

4 ROADWAYS



Alexandria's streets have evolved over centuries to form the transportation network that exists today. In older parts of the city, the roadways are laid out in a regular grid pattern and are relatively compact. In areas of the city that were developed after the 1940's, the roads are more curvilinear and grid patterns are less common. Major roadways are typically quite wide while minor streets can be very narrow.

While Alexandria's roadways have long been dominated by vehicular traffic, the City recognizes the need to rebalance the transportation network to ensure the safe and efficient movement of all forms of transportation including bicycles, automobiles, delivery trucks, and transit vehicles.

This chapter addresses roadway design in Alexandria, specifically covering the area of the street that extends between two curb faces. This is generally intended for vehicular travel and parking. It is often the area where bicycle travel accommodations are

made. Roadways also include medians and other raised features that occur between the curbs delineating the sidewalk zone.

» *T&ES is responsible for approving all roadway designs and all changes on city-owned streets. Roadway designs may also require coordination with the Alexandria Fire Department, Commission on Persons with Disabilities, the Virginia Department of Transportation (VDOT) and P&Z.*

For additional roadway design guidance, reference the **Manual on Uniform Traffic Control Devices (MUTCD)**, the National Association of City Transportation Officials (NACTO) **Urban Street** and **Bikeway Design** Guides, and the **American Association of State Highway and Transportation Officials (AASHTO) "Green Book,"** the **AASHTO Guide for the Development of Bicycle Facilities**, and the **AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities**.

Safe Speeds

Streets should operate at speeds that create comfortable environments for pedestrians and bicyclists as well as motor vehicles. Street designs will aim to limit excessive speeding, and design speeds should be appropriate for the street type and context of surrounding land uses. New streets will be designed to produce operating speeds that match the target design speed. On existing streets with excessive speeds, traffic calming measures will be considered to reduce speeds to improve safety and comfort for all users.

Pedestrians and bicyclists are particularly vulnerable in the event of a crash. Speed is of fundamental importance: the severity of a pedestrian injury in the event of a crash is directly related to the speed of the vehicle at the point of impact. For example, a pedestrian who is hit by a motor vehicle traveling at 20 mph has a 95% chance of survival, whereas a pedestrian hit by a motor vehicle traveling at 40 mph has a 15% chance of survival.¹ In addition, vehicles travelling at lower speeds also have more reaction time, which helps prevent crashes.

**25
MPH**

City streets should be designed to produce an operating speed that does not exceed 25 mph.

The following exceptions apply:

**15
MPH**

Shared Streets and alleys should be designed to produce operating speeds that generally do not exceed 15 mph (Virginia law allows municipalities to set speeds that are lower than 25 mph).

**25
MPH**

Neighborhood Residential Streets should be designed to produce operating speeds that do not exceed 25 mph.

**35
MPH**

Parkways should be designed to produce operating speeds that generally do not exceed 35 mph.

**35
MPH**

Commercial Connectors and Industrial Streets should be designed to produce operating speeds that do not exceed 35 mph.

TARGET SPEED = DESIGN SPEED = POSTED SPEED



Typical 25 mph street

¹ Killing Speed and Saving Lives, UK Dept. of Transportation, 1987, London, England. See also Limpert, Rudolph. Motor Vehicle Accident Reconstruction and Cause Analysis. Fourth Edition. Charlottesville, VA. The Michie Company, 1994, p. 663.

Lane Widths

Minimizing travel lane widths is essential to creating additional roadway space for other users. Travel lane width also has an impact on motor vehicle speeds: motorists tend to drive faster in wide travel lanes and slower in narrower lanes. Traditionally, 12' has been the standard for motor vehicle travel lanes. The AASHTO “Green Book” allows 10' travel lanes in low speed environments (45 mph or less). Narrower lane widths have been avoided in the past due to concerns about vehicle occupant safety and congestion, especially on arterial roadways; however, research on suburban and urban arterials has shown that in most cases, travel lane widths between 10 feet and 11' on arterials and collectors do not negatively impact overall motor vehicle safety or operations, and also have no measurable effect on capacity.² The study found one exception where 10' wide travel lanes should be used with caution—on four-lane, undivided arterial roadways.

The benefits of narrower lane widths include:

- Lower speeds, improving the safety of all users
- Fewer, less severe crashes for all users
- Reduced crossing distance for pedestrians
- Reduced footprint of the roadway, resulting in better use of land and reduced run-off

The chart below summarizes guidelines for designating lane widths in the City of Alexandria. The values in this chart should be applied to major street reconstructions as well as resurfacing or other maintenance projects where lane reallocation or resizing may occur.

Many existing residential streets in Alexandria are “yield streets,” which are two-way streets with parallel parking on both sides, where oncoming drivers must yield in order pass each other when parked cars are present. These streets are generally 25' in width (curb to curb dimension) and carry traffic volumes that do not exceed 1,500 vehicles per day.

STREET TYPOLOGY	MINIMUM ^{3 4 5}	PREFERRED	MAXIMUM
Commercial Connector	10'	11'	12'
Main Street	10'	10'	12'
Neighborhood Residential	9'	10'	10'
Mixed Use Boulevard	10'	10'	12'
Neighborhood Connector	10'	10'	12'
Parkways	10'	10'	11'
Industrial	11'	12'	13'
Shared Streets	N/A	N/A	N/A
Overlays	Minimum	Preferred	Maximum
Bicycle Network Streets	N/A	N/A	N/A
Transit Streets ⁶	11'	11'	12'
Historic Streets and Alleys	N/A	N/A	N/A
Other	Minimum	Preferred	Maximum
Parking Lane	7'	8'	N/A
Two-way left turn lane	10'	12'	12'
Right or left turn lane	9'	10'	11'
Alley (one-way)	N/A	15'	N/A
Alley (two-way)	N/A	18'	N/A

Notes: A design exception may be required for some widths on federal or state-funded projects.

² Potts, Ingrid B, Harwood, Douglas W and Richard, Karen R. Relationship of Lane width to Safety for Urban and Suburban Arterials. Washington, D.C.: Transportation Research Board, 2007.

³ The width of the gutter is included as a part of the total width of the lane. When a travel lane is adjacent to the curb, add 1' to the preferred lane width. When the speed limit is 35 mph or greater, the width of the concrete gutter should not be counted towards the width of the travel lane adjacent to the curb. Additionally, when a travel lane is next to a raised median, a 1' shy distance should be added to the lane width. There should also be a stripe painted around the median.

⁴ On streets with high volumes of heavy vehicles (>8%), one 11-foot wide travel lane should be provided in each direction (generally the curb-side lane).

⁵ A street should not be designed using all minimums.

⁶ For Complete Streets retrofit projects involving a constrained transit street, maintain the existing width of the transit lane.

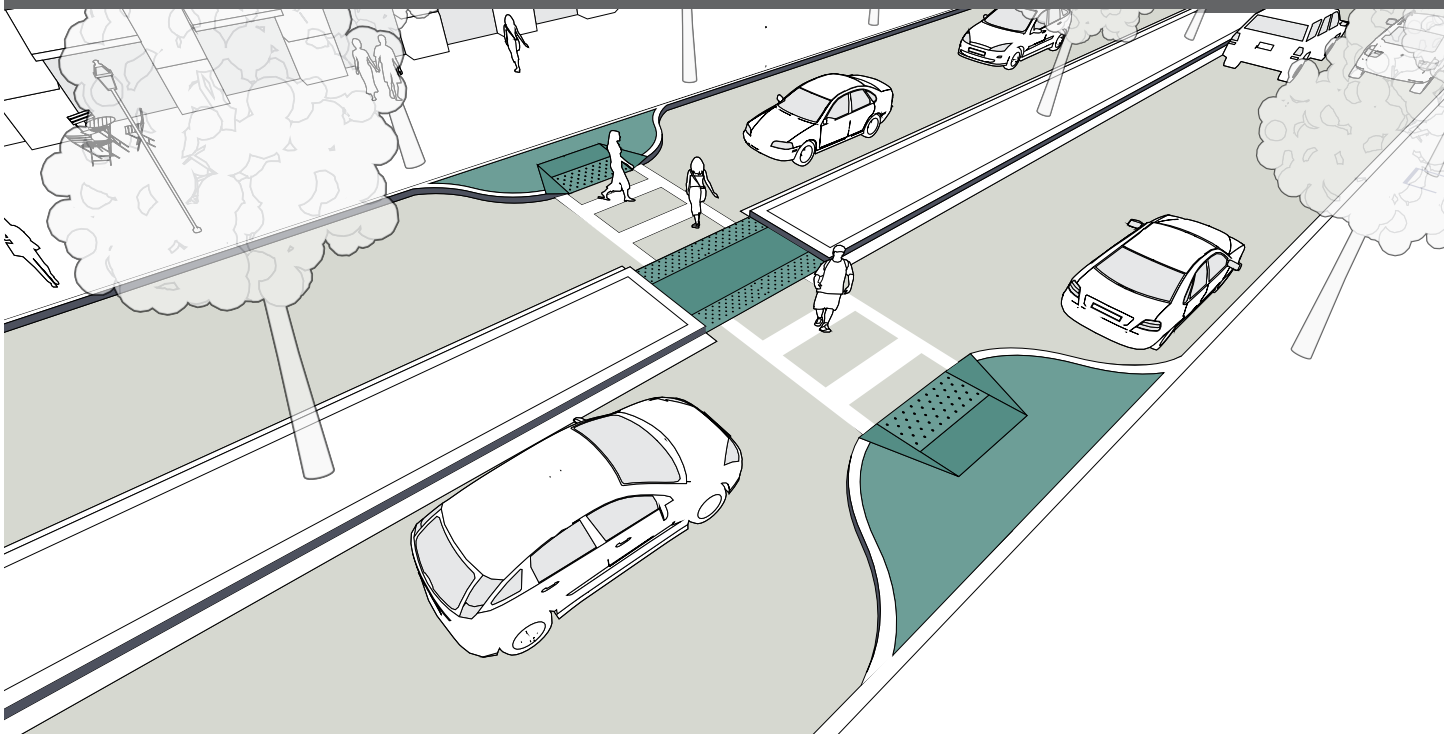
Design Features That Reduce Operating Speeds

Alexandria’s roadways should be designed to operate at speeds appropriate for the context of the street type. Managing traffic speeds is critical to maintaining safety for all users.

There are a number of different tools and treatments that can be used to reduce operating speeds. Ideally, the street environment provides cues to the driver to reduce speed. This can be accomplished through a variety of geometric design features described below.

Enforcement and regulatory measures are a necessary complement to any physical infrastructure to manage travel speeds.

MID-BLOCK NECKDOWNS



OVERVIEW

Neckdowns are curb extensions on opposite sides of the road that create a “pinch-point” at a midblock location. They are particularly useful on streets with longer block lengths where motorists tend to pick up speed.

They can be combined with mid-block pedestrian crossings to further enhance pedestrian safety by reducing crossing distances and increasing visibility.

MID-BLOCK NECKDOWNS

DESIGN

- Neckdowns, like other curb extensions, are typically only used on streets with on-street parking.
- Mid-block neckdowns can be used on both one-way and two-way streets. Neckdowns are most effective on two lane streets in order to deliver the narrowing effect.
- Neckdowns may alternate with intermittent medians to further maintain and encourage reduced speeds along the length of a roadway.
- Vegetation used in the neckdown should be low-growing and low-maintenance. Neckdowns, like other forms of curb extensions, can be an opportunity to apply BMPs for stormwater management.
- In locations with mid-block pedestrian crossings, sight distances must be maintained.



Mid-block Neckdown on Cameron Street

CONSIDERATIONS

- Where neckdowns provide pedestrian crossings, **Americans with Disabilities Act (ADA)** compliant curb ramps, tactile warning strips, and cross slopes must be provided. Other traffic calming elements such as raised crossings may also be considered.
- Mid-block neckdowns can serve as alternatives to speed tables or, combined with raised crossings, can serve both purposes.
- Neckdowns can introduce conflicts on streets with bicycle facilities. Traditional neckdowns should not be used on streets with protected bike lanes or other protected facilities. On streets with bicycle lanes, care should be taken to avoid squeezing bicyclists into the traffic flow.
- On low-volume Residential Streets, neckdowns can reduce the street to a narrowed passage, requiring oncoming drivers to yield and alternate passage through the neckdown. The gap must maintain enough space for fire trucks and other large vehicles.
- Designs should consider snow removal operations. The curb extensions of mid-block neckdowns offer space to store snow in winter; however, visual cues, particularly vertical elements, should alert snow plow operators of the change in the roadway. Turn radii should be designed with snow removal and street sweeping vehicles in mind, where warranted.
- Neckdowns should only be used on non-emergency routes.
- Neckdowns should not be used on curved roadway sections.

PAVING TREATMENTS



Example of brick paving treatment



Example of a cobblestone paving treatment

OVERVIEW

Roadway materials can have significant impacts on traffic safety and speeds, user comfort, vehicle maintenance costs, stormwater management, street noise, and the heat island effect. Paving treatments include stamped concrete or asphalt, and colored pavements.

Paving treatments can help reduce speeds and are more commonly used on streets with high volumes of pedestrians and lower volumes of motor vehicle traffic, such as Mixed Use Boulevards and Main Streets. Alexandria's historic cobblestone streets and alleys are an example of the effects of textured pavements on vehicle speeds. Modern textured pavements are smoother than cobblestones, which help accommodate bicyclists.

Regardless of the material used on the roadway, an accessible, smooth travel path must be provided at crosswalks in order to accommodate people with disabilities.

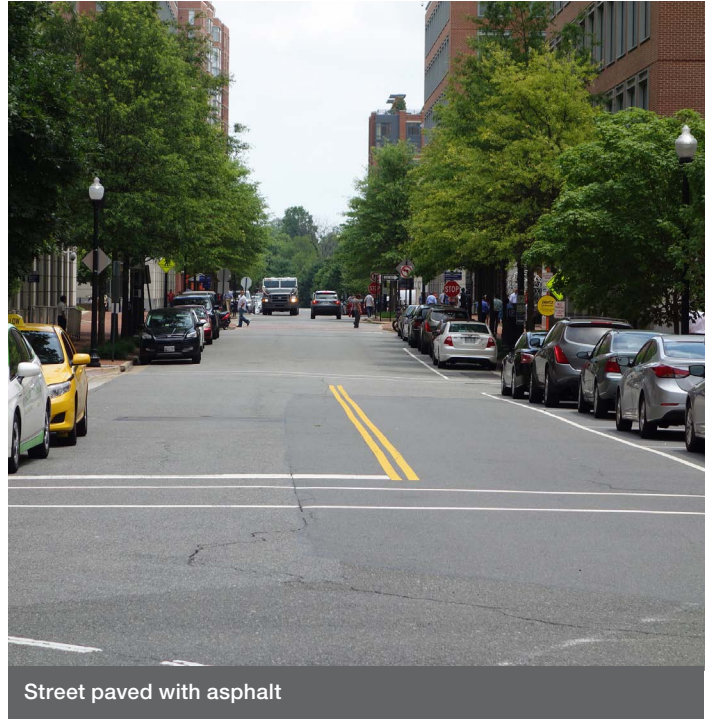
DESIGN

- Asphalt is the preferred pavement for City streets.
- Pavers should generally not be used in roadway construction. Pavers may be used in limited areas to denote special locations if approved by the City.
- Care should also be taken to ensure that materials do not settle to different heights.
- The use of paving treatments in parking lanes can visually reduce the width of the roadway.
- Pedestrian crossings must meet accessibility requirements by providing a smooth, stable, and slip-resistant accessible path, and should include the necessary reflective markings as required in the MUTCD. Pavers should not be used in crosswalks.

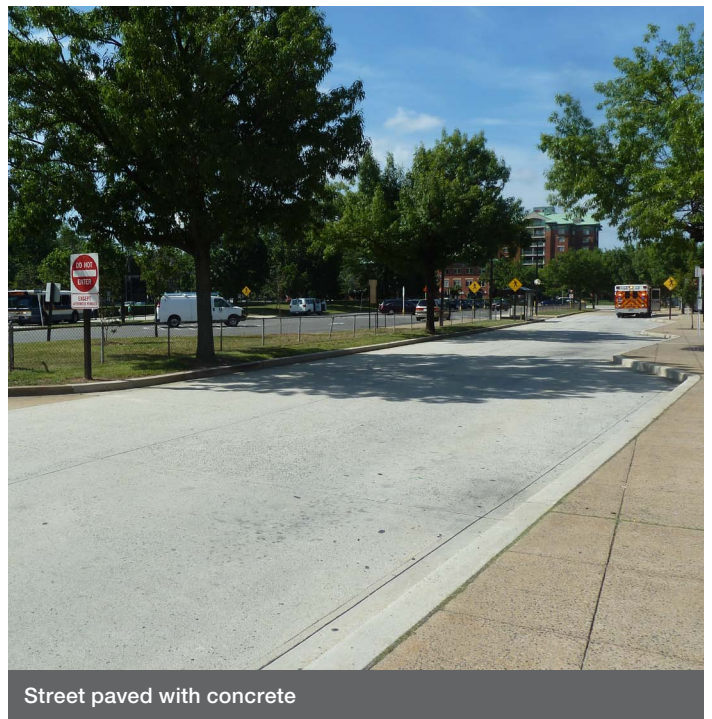
PAVING TREATMENTS

CONSIDERATIONS

- Key considerations for pavement materials selection include constructability, ease-of-maintenance, smoothness, durability, porosity, and color. Also, consideration should be given to the street type, the volumes and types of users (i.e., pedestrians, heavy vehicles, bicyclists, etc.), adjacent land uses, and stormwater management goals.
- Textured pavements are an expensive treatment and include long-term maintenance responsibilities.
- Consider the reflective characteristics of the pavement.
- Slippery surfaces such as smooth granite or tile should not be used as they create slippery conditions for bicyclists and pedestrians in wet weather.
- The use of colored pavements for traffic control purposes (i.e., to communicate a regulatory, warning, guidance message) is narrowly defined by the MUTCD, and may be required to follow Federal Highway Administration's (FHWA) experimentation process.
- Pavements that resist heaving and rutting should be used for locations where heavy vehicles stand or park, or locations that are particularly susceptible to wear such as high-volume intersections or steep grades. Concrete bus pads should be considered on high frequency bus routes.



Street paved with asphalt



Street paved with concrete

OTHER STRATEGIES FOR REDUCING SPEEDS

CHICANE

A chicane is an intentional “S” curve commonly created by alternating curb extensions and/or curbside parking. The undulating path (horizontal deflection) is designed to slow drivers down as they maneuver along the street. If parking is used as the mechanism for deflection, streets should have regular and sustained parking demand along them.

Traffic calming effects are greatest when deflection shifts vehicles at least one full lane width back and forth.

Chicanes may be used on one lane, one-way, or two-lane bi-directional streets. Bi-directional streets should have roughly balanced traffic volumes to ensure that vehicles do not simply speed down the clear center area between curb extensions/deflectors.

- Chicanes may be combined with median islands at the points of deflection to preclude travel down the centerline of the street.
- Chicanes occur along a block, typically on longer block segments to permit sufficient deflection.
- Chicanes are generally only appropriate on low volume, local streets.
- Chicanes can complicate street sweeping and snow removal. If curb extensions are used to establish the chicane, curb extensions may be used for short term snow storage.
- If used on streets where transit vehicles or trucks are expected, chicane design must consider maneuverability.
- Chicanes must maintain clearance required for emergency vehicle access.



Chicane



Diverters

DIVERTERS

Diverters alter the movement of through vehicle traffic either through partial diversion (closing half of a street entrance) or full diversion (prohibiting through movement of all vehicle traffic). Diverters are commonly designed to maintain through travel for bicycles and pedestrians even while altering routes for vehicles.

Partial diverters preclude entry or exit of one direction of traffic and channelize remaining movements. Diagonal diverters are the most common form of full diversion. Diagonal diverters connect diagonal corners creating two disconnected streets. Vehicles are forced into a right angle turn even while maintaining through travel for bicycles and pedestrians.

- Full diverters must be designed with transit and emergency vehicle navigation in mind. Typically, emergency vehicles must be able to travel over the diverter.
- Diverters affect all traffic. They are effective at reducing or precluding cut-through traffic, but as a result all local traffic is diverted as well.

Travel Lanes

The number and configuration of travel lanes has a great impact on the availability of space on Alexandria’s streets. While projects should strive to minimize delay to motor vehicles, the safety and comfort of vulnerable roadway users is an equal priority. Travel lanes should be minimized to the extent possible in order to maintain the narrowest cross section. This supports the comfort of other users of the street, reduces speeding, and decreases impervious surfaces.

ROAD DIETS



Four to three lane road diet conversion

OVERVIEW

A road diet is a reduction in overall roadway width, typically accomplished by removing motor vehicle travel lanes. This strategy can be applied broadly to a wide variety of cross sections where one or more travel lanes are repurposed to provide more space for pedestrians and bicyclists. Road diets are most typically done on roadways with excess capacity where anticipated traffic volumes have not materialized to support the need for additional travel lanes. The most

common road diet configuration involves converting a four lane road to three lanes: two travel lanes with a turn lane in the center of the roadway. The center turn lane at intersections often provides a great benefit to traffic congestion. A three lane configuration with one lane in each direction and a center turn lane is often as productive (or more productive) than a four lane configuration with two lanes in each direction and no dedicated turn lane.

ROAD DIETS

Four to three lane conversions have been found to reduce total crashes by an average of 29%.⁷ The magnitude of the safety benefits at specific locations depends on the street context and the specific design of the conversion. Four to three lane conversions typically have minimal effects on the vehicular capacity of the roadway because left-turning vehicles are moved into a common two-way left turn lane.

Roadway configurations with two travel lanes and a center turn lane can:

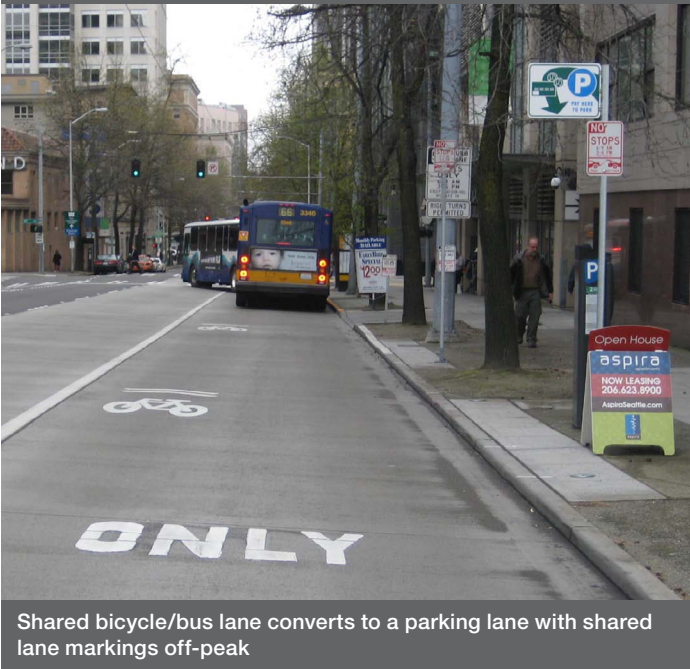
- Discourage speeding and weaving.
- Reduce the potential for rear end and side swipe collisions.
- Improve sight distances for left-turning vehicles.
- Reduce pedestrian crossing distances and exposure to motor vehicle traffic.
- Reallocate space for sidewalks, standard bicycle lanes, protected bike lanes, bus bulbs, or curbside parking, which in turn creates a buffer between motor vehicle traffic and pedestrians.
- Improve access for emergency vehicles by allowing them to use the center turn lane to bypass traffic if a continuous two-way left turn lane is provided.

DESIGN

- The space gained for a center turn lane is often supplemented with painted, textured, or raised center islands. If considered during reconstruction, raised center islands may be incorporated in between intersections to provide improved pedestrian crossings, incorporate landscape elements and reduce travel speeds.
- The minimum width of the center turn lane is 12'.
- Four lane streets with volumes less than 15,000 vehicles per day are generally good candidates for four to three lane conversions.
- Four lane streets with volumes between 15,000 to 20,000 vehicles per day may be good candidates for four to three lane conversions. A traffic analysis is needed to determine feasibility.
- Six lane streets with volumes less than 35,000 vehicles per day may be good candidates for six to four lane (with center turn lane) conversions. A traffic analysis is needed to determine feasibility.

⁷ Crash Modification Factor Clearing House, Countermeasure: Road diet (Convert 4-lane undivided road to 2-lanes plus turning lane), http://www.cmfclearinghouse.org/study_detail.cfm?stid=23

PEAK TIME RESTRICTED PARKING LANES



Shared bicycle/bus lane converts to a parking lane with shared lane markings off-peak

- Peak hour restricted parking lanes should be a minimum of 12' wide to accommodate parked cars and bicycles in off-peak times. See the Minimum Lane Width Chart for more information.
- Peak time restricted parking lanes are not compatible with curb extensions or neckdowns.

CONSIDERATIONS

- Restricting parking, stopping and standing at the curbside during peak hours can improve traffic capacity and flow, however the decision to restrict parking should be carefully weighed against the other vital demands on curbside use including loading and deliveries, parking or access for persons with disabilities, and buffer and comfort to sidewalk users. Planners and designers should carefully evaluate the effects of temporary parking restrictions on local businesses, community character, and other roadway users,
- Converting parking lanes to general purpose travel lanes at peak times can make it difficult to install bicycles lanes due to safety concerns associated with having moving traffic on both sides of the bicycle lane. Potential solutions include separated bike lanes or shared travel lanes.
- Temporal conversion of parking lanes to travel lanes, regardless of the frequency or duration, precludes the opportunity for curb extensions on the street. Curb extensions, or bulbouts, may only be located on blocks where the curbside is not used for through travel.
- In some situations, there may be benefits to removing peak time restricted parking lanes where they currently exist.

OVERVIEW

Peak time restricted parking lanes are parking lanes that are converted to other uses during peak or rush hour times. The traditional application of this treatment involves converting parking lanes to general purpose travel lanes; however, peak time restricted parking lanes can also be converted to other purposes, including transit lanes and bicycle lanes.

Peak time restricted parking lanes can increase the capacity of the roadway for general purpose traffic. Depending on conditions, an additional travel lane can improve capacity by 600 to 1000 vehicles per hour; however, the capacity advantages of peak time restricted parking lanes for moving general purpose traffic assume universal compliance with the parking restriction; enforcement is required to deter illegally parked vehicles during peak hours.

DESIGN

- Peak time restricted parking lanes may be considered on roadways where additional capacity is needed during peak hours.
- The decision to install peak time restricted parking should be accompanied by a prompt and rigorous enforcement effort that involves ticketing and towing illegally parked vehicles.

TRUCK AND TRANSIT ROUTES



OVERVIEW

Many of Alexandria's busiest streets are also the primary routes used by heavy vehicles, such as commercial vehicles, transit vehicles, and heavy trucks. These large vehicles have different performance characteristics than cars. They often require more space for turning and longer stopping distances. Their size can intimidate other roadway travelers such as bicyclists, pedestrians, and drivers in small autos and create some discomfort in the environment of the street.

Nonetheless, trucks and transit vehicles are vital to urban economies and should be accommodated in the urban system. It is important to ensure that roads frequented by heavy vehicles are designed to accommodate them safely alongside other roadway users. This may mean providing a more generously scaled travel lane to accommodate the heavy vehicles or extra width in adjacent facilities such as bike lanes or buffers to provide additional comfort and separation.

With the exception of industrial districts, even on primary truck routes, heavy vehicles comprise a minority of the total vehicle traffic on a street. The

majority of vehicles are smaller passenger cars. Care should be taken to accommodate large vehicles appropriate to their level of frequency and need while not inadvertently creating conditions that may lead to speeding by smaller vehicles on the road.

Identifying and appropriately designing targeted corridors to facilitate truck movement in Alexandria ensures that the needs of these vital providers are met while permitting design on the balance of streets to orient around the needs of far more dominant and vulnerable users including pedestrians, bicyclists, and passenger autos.

Transit vehicles are a unique type of heavy vehicle and the interests of transit operators distinctly vary from the interests of truck operators. While transit vehicles are large in size, transit routes should still orient around the pedestrians who are the very riders the transit vehicle serves. Careful balance and sensitive design is necessary to ensure transit vehicles can operate smoothly through their routes while at the same time providing a comfortable street and transit-supportive environment.

TRUCK AND TRANSIT ROUTES

DESIGN

- Industrial streets should have 12' outside lanes.
- Designated truck routes, high frequency transit corridors, and/or higher order streets (e.g. Commercial Connector, Mixed Use Boulevard, and Residential Connector) with more than 8% to 10% heavy vehicles should provide 11' outside lanes, exclusive of the gutter pan, to accommodate heavy vehicle use.
- Lower intensity streets typically have less heavy vehicle traffic. The frequency and volume of trucks and transit vehicles on these streets can generally be accommodated within the overall section of the street without the specific provision of wider lanes.
- Turning movements with a high volume of large trucks, transit, and commercial vehicles should be designed to sufficiently accommodate turning radii and stacking space of the appropriate design vehicle.
- Heavy vehicle braking characteristics should be considered when determining the placement of warning signs for intersections, curves, railroad crossings, mid-block pedestrian crossings, and shared use trail crossings. Heavy vehicles typically require longer stopping distances and therefore more advance warning.
- To the extent possible, bicycle facilities should be separated from travel lanes designed for heavy vehicle traffic. Where there is insufficient roadway space for separation or buffering, on street bicycle lanes should be more generously scaled (as possible) to improve bicyclist comfort and safety.
- Skid resistance and strength should be considered when choosing pavement surfaces for routes frequented by heavy vehicles. For routes with transit stops, consider installing concrete pads within the roadway at transit stops.

CONSIDERATIONS

- Flush medians or center turn lanes of sufficient width can help facilitate left-turn movements for heavy vehicles by providing a space to stop and wait for gaps.
- On sharply curving roads frequented by heavy vehicles, additional lane width may be necessary.

FIRE AND EMERGENCY LANES



Emergency vehicles

OVERVIEW

The mission of the Alexandria Fire Department is to plan for and deliver responsive and caring emergency service, mitigate emergencies and disasters, prevent the loss of life, protect property and enforce applicable construction, fire, and building maintenance codes for the city residents and the general public in order to maintain and enhance public safety. Response time is critical to this mission; therefore, roadway design should consider the specific needs of fire apparatus and emergency medical services vehicles.

Within these guidelines are elements designed to reclaim roadway space for a more equitable division of the public roadway, which often reduces available roadway width and overall travel speed. Pedestrian deaths and injuries significantly decrease as motor vehicle speeds decrease. For example, intersections intended for emergency vehicle access should ensure that the curb radii can accommodate the appropriate emergency vehicle turning radius; however, encroachment into adjacent travel lanes is a regular and expected measure taken by emergency responders to reach their destination quickly.

DESIGN

The City of Alexandria Fire Prevention Code establishes **Emergency Vehicle Easement (Fire Lane) requirements** through Appendix D. The code requires an emergency vehicle easement adjacent to buildings, which can either be satisfied within a driveway or parking lot, or the street right-of-way.

For new streets that fall under the definition of emergency vehicle easements, street design should provide adequate space for fire trucks to access adjacent buildings. In these locations, T&ES will work with the Fire Department to determine the appropriate street cross section and design.

CONSIDERATIONS

- The guidelines for curb radii (see [page 5-2](#) of these Guidelines) take into account the turning radius of the standard city fire truck.
- The design of plazas and curb extensions should take into account the requirements for fire apparatus stabilization arms to provide ladder access to upper stories on buildings.
- Where an Emergency Vehicle Easement transitions from the established grade to a higher or lower grade level and continues as an Emergency Vehicle Easement, a mountable / drivable curb shall be designed to City Standard MOD CG-3 or MOD CG-7 that are based on VDOT standards CG-3 and CG-7.
- Dead-end emergency vehicle easements greater than 100 feet shall be provided with an approved area for turning around the fire apparatus. This can consist of either a circular turning area, or an area where an emergency vehicle can back up to turn around.

Transit Lanes

Efficient, cost-effective public transportation is essential for continued growth and quality of life in a dense, compact city like Alexandria. Compared with single occupancy vehicles, transit vehicles such as buses consume far less public space per person trip and can help relieve congestion, enhance access to goods and opportunities, improve air quality, and reduce greenhouse gas emissions.

Buses that travel in mixed traffic on congested streets are often subject to delays. Transit lanes, which are travel lanes reserved for the exclusive or dominant use of transit vehicles, are one way to improve efficiency in congested areas of the city.

Dedicated transit lanes (bus lanes and protected busways) make it possible to increase the frequency and reliability of bus service along a corridor and help reduce congestion in other travel lanes. When combined with signal priority strategies and bus stop improvements (shelters, seating, off-board fare collection, and real-time information displays), transit lanes can result in high quality, fast, comfortable and cost effective public transportation.

Dedicated transit lanes may be fully and physically separated from other travel lanes or simply designated with signs and pavement markings. They may be located at either the curbside or center lanes of streets. Transit lanes may occasionally serve a shared function such as permitting right turns or concurrently accommodating other high occupancy vehicles.

Where transit lanes are not feasible or appropriate, substantial improvements to transit service can be achieved through the use of intelligent transportation systems (ITS), transit queue jumps, bus bulbs, consolidation of stops, all door boarding, and/or off board fare collection.

CURBSIDE BUS LANES



Bus lane

OVERVIEW

Curbside transit lanes in the roadway are reserved primarily for buses and are typically distinguished by either colored pavement, bus-only pavement markings, or signage. Where there are few curbside access points and adequate right-of-way width, curbside transit lanes may be further enhanced with separation treatments.

Curbside transit lanes are generally open to other vehicles at intersections as right turning lanes. Curbside transit lanes may be located adjacent curbside parking, in which case vehicles cross the bus lane to access parking, or in a curbside lane with an offset parking lane. Although permitted, this condition may result in sub-optimal transit performance as motorists who are parking may interfere with transit progression along the curbside lane.

CURBSIDE BUS LANES

DESIGN

- Curbside transit lanes provide fast, efficient service on one-way or two-way multi-lane streets where there is adequate width to accommodate them.
- Curbside transit lanes are placed on the right hand side of the road, adjacent to the curb or curbside parking. They work best in locations with no curbside parking.
- Generally, transit stops associated with dedicated transit travel lanes are spaced at least a quarter-mile apart.
- To deter encroachment by private vehicles, curbside transit lanes are marked with colored pavement or bus-only pavement markings.
- The minimum width of a transit lane is 11'. 12' is preferred for transit operations but should be evaluated in the overall assemblage of the street. Curbside transit lanes are exclusive of the gutter pan.
- Physical separation is generally preferred for bus rapid transit operations; however, separation should end prior to any intersection where right turning vehicles are permitted to share the transit lane. Where turns do not share the curbside lane, a separate transit signal and phase is required.
- Transit lanes should be appropriately marked to indicate where other vehicles may cross or enter the transit lane such as right turn lanes, curb cuts, driveways, alleys, or other curbside access points.
- Where curbside transit lanes are adjacent to parking, bus bulbs or transit islands should be provided to define parking area and facilitate operations.
- Dedicated curbside transit lanes provide a higher level of transit service. In concert with improved operations, consider providing improved passenger facilities including shelters, traveler information, and other amenities.

CONSIDERATIONS

- Space for a curbside transit lane is typically created by removing a travel lane, parking lane, or median.
- Curbside transit lanes work best when there are few or no curb cuts, driveways, or alleys introducing conflicts at the curbside. Where possible, consolidate or eliminate curb cuts or consider operational solutions such as right-in/right-out only.
- Measures to reduce conflicts with right-turning vehicles and opposing left-turning vehicles through signalization and signage.
- Vehicles performing parking maneuvers in the bus lane will delay buses and decrease the efficiency of service. Curbside parking requiring vehicles to cross the transitway to access should be avoided whenever possible.
- Curbside transit lanes can complicate access to adjacent commercial buildings particularly if parking is removed for installation. Effect should be evaluated and mitigations for access considered.
- Bicyclists should be safely accommodated on every street. Where bicyclists are prohibited from using the transit lane, they should be otherwise accommodated on the street.
- Bicyclists are generally not anticipated in separated curbside transit lanes.

SHARED BICYCLE/TRANSIT LANES



OVERVIEW

Under certain circumstances, a shared lane reserved for transit vehicles and bicyclists can provide much improved accommodation for both traveler groups. Shared Bicycle/Transit Lanes (SBTLs) are specifically designed to provide room for the two users to maneuver together as transit vehicles start and proceed again along a corridor. Shared lanes are commonly also used to accommodate right turning vehicles.

Shared bicycle/transit lanes are appropriate on streets where space constraints preclude the opportunity to provide separate facilities and where bus headways

and speeds are moderate. Shared bicycle/transit lanes typically require less total right-of-way space than separate facilities for each user.

Shared bicycle/transit lanes, however, should not be considered adequate treatments on high frequency transit corridors or on corridors where bicycle volumes are high enough to significantly adversely affect transit operations. In such instances, prioritization of one or the other mode may be necessary or separate facilities provided.

SHARED BICYCLE/TRANSIT LANES

DESIGN

- Shared bicycle/transit lanes should be located in the outermost lane, ideally adjacent to the curb. Bike/transit lanes may be located adjacent to curbside parking; however, this introduces substantial conflict and degrades operations and safety in the priority lane.
- Shared bicycle/transit lanes should have sufficient width for dual bicycle/transit use. 16' is preferred to permit vehicles and bicyclists to pass one another comfortably within the priority lane. The minimum width of shared bicycle/transit lanes is 13' (inclusive of the gutter pan).
- Shared bicycle/transit lanes typically are not physically separated from adjacent travel lanes.



7th Street NW, Washington, D.C.

CONSIDERATIONS

- Bicycle volumes, transit frequency, available right-of-way, total cross section, frequency of transit stops, and temporal changes in street operation should be considered in determining the appropriateness of a shared bicycle/transit lane.
- Shared bicycle/transit lanes are not appropriate on rush hour restricted streets (streets where the curb parking lane converts to a travel lane during peak hours).
- Transit operators should be trained in how to interact with bicyclists in shared bicycle/transit lane facilities.
- Typically, shared bicycle/transit lanes should not be used on any street with a posted speed limit above 30 MPH.
- Vehicles using shared bicycle/transit lanes for through travel can be a major issue. This not only degrades performance, but introduces serious safety concerns. Education and enforcement is always a necessary component when using shared bicycle/transit lanes.
- Shared bicycle/transit lanes may be less inviting or comfortable for inexperienced or timid bicyclists.

MEDIAN TRANSIT LANES



OVERVIEW

Median transit lanes operate in a similar fashion as curbside transit lanes. These lanes are aligned adjacent to a center median in the street. Typically passengers board and alight at stations located in the center median. Lanes may or may not be reserved for transit vehicles. Where reserved use lanes are distinguished by pavement markings and/or signage. Colored pavement is also commonly used to call out the transit lane, as median transit lanes are generally not physically separated from adjacent travel lanes. Where separation is needed, it is more common to utilize a median transitway (please see facing page).

While median transit lanes are viable roadway configurations, they may require special transit vehicles. The median is located on the left side of the transit vehicle which generally requires passenger doors also be available on the left side of the vehicle.

DESIGN

- Median transit lanes may be used on two-way multi-lane streets where there is adequate width to accommodate them.
- Median transit lanes are placed on the left hand side of the road, adjacent to a median or center line.

- The minimum width of a median transit lane is 12' plus 1' shy distance from the median.
- Median transit lanes may be used to route transit vehicles through particularly congested route segments where no stops are made.
- Median transit lanes are commonly used for streetcar or bus rapid transit service where transit vehicles accommodate passenger loading on both sides of the transit vehicle.
- Median transit lanes provide a higher level of transit service. If stops are provided, a higher level of passenger amenities should also be provided including shelters, seating, and traveler information.

CONSIDERATIONS

- Left turn lanes may conflict with median transit lanes. If shared, left turns may negate transit travel time savings. If separated, separate signal cycles are required.

MEDIAN PROTECTED TRANSIT LANES



OVERVIEW

Median protected transit lanes are lanes in the center of multi-lane streets that are separated from general traffic by means of a physical barrier median. Only transit and emergency vehicles are permitted in these lanes. Combined with comfortable stations and off-board fare collection, median protected transitways can form the framework of the City's high capacity transit corridors.

Median protected transit lanes are less flexible than median transit lanes as they do not generally allow passing and buses can only enter and exit at specific locations. Good design, however, may mitigate such conflicts. They are typically more expensive to construct and maintain than median bus lanes, but allow for more consistent speeds and require less enforcement.

DESIGN

- Median protected transit lanes provide fast, efficient, and reliable service on multi-lane streets with adequate width for the lane(s), barriers, and stations.
- Separation from general traffic is achieved by means of a curb, island, fence, greenspace, or other well-defined structural feature.

- Transit stops on median protected transit lanes are generally spaced farther apart (1/3 to 1/2 mile) than typical transit stops (1/5 to 1/4 mile) to permit greater speeds and to reduce trip times.
- The width for a median protected transit lane is 12' for the lane plus 1' shy distance from the median barrier.

CONSIDERATIONS

- Width of stations on median protected transit lanes may vary depending on location, configuration and peak passenger volume.
- Opportunities for passing and entry/exit of vehicles should be designed into the system.
- Use of median protected transit lanes may be limited to high capacity transit service only restricting or prohibiting use by local transit service (with frequent stops) or commuter transit services (with longer dwell times). In Alexandria, local transit service is currently allowed in the median protected transit lanes on Route 1.
- Because of the physical barrier, special procedures for snow removal are required.

Bicycle Facilities

PROTECTED BIKE LANES



Bike lanes separated by vertical objects

OVERVIEW

Protected bicycle lanes, also known as cycle tracks, are exclusive bicycle facilities physically separated by a vertical element from the adjacent motor vehicle lanes. Separation can be achieved through a vertical curb, a parking lane, flexposts, plantings, removable curbs, or other measures. Buffered bike lanes that do not include a vertical element are not considered protected bike lanes.

There are four basic configurations for protected bike lanes:

- Sidewalk-level bike lanes
- Bike lanes constructed at an intermediate level between the sidewalk and the street
- Street-level bike lanes separated from traffic or parking by a curb
- Street-level bike lanes separated from traffic or parking by a vertical object

Protected bike lanes dramatically increase rider comfort and decrease stress. They are usable by a broad spectrum of bicyclists including very young riders and more cautious bicyclists. Protected bike lanes may be used on many different street types and are especially welcome on higher speed, higher volume roadways. Studies show that bicyclists prefer separation from motor vehicles on most types of roadways, which suggests separation can contribute to expanding bicycle mode share. Protected bike lanes can be one-directional or two-directional. They may be provided on both sides of two-way streets or on one side of one-way streets.

DESIGN

- Protected bike lanes are appropriate on streets with operating speeds of 20 mph and higher, or volumes that exceed 4,000 vehicles per day.
- Protected bike lanes can be useful on streets that provide connections to off-street trails, since bicyclists on these streets may be more accustomed to riding in an area separated from traffic.
- Intersection design for protected bike lanes is complex and requires careful attention to conflicts with turning vehicles. For more information, see the [NACTO Bikeway Design Guide](#).

PROTECTED BIKE LANE WIDTH¹

One-Way		Two-Way	
Minimum ²	Preferred	Minimum ³	Preferred
5'	7'	8'	12'

¹ Dimensions are for the protected bike lane only and do not include sidewalk or street buffers. Width dimensions include a standard 2' wide gutter pan.

² Minimum width will not accommodate passing. 6.5' is required for two bicyclists to pass one another. The edge condition impacts ability to comfortably pass or ride two abreast. The minimum width is discouraged when a protected bike lane is located between raised curbs. If the width is constrained, the designer should consider options that allow bicyclists to use the buffer space to pass another user.

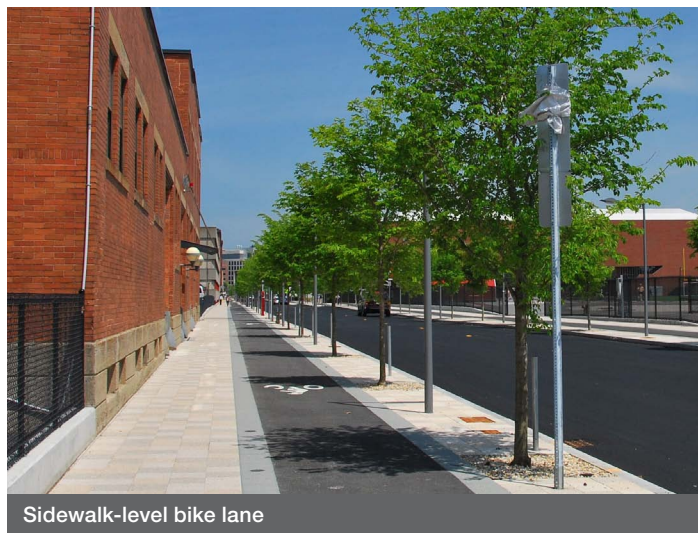
³ Passing may occur in the opposing lane.

PROTECTED BIKE LANES

Adjacent to on-street parking, a minimum 2' to 3' buffer should be provided between parking and the separated bike lane; the buffer serves as a pedestrian loading and unloading zone and helps keep bicyclists out of the door zone of parked vehicles.

CONSIDERATIONS

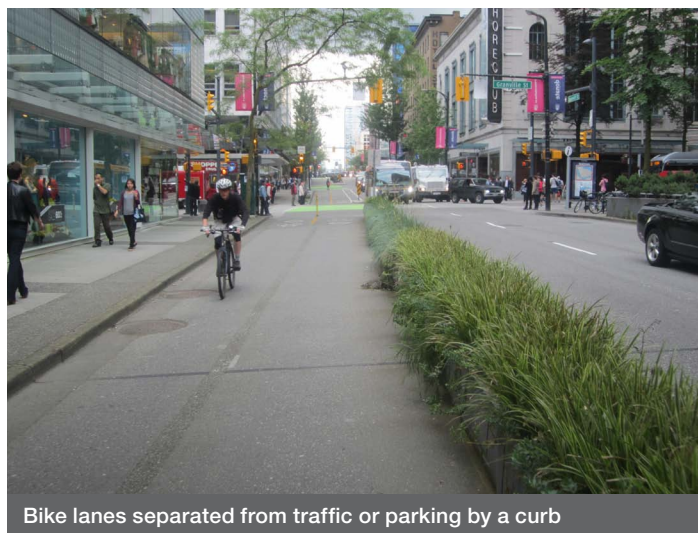
- Protected bike lanes require increased parking restrictions approaching intersections compared to standard bicycle lanes to provide for visibility at intersection transitions.
- Vertical curb separation should be considered where on-street parking is not present. Snow clearance and stormwater drainage will need to be considered with this option. Street-level protected bike lanes may be combined with islands at corners and crossings.
- At transit stops, protected bike lanes should be routed between the passenger waiting area and the sidewalk to reduce conflicts while passengers are boarding and alighting. Signage and/or markings may be added to alert transit riders and bicyclists of the conflict zone as pedestrians cross the bike lane from the sidewalk to the transit stop.
- The presence of drainage and utility structures along the curb may reduce the effective width of a protected bike lane.
- Maintenance should be considered during all seasons including street sweeping and snow removal.
- Please see [Bicycle Accommodation at Intersections](#) for protected bicycle lane design at and approaching intersections.



Sidewalk-level bike lane



Bike lanes between a parking lane and the sidewalk



Bike lanes separated from traffic or parking by a curb

STANDARD BIKE LANES



Bike lane on Braddock Road

OVERVIEW

Bicycle lanes provide an exclusive space for bicyclists in the roadway. Bicycle lanes are established through the use of lines and symbols on the roadway surface. Bicycle lanes are for one-way travel and are normally provided in both directions on two-way streets and/or on one side of a one-way street. Bicyclists are not required to remain in a bicycle lane when traveling on a street and may leave the bicycle lane as necessary to make turns, pass other bicyclists, or to properly position themselves for other necessary movements. Bicycle lanes may only be used temporarily by vehicles accessing parking spaces and entering and exiting driveways and alleys. Stopping, standing and parking in bike lanes is prohibited.

DESIGN

- Bicycle lanes can be used on one-way or two-way streets with single or multiple lanes.
- Bicycle lanes may be placed adjacent to a parking lane or against the curb if there is no parking. Conventional bicycle lanes are located on the right side of the roadway. (see also [Left-Side Bike Lanes](#))
- Bicycle lanes are typically installed by reallocating existing street space (i.e., narrowing other travel lanes, converting travel lanes and/or reconfiguring parking lanes).
- The minimum width of bicycle lanes in Alexandria is 5'. Bicycle lanes may be 4' if adjacent to a gutter pan. Other 4' lanes may be permitted under limited circumstances based on the [AASHTO Guide for the Development of Bicycle Facilities](#).

STANDARD BIKE LANES

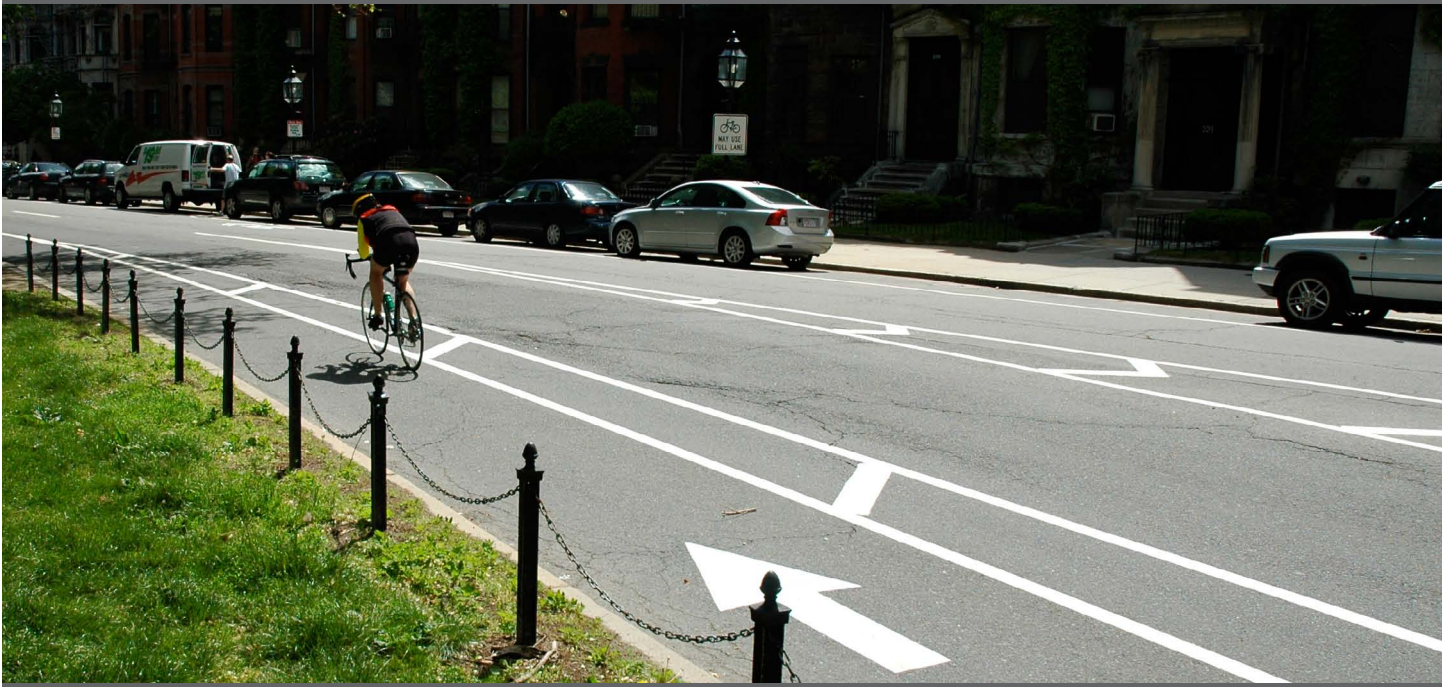
- When bike lanes are adjacent to parking, the combined width (from face of curb) of parking and bicycle lane should be at least 12'.
- Bike lanes are indicated by a solid white line along the left side of the lane. Use dotted or dashed line marks to indicate areas of bicycle/vehicle conflict.

BIKE LANES	Minimum	Preferred
Bicycle lane: parking permitted adjacent	5'	6'
Bicycle lane: parking not permitted, curb and gutter present (<i>width measurement includes the 2' wide gutter pan</i>)	6'	7'
Bicycle lane: parking not permitted, no curb and gutter	4'	5'

CONSIDERATIONS

- Bicycle lane design should consider parking configurations and turnover, the presence of medians, the continuity of the facility, and the configuration and complexity of turning movements at intersections.
- If bicycle lanes are adjacent to guardrails, walls, or other vertical barriers, additional bicycle lane width is desired to account for bicyclist “shy” distance from the edge. Similarly, provide additional space if bicycle lanes are at sidewalk level and adjacent to the curb and travel lanes.
- Ensure gutter seams, drainage inlets and utility covers are flush with the roadway surface. Where possible, these features should be kept out of the bicycle lane.
- Bicycle lanes provided at an intermediate level between roadway and sidewalk should have rolled or mountable curbs down to the roadway and up to sidewalk level.
- Consider using differentiated materials for bicycle lanes at sidewalk level (e.g. asphalt for the bicycle lane and concrete for the sidewalk). When bicycle lanes are at sidewalk level, tree pits with or without grates may not be considered as part of bike lane width. Care should be taken to trim street tree limbs up above the height of bicyclists (a minimum 9' of vertical clearance is desired).
- Wider bicycle lanes (6' to 7') enable bicyclists to pass one another on heavily traveled corridors and increase separation from faster traffic. While wider bicycle lanes improve bicyclist comfort, they may encourage illegal parking or travel in the bike lane.
- Where wider lanes are possible, consider providing a buffered bicycle lane, discussed later in this section.
- On constrained corridors with high parking turnover, consider designing pavement markings to guide bicyclists outside of the door zone of parked vehicles. Treatments include installing a buffer on the parking side of the bicycle lane, door zone, hatch marks, or using parking T's instead of a longitudinal parking line.
- Consider using colored pavements to highlight areas where conflicts might occur such as at intersection and driveway crossings.
- It is critical that bicycle lanes receive the same treatment as the remainder of a street surface with regard to cleaning and snow removal. In addition, bicycle lanes need to have regularly cleaned storm drains (especially during spring and autumn when fallen leaves or other tree debris may collect in drains and cause pooling or flooding of stormwater in curbside bicycle lanes).

LEFT-SIDE BIKE LANES



Left-side bicycle lanes on Commonwealth Avenue in Boston, MA

OVERVIEW

In some locations, bicycle lanes placed on the left-side of the roadway can result in fewer conflicts between bicyclists and motor vehicles, particularly on-streets with heavy right-turn volumes or frequent bus service and stops where buses operate in the right-side curb lane. Other occasions may be where parking is provided only on the right side of the street or where loading predominantly occurs on the right. Left-side bike lanes can increase visibility between motorists and bicyclists at intersections due to the location of the rider on the left-side of the vehicle. However, left-side bike lanes are often an unfamiliar orientation for both bicyclists and drivers and may be less intuitive.

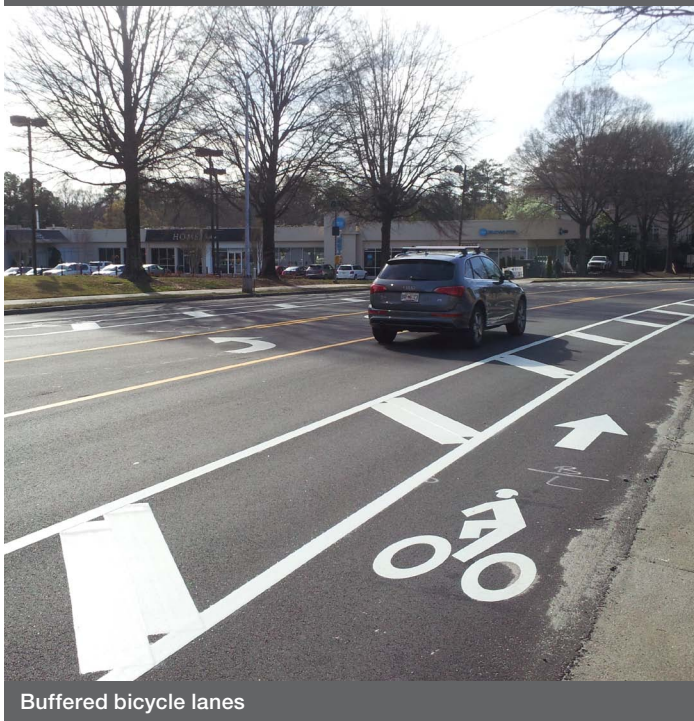
DESIGN

- Left-side bicycle lanes generally may only be used on one-way streets or on median divided streets.
- Left-side bicycle lanes have the same design requirements as right-side bicycle lanes.

CONSIDERATIONS

- On one-way streets with parking on both sides, bicyclists will typically encounter fewer conflicts with car doors opening on the passenger side.
- Colored pavement should be considered in curbside locations to increase awareness of the restriction against parking or stopping in the bicycle lane.
- Left-side placement may not be appropriate in locations where the street switches from one-way to two-way operation.
- Left-side bicycle lanes may not be appropriate near the center or left-side of free flow ramps or along medians with streetcar operations, unless appropriate physical separation and signal protection can be provided including.
- Consider dominant bicycle routes. Where a large proportion of bicyclists make right hand turns, conventional bike lanes may be preferable. Alternatively, bike boxes or left side two-stage turn queues should be provided (detailed on [page 5-44](#)).

BUFFERED BIKE LANES



Buffered bicycle lanes

Buffered bicycle lanes are created by painting or otherwise creating a flush buffer zone between a bicycle lane and the adjacent travel lane. While buffers are typically used between bicycle lanes and motor vehicle travel lanes to increase bicyclists' comfort, they can also be provided between bicycle lanes and parking lanes in locations with high parking turnover to discourage bicyclists from riding too close to parked vehicles.

Buffered bicycle lanes are distinct from protected bicycle lanes in that they have no vertical barrier between travel lanes and/or parking. Like protected bicycle lanes, buffered bicycle lanes have been found to dramatically increase bicycling comfort for a wide range of community bicyclists.

DESIGN

- The recommended minimum width of a buffer is 3'; however, width may vary depending upon the available space and need for separation. All other bicycle lane width dimensions as shown in the chart on [page 4-7](#) apply.
- Buffers should be painted with solid white lines and channelization markings.
- Buffers can be useful on multi-lane streets with higher speeds, but are not required in these locations.

CONSIDERATIONS

- Where only one buffer can be installed on a constrained corridor with on-street parking, the buffer should typically be placed between the bicycle lane and parking lane, depending upon roadway speeds and parking turnover.
- Generally speaking, there is no upper limit for buffer width and buffers of 5' to 6' are common where travel lanes are converted to buffered bicycle facilities; however, wide buffers without vertical separators may invite illegal use for vehicle travel.
- Consider using removable vertical elements such as flexposts, rubber curbing, or planters to further establish the bicycle facility. These elements may be removed seasonally to facilitate snow removal or street resurfacing.
- Ensure that buffered bicycle lanes are maintained with regard to street sweeping and snow removal. If the lanes are separated with vertical elements such as bollards, planters or flexposts, this may require using smaller equipment to treat the width of smooth surface inside the bicycle lane.
- Because they do not require construction of a separating element, buffered bicycle lanes may be established through simple street resurfacing and may enable trial or phasing prior to the installation of separated facilities.
- Buffered bicycle lanes, like protected bicycle lanes, may transition at intersections to provide adequate visibility and safety (see [Bicycle Accommodation at Intersections](#)).

CONTRA-FLOW BIKE LANES

OVERVIEW

The current configuration of one-way streets in Old Town Alexandria has been developed primarily to facilitate efficient movement of automobile traffic. This, combined with the organic, non-gridded nature of much of the rest of the City's street network, often make bicycling to specific destinations within short distances difficult.

Contra-flow bicycle lanes can help to solve this problem by enabling only bicyclists to operate in two directions on one-way streets. Contra-flow lanes are useful to reduce distances bicyclists must travel and can make bicycling safer by creating facilities that help other roadway users understand where to expect bicyclists.



Contra-flow bike lanes

DESIGN

- Contra-flow bicycle lanes are used on one-way streets that provide more convenient or direct connections for bicyclists where other alternative routes are less desirable or inconvenient.
- Contra-flow lanes should be used where there is a clear and observed need for the connection as evidenced by a number of “wrong way riding” bicyclists or bicyclists riding on sidewalks in the opposing direction.
- Contra-flow lanes are often short, connecting segments. They are not typically used along extended corridors.
- Contra-flow lanes may only be established where there is adequate roadway width for an exclusive lane.
- Care should be taken in the design of contra-flow lane termini. Bicyclists should be directed to the proper location on the receiving roadway.

CONSIDERATIONS

- Contra-flow lanes follow the same design parameters as conventional bicycle lanes: however, the left side marking is a double yellow line. The line should be dashed if parking is provided on both sides of the street. Contra-flow lanes may also be separated by a buffer or vertical separation such as a curb.
- Contra-flow lanes must be placed to the motorist's left.
- A bicycle lane or other marked bicycle facility should be provided for bicyclists traveling in the same direction as motor vehicle traffic on the street to discourage wrong way riding in the contra-flow lane.
- Parking is discouraged against the contra-flow lane as drivers' view of oncoming bicyclists would be blocked by other vehicles. If parking is provided, a buffer is recommended to increase the visibility of bicyclists. On-street parking should be restricted at corners.
- Contra-flow lanes are less desirable on-streets with frequent and/or high-volume driveways or alley entrances on the side with the proposed contra-flow lane. Drivers may neglect to look for opposing direction bicyclists on a one-way street.

CLIMBING LANES



Climbing lane on Wheeler Avenue. Note that there is no lane in the downhill direction.

OVERVIEW

On roadways with steep and/or sustained grades where there is not enough space to install standard 5' wide bicycle lanes on both sides of the street, climbing lanes are provided on the uphill side of roadway while shared lane markings are provided in the downhill direction. Bicyclists traveling in an uphill direction move at significantly slower speeds than adjacent traffic and therefore benefit from the presence of a bicycle lane. When travelling downhill, bicyclists gain momentum and can travel at similar speeds as motor vehicles, making shared lane markings in the downhill direction an appropriate treatment.

DESIGN

- Climbing lanes should be used in the uphill direction on roadways with steep grades to provide a dedicated space for bicyclists.
- Climbing lanes have the same minimum width (5') and design as standard bicycle lanes.

CONSIDERATIONS

- In general, bicycle lanes should be provided on both sides of the street where space permits. Wider outside travel lanes with shared lane markings should be provided if standard bicycle lanes do not fit within the provided right-of-way.
- If on-street parking is provided in the downhill direction, it is particularly important to ensure that bicyclists are directed to ride in a location outside of the door zone.

MARKED SHARED LANES (SHARROWS)

OVERVIEW

Marked shared lanes are indicated by specific bicycle symbols called shared lane markings or sharrows. Sharrow markings are two chevrons positioned above a bicycle symbol.

In general, this is a design solution that can only be used in locations where a standard bike lane or protected bike lane is not feasible due to space constraints.

Shared lane markings should be placed in such a manner to direct bicyclists to ride in the most appropriate location on the roadway. They can also be used in multiple lanes to position bicyclists for turning movements.

DESIGN USE

- Shared lane markings are not a preferred facility type except in locations with low traffic speeds and volumes (operating speeds less than 25 mph, volumes less than 4,000 vehicles per day).
- On streets that fall outside of these design parameters, shared lane marking can be used as an interim (retrofit) design solution; however, they should not be used on streets with speed limits above 35 mph and are generally not appropriate on roadways with more than four travel lanes (two-way) or more than three travel lanes (one-way).
- Refer to the MUTCD for additional design guidance on the use of shared lane markings.

- On narrow travel lanes adjacent to on-street parking, shared lane markings should be placed in a location that is outside of the door zone of parked vehicles (such as the center of the travel lane).
- Shared lane markings should be supplemented by SHARE THE ROAD signs and BICYCLES MAY USE FULL LANE signs where appropriate.

CONSIDERATIONS

- Marked shared lanes should be provided after considering narrowing or removing travel lanes, parking lanes, and medians as necessary to provide an exclusive bicycle facility.
- Shared lanes can be used as an interim solution to complete connections between bicycle lanes and other facilities.



Sharrows

PRIORITY SHARED LANES



Priority Shared Lane in San Francisco, CA

OVERVIEW

On multi-lane streets, marked shared lane symbols, or sharrows, can be enhanced with dashed longitudinal lines and colored pavements. This marked “lane within the lane” can reduce conflicts by encouraging (though not requiring) vehicles to use inside lanes and reserve the outside lane for bicyclists. On-streets with narrow travel lanes, priority shared lanes direct the bicyclist to the correct and most conspicuous position on the road—the middle of the travel lane.

DESIGN

- Priority shared lanes can be an appropriate retrofit solution on multi-lane one-way and two-way streets where roadway space is not available for separate bicycle facilities. They should be used cautiously in locations with higher operating speeds (35 mph or greater).
- Shared lane markings can be supplemented by SHARE THE ROAD signs and BICYCLE MAY USE FULL LANE signs where appropriate.

CONSIDERATIONS

- Priority shared lanes should be provided after considering narrowing or removing travel lanes, parking lanes, or medians as necessary to provide an exclusive facility.
- Dashed longitudinal lines and/or colored pavement may be provided along the length of the corridor or be location specific.

ADVISORY BIKE LANES



Advisory bike lane on Potomac Greens Drive in Alexandria

Where the width of a two-way street is too narrow for the installation of a standard bicycle lane or protected bicycle lane and a standard travel lane for motor vehicles, advisory bicycle lanes could be an alternative to the marked shared lane. They make safe bicycle and vehicle travel possible on narrow roads.

The layout for advisory bike lanes is a travel lane centered between two bicycle lanes marked with a solid white line on the right and a dotted line to the left. There is no centerline. This directs motorists down the center of the road and provides a defined space for bicycles to pass on either side. When two motorists traveling in opposing directions meet, they yield to passing bicyclists and then use the shared bicycle lanes to pass.

DESIGN

- Advisory bicycle lanes are intended for streets with high bicycle traffic, but not a high volume of car traffic
- Advisory bicycle lanes can be provided where there otherwise wouldn't be room for bicycle lanes.
- Despite narrow street width, streets with advisory bicycle lanes are still two-way streets.

CONSIDERATIONS

- Motorist are allowed to merge into the bike lane; however, they must first yield to bicyclists in the bike lane.
- Bicyclists should be prepared for a motorist in a vehicle to enter the bicycle lane more often than on typical streets.
- Traffic volume should be less than 6,000 ADT.
- Lateral width of travel lane is 14'-16' between dashed bicycle lanes.
- The street is not a designated truck or transit route, nor would the street be expected to facilitate these vehicle types to and from other facilities.
- Green-colored pavement can be used, but should be limited to mixing/weaving locations and/or as a background enhancement to the bicycle symbol, arrow, and/or pavement word markings used to mark the dashed bike lane.

NEIGHBORHOOD BIKEWAYS

Primarily located in residential areas, Neighborhood Bikeways are designed to encourage slow vehicular traffic and to be comfortable for people walking and bicycling. These streets feature design elements such as curb extensions and roundabouts, “calming” traffic and giving priority to local vehicle trips over cut-through traffic. As an important part of the citywide bicycle network, Neighborhood Bikeways may also feature bicycle facilities such as shared lane markings or bike route signage.



Neighborhood Bikeways signage on Wilkes Street

OVERVIEW

What most influences the way people drive isn't the speed limit, a caution sign, or the threat of a ticket. Rather, drivers take their cues from the design of the street. Narrower lanes, trees, wayfinding signage, pavement markings, people walking and biking give the impression that pedestrians and bicyclist are a priority, so drivers slow down.

Neighborhood Bikeways are quiet, often residential streets that are designed for slower speeds. These streets are designed to give priority to pedestrians and bicyclists. They are excellent places to play, walk a dog, or ride a bicycle that connect across neighborhoods and the city.

DESIGN

- Design features that reduce operating speeds are used to maintain low speeds (20 mph or less) on Neighborhood Bikeways.
- Neighborhood Bikeways are best accomplished in neighborhoods with a grid street network (where motor vehicle through-traffic can be directed to parallel routes), but can also be accomplished by combining a series of road and trail segments to form one continuous route.
- Ideally, Neighborhood Bikeways should not carry more than 4,000 motor vehicles per day to be comfortable for pedestrians and bicyclists. Traffic management devices are typically used to discourage motor vehicle through-traffic while still enabling local traffic access to the street.
- Neighborhood Bikeways should be long enough to provide connectivity between neighborhoods and common destinations such as schools or parks.

CONSIDERATIONS

- At major street crossings, Neighborhood Bikeways may need additional treatments other than marked crosswalks for pedestrians and bicyclists. Treatments can include signage, median refuge islands, curb extensions, advisory bike lanes, rapid flash beacons, pedestrian-actuated signals and/or bicycle signal heads.