

## PRIMARY GOAL - SAFETY

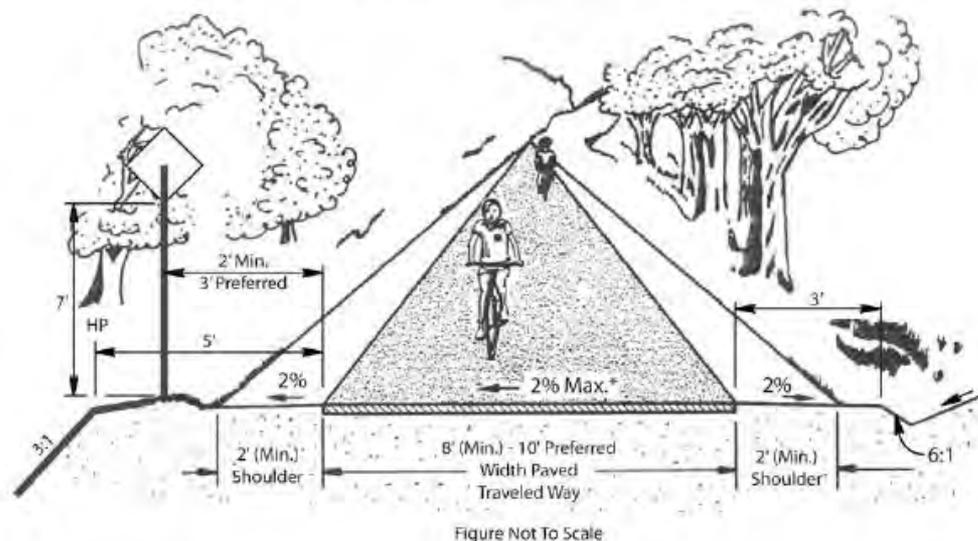
### A WELL-DESIGNED BICYCLE PATH:

- Anticipates potential traffic conflicts
- Adheres to or exceeds standards and guidelines
- Provides clear lines-of-sight or includes cautionary measures if needed
- Provides unambiguous signage
- Avoids obstructions or includes cautionary measures if needed
- Specifies materials that are durable relative to site conditions
- Projects the effects of time

## PATH WIDTHS

Figure 1003.1A

### Two-Way Class I Bikeway (Bike Path)

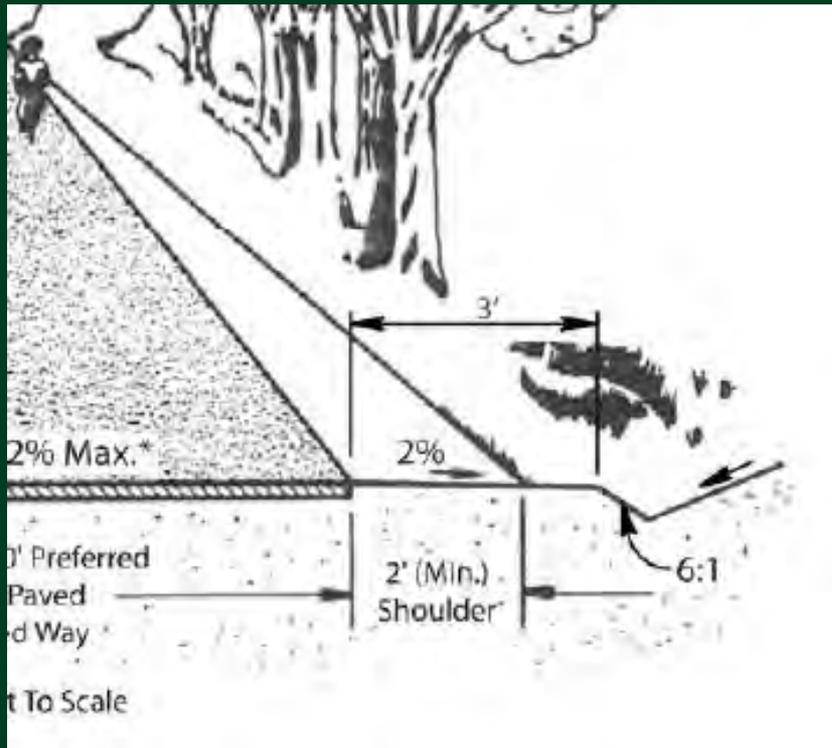


NOTES:

- (1) See Index 1003.1(13) for pavement structure guidance of bike path.
  - (2) For sign clearances, see California MUTCD, Figure 9B-1.
- \* 1% cross-slope minimum.

- The minimum paved width of travel way for a two-way bike path shall be **8 feet, 10 feet preferred**. The minimum paved width for a one-way bike path shall be **5 feet**.

## SHOULDER WIDTHS



- A minimum **2-foot-wide** shoulder, composed of the same pavement material as the path or all weather surface, free of vegetation, shall be provided adjacent to the traveled way of the path when not on a structure.

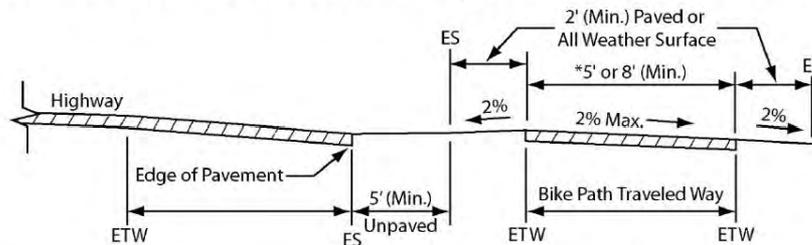
Source: CALTRANS HDM, Chapter 1000

## SEPARATION

- The minimum separation between the edge of pavement of a one-way or a two-way bicycle path and the edge of traveled way of a parallel road or street shall be **5 feet plus the standard shoulder widths**. Bike paths within the clear recovery zone of freeways shall include a physical barrier separation. (Standard)

Figure 1003.1B

### Typical Cross Section of Class I Bikeway (Bike Path) Parallel to Highway



NOTE:

(1) See Index 1003.1(6) for guidance on separation between bike paths and highways.

\* One-Way: 5' Minimum Width

Two-Way: 8' Minimum Width

Source: CALTRANS HDM, Chapter 1000

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### DESIGN SPEEDS

**Table 1003.1  
Bike Path Design Speeds**

Type of Facility	Design Speed (mph) <sup>(1)</sup>
Bike Paths with Mopeds Prohibited	20
Bike Paths with Mopeds Permitted	30
Bike Paths on Long Downgrades (steeper than 4%, and longer than 500')	30

- The design speed given in Table 1003.1 shall be the minimum.
- The minimum stopping sight distance based on design speed shall be 125 feet for 20 miles per hour, 175 feet for 25 miles per hour and 230 feet for 30 miles per hour.

Source: HDM, Chapter 1000

## SIGNALS AND SIGNS



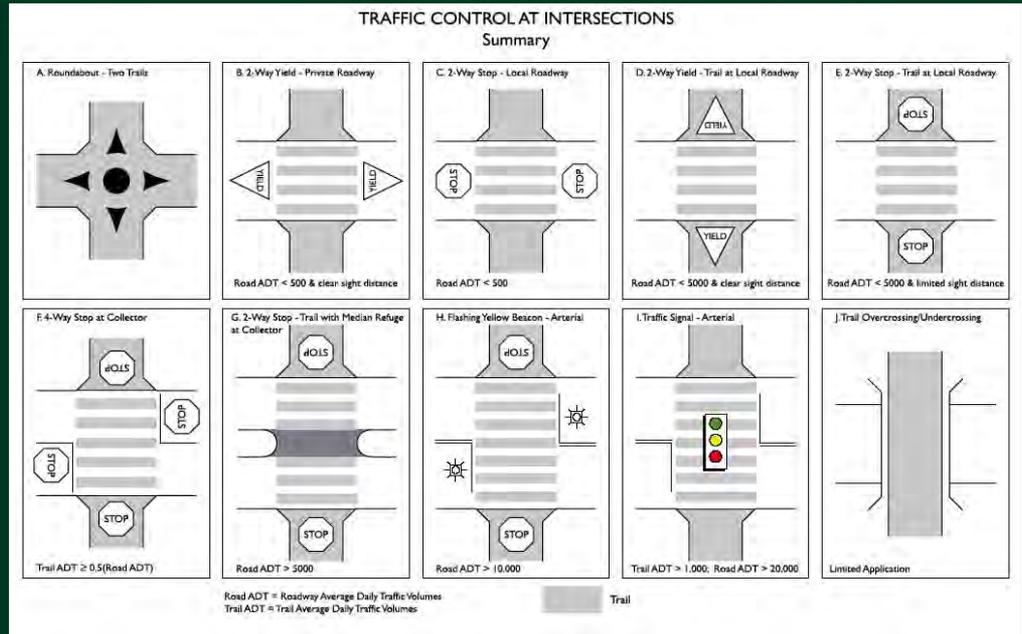
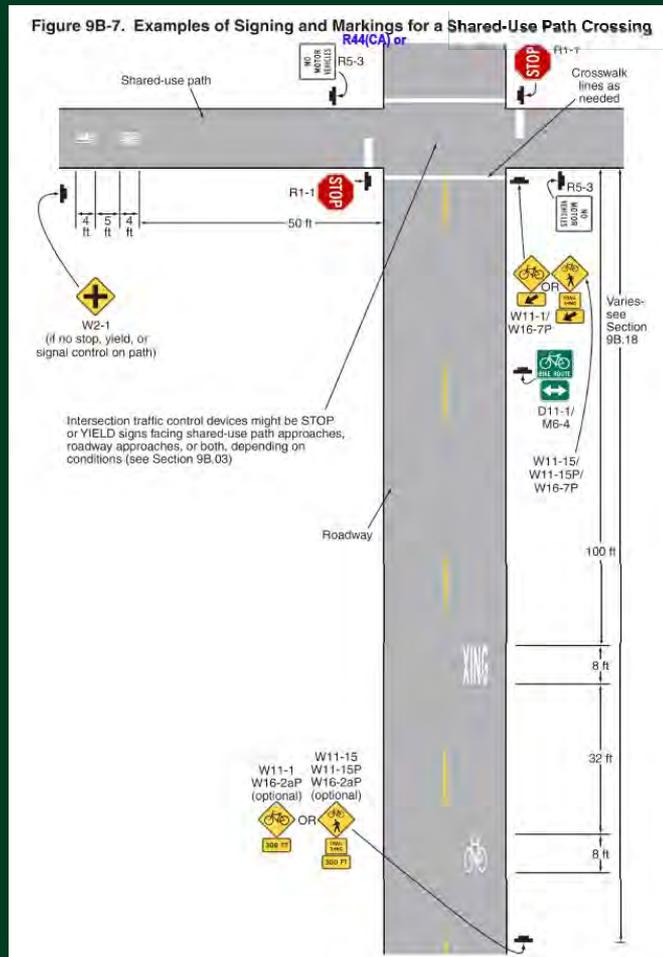
TOO COMMITTED TO STOP?

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# SIGNALS AND SIGNS

## INTERSECTION CONTROLS



Source: Trail Planning for California Communities

Source: California MUTCD

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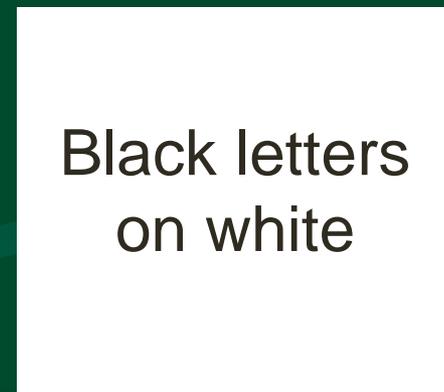
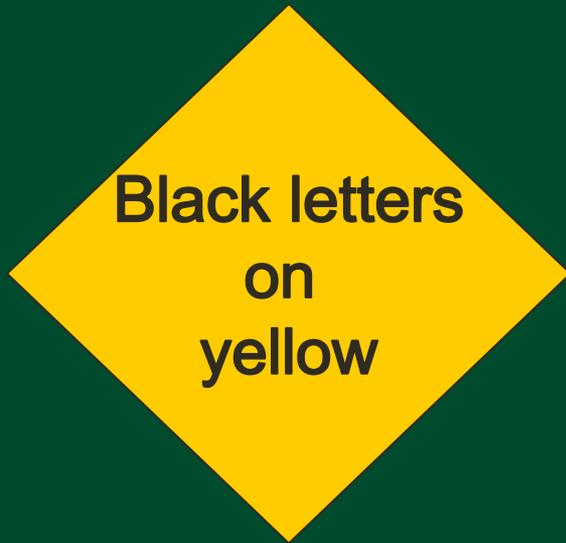
### SIGNS

- A. Black—regulation**
- B. Blue—road user services guidance, tourist information, and evacuation route**
- C. Brown—recreational and cultural interest area guidance**
- D. Coral—unassigned**
- E. Fluorescent Pink—incident management**
- F. Fluorescent Yellow-Green—pedestrian warning, bicycle warning, playground warning, school bus and school warning**
- G. Green—indicated movements permitted, direction guidance**
- H. Light Blue—unassigned**
- I. Orange—temporary traffic control**
- J. Purple—lanes restricted to use only by vehicles with registered electronic toll collection (ETC) accounts**
- K. Red—stop or prohibition**
- L. White—regulation**
- M. Yellow—warning**

Source: California MUTCD

## SIGNALS AND SIGNS

### REGULATORY SIGNS

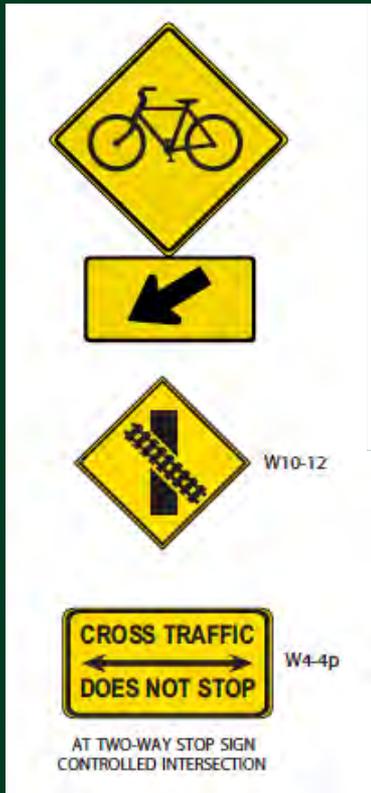


### WARNING SIGNS

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### SIGNS



## REGULATORY SIGNS



R81A (CA)



R81B (CA)

Source: California MUTCD

# WARNING SIGNS

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## OTHER SIGNS



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### SIGNS / PAVEMENT MARKINGS

- Regulatory
- Warning / Cautionary Notices
- Obstructions
- Use Designations
- Wayfinding / Travel Directions
- Entrance and Identity

Source: Trail Planning for California Communities

<b>GRADE STEEP SLOW</b>	Install where trail grade $\geq 5$ percent or where trail grade is 3 percent within 200 feet of stop sign
 <b>STOP</b>	Install with every RI stop sign
<b>AHEAD STOP</b>	Install 100 feet in advance of stop sign
 <b>YIELD</b>	Install with every RI-2 yield sign (see MUTCD 2000, figure 3-24)
	Four-inch yellow centerline stripe—install for 50 feet approaching each intersection and throughout horizontal curve; a centerline throughout entire trail would facilitate night trail use by improving visibility of trail
	Install at entrance where bikes and pedestrians use separate paths—place approx. every 500 feet, if needed, to improve compliance

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### SIGNS / PAVEMENT MARKINGS



- Avoid Unintended Consequences
- Avoid Ambiguity

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### STRIPING



- When to use striping:
- Where use is heavy
  - On curves with restricted sight distance
  - Where the path is not lighted and nighttime use is expected
  - Along edge of a path if contiguous with a continuous fixed object considered an obstruction, such as a wall or railing

Source: Trail Planning for California Communities

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### SHOULDER TREATMENT EXAMPLES



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### DETECTABLE WARNING SURFACES



- Detectable warning surfaces shall extend the full width of the ramp run (excluding any flared sides), blended transition, or turning space.

Source: US Access Board; Chapter R3: Technical Requirements

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### DETECTABLE WARNING SURFACES



- Ramp width too narrow



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### OBSTACLES

Figure R302.7.3 Horizontal Openings

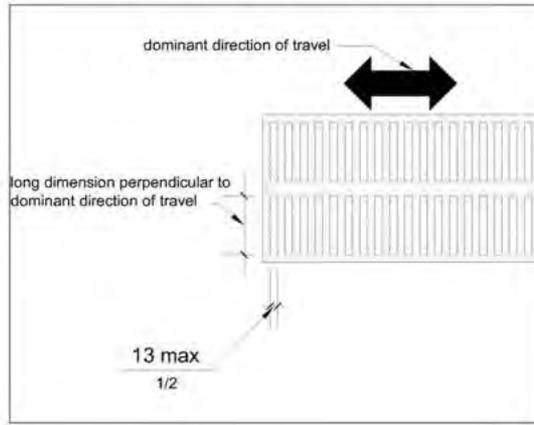


Figure R302.7.2 Vertical Surface Discontinuities

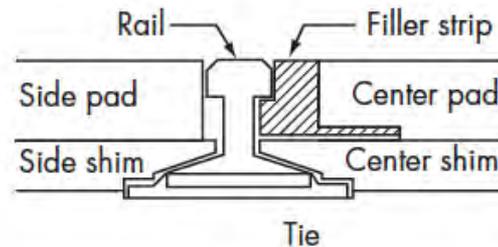
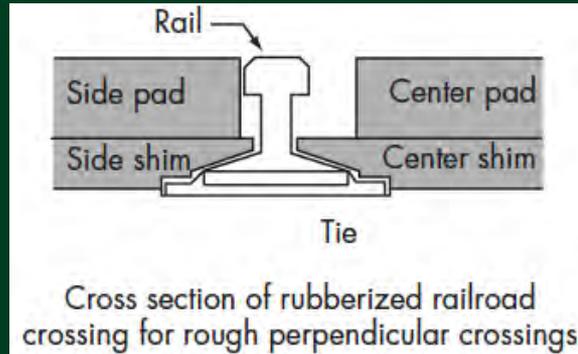
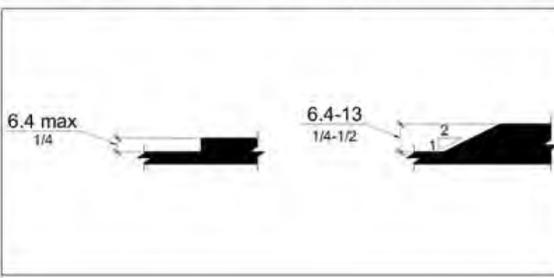
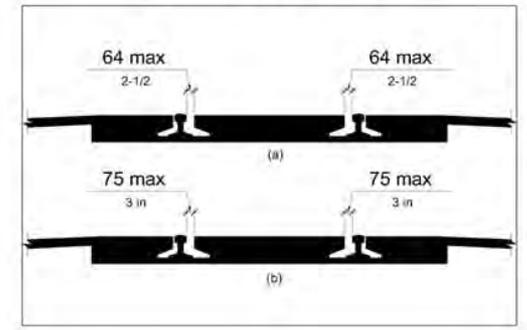


Figure R302.7.4 Flangeway Gaps



Source: US Access Board. Supplemental Notice of Proposed Rulemaking - Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; Shared Use Paths

Source: US Access Board: Guidelines for Outdoor Developed Areas

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### PATH WIDTHS, MARKINGS, AND HERDING CATS



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### PATH WIDTHS, MARKINGS, AND HERDING CATS



8' min to ??'

HDM CH. 1000: FIGURE 1003.1A



10' to 12' or more

PASSING NOT PERMITTED  
CAMUTCD: FIGURE 9C-2



10' to 12' or more

PASSING PERMITTED



8' min

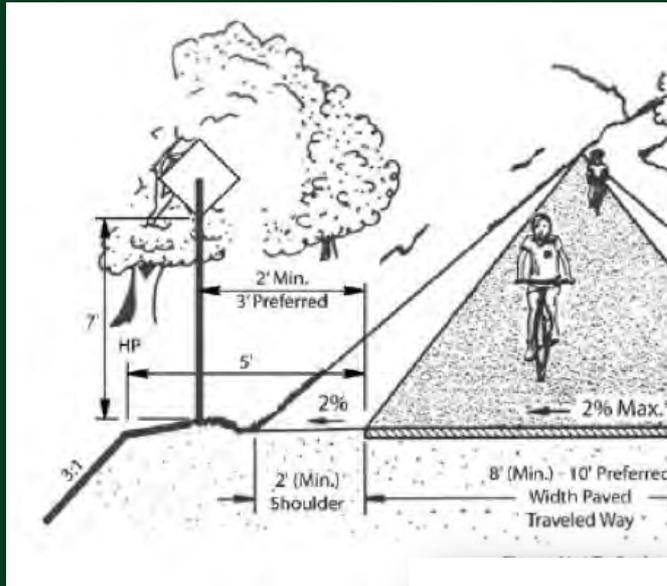
12' to 16' or more



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### CLEARANCES AND OBSTRUCTIONS



HDM, Chapter 1000



- A minimum **2-foot** horizontal clearance from the paved edge of a bike path to obstructions shall be provided.
- The vertical clearance to obstructions across the width of a bike path shall be a **minimum of 8 feet** and **7 feet over shoulder**.

Source: CALTRANS HDM, Chapter 1000

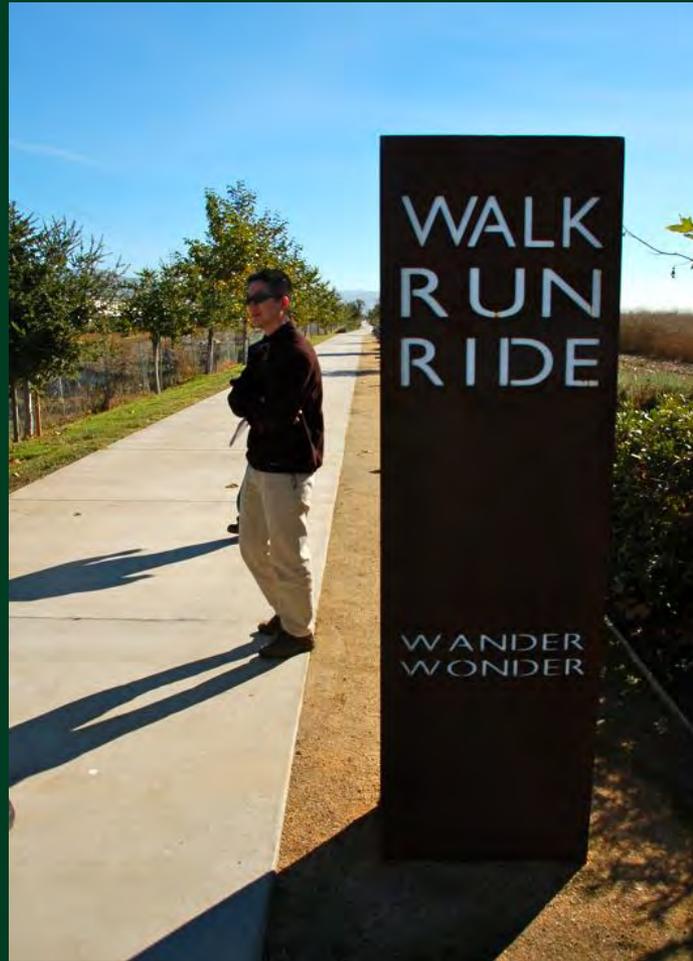
## OBSTRUCTIONS & SETBACKS MORE THAN SIGNS

- Bicycle Racks
- Bollards
- Gates
- Fences
- Railings
- Retaining Walls
- Lights
- Benches
- Signs of all types
- Trees / woody shrubs
- Drinking fountains
- Utility boxes
- Curbs
- Virtually anything vertical

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NOT OK



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### OBSTRUCTIONS • BOLLARDS



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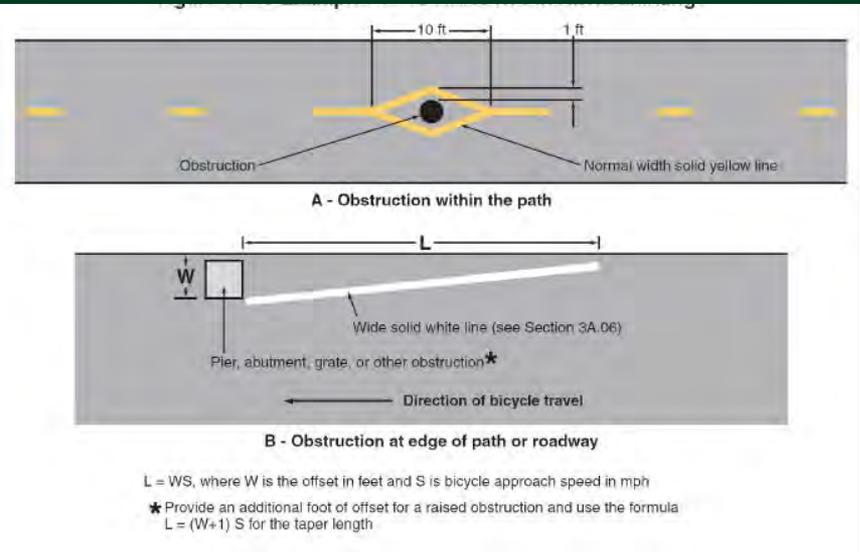
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### OBSTRUCTIONS • BOLLARDS

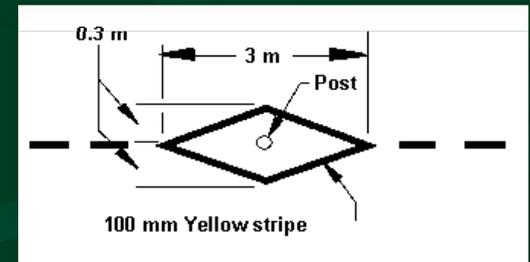
OK



ALMOST OK



Source: California MUTCD



Source: CALTRANS HDM, Chapter 1000

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### OBSTRUCTIONS • BOLLARDS



- Fold-down obstacle posts or bollards shall not be used within the paved area of bicycle paths.

Source: CALTRANS HDM, Chapter 1000

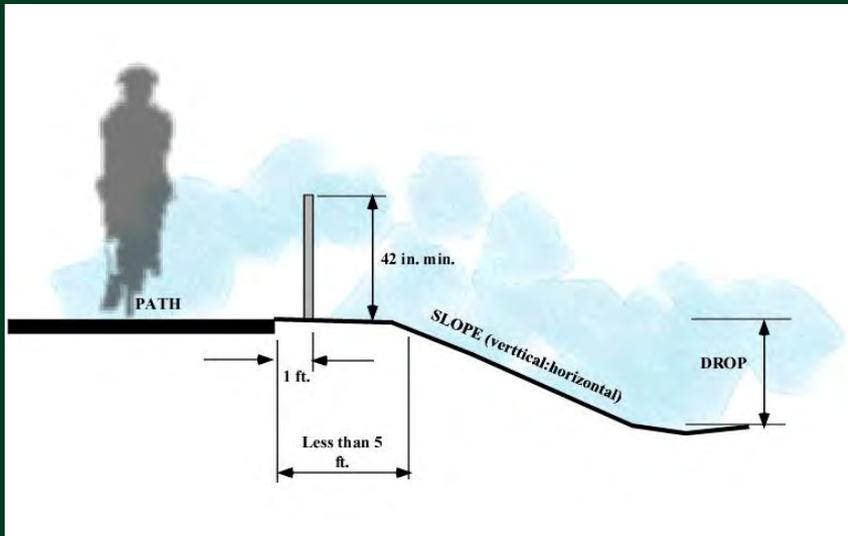
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### ONE ADVANTAGE OF BOLLARDS



## STEEP SIDE GRADES



### When to Use a Safety Rail:

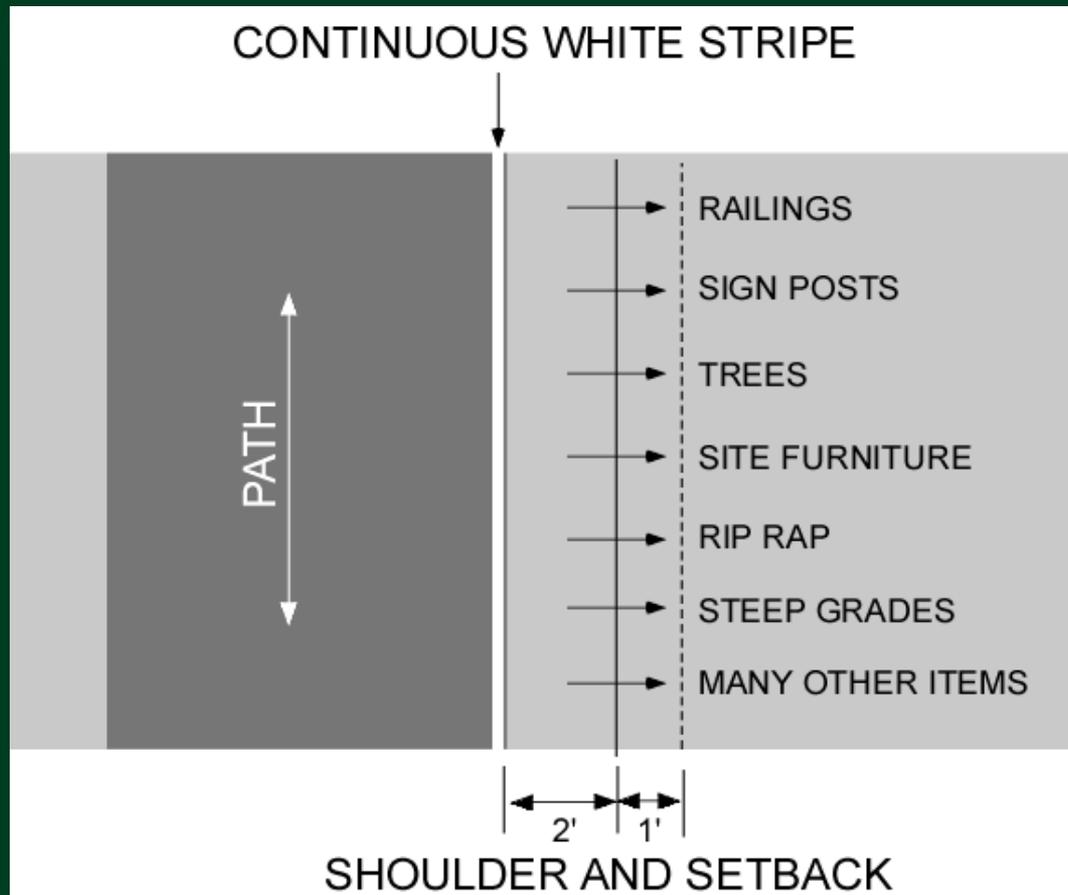
- Slopes of 1:3 or steeper
  - With a drop of 6 feet or greater
  - Adjacent to a parallel body of water or other substantial obstacle
- Slopes of 1:2 or steeper with a drop of 4 feet or greater
- Slopes of 1:1 or steeper with a drop of 1 foot or greater

Reference: AASHTO *Guide for the Development of Bicycle Facilities*

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### OBSTRUCTIONS & SETBACKS



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### EXAMPLES • OK



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### EXAMPLES • ALMOST PERFECT



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### EXAMPLES



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### EXAMPLES



Rillito River Park Trail, Tucson, AZ



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### EXAMPLES



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### EXAMPLES



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## Safety and Sustainability

### EXAMPLES • NOT OK

