



Fire Department Access Performance-Based Design Guide

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Summary

At this briefing, staff will provide the Planning Board with an overview of the Fire Department Access Performance-Based Design Guide. This document provides alternatives to address evolving fire department access issues while balancing these requirements with the needs of pedestrian and bicycle safety and the protection of natural resources. This document does not alter or replace the prescriptive requirements of National Fire Protection Association 1 Fire Code, as adopted and amended by Montgomery County.

The design guide is the result of interagency collaboration. Issued by the Montgomery County Department of Permitting Services (MCDPS), it was produced in coordination with the Montgomery County Fire and Rescue Service (MCFRS), Montgomery County Department of Transportation (MCDOT), and the Maryland-National Capital Park and Planning Commission (M-NCPPC). All four agencies formally adopted the document in August 2019. The Life Safety and Urban Design (LSUD) work group formed in early 2018 and met monthly to determine the guide's scope and recommendations. The LSUD work group included staff members from DPS, MCFRS, MCDOT, and M-NCPPC.

Discussion

By identifying safe and sustainable design considerations for fire department access, street intersections, and streetscapes, the design guide aims to streamline the development review process and will improve the quality of life in Montgomery County. The design guide consolidates key Fire Department access requirements and performance-based alternatives. It illustrates options for building and street design that meet the intent of prescriptive fire department access requirements while still accounting for other interests, including pedestrian and bicycle safety and stormwater management. The design guide is intended to be a resource to assist engineers, architects, developers, planners, and public agencies in designing communities that are fully accessible by MCFRS while promoting safe intersections and streets that encourage people to walk, bike and use transit.

The design guide applies to all new community and commercial development or redevelopment, infill development and road reconstruction, and prioritizes roadway safety, complementing the County's Vision Zero Action Plan and the Bicycle Master Plan.

Attachment

- Fire Department Access Performance-Based Design Guide



FIRE DEPARTMENT ACCESS

PERFORMANCE-BASED DESIGN GUIDE

Approved August 2019



Abstract

The Fire Department Access Performance-Based Design Guide is issued by the Department of Permitting Services as a resource to assist professionals design communities that are fully accessible by the Montgomery County Fire & Rescue Service while promoting safe and active intersections and streetscapes that support pedestrians, bikes, and public transit. Drafted by the Planning Department in collaboration with multiple County agencies, this guide consolidates some fire department access prescriptive code requirements and performance-based alternatives.

The guide accompanies Montgomery County's Fire Code and provides alternatives that meet the intent of prescriptive fire department access code while still accounting for other interests including pedestrian and bicycle safety, environmental protection, and stormwater management. The guide summarizes relevant portions of NFPA 1 Fire Code, identifies design considerations for travel and operational access, street intersections, and streetscapes, while presenting acceptable alternatives. The full text of NFPA 1 Fire Code is available online at www.NFPA.org.

Source of Copies

Montgomery County Department of Permitting Services
255 Rockville Pike, 2nd Floor
Rockville, MD 20850
Online at: <https://www.montgomerycountymd.gov/dps/>

Montgomery County Fire & Rescue Service
Montgomery County Department of Transportation
Montgomery County Department of Permitting Services
Maryland-National Capital Park and Planning Commission



DEPARTMENT OF PERMITTING SERVICES

Marc Elrich
County Executive

Hadi Mansouri
Acting Director

**MEMORANDUM OF UNDERSTANDING
BETWEEN
Montgomery County Department of Permitting Services
AND
Montgomery County Fire and Rescue Services
AND
Montgomery County Department of Transportation
AND
Maryland-National Capital Park and Planning Commission**

PURPOSE: The purpose of this memorandum of understanding (MOU) is for the Department of Permitting Services (MCDPS), Fire and Rescue Services (MCFRS), Department of Transportation (MCDOT), and the Montgomery County Planning Department (M-NCPPC) to express approval of and adherence to the newly developed document titled, "Fire Department Access Performance-Based Design Guide."

A. BACKGROUND

The document was created by the Life Safety and Urban Design (LSUD) Work Group which comprised of representatives of the aforementioned departments. The LSUD Work Group met in person for several months, working in tandem for nearly two years to produce the final set of guidelines. The document is intended to assist the departments and applicants in the design phase of development so they may provide reasonable and practical solutions to fire department access concerns while considering the ever-evolving landscape of urban design.

B. SHARED VISION

The LSUD Work Group had a shared vision during the creation of the document and plans to continue meeting outside of the Development Review Committee (DRC) to address unique applications for the benefit of the applicant. The shared vision included key items such as:

- Protecting life safety through community design
- Providing design excellence in buildings, public spaces, sidewalks, bikeways, and roadways
- Promote connectivity of streets through a grid-based approach
- Encourage non-combustible materials for building design

- Maximize fire response safety through the undergrounding of utilities

The LSUD Work Group plans to have quarterly meetings to ensure the shared vision is being achieved by the document and to review specific applications deemed necessary by the Planning Department.


C. TECHNICAL INFORMATION

The Fire Department Access Performance-Based Design Guide will streamline the development review process, serve as a model for interagency collaboration, and is integral to improving the quality of life in Montgomery County.

The design guide consolidates key Fire Department access prescriptive code requirements and performance-based alternatives. Performance-based design allows for alternatives to prescriptive code while supporting compact, walkable development and accounting for environmental concerns such as storm water management. The Guide is not intended to replace prescriptive code requirements as adopted and amended by the Executive Regulations of Montgomery County, Maryland.

In witness, thereof, the parties have executed this memorandum of understanding on this 27 day of August, 2019.

APPROVED.



Hadi Mansouri, Acting Director
Montgomery County Department of Permitting Services

8/22/2019

Date



Scott Goldstein, Fire Chief
Montgomery County Fire and Rescue Service

August 26, 2019


Date



Gwen L. M. Wright, Director
Montgomery County Planning Department, M-NCPPC

August 21, 2019

Date



Al Roshdieh, Director
Montgomery County Department of Transportation

Aug 27-19

Date

FIRE DEPARTMENT ACCESS

PERFORMANCE-BASED DESIGN GUIDE

Approved August 2019



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Chapter 1: Introduction



Overview

This document is issued by the Montgomery County Department of Permitting Services to supplement NFPA 1, as adopted and amended by Montgomery County. It applies to all new community and commercial development or redevelopment, infill development, road reconstruction, and any changes to existing fire department access. Fire department access requirements can be found in NFPA 1, NFPA 1141 and NFPA 1142, as adopted and amended by Montgomery County. Performance-based design is permitted per NFPA 1 and allows for alternatives that meet the intent of prescriptive fire department access requirements while still accounting for other interests including pedestrian and bicycle safety, environmental protection, and stormwater management.

Process & Team

These guidelines are written in collaboration with the Montgomery County Department of Permitting Services (MCDPS), Montgomery County Fire and Rescue Service (MCFRS), Montgomery County Department of Transportation (MCDOT), and the Maryland-National Capital Park and Planning Commission (M-NCPPC). To address evolving issues related to fire department access, a Life Safety and Urban Design (LSUD) work group was formed in early 2018. The LSUD work group met monthly to determine the scope and recommendations listed within this document.

The intent of National Fire Codes and the Montgomery County Fire Code is presented in this document alongside potential performance-based alternatives. The main objectives of this guide are to:

- Provide alternatives to prescriptive code where constraints exist on development sites and roads
- Balance the requirements of fire department access with pedestrian and bicycle safety and protection of natural resources

It must be noted that simply meeting these performance-based alternatives does not guarantee approval of designs. All performance-based designs must be reviewed on a case-by-case basis through the standard review procedures established by Chapter 50 Subdivision Regulations of the Montgomery County Code. This document is intended to be a tool for engineers, architects, developers, planners, and public agencies to facilitate the development review process and offer potential solutions.

Life Safety & Urbanization

Montgomery County is projected to experience robust population growth in the coming decades. Our current planning policies support concentrated growth along transit routes and preservation of open space. Such compact, mixed-use environments require streets to accommodate multiple modes of transportation including private vehicles, pedestrians, bicycles, and public transit users. The County is committed to prioritizing roadway safety. The County Council recently adopted two policies to further this mission. Vision Zero (2017) aims to eliminate severe injuries and fatal collisions on County roads. The Bicycle Master Plan (2018) aims to provide an interconnected network for safe bicycling throughout the county.

Simultaneously, denser living and working environments create challenges to effective emergency service operations. As dictated by the nature of an all-hazards response agency, fire department apparatus are large, commercial-type vehicles. While narrow streets limit pedestrian exposure to vehicle collisions, they also will limit fire department vehicular access. Features that improve quality of life for the community, such as street trees, set-backs, and separated bike lanes can impede the ability of the fire department to fulfill its mission to protect lives, property, and the environment. The goal of this collaboration is to find a working balance between increasing community density and ensuring effective, efficient delivery of emergency services.

All these vital public interests occasionally come into conflict, especially as the land available for future development shrinks. This performance-based guide demonstrates potential solutions that balance these critical needs and continue to ensure that future development creates places that are safe, sustainable, economically competitive, and maintain the highest quality design.

Definitions

Actual Curb Radius: The radius defined by the physical curb line at an intersection.

Effective Curb Radius: The minimum radius required and, as appropriate for the design vehicle, to turn from the right-hand travel lane on the approach street to the appropriate lane of the receiving street without vehicle encroachment on the curb or off-road surface, accounting for the presence of parking, conflicting travel lanes, bike lanes, medians, or other features.

Infill Redevelopment: Redevelopment on vacant or underutilized recorded lots or resubdivision of existing recorded lots. Existing setbacks, approximate lots sizes, and occupancy type may be retained to reflect the surrounding community character.

Main Side Hinge Door: Functions as the primary access point for fire department personnel.

New Development: Subdivision of previously undeveloped land for the construction of new residential and/or commercial structures and other improvements.

Operational Access: Locations designated for fire apparatus to operate while stationary. These zones can be comprised of different design elements such as bike lanes, load bearing medians, alternative load bearing surfaces, etc., as reviewed and approved by MCDPS.

Performance-Based Design: Design strategies that offer an alternative to prescriptive code while still meeting or improving upon the intended performance goals.

Redevelopment: Resubdivision of existing recorded lots or parcels with the intent of redefining, altering, and/or enhancing the existing property; or reflecting a change in zoning, use, occupancy, construction type, etc.

Secondary Side Hinge Door: Functions as an optional secondary access point for fire department personnel. A roll-up garage door that also includes a pass-thru man door satisfies the secondary side hinge door provision, but is only applicable to specific residential townhome developments.

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Chapter 2:

Prescriptive Code Requirements

Key Fire Department Access Design Elements

The Montgomery County Council adopted and amended NFPA 1, which provides prescriptive requirements covering the following topics:

- Width of streets serving as fire department access
- Street geometry including turning radii and dead-end turnarounds
- Treatment of load-bearing surfaces and vertical clearance for fire and emergency apparatus
- Sprinklers, detection systems, fire hydrants, and water supply provisions

Some key requirements of NFPA 1 have strong impacts on how streets and buildings are sited. The quality of the road network in terms of pedestrian and bicycle safety, ecological performance, and the effective speed of vehicles are also influenced by these requirements.

Width of Fire Department Vehicular Access

Amended NFPA 1 defines fire department apparatus access as:

“Any approved load-bearing, all-weather surfaces, including public, private, or access roads, driveways, parking lots, shoulder, and buffers, whose use is required to access more than one residential dwelling unit or any non-residential occupied building. Not all roadways are required for fire apparatus access.”

The code requires a minimum clear width of 20-feet for fire department vehicular access. The intent of the requirement is to ensure that there are no obstructions for fire and other emergency vehicles to navigate while traveling to or from an incident, as well as provide adequate clear space for apparatus set up and operations once arrived at an incident.



Figure 2.01: A two-story single family house



Figure 2.02: Four-story townhouses



Figure 2.03: A multi-story office building



Figure 2.04: Fire and rescue respondents using fire trucks and other fire apparatus to fight a townhouse fire.



Figure 2.05: Fire truck with its outriggers extended within the Operational Bays





Chapter 3: Performance-Based Alternatives

Travel and Operational Access Alternatives

As viewed from a performance-based perspective, fire department vehicular access can be generally classified in two categories that often overlap: travel access and operational access. Roads often serve as both travel and operational access.

Travel access is defined as access over which fire apparatus travel at speed during an emergency response or returning to routine service after an incident. Fire department performance-based needs dictate that travel access be no less than 12 feet wide, free and clear, and constructed of a traditional, paved, load bearing surface with passing zones and operational bays provided at acceptable intervals.

Operational access is defined as access over which fire apparatus set up and operate while stationary. Fire department performance-based needs dictate that operational access be at least 20 feet wide, but the clear width can be made of different design elements such as bike lanes, load bearing medians, alternative load bearing surfaces, etc., as reviewed and approved by MCDPS.

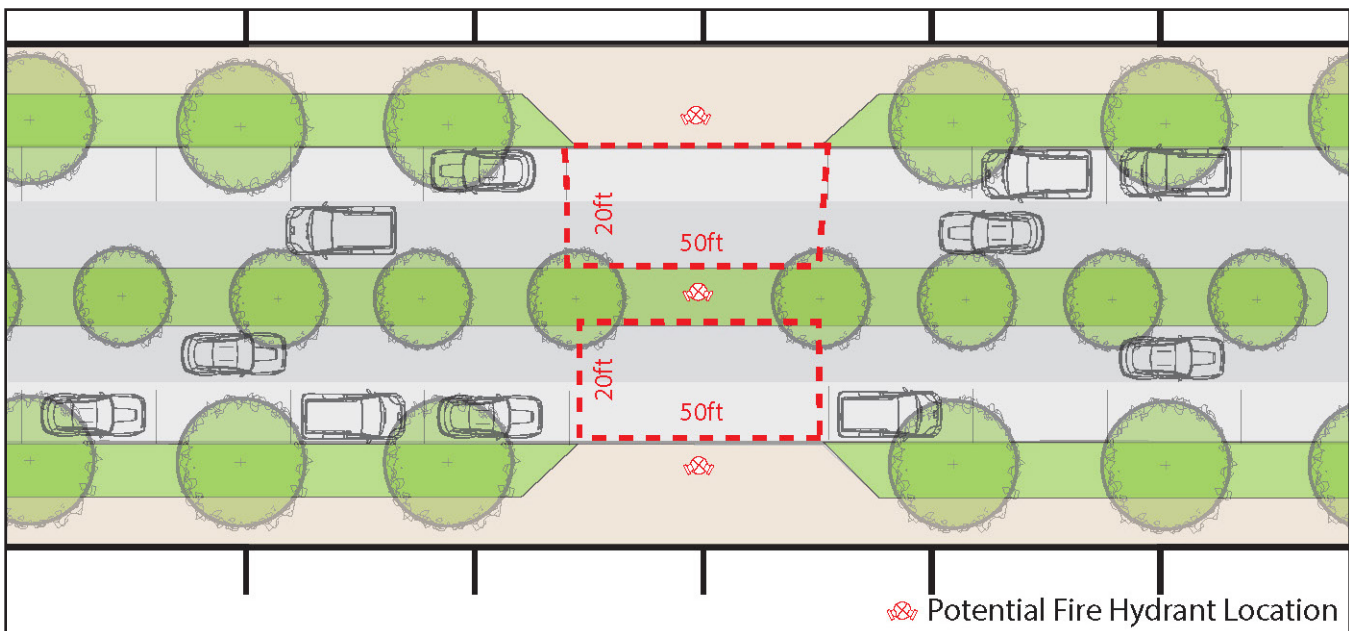


Figure 3.01: If an operational bay is used to provide operational access, the minimum dimension should be 20 feet x 50 feet. Fire hydrants must be placed within 7 feet from the edge of pavement. Location of fire hydrants will require WSSC approval.

Operational access can be met in a variety of ways. On streets with two or more 10 foot wide contiguous travel lanes, the minimum 20 foot clear dimension is naturally available. On streets where two or more contiguous travel lanes are not available, operational access can be provided by utilizing roadway design elements such as:

- Fire hydrant locations that limit on-street parking
- No parking zones
- Driveway curb cuts that limit on-street parking
- Street intersections
- Alleyways and their intersections with streets

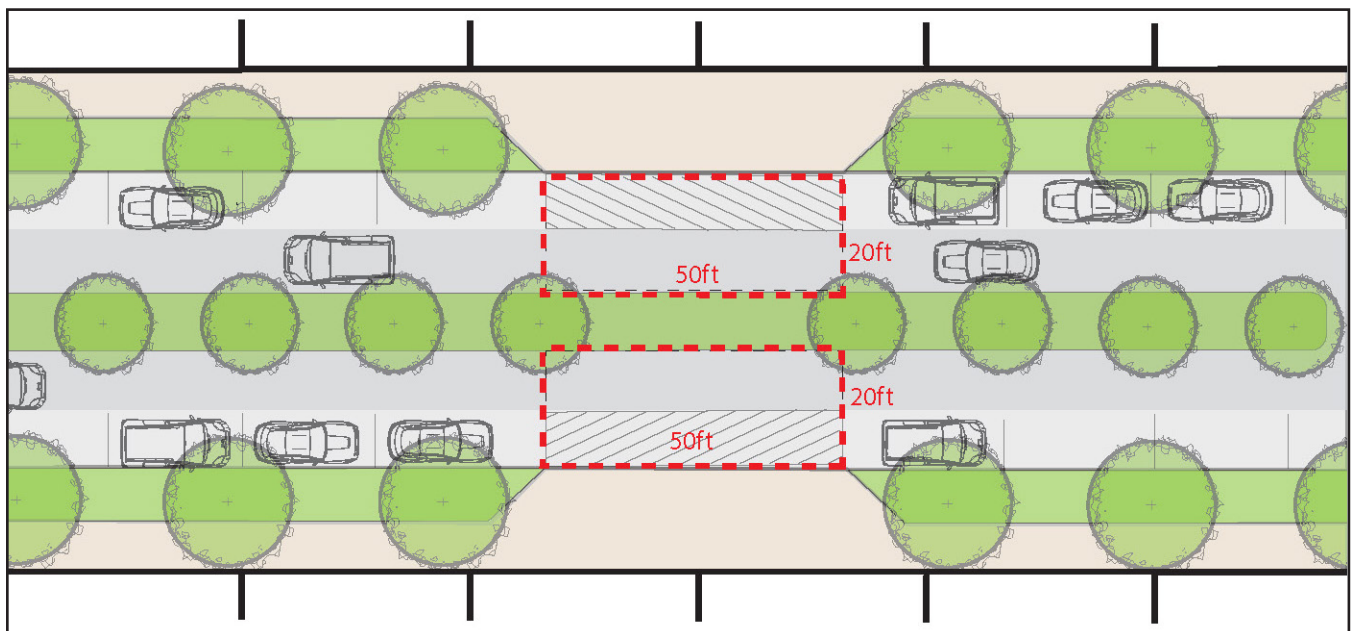


Figure 3.02: An operational bay is created with no parking zones; all dimensions shown are the minimum required.

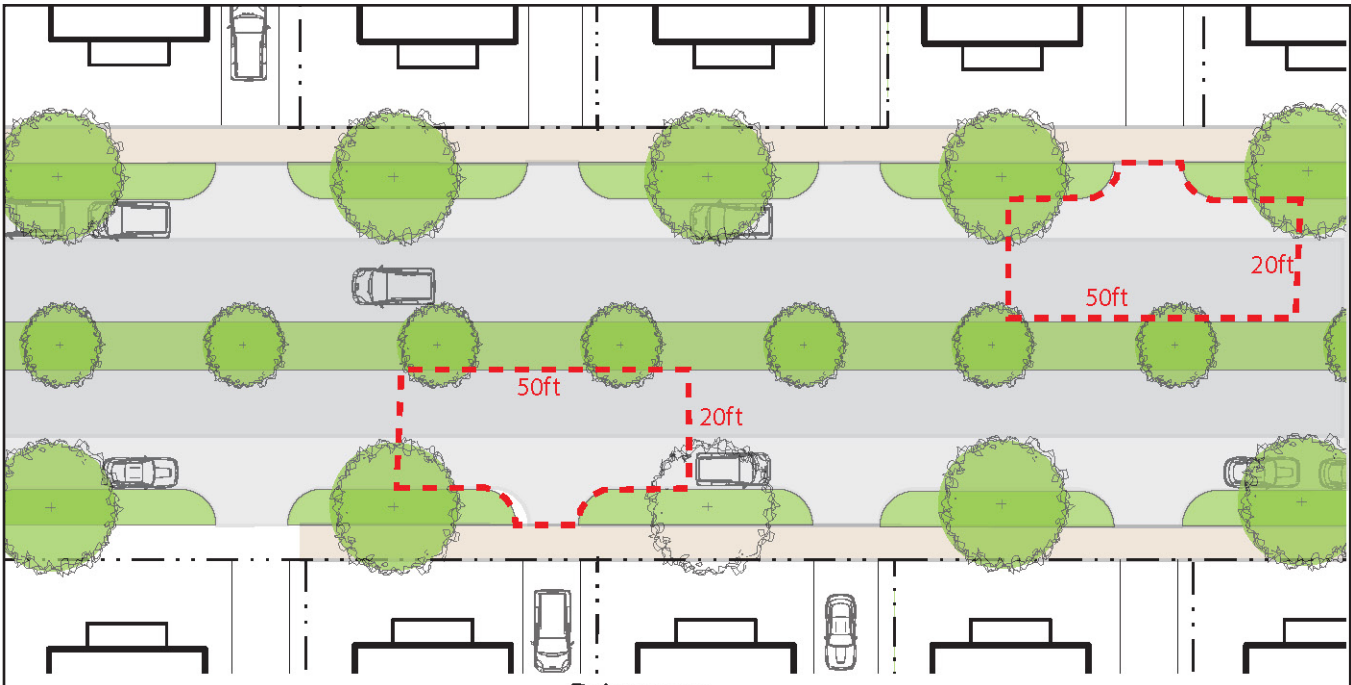


Figure 3.03: Driveways are naturally occurring no-parking zones in single-family neighborhoods which can be expanded into operational bays; all dimensions shown are the minimum required.

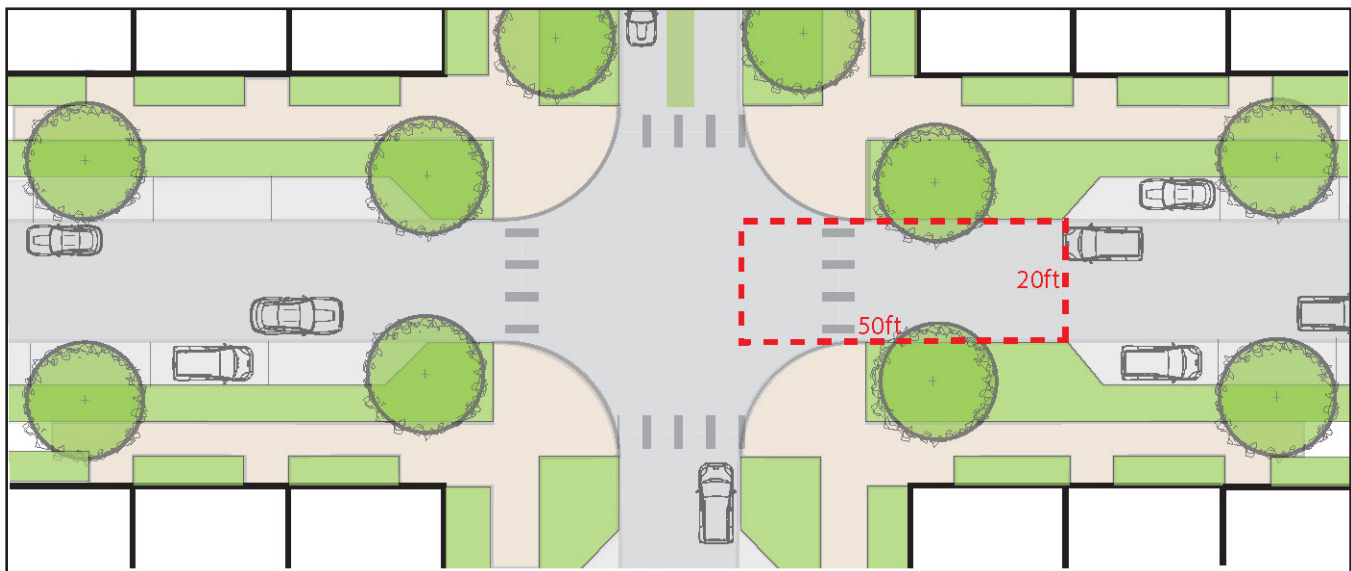


Figure 3.04: Operational bays may be identified at street intersections where parking is not allowed and the minimum dimensions are met. Street intersections may be utilized as part of an operational bay; all dimensions shown are the minimum required.

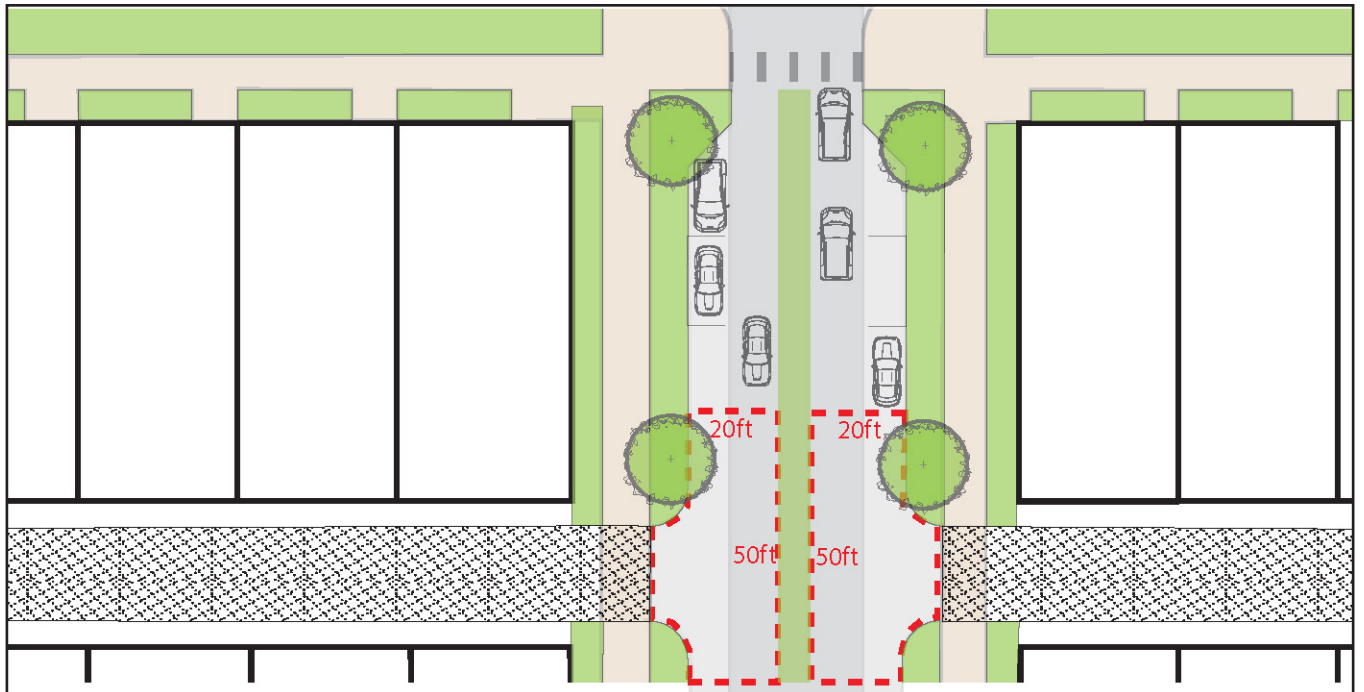


Figure 3.05: Alley intersections prohibit parking and therefore may create an operational access zone for fire trucks and engines to setup; all dimensions shown are the minimum required.

To demonstrate the potential application of these performance-based alternatives, the LSUD work group illustrated typical street and alleyway configurations that fulfill the travel and operational access requirements by combining travel lanes and alleyways with additional operational bays. Also included is a typical yield street section.

Residential Boulevard Street 1

On a residential boulevard lined by single-family houses, duplexes, and townhouses with window sills (defined as the bottom of any opening remotely recognizable as access to a possibly occupied space) no greater than 27 feet from grade, the performance-based alternative described below may provide sufficient fire department access (Figures 3.07-3.08).

The boulevard illustrated in Figures 3.07-3.08 has two 12 foot travel lanes, two 8 foot on-street parking lanes, and a minimum 8 foot wide vegetated center median; the minimum dimensions for an operational bay is 20-feet wide and 50 feet long. A 20-foot wide operational bay is provided by combining parts of the parking and travel lanes on either side of the median. Fire hydrants must be located at operational bays (wherever possible) with overall hydrant spacing being no more than 500 feet apart (measured as the truck travels). An operational bay must be located no more than 150 feet from the main side-hinge door of each unit along the street and no more than 300 feet from another operational bay.

Where operational bays are provided, the median should also be designed to provide clear workable space, with grass and low plantings. Trees may be located in the median but must be spaced 30-feet apart and should not be located adjacent to operational bays.



Figure 3.06: View down a residential boulevard lined with three story residential buildings

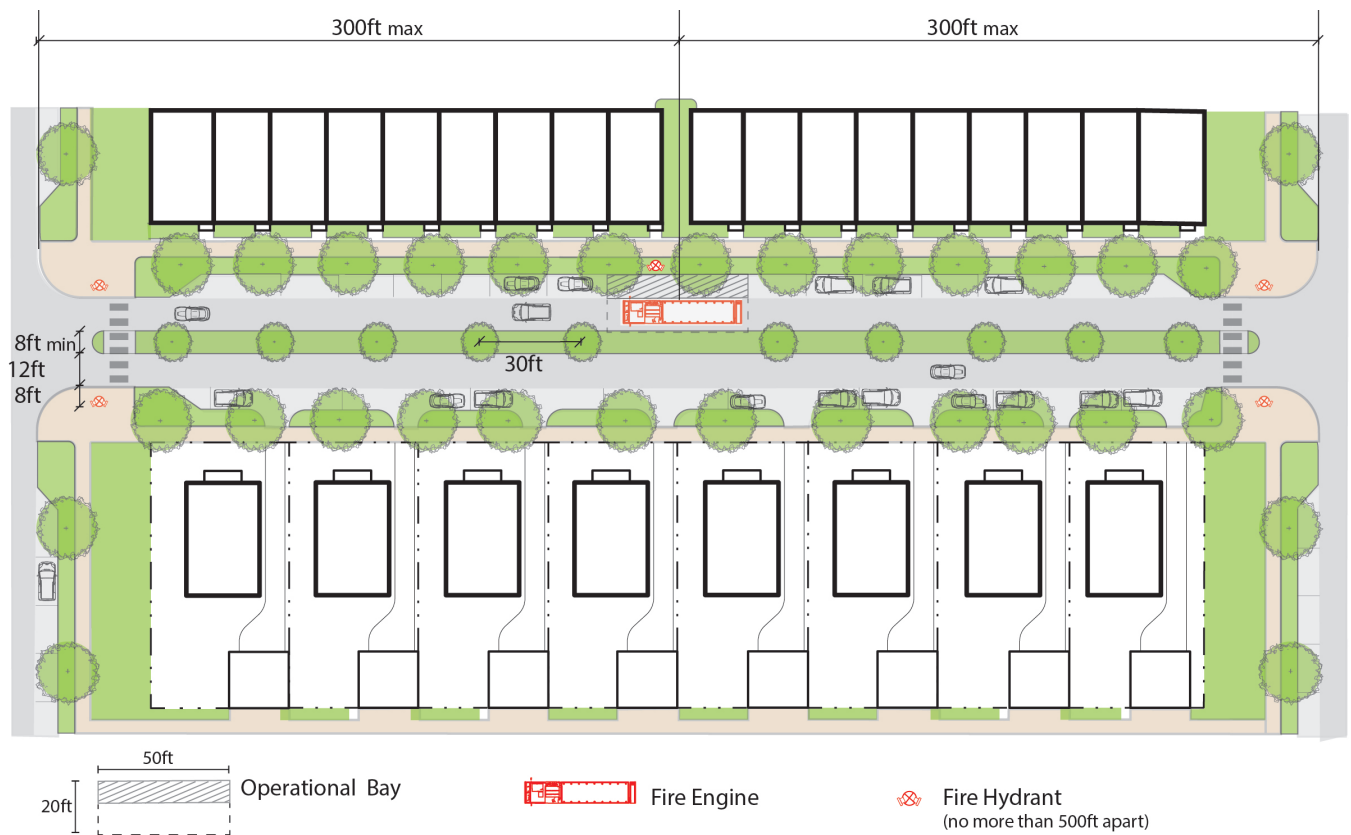


Figure 3.07: Plan of Residential Boulevard 1 showing single-family houses and townhouses that have window sills less than 27-feet in height.

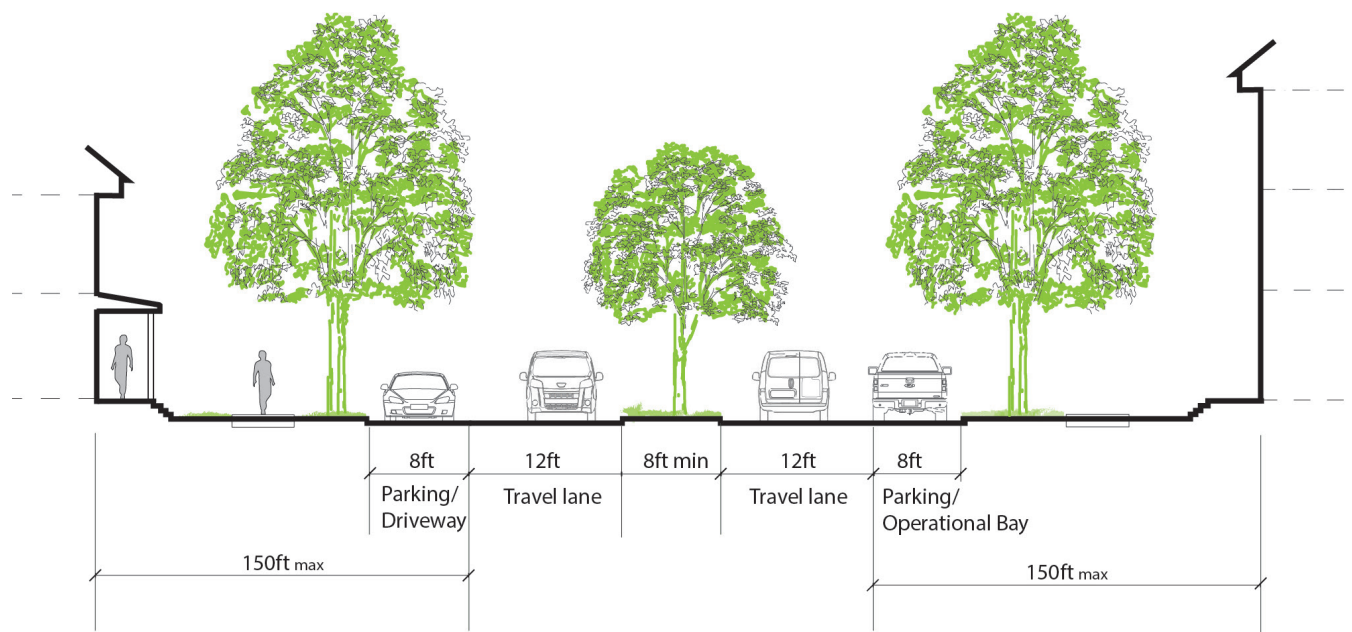


Figure 3.08: Cross-section of Residential Boulevard 1; roadway dimensions are the minimum required.

Residential Boulevard Street 2

On a residential boulevard lined by single family houses, townhouses, and multifamily buildings with window sills greater than 27 feet in height from grade, performance-based alternatives may provide adequate fire department access (Figures 3.10-3.11).

To use the Residential Boulevard Street 2 as described below, certain architecture and system requirements must be met:

- Sprinkler system:
 - Single-family houses and townhouses must be protected by an automatic sprinkler system compliant with NFPA 13D
 - Multifamily buildings or any building with superimposed dwelling units such as a two-over-two must be protected by an automatic sprinkler system compliant with NFPA 13
- All building types pursuing this modified vehicular access must provide non-combustible cladding from grade to 10 feet up each wall face.
- Adjacent utilities lines and systems must be buried underground

If the above conditions are met, the modified boulevard may have two 12 foot travel lanes, two 8 foot on-street parking lanes, and a minimum 8 foot wide vegetated center median. A 20 foot wide operational bay must be provided by combining the parking and travel lanes at intervals.



Figure 3.09: View down a residential boulevard with one travel lane and a parking lane

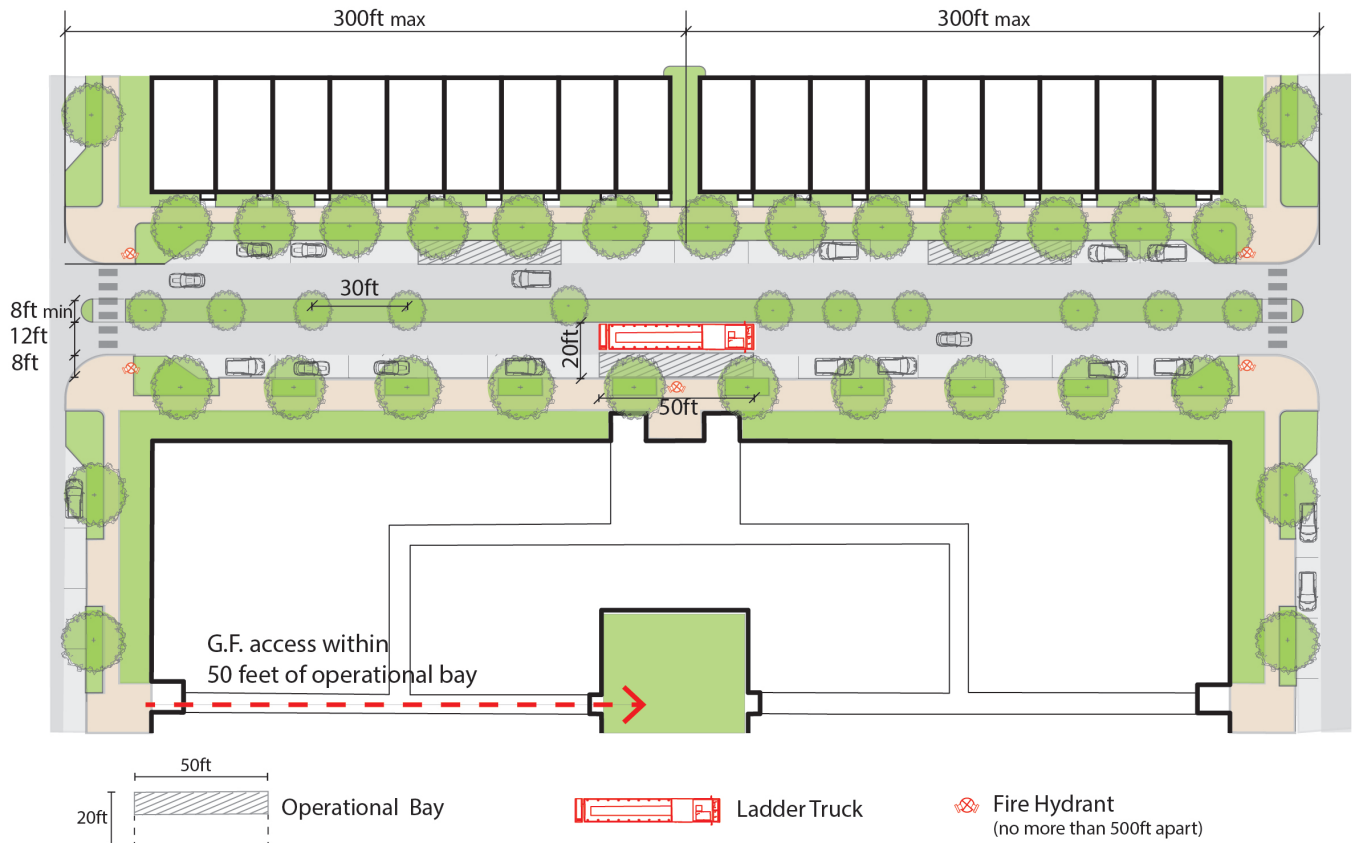


Figure 3.10: Plan of Residential Boulevard 2 showing multifamily and 4-story townhouses, with window sills greater than 27-feet in height

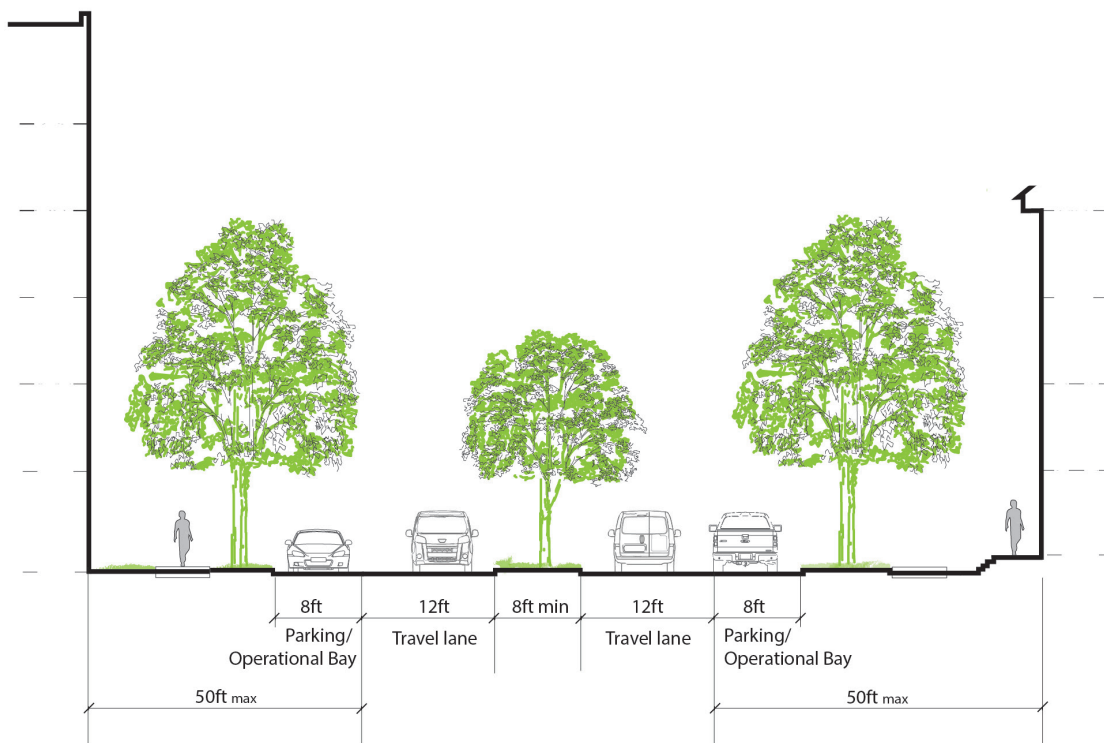


Figure 3.11: Cross-section of residential boulevard 2; roadway dimensions shown are the minimum required.

Residential Boulevard Street 2

Fire hydrants must be located at operational bays with overall hydrant spacing no more than 500 feet measured as the truck travels. An operational bay must be located no more than 50 feet from the main side-hinge door of each building along the street and no more than 200 feet from another operational bay.

The following building design elements must be located no farther than 50 feet from an operational bay:

- Main side hinge doors to any single-family house, townhouse, multifamily building lobby, and any ground floor retail spaces
- Fire department connections (FDCs)
- Ground floor courtyard access

Where operational bays are provided, median should also be designed to provide clear workable space, with grass and low plantings. Trees may be located in the median but must be spaced 30-feet apart and should not be located adjacent to operational bays.

Access must be provided to all ground floor, interior courtyards. Access to ground floor courtyards must be wide and straight to expedite the movement of fire department personnel and ground ladders as part of fire department operations.

Yield Street

On a low density and low traffic volume residential street serving single-family homes, duplexes, and townhouses with all window sills no more than 27 feet from grade, a performance-based alternative may provide sufficient fire department access (Figure 3.12). These yield streets contain a 12-foot wide, alternating directional travel access lane with two 8 foot on-street parking lanes. Operational bays can be found in naturally occurring areas such as driveway curb cuts in combination with intersections and/or no parking zones at fire hydrants. An operational bay must be located no more than 150 feet from the main side hinge door of each unit along the street.

MCDPS and MCDOT have the authority to remove additional parking as necessary.

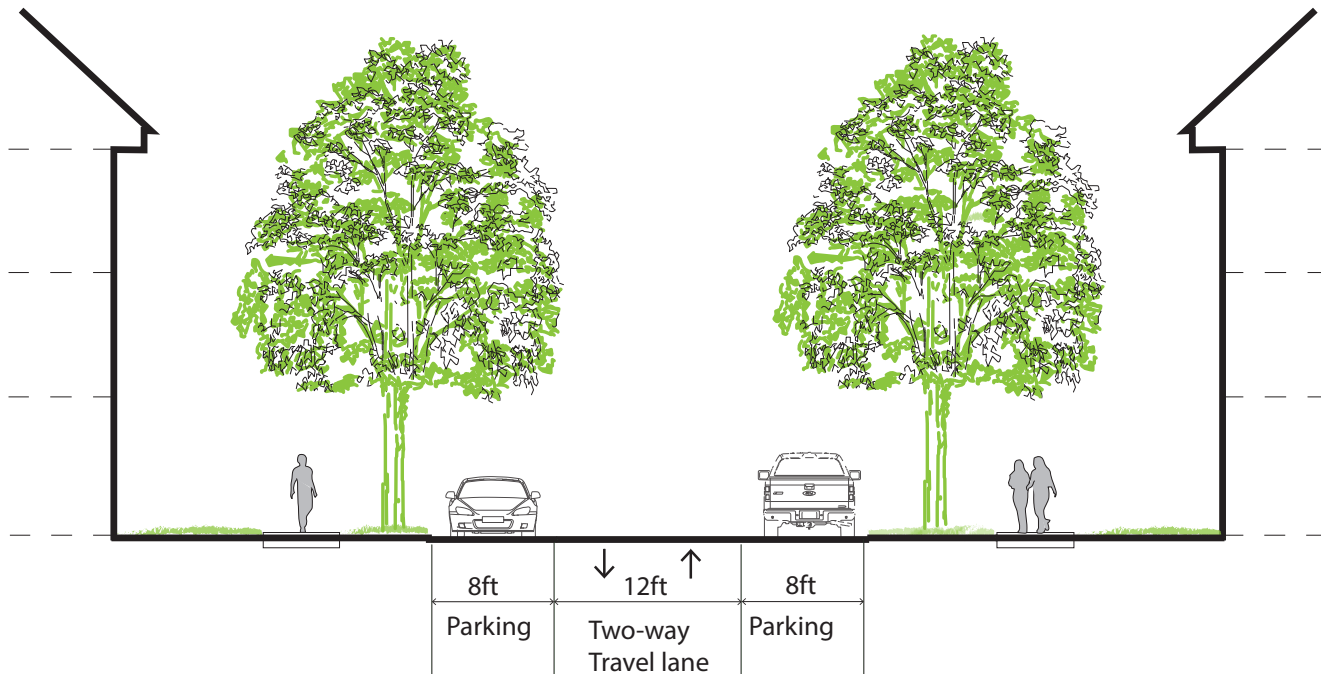


Figure 3.12: Cross-section of yield street; all dimensions shown are the minimum required

Distance to Side Hinge Door

For new development, redevelopment, and infill development, NFPA 1 as amended by Montgomery County, requires that a main side hinge door, providing access to the interior of an occupied structure, be located within 50 feet or 150 feet of fire department vehicular access via an unobstructed walkable grade depending on occupancy type and window sill height. Access requirements for main side hinge doors and secondary side hinge doors are as follows:

- **One- and Two-Family Dwellings with window sills no more than 27 feet from grade** require access to the occupied interior through a main, side hinge door within 150 feet of fire department vehicular access. This typically includes one- and two-family dwellings as well as townhouses that are three stories or less.
- **One- and Two-Family Dwellings with window sills higher than 27 feet from grade** require access to the occupied interior through a main, side hinge door within 50 feet of fire department vehicular access. This typically includes four-story townhomes.
 - Where alleys are used to provide fire department access to townhouses with window sills greater than 27 feet from grade, a combination of a main and secondary side hinge doors may be provided for firefighter access.
 - The secondary side hinge door to the rear of the unit must be within 50 feet of compliant fire department vehicular access. A roll-up garage door that also includes a pass-thru man door would satisfy the secondary side hinge door provision.
 - The main side hinge door located at the front of the unit must be within 150 feet of compliant fire department vehicular access.
 - The main and secondary side hinge doors can be accessed from separate points of fire department vehicular access.
- **Commercial Structures** require access to the occupied interior through a main, side hinge door within 50 feet of fire department vehicular access.



Figure 3.13: A garage door with a pass-thru man door

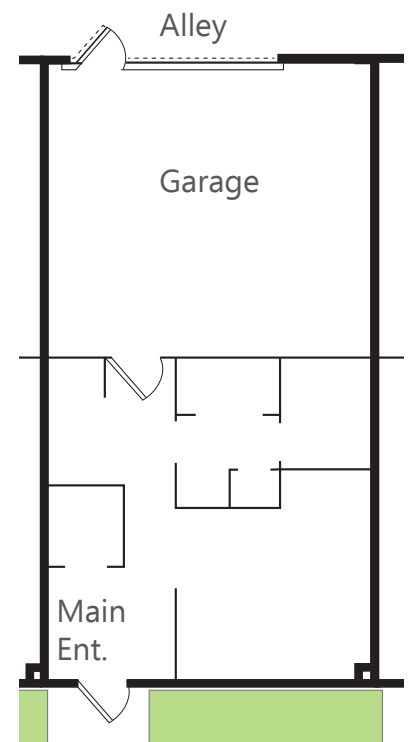


Figure 3.14: An entry-level plan of a typical rear-loaded townhouse shows how FDA requirements can be met by the use of a garage door with a pass-thru man door

Residential Alleyway 1



Figure 3.15: Alleyways, flanked by less than three-story townhouses, may be used to provide FDA if appropriately dimensioned

Alleyways with townhouses that have window sills no more than 27 feet from grade may be used for fire department access (Figures 3.16-3.17). The alleyway consists of a 20 foot wide, two-way driving surface and the townhouses must be located at least 30 feet apart. Projections from the building faces, such as decks, must not impede fire department operations. A cross-section view may be required at time of MCDPS plan review. Additional requirements are as follows:

- Main side hinge doors must be located no more than 150 feet from fire department vehicular access.
- There must be no less than 5 feet clear on each side of the lot line between divided sticks of townhouses for a minimum 10 feet clear between sticks. That distance may increase based on International Residential Code (IRC) or International Building Code (IBC) requirements. Developers must be mindful of openings allowed per IRC/IBC given unit spacing.
- Entrances into alleyways required for fire department vehicular access must meet fire department vehicular turning requirements.

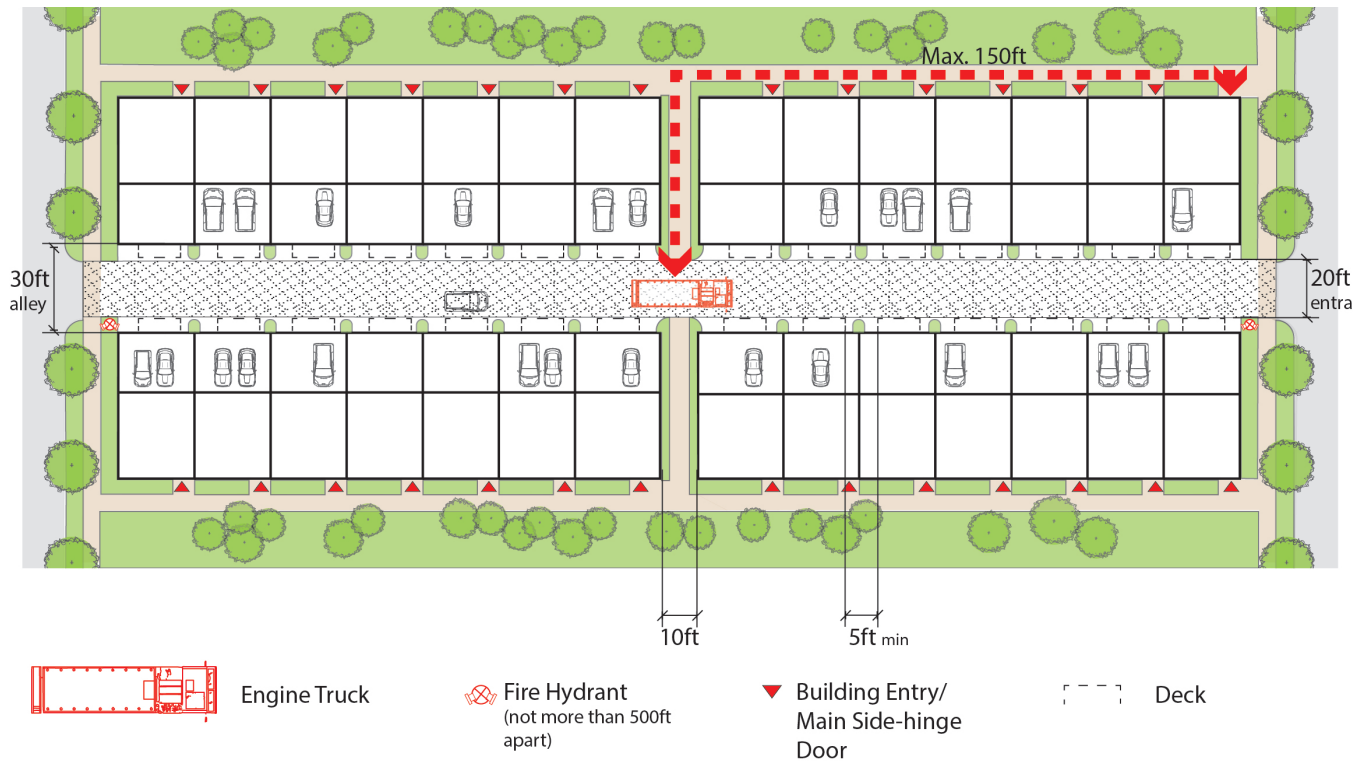


Figure 3.16: Plan of residential alleyway with up to 3-story townhouses or window sills less than 27-feet in height, showing a building-to-building distance of 30-feet

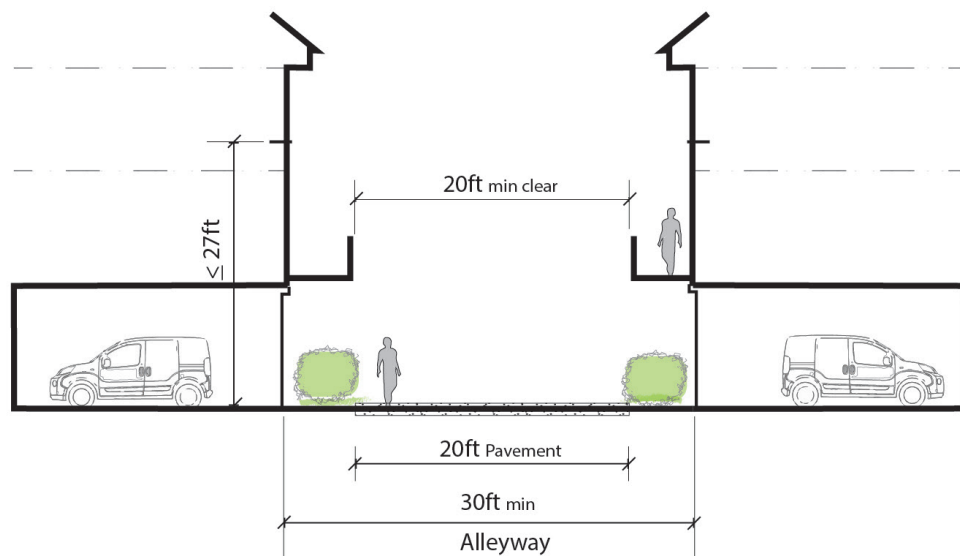


Figure 3.17: Cross-section of residential alleyway 1

Residential Alleyway 2



Figure 3.18: Alleyways shall be a minimum of 40 feet wide when townhouse window sills are greater than 27ft in height

Alleyways with townhouses that have window sills greater than 27 feet from grade may be used for fire department vehicular access (Figures 3.19-3.20). The alleyway consists of a 20 foot wide, two-way driving surface. The townhouses are located at least 40 feet apart, with 30 feet separating opposing decks. Projections from the building faces such as decks must not impede fire department operations. A cross section view may be required at time of MCDPS plan review. Additional requirements are as follows:

- A combination of a main and secondary side hinge doors may be provided for firefighter access.
- The main side hinge door located at the front of the unit must be within 150 feet of compliant fire department vehicular access.
- The secondary side hinge door to the rear of the unit must be within 50 feet of compliant fire department vehicular access. A roll-up garage door that also includes a pass-thru man door would satisfy the secondary side hinge door provision.
- The main and secondary side hinge doors may be accessed from separate points of fire department vehicular access.
- There must be no less than 5 feet clear on each side of the lot line between divided sticks of townhouses for a minimum 10 feet clear between sticks. That distance may increase based on IRC/IBC requirements. Developers must be mindful of openings allowed per IRC/IBC given unit spacing.
- Entrances into alleyways required for fire department vehicular access must meet fire department vehicular turning requirements

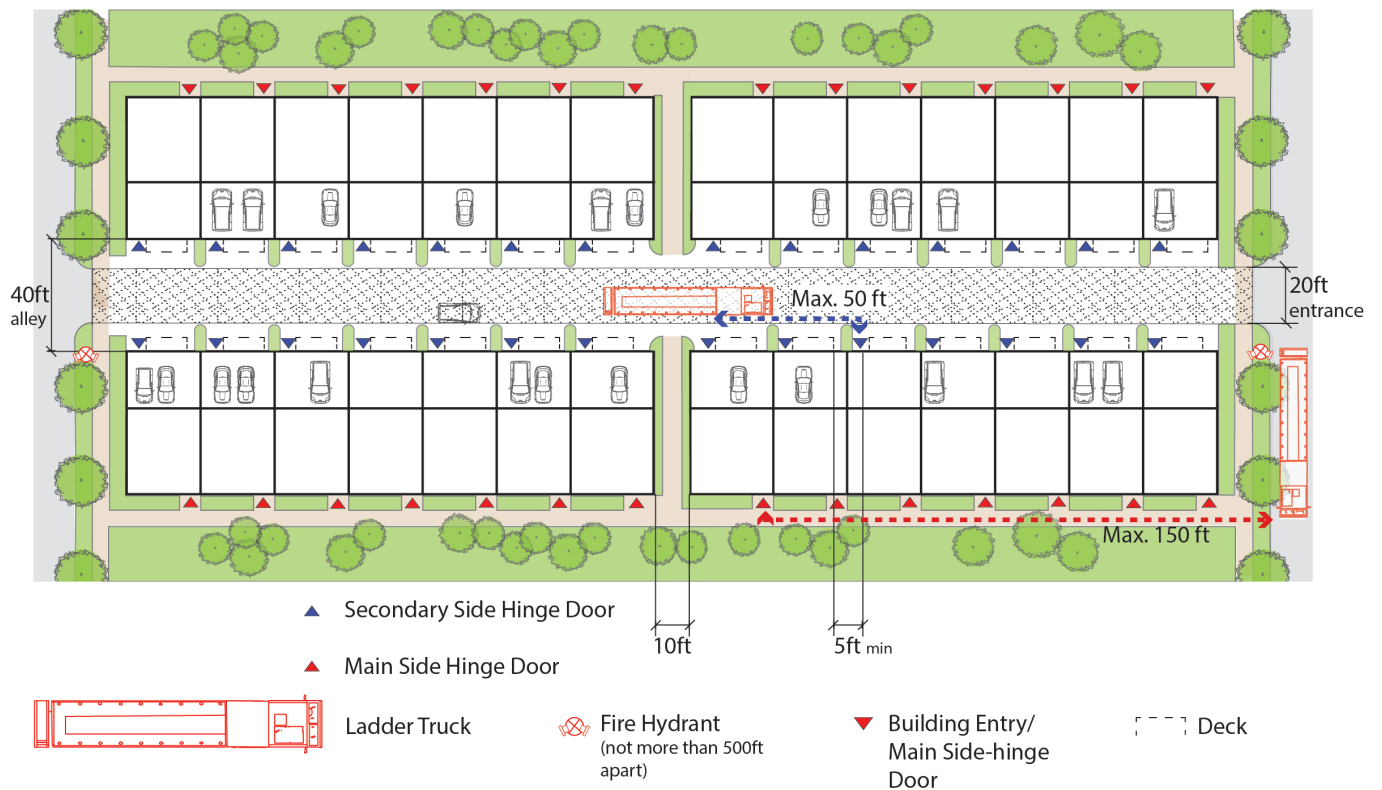


Figure 3.19: Plan of residential alleyway with four-story townhouses or window sills greater than 27-feet in height, showing a building-to-building distance of 40-feet

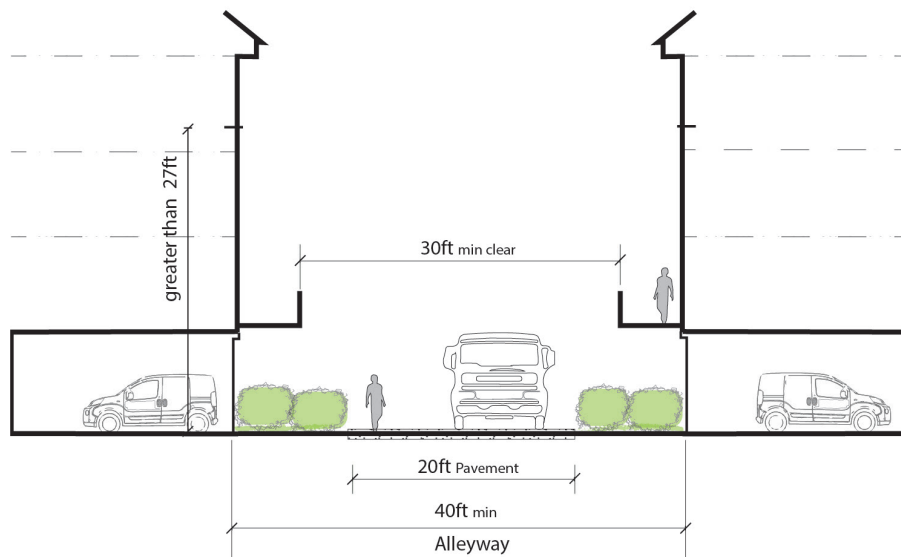


Figure 3.20: Cross-section of residential alleyway 2

Street Intersections

With the goals of Vision Zero in mind, a primary objective of the performance-based guidelines is to provide efficient and adequate fire department access while promoting safer, intuitive, and compact intersections. Intersections are natural conflict zones between modes and feature high rates of collisions, severe injuries and fatalities. To reduce collisions and conflicts, Montgomery County is designing safer streets for people that walk, bike, drive, and use public transit. Specific treatments may include designing intersections to lower vehicle speeds, increasing the visibility of people that walk and bike, and reducing curb radii and crossing distances.

Prescriptive code requires a minimum interior turning radius of 25 feet for fire department vehicular access at intersections. Wider curb radii facilitate turning movements for fire department apparatus but also encourage high-speed turning movements among everyday motorists, impacting how pedestrians approach and cross intersections.

Under these performance-based standards, curb radii of less than 25-feet may be approved at the intersection of two fire department vehicular access routes if effective clearance for fire department access is maintained. National best practices (NACTO and AASHTO) propose 10-to-15-foot-wide curb radii in urban settings. Within the Urban Road Code Areas in Montgomery County, curb radii as low as 15 feet are already recommended per MCDOT standards.

When determining the required curb radii during the regulatory review process, multiple design factors and elements that may limit fire access should be considered: adjacent road width, median, and sidewalk dimensions; on-street parking; pedestrian and transit facilities; the presence of street furniture and public art; and utility pole placement. Specific intersection design concepts can help minimize curb



Figure 3.21: Bulb-outs create shorter crosswalk distance for pedestrians



Figure 3.22: Curb extension create tighter corners and therefore reduces turning speeds of vehicles

radii at urban and suburban intersections and establish safer environments. These concepts include:

- Provide curb extensions at crosswalks and intersections to reduce crossing distances and improve visibility for pedestrians and cyclists
- Provide pedestrian refuge islands at medians on arterial roads
- Avoid channelized right-turn lanes
- Align crosswalks with pedestrian desire lines, where feasible. Crosswalks should be placed at perpendicular angles with cross streets and crossing distances should be minimized.

The LSUD work group reviewed design standards for typical Montgomery County street types and potential design treatments that could allow for smaller curb radii when appropriate, while also allowing for adequate turning access of emergency vehicles.

Curb radii may go as low as 15 feet or even lower, provided that encroachment on the opposing travel lanes is minimized.

When exploring turning radii to adequately accommodate fire apparatus movements, designers should begin by examining the effective radius between the approach street clear width and the receiving street clear width. Where alternative street designs are proposed, AutoTURN is a useful tool for demonstrating vehicular performance. The goal of this process is to minimize curb return radii, and promote pedestrian safety, while still allowing for effective emergency response as outlined in the County's Urban Road Code Standards.

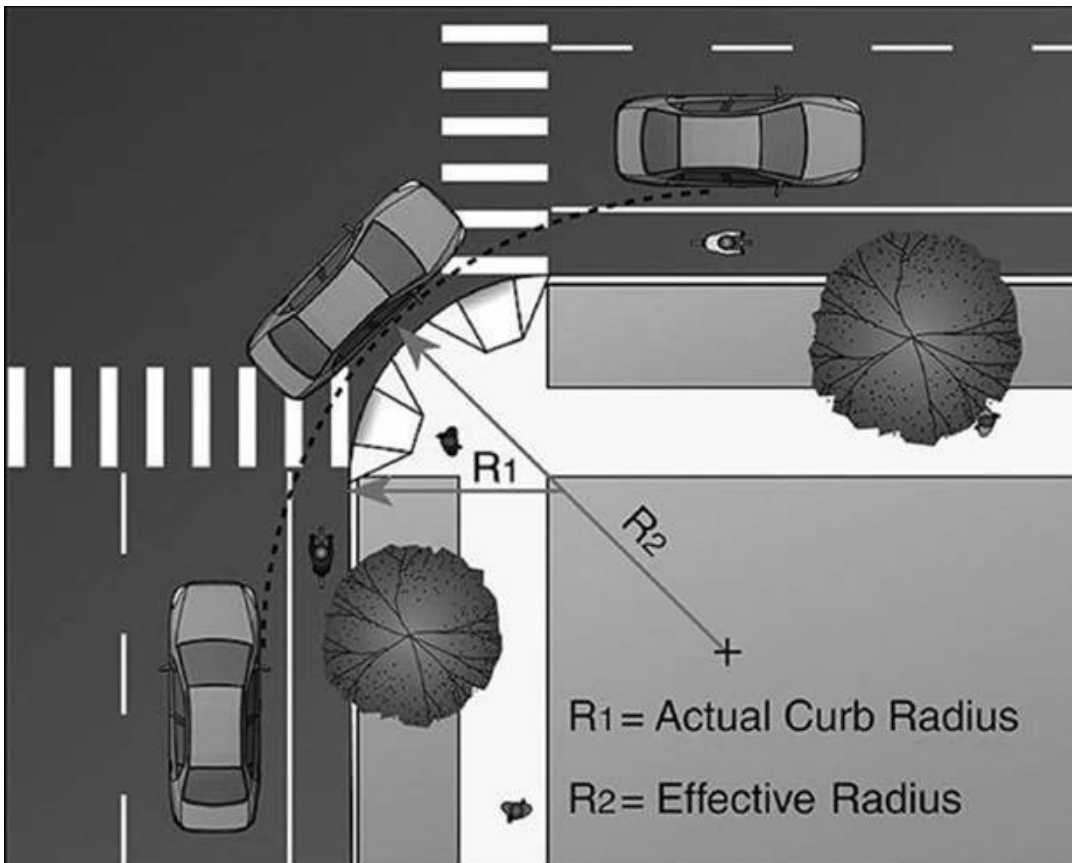


Figure 3.23: Minimizing curb radii lowers vehicle turning speeds and expands the pedestrian realm, increasing visibility for pedestrians and reducing crossing distances. Curb radii should be reduced to 15 feet in designated Urban Road Code Areas.

On-street design improvements may enable efficient fire department apparatus turning movements while prioritizing compact and safe intersections. The following strategies should be considered and will be reviewed on a case-by-case basis:

- Set back on-street parking further than required from intersections and crosswalks
- Set back stop bars in advance of pedestrian crosswalks
- Construct curbs, medians, and bike facility buffers with mountable curbs
- Utility poles, hydrants, and street furniture should be sited to avoid conflicts with Fire and emergency vehicles

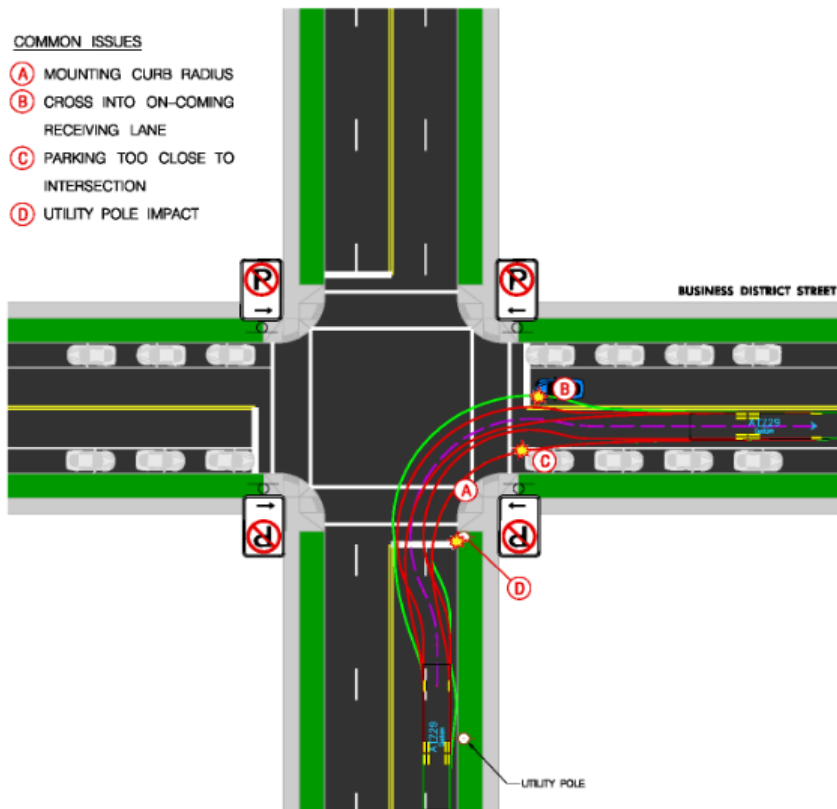
Figure 3.24 illustrate fire department apparatus turning movements in AutoTURN based on standard MCFRS dimensions (47 feet by 8 feet) for a typical Business District Street. These diagrams illustrate how tighter turning radii may be achieved by incorporating key considerations for fire department apparatus as they navigate intersections. Such considerations include conflicts with the front/rear wheels or the vehicle body and variables such as on-street parking, utility poles, medians, curb extensions, and the expected locations of pedestrians and bicyclists in relation to turning emergency vehicles.

During the regulatory review process, applicants seeking performance-based alternatives will be required to provide similar studies to demonstrate the adequacy of the proposed street intersection layout and will need approval from the Planning Department, MCDOT, and MCDPS.

TURNING MOVEMENT ISSUES

COMMON ISSUES

- (A) MOUNTING CURB RADIUS
- (B) CROSS INTO ON-COMING RECEIVING LANE
- (C) PARKING TOO CLOSE TO INTERSECTION
- (D) UTILITY POLE IMPACT



SOLUTIONS

SOLUTIONS:

- (1) MOUNTABLE CURB
- (2) RELOCATE STOP BAR
- (3) INCREASE 'NO PARKING' ZONE AT INTERSECTION
- (4) RELOCATE UTILITY POLE

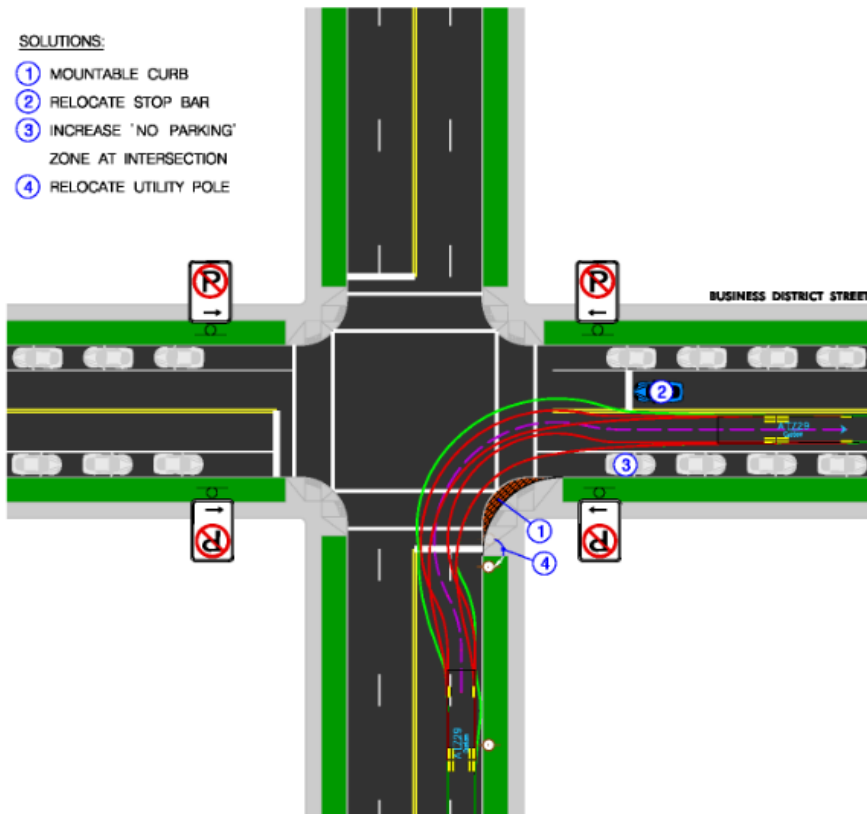


Figure 3.24: Example of an AutoTURN diagram on a business district street

Alternative Paving Surfaces

The required prescriptive minimum 20 feet of clear width for operational access is not necessarily required to be paved roadway for vehicular travel and parking. Load bearing shoulders and bike lanes are also acceptable. In low speed environments, alternative surfaces such as grass pavers that are visually distinguishable as a drivable surface, signage, and/or other acceptable means may be permissible to function as fire department vehicular access. A suitable load-bearing subgrade for these alternative surfaces must be provided to support MCFRS apparatus. Each proposal must be reviewed on a case by case basis. The MCDPS Division of Fire Prevention and Code Compliance will issue an operational permit to ensure long term maintenance of an alternative surface.

Where a fire department accessible road has less than 20 feet of clear pavement for operational access, a mountable curb to an apparatus load bearing sidewalk may be acceptable depending on other development parameters. Similarly, a load-bearing and mountable median might be provided at acceptable intervals to accommodate Operational Access. Mountable curbs are gently sloping faces that allow for fire emergency vehicles to drive over but restrict access for ordinary automobiles.



Figure 3.25: Median refuge islands reduce pedestrian exposure when crossing roadways and can be designed with mountable curbs to support Fire Department access



Figure 3.26: Raised intersections slow down regular drivers while providing adequate emergency vehicle access

Shared Streets

Shared streets (also referred to as woonerfs) minimize the segregation between modes of road users by removing features such as curbs, road surface markings, traffic signs and traffic signals. The goal is to slow vehicles by creating uncertainty about who has priority within the right-of-way. Shared streets typically accommodate flexible on-street parking, landscaping, and stormwater management, and are often treated with specialty paving.

Shared streets are an acceptable form of Fire Department Access, provided they create sufficient travel and operational access alternatives. The designs, materials, patterns and buffers proposed for shared streets will be evaluated during the regulatory review process.

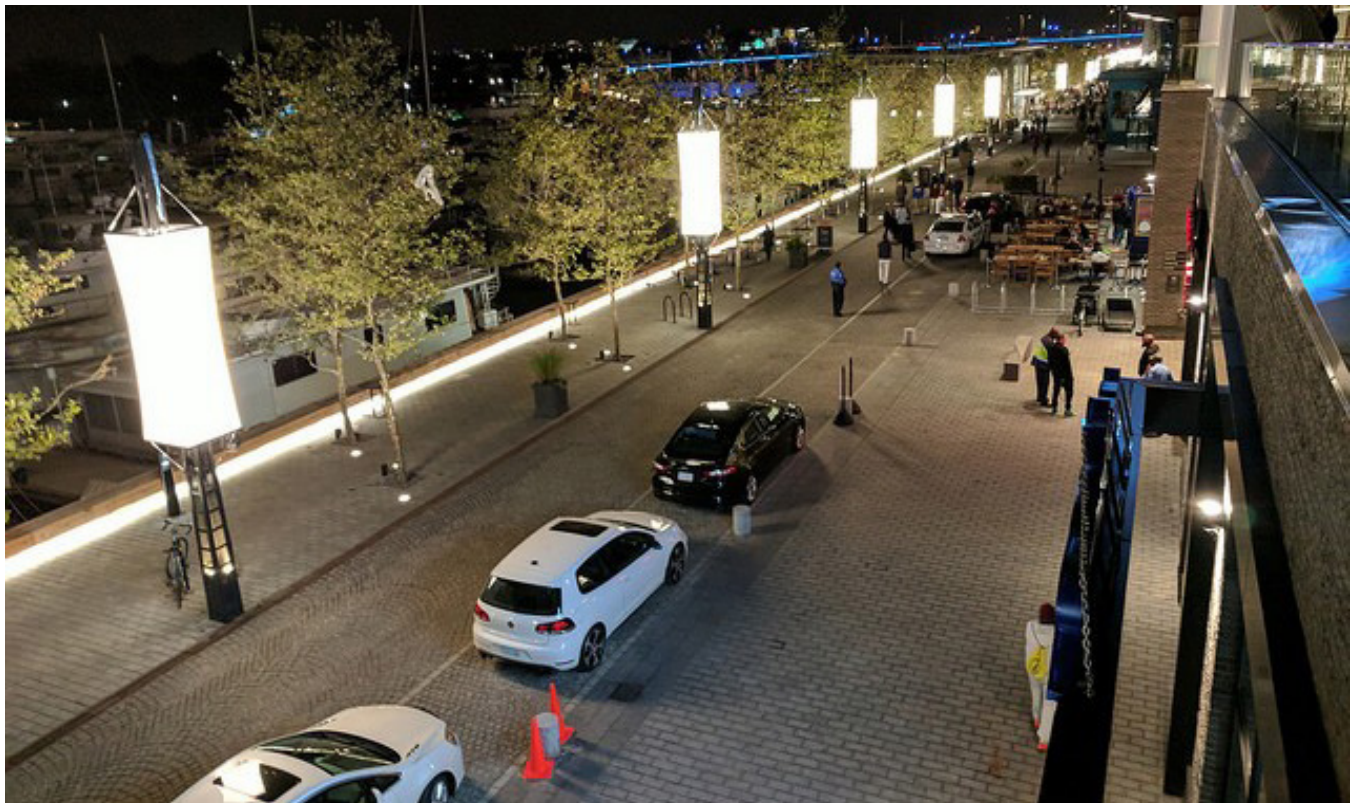


Figure 3.27: Shared street at District Wharf in Washington, D.C. Pavers and buffers subtly distinguish vehicle, bicyclist and pedestrian zones in shared streets

Compensatory Fire Protections

When fire department access cannot be provided per Prescriptive Code on constrained sites, additional performance-based features may be used to mitigate life safety hazards. These features may include, but are not limited to, upgraded sprinkler protection, on-site water supply, and early notification alarm systems; these compensatory measures are reviewed and approved by Montgomery County Department of Permitting Services staff and, when necessary, through the Code Modifications Request procedure or established MCDPS policies. Potential compensatory fire protection measures include:

- Increasing the distance required to the main side hinge door
- Modifications to fire department water supply
- Modification to travel and operational access requirements on rural or rustic roads



Figure 3.28: Underground water tanks may serve as additional fire protection measures where operational access is limited, such as on rural and rustic roads



Figure 3.29: Hydrants connect to underground water tanks and provide access for fire department personnel

Utilities

Utility lines are critical for the distribution of electricity and telecommunications. In urban areas overhead utility lines can limit and obstruct fire department access, especially to multifamily residential and commercial buildings with window sills greater than 27 feet from grade.

Overhead utility lines are especially vulnerable during high wind events such as severe thunderstorms, resulting in disrupted service and potentially hazardous situations for residents and emergency responders. Burying utilities underground mitigates future risk by ensuring Montgomery County's utility network is more resilient during high wind events and will improve the reliability of service. For new development, utility lines should be undergrounded where aerial operations are anticipated, namely buildings with any window sill greater than 27 feet from grade.





Chapter 4:

Streetscape Recommendations



Elements of a Good Streetscape

Streetscapes play a vital role in ensuring efficient access to buildings during emergencies, provide adequate levels of safety for pedestrians and cyclists and creates frontages for homes and businesses that are safe, attractive and economically competitive. To achieve these goals, all streetscapes should create places for people to socialize and gather. Streetscapes should:

- Allow sufficient setback from the curb for adequate curb zone, planting / furnishing zone, pedestrian zone and a frontage zone.
- The frontage zone along commercial ground floor uses should accommodate outdoor seating, awnings, signage and landscaping.
- The frontage zone along residential ground floors should accommodate landscaping that provides privacy and a transition from public to private realm.
- Large street trees should be planted 20-30 feet on-center.
- There should be adequate distance between street trees and the building face to ensure that the street tree canopy does not impede FDA.
- Sidewalks fronting commercial ground floors should be wide and include outdoor seating areas where applicable, ensuring adequate separation between street trees and building faces.
- Secondary rows of trees closer to buildings should be smaller in size to allow access to building facades by firefighters.
- On-street parking should be provided to the greatest extent possible, in keeping with street classifications in the applicable master plans. Private roads should also provide on-street parking to the greatest extent possible.
- Street furniture should either be movable or placed in a way that does not block FDA to the building from the street.
- Native tree and plant species are always preferred in planting zones. Street tree guidelines can be found on MCDOT's website or by contacting the County Arborist.

To illustrate how these streetscape elements can be accommodated without compromising FDA, the LSUD work group developed typical streetscape layouts for a mixed-use commercial street, a multifamily residential street and a residential townhouse street. These layouts emphasize the previously described principles that should be considered while creating new public and private streets or retrofitting existing streets.

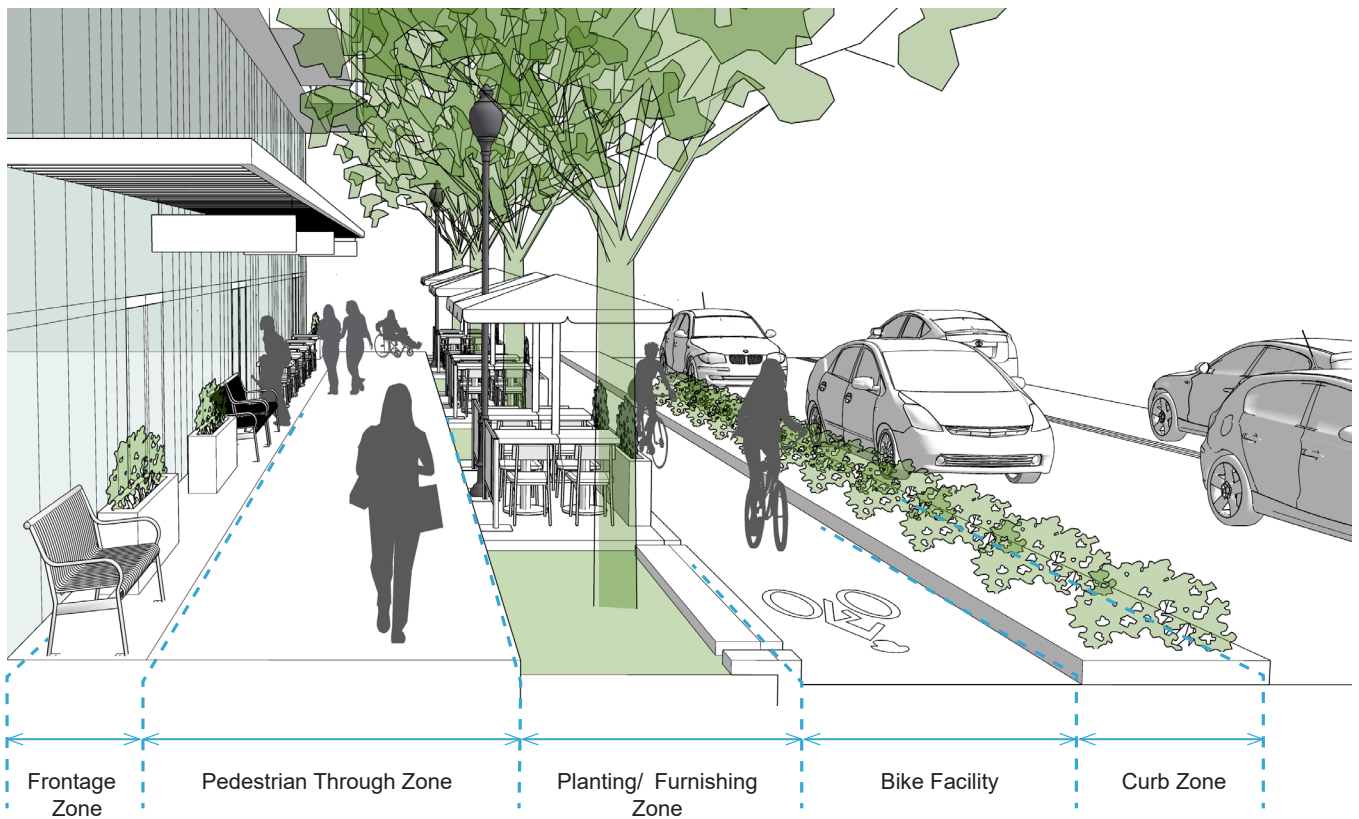


Figure 4.01: Mixed-use commercial street with distinct zones that ensure safety for all road users

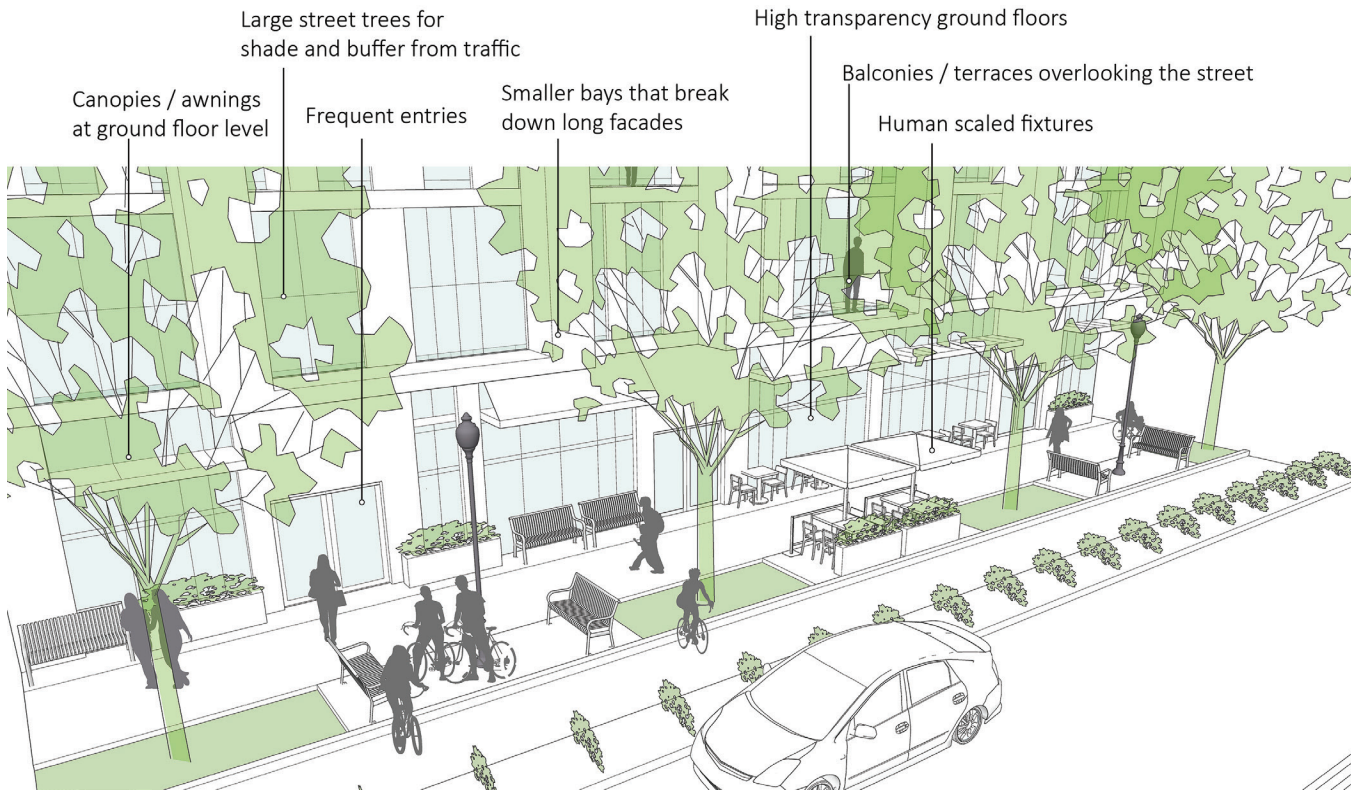


Figure 4.02: Diagram of good streetscaping along a commercial mixed use street

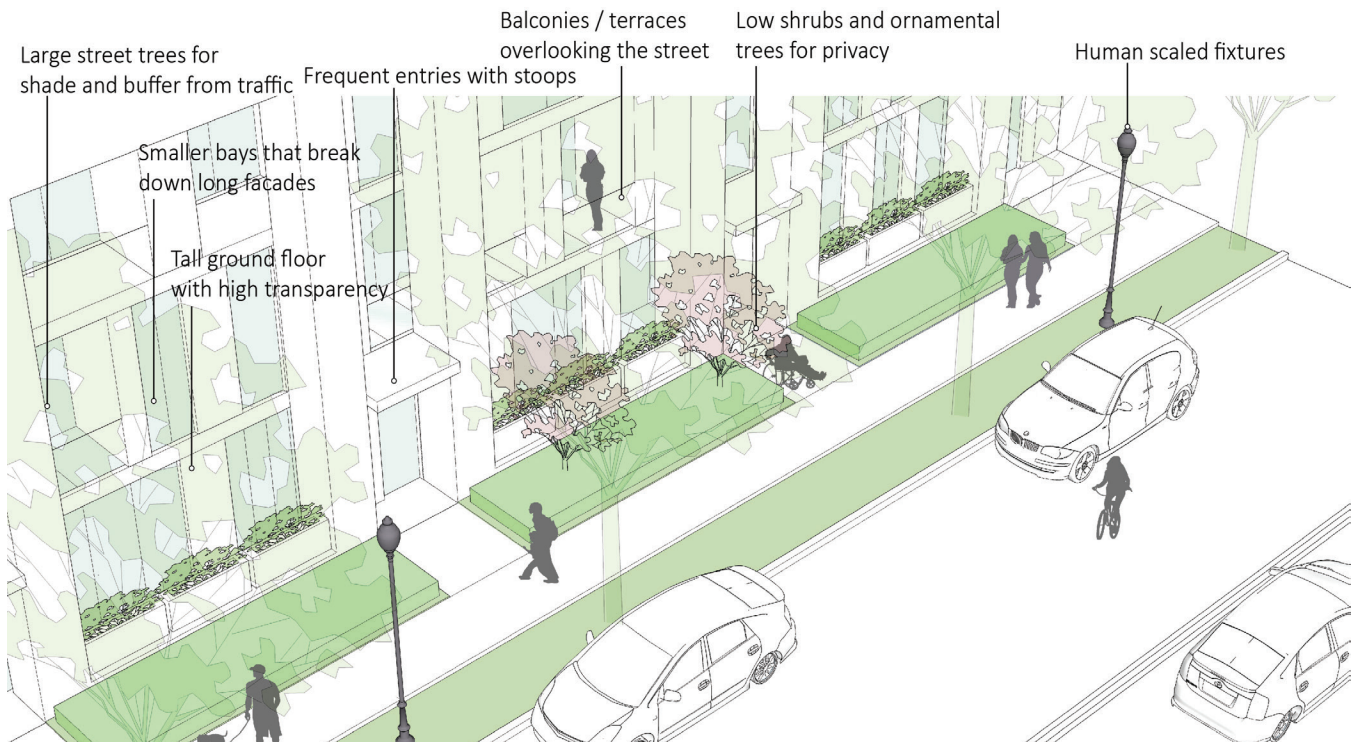


Figure 4.03: Diagram of good streetscaping along a residential street

Mixed Use Commercial Streetscape

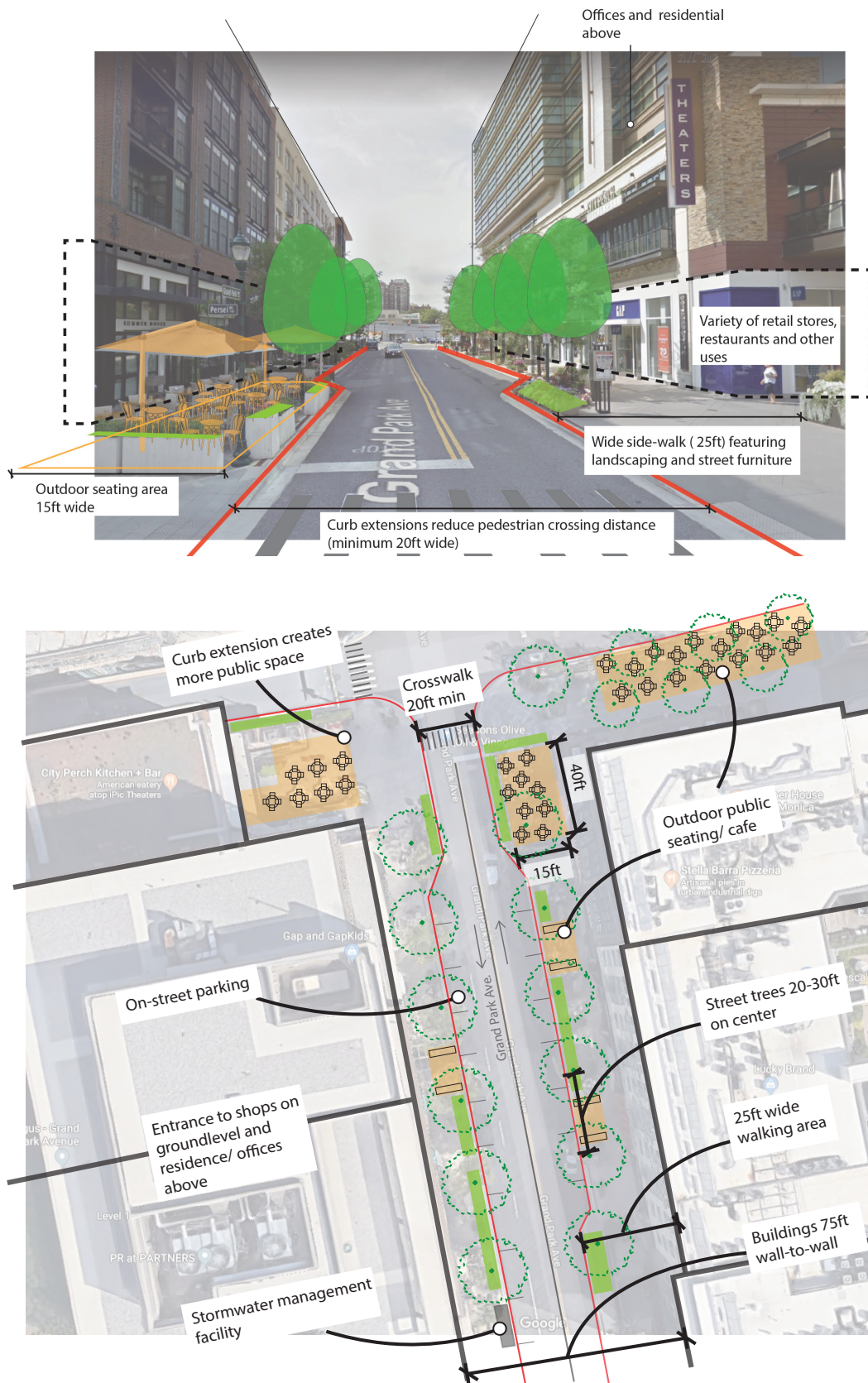


Figure 4.04: Perspective and correlating plan diagrams showing a real life example of a good commercial streetscape; all dimensions are approximate

Residential Multifamily Streetscape

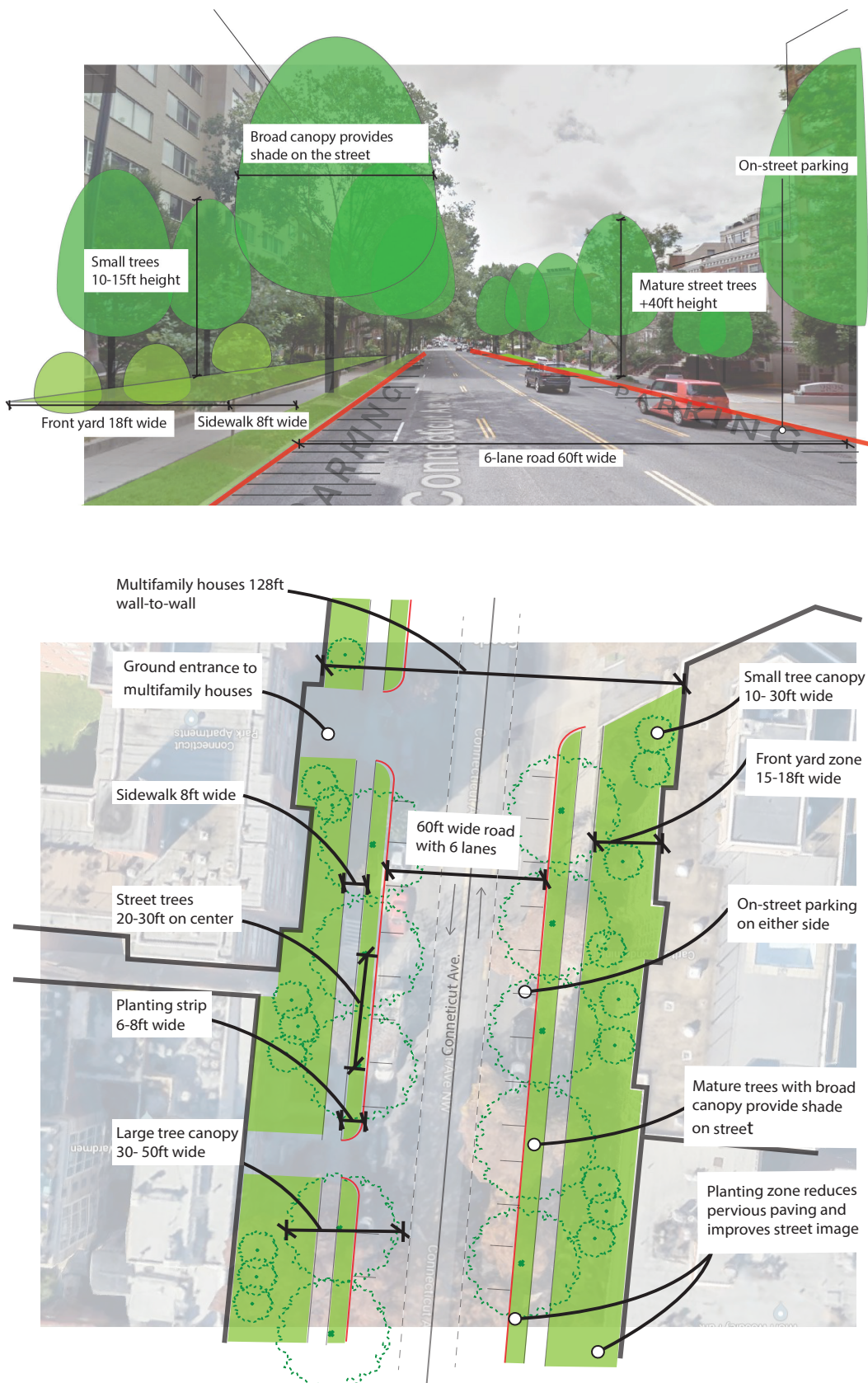


Figure 4.05: Perspective and correlating plan diagrams showing a real life example of a good multifamily streetscape; all dimensions are approximate.

Residential Townhouse Streetscape

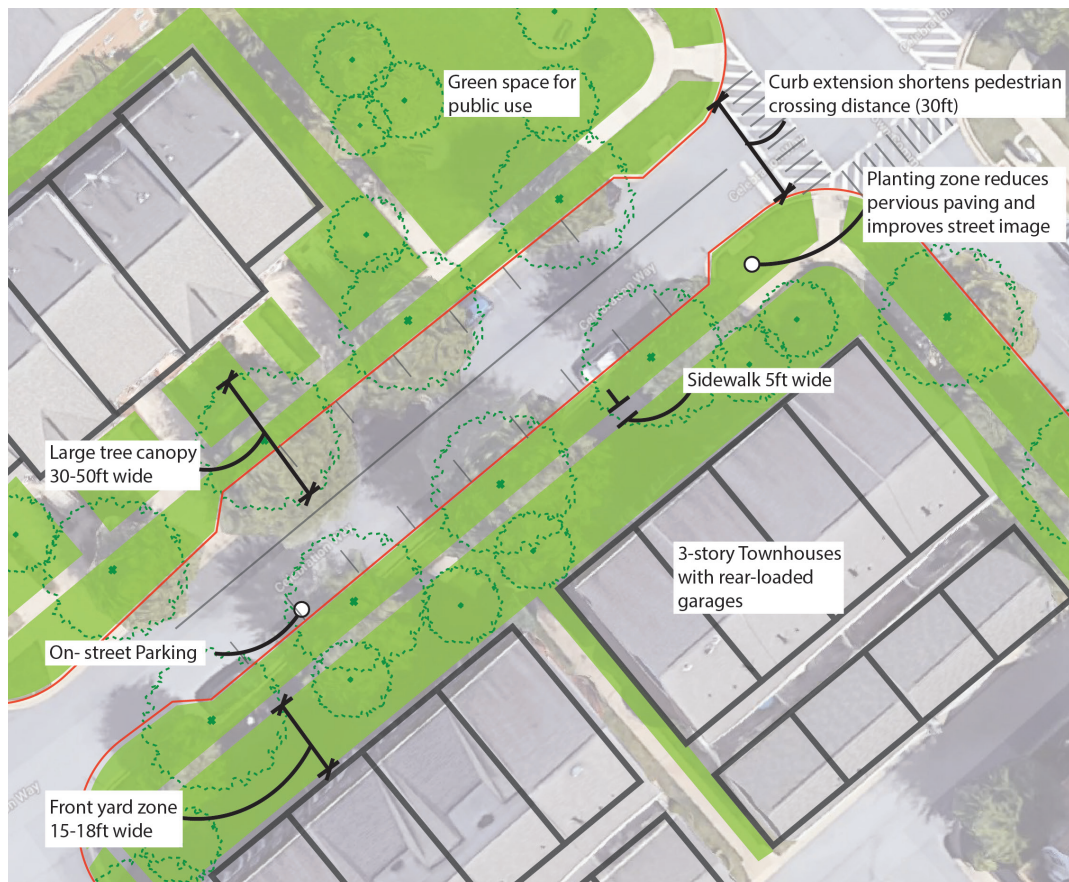
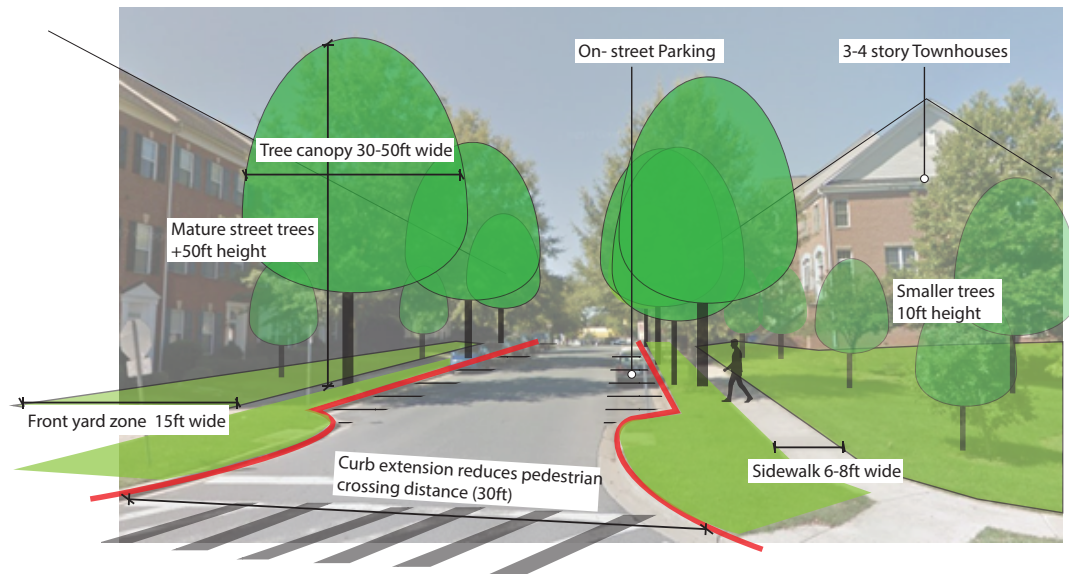


Figure 4.06: Perspective and correlating plan diagrams showing a real life example of a good residential townhouse streetscape; all dimensions are approximate.





Chapter 5:

Pedestrian and Bicycle Safety Recommendations



Public Safety

As Montgomery County continues to urbanize, the safety of its residents is the highest priority of all public agencies. The county recently adopted two influential plans and policies that prioritize safety and multimodal access, creating a safer environment for all users that traverse the county's road network.

Vision Zero

Created in Sweden in 1997, Vision Zero is a systems approach to transportation that proactively promotes the safety of all road users by redesigning roadway standards, bolstering pedestrian infrastructure and facilities, and increasing enforcement. Vision Zero aims to slow vehicular travel speeds by narrowing travel lanes, reducing posted speeds, and redesigning intersections.

Montgomery County adopted a two-year Vision Zero Action Plan in 2017. The goal of the Vision Zero Action Plan is to eliminate all fatal and severe collisions in the county by 2030. Between 2012 and 2016, an average of 35 individuals lost their lives and 400 were severely injured on roads in Montgomery County. The six common principles of Vision Zero are:

- Transportation-related deaths and severe injuries are preventable and unacceptable
- Human life takes priority over mobility and other objectives of the road system
- Transportation systems should be designed to anticipate human error
- People are inherently vulnerable, and speed is a fundamental predictor of crash survival. The transportation system should be designed for speeds that protect human life.
- Safe human behaviors, education and enforcement are essential contributors to a safe system
- Policies at all levels of government need to align, making safety the highest priority on our roads

Bicycle Access

The 2018 Bicycle Master Plan is a comprehensive overhaul of past functional plans, area master plans, sector plans and is a key element of Montgomery County's Vision Zero Action Plan. The plan establishes a vision for Montgomery County as a world-class bicycling community, where people in all areas of the county have access to a comfortable, safe and connected bicycle network, and where bicycling is a viable transportation option that improves residents' quality of life. The plan proposes a new bikeway classification system that organizes bikeways based on their level of separation from traffic. Long-term bicycle parking stations are recommended at all Metrorail Red Line and many MARC Brunswick Line, future Purple Line and Corridor Cities Transitway stations to encourage bicycling to transit.

Both these initiatives will transform how existing and new streets are designed and operate. All new development must conform to the recommendations in the Bicycle Master Plan and apply the principles of Vision Zero. Fire Department Access will remain a key consideration as Vision Zero and the Bicycle Master Plan are implemented. Performance-based alternatives can be a strong tool for resolving conflicts and balance competing needs on our roadways.

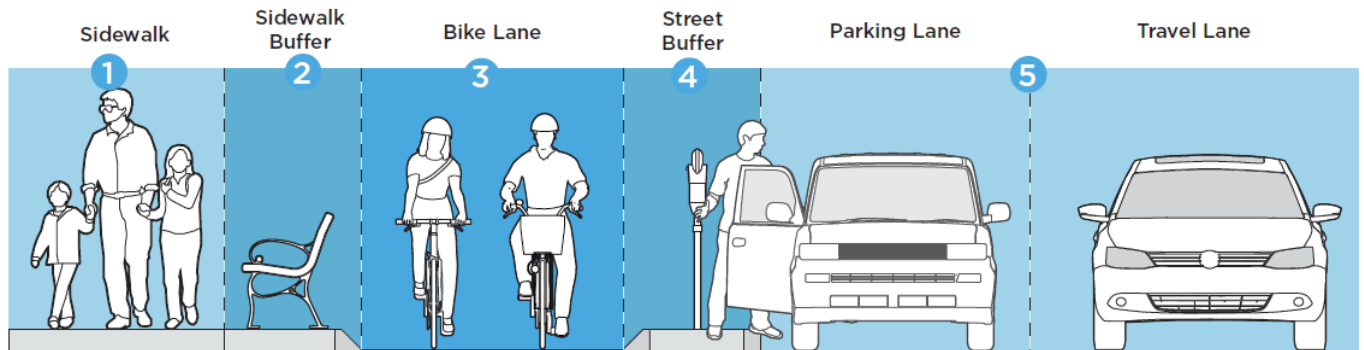
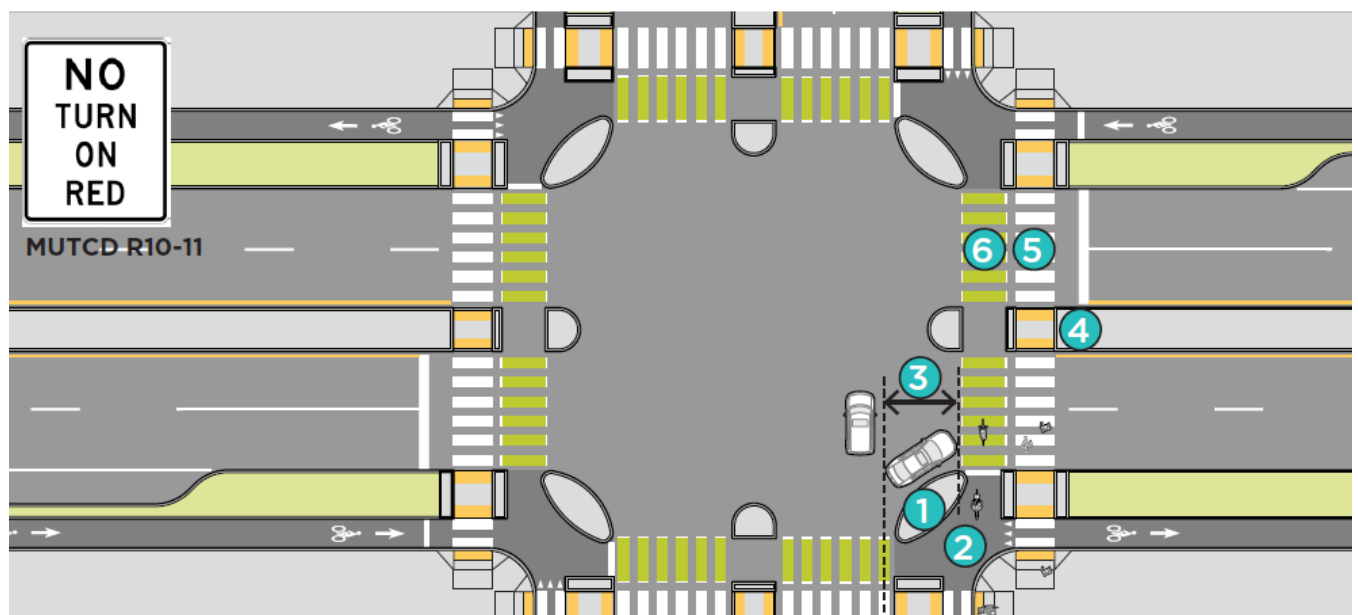


Figure 5.01: Design features that separate roadway users traveling at different speeds reduces risks of accidents



- 1 Corner refuge island size may vary. The curb radius should minimize motorist speeds to 15 mph or less.
- 2 The forward bicycle queuing area should allow bicyclist to wait without obstructing crossing bicyclists or pedestrians.
- 3 Motorist yield zone should be a minimum of six feet in length or up to typical car length.
- 4 Median refuge islands should be provided on roads with more than two lanes.
- 5 Marked pedestrian crosswalks should be provided and aligned with bicycle crossings.
- 6 Bicycle crossings should be separate from pedestrian crossings.

Figure 5.02: Protected intersections prevent conflicts between motorists, bicyclists and pedestrians

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PERFORMANCE-BASED DESIGN GUIDE

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