CHAPTER 9E. MARKINGS

Section 9E.01 Bicycle Lanes (Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane))

Support:

01 Pavement markings designate that portion of the roadway for preferential use by bicyclists. Markings inform all road users of the restricted nature of the bicycle lane.

Standard:

02 **Longitudinal pavement markings and bicycle lane symbol or word markings (see Figure 9E-1) shall be used to define bicycle lanes.**

02a **The BIKE LANE pavement markings shall be placed on the far side of each intersection.**

Option:

02b The BIKE LANE pavement markings may also be placed at other locations as desired.

Support:

02c Examples of BIKE LANE pavement markings are shown in various figures in this chapter.

Option:

02d Optional word, arrow and symbol markings with details as shown in Figure 9E-1 may be used.

Guidance:

03 *The first symbol, ~~or~~ word, and/or green-colored pavement marking in a bicycle lane should be placed at the beginning of the bicycle lane and downstream symbol or word markings should be placed after major intersections. Additional symbol or word markings should be placed at periodic intervals along the bicycle lane based on engineering judgment. See Figure 9E-110(CA).*

03a *Bicycle lane markings on Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane) should be placed a constant distance from the marked lane line or centerline, as appropriate. Bike lanes with parking permitted should not be directed toward the curb at intersections or localized areas where parking is prohibited. Such a practice prevents bicyclists from following a straight course. Where transitions from one type of bike lane to another are necessary, smooth tapers should be provided.*

Support:

03b Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane) require standard signing and pavement markings as shown in Figure 9E-102(CA). This figure also depicts the proper method of striping bike lanes through intersections. Bike lane lines are not typically extended through intersections.

Guidance:

03c *Where right turns are not permitted, the solid bike lane stripe should extend to the edge of the intersection, and begin again on the far side. Where there is no right turn only lane, but right turns are permitted, the solid stripe should terminate 50 feet to 200 feet prior to the intersection.*

Option:

03d A dashed line, as shown in Figure 9E-102(CA), may be carried to, or near, the intersection. Where city blocks are short (less than 400 feet), the length of dashed stripe may be 50 feet.

Guidance:

03e *Where blocks are longer or vehicle speeds are high (greater than 35 mph), the length of dashed stripe should be increased to 200 feet.*

Support:

03f Markings for a bike lane where vehicle parking is prohibited or permitted are shown in Figure 9E-102(CA).

Standard:

03g **Where motorist right turns are permitted, the solid bike lane shall either be dropped entirely, or dashed (Refer Bike Lane Intersection Line, Detail 39A, shown in Figure 9E-101(CA)) beginning at a point between 50 feet and 200 feet in advance of the intersection.**

Option:

03h In areas where parking stalls are not necessary (because parking is light), a 4 to 6 inch wide solid white stripe on local agency roadways and a 6 inch wide stripe on the state highways may be painted to fully delineate the bike lane. This may be advisable where there is concern that motorists may misconstrue the bike lane to be a traffic lane.

04 An arrow marking (see Figure 9E-1) may be used in conjunction with the bicycle lane symbol or word marking, placed downstream from the symbol or word marking.

05 Where the bicycle lane symbols or word markings are used, Bicycle Lane signs (see Section 9B.04) may also be

used, but not necessarily adjacent to every set of pavement markings in order to avoid overuse of the signs.

Support:

06 Section 3H.06 contains information on green-colored pavement for use in bicycle lanes. See Figure 9E-110(CA).

Standard:

06a **Raised barriers (e.g., raised traffic bars and asphalt concrete dikes) or raised pavement markers shall not be used to delineate bike lanes on Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane).**

Support:

06b Raised barriers prevent motorists from merging into bike lanes before making right turns, as required by the CVC, and restrict the movement of bicyclists desiring to enter or exit bike lanes.

06c They also impede routine maintenance. Raised pavement markers increase the difficulty for bicyclists when entering or exiting bike lanes, and discourage motorists from merging into bike lanes before making right turns.

Option:

06d Physical barriers or other vertical elements may be used to convert a Class II Bikeway (Bike Lane or Buffer-Separated Bicycle Lane) to Class I Bikeway (Bike Path) or Class IV Bikeway (Cycle Track, Separated Bikeway or Separated Bicycle Lane).

Standard:

07 **The bicycle symbol or BIKE LANE pavement word marking and the pavement marking arrow shall not be used in a shoulder.**

08 **A portion of the roadway shall not be established as both a shoulder and a bicycle lane.**

Option:

08a The BIKE LANE may count towards the shoulder width per Caltrans Highway Design Manual Index 301.2.

Support:

09 Where a shoulder is provided or is of sufficient width to meet the expectation of a highway user in that it can function as a space for emergency, enforcement, or maintenance activities, or avoidance or recovery maneuvers, Section 9B.16 contains information regarding the Bicycles Use Shoulder Only sign that can be used to denote locations on a freeway or expressway where bicycles are permitted on an available and usable shoulder.

10 Examples of pavement markings for bicycle lanes on a two-way street are shown in Figure 9E-2 and 9E-2(CA).

Section 9E.02 Bicycle Lanes at Intersection Approaches (Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane))

Standard:

01 **Except as provided in Paragraph 2 of this Section, a through bicycle lane shall not be positioned to the right of a right turn only lane or to the left of a left turn only lane.**

Option:

02 A through bicycle lane may be positioned to the right of a right turn only lane or to the left of a left turn only lane provided that the bicycle lane is controlled by a traffic signal that displays bicycle signal indications (see Chapter 4H).

02a A bicycle lane for travel in the same direction as the general purpose lanes may be placed on the left hand side of the general purpose lanes.

Support:

03 Unless controlled by a bicycle signal indication, a bicyclist continuing straight through an intersection from the right of a right turn only lane or from the left of a left turn only lane would be inconsistent with normal traffic behavior and would violate the expectations of right-turning or left-turning motorists.

Option:

03a When a bike lane approaches an intersection with right- or left-turn only lanes, Figures 9E-3 and 9E-3(CA) may be used.

Guidance:

03b *Where through motor vehicle lanes approaching an intersection become mandatory turn lanes adjacent bike lanes should be delineated using Figures 9E-4 and 9E-4(CA).*

04 *When the right (left) through lane is dropped to become a mandatory right-turn (left-turn) lane, the bicycle lane markings should stop at least 100 feet before the beginning of the right-turn (left-turn) lane. Through bicycle lane markings should resume to the left (right) of the mandatory right-turn (left-turn) lane.*

05 *Except as provided in Paragraph 2 of this Section, an optional through-right (through-left) turn lane next to a mandatory right-turn (left-turn) lane should not be used where there is a through bicycle lane.*

05a *A dashed line across the right-turn-only lane should not be used on extremely long lanes, or where there are double right-turn-only lanes. For these types of intersections, all striping should be dropped to permit judgment by the bicyclists to prevail.*

Standard:

06 **A bicycle lane located on an intersection approach between general-purpose lanes for motor vehicle movements shall be marked with at least one bicycle symbol and at least one arrow pavement marking as provided in Paragraph 4 of Section 9E.01.**

07 **A bicycle lane shall not be marked within a general-purpose lane, either with dotted or any other line markings.**

Option:

08 Where there is insufficient width in the roadway to include both a bicycle lane and a general-purpose turn lane, bicycle travel may be accommodated within the turn lane or general-purpose lane using shared-lane markings.

Standard:

09 **Where a general-purpose turn lane is controlled by a traffic control signal, through bicycle movements shall not be accommodated in the turn lane unless the turning movement is always permitted to proceed simultaneously with the adjacent through movement.**

Option:

09a A Bicycle Crossing (W11-1) sign may be used to warn road users of the potential for bicyclists crossing their path. See Section 9B.18.

09b When a bike lane approaches ramp intersection that intersects the local facility at or close to 90° (typical of a compact or spread diamond configuration), then Figures 9E-3 and 9E-3(CA) may be used.

Guidance:

09c *However, when a bike lane approaches one or more ramp intersections that intersect the local facility at various angles other than 90° (typically high-speed, skewed ramps), Figure 9E-103(CA) should be used.*

Support:

10 Examples of bicycle lane markings on approaches to intersections are shown in Figures 9E-3, 9E-3(CA), 9E-4, 9E-4(CA) and 9E-9.

Guidance:

11 *The longitudinal line defining a bicycle lane should be dotted on approaches to intersections where turning vehicles are permitted to cross the path of through-moving bicycles (see Figure 9D-7).*

Standard:

11a **If used, the space for bicycle use shall be delineated by Detail 39 on the right of the through lane and Detail 38A on the left of the right-turn-only lane. See Figure 9E-101(CA) and Figure 3A-111(CA).**

Support:

12 Buffer-separated and separated bicycle lanes require additional considerations at intersections, including sight distances for bicycles and other road users, user expectations, and intersection geometry.

Option:

13 A buffer-separated or separated bicycle lane may be shifted closer to, or farther away from the adjacent general-purpose lane depending upon site-specific conditions (see Drawings D and E in Figure 9E-7).

Support:

14 A buffer-separated or separated bicycle lane shifted away from the adjacent general-purpose lane at an intersection can create space for a motor vehicle to queue between the general-purpose lane and the extension of the bicycle lane. This design can also improve the safety and comfort of bicyclists by reducing the speed of turning motor vehicles, improving sightlines, and creating additional buffer space prior to the conflict point with turning motor vehicles.

15 The purpose of shifting a buffer-separated or separated bicycle lane away from the adjacent general- purpose lane is to allow the driver of a turning vehicle to undertake the tasks of turning and scanning for bicycle cross traffic in isolation versus simultaneously. Sufficient sight distance for both drivers and bicyclists is important in this design (see Drawing E in Figure 9E-7).

16 The purpose of shifting a buffer-separated or separated bicycle lane toward the adjacent general- purpose lane is to improve the visibility of bicyclists to the adjacent traffic and avoid conflicts between turning motor vehicles and bicyclists (see Drawing D in Figure 9E-7).

Option:

16a At locations with right-turn-only lanes where bicycles are not prohibited but Class II bicycle facilities do not exist on the approach,

a minimum 4-foot wide space for bicycle use may be provided between the right-turn and through lane, and where the posted speed is greater than 40 mph the minimum width should be 6 feet.

16b When the width between the right-turn and through lane is greater than 4-feet, a buffer area may be striped adjacent to the 4' minimum width for bicycle travel, regardless of the posted speed.

16c The buffer may be placed on the left or on the right of the 4' space for bicycle travel.

Support:

16d Refer to Caltrans' Highway Design Manual, Index 403.6 Turning Traffic.

16e Refer to Figures 9E-3 and 9E-3(CA) for details on striping and Figures 9E-6 and 9E-6(CA) for details on buffer area striping.

17 Staggering stop lines (see Section 3B.19) so that general-purpose lanes stop further in advance from the intersection than the bicycle lane can improve the visibility of bicyclists for drivers of turning vehicles (see Drawing D in Figure 9E-7).

Option:

18 Where a general-purpose mandatory turn lane is provided at an intersection and the approach also includes a separated or buffer-separated bicycle lane, a mixing zone may be established to allow general- purpose turning traffic to share the roadway space with bicyclists (see Figure 9E-5).

Standard:

19 **Mixing zones shall be used only where the bicycle lane is one-way in the same direction of travel as the adjacent general-purpose lane.**

20 **Mixing zones with a yielding area shall have yield markings indicating where general-purpose traffic entering the shared space shall yield to bicyclists.**

21 **Where a mixing zone continues to the intersection itself sharing space between bicyclists and general-purpose turning traffic, shared-lane markings and turn arrows shall be provided in the lane.**

Support:

22 Mixing zones require bicycles and general traffic to share space, interrupting a buffer-separated or separated bicycle lane where bicycle traffic is otherwise separated from general traffic. The preference is to provide a dedicated bicycle facility for the intersection approach, If that is not possible, the mixing zone needs to indicate that bicyclists and motorists are entering a shared condition.

Guidance:

23 *Where a mixing zone provides for the re-establishment of a bicycle lane after bicycles and general- purpose lanes cross paths, a buffered or physically-separated space should be provided between the bicycle lane and the adjacent general-purpose lane (see Drawing C in Figure 9E-5).*

Section 9E.03 Extensions of Bicycle Lanes through Intersections (Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane))

Support:

01 Extensions of bicycle lanes through intersections can help identify the paths of bicyclists and guide them on movements that could be difficult to discern. Extensions of bicycle lanes through intersections also assist other road users of the intersection to identify where bicyclists are expected to operate and to recognize potentially unexpected conflict points.

02 The design, placement, and maintenance of bicycle lane extensions through intersections are important considerations, especially when contiguous to a crosswalk, to avoid potential confusion to pedestrians with vision disabilities.

03 The width and color of lane extension markings are discussed in Section 3B.11. Option:

04 The bicycle symbol, the arrow marking, pavement word markings, or a combination thereof may be used in bicycle lane extensions through intersections.

05 Green-colored pavement may be used in a bicycle lane extension in accordance with the provisions of Section 3H.06.

Standard:

06 **Shared-lane markings or chevron markings shall not be used in bicycle lanes or bicycle lane extensions (see Section 9E.09).**

07 **Extensions of bicycle lanes through intersections shall use dotted line patterns.**

Support:

08 Separated and buffer-separated bicycle lanes may have alignments that are not as obvious within an intersection as a standard bicycle lane, therefore additional conspicuity is important where these types of bicycle lanes cross intersections.

Guidance:

09 *Lane extension markings should be used to extend a buffer-separated or separated bicycle lane through intersections and driveways.*

10 *The extension of a bicycle lane through an intersection should use two lines defining both lateral limits of the bicycle lane.*

Option:

10a The Bike Lane Intersection (Detail 39A) line as shown in Figure 9E-101(CA) may be used to extend the bike lane to or through an intersection.

10b The extension of bicycle lanes through intersections advises motorists that bicyclists are likely to use the intended path.

10c Bicycle lane markings may be extended through intersections consistent with the provisions of Section 3B.11.

10d Bicycle lane markings as shown in Figure 9E-104(CA) may be used within the boundaries of bicycle lane extensions.

10e Green-colored pavements may be used in a bicycle lane extension through an intersection or a driveway consistent with Section 3H.06. See Figures 9E-2, 9E-2(CA), 9E-3. 9E-3(CA), 9E-8, 9E-8(CA), 9E-103(CA), 9E-104(CA) and 9E-107(CA).

Standard:

11 **Where the path of the bicycle lane through the intersection is contiguous to a crosswalk, two longitudinal dotted lines shall be provided to establish the lateral limits of the bicycle lane extension. The transverse line establishing one side of the crosswalk, or the limit of a high-visibility crosswalk pattern (see Section 3C.05) that does not employ a transverse line, shall not be used to demarcate one side of the bicycle lane extension.**

Support:

12 Markings for a bike lane through a typical interchange are shown in Figure 9E-103(CA).

Option:

13 Figure 9E-103(CA) may also be used where the preferred designation is a Class III Bikeway (Bike Route), with the Bike Lane (R81(CA)) signs being replaced with Bike Route (D11-1) signs and the bike lane delineation eliminated. A 4- to 6-inch-wide stripe on local agency roadways, and a 6-inch-wide stripe on state highways, may be used to delineate the shoulder throughout the bike route designation.

Standard:

14 **Signing and striping as shown in Figure 9E-103(CA) shall be repeated at additional onramps within the interchange.**

Guidance:

15 *Where the onramps intersect at the local road at or near 90º, the striping should be per Figures 9E-3 and 9E-3(CA).*

Section 9E.04 Bicycle Lanes at Driveways (Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane))

Support:

01 The definition of an "Intersection" in Section 1C.02 contains information to determine if a driveway can be considered an intersection.

Option:

02 Bicycle lanes may be continued through a driveway using solid or dotted longitudinal lines.

03 The bicycle symbol, the arrow marking, pavement word markings, or a combination thereof may be used in bicycle lane extensions through driveways.

04 Green-colored pavement (see Section 3H.06) may be used as a background to enhance the conspicuity of the bicycle symbol at driveways.

Section 9E.05 Bicycle Lanes at Circular Intersections (Class II Bikeways (Bike Lane or Buffer-Separated Bicycle Lane))

Standard:

01 **Bicycle lanes shall not be provided in the circulatory roadway of an unsignalized circular intersection that includes conflicts at entry or exit points (see Chapter 3D) except as provided in Paragraph 4 of this Section.**

Guidance:

02 *Bicycle lane markings should stop at least 100 feet before the crosswalk, or if no crosswalk is provided, at least 100 feet before the yield line, or if no yield line is provided, then at least 100 feet before the edge of the circulatory roadway.*

03 *If used, bicycle crossings should be a minimum of 20 feet from the edge of the circular roadway.*

Option:

04 Separated bicycle lanes may be used in circular intersections.

Support:

05 Separated bicycle lanes allow bicycles to navigate a circular intersection and its crossing points without merging into traffic and without dismounting and using a crosswalk at the intersection crossing point. This is beneficial at multi-lane and higher-speed circular intersections.

06 Section 9E.10 contains information on using shared-lane markings to facilitate the bicycle movement through a circular intersection.

07 The "Guide for the Development of Bicycle Facilities," 2012 Fourth Edition, American Association of State Highway and Transportation Officials, contains information on designing for bicycles on the sidewalk in lieu of, or in addition to, using shared-lane markings in the circulatory roadway of the intersection.

08 The FHWA's informational guide "Improving Intersections for Pedestrians and Bicyclists" contains information on incorporating separated bicycle lanes and other bicycle facilities into circular intersections.

Section 9E.06 Buffer-Separated Bicycle Lanes (Class II Bikeway (Bike Lane or Buffer-Separated Bicycle Lane))

Support:

00a In California, Class II and Class IV Bikeways are classified as follows:

A. Class II Bikeway (bike lane, bicycle lane or buffer-separated bicycle lane) - Buffer-separated bicycle lanes provide additional lateral separation between a bicycle lane and a general-purpose lane by a pattern of pavement markings without the presence of vertical elements.

B. Class IV Bikeway (cycle track, separated bikeway or separated bicycle lane) - Separated bicycle lanes provide a physical separation between a general-purpose lane and a bicycle lane through the use of vertical objects or vertical separation between the general-purpose lane and bicycle lane.

00b Refer to Sections 1C.02, 9E.06 and California Streets and Highways Code Section 890.4.

Standard:

00c **All topics in this section referencing buffer, buffer area, buffer space, buffer-separated bicycle lane, shall mean to apply to Class II Bikeway, bike lane, bicycle lane or buffer-separated bicycle lane.**

Support:

01 Buffer-separated bicycle lanes provide additional lateral separation between a bicycle lane and a general-purpose lane by a pattern of pavement markings without the presence of vertical elements. Providing a buffer space between a bicycle lane and a general-purpose lane creates more separation between motor vehicles and bicycles, can reduce vehicle encroachment into the bicycle lane, and can increase the comfort of bicyclists.

02 Providing a buffer space between a bicycle lane and a parking lane can reduce crashes involving bicycles and the opening of vehicle doors from the parking lane.

Option:

02a A bicycle lane buffer area may be used to separate a bicycle lane from an adjacent general-purpose lane and/or parking lane.

Guidance:

02b *BIKE LANE (R3-17) signs (see Figure 9B-1) should be used to distinguish a buffer-separated bicycle lane from a general-purpose lane.*

Standard:

03 **If used, and except as provided in Paragraph 5 of this Section, a buffer space shall be marked with a solid white line along both edges of the buffer space where crossing is discouraged.**

03a **Directional arrows shall be used in conjunction with the bicycle lane symbol or word marking in buffer-separated bicycle lanes, placed downstream from the symbol or word marking.**

Guidance:

04 *Engineering judgment should be used to establish intermittent breaks or interruptions in the buffer space, such as for driveways, transit stops, or on-street parallel parking lanes, in order to convey access points or an otherwise*

general legal movement to cross the buffer space (see Figure 9E-6 and 9E-6(CA)).

Option:

05 Buffer spaces may be established without specific longitudinal lines if contiguous facilities have longitudinal lines or other pavement markings themselves that, when installed, automatically demarcate the buffer space (see Drawing D in Figure 9E-6).

Standard:

06 **Except as provided in Paragraph 7 of this Section, a through buffer-separated bicycle lane shall not be positioned to the right of a mandatory right-turn lane or to the left of a mandatory left-turn lane.**

Option:

07 A buffer-separated bicycle lane may be placed to the right of a mandatory right-turn lane (or to the left of a mandatory left-turn lane) only if a bicycle signal face (see Section 4H.01) is used and the signal phasing and signing eliminates any potential conflicts between the bicycle movement and the turning movement.

Guidance:

07a *If used and where there is parking on the right side of the buffered bicycle lane, the rightmost line should be broken. Where vehicles are expected to cross the buffer area at driveways, both lines should be broken. Where neither condition exists, both lines should be solid.*

07b *Buffer areas should end on the approach to the intersection of side streets or major commercial driveways as shown in Figures 9E-6 and 9E-6(CA).*

08 *The width of the buffer space should be at least 3 times the width of the normal or wide longitudinal line used to mark the buffer space.*

09 *Where a buffer space is 2 to 3 feet wide, chevron or diagonal markings (see Section 3B.25) should be applied within the buffer space.*

Support:

09a The buffer area width includes the width of the parallel white lines. See DIB 89-02 for buffer area width requirements.

09b Markings for buffered bicycle lanes are shown in Figures 9E-6 and 9E-6(CA).

Option:

10 Where a buffer space is less than 2 feet wide, diagonal markings or no markings at all in the buffer space may be applied within the buffer space.

Standard:

11 **If used, diagonal markings shall slant away from traffic in the adjacent travel lane for motor- vehicle traffic.**

Guidance:

12 *Where used, the spacing of chevrons or diagonal markings should be 10 feet or greater.*

Support:

13 Chevron and diagonal markings convey that the buffer space is not an additional bicycle lane or other travel lane open to traffic.

Standard:

14 **Where a buffer space is more than 3 feet wide, chevron or diagonal markings shall be applied within the buffer space.**

Guidance:

14a *The use of chevron or diagonal markings should be considered in a bicycle lane buffer area and should be based on Section 3B.24 and engineering judgment.*

14b *If used, interior chevron or diagonal markings should consist of 4 to 6 inch lines on local agency roadways and 6 inch line on state highways, angled at 45 degrees and striped at intervals of 10 to 40 feet.*

Support:

14c Increased interior chevron or diagonal marking frequency can increase motorist compliance.

Guidance:

15 *Lane extension markings should be used to extend a buffer-separated bicycle lane across intersections and driveways.*

Section 9E.07 Separated Bicycle Lanes (Class IV Bikeway (Cycle Track or Separated Bikeways))

Support:

00a In California, Class II and Class IV Bikeways are classified as follows:

A. Class II Bikeway (bike lane, bicycle lane or buffer-separated bicycle lane) - Buffer-separated bicycle lanes provide additional lateral separation between a bicycle lane and a general-purpose lane by a pattern of pavement markings without the presence of vertical elements.

B. Class IV Bikeway (cycle track, separated bikeway or separated bicycle lane) - Separated bicycle lanes provide a physical separation between a general-purpose lane and a bicycle lane through the use of vertical objects or vertical separation between the general-purpose lane and bicycle lane.

00b Refer to Sections 1C.02, 9E.06 and California Streets and Highways Code Section 890.4.

Standard:

00c **All topics in this section referencing buffer, buffer area, buffer space, buffer-separated bicycle lane, shall mean to apply to Class II Bikeway, bike lane, bicycle lane or buffer-separated bicycle lane.**

01 Separated bicycle lanes provide a physical separation between a general-purpose lane and a bicycle lane through the use of vertical objects or vertical separation between the general-purpose lane and bicycle lane. Providing a physical separation between a bicycle lane and a general-purpose lane can reduce vehicle encroachment into the bicycle lane beyond a marked buffer alone and can in some cases prevent that encroachment altogether.

02 Physical separation between general-purpose lanes and bicycle lanes introduces additional design considerations over buffer-separated bicycle lanes, including the awareness of a potentially unexpected conflict point for turning motor vehicles and the provision of adequate sight distance for all users at intersections and driveway crossings.

Option:

03 Vertical elements used to provide physical separation between general-purpose lanes and bicycle lanes may include, but are not limited to, tubular markers, raised islands, ~~or~~ parked vehicles~~.~~, grade separation, flexible delineator posts, bikeway separator posts, inflexible physical barriers, or on-street parking.

Support:

03a See Figure 9E-107(CA). See Caltrans' Design Information Bulletin Number 89 Class IV Bikeway Guidance (Separated Bikeways/Cycle Tracks) (DIB 89-02) for more information.

03b Refer to FHWA "Separated Bike Lane Planning and Design Guide" for detailed information on planning and design of separated bike lanes.

Standard:

03c **Vertical elements, vertical objects or vertical separation between the general-purpose lane and bicycle lane shall be used to define Class IV bikeway (cycle track, separated bikeway or separated bicycle lane).**

Support:

03d Vertical elements are not traffic control devices in themselves; however, when placed in a position identical to a line of channelizing devices and marked and/or equipped with appropriate channelization features to provide guidance and warning both day and night, they serve as traffic control devices.

04 Where on-street parking is provided adjacent to the buffer area of a separated bicycle lane, pedestrians will need to access those vehicles.

Guidance:

05 *BIKE LANE (R3-17) signs (see Figure 9B-1) should be used to distinguish a separated bicycle lane from a general-purpose lane. Refer to Paragraph 00a and 00b in this section.*

06 *Where an on-street parking lane serves as the separation between a general-purpose lane and a separated bicycle lane, a buffer space should be provided between the parking lane and the bicycle lane to allow for opening doors of parked vehicles. Refer to Paragraph 00a and 00b in this section.*

Support:

07 Separated bicycle lanes may be designed for one-way or two-way bicycle travel. Providing one-way separated bicycle lanes in the same direction as and on the right-hand side of the general-purpose lane, whether on a one-way or two-way roadway, accommodates the expectations of road users and might result in fewer conflict points at intersections or driveway crossings.

Option:

08 Separated bicycle lanes may be provided on one or both sides of a roadway or in a center median.

08a A through separated bicycle lane may be positioned to the right of a right turn only lane or to the left of a left turn only lane, if bicycle signals are used. See Section 4H.101(CA) for optional use of Bicycle Signal Faces.

Support:

09 The presence of two-way separated bicycle lanes on one side of a roadway or in a center median can introduce additional challenges and conflict points, which can warrant additional design considerations when selecting the design for a separated bicycle lane. These considerations include design requirements for pedestrians who would interact with the separated bicycle lane.

Standard:

10 **The edge line and lane line colors used for separated bicycle lanes shall conform to the requirements in Chapter 3A (see Figure 9E-7).**

10a **Where separated bikeways (cycle track or separated bicycle lane) are designed for two-way travel, a solid yellow line shall be used to separate the two directions of travel where passing is not permitted. A broken yellow line shall be used where passing is permitted (Refer to Figure 9E-107(CA). See Section 9E.13 for marking patterns.**

11 **Directional arrows shall be used in conjunction with the bicycle lane symbol or word marking in separated bicycle lanes, placed downstream from the symbol or word marking. Refer to Paragraph 00a and 00b in this section.**

11a **The Bike Symbol pavement markings (Figure 9E-1) shall be placed on the far side of each intersection.**

Option:

11b The dashed bike lane marking, with or without green-colored pavement between left and right dash may be placed through an intersection.

11c The DO NOT ENTER (R5-1) sign with the supplemental EXCEPT BICYCLES (R3-7bP) regulatory plaque may be used on separated bikeways (cycle tracks or separated bicycle lanes) to reduce the likelihood of accidental entrance by motor vehicles.

Standard:

12 **Turns on red shall be prohibited across separated bicycle lanes while bicyclists are allowed to proceed through the intersection.**

Support:

13 Additional information on signals for bicycle facilities is found in Chapter 4H.

Standard:

14 **The buffer space for a separated bicycle lane shall be marked with solid longitudinal lines. Refer to Paragraph 00a and 00b in this section.**

15 **A marked buffer space that is 2 feet or wider for a separated bicycle lane, including those buffer spaces where tubular markers are provided, shall use chevron or diagonal markings within the buffer, unless physical separation is provided that occupies the majority of the buffer space, such as raised islands or other physical dividers, or such as where an on-street parking lane occupies the majority of the buffer space. Refer to Paragraph 00a and 00b in this section.**

Standard:

15a **If accessible parking or loading zones are provided on a roadway alongside a separated bikeway (cycle track or separated bicycle lane), then unobstructed access by bicycles shall be maintained.**

Guidance:

16 *Where used in the buffer area of a separated bicycle lane, the spacing of chevrons or diagonal markings should be 10 feet or greater. Refer to Paragraph 00a and 00b in this section.*

17 *Crosswalks that cross a separated bicycle lane should be marked consistent with the style of crosswalk marking provided across the adjacent general-purpose lane.*

Support:

18 Where on-street parking is provided as the physical separation adjacent to the buffer area of a separated bicycle lane, the chevron or diagonal marking provisions in Section 9E.06 apply to the area outside of the marked parking area within the buffer (see Figure 9E-7).

19 Intersection treatments for separated bicycle lanes can vary depending on the geometric and operational conditions at the intersection (see Section 9E.02).

Guidance:

20 *If used in buffer-separated bicycle lanes, channelizing devices should be placed in the buffer space and at least 1 foot from the longitudinal bicycle lane pavement marking.*

21 *The flexible bikeway separator posts should be placed in the center of a marked buffer that is 3 feet wide preferred, with 2 feet*

being the minimum width.

Option:

22 For the separated bikeway (cycle track or separated bicycle lane) on a sidewalk, the separation may include the flexible bikeway separator posts 1.5 feet minimum from face of curb.

Guidance:

23 *An inflexible physical barrier should be used in lower speed environments (where the posted speed is 35 mph or less). An inflexible physical barrier should be placed in a marked buffer of 3 feet wide preferred, with 2 feet minimum width. In higher speed environments a concrete barrier should be used.*

Option:

24 On a sidewalk, the separation may include the inflexible physical barrier 1.5 feet minimum from face of curb.

Section 9E.08 Counter-Flow Bicycle Lanes (Class II Bikeway (Bike Lane or Buffer-Separated Bicycle Lane) or Class IV Bikeway (Cycle Track, Separated Bikeway or Separated Bicycle Lane))

Support:

01 Counter-flow bicycle lanes are one-directional and provide a lawful path of travel for bicycles in the opposite direction from general traffic on a roadway that allows general traffic to travel in only one direction.

02 Counter-flow bicycle lanes establish two-way traffic on a roadway. Section 9B.21 contains information on the Left Turn Yield to Bicycles (R10-12b) sign used with traffic signals and counter-flow bicycle lanes.

02a Counter-flow bicycle lanes can be provided as a Class II (bike lane, bicycle lane or buffer-separated bicycle lane) or as a Class IV Bikeway (cycle track, separated bikeway or separated bicycle lane), depending upon the physical separation provided between a general-purpose lane and a bicycle lane. If the physical separation is provided by a pattern of pavement markings without the presence of vertical elements, then it is a Class II Bikeway and if the physical separation is provided by vertical objects or vertical separation, then it is a Class IV Bikeway. Refer to Sections 1C.02, 9E.06, 9E.07 and California Streets and Highways Code Section 890.4.

Guidance:

03 *Where used, a counter-flow bicycle lane should be marked such that bicycles in the counter-flow lane travel on their right-hand side of the road in accordance with normal rules of the road, with opposing traffic on the left.*

Standard:

04 **Counter-flow bicycle lanes located at the edge of the roadway shall use double yellow center line pavement markings (see Section 3B.01), a painted median island, a raised median island (see Chapter 3J), or some form of physical separation where the speed limit is 30 mph or less.**

05 **For speed limits 35 mph or greater, a buffer per Section 3B.25, a painted or raised median island, or some form of physical separation shall be used to separate a counter-flow bicycle lane from the adjacent travel lane.**

Guidance:

06 *Lane extension markings should be used where counter-flow bicycle movements cross intersections.*

07 *Counter-flow bicycle lanes should not be used between a general-purpose lane and an on-street parallel parking lane for motor vehicles.*

Support:

08 Counter-flow bicycle lanes located between a general-purpose lane and an on-street parallel parking lane for motor vehicles can limit visibility of bicycles for vehicles exiting the parking lane, potentially impacting the safety of bicyclists. Locating counter-flow bicycle lanes at the edge of the roadway can reduce conflicts for bicycles.

Standard:

09 **Where signs are provided to regulate turns from streets or driveways that intersect with a roadway that has a counter-flow bicycle lane, ONE WAY signs (see Section 2B.49) shall not be used. Movement Prohibition signs (see Section 2B.26) with supplemental EXCEPT BICYCLES (R3-7bP) regulatory plaque(s) shall be used (see Figure 9E-8 and 9E-8(CA)).**

10 **If a DO NOT ENTER (R5-1) sign(s) is used at egress points for motor vehicle traffic, the EXCEPT BICYCLES (R3-7bP) regulatory plaque(s) shall be placed under the DO NOT ENTER sign (see Figure 9E-8 and 9E-8(CA)) where a counter-flow bicycle lane is used.**

11 **Where intersection traffic controls are provided (such as STOP or YIELD signs or traffic signals), appropriate devices shall be provided and oriented toward bicyclists in the counter-flow lane.**

12 **At signalized locations, appropriate bicycle signalization (see Chapter 9F) shall be provided and oriented**

toward bicyclists in the counter-flow lane, including a method for counter-flow bicycles to actuate the green phase for the counter-flow movement.

Support:

13 Higher levels of traffic control or additional signalization, signing, and/or pavement marking treatments can be helpful for intersecting traffic where the counter-flow bicycle movement is unexpected.

Guidance:

14 *A Bicycle Cross Traffic warning plaque (see Section 9C.06) should be used below a STOP sign on the crossroad at intersections where a counter-flow bicycle lane is provided on the primary street.*

Section 9E.09 Shared-Lane Marking

Support:

01 The "Standard Highway Signs" publication (see Section 1A.05) contains details on the shared-lane marking symbol.

Option:

02 The shared-lane marking shown in Figure 9E-9 may be used to:

A. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist impacting the open door of a parked vehicle,
B. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side-by-side within the same traffic lane,
C. Alert road users of the lateral location bicycles are likely to occupy within the traveled way,
D. Encourage safe passing of bicycles by motor vehicles,
E. Reduce the incidence of wrong-way bicycling in the roadway, and
F. Assist bicyclists with lateral positioning in mixing zones.
G. Assist bicyclists with lateral positioning within a traffic circle or roundabout (See Figure 9E-105(CA)),
H. Supplement a signed bicycle route that is identified as a Class III bicycle facility,
I. Encourage the lateral positioning of bicyclists away from on-street angled parking, and
J. Indicate that a bicycle can travel straight through a right-turn or left-turn only lane.

Guidance:

03 ~~*The shared-lane marking should not be placed on roadways that have a speed limit of 40 mph or greater*~~.

Standard:

03a **The shared lane marking shall not be placed on roadways that have a posted speed limit greater than 30 mph, except at or near an intersection for the purpose of connecting a Class I, Class II, or Class IV bikeway through the intersection. Refer to Streets and Highways Code Section 891.9.**

Support:

03b On roadways that have a speed limit greater than 30 mph, a Class II bikeway or Class IV bikeway is more appropriate to facilitate bicycle travel.

Standard:

04 **Shared-lane markings shall not be used in:**

A. Shoulders;
B. Bicycle lanes or in designated extensions of bicycle lanes through intersections or driveways,
C. A travel lane in which light-rail transit vehicles also travel;
D. The transition area where a motor vehicle entering a mandatory turn lane must weave across bicyclists in bicycle lanes;
E. Two-stage turn boxes;
F. Bicycle boxes;
G. Shared-use paths or shared-use path crossings; or
H. Physically-separated bikeways, either in the roadway or on an independent right-of-way.

05 **Green-colored pavement shall not be applied as a background to shared-lane markings (see Section 3H.06).**

Option:

06 Black background markings (see Section 3A.03) may be used in combination with shared-lane markings to enhance contrast.

Support:

06a The effective lane width, as used in this section, indicates the width of the pavement available after subtracting the width of the

parked vehicle and door zone from the distance of the lane line/centerline to the face of the curb/edge of the pavement.

Guidance:

07 *If used in a shared lane with on-street parallel parking, if the effective lane width is 14 feet or greater, shared-lane markings should be placed so that the centers of the markings are a minimum of ~~12~~ 13 feet from the face of the curb, or from the edge of the pavement where there is no curb. If the effective lane width is less than 14 feet, the marking should be centered within the effective lane width. See Figure 9E-106(CA).*

08 *If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide, shared-lane markings should be centered in the travel lane. If used on a street without on-street parking that has an outside travel lane with lane width equal to 14 feet or greater, the shared lane markings should be centered placed so that the centers of the markings are a minimum of 4 feet from the face of the curb, or from the edge of the pavement where there is no curb.*

08a *If used on a shared right-turn or left-turn only lane that is less than 14 feet wide, to indicate that a bicycle may travel straight through an intersection, the centers of the Shared Lane Markings should be centered in the travel lane. If used on a shared right-turn or left-turn only lane that is 14 feet or greater, the Shared Lane Markings should be centered at least 4 feet from the edge of channelizing line. See Figure 9E-108(CA) and Figure 9E-109(CA).*

08b *Placing Shared Lane Markings on the wheel paths should be avoided where possible.*

Support:

08c When a shared lane is sufficiently wide that motor vehicles can pass bicyclists within the lane, the purpose of the Shared Lane Marking is to indicate a bicyclist line of travel that facilitates passing while avoiding fixed obstructions (e.g. drainage inlet, gutter joint). When a shared lane is not wide enough to enable passing with adequate clearance, the purpose of the marking is to indicate a bicyclist line of travel that deters passing within the lane.

Spacing

Guidance:

09 *At non-intersection locations, the shared-lane marking should be spaced at intervals of not less than 50 feet or greater than 250 feet.*

10 *The first shared-lane marking downstream from an intersection should be placed no more than 50 feet from the intersection.*

Option:

10a Closer spacing between Shared Lane Markings may be considered approaching, traversing, and departing intersections, where there is higher potential for conflicts between motorists and bicyclists. See Figures 9E-4 and 9E-4(CA).

10b Closer spacing between Shared Lane Markings may be considered where there are sight distance constraints, for example, approaching the crest of a vertical curve.

10c Closer spacing between Shared Lane Markings may be considered to guide bicyclists when deviating from a straight line of travel (e.g. merging, angled railroad crossing).

11 Section 9B.14 describes a Bicycles Allowed Use of Full Lane sign that may be used in addition to or instead of the shared-lane marking to inform road users that bicyclists might occupy the travel lane.

Guidance:

12 *If the Bicycles Allowed Use of Full Lane (R9-20) sign is used as an addition to shared-lane marking, the shared-lane marking should be placed so that the center of the marking is in the approximate center of the travel lane.*

Option:

13 The shared-lane marking may be used (see Figure 9E-9) where the width of the roadway is insufficient to continue a bicycle lane or separated bikeway on the approach to the intersection, or it is advantageous to terminate the bicycle lane or separated bikeway in order to provide for a shared lane.

14 The shared-lane marking may be used on an approach to an intersection (see Figure 9E-5) in a mandatory turn lane to indicate a shared space for bicyclists and motorists where there is insufficient width in the roadway for both the bicycle lane and turn lane.

Section 9E.10 Shared-Lane Markings for Circular Intersections

Option:

01 Shared-lane markings may be used in the circulatory roadway of circular intersections.

Guidance:

02 *If used, shared-lane markings should be placed in the center of the lane when used inside of circulatory roadways.*

Support:

03 The "Guide for Development of Bicycle Facilities," 2012 Fourth Edition, American Association of State Highway and Transportation Officials, contains information on designing for bicycles on shared-used paths in lieu of, or in addition to, using shared-lane markings in the circulatory roadway of the intersection.

Section 9E.11 Two-Stage Bicycle Turn Boxes

Support:

01 Two-stage bicycle turn boxes allow bicyclists the opportunity to make turns at an intersection or crossing point instead of requiring them to merge into traffic upstream or to dismount and use a crosswalk at the intersection or crossing point.

02 Section 9B.18 contains information on regulatory signing that shall be used in conjunction with a two- stage bicycle turn box pavement marking where bicyclists are required to use the turn box.

03 Section 9D.13 contains information on guide signing that can be used in conjunction with a two-stage bicycle turn box pavement marking where bicyclists are not required to use the turn box.

Standard:

04 **If used, two-stage bicycle turn boxes shall be located:**

A. In an area between the closest through bicycle or motor vehicle movement and the parallel crosswalk (see Drawing A in Figure 9E-10),

B. In an area between the through bicycle movement and the parallel pedestrian crossing movement if no crosswalk is established (see Drawing B in Figure 9E-10),

C. On the innermost side of the bicycle facility provided that the two-stage turn box is located in a portion of the intersection where parallel or motor vehicle traffic does not travel, such as projections of islands or parking lanes (see Drawing C in Figure 9E-10), or

D. In an area between the through bicycle movement and a pedestrian facility for T-intersections (see Drawing D in Figure 9E-10).

05 **A two-stage bicycle turn box shall consist of at least one bicycle symbol pavement marking and at least one pavement marking arrow.**

06 **A turn arrow in the appropriate direction shall be used if a two-stage turn box is used with a one-way bicycle lane, and a through arrow in the appropriate direction shall be used if a two-stage turn box is used with a two-way bikeway (see Figure 9E-11).**

07 **A two-stage bicycle turn box shall be bounded on all sides by a solid white line.**

08 **For two-stage bicycle turn boxes that facilitate turns from a one-way bikeway, the bicycle symbol shall precede the pavement marking turn arrow in the direction of bicycle travel (see Figure 9E- 10).**

09 **Passive detection of bicycles in the two-stage bicycle turn box shall be provided if the signal phase that permits bicycles to enter the intersection during the second stage of their turn is actuated.**

Guidance:

10 *Engineering judgment should be used to develop the size of the two-stage bicycle turn box. Factors considered should include intersection geometry and keeping queued bicycles away from moving traffic, as well as peak hour bicycle volumes to avoid overflow of the two-stage turn box that subjects any bicyclist to conflicting movements.*

Option:

11 The two-stage turn box may use green-colored pavement.

Standard:

12 **If used, green-colored pavement shall encompass all of the two-stage turn box.**

13 **Where the path of vehicles lawfully turning on red would pass through a two-stage bicycle turn box, a full-time no-turn-on-red prohibition (see Section 2B.60) shall be provided for the crossroad approach.**

Section 9E.12 Bicycle Box

Option:

01 A bicycle box (see Figure 9E-12) may be used to increase the visibility of stopped bicycles on the approach to a signalized intersection during the portion of the signal cycle when a red signal indication is being displayed to motor vehicles in the approach lane(s) that is behind the box.

Guidance:

02 *Providing a bicycle box on a signalized intersection approach where a discernible number of conflicts between vehicles turning across through bicycles in a bicycle lane has been demonstrated during the green interval of a signal should be evaluated based on engineering judgment or study.*

03 *Other treatments should be considered for conflicts between turning vehicles and through bicycles such as using leading or exclusive signal phases, or separating turning traffic from through traffic through mandatory turn lanes.*

04 *A bicycle lane should be used on the approach to a bicycle box.*

05 *A bicycle box should not be contiguous with a crosswalk. A stop line on the downstream end of the bicycle box should be used to mark the location where bicycles are required to stop.*

Standard:

06 **If used, the distance from the upstream edge of the bicycle box that is nearest to the stop line for motor vehicles to the downstream edge of the bicycle box that is nearest the crosswalk or intersection shall be at least 10 feet. At least one bicycle symbol marking (see Figure 9E-12) shall be used in the bicycle box.**

07 **Where an existing stop line for motor vehicles is relocated upstream to install a new bicycle box, the yellow change and red clearance intervals (see Section 4F.17) shall be recalculated and if necessary, reprogrammed to accommodate the length of the bicycle box.**

Guidance:

08 *Countdown pedestrian signals (see Section 4I.04) for the crosswalk or pedestrian crossing movement that crosses the approach ~~shall~~ should accompany bicycle boxes that extend across more than one approach lane for motor vehicles. Countdown pedestrian signals used with bicycle boxes ~~shall~~ should display the pedestrian change interval countdown without the need for actuation.*

Standard:

09 **Turns on red shall be prohibited from the lane where a bicycle box is placed.**

Support:

10 Countdown pedestrian signals can inform bicyclists whether there is adequate time remaining to an adjacent lane before the onset of the green signal phase for that approach.

Guidance:

11 *Countdown pedestrian signals for the crosswalk or pedestrian crossing movement that crosses the approach should accompany single-lane bicycle boxes where it is demonstrated that bicycles arrive at the intersection at or near the end of the red signal indication being displayed to traffic in the approach lane(s) that is behind the box.*

Option:

12 Green-colored pavement may be used in a bicycle box.

Standard:

13 **If used, green-colored pavement shall be used in the full limits of the bicycle box.**

Support:

14 Section 9B.02 contains information on the EXCEPT BICYCLES (R3-7bP) regulatory plaque that can be used below the STOP HERE ON RED (R10-6 or R10-6a) sign (see Section 2B.59) to exempt bicyclists from the requirement of the advance stop line.

Section 9E.13 Shared-Use Paths (Class I Bikeway (Bike Path))

Option:

01 Where shared-use paths are of sufficient width to designate two minimum width lanes, a solid yellow center line may be used to separate the two directions of travel where passing or traveling to the left of the line is not permitted. A broken yellow center line may be used where passing is permitted (see Figure 9E-13).

Guidance:

02 *Broken lines used on shared-use paths should have a nominal 3-foot segment with a 9-foot gap.*

Support:

02a A centerline marking is particularly beneficial in the following circumstances:

A. Where there is heavy use;
B. On curves with restricted sight distance; and,
C. Where the path is unlighted and nighttime riding is expected.

Option:

03 A solid white line may be used on shared-use paths to separate different types of users in the same direction. The R9-7 sign (see Section 9B.13) may be used to supplement the solid white line.

03a A solid white line may be used to delineate the traveled way of the bike path from the shoulder if the shoulder is paved with the same material as the bike path.

Support:

03b Refer to Caltrans' Highway Design Manual Index 1003.1 Class I Bikeways (Bike Paths).

04 Smaller size pavement word markings and symbols may be used on shared-use paths. Where arrows are needed on shared-use paths, half-size layouts of the arrows may be used (see Section 3B.20).

Standard:

05 **Where a shared-use path crosses a roadway, crosswalk markings shall be used (see Chapter 3C).**

Option:

06 **Where pedestrian and bicycle movements on a shared-use path are separated on the approach to a roadway crossing, parallel bicycle and pedestrian crossing markings may be used as shown in Figure 9E-14.**

Guidance:

07 *If parallel bicycle and pedestrian crossing markings are used where a shared-use path crosses a roadway, crossing areas for bicycles should use green-colored pavement if the shared-use path crossing has a high volume of either mode.*

Barrier Posts on Class I Bikeways (Bike Path)

Support:

08 Before a decision is made to install barrier posts, consideration needs to be given to the implementation of other remedial measures, such as Bike Path Exclusion (R44A(CA)) signs (see Section 9B.07) and/or redesigning the path entry so that motorists do not confuse it with vehicle access.

09 It could be necessary to install barrier posts across the width of the bike path, at entrances to bike paths to prevent motor vehicles from entering or to slow down the bicyclists when approaching an intersection with vehicular traffic. This can occur, where the bike paths intersect with vehicular roadways, especially if the width of the bike path at its intersection, could lead to confusion for drivers on the vehicular roadway that the bike path is a vehicular roadway. The number of barriers posts installed need to be an odd number, as they will result in even number of passages, to provide equal number of passage ways for each direction. When locating such installations, care needs to be taken to assure that barriers are well marked and visible to bicyclists, day and night (i.e., install reflectors or reflectorized tape).

Guidance:

10 *An envelope around the barriers should be striped as shown in Figure 9E-17. If sight distance is limited, special advance warning signs or painted pavement warnings should be provided. Where more than one post is necessary, 5 foot spacing should be used to permit passage of bicycle-towed trailers, adult tricycles, and to assure adequate room for safe bicycle passage without dismounting. Barrier post installations should be designed so they are removable to permit entrance by emergency and service vehicles.*

Support:

11 Generally, barrier configurations that preclude entry by motorcycles present safety and convenience problems for bicyclists. Such devices are used only where extreme problems are encountered.

Section 9E.14 Bicycle Route Pavement Markings (Class III Bikeway (Bike Route))

Option:

01 Bicycle route pavement markings simulating guide signs for bicycle routes (see Section 9D.02 through 9D.07) and route auxiliary plaques (see Section 9D.08) may be used to supplement guide signing to help bicyclists in navigation (see Figure 9E-15).

Standard:

02 **Bicycle route pavement markings shall be limited to shared-use paths (Class I Bikeway), separated bicycle lanes (Class II or Class IV Bikeway), or buffer-separated bicycle lanes (Class II Bikeway). Bicycle route pavement markings shall not be used in standard bicycle lanes (Class II Bikeway) or in shared lanes (Class III Bikeway).**

Support:

02a Class III Bikeways (Bike Route) are shared routes and do not require pavement markings. In some instances, a 4 to 6 inch wide white edge stripe on local agency roadways and a 6 inch wide stripe on the state highways, separating the traffic lanes from the shoulder can be helpful in providing for safer shared use. This practice is particularly applicable on rural highways and on major

arterials in urban areas where there is no vehicle parking.

Guidance:

03 *A systematic methodology of locating guide signs for bicycle routes adjacent to the bicycle route pavement marking should be used that includes locations where either the sign or the pavement marking can exist alone to avoid overuse of the guide sign or the pavement marking.*

04 *The route marker pavement marking should be elongated.*

05 *The location, size, and materials of the route marker pavement marking should be designed in a manner that will minimize the loss of traction for bicyclists under wet conditions.*

Section 9E.15 Bicycle Detector Symbol

Option:

01 The bicycle detector symbol (see Figure 9E-16) may be placed on the pavement indicating the optimum position for a bicycle to actuate the signal.

02 Appropriately-sized WAIT HERE FOR GREEN word markings may be placed on the pavement immediately below the bicycle detector symbol.

03 A R10-22 sign (see Section 9B.20) may be installed to supplement the bicycle detector symbol pavement marking.

Support:

04 The "Standard Highway Signs" publication (see Section 1A.05) contains details on the bicycle detector symbol.

05 Section 3H.06 contains information on incorporating green-colored pavement as a background enhancement to the bicycle detector symbol.

06 Section 4H.102(CA) and Figure 4H-101(CA) contain information on bicycle detectors and their locations.

Section 9E.16 Pavement Markings for Obstructions

Guidance:

01 *Markings as shown in Figure 9E-17 should be used at the location of obstructions in the center of a shared-use path or a physically-separated bikeway, including vertical elements intended to physically prevent unauthorized motor vehicles from entering the path.*

02 For roadway situations where it is impracticable to eliminate a drain grate or other roadway obstruction that is inappropriate for bicycle travel, white markings applied as shown in Figure 9E-17 should be used to guide bicyclists around the condition.

Section 9E.17 Raised Devices (Class IV Bikeway (Cycle Track, Separated Bikeway or Separated Bicycle Lane))

Support:

01 Chapter 3I contains information on using channelizing devices to emphasize pavement marking patterns associated with certain bicycle facilities. A common application is the use of flexible raised devices to create separated bicycle lanes (see Section 9E.07).

02 Using inflexible raised devices immediately adjacent to the travel path of a bicyclist without a buffer creates a collision potential for bicyclists.

Option:

03 In accordance with Chapter 3I, channelizing devices may be used to emphasize a pavement marking pattern that establishes a bicycle lane or other bicycle facility provided that the installation of channelizing devices does not prevent motor vehicles from turning when the turn requires the motor vehicle to merge with the bicycle lane or facility as required by law or ordinance.

Guidance:

04 *If used, channelizing devices for bicycle facilities should be tubular markers (see Section 3I.02).*

05 *The selection of a raised device for use with bicycle facilities should consider the collision potential of both the post and the base since the base might still be present in the event the post is struck and missing.*

Support:

06 Measures to reduce the likelihood of a road user striking a channelizing device include marking a buffer space, improving lighting, improving retroreflectivity, or the periodic addition of taller vertical elements within runs of shorter elements.

Standard:

07 **Channelizing devices that are used to emphasize the pavement marking patterns of bicycle facilities shall not incorporate the color green into either the device or its retroreflective element to supplement the presence of green-colored pavement.**

Support:

08 Refer to Sections 3A.03 and 3I.01 for the color of channelizing devices, when the they are used in bicycle facilities.