SEPARATED BIKE LANES

Source: New York City Department of Transportation

A separated bike lane—also referred to as a cycle track or protected bike lane—is an exclusive facility for bicyclists that is located within or directly adjacent to the roadway and is physically separated from motor vehicle traffic with a curb, median, or other vertical element. On-street parking may supplement physical separation. Separated bike lanes are integral to the development of low-stress bicycle networks because they enhance safety for all road users, encourage more bicycling, and are preferred by bicyclists and motorists alike.

Key design resources including the **MUTCD 2009**, **AASHTO Green Book 2011**, and **AASHTO Bike Guide 2012** do not define separated bike lanes, which may discourage some designers from incorporating them into roadway designs.

Separated bike lanes are primarily a geometric design solution and are not a traffic control device. Therefore, the **MUTCD 2009** does not restrict their use. However, note that individual elements of separated bike lanes must be used in a manner that is compliant with the **MUTCD 2009**. The **AASHTO Green Book 2011** and **AASHTO Bike Guide 2012** also do not explicitly exclude the design of separated bike lanes. In practice, much of the guidance on sidepaths in the **AASHTO Bike Guide 2012** is applicable to separated bike lanes. Separated bike lane design guidelines have recently been introduced at the Federal and State levels, including the **FHWA Separated Bike Lane Guide 2015**, to communicate best practices, advance design guidance, and encourage flexible solutions to bicycle mobility.

KEY DESIGN FLEXIBILITY

The **AASHTO Green Book 2011** and **MUTCD 2009** do not provide specific design guidance on separated bike lanes. The **FHWA Separated Bike Lane Guide** emphasizes the importance of applying design flexibility when designing separated bike lanes:

"The practice of designing separated bike lanes is still evolving and until various configurations have been implemented and thoroughly evaluated on a consistent basis, design flexibility will remain a priority."

(2015, p. 27)

OTHER RESOURCES

"By separating cyclists from motor traffic, cycle tracks can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public."

NACTO Urban Bikeway Design Guide 2014, p. 27

"In some situations, it may be better to place one-way sidepaths on both sides of the street or highway, directing wheeled users to travel in the same direction as adjacent motor vehicle traffic."

AASHTO Bike Guide 2012, p. 5-11

"Separated bike lanes can contribute to increased bicycling volumes and mode shares, in part by appealing to less confident riders and this could eventually result in a more diverse ridership across age, gender, and ability."

FHWA Separated Bike Lane Guide 2015, p. 16

APPLYING DESIGN FLEXIBILITY

EXISTING SIDEPATH AND STANDARD BIKE LANE GUIDANCE

The **AASHTO Bike Guide 2012** does not cover separated bike lanes, and in some cases discourages their use. However, it is currently under revision with the purpose of providing much needed guidance on the design of separated bike lanes, due in part to the fact that over 250 of these facilities have been installed by communities throughout the U.S.

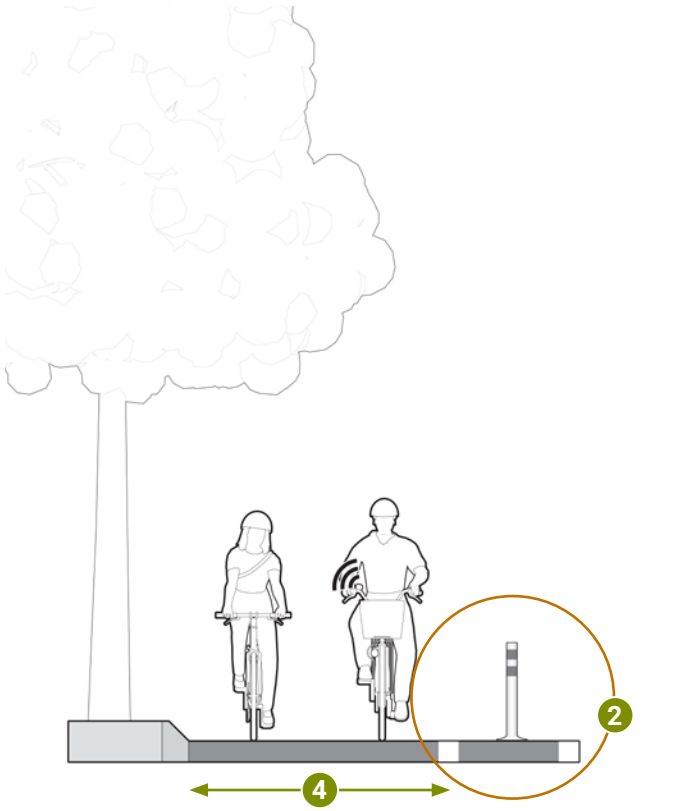
In the interim, FHWA published the **Separated Bike Lane Guide 2015**, which outlines planning considerations and provides a menu of design options covering typical one- and two-way scenarios.

FORMS OF SEPARATION

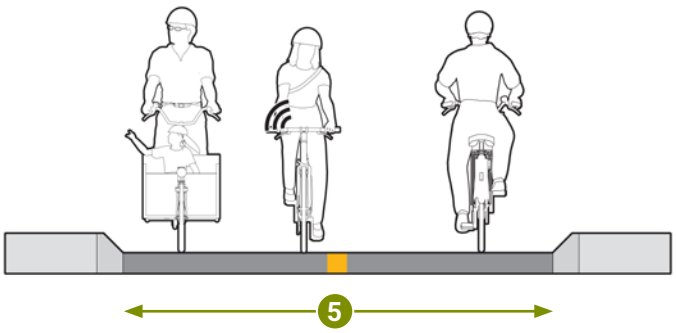
Separated bike lanes provide a physical separation from motor vehicles by a curb, raised median, or a vertical element. The design of the separation should be based on the presence of on-street parking, overall street and buffer width, cost, durability, aesthetics, traffic speeds, emergency vehicle and service access, and maintenance. **(FHWA Separated Bike Lane Guide 2015, p. 83)**

Raised medians 1 are generally preferred because they provide permanent curb separation. However, they are costly and may impact drainage. Therefore, they are most commonly installed as part of a full roadway reconstruction project. Delineator posts 2 or other lower-cost vertical elements 3 can be ideal for retrofit projects where existing curblines remain. Depending on the project, street buffer widths and vertical element spacing can vary **(FHWA Separated Bike Lane Guide 2015, p. 83)**. Designers may increase the street buffer width to create protected bicycle crossings at intersections, which improves motorists' visibility of people bicycling and creates space to yield without blocking traffic. The street buffer also helps manage pedestrian and bicycle conflicts. For more information, refer to the design topic on **Separated Bike Lanes at Intersections**.

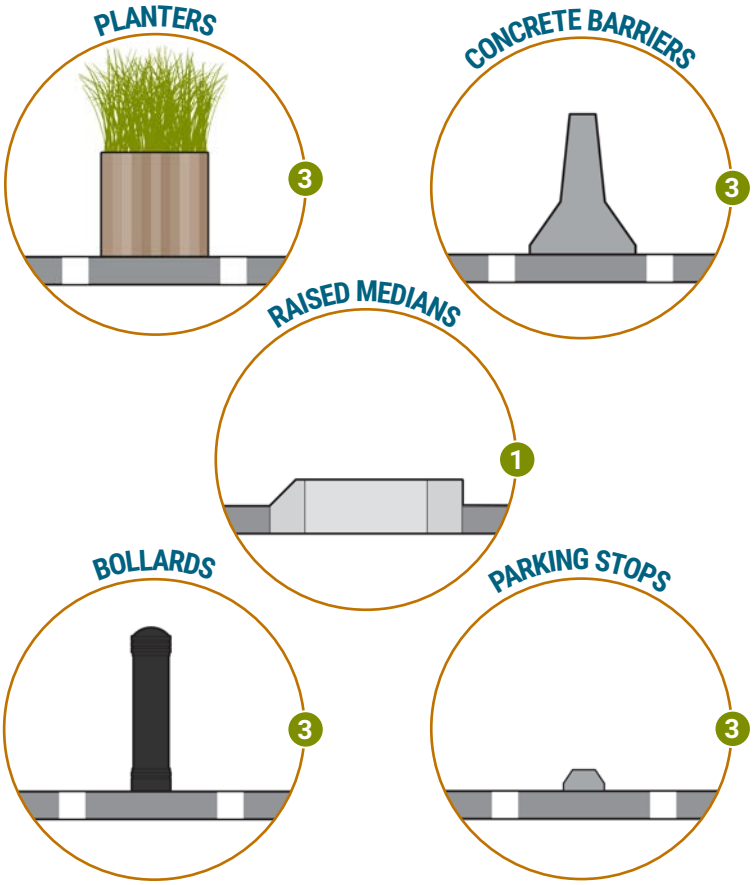
Designers should consider the crashworthiness of separation types. Fixed objects in the roadway are generally not recommended and some movable objects, such as planters, may not be appropriate on higher-speed streets. On lower-



ONE-WAY
7' PREFERRED
5' MINIMUM



TWO-WAY
12' PREFERRED
10' MINIMUM



speed streets, separation types "need not be of size and strength to redirect errant motorists toward the roadway" **(AASHTO Bike Guide 2012, p. 5-11)**.

BIKE LANE WIDTH

Separated bike lane width depends on a combination of factors, including the existing street characteristics, existing and anticipated demand, and maintenance considerations.

Separated bike lanes may be one-way, either in the direction of vehicle travel or contra-flow, or two-way. Preferred widths range from 7 feet 4 for one-way operation to 12 feet 5 for two-way operation, exclusive of the street buffer. Wider separated bike lanes accommodate greater volumes of bicyclists **(FHWA Separated Bike Lane Guide 2015, p. 77 and 80)**. Narrower widths are sometimes used in constrained locations. However, this may inhibit passing and side-by-side riding, which are important to providing a comfortable bicycling environment that appeals to all ages and bicycling abilities. Narrow separated bike lane widths may also require special maintenance equipment for street sweeping or snowplowing **(FHWA Separated Bike Lane Guide 2015, p. 77)**.

Designers should be mindful of bicyclist operating space and its relation to separated bike lane edge conditions **(AASHTO Bike Guide 2012, p. 3-2)**. Because bicyclists naturally shy away from hazards, proximity to streetscape furniture, vertical elements in the street buffer, or vertical curbs may reduce the usable width of the separated bike lane.

BIKE LANE ELEVATION

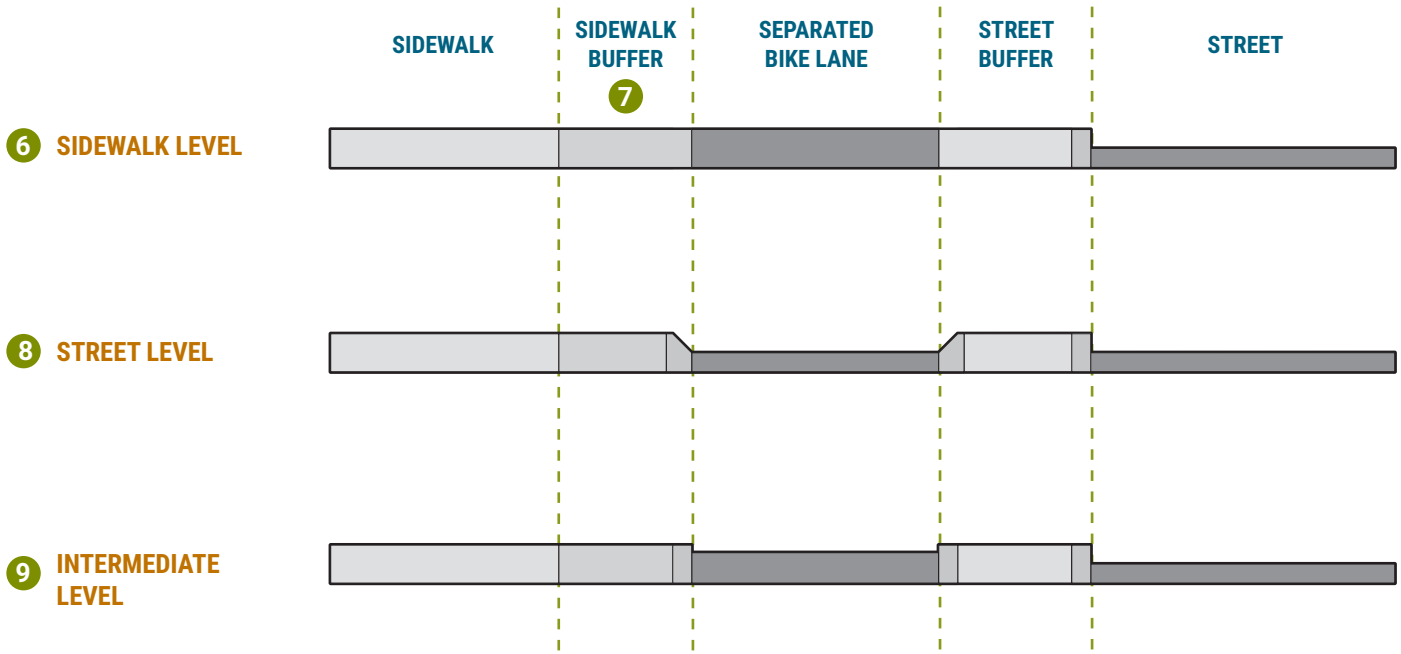
Separated bike lanes may be designed at any elevation between the street level and sidewalk level **(NACTO Urban Bikeway Design Guide 2014, p. 35)**. Many factors contribute to the selection of bike lane elevation, including drainage, accessibility, usable bike lane width, intersection frequency, curbside conflicts, maintenance, and separation from pedestrians and motor vehicles. However, the decision is often dictated by the construction technique (retrofit vs. reconstruction).

Sidewalk-level separated bike lanes 6 typically require reconstruction with drainage modifications. To minimize pedestrian encroachment, sidewalk buffers 7 are preferred. Where buffers are not provided, the separated bike lane should be visually distinct and at a lower grade from the adjacent sidewalk. Sidewalk-level bike lanes simplify raised driveway and street crossings, which improves bicyclist safety.

Street-level separated bike lanes 8 may be implemented as retrofit or reconstruction projects, often allowing the reuse of the existing drainage system. They maximize pedestrian separation, therefore a sidewalk buffer is not required. Raised street and driveway crossings typically require drainage modifications.

Intermediate-level separated bike lanes 9 are located below the sidewalk and above the street and are typically implemented as a reconstruction project. To minimize potential encroachment or conflicts with pedestrians, a minimum 2-inch vertical separation is preferred. Drainage may be captured within the separated bike lane or flow towards a roadway edge collection system.

Separated bike lane elevation may transition throughout a corridor in response to changing conditions (e.g., raising to sidewalk level at driveways, lowering to street level at major intersections). However, designers should avoid frequent transitions to preserve a comfortable bicycling environment.



CASE STUDIES

SOUTHWEST MOODY AVENUE SEPARATED BIKE LANE
PORTLAND, OR

In 2011, the City of Portland implemented a 0.5 mile two-way separated bike lane as part the SW Moody Avenue reconstruction project. This separated bike lane—the first in downtown Portland—is raised to sidewalk level to further separate bicyclists from motor vehicle traffic. Both the sidewalk and separated bike lane are constructed of concrete, but delineated by trees and unit pavers to provide visual contrast and discourage encroachment. The opening of the Tilikum Crossing Bridge in 2015 brought more changes to SW Moody Avenue: the sidewalk and separated bike lane were flipped to reduce conflicts between these users, and additional green paint further clarified the bicycle path of travel.

Source: PeopleForBikes

POLK STREET SEPARATED BIKE LANE
SAN FRANCISCO, CA

In 2014, the City of San Francisco installed a contra-flow separated bike lane on a two-block, one-way stretch of Polk Street, permitting bicyclists to safely travel northbound against the flow of southbound vehicular traffic. This separated bike lane creates a low-stress connection between Market Street and Polk Street, two of the busiest and most important bicycling corridors in San Francisco. The City removed a lane of parking to accommodate the bike lane and added a raised vegetated median. A designated vehicle loading area was retained for adjacent buildings. Bicyclists are directed by traffic signals at three intersections. Left-turn queue boxes on Market Street help transition bicyclists into and out of the separated bike lane.

Source: San Francisco Municipal Transportation Agency

WESTERN AVENUE SEPARATED BIKE LANE
CAMBRIDGE, MA

In 2015, the City of Cambridge completed a full reconstruction of 0.5 miles of Western Avenue, which replaced a standard bike lane with a one-way, sidewalk-level separated bike lane in the same direction of motor vehicle travel. The separated bike lane is visually delineated from the concrete sidewalk through the use of asphalt (which is porous to reduce stormwater runoff) and physically separated with trees and street furniture. The design incorporates raised bicycle and pedestrian crossings at minor street crossings; signalized crossings transition to street level and feature bicycle signals with leading intervals. Conflicts between buses and bicyclists are minimized through the use of floating bus stops. Cambridge performed extensive public outreach for this transformation, including 14 Advisory Committee and public meetings and five neighborhood walks over a 1.5-year period.