DESIGN INFORMATION BULLETIN NUMBER XX

Department of Transportation
Division of Design
Office of Standards and Procedures

CLASS IV BIKEWAY GUIDANCE
(Separated Bikeways / Cycle Tracks)

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FOREWORD

It is the goal of the state to increase the number of trips Californians take by bicycling, walking, and other forms of active transportation in order to help meet the state's greenhouse gas emissions reduction goals, improve Californians' health by helping more people be active, and stimulate the economy. Bicycle facilities are a vital part of the transportation infrastructure that is used by many to commute to and from work and other destinations and provide alternatives to vehicles that otherwise would transport citizens across the state's roads and highways. Class IV Bikeways, also referred to as separated bikeways or cycle tracks, provide an alternative to other bikeways that may minimize interactions with other modes of travel. The objective is to foster bicycling as a means of transportation, in a manner that improves safety for all users, including motorists, transit users, pedestrians, and persons with disabilities.

The Protected Bikeways Act of 2014 (Assembly Bill 1193 - Ting, Chapter 495) established Class IV Bikeways for California and required Caltrans, in cooperation with local agencies and in consultation with the existing Caltrans advisory committee dedicated to improve access for persons with disabilities, to establish design criteria for separated bikeways. This Design Information Bulletin (DIB) was prepared to provide that design criteria and other general guidance on best practices related to separated bikeways to establish uniform guidance for the use of owners of these facilities.

The design criteria and guidance in this DIB has been written to allow designers to exercise sound judgment when applying it, consistent with the Project Development philosophy (see Caltrans Highway Design Manual Index 81.1) when designing projects and has been written to allow for flexibility in applying the design criteria, taking into consideration the context of the project location; which enables the designer to tailor the design, as appropriate, for the specific circumstances while maintaining safety.

1.0 INTRODUCTION

Various separated bikeway/cycle track design criteria are in use around the world and the United States. California state and local laws and ordinances need to work together. This Design Information Bulletin (DIB) establishes design guidance and criteria to facilitate consistent user expectations. Best practices have been used to formulate this guidance and design criteria for the State of California. As with all guidance and design criteria, as engineers and practitioners gain more experience with the use of separated bikeways, this DIB will be updated, as necessary, to reflect the lessons learned.

The Federal Highway Administration (FHWA) publication *Separated Bike Lane Planning and Design Guide* (FHWA Guide) should be used to design separated bikeways. The FHWA Guide can be accessed at - - - http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/page00.cfm.

The FHWA Guide used the Urban Bikeway Design Guide, a National Association of City Transportation Officials (NACTO) publication, as part of its source material. The NACTO publication also provides additional guidance not covered in this DIB. The use of that guidance, coupled with sound engineering judgment, can be used in collaboration with the guidance in this DIB.

This DIB provides additional design criteria and traffic operations guidance (signing and markings) in accordance with existing California codes and the California Manual on Uniform Traffic Control Devices (CA MUTCD). In addition, this DIB is also referenced in the Caltrans *Highway Design Manual* (HDM).

Some local jurisdictions may have published standards for facilities that they own and operate. When Caltrans projects impact adjacent transportation facilities, local standards should be used in conjunction with this DIB to encourage designs that are sensitive to the local context and community values. Agreeing on which standards will be used needs to be decided early in the project development process.

Planning considerations are discussed in Chapter 4 of the FHWA Guide, which is helpful in deciding how the Class IV Bikeway will function within the local community context. Chapter 5 of the FHWA Guide presents a Four Step Design Process to determine various features of the Class IV Bikeway design.

Photo #1 San Francisco: Separated bikeway example.

2.0 CLASS IV BIKEWAY (SEPARATED BIKEWAY) USE

A Class IV Bikeway (separated bikeway) is a bikeway for the exclusive use of bicycles and includes a separation required between the separated bikeway and the through vehicular traffic. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking. As an example, see Photo #1 and page 59 of the FHWA Guide. Separated bikeways should operate as one-way bikeway facilities in the same direction as vehicular traffic on the same side of the roadway. However, two-way cycle tracks may be used in low speeds environments, e.g., 35 miles per hour or less and with flexible posts or inflexible physical barriers. See page 46 of the FHWA Guide (a yellow longitudinal marking would be required in the separation to denote traveling in the opposite direction). On one-way streets, the one-way separated bikeway may be on either side of vehicular traffic. But it is preferred to be on the left side in order to avoid conflicts with transit vehicles.

Where there is on-street parking, the separated bikeway is typically between the parking and the sidewalk. The separated bikeway may also be raised to an elevation higher than the finished grade of the roadway. On a sidewalk, the separated bikeway is on a different grade from the roadway and separated by the curb; but, in order to separate pedestrians a continuous barrier would be needed on the sidewalk. See Photos #2, #3, Figure 4.1 and page 78 of the FHWA Guide. Separated bikeways could also be on their own structure as a bicycle overcrossing or undercrossing; see HDM Index 208.6 for more information. As is necessity, vehicles will need to cross the separated bikeway to access driveways and alleys. Also, pedestrians will need to cross the separated bikeway from parked vehicles or transit facilities.

Where accessible parking is proposed as a requirement for the block, it may be better to avoid the block face where there is the separated bikeway. The federal Public Rights-of-Way Accessibility Guidelines contains the accessible parking provisions on a block perimeter basis. However, if accessible parking is required on the same block face as the separated bikeway, the separated bikeway will have to be modified. See Figure 4.2 and Figures 16 through 19 of the FHWA Guide.

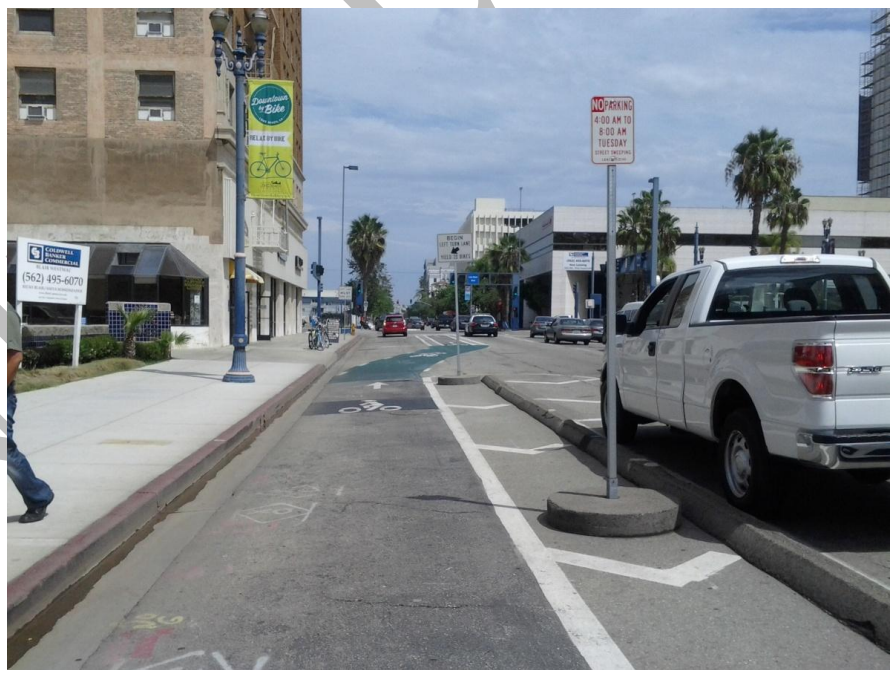


Photo #2 Long Beach: Parking example.

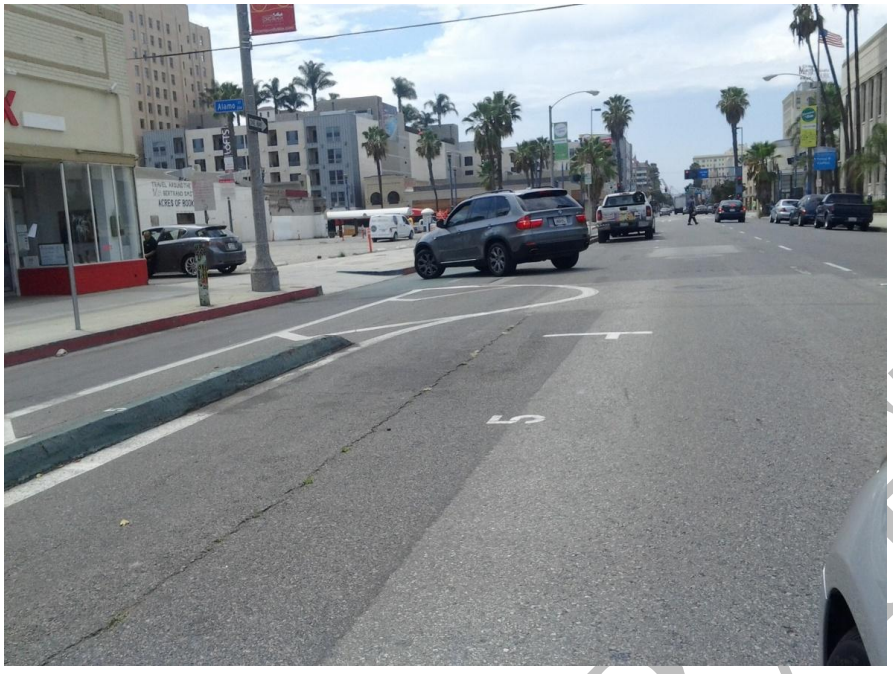


Photo #3 Long Beach: Parking example.

2.1 Bikeway Context

Providing an interconnected network of bikeways will improve safety for all users and access for bicyclists. The development of well-conceived bikeways can have a positive effect on bicyclist and motorist behavior. Providing an interconnected network of bikeways along with education and enforcement can improve safety and access for bicyclists. The decision as to which Class of bikeway to use should be made in coordination with the local agency the facility travels through. Regarding the various bikeways, there is potential overlap of bikeway designations, so the following helps to clarify the distinction:

- A contraflow bike lane is a Class II Bikeway that is designed for travel in the opposite direction as vehicular traffic on the same side of the roadway. However, contraflow bike lanes are not placed on two-way roadways. See the CA MUTCD for more information.
- A buffered bike lane is a Class II Bikeway that has a marked buffer without flexible posts or inflexible barriers as the separation between the bike lane and the vehicular traffic lane. If a marked buffer is provided with flexible posts or inflexible physical barriers, this is considered a separated bikeway.
- A two way bikeway adjacent to vehicular traffic is typically a bike path (Class I Bikeway) and can be for bicycles only if there is an adjacent pedestrian facility (e.g., a sidewalk) per CVC 21966. However, if flexible posts or inflexible physical barrier is used as the separation, this is regarded as a separated bikeway. See the HDM Index 1003.1 for more information.

In many contexts, it may be appropriate to have various bikeway designations that connect in an overall network. Also, it may not be appropriate or feasible to have a continuous separated bikeway through different street environments, as in a street with many driveways or where double parking is common.

2.2 Intersections, Alleys and Driveways

Separated bikeways at intersections should be separated from crosswalks to discourage bicycles from mixing with pedestrians; so the separated bikeway path will be adjacent to the crosswalk. For consistency with vehicular driver expectation, it may be necessary to have the bicycle to cross the intersection in a bike lane manner. To accomplish this, before the intersection, the separated bikeway should end and become a bike

lane and continue with the operations of a bike lane. Any separation feature has to be discontinued before the intersection and restart after the intersection (unless a separation is designed at the intersection). However, the markings may extend through the intersection denoting the separated bikeway projection as dotted white lines. See Figure 4.2.

Cycle tracks at alleys and driveways should remain as a cycle track facility. However, the physical separation feature, such as flexible posts, bollards, planters, etc. will be discontinued before the alley or driveway and restart after the alley or driveway. The separation markings may continue at these locations. For example, see Figure 14 of the FHWA Guide.

At intersections, right turn lanes will necessitate that the separated bikeway be modified or terminated. If terminated before the intersection, the approach markings can be the same as a bike lane positioned to the left side of the right turn lane. See the CA MUTCD. If it is desired to maintain the separated bikeway path through the intersection, Figures 22 and 23 in the FHWA Guide may be used. However, Figure 23 will necessitate an interruption to allow a vehicle to cross the separated bikeway; therefore, the separated bikeway marking should be dotted. When using the Figure 22 option, it may be best to utilize the CA MUTCD guidance to provide a bicycle signal, which may be used with a No Turn on Red sign to prohibit vehicular traffic right turns when bicycles proceed straight through the intersection in the separated bikeway.

Left turns may be accomplished by utilizing the guidance in the FHWA Guide for bike boxes and 2 stage turning boxes. See Figures 30 and 31. Also, the separated bikeway may discontinue on the approach to the intersection and be designed as a bike lane for a designated space for the left turn. See the CA MUTCD.

2.3 Loading and Unloading Zones and Valet Parking

Loading and unloading zones or valet parking pick-up or drop-off should take place in the standard parking space adjacent to the marked buffer separating the separated bikeway. Additionally, a modification to the separated bikeway may be necessary, e.g., narrowing the separated bikeway width and/or raising the separated bikeway. See page 101 of the FHWA Guide. However, due to anticipated high levels of pedestrian activity, consideration should be given to discontinue the separated bikeway before the loading and unloading zone or valet parking area and be designed as a bike lane or buffered bike lane, and then resume as a separated bikeway thereafter. However, this redesign from a separated bikeway to a bike lane and back to a separated bikeway can be problematic because of repositioning the parking spaces. So it may be better to do this on a block by block basis.

3.0 CLASS IV BIKEWAY (SEPARATED BIKEWAY) DESIGN CRITERIA

Documentation is recommended when employing these criteria. Documentation for the State Highway System is prescribed in the HDM Index 82.2. Documentation on the local road system is per the Local Assistance Procedures Manual Chapter 11. The documentation process must comply with the provisions in the California Streets and Highways Code Section 891(b).

3.1 Separation

The separated bikeway separation shall be at least one of the following to discourage the intrusion of motor vehicles into the bikeway and bicyclists from crossing into the vehicular traffic lanes:

(1) Grade Separation. A vertical alignment that is on a different elevation from the adjacent roadway. The horizontal alignment may also be separate from the roadway.

(2) Flexible Posts. Class 1 Flexible Posts. See the CA MUTCD. 10 ft on-center spacing should be used.

(3) Inflexible Physical Barrier. Bollards, barrier or railing, landscape planters or similar. See the CA MUTCD. 10 ft on-center spacing or continuous inflexible physical barrier should be used.

(4) On-Street Parking. Parking allowed all times of the day, except for maintenance. If an Inflexible Physical Barrier is used in the buffer, the spacing should be such that a 4 ft clear width opening is provided for pedestrians to access their vehicle and the sidewalk. Curb or dike may be placed in the buffer next to parking, but it should be designed for drainage. In the case of a cycle track on a hill, a curb or dike is required in order for wheels of parked vehicles to be turned against, per CVC 22509.

(5) Raised Island. Raised channelization islands that may include landscaping.

3.2 Separation Width

The separation shall include a width or buffer:

(1) Grade Separation. For a separated bikeway on a sidewalk, the separated bikeway separation width should be 1.5 ft minimum, including curb width. If the separated bikeway is in the roadbed and is raised, the vertical taper occurs in the buffer between the separated bikeway and the traffic lanes. The vertical taper width should be 2 ft minimum, 3 ft preferred for no parking; 3 ft minimum with parking.

(2) Flexible Posts. The flexible posts should be placed in the center of a marked buffer width of 2 ft minimum, 3 ft preferred. On a sidewalk, the separation should include the flexible posts in the 1.5 ft minimum area per Section 3.2(1) of this DIB.

(3) Inflexible Physical Barrier. An inflexible physical barrier should be used in low speed environments-when the posted speed is 35 miles per hour or less. An inflexible physical barrier should be placed in a marked buffer of 2 ft minimum, except when on a structure. When on a structure, the standard barrier should be used.

(4) On-Street Parking. A marked buffer between the on-street parking and the separated bikeway should be a minimum width of 3 ft. However, at on-street accessible parking the minimum width is 5 ft.

(5) Raised Island. Raised islands may be between the separated bikeway and vehicular traffic or parking. These should be 2 ft minimum width, 3 ft preferred if no parking; 3 ft minimum with parking.

3.3 Separated Bikeway Width

Separated bikeway width is designated by the clearance between markings, inflexible physical barriers, bridge barriers or railings, and curbs. Also, consideration for maintenance, such as street sweeping, should be part of the decision for the width selected. Anticipated bicycle volume, need for passing, bicycle commuting route, and availability of right-of-way are some of the factors where the separated bikeway width may exceed the minimum or preferred stated below.

(1) The separated bikeway minimum width should be 5 ft, 6 ft preferred, when adjacent to a roadway. When on a structure, the same width as a Class 1 Bikeway should apply. See the HDM Index 1003.1. However, when located at accessible parking or a bus stop, the cycle track minimum width should be 4 ft. See Figure 4.2 and the CA MUTCD.

3.4 Separated Bikeway Approach Tapers

Separated bikeway approach tapers will occur primarily at intersections, but may occur at other locations depending on the presence of traffic signal hardware, etc. For example, reducing the separated bikeway width may be required due to the presence of accessible parking, bus stops, or transit stations.

(1) The separated bikeway approach taper transition should be 5:1 minimum, 10:1 preferred.

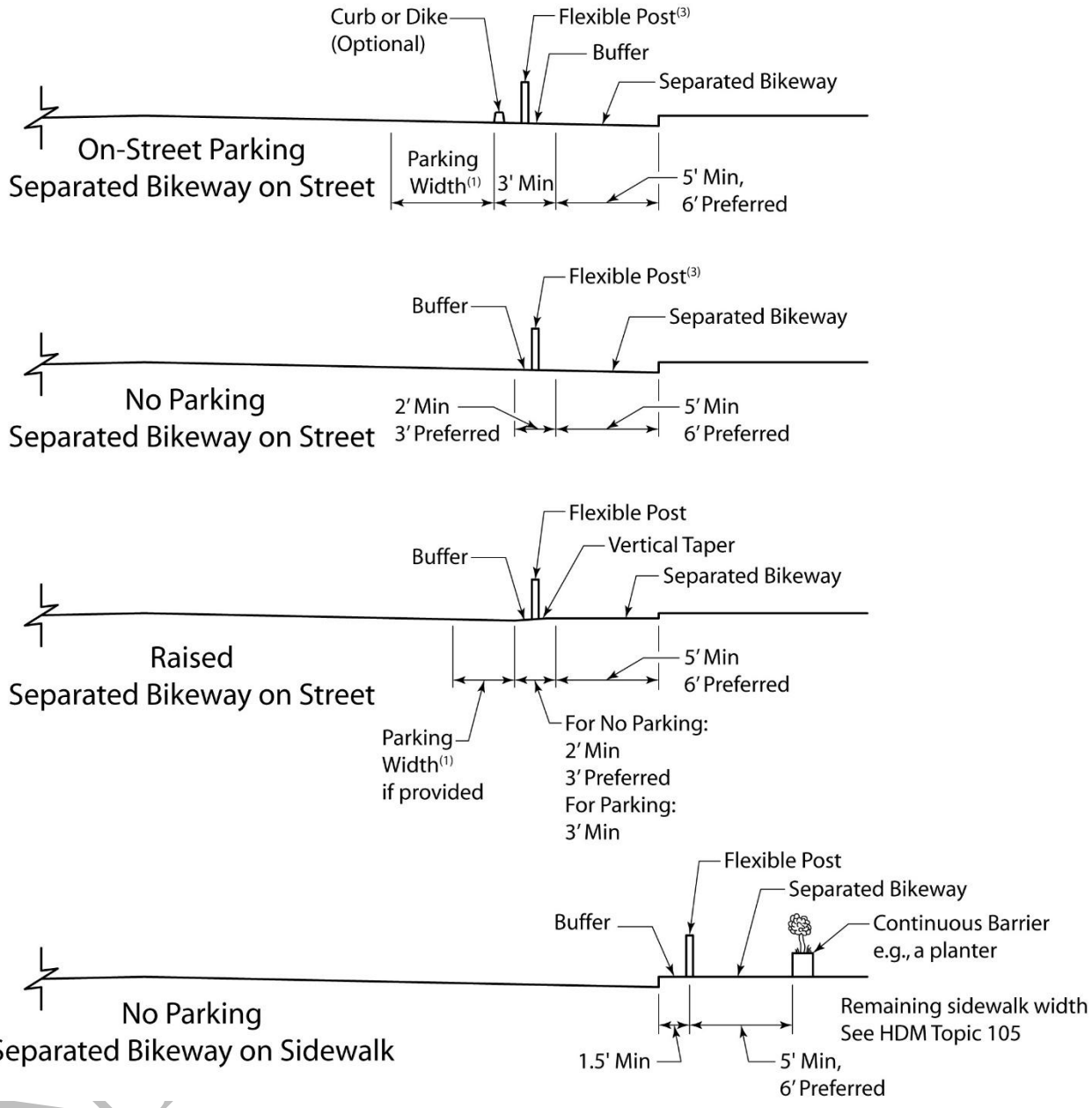
3.5 Raised Separated Bikeway

If the separated bikeway is to be raised, it should be designed for drainage.

(1) A raised separated bikeway should be elevated 3 inches minimum above the finished grade, but no higher than the adjacent curb in order to allow drainage towards the street unless some other drainage design is implemented.

(2) A vertical tapered edge should be 4:1 or flatter occurring in the marked buffer.

Figure 4.1
Typical Class IV Bikeway (Separated Bikeway) Cross Section

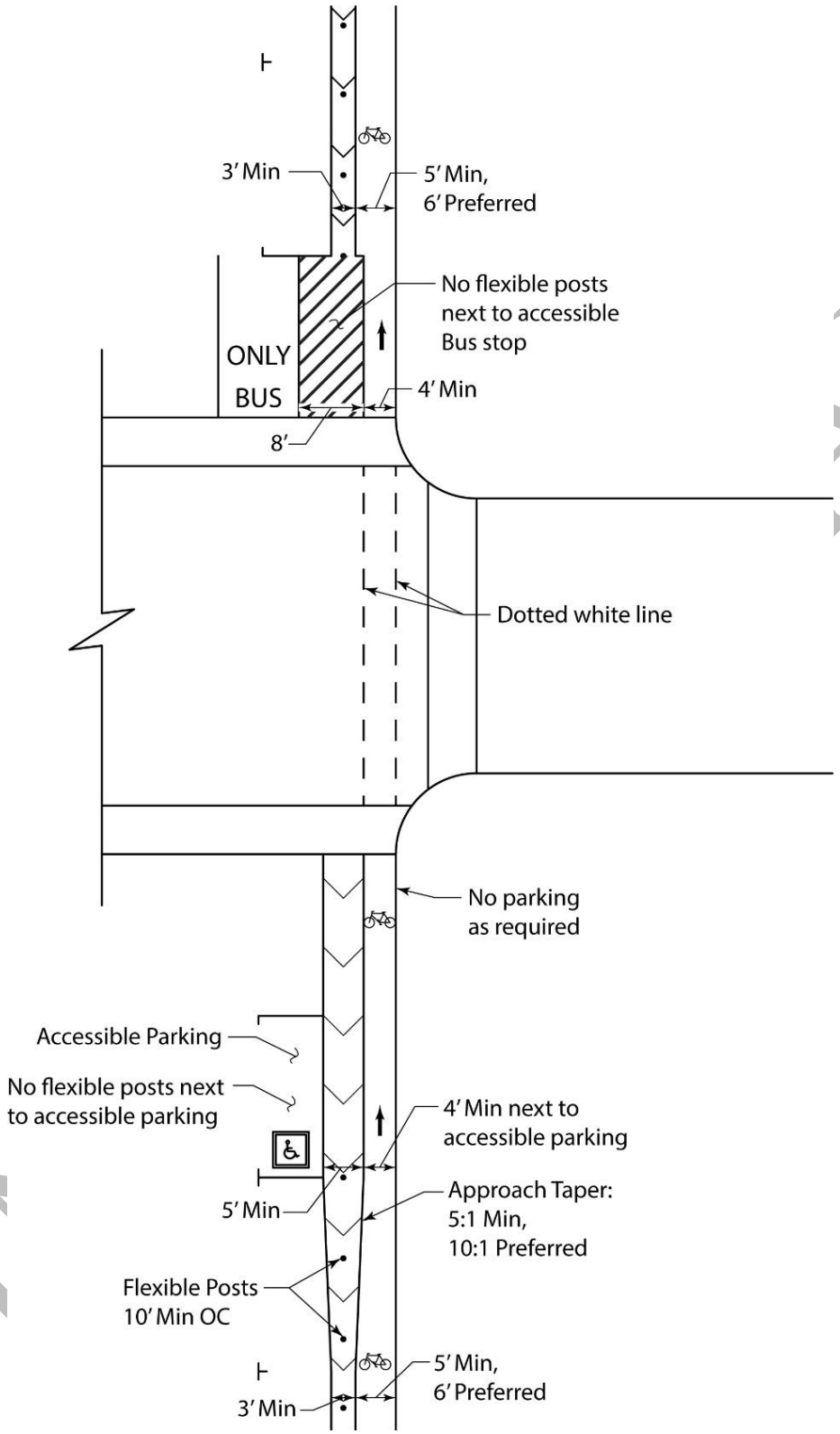


NOTES:

(1) See CA MUTCD Section 3B.19.
(2) For separated bikeway marking guidance, use the bicycle lane symbol marking per CA MUTCD Figure 9C-3 Option A.
(3) May be a raised island in lieu of flexible posts.

Figure 4.2

Typical Class IV Bikeway (Separated Bikeway) Layout Diagram



NOTES:

(1) See CA MUTCD Section 3B.19 for parking guidance.
(2) For separated bikeway marking guidance, use the bicycle lane symbol marking per CA MUTCD Figure 9C-3 Option A.