CITY OF ORLANDO

FIRE DESIGN GUIDELINES

Introduction

The following Fire Department Access Performance-Based Design Guide has been created as a resource to assist with designing projects and communities that are fully accessible by the City of Orlando Fire Department while promoting safe and active intersections and streetscapes that support pedestrians, bikes, and public transit as well as reflective of the city's Vision Zero commitment. Drafted by the Transportation, Public Works, Economic Development, and Orlando Fire Departments and external partners, this guide provides an overview of some fire department access prescriptive code requirements and performance-based alternatives.

The guide accompanies the City of Orlando's Life Safety 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 **NFPA.org**.

The full text of the City of Orlando Life Safety Fire Code is available online at
library.municode.com/fl/orlando/codes/code_of_ordinances?nodeId=TITIICICO_CH24FIPRCO

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Overview

This document is issued to supplement the Florida Fire Prevention Code, as adopted by the City of Orlando. 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, Chapters 16, 18 and NFPA 1142, as adopted and amended by the City of Orlando. Performance-based design is permitted per NFPA 1 and allows for alternatives that meet the intent of prescriptive fire department apparatus 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 following city departments - Orlando Fire Department, Public Works Department, Economic Development Department (Planning and Permitting Divisions) and Transportation Department.

The intent of the Florida Fire Prevention Code and the City of Orlando Life Safety Fire Code is presented in this document alongside potential performance-based alternatives. The main objectives of this guide are to:

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

It must be noted that this guide is meant to help provide additional options for possible alternatives to meet fire access needs and 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 60 Subdivision and Landscaping, and Chapter 65 Officers, Boards and Procedures of the Orlando Land Development Code and Chapter 24 of the Life Safety Fire Code. This document is intended to be a tool for engineers, architects, developers, planners, and public agencies to facilitate a successful development review process for customers and offer potential solutions.

Context

Life Safety & Urbanization

The City of Orlando and Central Florida region have experienced dramatic growth in the past few decades, with growth continuing to trend upward in the years to come. The city's current planning policies promote concentrated growth in mixed-use areas, smaller street sections, and the accommodation of pedestrian and bicycle infrastructure. Such compact, mixed-use environments require streets to accommodate multiple modes of transportation including private vehicles, pedestrians, bicycles, and public transit users. The city's commitment to prioritizing roadway safety resulted in the Orlando City Council's recent adoption of two policies to further this mission. The Bicycle Master Plan Update (2018) aims to provide an interconnected network for safe bicycling throughout the city. The Vision Zero Master Plan (2020) aims to eliminate severe injuries and fatal collisions on city roads.

Simultaneously, denser living and working environments create challenges for effective emergency service operations. By nature of an all-hazards response agency, fire department apparatus are large, commercial-type vehicles. While narrow streets limit pedestrian exposure to vehicle collisions and reduce traffic speeds, they may also limit fire department vehicular access. Features that improve quality of life for the community and improve safety for roadway users, such as street trees, setbacks, 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, providing appropriate traffic calming measures 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 safety and quality of life needs and continue to ensure that future development creates places that are safe, sustainable, economically competitive, and maintain the highest quality design.

Public Safety

As the City of Orlando continues to grow and urbanize, the safety of residents is the highest priority of all public agencies. The city has adopted two influential plans and policies that prioritize safety and multimodal access, creating a safer environment for all users that traverse the city 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. In Orange, Osceola, and Seminole counties, more than five people are killed and 35 people are seriously injured on our roads every week – a higher rate than elsewhere in Florida, or much of the nation. Of those killed on our roads, 30% are people who are walking or biking.

In 2017, Mayor Buddy Dyer signed a resolution to adopt the Vision Zero Action Plan. Community members and experts were engaged to understand the factors contributing to traffic violence in our city. The Vision Zero Orlando Action Plan outlines strategies to reduce crashes. It also describes ways to share the progress of the program's goals with the community. The goals of the Vision Zero Action Plan are:

1. Adopt a safe systems approach in roadway design, operations, and maintenance;
2. Increase everyone's understanding of the leading causes of crashes resulting in fatalities or serious injuries;
3. Support law enforcement efforts to eliminate behaviors leading to serious injury and fatal crashes;
4. Demonstrate continuous progress toward Vision Zero;
5. Improve access and travel time to Level 1 Trauma Center and other hospitals; and
6. Prioritize investments and programs in communities including underserved populations and higher numbers of vulnerable road users.

Bicycle Access

The Bicycle Plan is the city's strategic guide for improving its bicycling environment. To be an effective guide, it's critical to first understand where it is we are going.

The city initiated a comprehensive update to their citywide Bicycle Plan in the fall of 2018 following the latest national best practices for planning bikeway networks. The update was guided by a renewed vision statement:

> *In the City of Orlando, riding a bicycle is a safe and comfortable experience for residents and visitors of all ages, abilities and backgrounds. Residents consider bicycling a practical travel choice enabled by a highly connected, convenient and low-stress bikeway network that contributes to quality of life throughout the city.*

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.

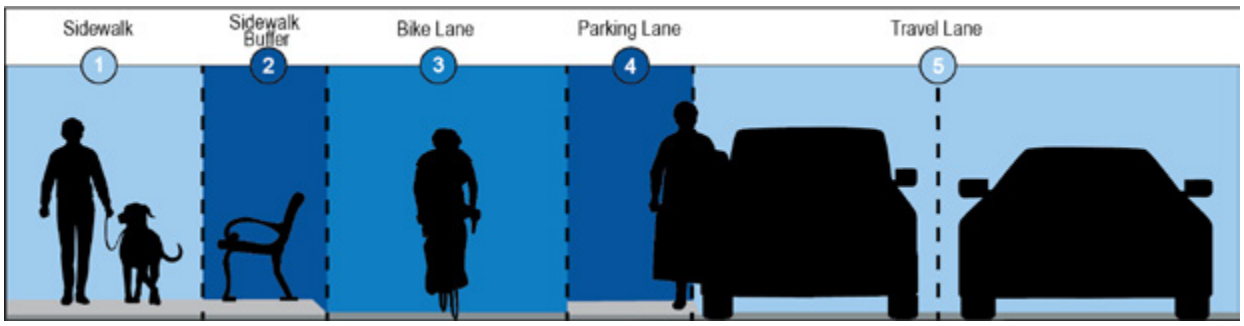


Figure 1: Design features that separate roadway users traveling at different speeds reduces risks of accidents.

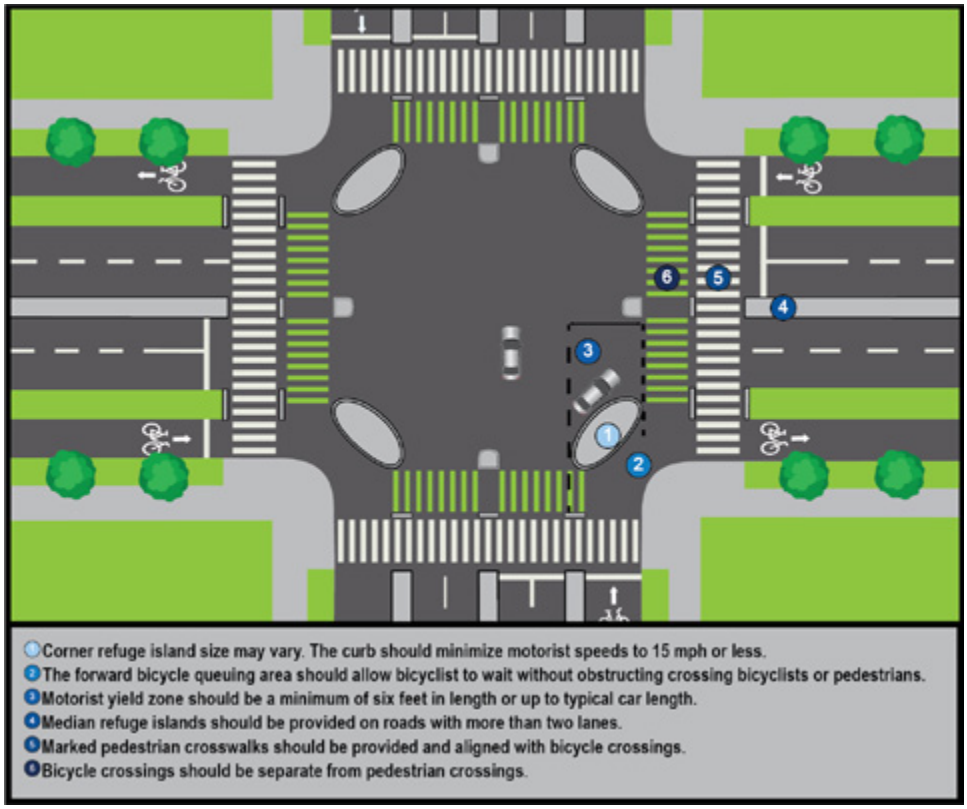


Figure 2. *For illustrative purposes only.*

1. Corner refuge island size may vary. The curb radius should minimize motorist speeds to 15 mph or less.
2. The forward bicycle queuing 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.

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 re-subdivision 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, may also be referred to as “Man Door”.

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 the city.

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

Redevelopment: Re-subdivision or masterplan 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.

Key Fire Department Access Design Elements

The City of Orlando City Council adopted the State of Florida, amended Florida Fire Prevention Code and Administration Code Rule 69A-60 as the Life Safety Fire Code of the City of Orlando. The Florida Fire Prevention Code inclusive of NFPA 1, Fire Code, Chapter 1, section 18 and NFPA 101, Life Safety Code which provide 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

NFPA 1 defines fire department apparatus access as:

> *"A road consisting of fire lanes, public and private access roads, alleyway, parking lot lanes, paved shoulders, and buffers, designed as load bearing with an approved all-weather surface made of non-permeable materials such as concrete and asphalt or permeable materials, pavers, and other engineered deigns."*

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.

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, with a vertical clearance of 13'6" 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, with a vertical clearance of 14 feet, 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 the city.

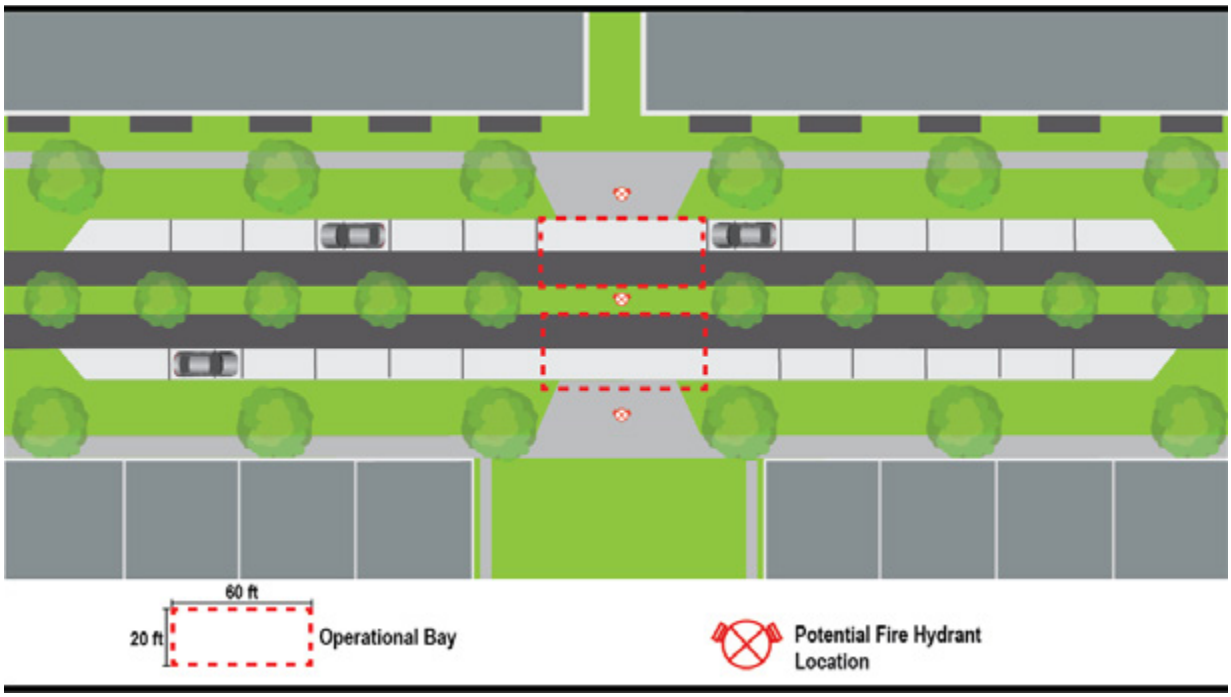


Figure 3: If an operational bay is used to provide operational access, the minimum dimension should be 20 feet x 60 feet. Fire hydrants must be placed within seven feet from the edge of pavement. Location of fire hydrants will require city approval.

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
- Buffered bike lanes
- Alleyways

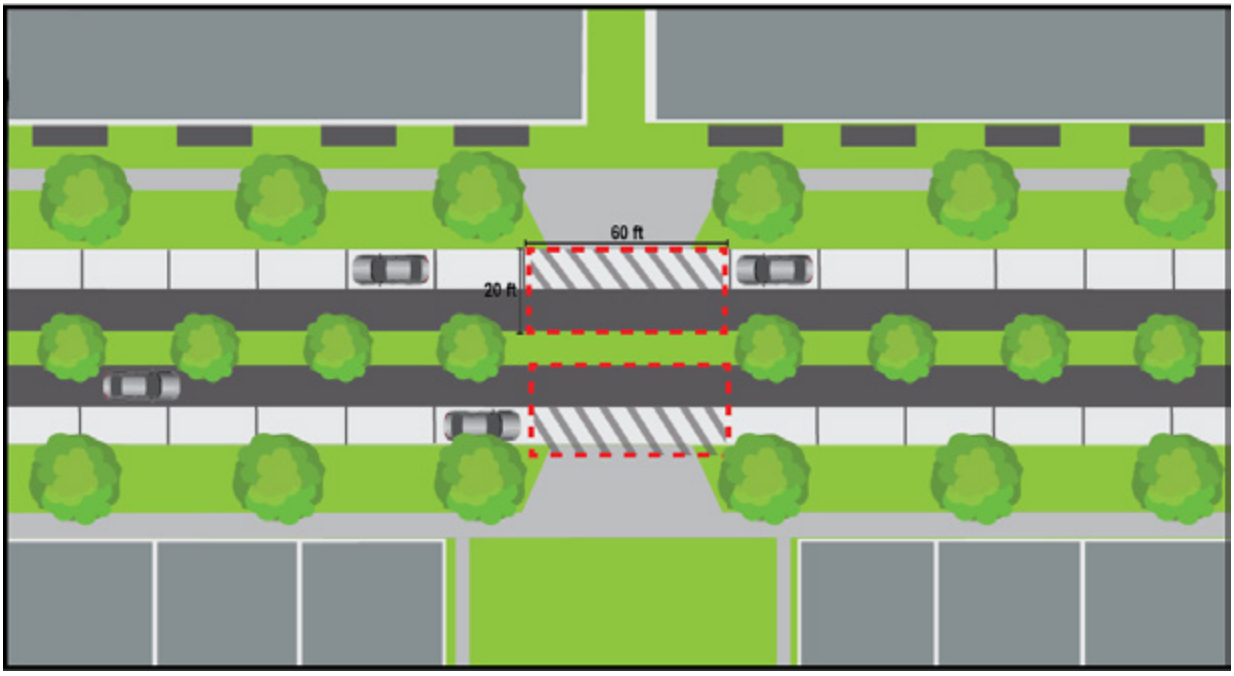


Figure 4: An operational bay is created with no parking zones; all dimensions shown are the minimum required.

Divided Travel Lane Streets 1

On a street lined by single-family houses, duplexes, and townhouses with windowsills (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 6-7).

The street illustrated in Figures 6-7 has two 12-foot travel lanes, two eight foot on-street parking lanes, and a minimum 8-foot-wide vegetated center median; the minimum dimension for an operational bay is 20 feet wide and 60 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 5: View down a residential boulevard lined with two-story residential buildings.

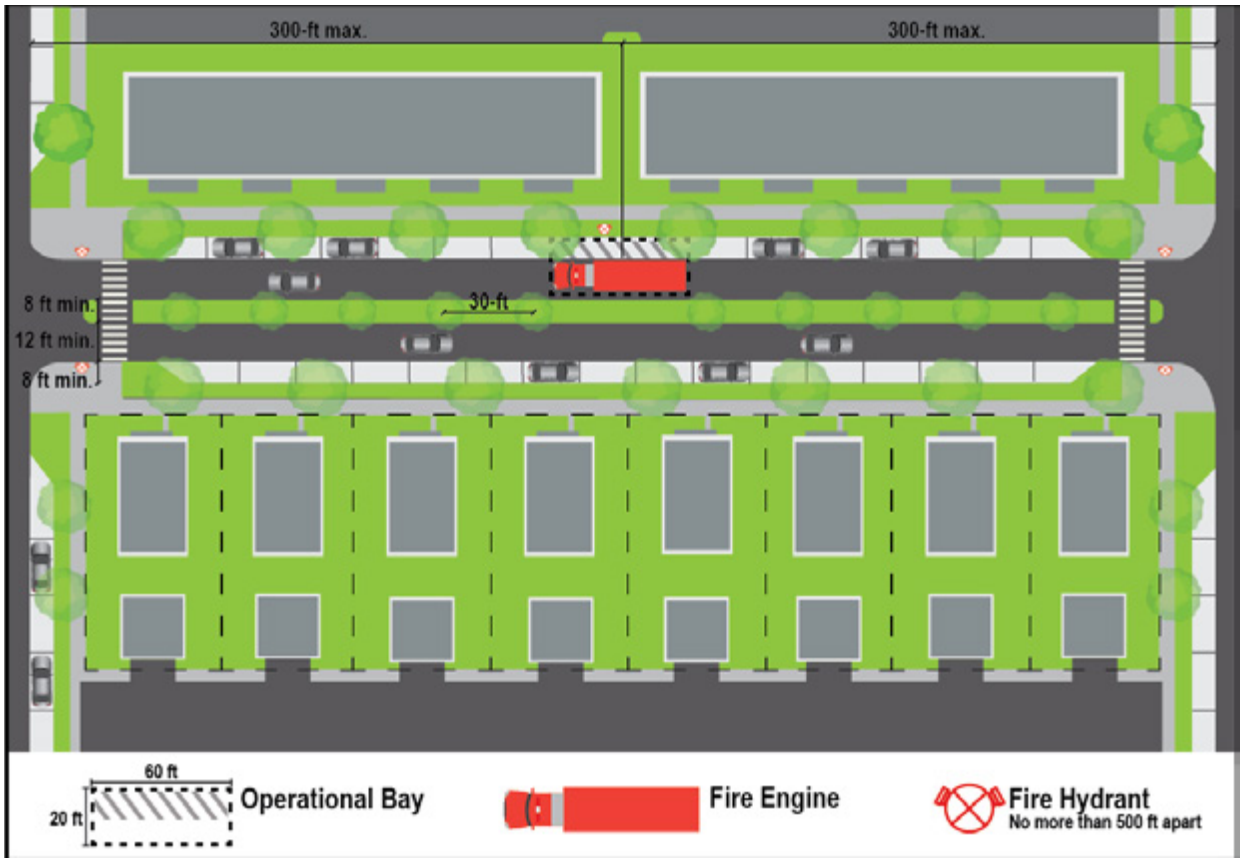


Figure 6: Plan of Divided Travel Lane Streets 1 showing single-family houses and townhouses.

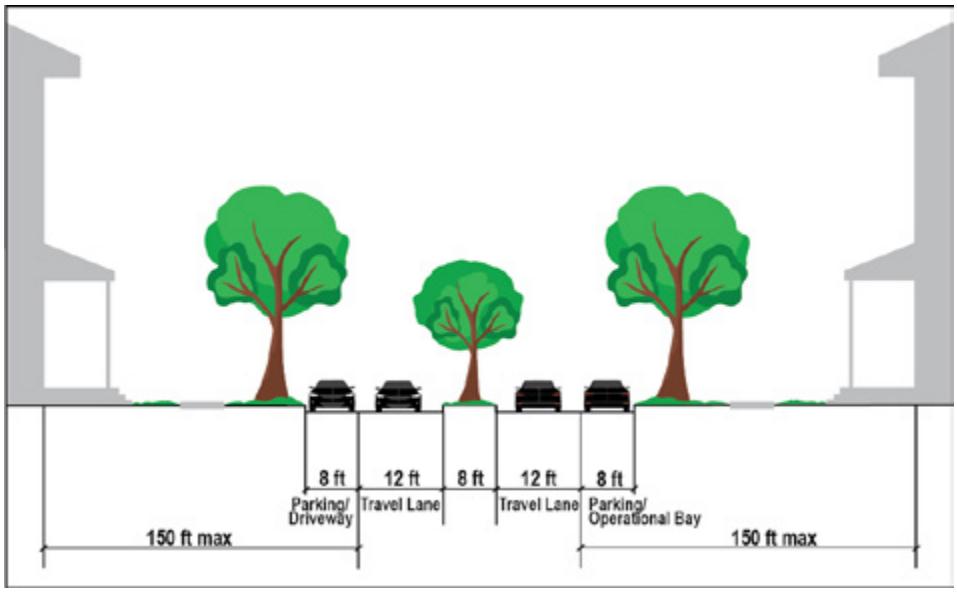


Figure 7: Cross-section of Divided Travel Lane Streets 1; roadway dimensions are the minimum required.

Divided Travel Lane Streets 2

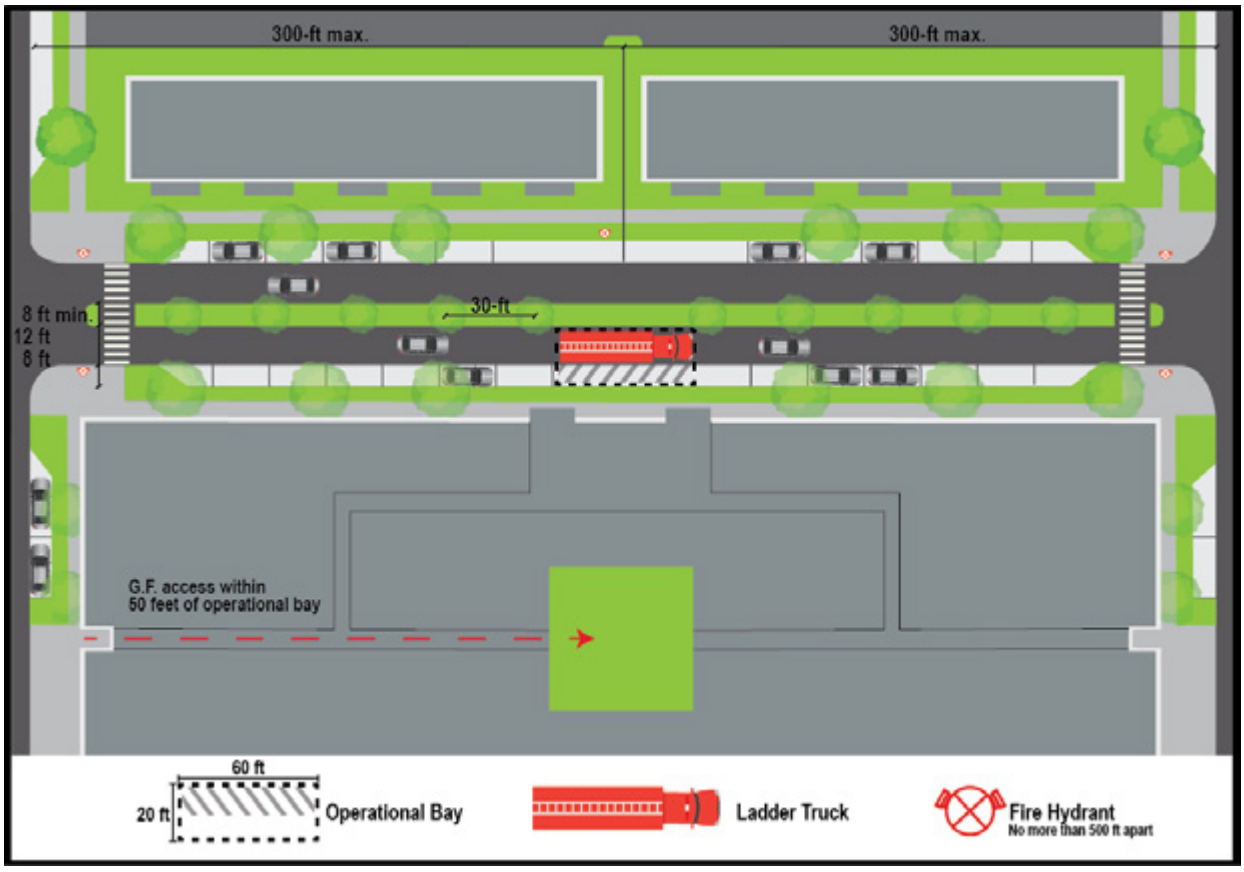
On a street lined by single-family houses, townhouses, commercial and multifamily buildings, performance-based alternatives may provide adequate fire department access (Figures 9-10).

To use the Divided Travel Lane Streets 2 as described below, certain architecture and system requirements must be met:

- Sprinkler system:
  - Townhouses must be protected by an automatic sprinkler system compliant with NFPA 13R.
  - Multifamily and commercial buildings must be protected by an automatic sprinkler system compliant with NFPA 13.

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 8: View down a residential boulevard with one travel lane and a parking lane.



A 20 ft X60 ft, operational bay

Figure 9: Plan of Divided Travel Lane Street 2 showing multifamily and four-story townhouses.

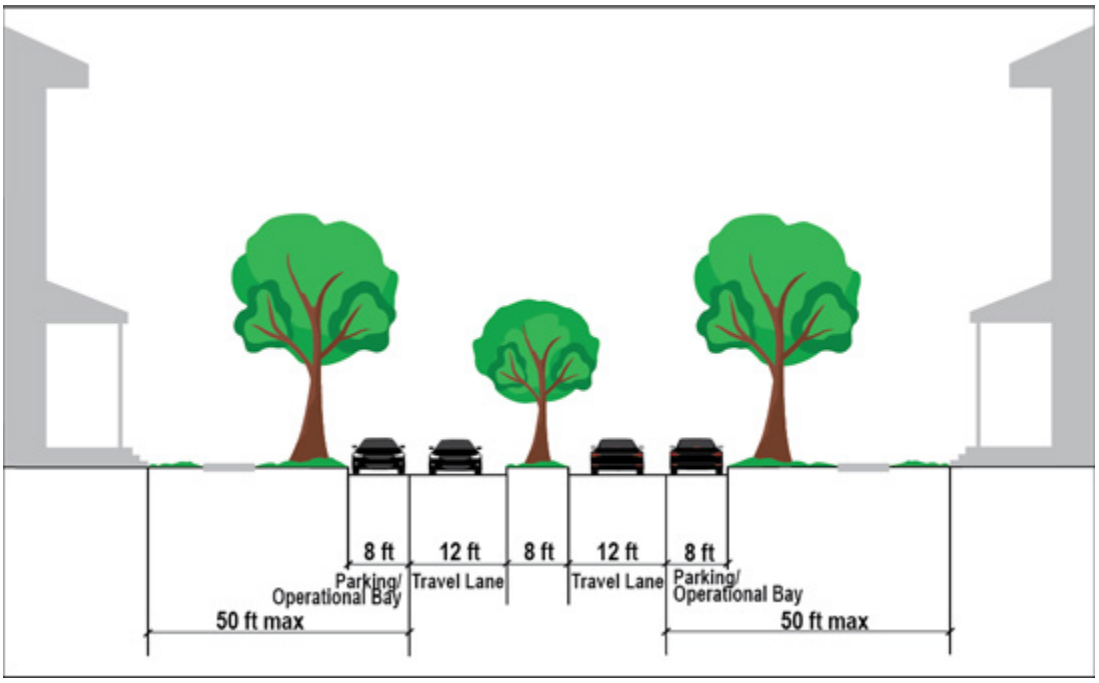


Figure 10: Cross-section of residential boulevard 2; roadway dimensions shown are the minimum required.

Divided Travel Lane Streets 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 150 feet from the main side hinge door of each building along the street.

The following building design elements must be located no farther than 150 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 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.

Distance to Side Hinge Door

For new development, redevelopment, and infill development, Florida Fire Prevention Code and NFPA 1 as amended by City of Orlando, 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 windowsill height. Access requirements for main side hinge doors and secondary side hinge doors are as follows:

- **One- and Two-Family Dwellings with windowsills 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 windowsills 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.
- **Commercial Structures** require access to the occupied interior through a main, side hinge door within 50 feet of fire department vehicular access.

Residential Alleyway

Alleyways with townhouses that front a mews or landscaped front yard without a street may be used for fire department access (Figures 11-12). The alleyway consists of a 20-foot wide, two-way driving surface and the townhouse buildings must be located at least 30 feet apart (back to back across the alley). Projections from the building faces, such as decks, must not impede into the 30-foot clear area required for fire department operations. A cross-section view may be required at time of 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 five feet clear on each side of the lot line between divided walls of townhouse buildings for a minimum 10 feet clear between buildings (side by side on the same side of the alley). 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.

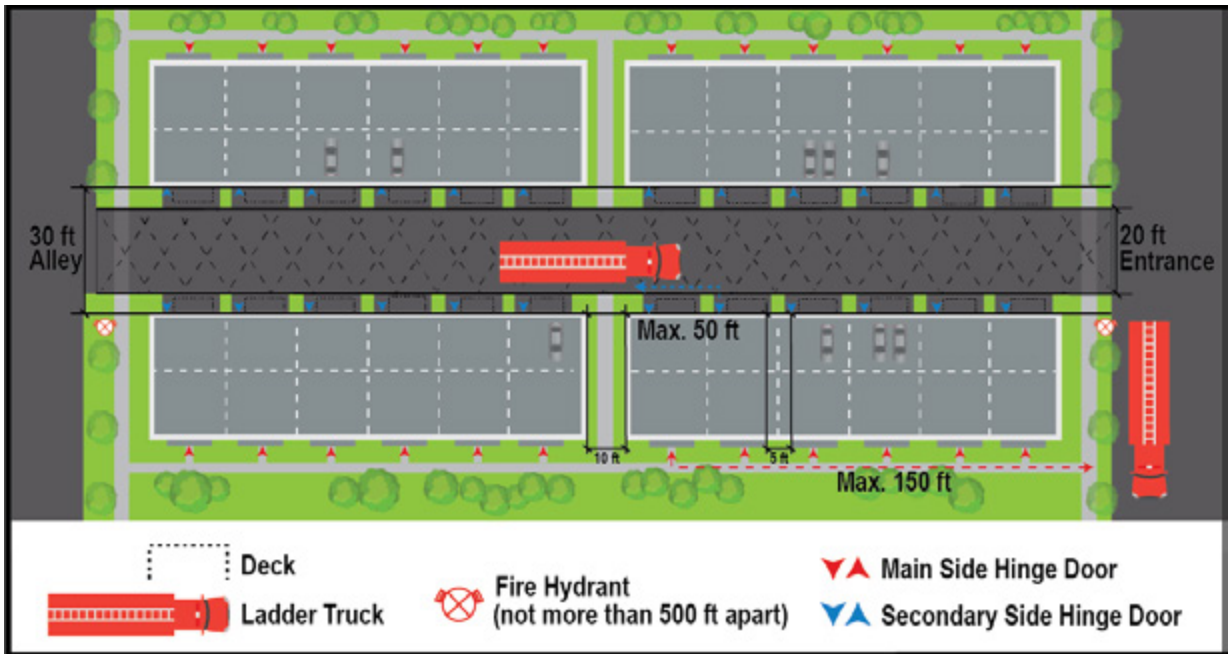


Figure 11: Plan of residential alleyway, showing a building-to-building distance of 30 feet.

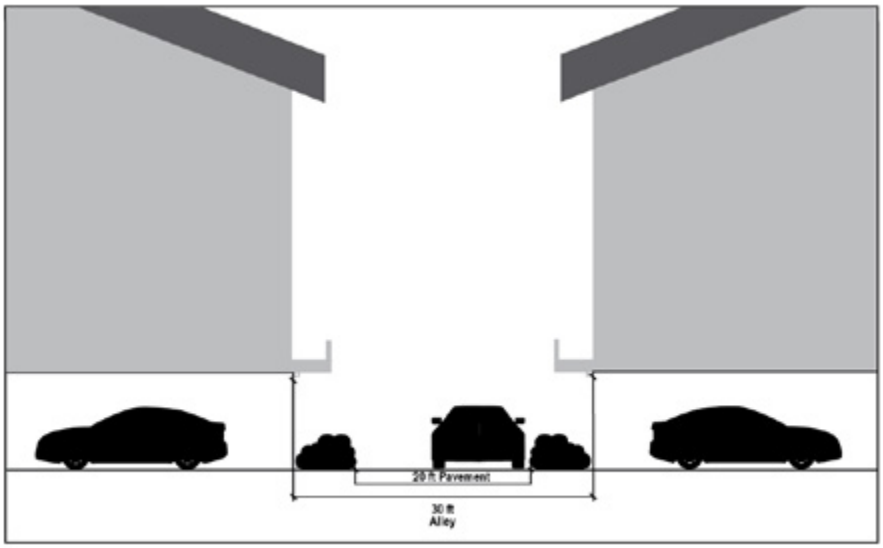


Figure 12: Cross-section of residential alleyway 2.

Street Intersections

With the goal 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, the City of Orlando has implemented a Vision Zero Plan to assist in 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.

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 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

Figure 13: Bulb-outs create shorter crosswalk distance for pedestrians.

Figure 14: Curb extension create tighter corners and therefore reduces turning speeds of vehicles.

Curb radii may go as low as 15 feet, 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, horizontal swept path analysis such as AutoTURN or Vehicle Tracking 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 city's Policies and Objectives.

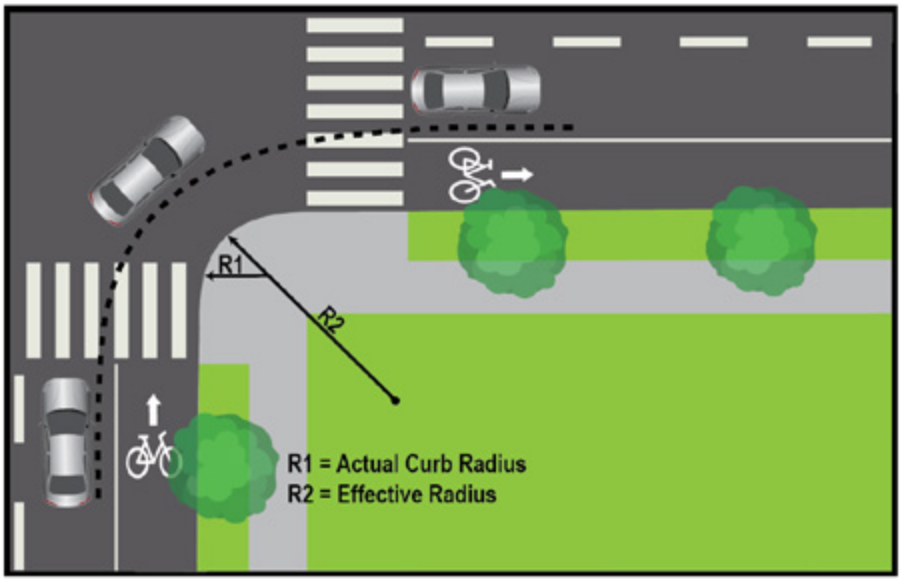


Figure 15: Minimizing curb radii lowers vehicle turning speeds and expands the pedestrian realm, increasing visibility for pedestrians and reducing crossing distances. Curb radii should be reduced to 15 feet in designated Urban Road Code Areas.

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 16 illustrates fire department apparatus turning movements in AutoTURN based on standard MCFRS dimensions (47'x8') 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 city.

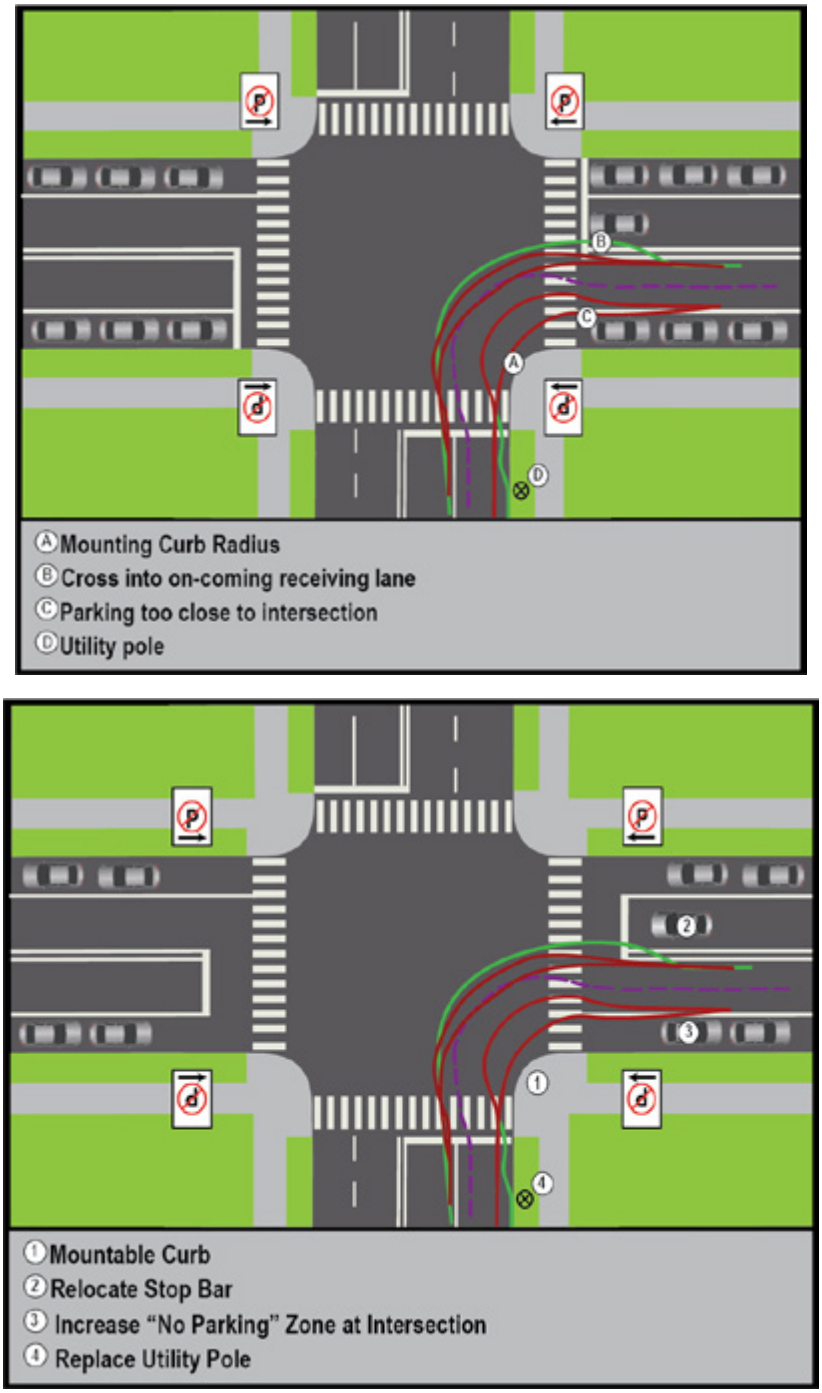


Figure 16: Example of an AutoTURN diagram on a business district street.

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 OFD apparatus. Each proposal must be reviewed on a case-by-case basis. The City of Orlando will review all proposed alternative surfaces as part of the permit review process to ensure appropriateness of the proposed 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 17: Median refuge islands reduce pedestrian exposure when crossing roadways and can be designed with mountable curbs to support fire department access.

Figure 18: Raised intersections slow down regular drivers while providing adequate emergency vehicle access.

Shared Streets

Shared streets (also referred to as curbless streets) 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 19: Shared street in Lake Nona. Pavers and buffers subtly distinguish vehicle, bicyclist and pedestrian zones in shared streets.

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 windowsills greater than 27 feet from grade.

Overhead utility lines are especially vulnerable during high wind events such as severe thunderstorms and hurricanes, resulting in disrupted service and potentially hazardous situations for residents and emergency responders. Burying utilities underground mitigates future risk by ensuring public utility networks are 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 windowsill greater than 27 feet from grade.

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 with at least 14 feet vertical clearance above the street maintained
- 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 website or by contacting the city arborist

To illustrate how these streetscape elements can be accommodated without compromising 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 20: Mixed-use commercial street with distinct zones that ensure safety for all road users.

Source: Montgomery Planning Department, Urban Design Guidelines for Rock Spring and White Flint 2 Sector Plans - JULY 2019

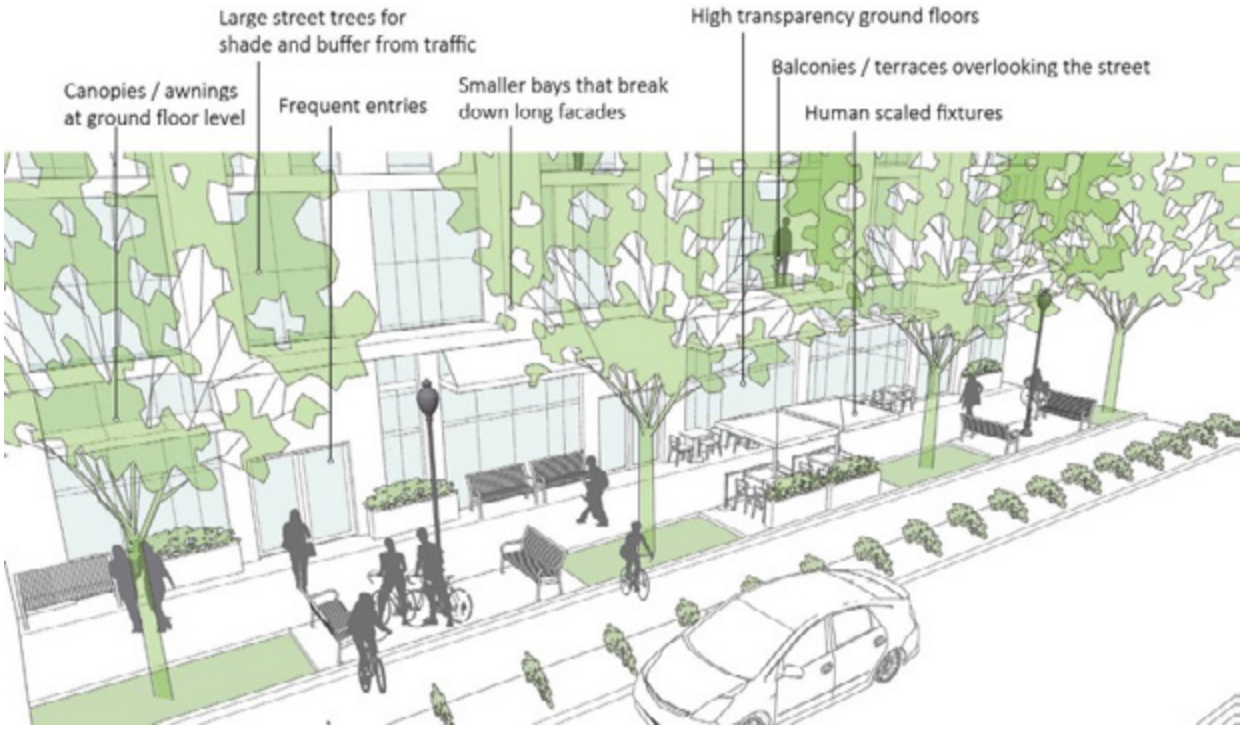


Figure 21: Diagram of good streetscaping along a commercial mixed-use street.

Source: Montgomery Planning Department, Urban Design Guidelines for Rock Spring and White Flint 2 Sector Plans - JULY 2019

Figure 22: Diagram of good streetscaping along a residential street.

Source: Montgomery Planning Department, Urban Design Guidelines for Rock Spring and White Flint 2 Sector Plans - JULY 2019

Mixed Use Commercial Streetscape

Figure 23: Perspective and correlating plan diagrams showing a real-life example of a good commercial streetscape; all dimensions are approximate.

Residential Multifamily Streetscape

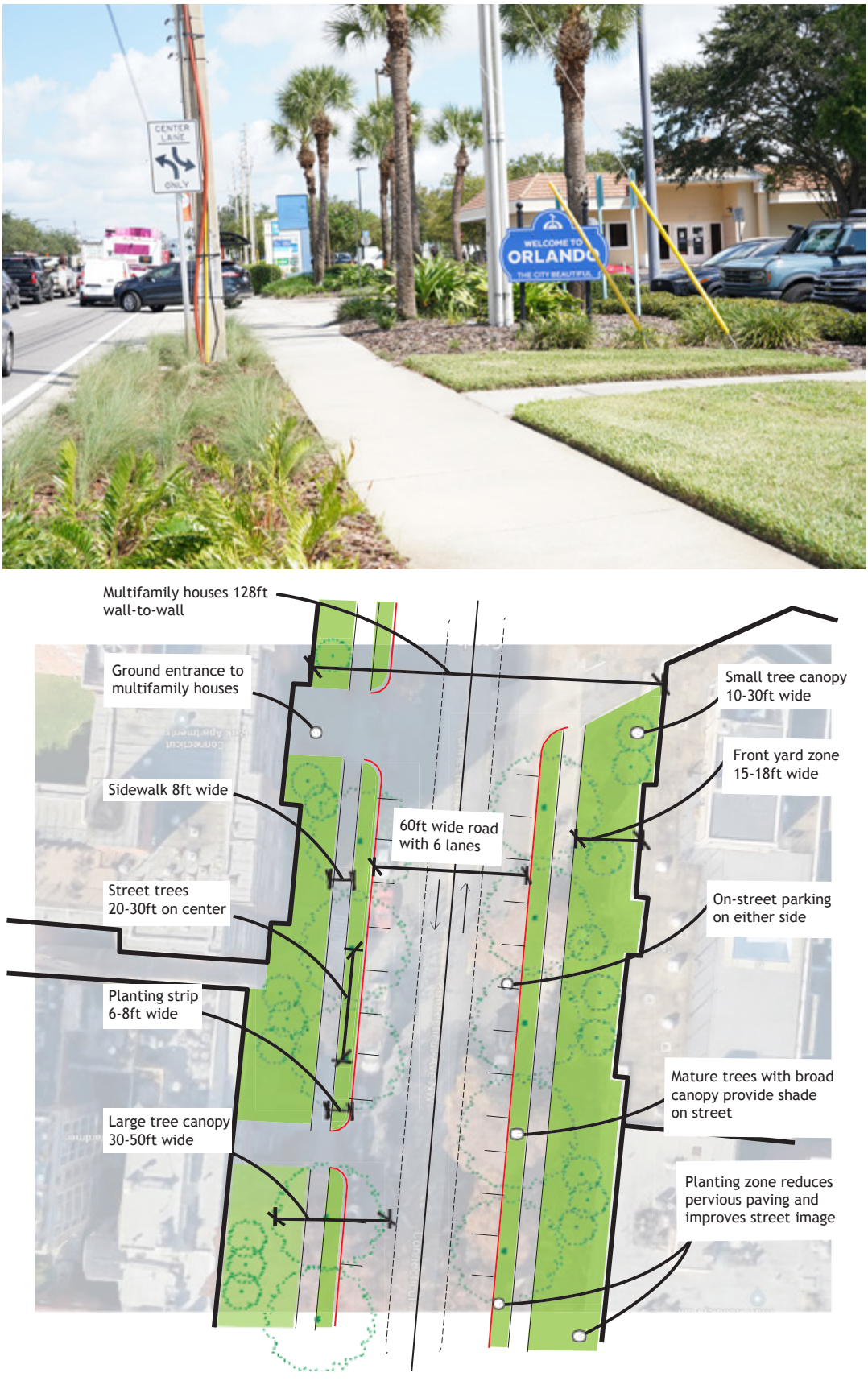


Figure 24: Perspective and correlating plan diagrams showing a real-life example of a good multifamily streetscape; all dimensions are approximate.

Residential Townhouse Streetscape

Figure 25: Perspective and correlating plan diagrams showing a real-life example of a good residential townhouse streetscape; all dimensions are approximate.