speed, target speed, and posted speed is essential to this goal.

- **Posted Speed:** The maximum legal speed limit for a section of roadway displayed on a regulatory sign.
- **Design Speed:** The speed used to determine a road's geometric criteria such as lane width, curvature, and sight distance.
- **Target Speed:** The desired operating speed for a roadway.

The design speed, target speed, and posted speed should align for all roadways within Lexington-Fayette County. Table 6-1 establishes the default target speeds for each street type. These target speeds shall also serve as the design speeds used for roadway design calculations.

TABLE 6-1 Target Speeds by Street Type

Street Type	Target/Design Speed (MPH)
Neighborhood Street	20 MPH
Avenue	25 MPH
Boulevard	25–30 MPH
Thoroughfare	35 MPH
Alley	10 MPH

6.3 Speed Management Design Strategies

Table 6-2 indicates which speed management strategies are required, recommended, optional, or not permitted/applicable to the various street types.

- All new streets and major roadway improvement projects must use the required and recommended strategies.
- For retrofits of existing streets, the table provides a starting point for review and decision-making.

When selecting or designing speed management strategies, the following principles should inform decision-making:

- **Prioritize vulnerable users:** Speed management should improve safety, access, and comfort for bicyclists, pedestrians, transit users, and people with disabilities without diminishing service for these modes.
- **Design for predictability:** Treatments should be easy for all users to understand and navigate. This helps to reduce confusion and promote consistent behavior.
- **Accommodate emergency access:** Treatments should ensure emergency vehicle access while considering emergency-response time goals.
- **Accommodate freight and transit access:** Speed management projects should maintain access for the appropriate design and control vehicles. (Sections **5.1.1.1** and **5.1.1.2**)
- **Achieve Target Speeds:** Set target speed as posted speed limit. While individual speed management strategies can be effective, they often produce the best results when used in combination, reinforcing desired operating speeds through multiple cues. Traffic calming measures shall be spaced 250-300 feet apart.

Speed management strategies within this Chapter are grouped by:

- Road reallocation
- Vertical measures
- Horizontal measures
- Surface treatments
- Enclosure

TABLE 6-2 Appropriate Speed Management Measures by Street Type

Legend
■ Required ● Recommended
○ Optional ✕ Not Permitted or N/A

Category	Measure	Neighborhood Street	Avenue	Boulevard	Thoroughfare	Alley	Page Reference
Road Reallocation	Reduction in number of travel lanes	✕	○	○	○	✕	193
	Lane Width Narrowing*	●	●	●	●	✕	193
	Removal of Right Turn Lanes	✕	✕	●	○	✕	193
Vertical measures	Speed Humps	○	○	✕	✕	✕	198
	Speed Cushions	○	●	●	✕	✕	198
	Speed Tables/Offset Speed Tables	○	●	●	✕	✕	198
	Raised Crosswalks	○	●	●	✕	✕	201
	Raised Intersections	○	○	○	✕	✕	203
Horizontal Measures	Curb Extensions/Bulbouts**	■	■	●	○	✕	205
	Roundabouts***	●	●	●	●	✕	207
	Neighborhood Traffic Circles	■	✕	✕	✕	●	207
	Neckdowns/Chokers	●	●	●	✕	✕	207
	Pedestrian Crossing Islands/Median Islands	○	○	●	●	✕	209
	Lateral Shifts	●	●	●	○	✕	211
	Chicanes/Roadway Curvature	●	●	●	✕	○	211
	Low-Speed Corner Radii	■	■	■	■	■	215
Surface	Textured Pavement Treatment	○	○	○	○	○	216
Enclosure	Medians	○	○	■	■	✕	218
	On-Street Parking	●	●	●	○	○	219
	Gateway Treatment/Signage	○	●	●	●	✕	219
	Street Trees and Landscaping	■	■	■	■	✕	220

*See default travel lane dimensions for street types.
**Curb extensions are required on all new streets.
***Roundabouts or traffic circles recommended for existing streets and required for new streets.

6.3.1 Road Reallocation

Roadway reallocation strategies help manage vehicle speeds by changing how drivers perceive and interact with the street. When travel lanes are narrowed or roadway space is reassigned to uses such as parking, bicycle facilities, or medians, the street feels more constrained and drivers naturally slow down. In technical terms, these treatments manage speeds by narrowing the effective travel way, increasing edge friction and visual enclosure, and reallocating roadway space to other modes or uses.

All opportunities to implement these strategies shall be reviewed as part of resurfacing projects, roadway reconstruction, or corridor retrofit initiatives.

- **Lane narrowing –** Reduce general travel lane widths to better reflect target speeds and reduce the perceived margin for error. See Figure 6-2 and **Section 4.3.3** for default, minimum, and maximum lane widths for each street type.
- **Lane reduction –** Convert excess through lanes to fewer travel lanes to reduce roadway width and simplify driver decision-making. This is often effective on four-lane roadways that lack a center turn lane. See **Section 6.3.1.1**.
- **Turn lane removal –** Remove underutilized or unnecessary right- or left-turn lanes that increase pavement width and encourage higher speeds. See **Section 5.1.4**.
- **Slip lane removal –** Eliminate channelized right-turn lanes that allow high-speed turning movements. See **Section 5.1.4.2**.
- **Convert center turn lanes to medians –** Replace two-way left-turn lanes with landscaped or raised medians to reduce crossing distance and limit weaving. See **Section 4.3.5**.
- **Addition of on-street parking –** Introduce parallel parking lanes to narrow the effective travel way and increase roadside friction. See **Section 4.3.4.1**.
- **Addition of bicycle facilities –** Install bike lanes, buffered bike lanes, or protected bike lanes to narrow vehicle travel lanes and increase driver awareness of other users. See **Section 4.2.3**.
- **Reallocation of excess pavement width –** Convert unused or overly wide pavement to medians, pedestrian space, green infrastructure, or streetscape elements. This may be effective on streets with excess vehicular capacity or underutilized on-street parking. See **Section 4.1.4**.

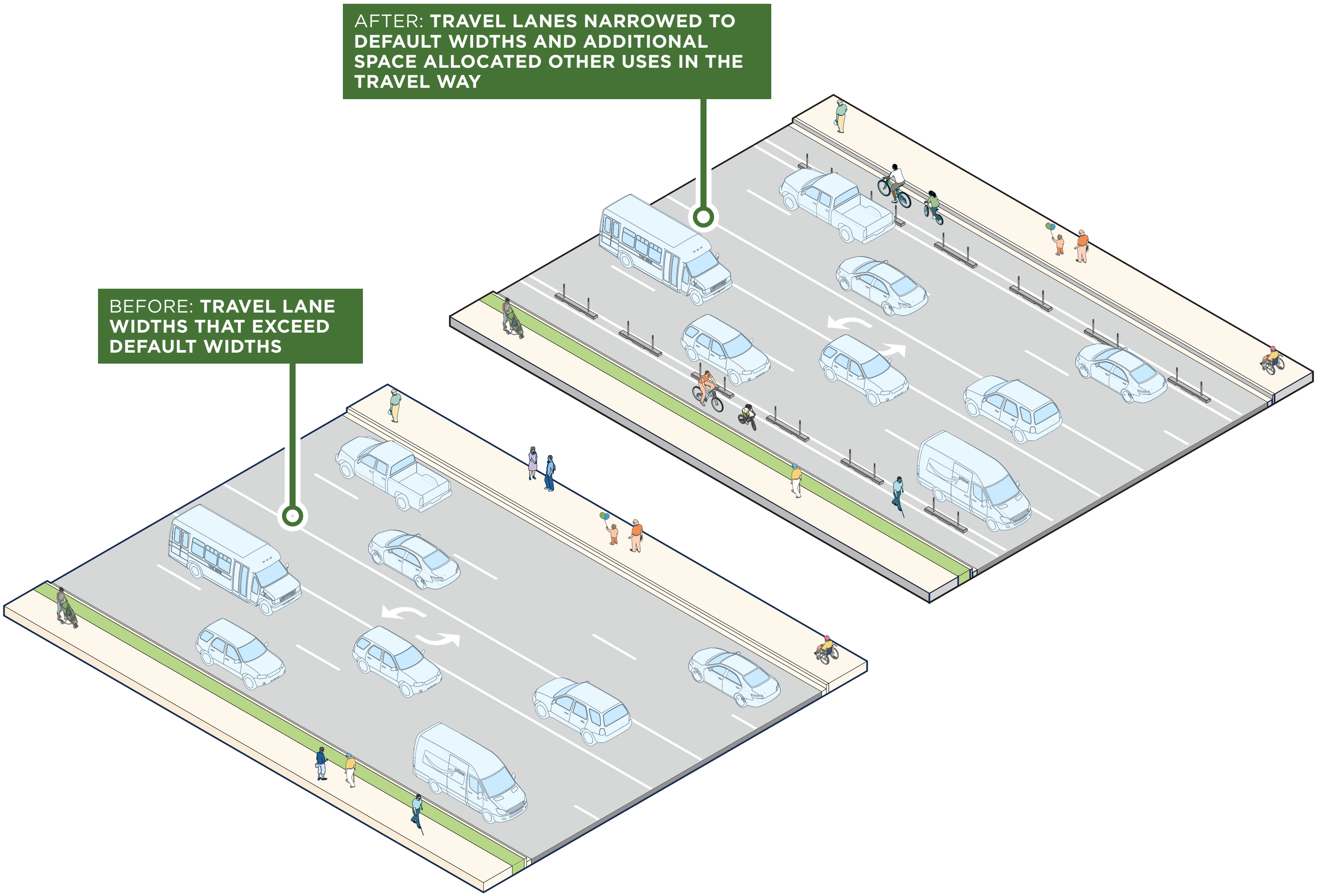


FIGURE 6-2 Before and after – Roadway Reconfiguration with Narrowed Travel Lanes

6.3.1.1 Lane Reduction / Reconfiguration

Lane reductions and other roadway reconfigurations should be considered along streets with excess roadway capacity, excessive speeds, known safety issues, existing parallel streets, or inadequate facilities for other travel modes. A common reconfiguration converts a four-lane undivided roadway to two through lanes with a two-way left-turn lane. Lane reconfiguration may also include reduction of lane widths.

Table 6-3 provides a starting point for evaluating streets for lane reduction or reconfiguration. While traffic volumes help characterize existing roadway conditions, decisions regarding lane reduction and reconfiguration must also consider safety, accessibility, multimodal needs, and context-sensitive design objectives through further analysis.

DESIGN GUIDANCE

- ADT thresholds are estimates – Actual capacity depends on context, traffic control operation, travel patterns, and prevailing driving behaviors.
- Roadway reconfiguration may impact vehicular level of service or increase travel times during peak periods. The evaluation of tradeoffs and tolerance for vehicular impacts should consider local context and broader goals for mobility, safety, connectivity, and livability. The evaluation should include both peak and off-peak periods when excess capacity can exacerbate speeding problems.

Key Benefits

Key benefits of roadway reconfiguration include:

- Fewer rear-end and left-turn collisions due to the dedicated turn lane.
- Reduced risk of right-angle crashes, since side street drivers cross fewer lanes.
- Shorter and safer pedestrian crossings.
- More consistent vehicle speeds.
- Additional space to add features like pedestrian refuge islands, curb extensions, bike lanes, on-street parking, or transit stops.

TABLE 6-3 Typical Traffic Volumes for Lane Reduction

Less than 10,000 ADT	Candidate for lane reduction in MOST instances. Capacity is unlikely to be affected.
10,000 to 15,000 ADT	Candidate for lane reduction in MANY instances. Agencies should conduct intersection analysis and consider signal retiming to determine any effect on capacity.
15,000 to 20,000 ADT	Candidate for lane reduction in SOME instances. Agencies should conduct a corridor analysis. Capacity may be affected at this volume depending on the "before" condition.
Greater than 20,000 ADT	Agencies should complete a feasibility study to determine whether a lane reduction is appropriate. Capacity may be affected at this volume and is dependent on other variables such as access management, the number and spacing of traffic signals, etc.

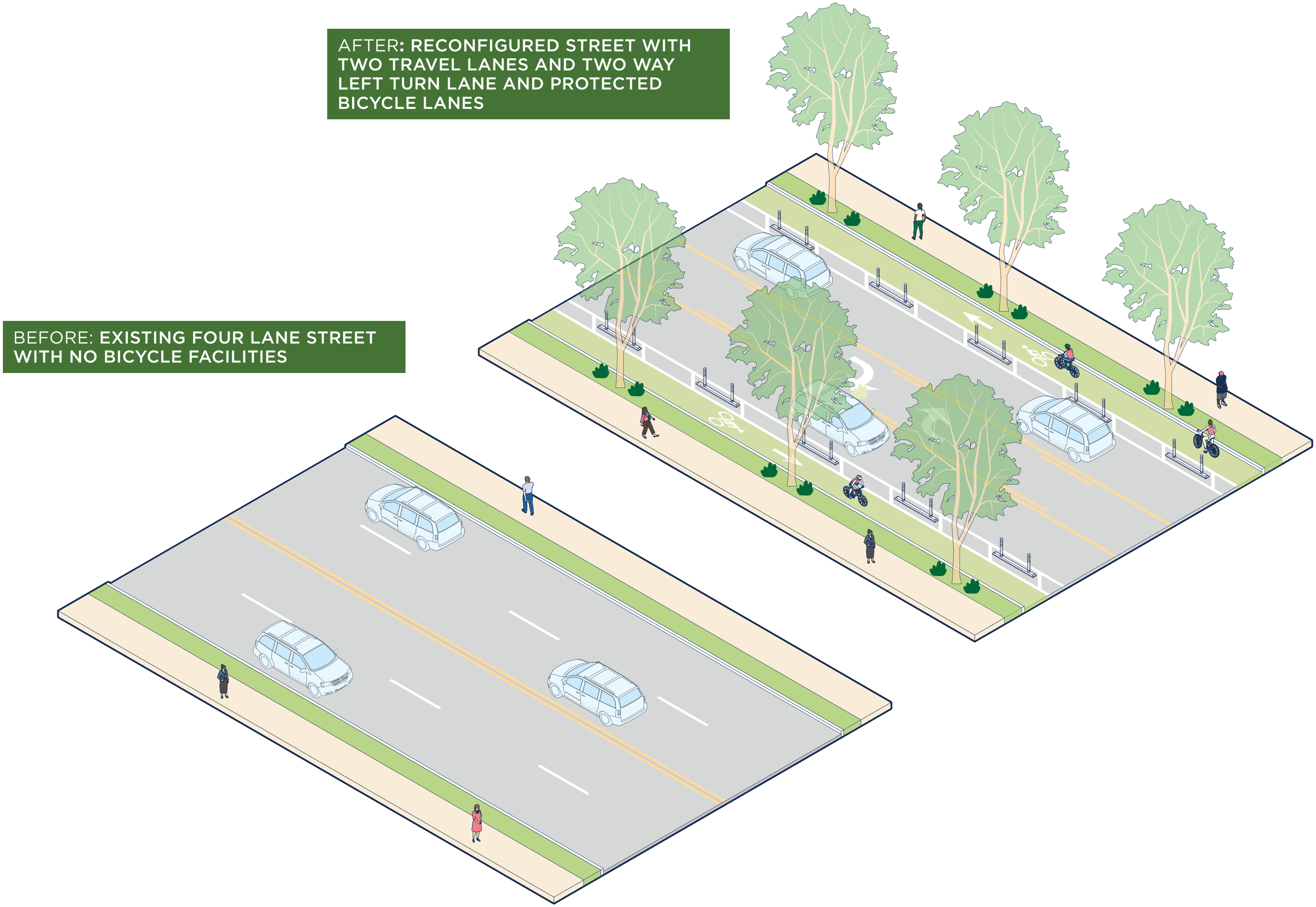


FIGURE 6-3 Before and after – Lane Reduction from 4 to 3 Lanes

6.3.2 Vertical Measures

Vertical measures slow vehicle speeds by creating vertical deflection. They help achieve target driving speeds and keep drivers attentive and aware. Vertical deflection is particularly well-suited to:

- Local and shared streets (e.g. neighborhood bicycle facilities)
- Streets where pedestrian prioritization is a goal
- Streets where the desired operating speed is 25 mph or less

DESIGN REQUIREMENTS

- Designers shall coordinate with Lextran and emergency services to review the operational impacts of vertical elements.
- Vertical elements shall be designed to support the weight of fire apparatus and outriggers.
- Vertical elements shall not impede stormwater drainage.

6.3.2.1 Speed Tables and Offset Speed Tables

Speed tables help to achieve lower overall speeds along a corridor. They are commonly used to calm traffic in areas with higher vehicle speeds and volumes, particularly at midblock locations. At intersections or midblock pedestrian crossings, raised crosswalks should be used.

- Speed tables shall be **clearly marked** with **speed hump pavement markings and advance signage** to alert drivers. Markings and signage shall comply with the MUTCD. Clear markings and advance signage are especially important at night and in low-visibility conditions.
- Speed tables shall match the **entire width of the traveled way,** including all travel lanes. Offset or directional speed tables shall match the full width of lanes in the same direction.
- The flat top of a speed table shall be at least **10 feet long** (measured parallel to direction of travel). This length accommodates vehicles and bicycles comfortably while achieving the desired speed control.
- Speed tables shall not be placed in front of driveways.

DESIGN GUIDANCE

- Speed tables should be placed **perpendicular to the direction of travel.** This helps to ensure consistent motorist response and maximize speed reduction.
- The **spacing and location** of speed tables should be planned to help drivers maintain the **target speed** for the corridor (see Table 6-1). Proper spacing is critical to minimize speeding between devices.
- Speed tables should be **3.5 inches** above the existing roadway surface.
- Ramp lengths should be designed to provide a maximum **approach and departure grade of 1:20** (approximately 5.0%) for smooth transitions.
- Maintain existing drainage patterns by installing a catch basin, incorporating a sidewalk culvert, or tapering the speed table toward the gutter.

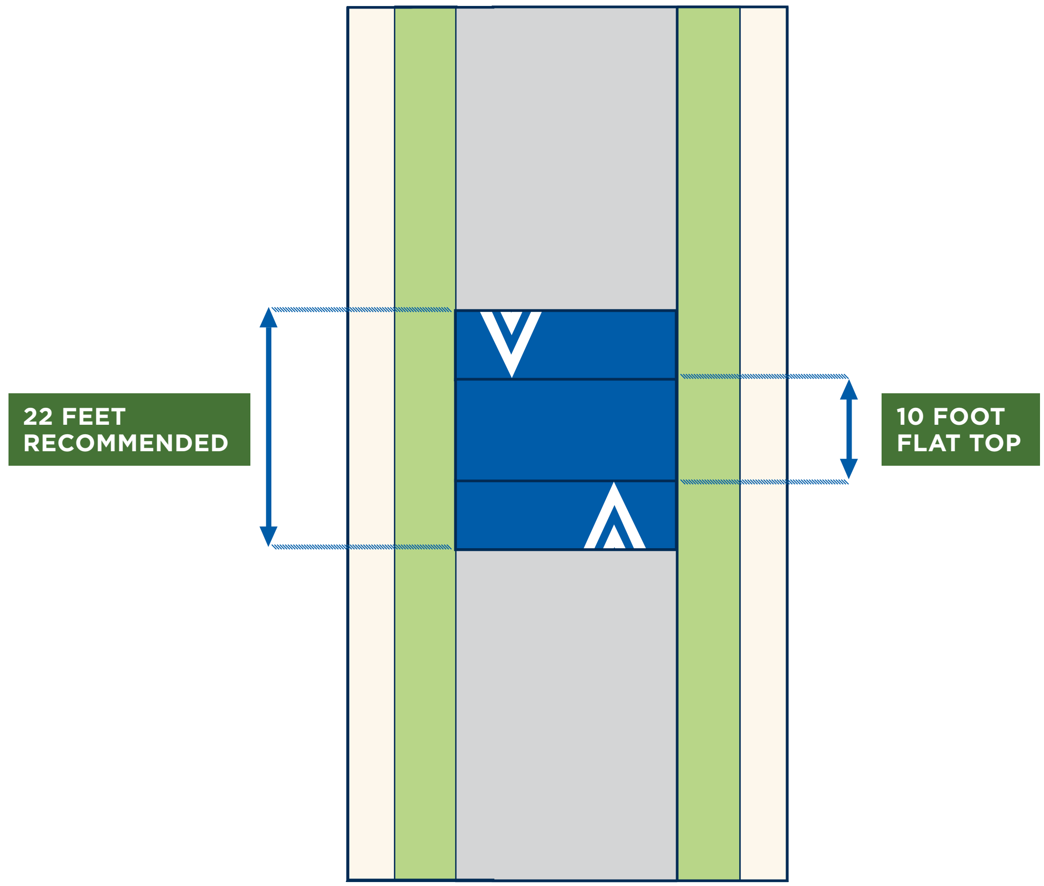


FIGURE 6-4 Speed Table Design Requirements

6.3.2.2 Speed Cushions

Speed cushions help to manage vehicle speeds but provide a cut-through for bicyclists, motorcycles, or vehicles with a wider wheelbase. They are well-suited to streets with frequent emergency vehicle traffic.

DESIGN REQUIREMENTS

- Pavement markings and signage used at speed cushions shall comply with the MUTCD.
- Speed cushions shall have a width of **6 to 7 feet,** encouraging passenger vehicles to slow while enabling wide-axle emergency vehicles to straddle the device.
- Speed cushions shall have a height of **3 to 4 inches** above the existing roadway surface.
- Speed cushions shall not be placed in front of driveways

DESIGN GUIDANCE

- Speed cushions should be placed **perpendicular to the direction of travel** and centered **within the travel lane(s)** to ensure consistent motorist response and maximize speed management.
- The **spacing and location** of speed cushions should be planned to help drivers maintain the **target speed** for the corridor (see **Section 6.2**). Proper spacing is critical to minimize speeding between devices.
- The gaps between speed cushions should be **2 to 5 feet** to accommodate emergency vehicle tire spacing and allow bicyclists to ride between the cushions. This spacing can be adjusted to ensure that wider vehicles traveling over the cushion can operate within the travel lane without encroaching on an adjacent lane.
- **Approach and departure ramps should be designed with a grade of 1:10 to 1:12** (approximately 8% to 10%). This range provides a smooth transition while achieving speed reduction. Steeper grades (closer to 1:10) may produce stronger speed reduction but increase discomfort and noise.

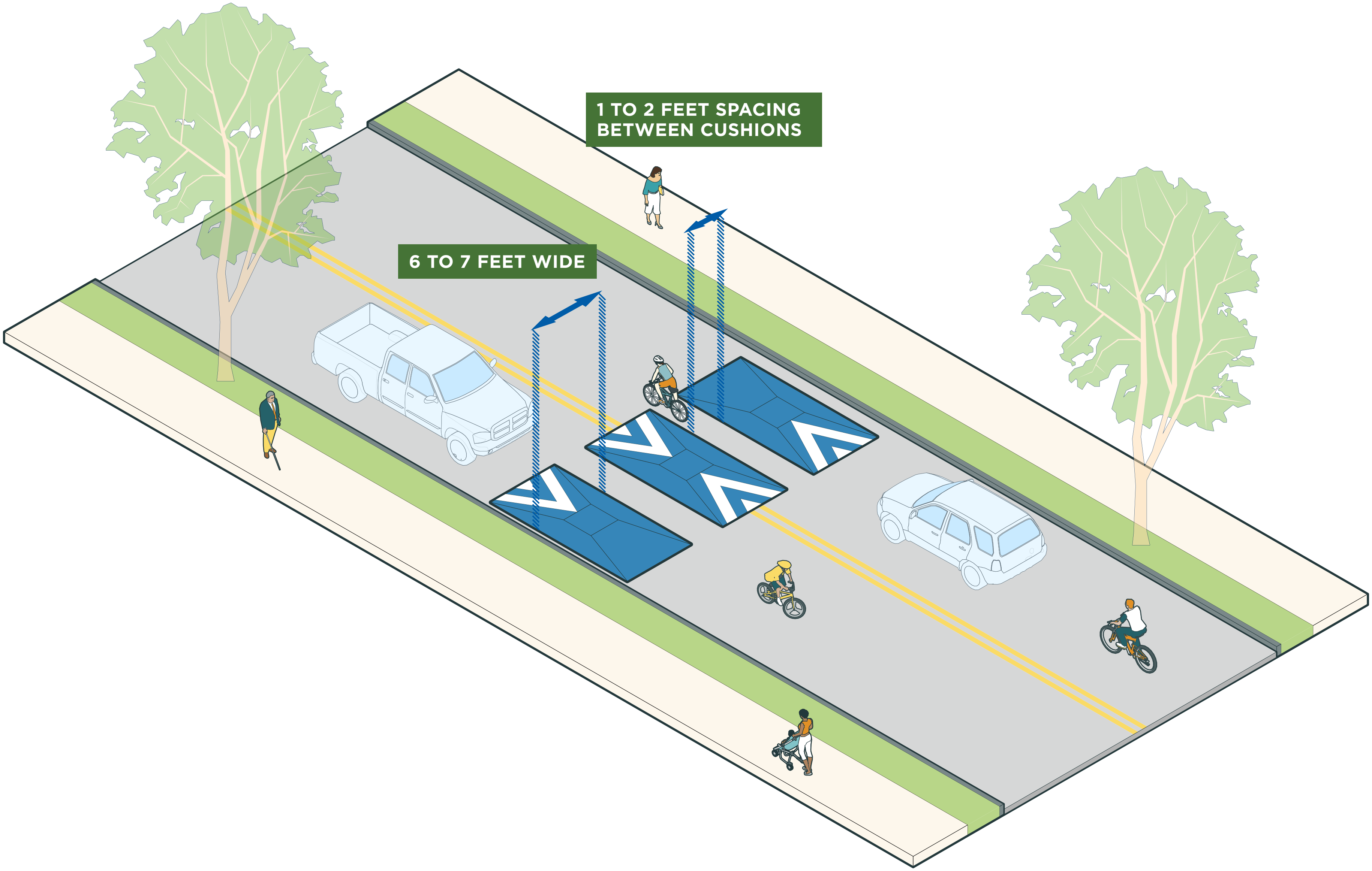


FIGURE 6-5 Speed Cushions

6.3.2.3 Raised Crosswalks

Raised crosswalks serve as both a **traffic calming measure** and a **pedestrian safety enhancement** by elevating the pedestrian crossing to sidewalk level. They require drivers to manage their speeds, which improves motorist yielding to people walking, biking, and rolling.

Raised crosswalks should be used at locations where a pedestrian crossing exists, and a speed table element is desired to calm traffic. Raised crosswalks are also beneficial:

- At transitions to a neighborhood street from a thoroughfare, boulevard, or avenue
- In school zones and near parks, libraries, and recreation centers
- In locations with high pedestrian activity such as town centers and transit stops
- At slip lane crossings

While raised crosswalks are suitable in many contexts, caution should be used when considering use on a signalized roadway.

DESIGN REQUIREMENTS

- Raised crosswalks shall be placed **perpendicular to the direction of vehicle travel** and aligned with the **Pedestrian Access Route** (PAR) to ensure PROWAG compliance.
- The length of a raised crosswalk shall match the **full roadway width** to connect sidewalk areas.
- The width of a raised crosswalk (measured perpendicular to the direction of pedestrian travel) shall be **at least 10 feet.**
- Raised crosswalks shall include **high-visibility crosswalk markings,** appropriate crossing **signage**, and speed hump markings on the approach ramps. Pavement markings and signage shall comply with the MUTCD. Clear markings and advance signage are especially important at night and in low-visibility conditions.
- The **cross slope** of a raised crosswalk shall comply with guidelines in PROWAG.
- The entire length of the crosswalk shall have a **5% maximum running slope** to comply with PROWAG.
- **Detectable warnings** shall be installed on both ends of the crosswalk.
- **Curb ramps** shall be installed if the raised crosswalk is below sidewalk elevation. Curb ramps at raised crosswalks shall **comply with PROWAG.** Curb ramps shall have detectable warning surfaces.
- **On-street parking shall be restricted** within 20 feet of the marked crosswalk.
- Raised crosswalks shall not impede stormwater drainage.
- Raised crosswalk shall not be placed in front of driveways.

DESIGN GUIDANCE

- Raised crosswalks are typically flush with the adjacent sidewalk; reduced heights between 3 inches and 6 inches may be considered if accessible curb ramps are provided.
- **Approach and departure ramps should be designed with a grade of 1:10 to 1:12** (approximately 8% to 10%) to provide a smooth transition while achieving speed reduction.
- Parking restrictions can be formally designated (with signage and pavement markings) or self-enforcing (with vertical elements such as flexible delineators, bollards, or planters).
- Coordinate raised crosswalk design with emergency services if placed on critical response routes.

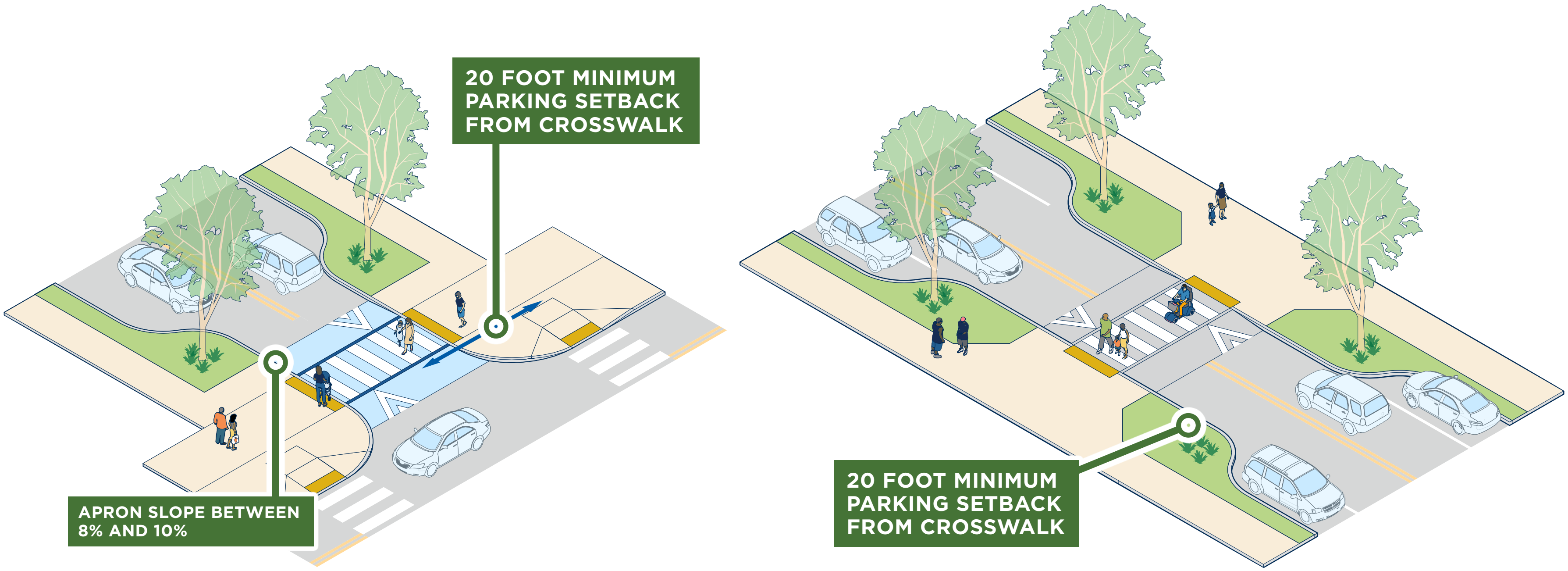


FIGURE 6-6 Raised Crosswalks

6.3.2.4 Raised Intersections

Raised intersections elevate the entire intersection platform—travel lanes and crosswalks—to reinforce pedestrian priority, improve visibility, and maintain safe vehicle speeds.

Raised intersections should be used at intersections where designers want to calm traffic and prioritize pedestrians. Raised intersections are also beneficial:

- At transitions to a neighborhood street from a boulevard or avenue
- At transitions to a pedestrian priority corridor (e.g. a commercial district)
- At intersections near school zones, parks, libraries, or recreation centers
- At intersections where two or more legs are recommended for raised crosswalks

DESIGN REQUIREMENTS

- Follow all raised crosswalk design requirements. Advance warning signage is not required for all crosswalks.
- Diagonal pedestrian crossings (if allowed) shall follow PROWAG guidance for maximum cross slope.

DESIGN GUIDANCE

- Follow all raised crosswalk design guidance.
- The entire area of the intersection should be raised.

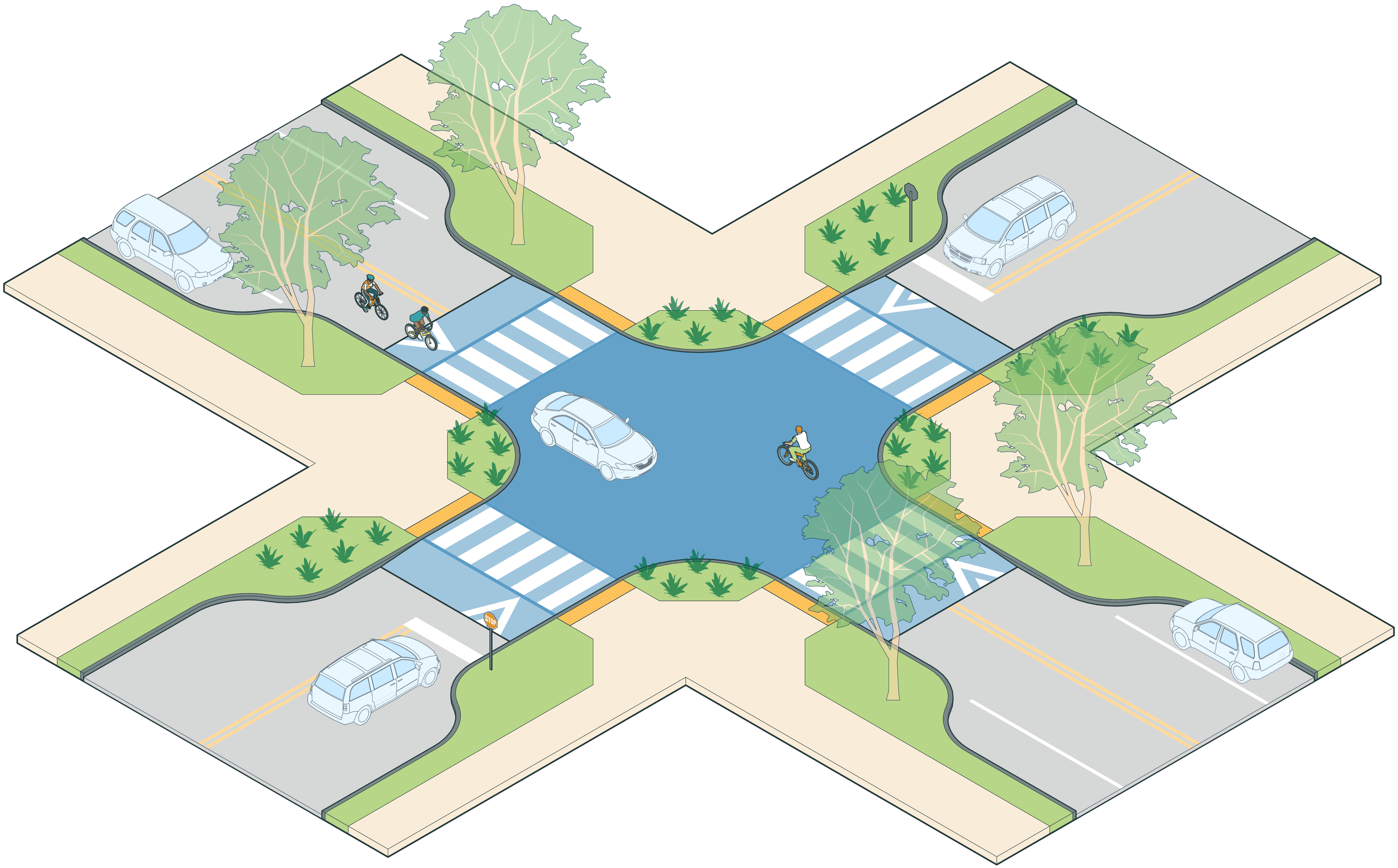


FIGURE 6-7 Raised Intersections

6.3.3 Horizontal Measures

Horizontal measures slow vehicular speeds by narrowing the street to minimum widths and introducing curvature to deflect traffic from a straight line of travel. Horizontal measures can change the "wide and straight" character of streets, which encourages higher-speed driving. Horizontal measures should be placed between 250 and 500 feet apart.

In addition to their safety benefits, horizontal measures offer a valuable opportunity to engage with community members to add desired amenities to a roadway. These amenities may include:

- Public art
- Street furniture
- Bicycle parking
- Planting areas

Similarly, some horizontal measures can create space to facilitate stormwater infiltration through:

- Bioretention areas
- Appropriately-sized tree filter boxes

When considering such additions, coordinate with the community and stakeholders such as the fire department and street maintenance team. Identify maintenance responsibilities in the design process. A collaborative approach helps create functional and community-oriented design.

6.3.3.1 Curb Extensions

Curb extensions, also known as bulbouts or neck-downs, extend the curb line into a parking lane or unused roadway space. They narrow the roadway, shorten pedestrian crossing distances, and increase the visibility of people walking and rolling, particularly where there is on-street parking.

Curb extensions should be considered in a variety of locations:

- **At intersection corners,** to tighten the intersection and help maintain safe vehicle turning speeds.
- **At bus stops,** to create a bus bulb and prevent illegal parking or stopping in a bus area (see **Section 4.4**).
- **Along corridors,** on alternating sides of a street to create chicanes (see **Section 6.3.3.6**).

DESIGN REQUIREMENTS

- Curb extensions shall be designed to **maintain positive drainage flow** along the curb.
- The length (along the existing curb) of a curb extension shall fully encompass the crosswalk.
- **On-street parking shall be restricted** within 20 feet of the crosswalk.
- Curb ramps shall comply with ADA and PROWAG. See **Section 5.4.2**.

DESIGN GUIDANCE

- Curb extensions typically extend **6 to 8 feet** into the roadway.
- There should be **1 foot of shy space** between the curb extension and adjacent travel or bike lanes.
- The corner radius should be 15-25 feet. Smaller radii are preferred. See **Section 5.1.2**.
- **Open throat inlets, slot drains, or modified curb cuts** may be used to handle stormwater at upstream and downstream edges.
- In some cases, curb extensions can be integrated with **green infrastructure** (e.g., rain gardens or permeable pavers).

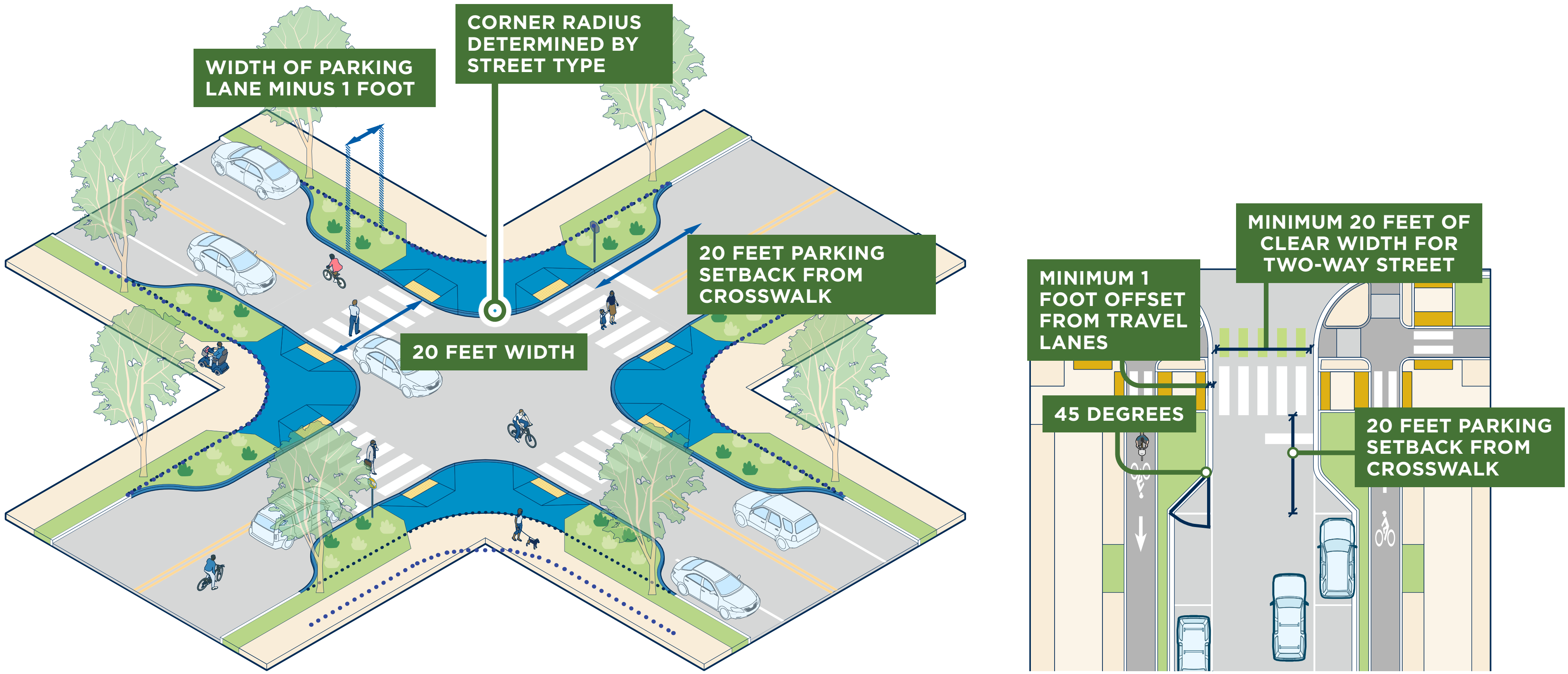


FIGURE 6-8 Curb Extensions

6.3.3.2 Roundabouts and Neighborhood Traffic Circles

Roundabouts and neighborhood traffic circles help to calm traffic by lowering vehicle speeds and can create additional safety benefits. See **Section 5.3**.

6.3.3.3 Neckdowns

A neckdown, also known as a choker or pinch-point, is a **traffic calming measure** that physically and visually narrows the **travel way at midblock locations** to manage vehicle speeds and improve pedestrian safety. A neckdown uses curb extensions or vertical elements (e.g., planters, flexible delineators) to narrow the travel way to a single lane, requiring motorists to yield to oncoming traffic to pass before proceeding.

Neckdowns are well-suited to low volume, two-way neighborhood streets, avenues, and boulevards. They should not be installed on thoroughfares or alleys.

DESIGN REQUIREMENTS

- Neckdowns shall maintain a **clear travel way width of 12-16 feet** to accommodate emergency vehicles.
- Neckdown curbs shall be painted yellow to increase visibility.
- Yellow centerlines shall not be used at these locations.

DESIGN GUIDANCE

- Neckdowns should have a **20-foot minimum length.** Their length may be extended based on roadway context and emergency service access.
- At locations where the curb or vertical elements may not be visible to motorists, provide white edge line markings and reflective flexible delineators or W1-6 (Object Marker) signs for visibility.

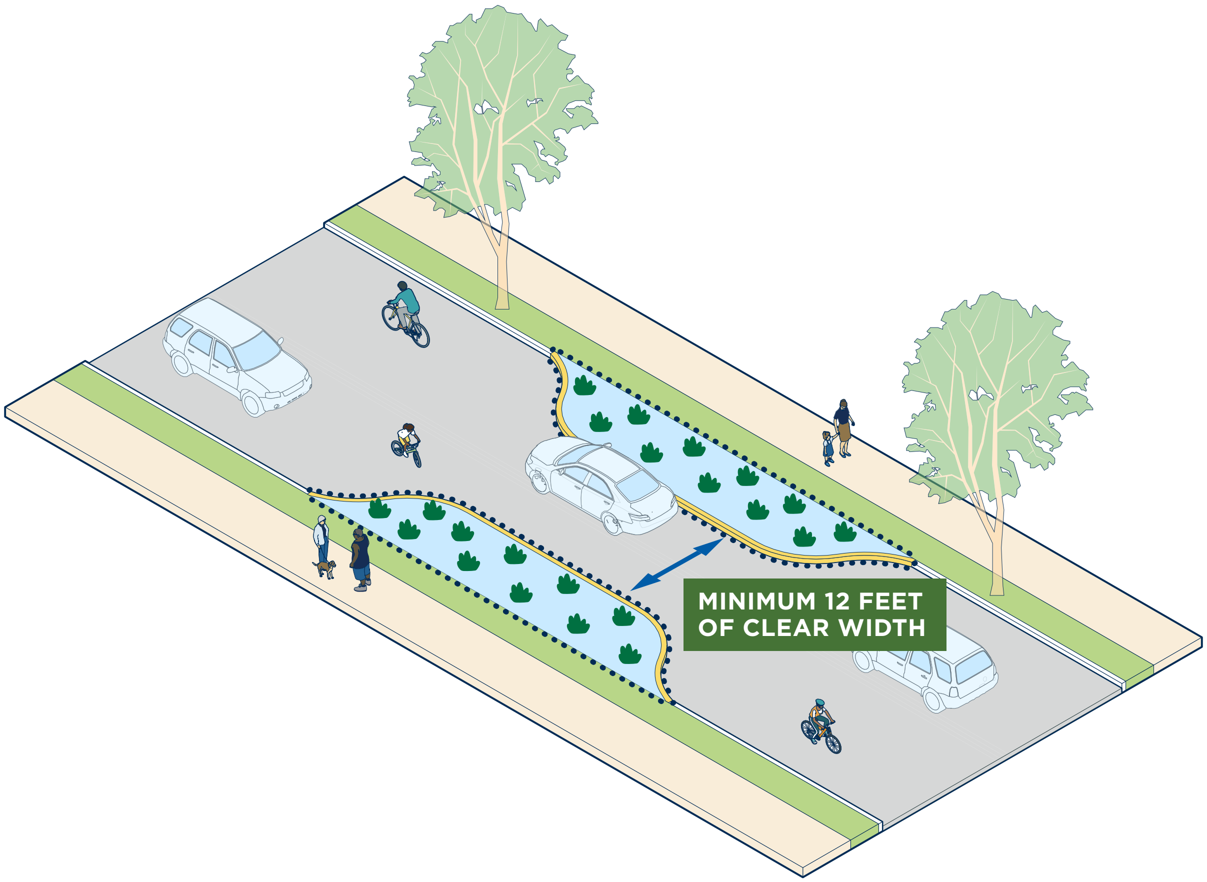


FIGURE 6-9 Neckdown

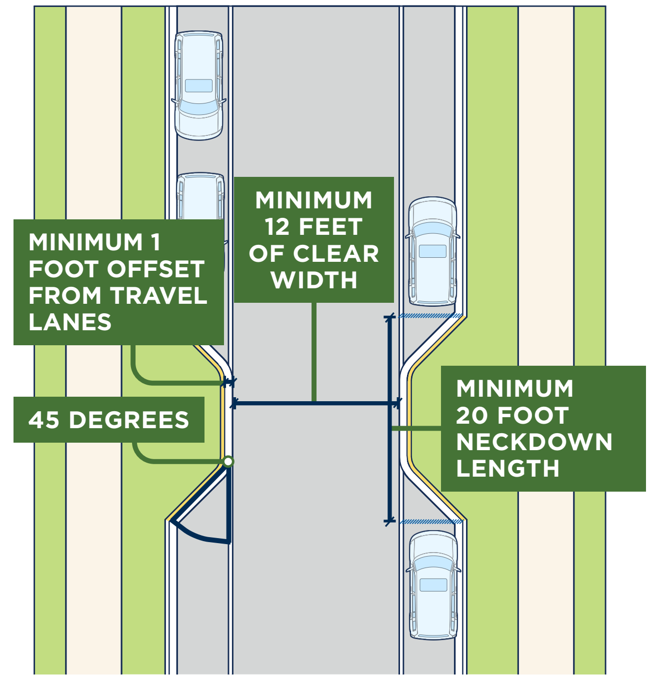


FIGURE 6-10 Typical Neckdown Dimensions

6.3.3.4 Crossing Islands/Median Refuge Islands

Crossing islands, also called median refuge islands, provide a protected space in the center of a street, allowing pedestrians to cross in two stages at intersections or midblock locations. Crossing islands also calm traffic by narrowing the roadway.

Crossing islands are recommended at the following locations:

- Unsignalized pedestrian crossings on roads with **3 or more lanes**
- Crossings with **high pedestrian activity** and/or crash history
- Transit stops or midblock crossings, especially near schools or parks

DESIGN REQUIREMENTS

- Crossing islands shall include **cut-throughs with detectable warning surfaces that align with marked crosswalks.**
- Cut-throughs shall **match the width of the crosswalk** (measured perpendicular to the direction of pedestrian travel). On roadways with speed limits of 40 mph or greater, the minimum width of the crosswalk shall be 8 feet.
- If there is a change of elevation at the crossing island, then crossing islands shall include **ADA-compliant ramps.**
- Crossing islands shall have a **minimum width of 6 feet** (measured perpendicular to the direction of vehicle travel). Median islands narrower than 6 feet shall not include detectable warning surfaces and shall not function as a refuge for pedestrians.
- Crossing islands shall include a rounded nose on both ends.

DESIGN GUIDANCE

- While the minimum width (measured perpendicular to the direction of vehicle travel) is 6 feet, crossing islands with a width of 8–10 feet are preferred for pedestrian comfort. Vehicle travel lanes should be narrowed to maximize crossing island width.
- The nose of a crossing island should be a minimum of 2 feet long (measured parallel to the direction of vehicle travel). A nose length of at least 5 feet is preferred.
- Side flares and catch basins should be used to **avoid water accumulation** in the pedestrian refuge.

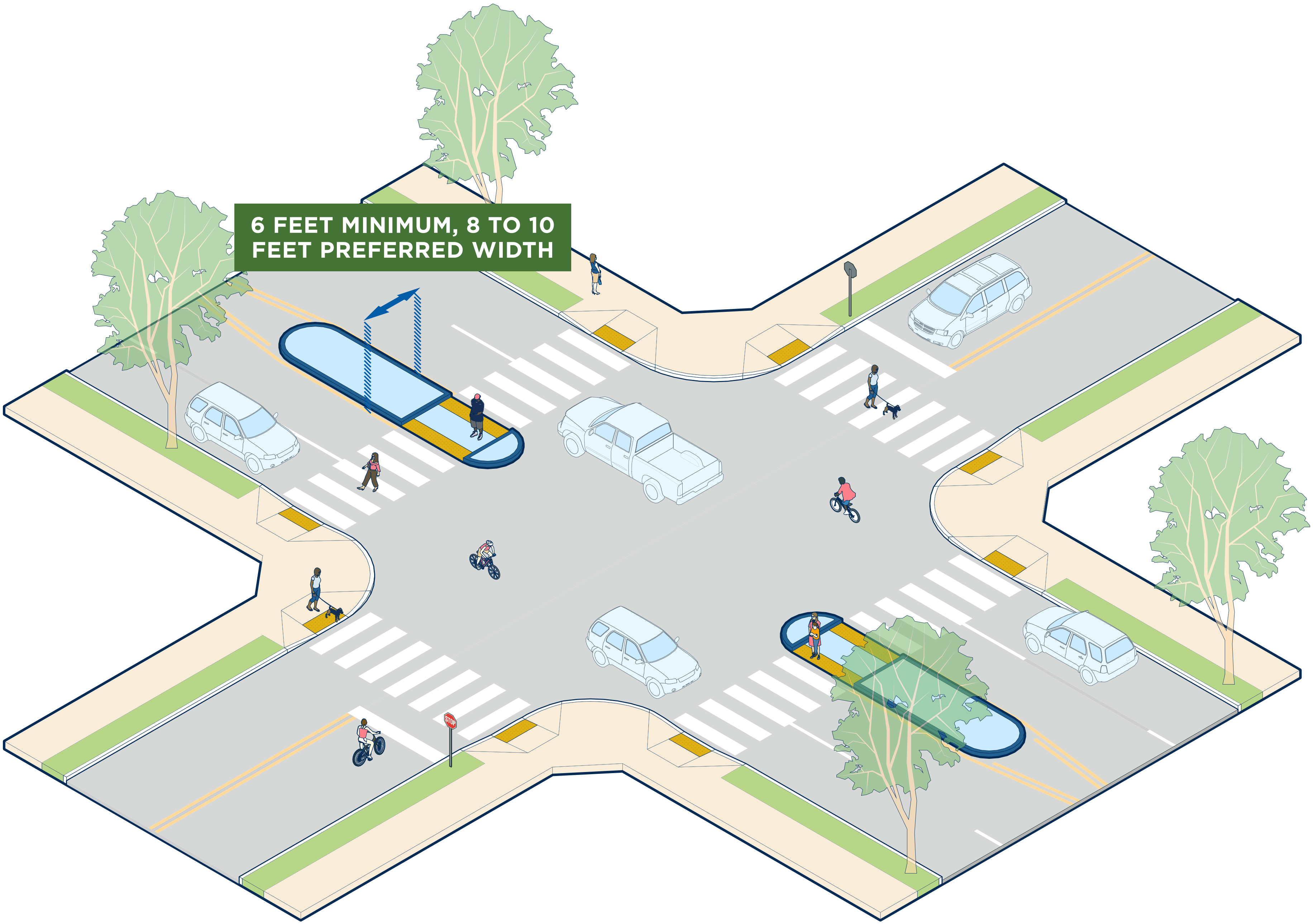


FIGURE 6-11 Crossing Island/Median Refuge Island

6.3.3.5 Lateral Shifts

A lateral shift realigns the roadway or travel lanes horizontally in one direction, forcing a change of direction to encourage slower operating speeds.

Lateral shifts are commonly used where left turn lanes are provided.

DESIGN REQUIREMENTS

- Lateral shifts shall comply with taper length guidelines in MUTCD Section 3B.12.

DESIGN GUIDANCE

- Lateral shifts can be created using a combination of **curb extensions, pavement markings, on-street parking,** and **landscaped medians.** Median islands should be used in all instances.
- The shift distance is based on the available width of the roadway up to one lane width. On roadways with on-street bicycle facilities, the lateral deflection may be reduced or shared lane markings and signage may be provided through the shift.
- Tapers and associated edge line pavement markings should be installed at a 45-degree angle to the curb or edge of pavement.

6.3.3.6 Chicanes

Chicanes alternate street features from one side of the street to the other, creating a serpentine travel path, typically through the addition of curb extensions or changes in roadway geometry. They can be combined with neckdowns to further slow traffic speeds. Curb extensions can also be used to manage stormwater, plant street trees, and provide benches, bicycle parking, or other amenities.

Chicanes and pinch points are effective traffic calming measures for lower-volume streets. They should be avoided on roads with higher volumes of buses and trucks and on primary emergency routes.

DESIGN REQUIREMENTS

- Chicane tapers and associated edge line pavement markings shall be oriented at a **45-degree angle to the curb or edge of pavement.**

DESIGN GUIDANCE

- Each direction should maintain a lane width of 10 feet.
- The default street width at pinch points is 20 feet.
- Curb extensions, landscaping, green infrastructure, or on-street parallel parking may be used to create a chicane.
- Vertical elements like plantings or signage should be used to alert drivers and snowplow operators to changing traffic patterns.
- Mountable curbs can be used to slow drivers while still accommodating larger motor vehicles.

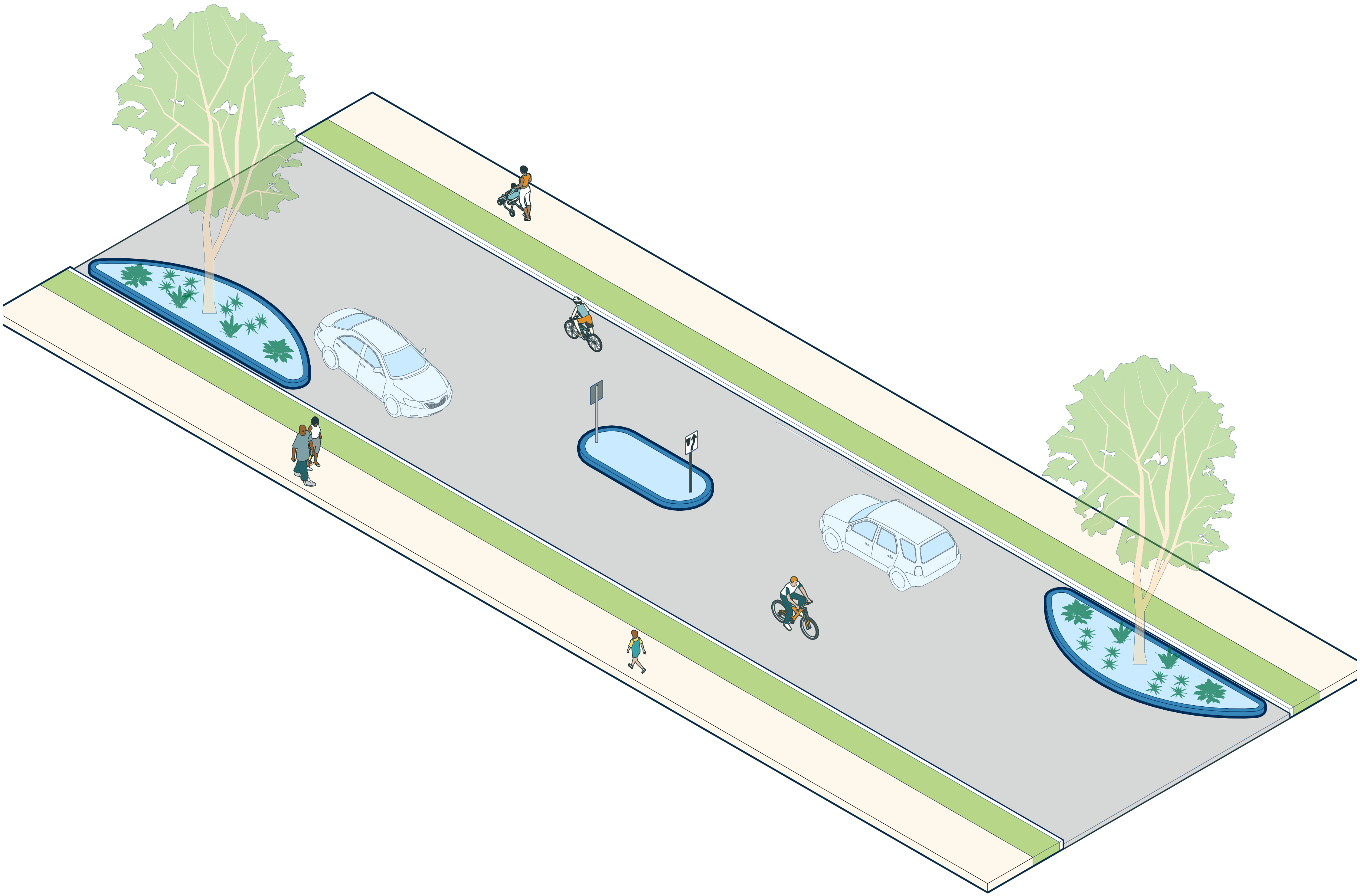


FIGURE 6-12 Chicanes with Median Island

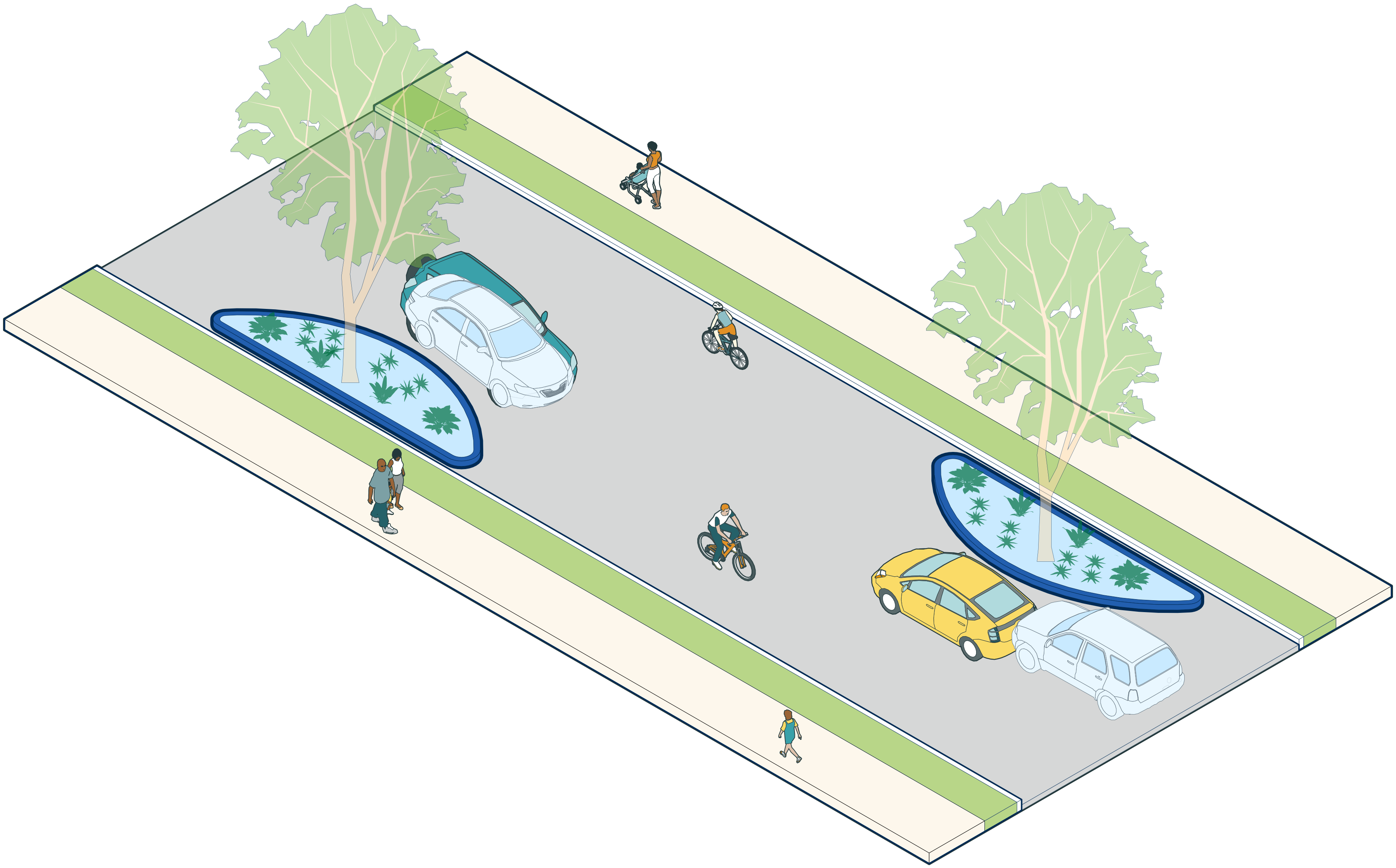


FIGURE 6-13 Chicanes with Landscaping

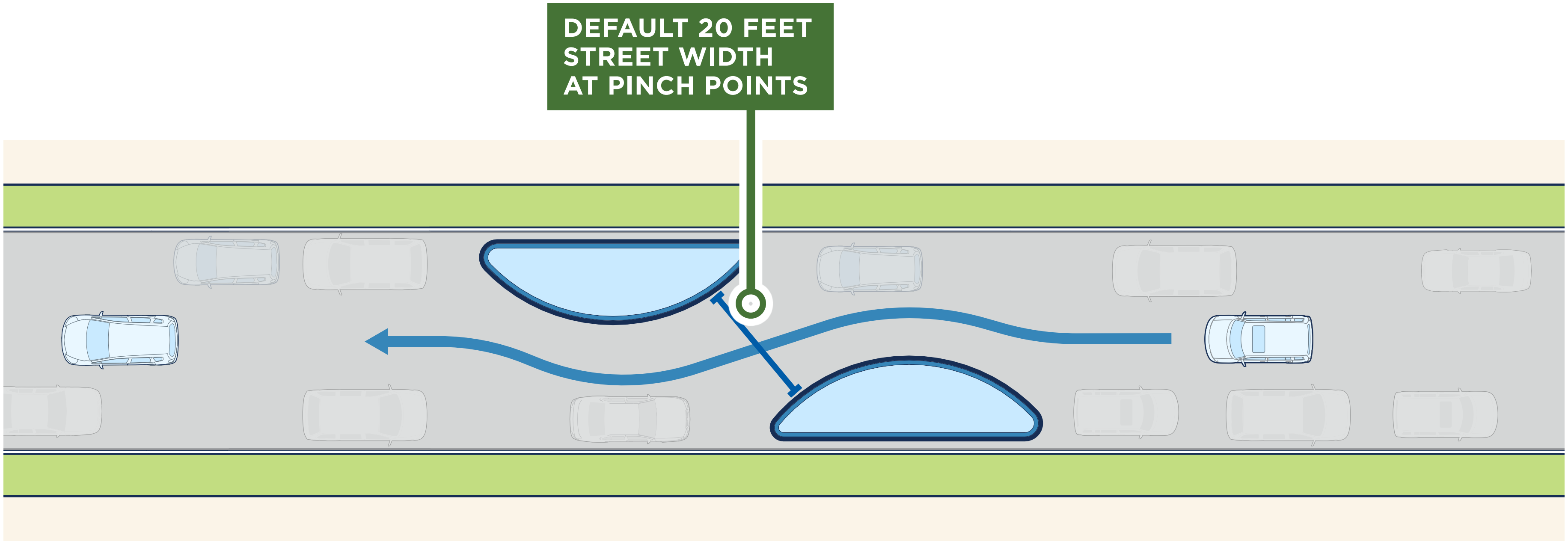


FIGURE 6-14 Typical Chicane Spacing

6.3.3.7 Roadway Curvature

Roadway curvature is a key factor in roadway design for speed management and overall safety. When feasible, it is advantageous to superimpose curves on existing straight street segments.

In less dense contexts, streets with gentle curves may encourage faster driving speeds. Streets like these may be retrofitted with speed management measures such as curb extensions, neckdowns, or chokers. In some development or redevelopment projects, it may be preferable to design streets with sharper corners. However, sight lines to oncoming travel lanes and pedestrian crossings must be maintained.

DESIGN REQUIREMENTS

- Clear sight triangles and sight distances shall be provided.
- An appropriate design vehicle shall be selected (See **Section 5.1.1**).
- Minimum radius shall match what is identified in the AASHTO Green Book for the desired turning speed.

DESIGN GUIDANCE

- The desired turning speed may be less than the posted speed and require a supplemental speed plaque.
- Design horizontal curves in coordination with vertical alignments and adjacent roadside conditions (vegetation, building siting, etc.).
- Encroachment by infrequent large vehicles into oncoming lanes may be appropriate on low volume, low speed streets.
- Where large vehicles are frequent, a larger radius of curvature, wider lanes, or a mountable truck apron may be appropriate to address off-tracking issues.

6.3.3.8 Low-Speed Corner Radii

Corner radii size determines both how fast a motor vehicle can navigate a turn and the length of pedestrian crossings. Low-speed corner radii limit corner radius to create safer intersections that can still accommodate larger vehicles. See **Section 5.1.2**.

6.3.4 Surface Treatments

While most streets are paved in asphalt or concrete, textured or special pavement treatments can be used to **reinforce driver awareness, calm traffic, and highlight pedestrian-priority zones.** These treatments enhance visibility and communicate context changes—such as entering a slower-speed area or crossing a high-foot-traffic zone—through **visual, tactile, and sometimes audible cues.**

Special pavements include:

- **Textured pavement:** stamped concrete or asphalt
- **Low-volume decorative materials:** chip seal, brick, gravel, asphalt pavers, and colored pavements
- **Porous pavements:** permeable pavers and porous asphalt (often integrated with stormwater management strategies)

Special pavements are recommended where:

- There is a desire to **highlight pedestrian crossings or zones** (e.g., town centers, schools, parks, senior centers).
- **Traffic calming** is desired without using vertical deflection (especially on transit or emergency routes).
- A **gateway treatment** is needed to signify entrance into a slower-speed or multimodal zone.

DESIGN REQUIREMENTS

- The use of alternative pavements requires approval from the Division of Water Quality, Division of Engineering (New Development) and Division of Streets & Roads.
- Alternative pavements shall meet the minimum pavement design criteria outlined in **Section 8.2.**
- Colored pavement usage shall comply with the MUTCD, which restricts the use of colored pavement to specific applications (e.g., red for transit lanes, green for bike lanes).

DESIGN GUIDANCE

- Special pavement treatments can be used for the length of a street or in specific locations such as an intersection or a parking lane.
- Materials should be integrated with subsurface stormwater systems and properly maintained to remain effective.
- Impermeable surfaces should be avoided in areas targeted for runoff reduction.
- **Porous pavements** reduce surface runoff by allowing water to infiltrate the ground, supporting **low-impact development (LID)** goals.
- Areas with lower traffic volumes—such as parking lanes, bike lanes, sidewalks, and shoulders—experience less surface wear than travel lanes but may require more frequent maintenance to manage silt buildup, clogging, and vegetation encroachment.

MATERIAL GUIDANCE

- **Durability:** Choose materials that can withstand snowplows, heavy vehicles, frequent turning, and freeze-thaw cycles.
- **Color Contrast:** Use **contrasting colors or patterns** to increase visibility and distinguish the treatment area from adjacent travel lanes.
- **Crosswalk Integration:** Textured materials can be used within or between standard **white transverse lines** to maintain MUTCD compliance; however, these materials must meet the surface requirements.
- **Noise and Visual Impact:** Certain materials (e.g., pavers, chip seal) may produce **more tire noise** than standard asphalt, which could affect nearby homes or noise-sensitive uses.
- **Maintenance:** Evaluate long-term **maintenance and repair needs** during planning, especially for materials susceptible to **cracking, color fading, or joint shifting.** Materials should be maintainable with standard municipal equipment.

FIGURE 6-15 Surface Treatments

6.3.5 Enclosure

Vertical elements along a street's edge — such as medians, street trees, and buildings — create a sense of enclosure and make a street feel narrower. This "side friction" helps manage vehicle speeds.

Using fixed objects, landscaping, and trees to create a sense of enclosure can be appropriate in all contexts; however, adequate clear zones and sight distances should be provided on higher speed streets.

6.3.5.1 Medians

Medians are raised areas placed between opposing lanes of traffic. They serve to **organize vehicle movements** and—when designed appropriately—**enhance pedestrian safety by providing a refuge at crossings.** When medians include **trees or plants,** they can help calm traffic by visually narrowing the roadway. Medians also provide space to install signage and lighting.

See **Section 4.3.5** for detailed guidance on medians per Lexington Complete Street type.

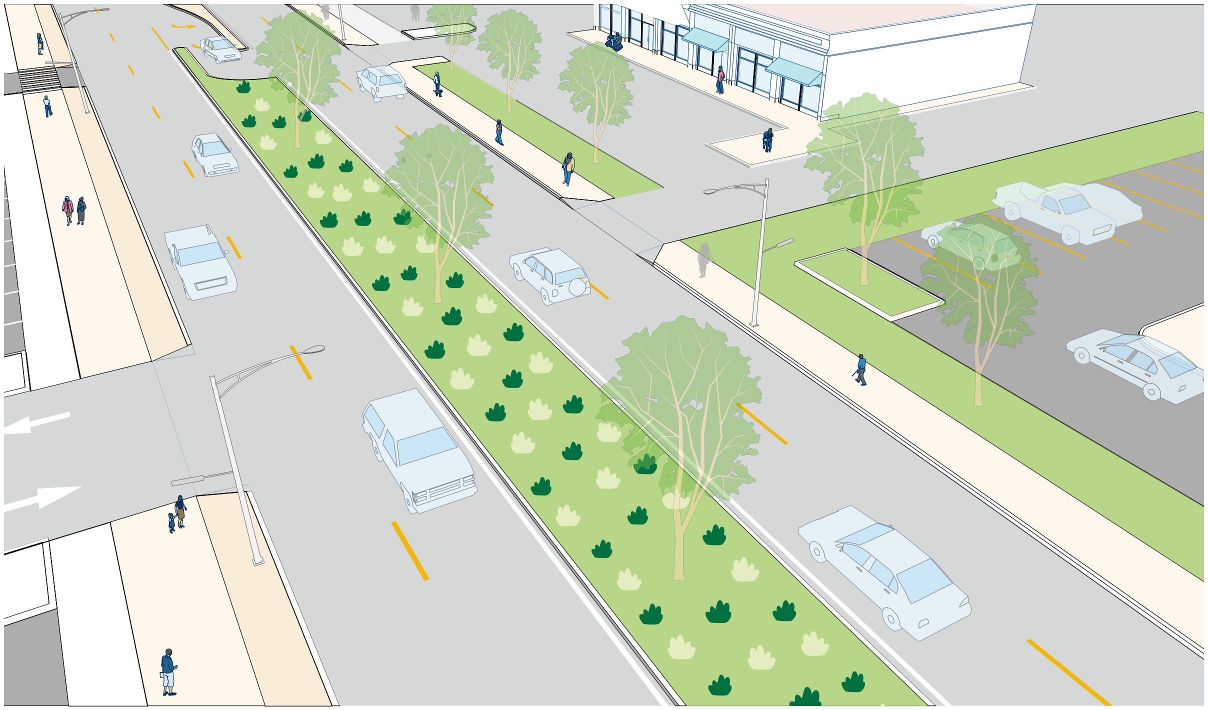


FIGURE 6-16 Median

6.3.5.2 On-Street Parking

On-street parking can function as a **traffic calming tool** by visually narrowing the roadway, buffering pedestrians from moving vehicles, and reinforcing lower-speed street environments in areas where pedestrians are present and parking is in moderate to high demand. Locations with higher turnover parking also introduce additional friction to travel lanes as people perform parking maneuvers, supporting lower speeds.

In locations where parking is in low demand, the street appears wider, which can encourage higher speeds. In these locations, **repurposing parking lanes** for **bike lanes, wider sidewalks, amenity zones, loading zones,** or **green infrastructure** should be considered.

See **Section 4.3.4.1** for detailed guidance.

6.3.5.3 Gateway Treatment/Signage

Gateway treatments are visual and physical cues that signal a **transition to a different street context,** such as a **slower-speed area, residential zone, school zone,** or **pedestrian-priority corridor.** These treatments are designed to alert drivers that they are entering an environment where **expectations for speed, behavior, and multimodal interaction change.**

Gateways are typically placed at **neighborhood entry points, town centers,** or **corridors transitioning from arterial to local character.** Gateways can be a strategy for neighborhoods to communicate a sense of identity through a sign, banner, landscaping, or other structure(s).

Gateways are often most effective when **combined with other traffic calming elements,** such as curb extensions, street trees and landscaping, medians, raised crosswalks, textured pavement, monuments or identity signage, overhead decorative art, or special lighting treatments.

FIGURE 6-17 Example Gateway Treatments

6.3.5.4 Street Trees and Landscaping

Street trees and landscaped elements play a critical role in supporting traffic calming objectives by shaping how drivers perceive and respond to the roadway environment. When thoughtfully integrated into medians, curb extensions, and planting strips, landscaping treatments can influence driver behavior, enhance safety, and improve the overall comfort and appeal of the street. The AASHTO Roadside Design Guide identifies trees as an element desirable in gateways, which are "intended to produce a traffic-calming effect by emphasizing to motorists that a change in the character of the roadside […] has occurred, such that slower and more cautious operation of their vehicle is appropriate." Street trees are also identified as speed reduction mechanisms by the National Association of City Transportation Officials (NACTO). The Institute of Transportation Engineers (ITE) notes that street trees can be used to provide a sense of definition and enclosure in a roadway environment.

See **Section 4.5** for more information.

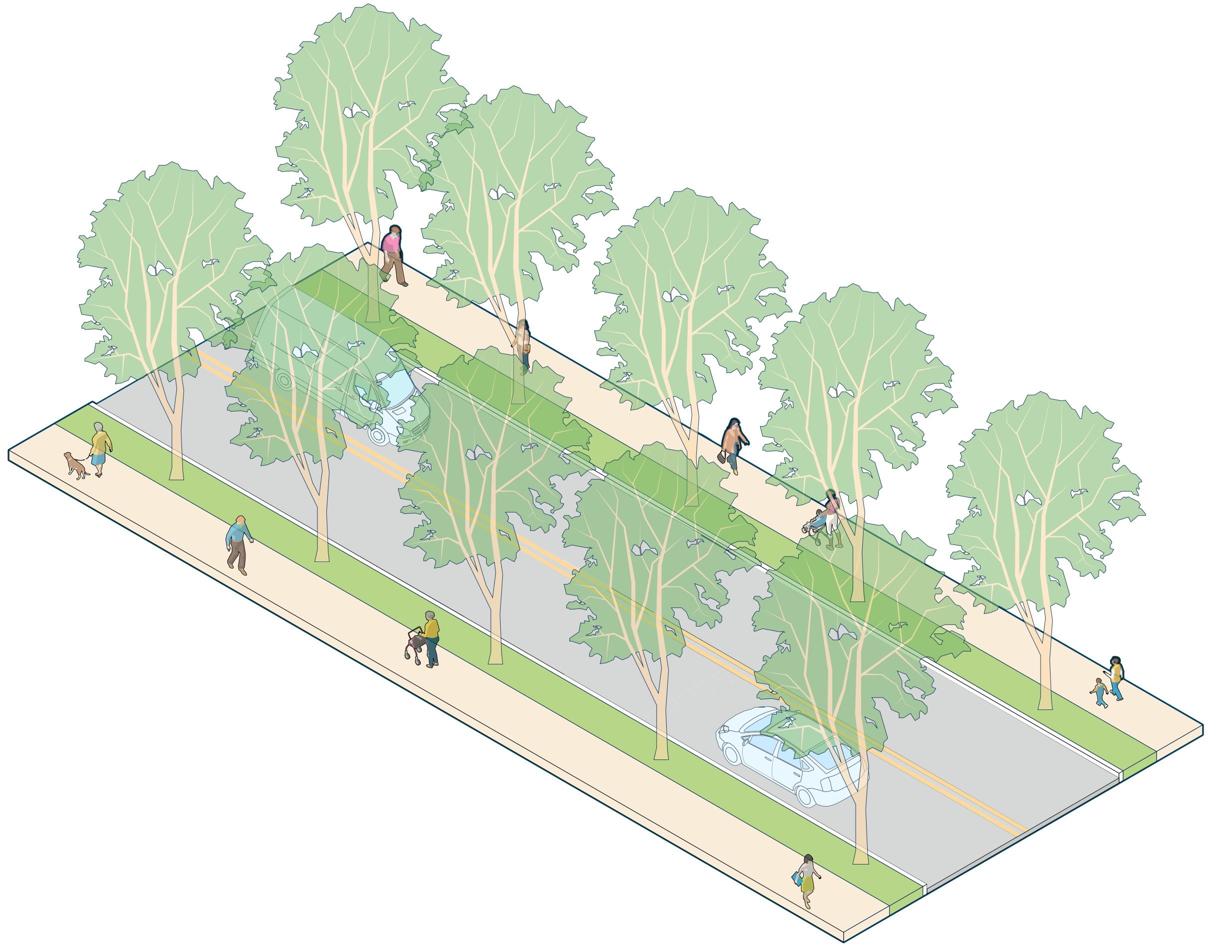


FIGURE 6-18 Street Trees Along Roadway

FIGURE 6-19 Street Trees Along Roadway with Bike Lanes


Central Bank

7 Street Improvement Procedures for Public Projects

7.1 Applicability

This chapter defines how the Manual's guiding principles and standards shall be applied throughout the design and delivery of LFUCG's roadway improvement projects and other capital investments that significantly affect public roadways. All roadway projects shall demonstrate consistency with the Manual and clearly document how design alternatives, trade-offs, and deviations from the guidelines and standards are evaluated in the design process. While this chapter establishes overarching expectations for project development, LFUCG may adopt internal Standard Operating Procedures (SOPs) to implement these expectations.

7.2 Coordination Expectations

Complete Streets implementation requires coordinated action across many LFUCG divisions, partner agencies, and advisory bodies to bring together policy leadership, technical and design expertise, operational and maintenance knowledge. All relevant LFUCG divisions and external stakeholders should be consulted during project development to identify any potential needs or conflicts early in the design process and work to resolve them collaboratively. Coordination is necessary in all project phases – from conceptual design through construction.

Coordination shall:

- begin at project initiation and continue through all phases of project development
- include any entity that has existing or potential future infrastructure, operational responsibilities, or regulatory authority within the project area
- identify and proactively resolve any conflicts to avoid unnecessary delay or subsequent design revisions
- ensure project design considers long-term operational and maintenance needs

The level and timing of coordination may vary based on project scope and complexity; however, some level of communication with relevant stakeholders is expected for all project types.

7.2.1 Internal Agencies

LFUCG shall establish Standard Operating Procedures (SOPs) to ensure all internal stakeholders are consulted during project development to provide input and expertise in the fields of planning, engineering, traffic operations, maintenance, water quality, urban forestry, waste collection, public safety and emergency response.

Operation and maintenance (O&M) divisions should be engaged during planning and design to confirm that projects are durable and practical to maintain. Their review ensures long-term needs for equipment, staffing, and funding are anticipated and addressed, so that new infrastructure can be effectively operated once built. Early integration of O&M perspectives is required to avoid conflicts, minimize future costs, and support a reliable transportation system.

7.2.2 External Stakeholders

External stakeholders may include public transit providers, state and federal transportation agencies, privately-owned utility providers (i.e. electric, gas, water, and telecommunications) or other entities. The operational needs, service requirements, infrastructure limitations, or other constraints of external entities should be identified early in the design process. Consultation should be ongoing through project development.

Coordination goals include:

- identifying existing infrastructure within the public right of way
- integrating infrastructure or service improvements that are beneficial to the public through the project design
- minimizing service and operational disruptions during project construction
- ensuring projects support long-term system performance goals

7.2.3 Boards, Commissions & Advisory Groups

Relevant boards, commissions, and advisory groups should be consulted during project design phases to provide input within their area of expertise or oversight authority to ensure Complete Streets projects align with broader community goals.

Example entities include the Tree Board (street trees and canopy preservation), Corridors Commission (enhancement of designated entrance corridors and scenic byways), Access Lexington Commission (accessibility guidance), and the Bicycle and Pedestrian Advisory Committee (multimodal access and mobility priorities).

7.2.4 Implementation Opportunities

LFUCG shall strive to incorporate Complete Streets improvements into routine maintenance, capital programs, and infrastructure improvements. Meaningful improvements such as enhanced crossings, reconfigured lane use, improved visibility, and safety features can be made at a lower cost during resurfacing, restriping, signal upgrades, and other routine activities. Multimodal improvements can also be integrated with larger infrastructure projects such stormwater and sanitary sewer projects, park improvements, construction or renovation of government buildings. These interventions may include permanent infrastructure or quick-build materials. This integration enables incremental and cost-effective progress toward Complete Street goals without relying solely on large-scale street reconstruction projects.

7.3 Community Engagement

Publicly funded projects shall include early and continuous engagement with stakeholders and the public throughout project development. Community engagement informs project goals, improves design outcomes, and helps ensure that transportation investments reflect the needs and priorities of the people who use them.

7.3.1 Expectations for Engagement

Community engagement efforts should seek to build consensus and public trust and should occur at the outset of a project and at key decision points. Engagement efforts should:

- be proportional to project scale and impact
- occur during concept development and prior to major design decisions
- use inclusive and accessible outreach methods
- document feedback and demonstrate how it influenced design outcomes

7.3.2 Transparency, Inclusion, and Equity

Project teams should demonstrate transparency, inclusion, and equity in the engagement process. Engagement efforts should be designed to reach a broad range of users and ensure that project decisions consider the needs of all members of the community. This includes:

- providing clear, accessible, and timely information about the project including when and how project decisions will be made and by whom
- actively engaging underrepresented and historically marginalized communities
- evaluating how project outcomes may affect different user groups and community members

7.4 Project Development Process

LFUCG capital improvement projects shall demonstrate consistency with the goals and principles of this Manual throughout all phases of project development. LFUCG staff shall reference any internal SOPs for detailed requirements governing approvals, documentation, and interdepartmental coordination.

7.4.1 Concept Development & Community Visioning

Whether initiated by the LFUCG, Lexington Area MPO, or KY Transportation Cabinet – any roadway project proposal begins at the conceptual and planning level. At this stage, projects should have a clearly defined purpose and need that is informed by public input. This phase is typically managed by the Division of Planning and MPO in collaboration with the Division of Engineering and partner agencies such as KYTC District 7 and Lextran.

7.4.2 Feasibility & Alternatives Analysis

At this stage, project concepts are further refined in alignment with the project vision. Alternatives are evaluated and community input helps shape and inform which project concept advances to full design. Expectations at this stage of project development include:

- developing, evaluating and considering trade-off between design alternatives that reflect Complete Streets principles
- establishing the appropriate street type, design speed, and modal priorities
- engaging stakeholders and the public early to shape project concepts and inform key decisions
- engaging property owners that may be affected within the project area to identify access needs and potential impacts

Community engagement shall be commensurate with project scale and complexity and shall occur before major design decisions are finalized.

7.4.3 Preliminary and Final Design

Preliminary and final design advances the preferred alternative through detailed engineering review and ensures compliance with any applicable design standards. The project design phase confirms and refines items such as:

- Roadway and intersection geometry
- Drainage and utilities
- Right-of-way impacts and limits
- Materials and specifications
- Cost estimates
- Bid documents

If detailed engineering reveals constraints that require a deviation to the preferred alternative, any major design alterations shall include an inter-disciplinary evaluation of potential impacts and trade-offs and shall follow any established SOPs for such review. Proposed engineering solutions must demonstrate consistency with project goals and guiding principles of this Manual. Additional public review may be warranted depending on the scale of required adjustments.

7.4.4 Project Delivery and Construction

Project construction activities shall be completed in accordance with approved plans and shall maintain safe, convenient, and continuous access for all users throughout the construction process.

Expectations for construction include:

- implementing approved traffic control and work zone safety measures
- maintaining pedestrian, bicycle, and transit access or providing alternative access that does not compromise safety or require significant out of direction travel
- notifying and coordinating with utilities and affected property owners
- providing inspection and oversight to ensure compliance with engineering plans

7.4.5 Operations and Maintenance

Projects shall be designed to support long-term operations and maintenance of the transportation system. Project designs shall consider:

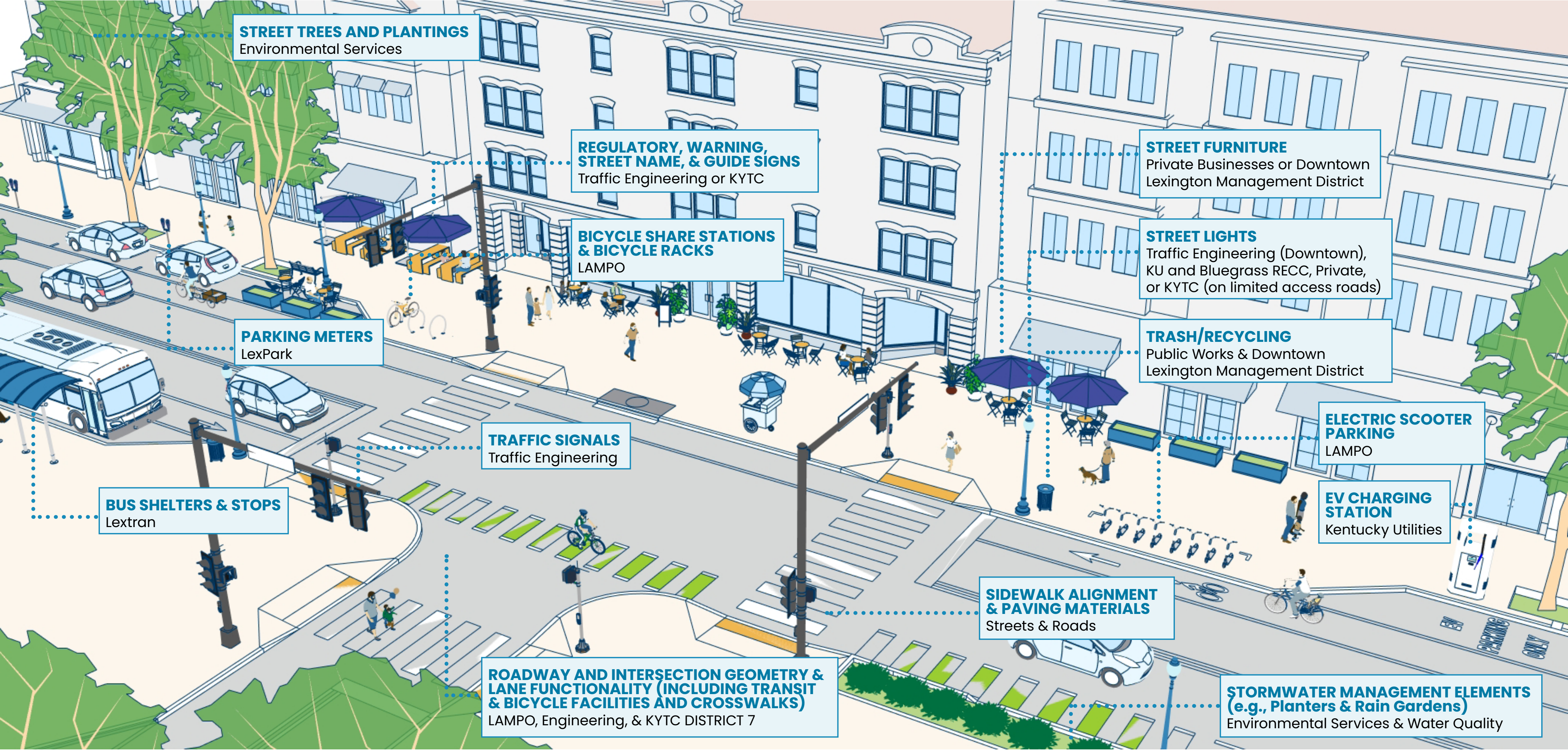
- durability of materials and infrastructure
- access for maintenance equipment
- long-term operational needs, costs, personnel and equipment
- performance of drainage and green infrastructure systems

Coordination with operations and maintenance divisions during planning and design ensures that infrastructure can be effectively maintained and operated over its lifecycle.

7.5 Design Exceptions

All projects shall comply with the design standards of this Manual. Exceptions shall be rare and shall require clear justification, documentation, and approval in accordance with the adopted Complete Streets Policy which states:

Appropriate justifications for excluding accommodations for a specific mode of transportation during roadway improvement projects and maintenance activities include, but are not limited to, findings that:



1. Specific Complete Streets principles are prohibited by law, such as bicycle and pedestrian facilities within access-restricted highway corridors;
2. Reasonable opportunities for Complete Street improvements cannot be achieved through routine maintenance activities that do not change the roadway geometry or operations;
3. Emergency repairs to streets and sidewalks due to broken utility lines, natural disasters, or human error.

There shall be a transparent review process for all proposed exceptions by submitting clear supportive documentation in writing justifying the exception to the Commissioner of Public Works, or designee, with opportunity for public comment as needed.

Appropriate justifications for exceptions that shall follow this review process include, but are not limited to, findings that:

1. The cost of complying with Policy on a project would substantially exceed the public value to be realized, taking into consideration the need and probable use of the project;
2. Compliance with Policy would substantially impair unique characteristics of great public value, such as areas formally identified as having historical importance, sensitive environmental or cultural characteristics.

8

Pavement Design and Construction Specifications

This chapter establishes the pavement design criteria and construction specifications applicable to all public and private streets within Lexington-Fayette County.

8.1 State and Federal Highways

Roadways designated as State or Federal Highways shall meet all pavement design requirements and construction specifications established by the Kentucky Transportation Cabinet.

8.2 Pavement Design Criteria

LFUCG has established a 20-year life cycle standard for all streets in Lexington-Fayette County including public streets, private streets, and access easements (where applicable).

8.2.1 Earthwork, Subgrade Preparation, and Subsurface Conditions

Proper preparation and treatment of subgrade, granular base, and base course is essential to the structural performance, durability, and service life of street pavements. Earthwork and pavement support layers shall be designed and constructed in accordance with approved geotechnical investigations and applicable **LFUCG Engineering Manuals** and KYTC Specifications.

8.2.1.1 Related Definitions

The following terms and definitions are used throughout this section:

1. **Subgrade** – The in-place natural soil that supports all overlying roadway layers.
2. **Modified Subgrade** – A treated or improved layer of subgrade material used where native soil strength is inadequate. Modification may include chemical stabilization, compaction, or blending of materials to achieve required strength, reduce moisture susceptibility, and mitigate frost-related effects.
3. **Granular Base** – A constructed layer of granular material placed above the subgrade to provide structural support for the pavement. Granular base materials shall meet specified requirements for strength, durability, gradation, and aggregate quality and serve as the foundation for asphalt or portland cement concrete pavements.
   a. **Dense Graded Aggregate (DGA)** is a well-graded mixture of crushed stone, gravel, and fines that compacts to form a dense, stable layer with minimal void space.
   b. **Crushed Stone Base (CSB)** refers to a base course material composed of crushed stone, typically with a controlled gradation that may include fewer fines than DGA, depending on the specification.
4. **Pavement Structure** – The engineered layers placed above the granular base, consisting of:
   a. **Base Course:** One or more layers of specified material and thickness that distribute loads and support the surface course. For asphalt pavements, the base course provides structural support beneath the surface course. For portland cement concrete pavements, the base and surface functions are combined into a single slab.
   b. **Surface Course:** The uppermost pavement layer designed to carry traffic loads, provide ride quality, resist wear, ensure skid resistance, and limit water infiltration. Asphalt surface courses consist of mineral aggregates and asphalt binder; portland cement concrete pavements perform this function within the concrete slab.

8.2.1.2 Testing Requirements

Prior to roadway design, geotechnical testing of existing soils and proposed subgrade shall be performed in accordance with the Lexington-Fayette Urban County Geotechnical Manual.

The Engineer shall review all available subsurface information prior to finalizing pavement design including soil maps, boring logs, laboratory test results, and other site-specific geotechnical data. Pavement design shall be consistent with the recommendations of the approved geotechnical report, including subgrade treatment, material selection, and any required stabilization measures.

8.2.1.3 Subgrade Analysis

A geotechnical analysis shall be completed for all roadway projects in accordance with the LFUCG Geotechnical Manual.

Subsurface investigation shall evaluate soil classification, moisture sensitivity, and bearing capacity, with particular attention to fine-grained soils that are susceptible to moisture-related strength loss. Testing shall include determination of the California Bearing Ratio (CBR) in accordance with applicable ASTM standards.

- Soils with a CBR value less than 5.0 shall require subgrade stabilization or replacement, or as recommended in the Geotechnical Report.
- Geotechnical recommendations shall address seasonal moisture effects, including conditions associated with winter and early spring freeze–thaw cycles.
- Pavement design shall be based on the lowest anticipated in-service subgrade strength, not short-term construction conditions.

8.2.1.4 Subgrade Preparation

All streets shall be constructed on a compacted or stabilized subgrade capable of supporting the designed pavement structure.

- Placement of granular base directly on weak or unstable natural soils is not permitted.
- Subgrade soils shall be compacted, improved, or stabilized as required to meet design strength and durability criteria.

Acceptable methods of subgrade improvement may include, as recommended by the Geotechnical Report:

- Moisture and density control through compaction
- Undercutting unsuitable materials and replacement with approved granular material
- Proof rolling and corrective re-compaction
- Use of granular working platforms
- Use of geosynthetics in combination with granular layers

Where chemical stabilization is required:

- Hydrated lime shall be used for fine-grained soils with high clay content.
- Portland cement shall be used for granular or coarse-grained soils.
- Stabilization methods shall be designed and constructed in accordance with KYTC specifications and geotechnical recommendations.

8.2.1.5 Granular Base and Pavement Design

Granular base and pavement thicknesses shall be designed using procedures in the latest AASHTO Pavement Design Guide, informed by site-specific geotechnical data.

- The Engineer shall compare calculated pavement thicknesses to the minimum values provided in Table 8-1.
- In no case shall base or pavement thicknesses be less than the minimums shown in Table 8-1, regardless of calculated results.
- Concrete pavements shall meet KYTC Class A concrete requirements, unless otherwise approved by LFUCG.

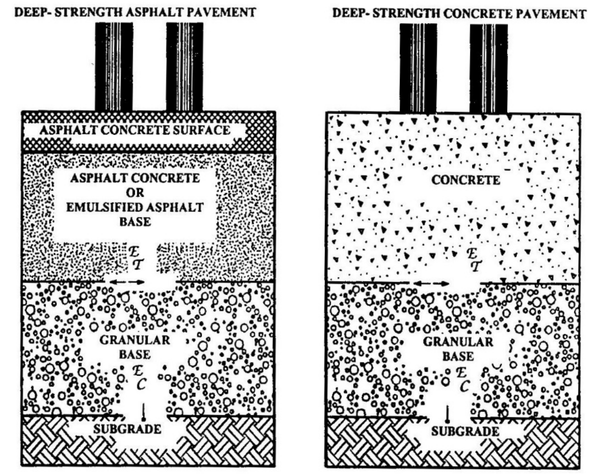


FIGURE 8-1 Pavement Design

The Lexington-Fayette County Division of Engineering may also approve experimental materials for limited use. It is the responsibility of the design Engineer planning to use these materials to demonstrate their effectiveness and required thickness.

TABLE 8-1 Minimum Thickness Standards for Granular Base and Pavement Courses

Street Type	Road Classification	Land Use	Thickness (Inches):	
			Asphalt Surface Course/Asphalt Base Course/ Granular Base	Portland Cement Single Course/ Granular Base
All Street Types	All Road Classifications	Non-residential (Urban)	1.125 / 6 / 9	8 / 4
Throughfare/ Boulevard	Arterial / Collector	Residential (Urban or Rural)	1.125 / 6 / 9	8 / 4
Avenue	Collector	Residential (Urban or Rural)	1.125 / 6 / 8	7 / 4
Neighborhood St/Alley	Local	Residential (Urban or Rural)	1.125 / 3 / 9	6 / 4

Note: "Full depth" asphalt concrete pavements are not permitted in Lexington-Fayette County. Asphalt pavements must be constructed on a proper depth of granular base.

8.2.1.6 Pavement Design Procedures

Procedures for designing flexible pavements include:

1. For a residential street, estimate the number of houses that will be served by the street. For a loop/cul-de-sac, it will equal the number of houses on that street. For a continuing street, it will equal the number of houses that will use the street when entering/leaving the subdivision.
2. For a street that will serve industrial or commercial property, estimate the gross floor area for the development. For hotels and motels, estimate the number of rooms.
3. Determine the number of Equivalent Single Axle Loads (ESALs) from **Table 8-4** for residential streets, and from **Table 8-5** for commercial/ industrial streets.
4. Based on the CBR, determine the required Structural Number from **Table 8-6**. The minimum structural number shall be 2.84 for residential streets, 4.04 for collector streets, and 4.16 for arterial streets.
5. Determine the required thickness of asphalt, DGA, and No. 2 stone to achieve the required Structural Number. The layer coefficients are listed below:
   - Asphalt – 0.44
   - DGA – 0.12
   - No. 2 Stone – 0.08

The following are the minimum thicknesses for asphalt and DGA.

TABLE 8-2 Minimum Thicknesses for Asphalt and DGA by Street Type

Street Type	Road Classification	Land Use	Asphalt	DGA
All Street Types	All Road Classifications	Non-residential (Urban)	7"	9"
Thoroughfare Boulevard	Arterial / Collector	Residential (Urban or Rural)	7"	9"
Avenue	Collector	Residential (Urban or Rural)	7"	8"
Neighborhood Alley	Local	Residential (Urban or Rural)	4"	9"

From November 1 to March 1, a "winter design" may be used with the following minimum thicknesses. A filter fabric shall be placed between the No. 2 stone and the subgrade when using the winter design.

TABLE 8-3 Minimum "Winter Design" Thicknesses for Asphalt and DGA by Street Type

Street Type	Road Classification	Land Use	Asphalt	DGA	No. 2 Stone
All Street Types	All Road Classifications	Non-residential (Urban)	7"	4.5"	As required to meet SN
Throughfare/ Boulevard	Arterial / Collector	Residential/ (Urban or Rural)	7"	4.5"	As required to meet SN
Avenue	Collector	Residential/ (Urban or Rural)	7"	4.0"	As required to meet SN
Neighborhood Alley	Local	Residential/ (Urban or Rural)	4"	4.5"	As required to meet SN

6. If unstable areas are discovered during the proof roll test, then stabilize the area by removing 4 to 8 inches of the unstable material and replacing it with No. 2 stone. No. 2 stone used to make up the structural number shall be separated from the subgrade by filter fabric. Stabilization is required when the soil subgrade pumps during the proof roll test. A CBR less than 4 does not automatically mean the subgrade is unstable.

TABLE 8-4 Equivalent Single Axle Loads (ESALs) for Residential Streets

Number of Houses Served By the Street	Equivalent Single Axle Loads				
	Construction Trucks	Moving Vans	Garbage Trucks	School Buses	Total
0	0	0	6240	12000	18240
20	600	240	6240	12000	19080
40	1200	480	6240	12000	19920
60	1800	720	6240	12000	20760
80	2400	960	6240	12000	21600
100	3000	1200	6240	12000	22440
120	3600	1440	6240	12000	23280
140	4200	1680	6240	12000	24120
160	4800	1920	6240	12000	24960
180	5400	2160	6240	12000	25800
200	6000	2400	6240	12000	26640
220	6600	2640	6240	12000	27480
240	7200	2880	6240	12000	28320
260	7800	3120	6240	12000	29160
280	8400	3360	6240	12000	30000
300	9000	3600	6240	12000	30840
320	9600	3840	6240	12000	31680
340	10200	4080	6240	12000	32520
360	10800	4320	6240	12000	33360
380	11400	4560	6240	12000	34200
400	12000	4800	6240	12000	35040

Table Notes:

Number of Houses Served By the Street – For a loop/cul-de-sac, it will equal the number of houses on that street. For a continuing local street or a collector, it will equal the total number of houses that will use the street when entering/leaving the subdivision.

Construction Trucks – Based on 20 loaded supply trucks per house and 1.5 ESALs per truck, for a total of 30 ESALs per house.

Moving Vans – Based on each house selling 4 times in 20 years and each transaction involving one loaded moving van for the seller and buyer, for a total of 8 trucks per house. It assumes 1.5 ESALs per truck for a total of 12 ESALs per house.

Garbage Trucks – Based on the following for a 20-year design life:

- 2 garbage trucks/street/wk x 52 wks/yr x 20 yrs x 1.5 ESALs/truck = 3120 ESALs
- 1 rosie recycling truck/street/wk x 52 wks/yr x 20 yrs x 1.5 ESALs/truck = 1560 ESALs
- 1 yard waste recycling truck/street/wk x 52 wks/yr x 20 yrs x 1.5 ESALs/truck = 1560 ESALs
- Total garbage trucks = 6240 ESALs per street

School Buses – Based on the following for a 20-year design life:

- 2 school buses/day/street x 200 days/yr x 20 yrs x 1.5 ESALs/truck = 12,000 ESALs per street

TABLE 8-5 20-Year ESALs for Various Industrial and Commercial Developments

Land Use	Gross Floor Area (Sq. Ft.) x 1000											
	1	5	10	20	40	60	80	100	200	300	500	1,000
General Light Industrial (15% Trucks)	80,000	115,000	159,000	246,000	418,000	586,000	752,000	915,000	1,681,000	2,370,000	3,515,000	5,020,000
General Heavy Industrial (20% Trucks)	3,000	16,000	31,000	63,000	126,000	188,000	251,000	314,000	628,000	942,000	1,570,000	3,141,000
Warehousing (25% Trucks)	32,000	123,000	219,000	389,000	692,000	968,000	1,229,000	1,479,000	2,629,000	3,681,000	5,623,000	9,994,000
General Office Building (2% Trucks)	1,000	8,000	17,000	35,000	70,000	105,000	141,000	176,000	354,000	531,000	885,000	1,771,000
Retail <200,000 Sq. Ft. (2% Trucks)	21,000	102,000	201,000	393,000	745,000	1,056,000	1,327,000	1,557,000	2,100,000			
Retail >200,000 Sq. Ft. (2% Trucks)										2,840,000	3,923,000	6,630,000

Land Use	Number of Rooms							
	10	50	100	200	400	600	800	1,000
Hotel (1% Trucks)	3,000	38,000	83,000	171,000	348,000	525,000	702,000	879,000
Motel (1% Trucks)	8,000	47,000	99,000	207,000	433,000	667,000	906,000	1,149,000

Table Notes:

1. Number of trips generated for each type of development calculated from the Manual of Trip Generation published by the Institute of Transportation Engineers.
2. ESALs calculated by the computer program PAS 5developed by the American Concrete Pavement Association.
3. Trucks were assumed to be 50% C5As (TYPE 9) and 50% SU3As (TYPE 6).
4. Loaded Type 9s were assumed to weigh 80,000 pounds. Empty or nearly empty Type 9s were assumed to weigh 50,000 pounds.
5. Loaded Type 6s were assumed to weigh 46,000 pounds. Empty or nearly empty Type 6s were assumed to weigh 30,000 pounds.
6. 50% of both Type 9s and Type 6s were assumed to be empty.
7. The numbers in the table have been rounded to the nearest 1000.

TABLE 8-6 Structural Numbers

ESALs	Structural Number						
	CBR 1	CBR 2	CBR 3	CBR 4	CBR 5	CBR 6	CBR 7
1,000	2.15	1.65	1.39	1.23	1.09	1.01	1.00
2,000	2.38	1.84	1.58	1.39	1.27	1.17	1.08
3,000	2.54	1.97	1.69	1.50	1.36	1.26	1.17
4,000	2.65	2.07	1.77	1.58	1.44	1.33	1.24
5,000	2.74	2.14	1.84	1.64	1.50	1.39	1.30
6,000	2.81	2.20	1.89	1.69	1.55	1.43	1.34
7,000	2.88	2.26	1.94	1.74	1.59	1.47	1.38
8,000	2.94	2.31	1.99	1.78	1.63	1.51	1.42
9,000	2.99	2.35	2.02	1.81	1.66	1.54	1.45
10,000	3.03	2.39	2.06	1.85	1.69	1.57	1.47
20,000	3.35	2.65	2.30	2.07	1.90	1.77	1.67
30,000	3.55	2.82	2.44	2.20	2.03	1.89	1.79
40,000	3.70	2.94	2.55	2.31	2.13	1.99	1.87
50,000	3.81	3.03	2.64	2.39	2.20	2.06	1.94
60,000	3.91	3.12	2.71	2.45	2.27	2.12	2.00
70,000	3.99	3.19	2.78	2.51	2.32	2.17	2.05
80,000	4.07	3.25	2.83	2.56	2.37	2.22	2.10
90,000	4.13	3.30	2.88	2.61	2.41	2.26	2.14
100,000	4.19	3.35	2.93	2.65	2.45	2.30	2.17
200,000	4.60	3.70	3.24	2.94	2.72	2.55	2.42
300,000	4.86	3.91	3.43	3.12	2.89	2.71	2.57
400,000	5.04	4.07	3.57	3.25	3.01	2.83	2.69
500,000	5.19	4.19	3.68	3.35	3.11	2.93	2.78
600,000	5.31	4.30	3.78	3.44	3.20	3.01	2.85
700,000	5.42	4.39	3.86	3.52	3.27	3.08	2.92
800,000	5.51	4.47	3.93	3.58	3.33	3.13	2.98
900,000	5.60	4.54	4.00	3.64	3.39	3.19	3.03
1,000,000	5.67	4.60	4.06	3.70	3.44	3.24	3.07
2,000,000	6.19	5.04	4.45	4.07	3.79	3.57	3.40
3,000,000	6.51	5.31	4.70	4.30	4.01	3.78	3.60
4,000,000	6.75	5.51	4.88	4.47	4.17	3.93	3.74
5,000,000	6.93	5.67	5.03	4.60	4.30	4.06	3.86
7,000,000	7.23	5.92	5.25	4.81	4.49	4.25	4.04
10,000,000	7.55	6.19	5.50	5.04	4.71	4.45	4.24

8.2.1.7 Alternative Pavement Surfaces

Pavement surfaces shall be designed to support fire apparatus loads of up to 81,000 pounds and a tire pressure of 75 psi. Any alternative pavement material or surface treatment used within the required 20-foot clear Fire Access Road shall provide an all-weather driving surface and comply with all applicable Fire Code requirements, including load-bearing capacity.

8.2.2 Phased Development Requirements

For new developments and/or roadways that are completed in phases, several street design requirements apply.

8.2.2.1 Delay in Asphalt Surface Course

The final surface course of asphalt shall be applied after all the primary utilities services have been installed, and in accordance with the following requirements:

- The base courses of the public roadways shall be installed for at least one year prior to the installation of the final surface course of pavement
- The final surface course shall be applied within three (3) years of the construction of the original street.
- The initial base course of asphalt concrete shall be designed such that this layer alone shall provide the required structural strength for the road's first three (3) years of usage.

8.2.2.2 "True Use" Design Standards

For phased developments, street design shall account for the anticipated loading and usage during the first three years following initial construction. Where a street will serve as a primary access route for construction traffic, including heavy vehicles associated with subdivision development, it shall be designed to meet the applicable industrial or commercial street standards for pavement structure and base thickness. Streets shall not be designed solely for their ultimate residential classification if early-phase construction traffic will impose higher loading demands.

This requirement is intended to prevent premature pavement failure and base deterioration and to ensure that the minimum 20-year design life for Lexington-Fayette County streets is achieved.

8.2.2.3 Phased Construction (Initial and Ultimate Sections)

- Where a roadway is designed for phased construction (e.g., two-lane initial construction with four-lane ultimate build-out), the following requirements shall apply:
- Plans shall document both initial and ultimate conditions to ensure long-term functionality and avoid unnecessary reconstruction.
- The roadway centerline and profile grade shall be established to accommodate both initial and ultimate construction.
- Initial and ultimate construction limits shall be clearly distinguished on applicable plan sheets.
- Construction quantities, earthwork summaries, and notes shall reflect initial construction only.
- The ultimate roadway footprint shall be identified for right-of-way determination and utility coordination.
- Infrastructure installed during initial construction shall not preclude or require unnecessary removal during ultimate widening.

8.2.3 Shared Use Path & Separated Bikeway Pavement Design

Shared use paths and separated bikeways shall be designed to provide a durable, smooth, stable, and accessible surface suitable for bicyclists, pedestrians, and mobility device users. Structural pavement design shall account for subgrade conditions, drainage, anticipated loading, and regular use by maintenance vehicles and occasional use by emergency vehicles.

Shared use path and separated bikeway pavement sections shall be developed using site-specific geotechnical information and shall be consistent with LFUCG Engineering Standards and KYTC specifications where applicable.

Barrier separated bikeways at street level shall comply with pavement specifications in **Section 8.2**.

Separated bikeways at sidewalk level may be constructed of asphalt or concrete and shall comply with the pavement specifications in either Table 8-7 or Table 8-8.

TABLE 8-7 Shared-Use Path & Separated Bikeway Minimum Thickness for Granular Base and Pavement Courses (Asphalt)

Asphalt	Thickness (Inches):
Surface Course	1.125
Base Course	3.0
Granular Base (DGA or CSB)	6.0

TABLE 8-8 Shared-Use Path & Separated Bikeway Minimum Thickness for Granular Base and Pavement Courses (Concrete)

Concrete	Thickness (Inches):
Class A Concrete	6.0
Granular Base (DGA or CSB)	4.0

8.3 Roadway Construction Specifications

8.3.1 Reference Standards

Construction of public and private streets within Lexington-Fayette County shall comply with all applicable construction specifications detailed within the **LFUCG Engineering Manuals** and **Standard Drawings**. These documents serve as the primary source of construction standards for roadway infrastructure within Lexington-Fayette County.

Where the **LFUCG Engineering Manuals** or **Standard Drawings** do not provide specific guidance, the Kentucky Transportation Cabinet (KYTC) Standard Specifications for Road and Bridge Construction shall apply. Applicable sections of the KYTC specifications include, but are not limited to, the following:

- Division 200 – Earthwork, Excavation, and Subgrade Preparation
- Division 300 – Dense Graded Aggregate Base
- Division 400 – Asphalt Pavement (Bituminous Concrete)
- Division 500 – Portland Cement Concrete Pavement

Where construction specifications are not provided within either the **LFUCG Engineering Manuals** or the KYTC Standard Specifications, the project Engineer shall propose appropriate design and construction specifications. Such specifications require review and approval by the LFUCG Division of Engineering prior to construction.

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CENTRO
FIFTH THIRD BANK
PAVILION
ROXY
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CLAY ANGELUCCI
HEATING & COOLING

Appendix A

Roadway Plan Submission Requirements

Roadway plan submissions shall include all required construction documentation, engineering details, and plan sheet content necessary for LFUCG review, approval, inspection, and acceptance of infrastructure improvements.

Submitted roadway design plans shall include sufficient detail, analysis, and supporting documentation to demonstrate compliance with **LFUCG Engineering Manuals**, applicable state and federal standards, and to allow LFUCG to verify the safety, functionality, accessibility, and constructability of the proposed improvements.

A.1 Reference Title and Site Layout Sheets

Reference points may be plotted on the plan sheets if they are few and the plan sheets are not crowded. Otherwise, all reference points shall be plotted on a separate sheet containing only reference points.

The layout sheet is the cover or title sheet for the set of plans. The layout sheet shall contain the following information:

- Proper headings (LFUCG, for example)
- Project title
- Construction number
- Sheet number
- Checked by
- Record plans/construction plans box
- Index of sheets and sheets not included
- List and/or check applicable standard drawings and show total standard drawings
- Show total bridge sheets
- Type of work (grade, drain, and surfacing)
- Control of access
- Design criteria
- Location map
- North arrow
- Project limits, begin, and end stations
- Location of bridges
- Equations
- Check breakouts, section lengths and project length
- Scale
- Consultant seal and signature
- Date

A.2 General Notes Sheet

The plan set shall include a General Notes Sheet that clearly identifies all project-specific requirements governing construction, materials, coordination, and implementation.

The General Notes Sheet shall include:

- A current and complete listing of all applicable special provisions, special notes, general notes, and supplemental specifications relevant to the project.
- All project-specific notes, including plan notes and proposal notes unique to the project scope.
- Traffic control notes addressing maintenance of traffic, phasing, detours, pedestrian and bicycle accommodation, and applicable MUTCD compliance.
- Utility coordination notes identifying affected utility agencies and required coordination procedures.

All special provision notes shall be formatted as follows:

- The project number and note title shall appear on the first sheet of notes (or cover sheet).
- Each note sheet shall include a sheet number.
- All utility agencies involved in the project shall be clearly identified.

A.3 Typical Section Sheets

The typical section to be used should be based on the street type and land use context, and to a lesser degree, the street classification. The typical section sheet shows the geometric and pavement details for each project. In addition to geometric and pavement details, the typical section sheet shall show the pay limits of road excavation for solid rock undercut and removal of low bearing soils which shall be utilized in the cross sections. The following information shall also be included:

- Tangent and superelevated sections
- Pavement design
- Undercut and subgrade lines
- Guardrail location
- Note pertaining to slopes outside limits of shoulder
- Edge details (step-outs, keys)

A.4 Plan Sheets

Plan sheets may be either full size with separate profile sheets or the conventional half-plan, half-profile sheets. The first plan sheet shall contain the standard symbols. Each plan sheet shall show the beginning and ending stations for each plan sheet, a north arrow, and station equations for main line and approach intersections. Lengths of proposed structures shall be shown. The direction of centerline stationing shall run from south to north and from west to east. The alignment shall be a heavy line with the centerline stationing shown at 100-foot intervals. All P.I.'s, P.O.S.T.'s, P.O.T.'s, and triangulation points shall be shown by stationing vertically. Each tangent shall have its calculated bearing shown and all curve data must be shown. The P.C., P.T., T.S., S.C., C.S., and S.T. must be drawn with the station number shown on a line drawn perpendicular to the point. Curve data shall be shown for all simple and spiral curves consisting of the following:

SIMPLE CURVES:

- P.I. Station
- Δ = Delta Angle
- T = Tangent Distance
- L = Length of Curve
- R = Radius of Curve
- E = External Distance
- e = Rate of Superelevation
- Runoff = Runoff Distance
- Runout = Runout Distance

SPIRAL CURVES:

- P.I. Station
- Δ = Delta Angle
- Ts - Tangent Distance Spiral Curve
- Ls = Length of Spiral Curve
- Lc = Length of Simple Curve
- Os = Spiral Angle
- LT = Long Tangent Spiral Curve
- ST = Short Tangent Spiral Curve
- R = Radius of Simple Curve
- Es = External Distance Combination of Simple and Spiral Curve
- e = Rate of Superelevation
- Runoff = Runoff Distance
- Runout = Runout Distance

Plan sheets shall show as a minimum the following information:

- Sheet numbers
- North arrow
- Scale
- Topographic information
- Vertical controls and origin of levels
- Horizontal control
- Curve data
- Centerline and stationing
- Intersection stations
- Curb lines, gutter lines, and right-of-way lines
- Sidewalks and/or bicycle paths
- Storage lanes and tapers
- Shoulders
- Subdrainage
- Channelization islands
- Pavement markings
- Property lines, easements and ownership, source of title including deed book and plat
- Disturbed limits
- Drainage systems and structures
- Erosion control measures
- Approach roads
- Entrances
- Utilities (existing and proposed)

A.5 Profile Sheets

Profile sheets shall also show proposed structures with construction notes for the location, type, size and skew, surface ditches and description of all benchmarks.

The first plan/profile sheet shall indicate the source of elevations used along with a summary of all USGS, USC & GS, and LFUCG markers within the limits of the project, and the earthwork calculations for the entire project, and utility owner (with address).

Profile sheets shall show as a minimum the following information:

- Sheet number
- Vertical curve data, grades, sight distances
- Roadway stationing
- Proposed grade elevations
- Existing profile elevations
- Surface ditching
- Drainage structures
- Utility crossings
- The plans shall extend at least 300 beyond the project limit

A.6 Scales

Alignment and topography on plan sheets shall be plotted using a scale of 1 inch = 50 feet in rural areas and urban areas of sparse topography. Urban areas of dense topography shall be at a scale of 1 inch = 20 feet. Profile sheets shall be plotted on the same horizontal scale as the plan and the ratio of the vertical scale to the horizontal scale shall be 1:20. Groundline and gradeline elevations shall be shown at 50-foot intervals. Detour plan and profile shall be included and numbered with the plan and profile sheets.

A.7 Grading and Drainage Sheets

All inlets, manholes, pipes, and culverts with the exception of entrance pipe and longitudinal pipe shall be plotted on standard cross-section sheets with slope lengths and sizes shown. Pertinent data such as discharge, high-water elevations, and material quantities shall be shown. Refer to Urban County Government's Stormwater Manual for additional requirements.

A.8 Erosion and Erosion Control Sheets

Refer to the LFUCG Stormwater Manual and Erosion and Sediment Control Checklist for requirements.

A.9 Utility Plans (Storm and Sanitary Sewer Profiles)

Utility plans are required for each project if any utilities are involved. Utility plans may be

either separate plans for utilities or construction plan sheets showing utilities, depending upon the complexity of the project and the number of utilities involved. The Engineer is referred to KDOH's Utilities Guidance Manual for specific procedures to be followed and for the consideration that shall be given to the effect of utility installations with regard to safety, aesthetics, operational characteristics of the highway and cost of utility construction and maintenance. The Engineer shall coordinate with the LFUCG Division of Engineering to assure compliance with all applicable local, state, and federal permits and regulations.

A.10 Pipe Drainage Sheets

All inlets, manholes, pipes, and culverts with the exception of entrance pipe and longitudinal pipe shall be plotted on standard cross-section sheets with slope lengths and sizes shown. Pertinent data such as discharge, high-water elevations, and material quantities shall be shown.

These should include:

- Pipe alternates
- Classes and schedules of pipe
- Pipe lengths (scaled)
- Concrete and steel reinforcement quantities for headwalls

Refer to LFUCG's Stormwater Manual for additional requirements.

A.11 Detail Sheets

Detail sheets shall consist of all other sheets not classified in the layout sheet's index of sheets and include special drawings, elevation development sheets, interchange and intersection layout sheets and contour grading plans.

Ensure that Specifications/ **Standard Drawings**, or Detail Sheets cover all of the construction. Include any special drawings for items not covered by **Standard Drawings**.

A.12 Cross-section Sheets

Cross-sections grading plans can be used. A scale of either 1" = 10' or 1" = 5' shall be used on urban roads. Templates, end areas, grade elevations, volumes, and sheet totals shall be shown. If cross-sections have been developed from aerial photography, the general notes sheet and first cross-section sheet shall carry the following note: "Cross-sections for this project developed from aerial photography."

A.13 Intersection & Round-about Detail Sheets

Provide detailed information for the cross slope and elevation of the gutter line, to alleviate ponding in the gutter pan and specifically at sidewalk ramps, and at bike lane ingress and egress points (1:10 scale).

A.14 Plan Review and Final Documentation

The development and Improvement plan process shall comply with the requirements outlined in the **Land Subdivision Regulations** and the **Procedures Manual for Infrastructure Development**.

Refer to the Land Subdivision Regulation Procedures Manual for responsibilities of the Engineer and requirements for the submission of Improvement plans for construction, inspection during construction, and final documentation requirements and procedures.