Xings 101:
Introduction to Basic Principles of Highway-Rail Grade Crossings

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Commissioners

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John Bohn

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Timothy Alan Simon

CPUC Jurisdiction

- RR Crossing Design
- RR Crossing Warning Devices
- Clearances
- Rough Crossings
- Blocked Crossings
- Exempt Crossings
- Light Rail Systems

Policy on Reducing Number of At-grade Crossings

Part 8
Traffic Controls
for Highway-Rail Grade Crossings

Part 4 – Preemption

Part 6 - TTC

Part 10
Traffic Controls
for Highway-Light Rail Transit
Grade Crossings

CA MUTCD Section 8A.04

Highway-Rail Grade Crossing Elimination

- Requires TCD removal when Crossing Eliminated
- Modification of TCDs if number of tracks change
- If grade crossing cannot be justified it should be removed

Construction Near Xings

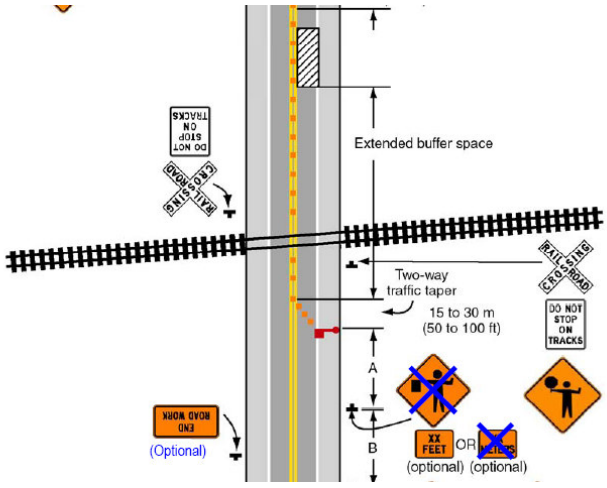
CA MUTCD Section 8A.05

… temporary traffic control zone, lane restrictions, flagging, or other operations shall not be performed in a manner that would cause vehicles to stop on the railroad tracks…

CA MUTCD Notes for Fig 6H-46

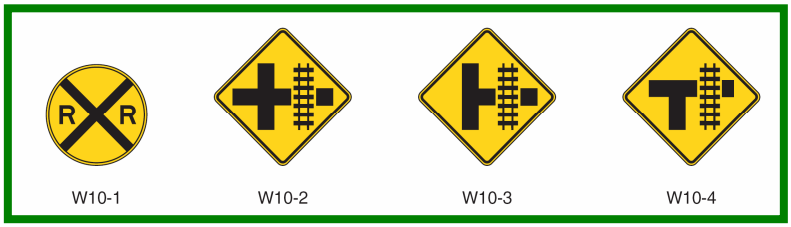
If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing … even if automatic warning devices are in place.

CA MUTCD Figure 6H-46



CA MUTCD Section 8B.04
Advance Warning Signs

- CA MUTCD different than Federal MUTCD
- CVC 21362 - Advance warning signs required on each approach to every crossing.
- 100-feet rule for parallel approach signs
- Orientation of Signs



CA MUTCD Section 8B.04
Advance Warning Signs

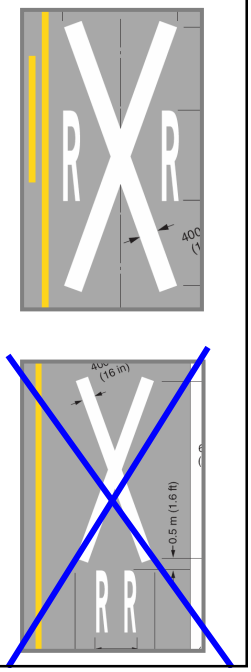
W48(CA)

Required below W10-1

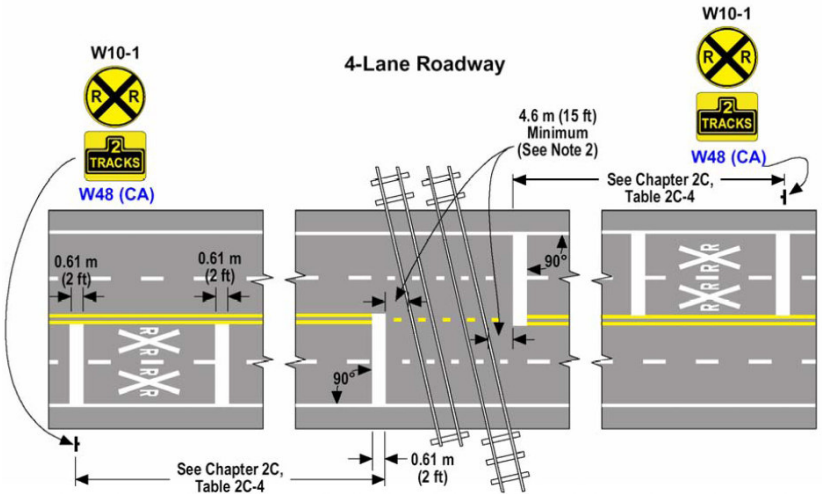
Optional below

W10-2, 3, 4

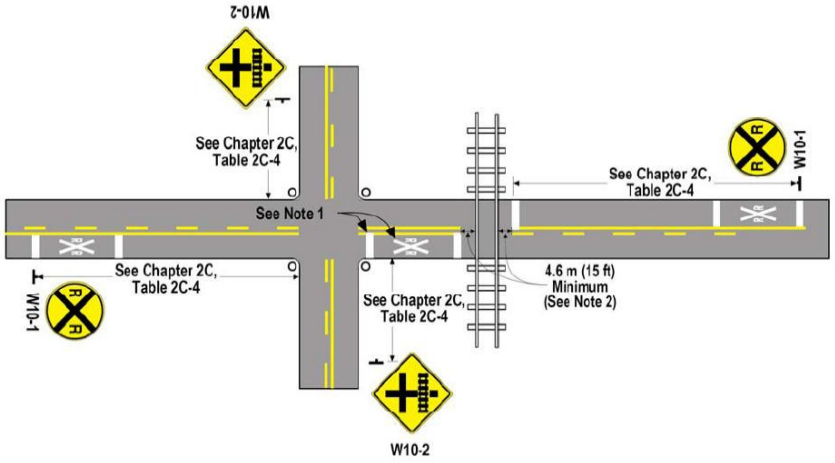
“Adult” Markings?



CA MUTCD Fig 8B-6
Stop Line, W10-1, W48, RXR



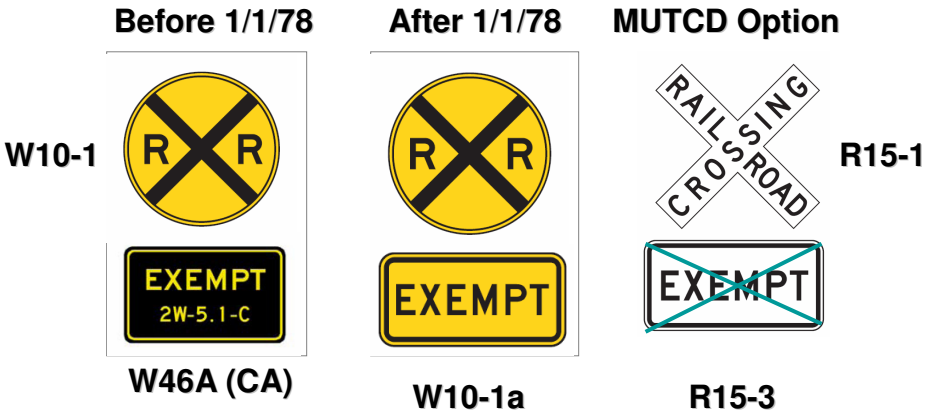
CA MUTCD Fig 8B-6
Stop Line, W10-1, W48, RXR



Not Shown: Dedicated Turn Lanes Towards the Crossing

RXR may be omitted if less than 50-ft

CA MUTCD Section 8B.05
EXEMPT Signs



CA MUTCD Fig 8B-101

W46A

- Crossing number not CPUC Code or Reg. number
- Unique Crossing # assigned by CPUC for exempt crossing established prior to 1/1/78

CA MUTCD Section 8B.07

R8-8

Should be placed when engineering judgment determines that potential for vehicle stopping on the tracks is high

CA MUTCD Section 8B.12
Emergency Reporting Number

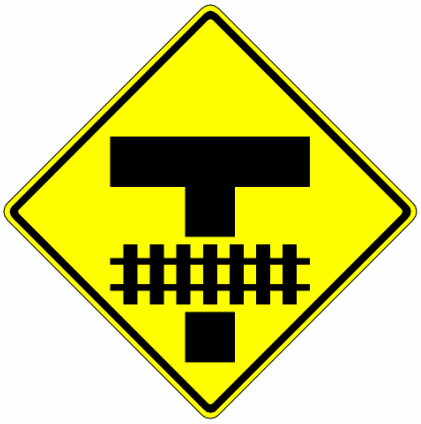
CA MUTCD Section 8B.17
Low Ground Clearance

Must Have Plaque for 3 years

W10-5

Low Ground Clearance

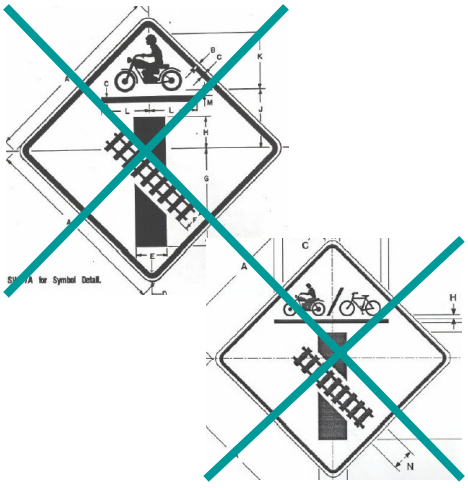
CA MUTCD Section 8B.18
Limited Storage Space



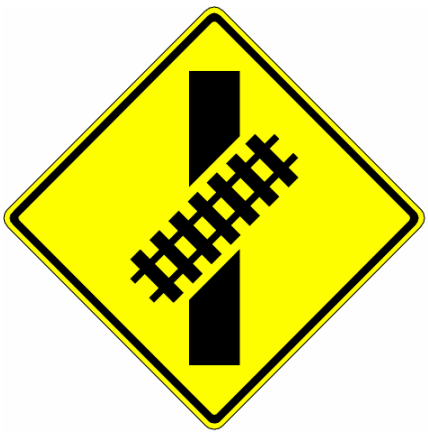
W10-11

W10-11a

CA MUTCD Section 8B.19
Skewed Crossing



DELETE CA Code SW27 signs



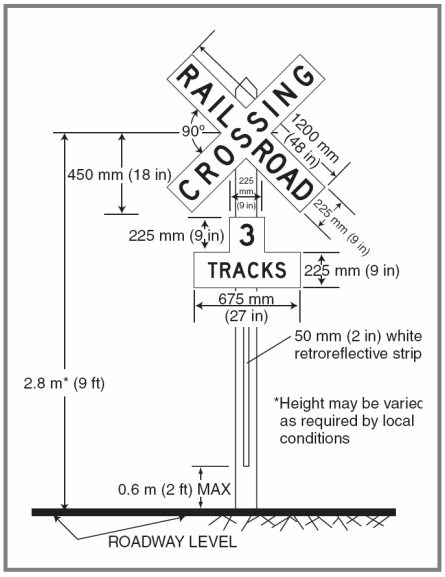
W10-12

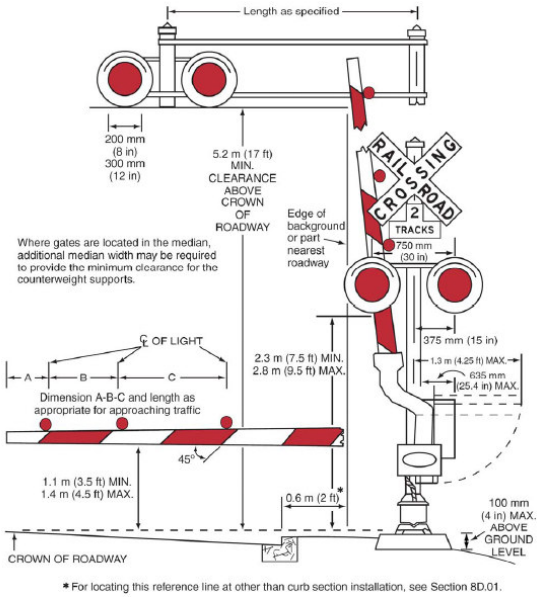
USE MUTCD sign

More on W10-12

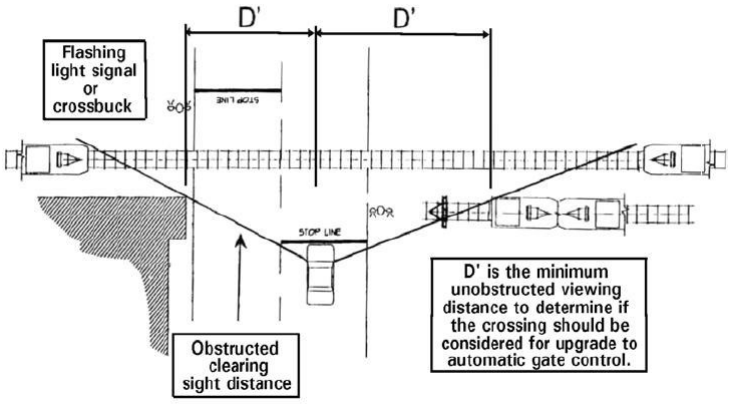
- Show approximate angle
- Same Direction of Crossing
- Should be used on State highways if skewed 30 degrees or less
- May be used on local streets if skewed 30 degrees of less
- Should be erected midway between W10-1 and crossing

Crossbuck

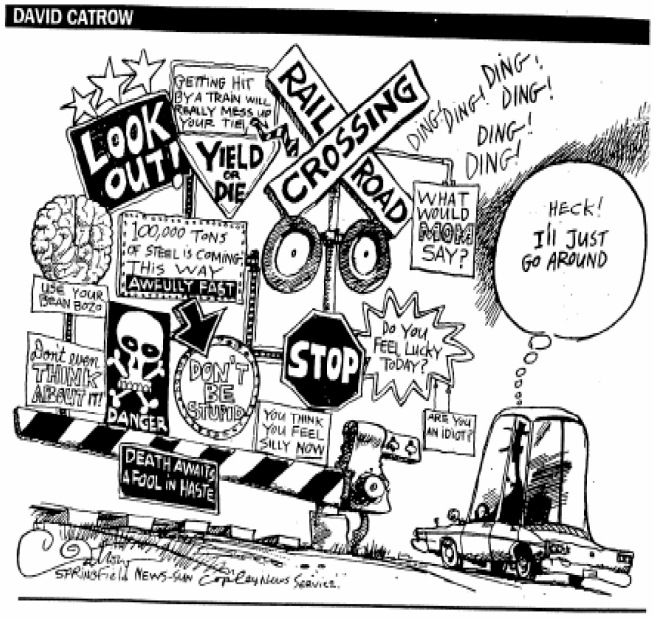



Length as specified
200 mm (8 in) 300 mm (12 in)
5.2 m (17 ft) MIN. CLEARANCE ABOVE CROWN OF ROADWAY
Edge of background or part nearest roadway
RAIL ROAD CROSSING
2
TRACKS
750 mm (30 in)
Where gates are located in the median, additional median width may be required to provide the minimum clearance for the counterweight supports.
℄ OF LIGHT
A
B
C
Dimension A-B-C and length as appropriate for approaching traffic
45°
2.3 m (7.5 ft) MIN. 2.8 m (9.5 ft) MAX.
375 mm (15 in)
1.3 m (4.25 ft) MAX.
635 mm (25.4 in) MAX.
1.1 m (3.5 ft) MIN. 1.4 m (4.5 ft) MAX.
0.6 m (2 ft)*
100 mm (4 in) MAX. ABOVE GROUND LEVEL
CROWN OF ROADWAY
* For locating this reference line at other than curb section installation, see Section 8D.01.

Sightlines


D'
D'
Flashing light signal or crossbuck
STOP LINE
STOP LINE
Obstructed clearing sight distance
D' is the minimum unobstructed viewing distance to determine if the crossing should be considered for upgrade to automatic gate control.

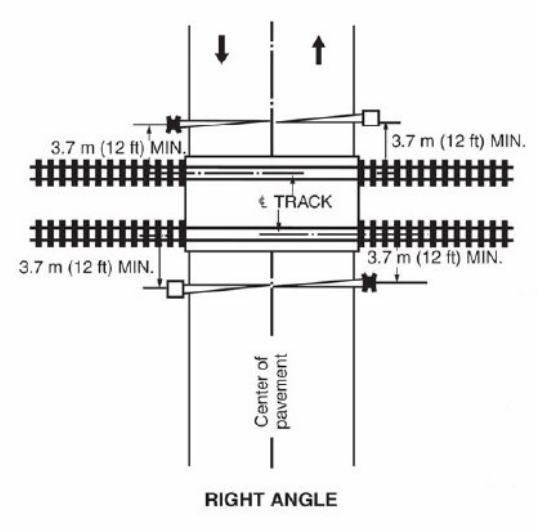
FLS Visible From All Lanes



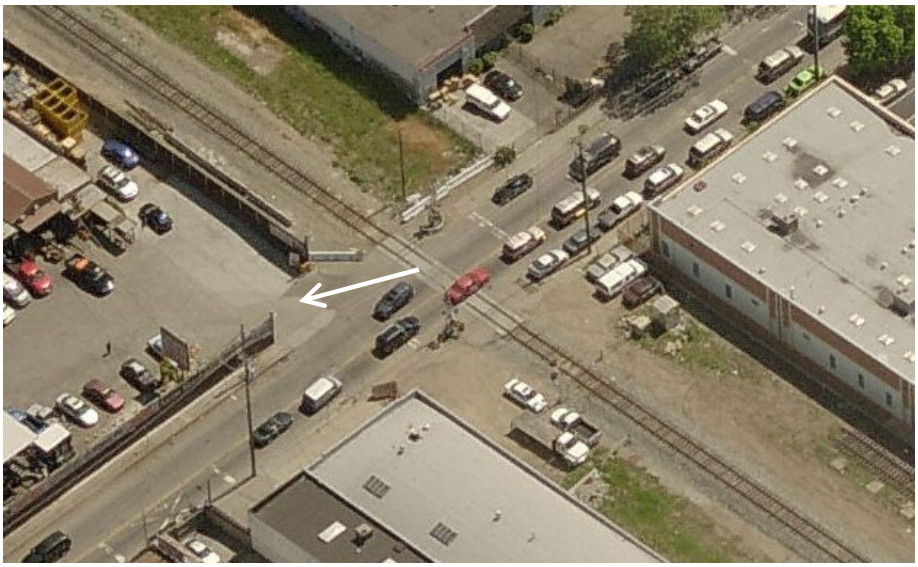
Gates & Medians

Active Advance Warning Devices

Exit Gates



Exit Gates



Turn Restrictions During Preemption
CA MUTCD Section 8B.06

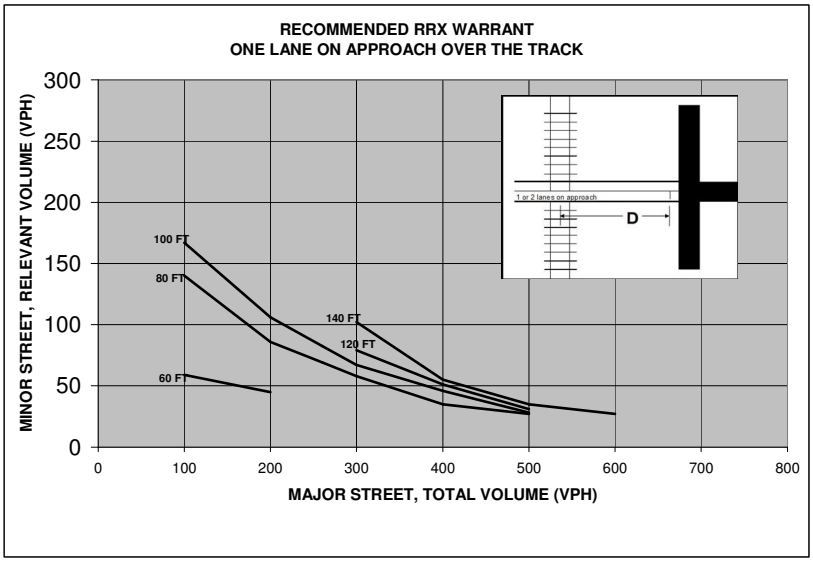
R3-1
Activated Blank Out

R3-2
Activated Blank Out

Avoid All-Red Flash

Permissive vs Protected Left Turns

Signalizing Intersection Near Grade Crossings



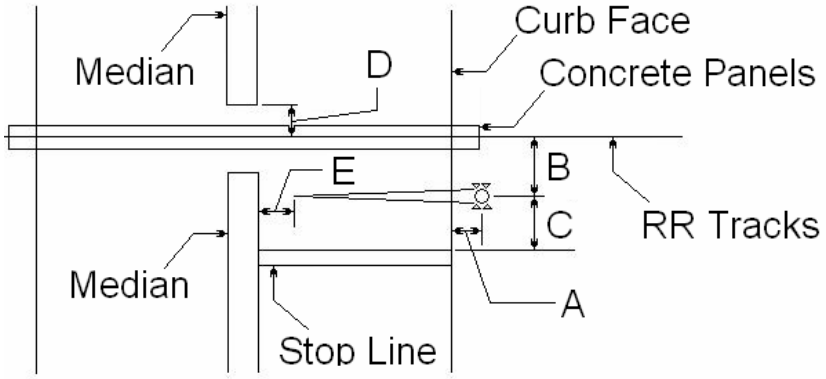
The existing provisions of Chapter 4C of the MUTCD state that an engineering study shall be performed and the study shall consider the specific numerical warrants as well as other pertinent factors. Chapter 4C states in a Guidance provision that a traffic signal should not be installed unless one of the warrants is met. This is Guidance, using the word "should," rather than a Standard using the word "shall," because it has been long recognized that there are sometimes special conditions that exist at a location that make the installation of a traffic signal the only or the best overall solution.

Under the definition of Guidance in the MUTCD Introduction, the engineer has the latitude to decide to install a signal if the engineering study considers all pertinent factors, such as those that might exist at an intersection near a highway-rail grade crossing, and determines that a signal is required despite lack of numerical warrant satisfaction. We believe that these existing MUTCD provisions can be utilized by traffic engineering practitioners as needed until such time as rulemaking on the proposed warrant 9 is completed.

Anthony T. Furst
Acting Director, Office of Transportation Operations
Federal Highway Administration
March 1, 2007

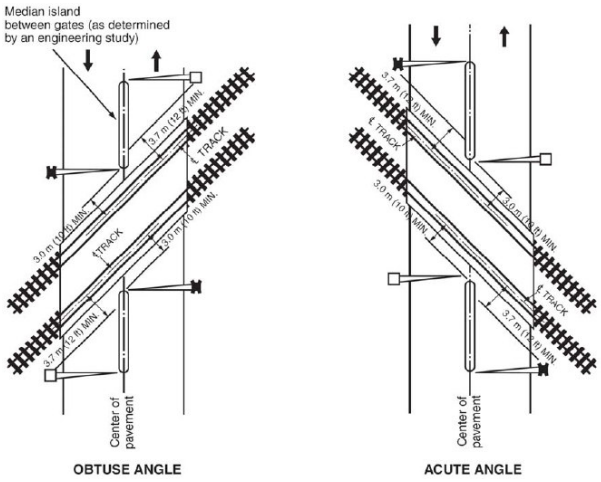
Clearances

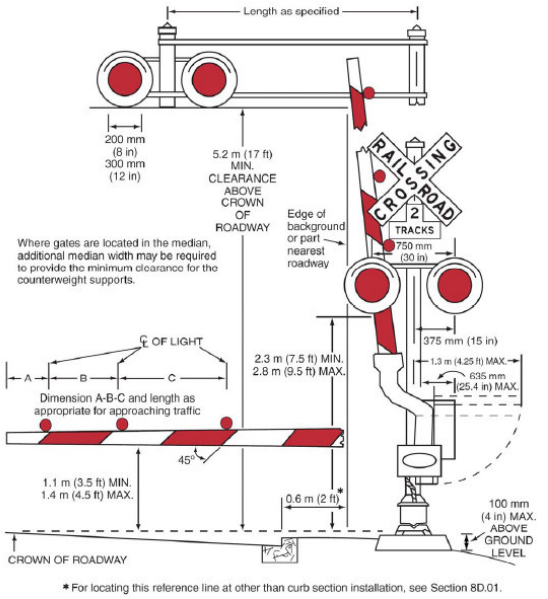
- Center mast to curb
- Center of Track to Warning Device
- Track to Face of Curb
- Warning Device to Stop Line
- Between Gate Tips



A: Warning Device CL to Curb Face – 4' 3"
B: Track CL to Warning Device CL – 12'
C: Gate Arm to Stop Line – 8' (Stop Line must be min 15' from CL Track)
D: Track CL to Face of median – 10'
E: Tip of lowered gate to edge of travel way – 1'
Not shown: distance between tips of two complimentary gates – 2'

Skew Crossings





Relocating Bus Stops

Private Crossings

Quiet Zones

CA MUTCD Section 8B.14

W10-9

Environmental Review

Funding Programs

- Section 130
- Grade-Sep Fund
- Maintenance Fund

When Should You Contact CPUC

GO 88-B vs Application

- Response Time
- Staff vs Commission

Diagnostic Review

Section 8A.01

A diagnostic team, consisting of knowledgeable representatives of parties of interest … evaluates conditions at a grade crossing to make determinations or recommendations concerning safety needs at the crossing. The diagnostic team needs to, at a minimum, include representatives of the highway agency or authority with jurisdiction over the roadway, the railroad agency, and the California Public Utilities Commission ... The removal, reduction, addition, or change in the type of warning devices at each public at-grade crossing, or publicly used private at-grade crossing …must be authorized by CPUC. This includes any changes that can affect interconnections with adjacent traffic signals, or any other modification that may impact the safety of the grade crossing…

Reference Web pages

CPUC Rail Crossings Engineering Section

- www.cpuc.ca.gov/crossings

FHWA Technical Working Group Report

GUIDANCE ON TRAFFIC CONTROL DEVICES AT HIGHWAY-RAIL GRADE CROSSINGS

- safety.fhwa.dot.gov/media/twgreport.htm

CA MUTCD on Caltrans website

- www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd.htm

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http://www.cpuc.ca.gov/crossings