

1 **CHAPTER 8A. GENERAL**

2 **Section 8A.01 Introduction**

3 Support:

4 Traffic control for highway-rail grade crossings includes all signs, signals, markings, other warning  
5 devices, and their supports along highways approaching and at highway-rail grade crossings. The function of  
6 this traffic control is to promote safety and provide effective operation of both rail and highway traffic at  
7 highway-rail grade crossings.

8 For purposes of installation, operation, and maintenance of traffic control devices at highway-rail grade  
9 crossings, it is recognized that the crossing of the highway and rail tracks is situated on a right-of-way  
10 available for the joint use of both highway traffic and railroad traffic.

11 The highway agency or authority with jurisdiction and the regulatory agency with statutory authority, if  
12 applicable, jointly determine the need and selection of devices at a highway-rail grade crossing.

13 In Part 8, the combination of devices selected or installed at a specific highway-rail grade crossing is  
14 referred to as a “traffic control system.”

15 **Standard:**

16 **The traffic control devices, systems, and practices described herein shall be used at all highway-rail**  
17 **grade crossings open to public travel, consistent with Federal, State, and local laws and regulations.**

18 **To promote an understanding of common terminology between highway and railroad signaling**  
19 **issues, the following definitions shall be used:**

- 20 1. **Advance Preemption**—the notification of an approaching train that is forwarded to the highway  
21 traffic signal controller unit or assembly by the railroad equipment in advance of the activation  
22 of the railroad warning devices.
- 23 2. **Advance Preemption Time**—the period of time that is the difference between the required  
24 maximum highway traffic signal preemption time and the activation of the railroad warning  
25 devices.
- 26 3. **Cantilevered Signal Structure**—a structure that is rigidly attached to a vertical pole and is used  
27 to provide overhead support of signal units.
- 28 4. **Clear Storage Distance**—the distance available for vehicle storage measured between 1.8 m (6  
29 ft) from the rail nearest the intersection to the intersection stop line or the normal stopping  
30 point on the highway. At skewed highway-rail grade crossings and intersections, the 1.8 m (6 ft)  
31 distance shall be measured perpendicular to the nearest rail either along the center line or edge  
32 line of the highway, as appropriate, to obtain the shorter distance. Where exit gates are used,  
33 the distance available for vehicle storage is measured from the point where the rear of the  
34 vehicle would be clear of the exit gate arm. In cases where the exit gate arm is parallel to the  
35 track(s) and is not perpendicular to the highway, the distance is measured either along the  
36 center line or edge line of the highway, as appropriate, to obtain the shorter distance.
- 37 5. **Constant Warning Time Train Detection**—a means of train detection that provides relatively  
38 uniform warning time for the approach of a train that is not accelerating or decelerating after  
39 being detected.
- 40 6. **Design Vehicle**—the longest vehicle permitted by statute of the road authority (State or other)  
41 on that roadway.
- 42 7. **Diagnostic Team**—a group of knowledgeable representatives of the parties of interest (such as  
43 the railroad, road authority, or state regulatory agency, where applicable) in a highway-rail  
44 grade crossing or group of grade crossings who, using crossing safety management principles,  
45 evaluate conditions at a grade crossing(s) to make determinations or recommendations for the  
46 responsible public authority concerning the safety needs of that crossing(s) (see 23 CFR Part  
47 646.204 and 49 CFR Part 222.9).
- 48 8. **Dynamic Envelope**—the clearance required for the train and its cargo overhang due to any  
49 combination of loading, lateral motion, or suspension failure (see Figure 8A-1).
- 50 9. **Dynamic Exit Gate Operating Mode**—a mode of operation where the exit gate operation is  
51 based on the presence of vehicles within the minimum track clearance distance.
- 52 10. **Exit Gate Clearance Time**—for Four-Quadrant Gate systems, the exit gate clearance time is the  
53 amount of time provided to delay the descent of the exit gate arm(s) after entrance gate arm(s)  
54 begin to descend.

- 1 11. **Exit Gate Operating Mode**—for Four-Quadrant Gate systems, the mode of control used to  
2 govern the operation of the exit gate arms.
- 3 12. **Flashing-Light Signals**—a warning device consisting of two red signal indications arranged  
4 horizontally that are activated to flash alternately when a train is approaching or present at a  
5 highway-rail grade crossing.
- 6 13. **Interconnection**—the electrical connection between the railroad active warning system and the  
7 highway traffic signal controller assembly for the purpose of preemption.
- 8 14. **Locomotive Horn**—a locomotive air horn, steam whistle, or similar audible warning device (see  
9 49 CFR Part 229.129) mounted on a locomotive or control cab car. The terms “locomotive  
10 horn,” “train whistle,” “locomotive whistle,” and “train horn” are used interchangeably in the  
11 railroad industry.
- 12 15. **Maximum Highway Traffic Signal Preemption Time**—the maximum amount of time needed  
13 following initiation of the preemption sequence for the highway traffic signals to complete the  
14 timing of the right-of-way transfer time, queue clearance time, and separation time.
- 15 16. **Minimum Track Clearance Distance**—for standard two-quadrant railroad warning devices, the  
16 minimum track clearance distance is the length along a highway at one or more railroad tracks,  
17 measured from the highway stop line, warning device, or 3.7 m (12 ft) perpendicular to the  
18 track centerline, to 1.8 m (6 ft) beyond the track(s) measured perpendicular to the far rail, along  
19 the center line or edge line of the highway, as appropriate, to obtain the longer distance. For  
20 Four-Quadrant Gate systems, the minimum track clearance distance is the length along a  
21 highway at one or more railroad tracks, measured either from the highway stop line or entrance  
22 warning device, to the point where the rear of the vehicle would be clear of the exit gate arm. In  
23 cases where the exit gate arm is parallel to the track(s) and is not perpendicular to the highway,  
24 the distance is measured either along the center line or edge line of the highway, as appropriate,  
25 to obtain the longer distance.
- 26 17. **Minimum Warning Time—Through Train Movements**—the least amount of time active  
27 warning devices shall operate prior to the arrival of a train at a highway-rail grade crossing.
- 28 18. **Pathway-Rail Grade Crossing**—the general area where a pathway and a railroad’s right-of-way  
29 cross at the same level, within which are included the railroad tracks, pathway, and traffic  
30 control devices for pathway traffic traversing that area.
- 31 19. **Preemption**—the transfer of normal operation of highway traffic signals to a special control  
32 mode.
- 33 20. **Pre-signal**—supplemental highway traffic signal faces operated as part of the highway  
34 intersection traffic signals, located in a position that controls traffic approaching the highway-  
35 rail grade crossing in advance of the intersection.
- 36 21. **Queue Clearance Time**—the time required for the design vehicle of maximum length stopped  
37 just inside the minimum track clearance distance to start up and move through and clear the  
38 entire minimum track clearance distance. If presignals are present, this time shall be long  
39 enough to allow the vehicle to move through the intersection, or to clear the tracks if there is  
40 sufficient clear storage distance. If a Four-Quadrant Gate system is present, this time shall be  
41 long enough to permit the exit gate arm to lower after the design vehicle is clear of the minimum  
42 track clearance distance.
- 43 22. **Quiet Zone**—a segment of a rail line, with one or a number of consecutive public highway-rail  
44 grade crossings at which locomotive horns are not routinely sounded per 49 CFR Part 222.
- 45 23. **Right-of-Way Transfer Time**—the maximum amount of time needed for the worst case  
46 condition, prior to display of the track clearance green interval. This includes any railroad or  
47 highway traffic signal control equipment time to react to a preemption call, and any traffic  
48 control signal green, pedestrian walk and clearance, yellow change, and red clearance intervals  
49 for conflicting traffic.
- 50 24. **Separation Time**—the component of maximum highway traffic signal preemption time during  
51 which the minimum track clearance distance is clear of vehicular traffic prior to the arrival of  
52 the train.
- 53 25. **Simultaneous Preemption**—notification of an approaching train is forwarded to the highway  
54 traffic signal controller unit or assembly and railroad active warning devices at the same time.
- 55 26. **Station Crossing**—a pathway-rail grade crossing that is associated with a station platform.
- 56 27. **Timed Exit Gate Operating Mode**—a mode of operation where the exit gate descent is based on  
57 a predetermined time interval.

- 1       **28. Vehicle Intrusion Detection Devices**—a detector or detectors used as a part of a system  
2       **incorporating processing logic to detect the presence of vehicles within the minimum track**  
3       **clearance distance and to control the operation of the exit gates.**  
4       **29. Wayside Equipment**—the signals, switches, and/or control devices for railroad operations  
5       **housed within one or more enclosures located along the railroad right-of-way and/or on railroad**  
6       **property.**  
7       **30. Wayside Horn**—a stationary horn located at a highway-rail grade crossing, designed to provide  
8       **audible warning to oncoming motorists of the approach of a train.**

### 9       **Section 8A.02 Use of Standard Devices, Systems, and Practices**

10      Support:

11          Because of the large number of significant variables to be considered, no single standard system of traffic  
12      control devices is universally applicable for all highway-rail grade crossings.

13      Guidance:

14          The appropriate traffic control system to be used at a highway-rail grade crossing should be determined by  
15      an engineering study involving both the highway agency and the railroad company.

16      Option:

17          The engineering study may include the Highway-Rail Intersection (HRI) components of the National  
18      Intelligent Transportation Systems (ITS) architecture, which is a USDOT accepted method for linking the  
19      highway, vehicles, and traffic management systems with rail operations and wayside equipment.

20      Support:

21          More detail on Highway-Rail Intersection components is available from the USDOT's Federal Railroad  
22      Administration, 1120 Vermont Ave., NW, Washington, DC 20590, or [www.fra.dot.gov](http://www.fra.dot.gov).

23      **Standard:**

24          **Traffic control devices, systems, and practices shall be consistent with the design and application of**  
25      **the Standards contained herein.**

26          **Before any new highway-rail grade crossing traffic control system is installed or before**  
27      **modifications are made to an existing system, approval shall be obtained from the highway agency with**  
28      **the jurisdictional and/or statutory authority, and from the railroad company.**

29      Guidance:

30          To stimulate effective responses from road users, these devices, systems, and practices should use the five  
31      basic considerations employed generally for traffic control devices and described fully in Section 1A.02:  
32      design, placement, operation, maintenance, and uniformity.

33      Support:

34          Many other details of highway-rail grade crossing traffic control systems that are not set forth in Part 8 are  
35      contained in the publications listed in Section 1A.11.

### 36      **Section 8A.03 Uniform Provisions**

37      **Standard:**

38          **All signs used in highway-rail grade crossing traffic control systems shall be retroreflectorized or**  
39      **illuminated as described in Section 2A.07 to show the same shape and similar color to an approaching**  
40      **road user during both day and night.**

41          **No sign or signal shall be located in the center of an undivided highway, except in a raised island.**

42      Guidance:

43          Any signs or signals mounted in a raised island in the center of an undivided highway should be installed  
44      with a clearance of at least 0.6 m (2 ft) from the outer edge of the raised island to the nearest edge of the sign  
45      or signal, except as permitted in Section 2A.19.

46          Where the distance between tracks, measured along the highway between the inside rails, exceeds 30 m  
47      (100 ft), additional signs or other appropriate traffic control devices should be used to inform approaching  
48      road users, especially non-motorized users, of the long distance to cross the tracks.

### 49      **Section 8A.04 Highway-Rail Grade Crossing Elimination**

50      Guidance:

1 Because highway-rail grade crossings are a potential source of crashes and congestion, agencies should  
2 conduct engineering studies to determine the cost and benefits of eliminating these crossings.

3 **Standard:**

4 **When a highway-rail grade crossing is eliminated, the traffic control devices for the crossing shall**  
5 **be removed.**

6 **If the existing traffic control devices at a multiple-track highway-rail grade crossing become**  
7 **improperly placed or inaccurate because of the removal of some of the tracks, the existing devices shall**  
8 **be relocated and/or modified.**

9 **Guidance:**

10 Any highway-rail grade crossing that cannot be justified should be eliminated.

11 Where a roadway is removed from a highway-rail grade crossing, the roadway approaches in the railroad  
12 right-of-way should also be removed and appropriate signs should be placed at the roadway end in accordance  
13 with Section 2L.04.

14 Where a railroad is eliminated at a highway-rail grade crossing, the tracks should be removed or paved  
15 over.

16 **Option:**

17 Based on engineering judgment, the TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-4) may be  
18 temporarily installed until the tracks are removed or paved over. The length of time before the tracks will be  
19 removed or paved over may be considered in making the decision as to whether to install the sign.

20 **Section 8A.05 Illumination at Highway-Rail Grade Crossings**

21 **Support:**

22 Illumination is sometimes installed at or adjacent to a highway-rail grade crossing in order to provide  
23 better nighttime visibility of the train and the highway-rail grade crossing (for example, where a substantial  
24 amount of railroad operations are conducted at night, where train speeds are low and highway-rail grade  
25 crossings are blocked for long periods, or where crash history indicates that road users experience difficulty in  
26 seeing trains or traffic control devices during hours of darkness).

27 Recommended types and locations of luminaires for illuminating highway-rail grade crossings are  
28 contained in the American National Standards Institute's (ANSI) "Practice for Roadway Lighting RP-8,"  
29 which is available from the Illuminating Engineering Society (see Section 1A.11).

30 **Section 8A.06 Temporary Traffic Control Zones**

31 **Support:**

32 Temporary traffic control planning provides for continuity of operations (such as movement of traffic,  
33 pedestrians and bicycles, transit operations, and access to property/utilities) when the normal function of a  
34 roadway at a highway-rail grade crossing is suspended because of temporary traffic control operations.

35 **Standard:**

36 **Traffic controls for temporary traffic control zones that include highway-rail grade crossings shall**  
37 **be as outlined in Part 6 of this Manual.**

38 **When a highway-rail grade crossing exists either within or in the vicinity of a temporary traffic**  
39 **control zone, lane restrictions, flagging, or other operations shall not be performed in a manner that**  
40 **would cause vehicles to stop on the railroad tracks, unless a uniformed law enforcement officer or**  
41 **flagger (see Chapter 6E) is provided at the highway-rail grade crossing to minimize the possibility of**  
42 **vehicles stopping on the tracks, even if automatic warning devices are in place.**

43 **Guidance:**

44 Public and private agencies, including emergency services, businesses, and railroad companies, should  
45 meet to plan appropriate traffic detours and the necessary signing, marking, and flagging requirements for  
46 operations during temporary traffic control zone activities. Consideration should be given to the length of  
47 time that the highway-rail grade crossing is to be closed, the type of rail and highway traffic affected, the time  
48 of day, and the materials and techniques of repair.

49 Temporary traffic control operations should minimize the inconvenience, delay, and crash potential to  
50 affected traffic. Prior notice should be given to affected public or private agencies, emergency services,

1 businesses, railroad companies, and road users before the free movement of road users or trains is infringed  
2 upon or blocked.

3 Temporary traffic control zone activities should not be permitted to extensively prolong the closing of the  
4 highway-rail grade crossing.

5 The width, grade, alignment, and riding quality of the highway surface at a highway-rail grade crossing  
6 should, at a minimum, be restored to correspond with the quality of the approaches to the highway-rail grade  
7 crossing.

8

## CHAPTER 8B. SIGNS AND MARKINGS

### Section 8B.01 Purpose

Support:

Passive traffic control systems, consisting of signs and pavement markings, identify and direct attention to the location of a highway-rail grade crossing and advise road users to slow down or stop at the crossing as necessary in order to yield to any rail traffic occupying, or approaching and in proximity to, the crossing.

### Section 8B.02 Sizes of Grade Crossing Signs

**Standard:**

The sizes of grade crossing signs shall be as shown in Table 8B-1.

Option:

Signs larger than those shown in Table 8B-1 may be used (see Section 2A.11).

### Section 8B.03 Highway-Rail Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks Plaque (R15-2P)

**Standard:**

Except as noted in the Option below, the Highway-Rail Grade Crossing (R15-1) sign, commonly identified as the Crossbuck sign, shall be retroreflectorized white with the words RAILROAD CROSSING in black lettering, mounted as shown in Figure 8B-1.

Option:

At non-signalized crossings, the Crossbuck sign may be retroreflectorized white with the words RAILROAD CROSSING in retroreflectorized red lettering, mounted as shown in Figure 8B-1.

Support:

The Crossbuck sign assigns the right-of-way to rail traffic at a highway-rail grade crossing.

**Standard:**

As a minimum, one Crossbuck sign shall be used on each highway approach to every highway-rail grade crossing, alone or in combination with other traffic control devices.

If automatic gates are not present and if there are two or more tracks at the highway-rail grade crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) plaque of inverted T shape mounted below the Crossbuck sign in the manner and at the height indicated in Figure 8B-1.

Option:

The supplemental Number of Tracks plaque may also be used at highway-rail grade crossings with automatic gates.

**Standard:**

The Crossbuck sign shall be installed on the right-hand side of the highway on each approach to the highway-rail grade crossing. Where restricted sight distance or unfavorable highway geometry exists on an approach to a highway-rail grade crossing, an additional Crossbuck sign shall be installed on the left-hand side of the highway, possibly placed back-to-back with the Crossbuck sign for the opposite approach, or otherwise located so that two Crossbuck signs are displayed for that approach.

A strip of retroreflective white material not less than 50 mm (2 in) in width shall be used on the back of each blade of each Crossbuck sign for the length of each blade, at all highway-rail grade crossings, except those where Crossbuck signs have been installed back-to-back.

A strip of retroreflective white material, not less than 50 mm (2 in) in width, shall be used on each support at passive highway-rail grade crossings for the full length of the front and back of the support from the Crossbuck sign or Number of Tracks plaque to within 0.6 m (2 ft) above the ground, except on the side of those supports where a STOP (R1-1) or YIELD(R1-2) sign or flashing lights have been installed or on the back side of supports for Crossbuck signs installed on one-way streets.

Guidance:

1 Crossbuck signs should be located with respect to the highway pavement or shoulder in accordance with  
2 the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest track  
3 in accordance with Figure 8C-2.

4 The minimum lateral offset for the nearest edge of the Crossbuck sign should be 1.8 m (6 ft) from the  
5 edge of the shoulder or 3.7 m (12 ft) from the edge of the traveled way in rural areas (whichever is greater),  
6 and 0.6 m (2 ft) from the face of the curb in urban areas.

7 Where unusual conditions make variations in location and lateral offset appropriate, engineering judgment  
8 should be used to provide the best practical combination of view and safety clearances.

#### 9 **Section 8B.04 Use and Meaning of STOP (R1-1) or YIELD (R1-2) Signs at Passive Highway-** 10 **Rail Grade Crossings**

##### 11 **Standard:**

12 **A YIELD (R1-2) sign or STOP (R1-1) sign shall be installed at all passive highway rail grade**  
13 **crossings, except where train crews always manually stop road users from entering the crossing.**

14 **A YIELD sign shall be the default traffic control device on all highway approaches to passive**  
15 **highway rail grade crossings unless an engineering study determines that a STOP sign is appropriate.**

##### 16 **Support:**

17 Because a STOP sign establishes a legal requirement for all approaching vehicles to come to a full stop,  
18 the indiscriminate use of STOP signs at all or many passive grade crossings can result in a high rate of non-  
19 compliance by road users, thus increasing the risk of collisions that are associated with non-compliance.

##### 20 **Guidance:**

21 The use of STOP signs at passive crossings should be limited to unusual conditions where requiring all  
22 vehicles to make a full stop is deemed essential by an engineering study or by engineering judgment. The  
23 following are among the factors that an engineering study or engineering judgment should consider:

- 24 A. The line of sight from an approaching highway vehicle to an approaching train;
- 25 B. The characteristics of the highway, such as the functional classification, geometric conditions, and  
26 traffic volumes and speed;
- 27 C. The characteristics of the railroad including, but not limited to, the frequency, type, and speed of  
28 trains, and the number of tracks;
- 29 D. The crash history at the crossing; and
- 30 E. The need for active control devices.

##### 31 **Support:**

32 Certain commercial motor vehicles and school buses are required to stop at all highway-rail grade  
33 crossings in accordance with 49 CFR 392.10 even if a YIELD sign (or just a Crossbuck sign) is posted.

#### 34 **Section 8B.05 Crossbuck Assemblies with YIELD (R1-2) Signs or STOP (R1-1) Signs at** 35 **Passive Highway-Rail Grade Crossings**

##### 36 **Standard:**

37 **A highway-rail grade crossing Crossbuck Assembly at a passive crossing shall consist of a**  
38 **Crossbuck (R15-1) sign, a Number of Tracks (R15-2P) plaque if two or more tracks are present, and**  
39 **either a YIELD (R1-2) sign or STOP (R1-1) sign installed on the same support, except as noted in the**  
40 **Option below.**

##### 41 **Option:**

42 If a YIELD sign or STOP sign is installed at a highway-rail grade crossing, it may be installed on the  
43 same support as the Crossbuck sign or it may be installed on a separate support at a point where the vehicle is  
44 to stop, or as near to that point as practical, but in either case, the YIELD sign or STOP sign is considered to  
45 be a part of the Crossbuck Assembly.

##### 46 **Standard:**

47 **At all public highway-rail grade crossings that are not equipped with the active traffic control**  
48 **systems that are described in Chapter 8C, a Crossbuck Assembly shall be installed on the right-hand**  
49 **side of the highway on each approach to the highway-rail grade crossing. Where restricted sight**  
50 **distance or unfavorable highway geometry exists on an approach to a highway-rail grade crossing, or**

1 **where there is a one-way multi-lane approach, an additional Crossbuck Assembly shall be installed on**  
2 **the left-hand side of the highway.**

3 Guidance:

4 At crossings where train speeds are above 16 km/h (10 mph) or where rail traffic movements cannot  
5 appropriately yield to road users, Crossbuck Assemblies should be provided and reasonable locations for such  
6 signs should be created by necessary roadway realignment or railway relocation.

7 Reasonable locations for Crossbuck Assemblies should not be in conflict with turning vehicles from  
8 roadways either closely parallel to the track or visually obstructed from approaching roadway users.

9 Crossbuck Assemblies should be located with respect to the highway pavement or shoulder in accordance  
10 with the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest  
11 track in accordance with Figure 8C-2.

12 The minimum lateral clearance for the nearest edge of the Crossbuck Assembly should be 1.8 m (6 ft)  
13 from the edge of the shoulder or 3.7 m (12 ft) from the edge of the traveled way in rural areas (whichever is  
14 greater), and 0.6 m (2 ft) from the face of the curb in urban areas.

15 Where unusual conditions make variations in location and lateral clearance appropriate, engineering  
16 judgment should be used to provide the best practical combination of view and safety clearances.

17 Support:

18 The meaning of a Crossbuck Assembly that includes a YIELD sign is that a road user approaching the  
19 highway-rail grade crossing needs to be prepared to decelerate, and when necessary, yield the right-of-way to  
20 any rail traffic that might be occupying the crossing or might be approaching and in such close proximity to  
21 the crossing that it would be unsafe for the road user to cross.

22 The meaning of a Crossbuck Assembly that includes a STOP sign is that a road user approaching the  
23 highway-rail grade crossing must come to a full and complete stop not less than (15 ft) short of the nearest  
24 rail, and remain stopped while the road user determines if there is rail traffic either occupying the crossing or  
25 approaching and in such close proximity to the crossing that the road user must yield the right-of-way to rail  
26 traffic. The road user is permitted to proceed when it is safe to cross.

27 **Standard:**

28 **If used at a passive crossing, a YIELD (R1-2) sign or STOP (R1-2) sign shall be installed in**  
29 **compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-1 and 8B-2.**

30 **When the YIELD sign or STOP sign is installed on the same support as the Crossbuck sign, a strip**  
31 **of retroreflective material shall be used on the front and back (except as noted in the Option below) of**  
32 **the support. The dimensions and placement of the retroreflective strip shall be in compliance with the**  
33 **Standards in Section 8B.03. The color of the retroreflective strip on the back of the support shall be**  
34 **white.**

35 Option:

36 The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck Assembly  
37 supports installed on one-way streets.

38 The color of the retroreflective strip on the front of the support where a YIELD sign or STOP sign is  
39 installed on the same support as the Crossbuck sign may be red (see Section 2A.21) or white (see Section  
40 8B.03).

41 If a YIELD (R1-2) sign is installed in conjunction with the Crossbuck sign, a yield line (see Section  
42 3B.16) may be installed to supplement the YIELD sign.

43 Guidance:

44 If a yield line is used, it should be a transverse line at a right angle to the traveled way at a point where a  
45 vehicle is to yield or stop or as near to that point as practical. The yield line should be placed no closer than  
46 4.6 m (15 ft) measured perpendicular from the nearest rail as shown in Figure 8B-7.

47 If a STOP (R1-1) sign is installed in conjunction with the Crossbuck sign, a stop line (see Section 3B.16)  
48 should be installed to indicate the point behind which vehicles are required to stop. The stop line should be  
49 placed no closer than 4.6 m (15 ft) measured perpendicular from the nearest rail as shown in Figure 8B-6.

50 If a YIELD sign or STOP sign is installed at a highway-rail grade crossing on a separate support than the  
51 Crossbuck sign (see Figure 8B-2), the YIELD sign or STOP sign should be placed at a point where the vehicle  
52 is to stop, or as near to that point as practical, but no closer than 4.6 m (15 ft) measured perpendicular from the  
53 nearest rail as shown in Figure 8B-7.



1 **Standard:**

2 At all highway-rail grade crossings where YIELD signs or STOP signs are installed, Stop Ahead  
3 (W3-1) or Yield Ahead (W3-2) signs shall also be installed if the criteria for their installation in Section  
4 2C.35 is met.

5 **Section 8B.06 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)**

6 **Standard:**

7 A Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-3) with a  
8 supplemental plaque describing the type of traffic control at the highway-rail grade crossing shall be  
9 used on each highway in advance of every highway-rail grade crossing except in the following  
10 circumstances:

- 11 A. On an approach to a highway-rail grade crossing from a T-intersection with a parallel highway  
12 if the distance from the edge of the track to the edge of the parallel roadway is less than 30 m  
13 (100 ft) and W10-3 signs are used on both approaches of the parallel highway;  
14 B. On low-volume, low-speed highways crossing minor spurs or other tracks that are infrequently  
15 used and are flagged by train crews;  
16 C. In business or commercial areas where active highway-rail grade crossing traffic control devices  
17 are in use; or  
18 D. Where physical conditions do not permit even a partially effective display of the sign.

19 The supplemental plaque shall be a No Signal (W10-10P) plaque where used in advance of a  
20 crossing that does not have active traffic control devices and shall be a SIGNAL AHEAD (W10-16P)  
21 plaque where used in advance of a crossing with active traffic control devices. The supplemental plaque  
22 shall be mounted directly below the W10-1 sign unless a NO TRAIN HORN (W10-9P) plaque (see  
23 Section 8B.15) is used, in which case the supplemental No Signal (W10-10P) or SIGNAL AHEAD (W10-  
24 16P) plaque shall be mounted directly below the W10-9P plaque.

25 Placement of the Highway-Rail Grade Crossing Advance Warning sign shall be in accordance with  
26 Section 2C.05 and Table 2C-4.

27 A Yield Ahead (W3-2) or Stop Ahead (W3-1) Advance Warning sign (see Figure 2C-6) shall also be  
28 installed if the criteria for their installation given in Section 2C.35 is met. If a Yield Ahead or Stop  
29 Ahead sign is installed on the approach to the crossing, the W10-1 sign and supplemental plaque shall  
30 be installed upstream from the Yield Ahead or Stop Ahead sign. The Yield Ahead or Stop Ahead sign  
31 shall be located in accordance with Table 2C-4. The minimum distance between the signs shall be in  
32 accordance with Section 2C.05 and Table 2C-4.

33 **Option:**

34 On divided highways and one-way streets, an additional W10-1 sign and supplemental plaque may be  
35 installed on the left-hand side of the roadway.

36 **Standard:**

37 If the distance between the railroad tracks and a parallel highway, from the edge of the tracks to  
38 the edge of the parallel roadway, is less than 30 m (100 ft), W10-2, W10-3, or W10-4 signs (see Figure  
39 8B-3) with a supplemental NO SIGNAL (W10-10P) or SIGNAL AHEAD (W10-16P) plaque describing  
40 the type of traffic control at the highway-rail grade crossing shall be installed on each approach of the  
41 parallel highway to warn road users making a turn that they will encounter a highway-rail grade  
42 crossing soon after making a turn, and a W10-1 sign for the approach to the tracks shall not be  
43 required to be between the tracks and the parallel highway.

44 If the W10-2, W10-3, or W10-4 signs and supplemental plaques are used, sign placement in  
45 accordance with the guidelines for Intersection Warning signs in Table 2C-4 using the speed of through  
46 traffic shall be measured from the highway intersection.

47 **Guidance:**

48 If the distance between the railroad tracks and the parallel highway, from the edge of the tracks to the  
49 edge of the parallel roadway, is 30 m (100 ft) or more, a W10-1 sign and supplemental plaque should be  
50 installed in advance of the highway-rail grade crossing, and the W10-2, W10-3, or W10-4 signs should not be  
51 used on the parallel highway.

52 **Section 8B.07 EXEMPT Highway-Rail Grade Crossing Plaques (R15-3P, W10-1aP)**

1 Option:

2 When authorized by law or regulation, a supplemental EXEMPT (R15-3P) plaque (see Figure 8B-4) with  
3 a white background bearing the word EXEMPT may be used below the Crossbuck sign or Number of Tracks  
4 plaque, if present, at the highway-rail grade crossing, and a supplemental EXEMPT (W10-1aP) plaque (see  
5 Figure 8B-6) with a yellow background bearing the word EXEMPT may be used below the Highway-Rail  
6 Advance Warning (W10-1) sign.

7 Support:

8 These supplemental plaques inform drivers of vehicles carrying passengers for hire, school buses carrying  
9 students, or vehicles carrying hazardous materials that a stop is not required at certain designated highway-rail  
10 grade crossings, except when a train, locomotive, or other railroad equipment is approaching or occupying the  
11 highway-rail grade crossing, or the driver's view is blocked.

## 12 **Section 8B.08 Turn Restrictions During Preemption**

13 Guidance:

14 At a signalized intersection that is located within 60 m (200 ft) of a highway-rail grade crossing, measured  
15 from the edge of the track to the edge of the roadway, where the intersection traffic control signals are  
16 preempted by the approach of a train, all existing turning movements toward the highway-rail grade crossing  
17 should be prohibited during the signal preemption sequences.

18 Option:

19 A blank-out or changeable message sign and/or appropriate highway traffic signal indication or other  
20 similar type sign may be used to prohibit turning movements toward the highway-rail grade crossing during  
21 preemption. The R3-1a and R3-2a signs shown in Figure 8B-4 may be used for this purpose.

22 **Standard:**

23 **Turn prohibition signs that are associated with preemption shall be visible only when the highway-**  
24 **rail grade crossing restriction is in effect.**

## 25 **Section 8B.09 DO NOT STOP ON TRACKS Sign (R8-8)**

26 Guidance:

27 Whenever engineering judgment determines that the potential for vehicles stopping on the tracks is high, a  
28 DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-4) should be used.

29 The sign, if used, should be located on the right-hand side of the highway on either the near or far side of  
30 the highway-rail grade crossing, depending upon which side provides better visibility to approaching drivers.

31 Option:

32 DO NOT STOP ON TRACKS signs may be placed on both sides of the track.

33 On divided highways and one-way streets, a second DO NOT STOP ON TRACKS sign may be placed on  
34 the near or far left-hand side of the highway-rail grade crossing to further improve visibility of the sign.

## 35 **Section 8B.10 TRACKS OUT OF SERVICE Sign (R8-9)**

36 Option:

37 The TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-4) may be used at a highway-rail grade  
38 crossing instead of a Crossbuck (R15-1) sign and a Number of Tracks (R15-2P) plaque (see Figure 8B-1)  
39 when railroad tracks have been temporarily or permanently abandoned, but only until such time that the tracks  
40 are removed or paved over.

41 **Standard:**

42 **When tracks are out of service, traffic control devices and gate arms shall be removed and the**  
43 **signal heads shall be removed or hooded or turned from view to clearly indicate that they are not in**  
44 **operation.**

45 **The R8-9 sign shall be removed when the tracks have been removed or covered or when the**  
46 **highway-rail grade crossing is returned to service.**

## 47 **Section 8B.11 STOP HERE WHEN FLASHING Sign (R8-10, R8-10a)**

48 Option:

1 The STOP HERE WHEN FLASHING (R8-10, R8-10a) sign (see Figure 8B-4) may be used at a highway-  
2 rail grade crossing to inform drivers of the location of the stop line or the point at which to stop when the  
3 flashing-light signals (see Section 8C.02) are activated.

#### 4 **Section 8B.12 STOP HERE ON RED Sign (R10-6, R10-6a)**

5 Support:

6 The STOP HERE ON RED (R10-6, R10-6a) sign (see Figure 8B-4) defines and facilitates observance of  
7 stop lines at traffic control signals.

8 Option:

9 A STOP HERE ON RED sign may be used at locations where vehicles frequently violate the stop line or  
10 where it is not obvious to road users where to stop.

11 Guidance:

12 If possible, stop lines should be placed at a point where the vehicle driver has adequate sight distance  
13 along the track.

#### 14 **Section 8B.13 Emergency Notification Sign (I-13)**

15 Guidance:

16 Emergency Notification (I-13) signs (see Figure 8B-5) should be installed at all highway-rail grade  
17 crossings to provide information to road users so that they can notify the railroad company about emergencies  
18 or malfunctioning traffic control devices.

19 **Standard:**

20 **When Emergency Notification signs are used, they shall, at a minimum, include the U.S. DOT grade**  
21 **crossing inventory number and the emergency contact telephone number in letters and numbers that**  
22 **are at least 13 mm (0.5 in) in height.**

23 **The Emergency Notification signs shall be positioned so as to not obstruct any traffic control**  
24 **devices or limit the view of trains approaching the highway-rail grade crossing.**

25 Option:

26 In lieu of Emergency Notification signs, the U.S. DOT grade crossing inventory number and the  
27 emergency contact telephone number may be displayed on the enclosure for the signal apparatus at crossings  
28 that are equipped with active traffic control systems if the signal apparatus enclosure is located in direct view  
29 of road users at or near the crossing.

30 **Standard:**

31 **Emergency Notification Signs shall have a white legend and border on a blue background.**

32 Guidance:

33 Emergency Notification signs should be retroreflective.

34 Emergency Notification signs, or the information placed on the signal apparatus enclosure, should be  
35 oriented so as to face vehicles stopped on or at the crossing or on the traveled way near the crossing.

36 At station crossings, Emergency Notification signs or information should be posted in a conspicuous  
37 location.

38 Emergency Notification signs mounted on Crossbuck Assemblies or signal masts should only be large  
39 enough to provide the necessary contact information. Use of larger signs that might obstruct the view of trains  
40 or other vehicles should be avoided.

#### 41 **Section 8B.14 TRAINS MAY EXCEED 130 km/h (80 MPH) Sign (W10-8)**

42 Guidance:

43 Where trains are permitted to travel at speeds exceeding 130 km/h (80 mph), a TRAINS MAY EXCEED  
44 130 km/h (80 MPH) (W10-8) sign (see Figure 8B-6) should be installed facing road users approaching the  
45 highway-rail grade crossing.

46 If used, the TRAINS MAY EXCEED 130 km/h (80 MPH) signs should be installed between the  
47 Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-3) and the highway-rail grade  
48 crossing on all approaches to the highway-rail grade crossing. The locations should be determined based on  
49 specific site conditions.

1 **Section 8B.15 NO TRAIN HORN Plaque (W10-9P)**

2 **Standard:**

3 A NO TRAIN HORN (W10-9P) plaque (see Figure 8B-6) shall be installed at each highway-rail  
4 grade crossing where there is a Federal Railroad Administration authorization for trains to not sound a  
5 horn. The plaque shall supplement and be mounted directly below the Highway-Rail Grade Crossing  
6 Advance Warning (W10-1) sign (see Figure 8B-3).

7 **Section 8B.16 LOOK Sign (R15-8)**

8 **Option:**

9 At highway-rail grade crossings, the LOOK (R15-8) sign (see Figure 8B-4) may be mounted on a separate  
10 post in the immediate vicinity of the highway-rail grade crossing on the railroad right-of-way.

11 **Section 8B.17 Low Ground Clearance Highway-Rail Grade Crossing Sign (W10-5)**

12 **Guidance:**

13 If the highway profile conditions are sufficiently abrupt to create a hang-up situation for long wheelbase  
14 vehicles or for trailers with low ground clearance, the Low Ground Clearance Highway-Rail Grade Crossing  
15 (W10-5) sign (see Figure 8B-6) should be installed in advance of the highway-rail grade crossing.

16 **Standard:**

17 **Because this symbol might not be readily recognizable by the public, the Low Ground Clearance**  
18 **Highway-Rail Grade Crossing (W10-5) warning sign shall be accompanied by an educational plaque,**  
19 **LOW GROUND CLEARANCE. The LOW GROUND CLEARANCE educational plaque shall remain**  
20 **in place for at least 3 years after the initial installation of the W10-5 sign (see Section 2A.12).**

21 **Guidance:**

22 Auxiliary plaques such as AHEAD, NEXT CROSSING, or USE NEXT CROSSING (with appropriate  
23 arrows), or a supplemental distance plaque should be placed below the W10-5 sign at the nearest intersecting  
24 highway where a vehicle can detour or at a point on the highway wide enough to permit a U-turn.

25 If engineering judgment of roadway geometric and operating conditions confirms that vehicle speeds  
26 across the railroad tracks should be below the posted speed limit, a W13-1P advisory speed plaque should be  
27 posted.

28 **Option:**

29 If the highway-rail grade crossing is rough, word message signs such as BUMP, DIP, or ROUGH  
30 CROSSING may be installed. A W13-1P advisory speed plaque may be installed below the word message  
31 sign in advance of rough crossings.

32 **Support:**

33 Information on railroad ground clearance requirements is also available in the “American Railway  
34 Engineering and Maintenance-of-Way Association’s Engineering Manual,” or the American Association of  
35 State Highway and Transportation Officials’ “Policy on Geometric Design of Highways and Streets” (see  
36 Section 1A.11).

37 **Section 8B.18 Storage Space Signs (W10-11, W10-11a, W10-11b)**

38 **Guidance:**

39 A Storage Space (W10-11) sign supplemented by a word message storage distance (W10-11a) sign (see  
40 Figure 8B-6) should be used where there is a highway intersection in close proximity to the highway-rail  
41 grade crossing and an engineering study determines that adequate space is not available to store a design  
42 vehicle(s) between the highway intersection and the train dynamic envelope.

43 The Storage Space (W10-11 and W10-11a) signs should be mounted in advance of the highway-rail grade  
44 crossing at an appropriate location to advise drivers of the space available for vehicle storage between the  
45 highway intersection and the highway-rail grade crossing.

46 **Option:**

47 A Storage Space (W10-11b) sign (see Figure 8B-6) may be mounted beyond the highway-rail grade  
48 crossing at the highway intersection under the STOP or YIELD sign or just prior to the signalized intersection  
49 to remind drivers of the storage space between the tracks and the highway intersection.

1 **Section 8B.19 Skewed Crossing Sign (W10-12)**

2 Option:

3 The Skewed Crossing (W10-12) sign (see Figure 8B-6) may be used at a skewed highway-rail grade  
4 crossing to warn road users that the railroad tracks are not perpendicular to the highway.

5 Guidance:

6 If the Skewed Crossing sign is used, the symbol should show the direction of the crossing (near left to far  
7 right as shown in Figure 8B-6, or the mirror image if the track goes from far left to near right). If the Skewed  
8 Crossing sign is used where the angle of the crossing is significantly different than 45 degrees, the symbol  
9 should show the approximate angle of the crossing.

10 **Standard:**

11 **The Skewed Crossing sign shall not be used as a replacement for the required Advance Warning**  
12 **(W10-1) sign. If used, the Skewed Crossing sign shall supplement the W10-1 sign and shall be mounted**  
13 **on a separate post.**

14 **Section 8B.20 Pavement Markings**

15 **Standard:**

16 **All highway-rail grade crossing pavement markings shall be retroreflectorized white. All other**  
17 **markings shall be in accordance with Part 3.**

18 **On paved roadways, pavement markings in advance of a highway-rail grade crossing shall consist**  
19 **of an X, the letters RR, a no-passing zone marking (on two-lane, two-way highways with center line**  
20 **markings in compliance with Section 3B.01), and certain transverse lines as shown in Figures 8B-7 and**  
21 **8B-8.**

22 **Identical markings shall be placed in each approach lane on all paved approaches to highway-rail**  
23 **grade crossings where signals or automatic gates are located, and at all other highway-rail grade**  
24 **crossings where the posted or statutory highway speed is 60 km/h (40 mph) or greater.**

25 **Pavement markings shall not be required at highway-rail grade crossings where the posted or**  
26 **statutory highway speed is less than 60 km/h (40 mph). In urban areas, pavement markings shall not be**  
27 **required at highway-rail grade crossings if an engineering study indicates that other installed devices**  
28 **provide suitable warning and control.**

29 Guidance:

30 When pavement markings are used, the center of the X symbol should be directly in line with the  
31 Advance Warning sign. The X symbol and letters should be elongated to allow for the low angle at which  
32 they will be viewed.

33 Option:

34 When justified by engineering judgment, supplemental pavement marking symbol(s) may be placed  
35 between the Advance Warning sign and the highway-rail grade crossing.

36 **Section 8B.21 Stop Lines**

37 **Standard:**

38 **On paved roadways at highway-rail grade crossings that are equipped with active control devices**  
39 **such as flashing-light signals, gates, or traffic control signals, a stop line (see Section 3B.16) shall be**  
40 **installed to indicate the point behind which vehicles are required to stop.**

41 Guidance:

42 The stop line should be a transverse line at a right angle to the traveled way at a point where a vehicle is to  
43 stop or as near to that point as practical. The stop line should be placed approximately 2.4 m (8 ft) from the  
44 gate (if present), but no closer than 4.6 m (15 ft) from the nearest rail.

45 Support:

46 Section 8B.05 contains provisions regarding the use of stop lines or yield lines at passive grade crossings.

47 **Section 8B.22 Dynamic Envelope Markings**

48 Option:

1 Dynamic envelope markings may be used to mark the edges of the dynamic envelope where there is a  
2 highway intersection in close proximity to the highway-rail grade crossing and an engineering study  
3 determines that vehicles might stop within the dynamic envelope area.

4 Dynamic envelope markings may be installed at all highway-rail grade crossings, unless a Four-Quadrant  
5 Gate system (see Section 8C.05) is used.

6 **Standard:**

7 **If used, pavement markings for indicating the dynamic envelope shall comply with the provisions of**  
8 **Part 3 and shall be a 100 mm (4 in) normal solid white line or contrasting pavement color and/or**  
9 **contrasting pavement texture.**

10 **Guidance:**

11 If used, dynamic envelope pavement markings should be placed on the highway 1.8 m (6 ft) from the  
12 nearest rail, installed parallel to the tracks, unless the operating railroad company advises otherwise. The  
13 pavement markings should extend across the roadway as shown in Figure 8B-9.  
14

## CHAPTER 8C. FLASHING-LIGHT SIGNALS, GATES, AND TRAFFIC CONTROL SIGNALS

### Section 8C.01 Introduction

Support:

Active traffic control systems inform road users of the approach or presence of trains, locomotives, or other railroad equipment at highway-rail grade crossings.

A composite drawing (see Figure 8C-1) shows a post-mounted flashing-light signal (two light units mounted in a horizontal line), a flashing-light signal mounted on an overhead structure, and an automatic gate assembly.

Option:

Post-mounted and overhead flashing-light signals may be used separately or in combination with each other as determined by an engineering study. Also, flashing-light signals may be used without automatic gate assemblies, as determined by an engineering study.

**Standard:**

**The meaning of flashing-light signals and gates shall be as stated in the “Uniform Vehicle Code” (see Sections 11-701 and 11-703 of the “UVC”), which is available from the National Committee on Uniform Traffic Laws and Ordinances (see Page i for the address).**

**Location and clearance dimensions for flashing-light signals and gates shall be as shown in Figure 8C-1.**

**When there is a curb, a horizontal clearance of at least 0.6 m (2 ft) shall be provided from the face of the vertical curb to the closest part of the signal or gate arm in its upright position. When a cantilevered-arm flashing-light signal is used, the vertical clearance shall be at least 5.2 m (17 ft) above the crown of the highway to the lowest point of the signal unit.**

**Where there is a shoulder, but no curb, a horizontal clearance of at least 0.6 m (2 ft) from the edge of a paved or surfaced shoulder shall be provided, with a clearance of at least 1.8 m (6 ft) from the edge of the traveled way.**

**Where there is no curb or shoulder, the minimum horizontal clearance shall be 1.8 m (6 ft) from the edge of the traveled way.**

Guidance:

Equipment housings (controller cabinets) should have a lateral offset of at least 9 m (30 ft) from the edge of the highway, and where railroad property and conditions allow, at least 7.6 m (25 ft) from the nearest rail.

If a pedestrian route is provided, sufficient clearance from supports, posts, and gate mechanisms should be maintained for pedestrian travel.

When determined by an engineering study, a lateral escape route to the right of the highway in advance of the highway-rail grade crossing traffic control devices should be kept free of guardrail or other ground obstructions. Where guardrail is not deemed necessary or appropriate, barriers should not be used for protecting signal supports.

The same lateral offset and roadside safety features should apply to flashing-light signal and automatic gate locations on both the right-hand and left-hand sides of the roadway.

Option:

In industrial or other areas involving only low-speed highway traffic or where signals are vulnerable to damage by turning truck traffic, guardrail may be installed to provide protection for the signal assembly.

### Section 8C.02 Flashing-Light Signals, Post-Mounted

**Standard:**

**The flashing-light signal assembly (shown in Figure 8C-1) on the side of the highway shall include a standard Crossbuck (R15-1) sign, and where there is more than one track, a supplemental Number of Tracks (R15-2P) plaque, all of which indicate to motorists, bicyclists, and pedestrians the location of a highway-rail grade crossing.**

Option:

1 Bells or other audible warning devices may be included in the assembly and may be operated in  
2 conjunction with the flashing lights to provide additional warning for pedestrians, bicyclists, and/or other non-  
3 motorized road users.

4 **Standard:**

5 **When indicating the approach or presence of a train, the flashing-light signal shall display toward**  
6 **approaching highway traffic two red lights mounted in a horizontal line flashing alternately.**

7 **Flashing-light signals shall be placed to the right of approaching highway traffic on all highway**  
8 **approaches to a highway-rail grade crossing. They shall be located laterally with respect to the**  
9 **highway in conformance with Figure 8C-1 except where such location would adversely affect signal**  
10 **visibility.**

11 **At highway-rail grade crossings with highway traffic in both directions, back-to-back pairs of lights**  
12 **shall be placed on each side of the tracks. On multi-lane one-way streets and divided highways,**  
13 **flashing-light signals shall be placed on the approach side of the highway-rail grade crossing on both**  
14 **sides of the roadway or shall be placed above the highway.**

15 **Each red signal unit in the flashing-light signal shall flash alternately. The number of flashes per**  
16 **minute for each lamp shall be 35 minimum and 65 maximum. Each lamp shall be illuminated**  
17 **approximately the same length of time. Total time of illumination of each pair of lamps shall be the**  
18 **entire operating time. Flashing-light units shall use either 200 mm (8 in) or 300 mm (12 in) nominal**  
19 **diameter lenses.**

20 **Guidance:**

21 In choosing between the 200 mm (8 in) or 300 mm (12 in) nominal diameter lenses for use in highway-  
22 rail grade crossing flashing-light signals, consideration should be given to the principles stated in Section  
23 4D.05.

24 **Standard:**

25 **Highway-rail grade crossing flashing-light signals shall operate at a low voltage using storage**  
26 **batteries either as a primary or stand-by source of electrical energy. Provision shall be made to provide**  
27 **a source of energy for charging batteries.**

28 **Option:**

29 Additional pairs of flashing-light units may be mounted on the same supporting post and directed toward  
30 vehicular traffic approaching the highway-rail grade crossing from other than the principal highway route,  
31 such as where there are approaching routes on highways closely adjacent to and parallel to the railroad.

32 **Section 8C.03 Flashing-Light Signals, Overhead Structures**

33 **Option:**

34 Flashing-light signals may be installed on overhead structures or cantilevered supports as shown in Figure  
35 8C-1 where needed for additional emphasis, or for better visibility to approaching traffic, particularly on  
36 multi-lane approaches or highways with profile restrictions.

37 If it is determined by an engineering study that one set of flashing lights on the cantilever arm is not  
38 sufficiently visible to road users, one or more additional sets of flashing lights may be mounted on the  
39 supporting post and/or on the cantilever arm.

40 **Standard:**

41 **Breakaway or frangible bases shall not be used for overhead structures or cantilevered supports.**

42 **Except as noted in this Section, flashing-light signals mounted overhead shall comply with the**  
43 **applicable provisions of Section 8C.02.**

44 **Section 8C.04 Automatic Gates**

45 **Support:**

46 An automatic gate is a traffic control device used in conjunction with flashing-light signals.

47 **Standard:**

48 **The automatic gate (see Figure 8C-1) shall consist of a drive mechanism and a fully**  
49 **retroreflectorized red- and white-striped gate arm with lights. When in the down position, the gate arm**  
50 **shall extend across the approaching lanes of highway traffic.**



1       **In the normal sequence of operation, unless constant warning time or other advanced system**  
2 **requires otherwise, the flashing-light signals and the lights on the gate arm (in its normal upright**  
3 **position) shall be activated immediately upon detection of the approaching train. The gate arm shall**  
4 **start its downward motion not less than 3 seconds after the flashing-light signals start to operate, shall**  
5 **reach its horizontal position at least 5 seconds before the arrival of the train, and shall remain in the**  
6 **down position as long as the train occupies the highway-rail grade crossing.**

7       **When the train clears the highway-rail grade crossing, and if no other train is detected, the gate**  
8 **arm shall ascend to its upright position, following which the flashing-light signals and the lights on the**  
9 **gate arm shall cease operation.**

10       **Gate arms shall be fully retroreflectorized on both sides, have vertical stripes alternately red and**  
11 **white at 400 mm (16 in) intervals measured horizontally, and shall have at least three red lights as**  
12 **indicated in Figure 8C-1.**

13       **When activated, the gate arm light nearest the tip shall be illuminated continuously and the other**  
14 **lights shall flash alternately in unison with the flashing-light signals.**

15       **The entrance gate arm mechanism shall be designed to fail safe in the down position.**

16       **Guidance:**

17       The gate arm should ascend to its upright position in not more than 12 seconds.

18       In its normal upright position, when no train is approaching or occupying the highway-rail grade crossing,  
19 the gate arm should be either vertical or nearly so (see Figure 8C-1).

20       In the design of individual installations, consideration should be given to timing the operation of the gate  
21 arm to accommodate large and/or slow-moving vehicles.

22       The gates should cover the approaching highway to block all motor vehicles from being driven around the  
23 gate without crossing the center line.

24       **Option:**

25       Automatic gate installations may include median islands between opposing lanes on an approach to a  
26 highway-rail grade crossing.

27       Where gates are located in the median, additional median width may be required to provide the minimum  
28 clearance for the counterweight supports.

## 29       **Section 8C.05 Four-Quadrant Gate Systems**

30       **Option:**

31       Four-Quadrant Gate systems may be installed to improve safety at highway-rail grade crossings based on  
32 an engineering study when less restrictive measures, such as automatic gates and median islands, are not  
33 effective.

34       **Standard:**

35       **A Four-Quadrant Gate system shall consist of a series of automatic gates used in conjunction with**  
36 **flashing-light signals to control traffic on all lanes entering and exiting the highway-rail grade crossing.**

37       **The Four-Quadrant Gate system shall consist of a drive mechanism and fully retroreflectorized**  
38 **red- and white-striped gate arms with lights, and when in the down position the gate arms extend**  
39 **individually across the entrance and exit lanes of highway traffic as shown in Figure 8C-2. Standards**  
40 **contained in Sections 8C.01 through 8C.03 for flashing-light signals shall be followed for signal**  
41 **specifications, location, and clearance distances.**

42       **In the normal sequence of operation, unless constant warning time or other advanced system**  
43 **requires otherwise, the flashing-light signals and the lights on the gate arms (in their normal upright**  
44 **positions) shall be activated immediately upon detection of the approaching train. The gate arms for**  
45 **the entrance lanes of traffic shall start their downward motion not less than 3 seconds after the flashing-**  
46 **light signals start to operate and shall reach their horizontal position at least 5 seconds before the**  
47 **arrival of the train. Exit gate arm activation and downward motion shall be based on detection or**  
48 **timing requirements established by an engineering study of the individual site. The gate arms shall**  
49 **remain in the down position as long as the train occupies the highway-rail grade crossing.**

50       **When the train clears the highway-rail grade crossing, and if no other train is detected, the gate**  
51 **arms shall ascend to their upright positions, following which the flashing-light signals and the lights on**  
52 **the gate arms shall cease operation.**

1        **Gate arm design, colors, and lighting requirements shall be in accordance with the Standards**  
2 **contained in Section 8C.04.**

3        **Except as noted in the Option below, the exit gate arm mechanism shall be designed to fail-safe in**  
4 **the up position.**

5        **At locations where gate arms are offset a sufficient distance for vehicles to drive between the**  
6 **entrance and exit gate arms, median islands shall be installed in accordance with the needs established**  
7 **by an engineering study.**

8        Guidance:

9            The gate arm should ascend to its upright position in not more than 12 seconds.

10          Four-Quadrant Gate systems should only be used in locations with constant-warning-time train detection.

11          The operating mode of the exit gates should be determined based upon an engineering study, with input  
12 from the affected railroad company.

13          If the Timed Exit Gate Operating Mode is used, the engineering study, with input from the affected  
14 railroad company, should also determine the Exit Gate Clearance Time (see Section 8A.01).

15          If the Dynamic Exit Gate Operating Mode is used, vehicle intrusion detection devices should be installed  
16 to control exit gate operation based on vehicle presence within the minimum track clearance distance.

17          Regardless of which exit gate operating mode is used, the Exit Gate Clearance Time should be considered  
18 when determining additional time requirements for the Minimum Warning Time.

19          If a Four-Quadrant Gate system is used at a location that is adjacent to an intersection that could cause  
20 vehicles to queue within the minimum track clearance distance, the Dynamic Exit Gate Operating Mode  
21 should be used unless an engineering study indicates otherwise.

22          If a Four-Quadrant Gate system is interconnected with a highway traffic signal, backup or standby power  
23 should be considered for the highway traffic signal. Also, circuitry should be installed to prevent the highway  
24 traffic signal from leaving the track clearance green interval until all of the gates are lowered.

25          At locations where sufficient space is available, exit gates should be positioned downstream from the  
26 track a distance that provides a safety zone long enough to accommodate at least one design vehicle between  
27 the exit gate and the nearest rail.

28          Four-Quadrant Gate systems should include remote health (status) monitoring capable of automatically  
29 notifying railroad signal maintenance personnel when anomalies have occurred within the system.

30        Option:

31            Exit gate arms may fail in the down position if the highway-rail grade crossing is equipped with remote  
32 health (status) monitoring.

33          Four-Quadrant Gate installations may include median islands between opposing lanes on an approach to a  
34 highway-rail grade crossing.

35        Guidance:

36            Where sufficient space is available, median islands should be at least 18 m (60 ft) in length.

### 37 **Section 8C.06 Wayside Horn Systems**

38        Option:

39            Wayside horn systems may be installed to provide directional audible warning at highway-rail grade  
40 crossings, including pedestrian or other non-motorized facility grade crossings or other applications, as  
41 determined by a diagnostic team. Wayside horn systems may either be installed to provide supplemental  
42 audible warning where the locomotive-mounted horn is sounded or as an alternative to the sounding of a  
43 locomotive-mounted horn.

44        **Standard:**

45            **A wayside horn system shall consist of a horn or series of horns used in conjunction with train-**  
46 **activated warning systems to provide audible warning of an approaching train for traffic on the**  
47 **highway approaches to the highway-rail grade crossing.**

48            **The wayside horn system shall be designed using fail-safe principles. A means shall be employed to**  
49 **verify the sound output from the wayside horn system.**

1       **If a wayside horn system is used at a highway-rail grade crossing where the locomotive-mounted**  
2 **horn is not sounded, the highway-rail grade crossing shall be equipped with flashing-light signals and**  
3 **gates.**

4       **Wayside horn systems used at highway-rail grade crossings where the locomotive-mounted horn is**  
5 **not sounded shall be equipped with a confirmation indicator and shall operate in conformance with 49**  
6 **CFR Part 222. For other applications, the wayside horn minimum sound level shall be determined by a**  
7 **diagnostic team.**

8       **The wayside horn system shall simulate a train horn and produce sound output for a minimum of**  
9 **15 seconds prior to the train's arrival at the highway-rail grade crossing, or simultaneously with the**  
10 **activation of the flashing-light signals or the descent of the gate, and shall continue to produce sound**  
11 **output until the lead locomotive has traversed the crossing. Where multiple tracks are present, the**  
12 **wayside horn system shall immediately reactivate when another train is detected before the previous**  
13 **train clears the crossing.**

14       **The wayside horn system shall be directed toward approaching road users; however, directing the**  
15 **wayside horn system toward approaching road users on adjacent roadways whose movement toward**  
16 **the crossing is controlled by a STOP sign or traffic control signal shall not be required.**

17       **The highway-rail grade crossing shall be equipped with constant warning time train detection**  
18 **circuitry unless conditions at the crossing would prevent the proper operation of the constant warning**  
19 **time device.**

20 Guidance:

21       Wayside horn systems should be installed to provide audible warning for each roadway approach to the  
22 highway-rail grade crossing. The same lateral clearance and roadside safety features should apply to wayside  
23 horn systems as described in the Standards contained in Section 8C.01. Wayside horn systems, when  
24 mounted on a separate pole assembly, should be installed no closer than 4.6 m (15 ft) from the center of the  
25 nearest track and should be positioned to not obstruct the motorists' line of sight of the flashing-light signals.

26       Prior to installing any wayside horn system, the responsibility for maintenance of the system and all of the  
27 appurtenances, hardware, and software should be clearly established. The responsible agency should provide  
28 for the maintenance of the system and the appurtenances to retain the proper functioning of the device.

29 Option:

30       Wayside horn systems may include a delay of 3 to 5 seconds after the activation of the flashing-light  
31 signals before sounding.

32       Wayside horn systems may include remote health (status) monitoring capable of automatically notifying  
33 maintenance personnel when anomalies have occurred within the system.

34       Wayside horn systems may be equipped with a back-up power system.

## 35 **Section 8C.07 Train Detection**

36 **Standard:**

37       **The devices employed in active traffic control systems shall be actuated by some form of train**  
38 **detection.**

39       **Train detection circuits, insofar as practical, shall be designed on the fail-safe principle.**

40       **Flashing-light signals shall operate for at least 20 seconds before the arrival of any train, except as**  
41 **noted in the Option below.**

42 Option:

43       On tracks where all trains operate at less than 30 km/h (20 mph) and where an employee on the ground  
44 manually stops road users from entering the crossing, a shorter signal operating time for the flashing-light  
45 signals may be used.

46       Additional warning time may be provided when determined by an engineering study.

47 Guidance:

48       Where the speeds of different trains on a given track vary considerably under normal operation, special  
49 devices or circuits should be installed to provide reasonably uniform notice in advance of all train movements  
50 over the highway-rail grade crossing. Special control features should be used to eliminate the effects of  
51 station stops and switching operations within approach control circuits to prevent excessive activation of the  
52 traffic control devices while trains are stopped on or switching upon the approach track control circuits.

1 **Section 8C.08 Traffic Control Signals at or Near Highway-Rail Grade Crossings**

2 Option:

3 Traffic control signals may be used instead of flashing-light signals to control road users at industrial  
4 highway-rail grade crossings and other places where train movements are very slow, such as in switching  
5 operations.

6 **Standard:**

7 **The appropriate provisions of Part 4 relating to traffic control signal design, installation, and**  
8 **operation shall be applicable where traffic control signals are used to control road users instead of**  
9 **flashing-light signals at highway-rail grade crossings.**

10 **Traffic control signals shall not be used instead of flashing-light signals to control road users at a**  
11 **mainline highway-rail grade crossing.**

12 Guidance:

13 If a highway-rail grade crossing is equipped with a flashing-light signal system and is located within 60 m  
14 (200 ft) of an intersection or midblock location controlled by a traffic control signal, the traffic control signal  
15 should be provided with preemption in accordance with Section 4D.27.

16 Coordination with the flashing-light signal system, queue detection, or other alternatives should be  
17 considered for traffic control signals located farther than 60 m (200 ft) from the highway-rail grade crossing.  
18 Factors to be considered should include traffic volumes, vehicle mix, vehicle and train approach speeds,  
19 frequency of trains, and queue lengths.

20 Except for traffic control signals interconnected with light rail transit systems, traffic control signals with  
21 railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up  
22 power supply.

23 The highway agency or authority with jurisdiction and the regulatory agency with statutory authority, if  
24 applicable, should jointly determine the preemption operation and the timing of traffic control signals  
25 interconnected with highway-rail grade crossings adjacent to signalized highway intersections.

26 **Standard:**

27 **Information regarding the type of preemption and any related timing parameters shall be provided**  
28 **to the railroad company so that they can design the appropriate train detection circuitry.**

29 **If preemption is provided, the normal sequence of traffic control signal indications shall be**  
30 **preempted upon the approach of trains to avoid entrapment of vehicles on the highway-rail grade**  
31 **crossing by conflicting aspects of the traffic control signals and the highway-rail grade crossing**  
32 **flashing-light signals.**

33 **This preemption feature shall have an electrical circuit of the closed-circuit principle, or a**  
34 **supervised communication circuit between the control circuits of the highway-rail grade crossing**  
35 **warning system and the traffic control signal controller. The traffic control signal controller preemptor**  
36 **shall be activated via the supervised communication circuit or the electrical circuit that is normally**  
37 **energized by the control circuits of the highway-rail grade crossing warning system. The approach of a**  
38 **train to a highway-rail grade crossing shall de-energize the electrical circuit or activate the supervised**  
39 **communication circuit, which in turn shall activate the traffic control signal controller preemptor. This**  
40 **shall establish and maintain the preemption condition during the time the highway-rail grade crossing**  
41 **warning system is activated, except that when crossing gates exist, the preemption condition shall be**  
42 **maintained until the crossing gates are energized to start their upward movement. When multiple or**  
43 **successive preemptions occur, train activation shall receive first priority.**

44 Guidance:

45 If a highway-rail grade crossing is located within 15 m (50 ft) (or within 23 m (75 ft) for a highway that is  
46 regularly used by multi-unit vehicles) of an intersection controlled by a traffic control signal, the use of pre-  
47 signals to control traffic approaching the grade crossing should be considered.

48 **Standard:**

49 **If used, the pre-signals shall display a steady red signal indication during the track clearance**  
50 **portion of a signal preemption sequence to prohibit additional vehicles from crossing the railroad track.**

51 Guidance:

52 Consideration should be given to using visibility-limited signal faces (see Section 4A.02) at the  
53 intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

1 Option:

2 The pre-signal phase sequencing may be timed with an offset from the downstream signalized intersection  
3 such that the railroad track area and the area between the railroad track and the downstream signalized  
4 intersection is generally kept clear of stopped vehicles.

5 **Standard:**

6 **If a pre-signal is installed at an interconnected highway-rail grade crossing near a signalized**  
7 **intersection, a STOP HERE ON RED (R10-6) sign shall be installed near the pre-signal or at the stop**  
8 **line if used. If there is a nearby signalized intersection with insufficient clear storage distance for a**  
9 **design vehicle, or the highway-rail grade crossing does not have gates, a No Turn on Red (R10-11, R10-**  
10 **11a, or R10-11b) sign (see Section 2B.59) shall be installed for the approach that crosses the railroad**  
11 **track.**

12 Option:

13 At locations where a highway-rail grade crossing is located more than 15 m (50 ft) (or more than 23 m (75  
14 ft) for a highway regularly used by multi-unit vehicles) from an intersection controlled by a traffic control  
15 signal, a pre-signal may be used if an engineering study determines a need.

16 If highway traffic signals must be located within close proximity to the flashing-light signal system, the  
17 highway traffic signals may be mounted on the same overhead structure as the flashing-light signals.

18 Support:

19 Section 4C.10 describes the Intersection Near a Highway-Rail Grade Crossing signal warrant that is  
20 intended for use at a location where the proximity to the intersection of a highway-rail grade crossing on an  
21 intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a  
22 traffic control signal.

23 Section 4D.27 describes additional considerations regarding preemption of traffic control signals at or  
24 near highway-rail grade crossings.

25 **Section 8C.09 Highway-Rail Grade Crossing(s) Within or In Close Proximity to Roundabouts,**  
26 **Traffic Circles, or Circular Intersections**

27 Support:

28 At roundabouts, traffic circles, or circular intersections that include or are within close proximity to a  
29 highway-rail grade crossing, a queue of vehicular traffic could cause vehicles to stop on the highway-rail  
30 grade crossing.

31 **Standard:**

32 **Where roundabouts, traffic circles, or circular intersections include or are within close proximity to**  
33 **a highway-rail grade crossing, an engineering study shall be made to determine if queuing could impact**  
34 **the highway-rail grade crossing. If traffic queues impact the highway-rail grade crossing, provisions**  
35 **shall be made to clear highway traffic from the highway-rail grade crossing prior to the arrival of a**  
36 **train.**

37 Guidance:

38 Among the provisions that should be considered for keeping the crossing clear of traffic or for clearing  
39 traffic from the crossing prior to the arrival of a train are the following:

- 40 A. Elimination of the roundabout,
- 41 B. Geometric design revisions,
- 42 C. Highway-rail grade crossing warning devices,
- 43 D. Highway traffic signals,
- 44 E. Traffic metering devices,
- 45 F. Activated signs, or
- 46 G. A combination of these or other actions.

1    **CHAPTER 8D. QUIET ZONE TREATMENTS AT HIGHWAY-RAIL GRADE CROSSINGS**

2    **Section 8D.01 Introduction**

3    Support:

4        49 CFR Part 222 (Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule) prescribes  
5    Quiet Zone requirements and treatments.

6    **Standard:**

7        **Any traffic control device and its application where used as part of a Quiet Zone shall comply with**  
8    **all applicable provisions of the MUTCD.**

9

## CHAPTER 8E. PATHWAY-RAIL GRADE CROSSINGS

### Section 8E.01 Purpose

Support:

Traffic control for pathway-rail grade crossings includes all signs, signals, markings, other warning devices, and their supports at pathway-rail grade crossings and along pathway approaches to a grade crossing. The function of this traffic control is to promote safety and provide effective operation of both rail and pathway traffic at pathway-rail grade crossings.

Except as specifically noted in this Chapter, sidewalks are considered to be part of a highway-rail grade crossing rather than a pathway-rail grade crossing, and are not covered by this Chapter.

### Section 8E.02 Use of Standard Devices, Systems, and Practices

Guidance:

The public agency with jurisdiction over the pathway and the regulatory agency with statutory authority, if applicable, should jointly determine the need and selection of devices at a pathway-rail grade crossing.

The appropriate traffic control system to be used at a pathway-rail grade crossing should be determined by a diagnostic team.

### Section 8E.03 Pathway-Rail Grade Crossing Signs and Markings

Standard:

**Pathway-rail grade crossing signs shall be standard in shape, legend, and color.**

**Traffic control devices mounted adjacent to pathways at a height of less than 2.4 m (8 ft) measured vertically from the bottom edge of the device to the elevation of the near edge of the pathway surface shall have a minimum lateral clearance of 0.6 m (2 ft) from the near edge of the device to the near edge of the pathway (see Figure 9B-1).**

**The minimum mounting height for post-mounted signs on pathways shall be 1.2 m (4 ft), measured vertically from the bottom edge of the sign to the elevation of the near edge of the pathway surface (see Figure 9B-1).**

**Pathway-rail grade crossing traffic control devices shall be located a minimum of 3.7 m (12 ft) from the center of the nearest track.**

**The minimum sizes of pathway-rail grade crossing signs shall be as shown in the shared-use path column in Table 9B-1.**

**When overhead traffic control devices are used on pathways, the clearance from the bottom edge of the device to the pathway surface directly under the sign or device shall be at least 2.4 m (8 ft).**

Guidance:

If pathway users include those who travel faster than pedestrians, such as bicyclists or skaters, the diagnostic team should consider the use of warning signs and pavement markings in advance of the pathway-rail grade crossing (see Figure 9B-7).

### Section 8E.04 Stop Lines and Detectable Warnings

Guidance:

If used at pathway-rail-grade crossings, the stop line should be a transverse line at the point where a pathway user is to stop. The stop line should be placed at least 0.6 m (2 ft) upstream from the gate or counterweight (if present), and at least 3.7 m (12 ft) from the nearest rail.

If used on pathway-rail grade crossings or sidewalks at highway-rail grade crossings, detectable warnings (see Section 3B.18) should extend across the full width of the pathway or sidewalk and should be 0.6 m (2 ft) wide in the pedestrian direction of travel. Detectable warnings should be placed at least 0.6 m (2 ft) upstream from the gate or counterweight (if present), and no closer than the stop line (if present) or 3.7 m (12 ft) from the nearest rail.

### Section 8E.05 Passive Devices for Pathway-Rail Grade Crossings

Standard:

1       **Except as noted in the Option below, where active traffic control devices are not used, a Crossbuck**  
2 **Assembly shall be installed on each approach to a pathway-rail grade crossing.**

3 Option:

4       The Crossbuck Assembly may be omitted at station crossings and on the approaches to a pathway-rail  
5 grade crossing that is located within 7.6 m (25 ft) of the traveled way at a highway-rail grade crossing.

6 Guidance:

7       The pathway user's ability to detect the presence of an approaching train should be considered in  
8 determining the type and placement of traffic control devices or design features (such as fencing or swing  
9 gates).

10       Nighttime visibility should be considered if design features (such as fencing or swing gates) are used to  
11 channelize pathway users.

12       When automatic gates and swing gates are used, the pathway should be channelized to direct users to the  
13 entrance to and exit from the pathway-rail grade crossing.

14 **Standard:**

15       **If used, swing gates shall open away from the track(s) and return to the closed position after use.**

16 Option:

17       When used in conjunction with automatic gates at pathway-rail grade crossings, swing gates may be  
18 equipped with a latching device that permits the gate to be opened only by pedestrians who are on the track  
19 side of the gate.

20       Refuge areas may be provided to provide a place for large numbers of pedestrians to congregate during  
21 the passage of a train.

22 Guidance:

23       Where refuge areas are provided, fencing should be installed to limit access to only the pathway-rail grade  
24 crossing.

## 25 **Section 8E.06 Active Traffic Control Systems for Pathway-Rail Grade Crossings**

26 **Standard:**

27       **If an active traffic control system is used at a pathway-rail grade crossing, flashing-light signals and**  
28 **a bell or other audible warning device shall be provided for each direction of the pathway.**

29 Support:

30       If a pathway-rail grade crossing is located within 7.6 m (25 ft) of the traveled way at a highway-rail grade  
31 crossing equipped with an active traffic control system, a separate active traffic control system for the  
32 pathway is usually not provided.

33 **Standard:**

34       **If used at pathway-rail grade crossings, flashing-light signals shall be alternately flashing red lights**  
35 **that are aligned horizontally and the light units shall have a diameter of at least 100 mm (4 in). The**  
36 **mounting height for flashing red lights installed at pathway-rail grade crossings shall be a minimum of**  
37 **1.2 m (4 ft), measured vertically from the bottom edge of the lights to the elevation of the near edge of**  
38 **the pathway surface.**

39 Option:

40       At station crossings where more than one track is present, additional traffic control devices may be  
41 installed between the tracks as recommended by a diagnostic team.

42 **Standard:**

43       **The mounting height for flashing red lights installed between the tracks at station crossings shall be**  
44 **a minimum of 0.3 m (1 ft), measured vertically from the bottom edge of the lights to the elevation of the**  
45 **near edge of the pathway surface.**

46 Option:

47       Automatic gates may be used at pathway-rail grade crossings as recommended by a diagnostic team.

48 Guidance:

49       If used at a pathway-rail grade crossing, each automatic gate should be installed to rest a minimum of 0.9  
50 m (3 ft) above the pathway when in the down position.



1 If used, the gate configuration should provide for full width coverage of the pathway on both approaches  
2 to the track.

3 **Standard:**

4 **Where sidewalks are located between the edge of a roadway and active traffic control devices, the**  
5 **location, placement, and height prescribed for roadway gates shall be used (see Section 8C.04).**

6 **Guidance:**

7 Separate automatic gates used at sidewalks should be installed to rest a minimum of 0.9 m (3 ft) above the  
8 sidewalk when in the down position.

9 If separate automatic gates are used for a sidewalk, a separate gate mechanism should be provided for the  
10 sidewalk gate, instead of a supplemental or auxiliary gate arm installed as a part of the same mechanism as the  
11 vehicular gate, in order to prevent a pedestrian from raising the vehicular gate at a highway-rail grade  
12 crossing.

13

## CHAPTER 8A. GENERAL

### Section 8A.01 Introduction

Support:

Traffic control for highway-rail grade crossings includes all signs, signals, markings, other warning devices, and their supports along highways approaching and at highway-rail grade crossings. The function of this traffic control is to ~~permit reasonably safe~~ promote safety and provide ~~efficient~~ effective operation of both rail and highway traffic at highway-rail grade crossings.

For purposes of installation, operation, and maintenance of traffic control devices at highway-rail grade crossings, it is recognized that the crossing of the highway and rail tracks is situated on a right-of-way available for the joint use of both highway traffic and railroad traffic.

The highway agency or authority with jurisdiction and the regulatory agency with statutory authority, if applicable, jointly determine the need and selection of devices at a highway-rail grade crossing.

In Part 8, the combination of devices selected or installed at a specific highway-rail grade crossing is referred to as a “traffic control system.”

#### **Standard:**

**The traffic control devices, systems, and practices described herein shall be used at all highway-rail grade crossings open to public travel, consistent with Federal, State, and local laws and regulations.**

**To promote an understanding of common terminology between highway and railroad signaling issues, the following definitions shall be used:**

1. **Advance Preemption**—the notification of an approaching train that is forwarded to the highway traffic signal controller unit or assembly by the railroad equipment in advance of the activation of the railroad warning devices.
2. **Advance Preemption Time**—the period of time that is the difference between the required maximum highway traffic signal preemption time and the activation of the railroad warning devices.
3. **Cantilevered Signal Structure**—a structure that is rigidly attached to a vertical pole and is used to provide overhead support of signal units.
4. **Clear Storage Distance**—the distance available for vehicle storage measured between 1.8 m (6 ft) from the rail nearest the intersection to the intersection stop line or the normal stopping point on the highway. At skewed highway-rail grade crossings and intersections, the 1.8 m (6 ft) distance shall be measured perpendicular to the nearest rail either along the ~~centerline~~ center line or edge line of the highway, as appropriate, to obtain the shorter distance. Where exit gates are used, the distance available for vehicle storage is measured from the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is measured either along the ~~centerline~~ center line or edge line of the highway, as appropriate, to obtain the shorter distance.
5. **Constant Warning Time Train Detection**—a means of train detection that provides relatively uniform warning time for the approach of a train that is not accelerating or decelerating after being detected.
6. **Design Vehicle**—the longest vehicle permitted by statute of the road authority (State or other) on that roadway.
7. **Diagnostic Team**—a group of knowledgeable representatives of the parties of interest (such as the railroad, road authority, or state regulatory agency, where applicable) in a highway-rail grade crossing or group of grade crossings who, using crossing safety management principles, evaluate conditions at a grade crossing(s) to make determinations or recommendations for the responsible public authority concerning the safety needs of that crossing(s) (see 23 CFR Part 646.204 and 49 CFR Part 222.9).
8. **Dynamic Envelope**—the clearance required for the train and its cargo overhang due to any combination of loading, lateral motion, or suspension failure (see Figure 8A-1).
9. **Dynamic Exit Gate Operating Mode**—a mode of operation where the exit gate operation is based on the presence of vehicles within the minimum track clearance distance.
10. **Exit Gate Clearance Time**—for Four-Quadrant Gate systems, the exit gate clearance time is the amount of time provided to delay the descent of the exit gate arm(s) after entrance gate arm(s) begin to descend.

- 1 11. Exit Gate Operating Mode—for Four-Quadrant Gate systems, the mode of control used to  
2 govern the operation of the exit gate arms.
- 3 12. Flashing-Light Signals—a warning device consisting of two red signal indications arranged  
4 horizontally that are activated to flash alternately when a train is approaching or present at a  
5 highway-rail grade crossing.
- 6 13. Interconnection—the electrical connection between the railroad active warning system and the  
7 highway traffic signal controller assembly for the purpose of preemption.
- 8 14. Locomotive Horn—a locomotive air horn, steam whistle, or similar audible warning device (see  
9 49 CFR Part 229.129) mounted on a locomotive or control cab car. The terms “locomotive  
10 horn,” “train whistle,” “locomotive whistle,” and “train horn” are used interchangeably in the  
11 railroad industry.
- 12 15. Maximum Highway Traffic Signal Preemption Time—the maximum amount of time needed  
13 following initiation of the preemption sequence for the highway traffic signals to complete the  
14 timing of the right-of-way transfer time, queue clearance time, and separation time.
- 15 16. Minimum Track Clearance Distance—for standard two-quadrant railroad warning devices, the  
16 minimum track clearance distance is the length along a highway at one or more railroad tracks,  
17 measured ~~either~~ **grammar – more than two choices** from the highway stop line, warning device,  
18 or 3.7 m (12 ft) perpendicular to the track centerline, to 1.8 m (6 ft) beyond the track(s)  
19 measured perpendicular to the far rail, along the ~~centerline~~ **center line** or edge line of the  
20 highway, as appropriate, to obtain the longer distance. For Four-Quadrant Gate systems, the  
21 minimum track clearance distance is the length along a highway at one or more railroad tracks,  
22 measured either from the highway stop line or entrance warning device, to the point where the  
23 rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is  
24 parallel to the track(s) and is not perpendicular to the highway, the distance is measured either  
25 along the ~~centerline~~ **center line** or edge **line** **consistency with first sentence of this definition** of  
26 the highway, as appropriate, to obtain the longer distance.
- 27 17. Minimum Warning Time—Through Train Movements—the least amount of time active  
28 warning devices shall operate prior to the arrival of a train at a highway-rail grade crossing.
- 29 18. Pathway-Rail Grade Crossing—the general area where a pathway and a railroad’s right-of-way  
30 cross at the same level, within which are included the railroad tracks, pathway, and traffic  
31 control devices for pathway traffic traversing that area.
- 32 19. Preemption—the transfer of normal operation of highway traffic signals to a special control  
33 mode.
- 34 20. Pre-signal—supplemental highway traffic signal faces operated as part of the highway  
35 intersection traffic signals, located in a position that controls traffic approaching the highway-  
36 rail grade crossing in advance of the intersection.
- 37 21. Queue Clearance Time—the time required for the design vehicle of maximum length stopped  
38 just inside the minimum track clearance distance to start up and move through and clear the  
39 entire minimum track clearance distance. If presignals are present, this time shall be long  
40 enough to allow the vehicle to move through the intersection, or to clear the tracks if there is  
41 sufficient clear storage distance. If a Four-Quadrant Gate system is present, this time shall be  
42 long enough to permit the exit gate arm to lower after the design vehicle is clear of the minimum  
43 track clearance distance.
- 44 22. Quiet Zone—a segment of a rail line, with one or a number of consecutive public highway-rail  
45 grade crossings at which locomotive horns are not routinely sounded per 49 CFR Part 222.
- 46 23. Right-of-Way Transfer Time—the maximum amount of time needed for the worst case  
47 condition, prior to display of the track clearance green interval. This includes any railroad or  
48 highway traffic signal control equipment time to react to a preemption call, and any traffic  
49 control signal green, pedestrian walk and clearance, yellow change, and red clearance intervals  
50 for conflicting traffic.
- 51 24. Separation Time—the component of maximum highway traffic signal preemption time during  
52 which the minimum track clearance distance is clear of vehicular traffic prior to the arrival of  
53 the train.
- 54 25. Simultaneous Preemption—notification of an approaching train is forwarded to the highway  
55 traffic signal controller unit or assembly and railroad active warning devices at the same time.
- 56 26. Station Crossing—a pathway-rail grade crossing that is associated with a station platform.

- 1 27. **Timed Exit Gate Operating Mode**—a mode of operation where the exit gate descent is based on  
2 a predetermined time interval.
- 3 28. **Vehicle Intrusion Detection Devices**—a detector or detectors used as a part of a system  
4 incorporating processing logic to detect the presence of vehicles within the minimum track  
5 clearance distance and to control the operation of the exit gates.
- 6 29. **Wayside Equipment**—the signals, switches, and/or control devices for railroad operations  
7 housed within one or more enclosures located along the railroad right-of-way and/or on railroad  
8 property.
- 9 30. **Wayside Horn**—a stationary horn located at a highway-rail grade crossing, designed to provide  
10 audible warning to oncoming motorists of the approach of a train.

## 11 **Section 8A.02 Use of Standard Devices, Systems, and Practices**

12 Support:

13 Because of the large number of significant variables to be considered, no single standard system of traffic  
14 control devices is universally applicable for all highway-rail grade crossings.

15 Guidance:

16 The appropriate traffic control system to be used at a highway-rail grade crossing should be determined by  
17 an engineering study involving both the highway agency and the railroad company.

18 Option:

19 The engineering study may include the Highway-Rail Intersection (HRI) components of the National  
20 Intelligent Transportation Systems (ITS) architecture, which is a USDOT accepted method for linking the  
21 highway, vehicles, and traffic management systems with rail operations and wayside equipment.

22 Support:

23 More detail on Highway-Rail Intersection components is available from the USDOT's Federal Railroad  
24 Administration, 1120 Vermont Ave., NW, Washington, DC 20590, or [www.fra.dot.gov](http://www.fra.dot.gov).

25 **Standard:**

26 **Traffic control devices, systems, and practices shall be consistent with the design and application of**  
27 **the Standards contained herein.**

28 **Before any new highway-rail grade crossing traffic control system is installed or before**  
29 **modifications are made to an existing system, approval shall be obtained from the highway agency with**  
30 **the jurisdictional and/or statutory authority, and from the railroad company.**

31 Guidance:

32 To stimulate effective responses from ~~vehicle operators and pedestrians~~ [road users](#), these devices,  
33 systems, and practices should use the five basic considerations employed generally for traffic control devices  
34 and described fully in Section 1A.02: design, placement, operation, maintenance, and uniformity.

35 Support:

36 Many other details of highway-rail grade crossing traffic control systems that are not set forth in Part 8 are  
37 contained in the publications listed in Section 1A.11.

## 38 **Section 8A.03 Uniform Provisions**

39 **Standard:**

40 **All signs used in highway-rail grade crossing traffic control systems shall be retroreflectorized or**  
41 **illuminated as described in Section 2A.07 to show the same shape and similar color to an approaching**  
42 **road user during both day and night.**

43 **No sign or signal shall be located in the center of an undivided highway, except in a raised island.**

44 Guidance:

45 ~~Such~~ [Any](#) signs or signals [mounted in a raised island in the center of an undivided highway](#) should be  
46 installed with a clearance of at least 0.6 m (2 ft) from the outer edge of the raised island to the nearest edge of  
47 the sign or signal, except as ~~allowed~~ [permitted](#) [edited to increase consistency](#) in Section 2A.19.

48 Where the distance between tracks, measured along the highway between the inside rails, exceeds 30 m  
49 (100 ft), additional signs or other appropriate traffic control devices should be used [to inform approaching](#)  
50 [road users, especially non-motorized users, of the long distance to cross the tracks.](#)

1 **Section 8A.04 Highway-Rail Grade Crossing Elimination**

2 Guidance:

3 Because highway-rail grade crossings are a potential source of crashes and congestion, agencies should  
4 conduct engineering studies to determine the cost and benefits of eliminating these crossings.

5 **Standard:**

6 **When a highway-rail grade crossing is eliminated, the traffic control devices for the crossing shall**  
7 **be removed.**

8 **If the existing traffic control devices at a multiple-track highway-rail grade crossing become**  
9 **improperly placed or inaccurate because of the removal of some of the tracks, the existing devices shall**  
10 **be relocated and/or modified.**

11 Guidance:

12 Any highway-rail grade crossing that cannot be justified should be eliminated.

13 Where a roadway is removed from a highway-rail grade crossing, the roadway approaches in the railroad  
14 right-of-way should also be removed and appropriate signs should be placed at the roadway end in accordance  
15 with Section 2L.04.

16 Where a railroad is eliminated at a highway-rail grade crossing, the tracks should be removed or paved  
17 over.

18 Option:

19 Based on engineering judgment, the TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-4) may be  
20 temporarily installed until the tracks are removed or paved over. The length of time before the tracks will be  
21 removed or paved over may be considered in making the decision as to whether to install the sign.

22 **Section ~~8C.04~~ 8A.05 Illumination at Highway-Rail Grade Crossings** **relocated from Chapter**  
23 **8C**

24 ~~Option~~ Support:

25 Illumination ~~may be~~ is sometimes installed at or adjacent to a highway-rail grade crossing.

26 ~~Guidance:~~

27 ~~If an engineering study is conducted and if the engineering study determines that~~ in order to provide better  
28 nighttime visibility of the train and the highway-rail grade crossing ~~is needed~~ (for example, where a  
29 substantial amount of railroad operations ~~is~~ are conducted at night, where train speeds are low and highway-  
30 rail grade crossings are blocked for long periods, or where crash history indicates that ~~drivers~~ road users  
31 experience difficulty in seeing trains or traffic control devices during hours of darkness), ~~then illumination~~  
32 ~~should be installed at and adjacent to the highway-rail grade crossing.~~

33 ~~Support:~~

34 Recommended types and locations of luminaires for illuminating highway-rail grade crossings  
35 ~~illumination~~ are contained in the American National Standards Institute's (ANSI) "Practice for Roadway  
36 Lighting RP-8," which is available from the Illuminating Engineering Society (see Section 1A.11).

37 **Section ~~8A.05~~ 8A.06 Temporary Traffic Control Zones**

38 Support:

39 Temporary traffic control planning provides for continuity of operations (such as movement of traffic,  
40 pedestrians and bicycles, transit operations, and access to property/utilities) when the normal function of a  
41 roadway at a highway-rail grade crossing is suspended because of temporary traffic control operations.

42 **Standard:**

43 **Traffic controls for temporary traffic control zones that include highway-rail grade crossings shall**  
44 **be as outlined in Part 6 of this Manual.**

45 **When a highway-rail grade crossing exists either within or in the vicinity of a temporary traffic**  
46 **control zone, lane restrictions, flagging, or other operations shall not be performed in a manner that**  
47 **would cause vehicles to stop on the railroad tracks, unless a uniformed added to increase accuracy law**  
48 **enforcement officer or flagger (see Chapter 6E) is provided at the highway-rail grade crossing to**  
49 **minimize the possibility of vehicles stopping on the tracks, even if automatic warning devices are in**  
50 **place.**

1 Guidance:

2 Public and private agencies, including emergency services, businesses, and railroad companies, should  
3 meet to plan appropriate traffic detours and the necessary signing, marking, and flagging requirements for  
4 operations during temporary traffic control zone activities. Consideration should be given to the length of  
5 time that the highway-rail grade crossing is to be closed, the type of rail and highway traffic affected, the time  
6 of day, and the materials and techniques of repair.

7 Temporary traffic control operations should minimize the inconvenience, delay, and crash potential to  
8 affected traffic. Prior notice should be given to affected public or private agencies, emergency services,  
9 businesses, railroad companies, and road users before the free movement of ~~vehicles~~ [road users](#) or trains is  
10 infringed upon or blocked.

11 Temporary traffic control zone activities should not be permitted to extensively prolong the closing of the  
12 highway-rail grade crossing.

13 The width, grade, alignment, and riding quality of the highway surface at a highway-rail grade crossing  
14 should, at a minimum, be restored to correspond with the quality of the approaches to the highway-rail grade  
15 crossing.

16



## CHAPTER 8B. SIGNS AND MARKINGS

### Section 8B.01 Purpose

Support:

Passive traffic control systems, consisting of signs and pavement markings, identify and direct attention to the location of a highway-rail grade crossing and advise ~~motorists, bicyclists, and pedestrians to take appropriate action~~ road users to slow down or stop at the crossing as necessary in order to yield to any rail traffic occupying, or approaching and in proximity to, the crossing.

### Section 8B.02 Sizes of Grade Crossing Signs

Standard:

The sizes of grade crossing signs shall be as shown in Table 8B-1.

Option:

Signs larger than those shown in Table 8B-1 may be used (see Section 2A.11).

### Section 8B.03 Highway-Rail Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks Sign Plaque (R15-2P)

Standard:

Except as noted in the Option below, the Highway-Rail Grade Crossing (R15-1) sign, commonly identified as the Crossbuck sign, shall be retroreflectorized white with the words RAILROAD CROSSING in black lettering, mounted as shown in Figure 8B-1.

Option:

At non-signalized crossings, the Crossbuck sign may be retroreflectorized white with the words RAILROAD CROSSING in retroreflectorized red lettering, mounted as shown in Figure 8B-1.

Support:

The Crossbuck sign assigns the right-of-way to rail traffic at a highway-rail grade crossing.

Standard:

As a minimum, one Crossbuck sign shall be used on each highway approach to every highway-rail grade crossing, alone or in combination with other traffic control devices.

If automatic gates are not present and if there are two or more tracks at the highway-rail grade crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) ~~sign~~ plaque of inverted T shape mounted below the Crossbuck sign in the manner and at the height indicated in Figure 8B-1.

Option:

The supplemental Number of Tracks ~~sign~~ plaque may also be used at highway-rail grade crossings with automatic gates.

Standard:

The Crossbuck sign shall be installed on the right-hand edited to increase clarity side of the highway on each approach to the highway-rail grade crossing. Where restricted sight distance or unfavorable highway geometry exists on an approach to a highway-rail grade crossing, an additional Crossbuck sign shall be installed on the left-hand edited to increase clarity side of the highway, possibly placed back-to-back with the Crossbuck sign for the opposite approach, or otherwise located so that two Crossbuck signs are displayed for that approach.

A strip of retroreflective white material not less than 50 mm (2 in) in width shall be used on the back of each blade of each Crossbuck sign for the length of each blade, at all highway-rail grade crossings, except those where Crossbuck signs have been installed back-to-back.

A strip of retroreflective white material, not less than 50 mm (2 in) in width, shall be used on each support at passive highway-rail grade crossings for the full length of the front and back of the support from the Crossbuck sign or Number of Tracks ~~sign~~ plaque to within 0.6 m (2 ft) above the ~~edge of the roadway~~ ground, except on the side of those supports where a STOP (R1-1) or YIELD(R1-2) sign or flashing lights have been installed or on the back side of supports for Crossbuck signs installed on one-way streets.

Guidance:

1 Crossbuck signs should be located with respect to the highway pavement or shoulder in accordance with  
2 the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest track  
3 in accordance with Figure 8C-2.

4 The minimum lateral ~~clearance offset~~ **edited to increase consistency** for the nearest edge of the Crossbuck  
5 sign should be 1.8 m (6 ft) from the edge of the shoulder or 3.7 m (12 ft) from the edge of the traveled way in  
6 rural areas (whichever is greater), and 0.6 m (2 ft) from the face of the curb in urban areas.

7 Where unusual conditions make variations in location and lateral ~~clearance offset~~ **edited to increase**  
8 **consistency** appropriate, engineering judgment should be used to provide the best practical combination of  
9 view and safety clearances.

## 10 **Section ~~8B.08~~ 8B.04 Use and Meaning of STOP (R1-1) or YIELD (R1-2) Signs at Passive** 11 **Highway-Rail Grade Crossings**

### 12 ~~Option:~~

13 ~~At the discretion of the responsible State or local highway agency, STOP (R1-1) or YIELD (R1-2) signs~~  
14 ~~(see Figure 2B-1) may be used at highway-rail grade crossings that have two or more trains per day and are~~  
15 ~~without automatic traffic control devices.~~

### 16 ~~Support:~~

17 ~~Two or more trains per day means an average of two or more trains per day operating over the highway-~~  
18 ~~rail grade crossing for a 12-month period prior to the installation of the STOP or YIELD control sign.~~

### 19 ~~Option:~~

20 ~~For other highway-rail grade crossings with passive warning devices, STOP or YIELD signs may be used~~  
21 ~~based on an engineering study.~~

### 22 ~~Guidance:~~

23 ~~The engineering study should take into consideration such factors as highway and train traffic~~  
24 ~~characteristics (including volume and speed), collision history, the need for active control devices, and sight~~  
25 ~~distance to the approaching train.~~

### 26 ~~Option:~~

27 ~~If a STOP or YIELD sign is installed at a highway-rail grade crossing, it may be installed on the~~  
28 ~~Crossbuck post or on a separate post at a point where the vehicle is to stop, or as near to that point as practical.~~

### 29 ~~Standard:~~

30 ~~For all highway-rail grade crossings where STOP or YIELD signs are installed, the placement shall~~  
31 ~~conform to the requirements of Sections 2B.06 and 2B.10. Stop Ahead (W3-1) or Yield Ahead (W3-2)~~  
32 ~~Advance Warning signs (see Figure 2C-4) shall also be installed if the criteria for their installation given~~  
33 ~~in Section 2C.29 is met.~~

### 34 Standard:

35 A YIELD (R1-2) sign or STOP (R1-1) sign shall be installed at all passive highway rail grade  
36 crossings, except where train crews always manually stop road users from entering the crossing.

37 A YIELD sign shall be the default traffic control device on all highway approaches to passive  
38 highway rail grade crossings unless an engineering study determines that a STOP sign is appropriate.

### 39 Support:

40 Because a STOP sign establishes a legal requirement for all approaching vehicles to come to a full stop,  
41 the indiscriminate use of STOP signs at all or many passive grade crossings can result in a high rate of non-  
42 compliance by road users, thus increasing the risk of collisions that are associated with non-compliance.

### 43 Guidance:

44 The use of STOP signs at passive crossings should be limited to unusual conditions where requiring all  
45 vehicles to make a full stop is deemed essential by an engineering study or by engineering judgment. The  
46 following are among the factors that an engineering study or engineering judgment should consider:

47 A. The line of sight from an approaching highway vehicle to an approaching train;

48 B. The characteristics of the highway, such as the functional classification, geometric conditions, and  
49 traffic volumes and speed;

50 C. The characteristics of the railroad including, but not limited to, the frequency, type, and speed of  
51 trains, and the number of tracks;



- D. The crash history at the crossing; and
- E. The need for active control devices.

Support:

Certain commercial motor vehicles and school buses are required to stop at all highway-rail grade crossings in accordance with 49 CFR 392.10 even if a YIELD sign (or just a Crossbuck sign) is posted.

**Section 8B.05 Crossbuck Assemblies with YIELD (R1-2) Signs or STOP (R1-1) Signs at Passive Highway-Rail Grade Crossings**

**Standard:**

**A highway-rail grade crossing Crossbuck Assembly at a passive crossing shall consist of a Crossbuck (R15-1) sign, a Number of Tracks (R15-2P) plaque if two or more tracks are present, and either a YIELD (R1-2) sign or STOP (R1-1) sign installed on the same support, except as noted in the Option below.**

Option:

If a YIELD sign or STOP sign is installed at a highway-rail grade crossing, it may be installed on the same support as the Crossbuck sign or it may be installed on a separate support at a point where the vehicle is to stop, or as near to that point as practical, but in either case, the YIELD sign or STOP sign is considered to be a part of the Crossbuck Assembly.

**Standard:**

**At all public highway-rail grade crossings that are not equipped with the active traffic control systems that are described in Chapter 8C, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-rail grade crossing. Where restricted sight distance or unfavorable highway geometry exists on an approach to a highway-rail grade crossing, or where there is a one-way multi-lane approach, an additional Crossbuck Assembly shall be installed on the left-hand side of the highway.**

Guidance:

At crossings where train speeds are above 16 km/h (10 mph) or where rail traffic movements cannot appropriately yield to road users, Crossbuck Assemblies should be provided and reasonable locations for such signs should be created by necessary roadway realignment or railway relocation.

Reasonable locations for Crossbuck Assemblies should not be in conflict with turning vehicles from roadways either closely parallel to the track or visually obstructed from approaching roadway users.

Crossbuck Assemblies should be located with respect to the highway pavement or shoulder in accordance with the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest track in accordance with Figure 8C-2.

The minimum lateral clearance for the nearest edge of the Crossbuck Assembly should be 1.8 m (6 ft) from the edge of the shoulder or 3.7 m (12 ft) from the edge of the traveled way in rural areas (whichever is greater), and 0.6 m (2 ft) from the face of the curb in urban areas.

Where unusual conditions make variations in location and lateral clearance appropriate, engineering judgment should be used to provide the best practical combination of view and safety clearances.

Support:

The meaning of a Crossbuck Assembly that includes a YIELD sign is that a road user approaching the highway-rail grade crossing needs to be prepared to decelerate, and when necessary, yield the right-of-way to any rail traffic that might be occupying the crossing or might be approaching and in such close proximity to the crossing that it would be unsafe for the road user to cross.

The meaning of a Crossbuck Assembly that includes a STOP sign is that a road user approaching the highway-rail grade crossing must come to a full and complete stop not less than (15 ft) short of the nearest rail, and remain stopped while the road user determines if there is rail traffic either occupying the crossing or approaching and in such close proximity to the crossing that the road user must yield the right-of-way to rail traffic. The road user is permitted to proceed when it is safe to cross.

**Standard:**

**If used at a passive crossing, a YIELD (R1-2) sign or STOP (R1-2) sign shall be installed in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-1 and 8B-2.**

1 When the YIELD sign or STOP sign is installed on the same support as the Crossbuck sign, a strip  
2 of retroreflective material shall be used on the front and back (except as noted in the Option below) of  
3 the support. The dimensions and placement of the retroreflective strip shall be in compliance with the  
4 Standards in Section 8B.03. The color of the retroreflective strip on the back of the support shall be  
5 white.

6 Option:

7 The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck Assembly  
8 supports installed on one-way streets.

9 The color of the retroreflective strip on the front of the support where a YIELD sign or STOP sign is  
10 installed on the same support as the Crossbuck sign may be red (see Section 2A.21) or white (see Section  
11 8B.03).

12 If a YIELD (R1-2) sign is installed in conjunction with the Crossbuck sign, a yield line (see Section  
13 3B.16) may be installed to supplement the YIELD sign.

14 Guidance:

15 If a yield line is used, it should be a transverse line at a right angle to the traveled way at a point where a  
16 vehicle is to yield or stop or as near to that point as practical. The yield line should be placed no closer than  
17 4.6 m (15 ft) measured perpendicular from the nearest rail as shown in Figure 8B-7.

18 If a STOP (R1-1) sign is installed in conjunction with the Crossbuck sign, a stop line (see Section 3B.16)  
19 should be installed to indicate the point behind which vehicles are required to stop. The stop line should be  
20 placed no closer than 4.6 m (15 ft) measured perpendicular from the nearest rail as shown in Figure 8B-6.

21 If a YIELD sign or STOP sign is installed at a highway-rail grade crossing on a separate support than the  
22 Crossbuck sign (see Figure 8B-2), the YIELD sign or STOP sign should be placed at a point where the vehicle  
23 is to stop, or as near to that point as practical, but no closer than 4.6 m (15 ft) measured perpendicular from the  
24 nearest rail as shown in Figure 8B-7.

25 Standard:

26 At all highway-rail grade crossings where YIELD signs or STOP signs are installed, Stop Ahead  
27 (W3-1) or Yield Ahead (W3-2) signs shall also be installed if the criteria for their installation in Section  
28 2C.35 is met.

29 **Section ~~8B.04~~ 8B.06 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)**

30 **Standard:**

31 **A Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-3) with a**  
32 **supplemental plaque describing the type of traffic control at the highway-rail grade crossing shall be**  
33 **used on each highway in advance of every highway-rail grade crossing except in the following**  
34 **circumstances:**

- 35 **A. On an approach to a highway-rail grade crossing from a T-intersection with a parallel highway**  
36 **if the distance from the edge of the track to the edge of the parallel roadway is less than 30 m**  
37 **(100 ft) and W10-3 signs are used on both approaches of the parallel highway;**
- 38 **B. On low-volume, low-speed highways crossing minor spurs or other tracks that are infrequently**  
39 **used and are flagged by train crews;**
- 40 **C. In business or commercial ~~districts~~ areas where active highway-rail grade crossing traffic**  
41 **control devices are in use; or**
- 42 **D. Where physical conditions do not permit even a partially effective display of the sign.**

43 The supplemental plaque shall be a No Signal (W10-10P) plaque where used in advance of a  
44 crossing that does not have active traffic control devices and shall be a SIGNAL AHEAD (W10-16P)  
45 plaque where used in advance of a crossing with active traffic control devices. The supplemental plaque  
46 shall be mounted directly below the W10-1 sign unless a NO TRAIN HORN (W10-9P) plaque (see  
47 Section 8B.15) is used, in which case the supplemental No Signal (W10-10P) or SIGNAL AHEAD (W10-  
48 16P) plaque shall be mounted directly below the W10-9P plaque.

49 **Placement of the Highway-Rail Grade Crossing Advance Warning sign shall be in accordance with**  
50 **~~Chapter 2A~~ Section 2C.05 and Table 2C-4.**

51 A Yield Ahead (W3-2) or Stop Ahead (W3-1) Advance Warning sign (see Figure 2C-6) shall also be  
52 installed if the criteria for their installation given in Section 2C.35 is met. If a Yield Ahead or Stop  
53 Ahead sign is installed on the approach to the crossing, the W10-1 sign and supplemental plaque shall

1 be installed upstream from the Yield Ahead or Stop Ahead sign. The Yield Ahead or Stop Ahead sign  
2 shall be located in accordance with Table 2C-4. The minimum distance between the signs shall be in  
3 accordance with Section 2C.05 and Table 2C-4.

4 Option:

5 On divided highways and one-way streets, an additional W10-1 sign and supplemental plaque may be  
6 installed on the left-hand side of the roadway.

7 **Standard:**

8 **If the distance between the railroad tracks and a parallel highway, from the edge of the tracks to**  
9 **the edge of the parallel roadway, is less than 30 m (100 ft), W10-2, W10-3, or W10-4 signs (see Figure**  
10 **8B-3) with a supplemental NO SIGNAL (W10-10P) or SIGNAL AHEAD (W10-16P) plaque describing**  
11 **the type of traffic control at the highway-rail grade crossing shall be installed on each approach of the**  
12 **parallel highway to warn road users making a turn that they will encounter a highway-rail grade**  
13 **crossing soon after making a turn, and a W10-1 sign for the approach to the tracks shall not be**  
14 **required to be between the tracks and the parallel highway.**

15 **If the W10-2, W10-3, or W10-4 signs and supplemental plaques are used, sign placement in**  
16 **accordance with the guidelines for Intersection Warning signs in Table 2C-4 using the speed of through**  
17 **traffic shall be measured from the highway intersection.**

18 **Guidance:**

19 If the distance between the railroad tracks and the parallel highway, from the edge of the tracks to the  
20 edge of the parallel roadway, is 30 m (100 ft) or more, a W10-1 sign and supplemental plaque should be  
21 installed in advance of the highway-rail grade crossing, and the W10-2, W10-3, or W10-4 signs should not be  
22 used on the parallel highway.

### 23 **Section ~~8B-05~~ 8B.07 EXEMPT Highway-Rail Grade Crossing Signs Plaques (R15-3P, W10-** 24 **1aP)**

25 Option:

26 When authorized by law or regulation, a supplemental EXEMPT (R15-3P) sign plaque (see Figure 8B-4)  
27 with a white background bearing the word EXEMPT may be used below the Crossbuck sign or Number of  
28 Tracks sign plaque, if present, at the highway-rail grade crossing, and a supplemental EXEMPT (W10-1aP)  
29 sign plaque (see Figure 8B-6) with a yellow background bearing the word EXEMPT may be used below the  
30 Highway-Rail Advance Warning (W10-1) sign.

31 Support:

32 These supplemental signs plaques inform drivers of vehicles carrying passengers for hire, school buses  
33 carrying students, or vehicles carrying hazardous materials that a stop is not required at certain designated  
34 highway-rail grade crossings, except when a train, locomotive, or other railroad equipment is approaching or  
35 occupying the highway-rail grade crossing, or the driver's view is blocked.

### 36 **Section ~~8B-06~~ 8B.08 Turn Restrictions During Preemption**

37 **Guidance:**

38 At a signalized intersection that is located within 60 m (200 ft) of a highway-rail grade crossing, measured  
39 from the edge of the track to the edge of the roadway, where the intersection traffic control signals are  
40 preempted by the approach of a train, all existing turning movements toward the highway-rail grade crossing  
41 should be prohibited during the signal preemption sequences.

42 **Option:**

43 A blank-out or changeable message sign and/or appropriate highway traffic signal indication or other  
44 similar type sign may be used to prohibit turning movements toward the highway-rail grade crossing during  
45 preemption. The R3-1a and R3-2a signs shown in Figure 8B-4 may be used for this purpose.

46 **Standard:**

47 **Turn prohibition signs that are associated with preemption shall be visible only when the highway-**  
48 **rail grade crossing restriction is in effect.**

### 49 **Section ~~8B-07~~ 8B.09 DO NOT STOP ON TRACKS Sign (R8-8)**

50 **Guidance:**

1 Whenever engineering judgment determines that the potential for vehicles stopping on the tracks is high, a  
2 DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-4) should be used.

3 The sign, if used, should be located on the right-hand **edited to increase clarity** side of the highway on  
4 either the near or far side of the highway-rail grade crossing, depending upon which side provides better  
5 visibility to approaching drivers.

6 Option:

7 DO NOT STOP ON TRACKS signs may be placed on both sides of the track.

8 On divided highways and one-way streets, a second DO NOT STOP ON TRACKS sign may be placed on  
9 the near or far left-hand **edited to increase clarity** side of the highway-rail grade crossing to further improve  
10 visibility of the sign.

### 11 **Section ~~8B.09~~ 8B.10 TRACKS OUT OF SERVICE Sign (R8-9)**

12 Option:

13 The TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-4) may be used at a highway-rail grade  
14 crossing instead of a Crossbuck (R15-1) sign and a Number of Tracks (R15-2P) ~~sign~~ plaque (see Figure 8B-1)  
15 when railroad tracks have been temporarily or permanently abandoned, but only until such time that the tracks  
16 are removed or paved over.

17 **Standard:**

18 **When tracks are out of service, traffic control devices and gate arms shall be removed and the**  
19 **signal heads shall be removed or hooded or turned from view to clearly indicate that they are not in**  
20 **operation.**

21 **The R8-9 sign shall be removed when the tracks have been removed or covered or when the**  
22 **highway-rail grade crossing is returned to service.**

### 23 **Section ~~8B.10~~ 8B.11 STOP HERE WHEN FLASHING Sign (R8-10, R8-10a)**

24 Option:

25 The STOP HERE WHEN FLASHING (R8-10, R8-10a) sign (see Figure 8B-4) may be used at a highway-  
26 rail grade crossing to inform drivers of the location of the stop line or the point at which to stop when the  
27 flashing-light signals (see Section 8C.02) are activated.

### 28 **Section ~~8B.11~~ 8B.12 STOP HERE ON RED Sign (R10-6, R10-6a)**

29 Support:

30 The STOP HERE ON RED (R10-6, R10-6a) sign (see Figure 8B-4) defines and facilitates observance of  
31 stop lines at traffic control signals.

32 Option:

33 A STOP HERE ON RED sign may be used at locations where vehicles frequently violate the stop line or  
34 where it is not obvious to road users where to stop.

35 Guidance:

36 If possible, stop lines should be placed at a point where the vehicle driver has adequate sight distance  
37 along the track.

### 38 **Section ~~8B.12~~ 8B.13 Emergency Notification Sign (I-13 ~~or I-13a~~)**

39 Guidance:

40 ~~An~~ Emergency Notification (I-13 ~~or I-13a~~) sign~~s~~ (see Figure 8B-5) should be installed at all highway-rail  
41 grade crossings to provide ~~for emergency notification~~ information to road users so that they can notify the  
42 railroad company about emergencies or malfunctioning traffic control devices. ~~The sign should have a white~~  
43 ~~message on blue background.~~

44 ~~Location and placement should be decided cooperatively by the railroad company and the public or~~  
45 ~~private highway agencies based on specific site conditions. However, these signs are typically located on the~~  
46 ~~railroad right-of-way.~~

47 ~~This sign, which is for emergency notification, should convey a clear and simple message that is visible to~~  
48 ~~anyone stalled or disabled on the railroad tracks, and to anyone with other emergencies.~~

49 ~~Support:~~

~~Examples of sign messages are shown in Figure 8B-4.~~

**Standard:**

When Emergency Notification signs are used, they shall, at a minimum, include the U.S. DOT grade crossing inventory number and the emergency contact telephone number in letters and numbers that are at least 13 mm (0.5 in) in height.

The Emergency Notification signs shall be positioned so as to not obstruct any traffic control devices or limit the view of trains approaching the highway-rail grade crossing.

**Option:**

In lieu of Emergency Notification signs, the U.S. DOT grade crossing inventory number and the emergency contact telephone number may be displayed on the enclosure for the signal apparatus at crossings that are equipped with active traffic control systems if the signal apparatus enclosure is located in direct view of road users at or near the crossing.

**Standard:**

Emergency Notification Signs shall have a white legend and border on a blue background.

**Guidance:**

Emergency Notification signs should be retroreflective.

Emergency Notification signs, or the information placed on the signal apparatus enclosure, should be oriented so as to face vehicles stopped on or at the crossing or on the traveled way near the crossing.

At station crossings, Emergency Notification signs or information should be posted in a conspicuous location.

Emergency Notification signs mounted on Crossbuck Assemblies or signal masts should only be large enough to provide the necessary contact information. Use of larger signs that might obstruct the view of trains or other vehicles should be avoided.

**Section ~~8B.13~~ 8B.14 TRAINS MAY EXCEED 130 km/h (80 MPH) Sign (W10-8)**

**Guidance:**

Where trains are permitted to travel at speeds exceeding 130 km/h (80 mph), a TRAINS MAY EXCEED 130 km/h (80 MPH) (W10-8) sign (see Figure 8B-6) should be installed facing road users approaching the highway-rail grade crossing.

If used, the TRAINS MAY EXCEED 130 km/h (80 MPH) signs should be installed between the Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-3) and the highway-rail grade crossing on all approaches to the highway-rail grade crossing. The locations should be determined based on specific site conditions.

**Section ~~8B.14~~ 8B.15 NO TRAIN HORN Sign Plaque (W10-9P)**

**Standard:**

A NO TRAIN HORN (W10-9P) **sign plaque** (see Figure 8B-6) shall be installed at each highway-rail grade crossing where there is a Federal Railroad Administration authorization for trains to not sound a horn. The **sign plaque** shall ~~be mounted as a supplemental plaque~~ **and be mounted directly** below the Highway-Rail Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-3).

~~Section 8B.15 NO SIGNAL Sign (W10-10) or NO GATES OR LIGHTS Sign (W10-13) this is now covered in Section 8B.06~~

**Option:**

~~A NO SIGNAL (W10-10) sign or a NO GATES OR LIGHTS (W10-13) sign (see Figure 8B-5) may be installed at highway-rail grade crossings that are not equipped with automated signals.~~

~~The NO SIGNAL (W10-10) sign or the NO GATES OR LIGHTS (W10-13) sign may be mounted as a supplemental plaque below the Advance Warning (W10-1) sign.~~

**Section 8B.16 LOOK Sign (R15-8)**

**Option:**



1 At highway-rail grade crossings, the LOOK (R15-8) sign (see Figure 8B-4) may be mounted ~~as a~~  
2 ~~supplemental plaque on the Crossbuck (R15-1) sign post, or as~~ on a separate sign post in the immediate  
3 vicinity of the highway-rail grade crossing on the railroad right-of-way.

#### 4 **Section 8B.17 Low Ground Clearance Highway-Rail Grade Crossing Sign (W10-5)**

5 Guidance:

6 If the highway profile conditions are sufficiently abrupt to create a hang-up situation for long wheelbase  
7 vehicles or for trailers with low ground clearance, the Low Ground Clearance Highway-Rail Grade Crossing  
8 (W10-5) sign (see Figure 8B-6) should be installed in advance of the highway-rail grade crossing.

9 **Standard:**

10 **Because this symbol might not be readily recognizable by the public, the Low Ground Clearance**  
11 **Highway-Rail Grade Crossing (W10-5) warning sign shall be accompanied by an educational plaque,**  
12 **LOW GROUND CLEARANCE. The LOW GROUND CLEARANCE educational plaque shall remain**  
13 **in place for at least 3 years after the initial installation of the W10-5 sign (see Section 2A.12).**

14 Guidance:

15 Auxiliary plaques such as AHEAD, NEXT CROSSING, or USE NEXT CROSSING (with appropriate  
16 arrows), or a supplemental distance plaque should be placed below the W10-5 sign at the nearest intersecting  
17 highway where a vehicle can detour or at a point on the highway wide enough to permit a U-turn.

18 If engineering judgment of roadway geometric and operating conditions confirms that vehicle speeds  
19 across the railroad tracks should be below the posted speed limit, a W13-1P advisory speed plaque should be  
20 posted.

21 Option:

22 If the highway-rail grade crossing is rough, word message signs such as BUMP, DIP, or ROUGH  
23 CROSSING may be installed. A W13-1P advisory speed plaque may be installed below the word message  
24 sign in advance of rough crossings.

25 Support:

26 Information on railroad ground clearance requirements is also available in the “American Railway  
27 Engineering and Maintenance-of-Way Association’s Engineering Manual,” or the American Association of  
28 State Highway and Transportation Officials’ “Policy on Geometric Design of Highways and Streets” (see  
29 Section 1A.11).

#### 30 **Section 8B.18 Storage Space Signs (W10-11, W10-11a, W10-11b)**

31 Guidance:

32 A Storage Space (W10-11) sign supplemented by a word message storage distance (W10-11a) sign (see  
33 Figure 8B-6) should be used where there is a highway intersection in close proximity to the highway-rail  
34 grade crossing and an engineering study determines that adequate space is not available to store a design  
35 vehicle(s) between the highway intersection and the train dynamic envelope.

36 The Storage Space (W10-11 and W10-11a) signs should be mounted in advance of the highway-rail grade  
37 crossing at an appropriate location to advise drivers of the space available for vehicle storage between the  
38 highway intersection and the highway-rail grade crossing.

39 Option:

40 A Storage Space (W10-11b) sign (see Figure 8B-6) may be mounted beyond the highway-rail grade  
41 crossing at the highway intersection under the STOP or YIELD sign or just prior to the signalized intersection  
42 to remind drivers of the storage space between the tracks and the highway intersection.

#### 43 **Section 8B.19 Skewed Crossing Sign (W10-12)**

44 Option:

45 The Skewed Crossing (W10-12) sign (see Figure 8B-6) may be used at a skewed highway-rail grade  
46 crossing to warn ~~drivers~~ road users that the railroad tracks are not perpendicular to the highway.

47 Guidance:

48 If the Skewed Crossing sign is used, the symbol should show the direction of the crossing (near left to far  
49 right as shown in Figure 8B-6, or the mirror image if the track goes from far left to near right). If the Skewed

1 Crossing sign is used where the angle of the crossing is significantly different than 45 degrees, the symbol  
2 should show the approximate angle of the crossing.

3 **Standard:**

4 The Skewed Crossing sign shall not be used as a replacement for the required Advance Warning  
5 (W10-1) sign. If used, the Skewed Crossing sign shall supplement the W10-1 sign and shall be mounted  
6 on a separate post.

7 **Section 8B.20 Pavement Markings**

8 **Standard:**

9 All highway-rail grade crossing pavement markings shall be retroreflectorized white. All other  
10 markings shall be in accordance with Part 3.

11 On paved roadways, pavement markings in advance of a highway-rail grade crossing shall consist  
12 of an X, the letters RR, a no-passing zone marking (on two-lane, two-way highways where with  
13 centerline center line markings are used in compliance with Section 3B.01), and certain transverse lines  
14 as shown in Figures 8B-7 and 8B-8.

15 Identical markings shall be placed in each approach lane on all paved approaches to highway-rail  
16 grade crossings where signals or automatic gates are located, and at all other highway-rail grade  
17 crossings where the posted or statutory highway speed is 60 km/h (40 mph) or greater.

18 Pavement markings shall not be required at highway-rail grade crossings where the posted or  
19 statutory highway speed is less than 60 km/h (40 mph). ~~☞~~ In urban areas, pavement markings shall not  
20 be required at highway-rail grade crossings if an engineering study indicates that other installed devices  
21 provide suitable warning and control.

22 **Guidance:**

23 When pavement markings are used, ~~a portion~~ the center of the X symbol should be directly ~~opposite in~~  
24 line with the Advance Warning sign. The X symbol and letters should be elongated to allow for the low angle  
25 at which they will be viewed.

26 **Option:**

27 When justified by engineering judgment, supplemental pavement marking symbol(s) may be placed  
28 between the Advance Warning sign and the highway-rail grade crossing.

29 **Section 8B.21 Stop Lines**

30 **Standard:**

31 On paved roadways at highway-rail grade crossings that are equipped with active control devices  
32 such as flashing-light signals, gates, or traffic control signals, a stop line (see Section 3B.16) shall be  
33 installed to indicate the point behind which vehicles are required to stop.

34 **Guidance:**

35 The stop line should be a transverse line at a right angle to the traveled way at a point where a vehicle is to  
36 stop or as near to that point as ~~possible~~ practical. edited to increase consistency The stop line should be placed  
37 approximately 2.4 m (8 ft) from the gate (if present), but no closer than 4.6 m (15 ft) from the nearest rail.

38 **Support:**

39 Section 8B.05 contains provisions regarding the use of stop lines or yield lines at passive grade crossings.

40 **Section 8B.22 Dynamic Envelope Markings**

41 **Option:**

42 Dynamic envelope markings may be used to mark the edges of the dynamic envelope where there is a  
43 highway intersection in close proximity to the highway-rail grade crossing and an engineering study  
44 determines that vehicles might stop within the dynamic envelope area.

45 Dynamic envelope markings may be installed at all highway-rail grade crossings, unless a Four-Quadrant  
46 Gate system (see Section 8C.05) is used.

47 **Standard:**

48 If used, pavement markings for indicating the dynamic envelope shall ~~conform to~~ comply with the  
49 provisions of Part 3 and shall be a 100 mm (4 in) normal solid white line or contrasting pavement color  
50 and/or contrasting pavement texture.

1 Guidance:

2 If used, dynamic envelope pavement markings should be placed on the highway 1.8 m (6 ft) from the  
3 nearest rail, installed parallel to the tracks, unless the operating railroad company advises otherwise. The  
4 pavement markings should extend across the roadway as shown in Figure 8B-9.  
5



CHAPTER ~~8D~~ 8C. FLASHING-LIGHT SIGNALS, GATES, AND TRAFFIC CONTROL SIGNALS

Section ~~8D.01~~ 8C.01 Introduction

Support:

Active traffic control systems inform ~~motorists, bicyclists, and pedestrians~~ road users of the approach or presence of trains, locomotives, or other railroad equipment at highway-rail grade crossings.

A composite drawing (see Figure 8C-1) shows a post-mounted flashing-light signal (two light units mounted in a horizontal line), a flashing-light signal mounted on an overhead structure, and an automatic gate assembly.

Option:

Post-mounted and overhead ~~mounted~~ edited to increase consistency flashing-light signals may be used separately or in combination with each other as determined by an engineering study. Also, flashing-light signals may be used without automatic gate assemblies, as determined by an engineering study.

**Standard:**

**The meaning of flashing-light signals and gates shall be as stated in the “Uniform Vehicle Code” (see Sections 11-701 and 11-703 of the “UVC”), which is available from the National Committee on Uniform Traffic Laws and Ordinances (see Page i for the address).**

**Location and clearance dimensions for flashing-light signals and gates shall be as shown in Figure 8C-1.**

**When there is a curb, a horizontal clearance of at least 0.6 m (2 ft) shall be provided from the face of the vertical curb to the closest part of the signal or gate arm in its upright position. When a cantilevered-arm flashing-light signal is used, the vertical clearance shall be at least 5.2 m (17 ft) above the crown of the highway to the lowest point of the signal unit.**

**Where there is a shoulder, but no curb, a horizontal clearance of at least 0.6 m (2 ft) from the edge of a paved or surfaced shoulder shall be provided, with a clearance of at least 1.8 m (6 ft) from the edge of the traveled way.**

**Where there is no curb or shoulder, the minimum horizontal clearance shall be 1.8 m (6 ft) from the edge of the traveled way.**

Guidance:

Equipment housings (controller cabinets) should have a lateral ~~clearance offset~~ edited to increase consistency of at least 9 m (30 ft) from the edge of the highway, and where railroad property and conditions allow, at least 7.6 m (25 ft) from the nearest rail.

If a pedestrian route is provided, sufficient clearance from supports, posts, and gate mechanisms should be maintained for pedestrian travel.

When determined by an engineering study, a lateral escape route to the right of the highway in advance of the highway-rail grade crossing traffic control devices should be kept free of guardrail or other ground obstructions. Where guardrail is not deemed necessary or appropriate, barriers should not be used for protecting signal supports.

The same lateral ~~clearance offset~~ edited to increase consistency and roadside safety features should apply to flashing-light signal and automatic gate locations on both the right ~~hand~~ edited to increase clarity and left ~~hand~~ edited to increase clarity sides of the roadway.

Option:

In industrial or other areas involving only low-speed highway traffic or where signals are vulnerable to damage by turning truck traffic, guardrail may be installed to provide protection for the signal assembly.

Section ~~8D.02~~ 8C.02 Flashing-Light Signals, Post-Mounted

**Standard:**

**The flashing-light signal assembly (shown in Figure 8C-1) on the side of the highway shall include a standard Crossbuck (R15-1) sign, and where there is more than one track, a supplemental Number of**

1 **Tracks (R15-2P) ~~sign~~ plaque, all of which indicate to motorists, bicyclists, and pedestrians the location**  
2 **of a highway-rail grade crossing.**

3 Option:

4 Bells or other audible warning devices may be included in the assembly and may be operated in  
5 conjunction with the flashing lights to provide additional warning for pedestrians, ~~and~~ bicyclists, and/or other  
6 non-motorized road users.

7 **Standard:**

8 **When indicating the approach or presence of a train, the flashing-light signal shall display toward**  
9 **approaching highway traffic two red lights mounted in a horizontal line flashing alternately.**

10 **Flashing-light signals shall be placed to the right of approaching highway traffic on all highway**  
11 **approaches to a highway-rail grade crossing. They shall be located laterally with respect to the**  
12 **highway in conformance with Figure 8C-1 except where such location would adversely affect signal**  
13 **visibility.**

14 **At highway-rail grade crossings with highway traffic in both directions, back-to-back pairs of lights**  
15 **shall be placed on each side of the tracks. On multi-lane one-way streets and divided highways,**  
16 **flashing-light signals shall be placed on the approach side of the highway-rail grade crossing on both**  
17 **sides of the roadway or shall be placed above the highway.**

18 **Each red signal unit in the flashing-light signal shall flash alternately. The number of flashes per**  
19 **minute for each lamp shall be 35 minimum and 65 maximum. Each lamp shall be illuminated**  
20 **approximately the same length of time. Total time of illumination of each pair of lamps shall be the**  
21 **entire operating time. Flashing-light units shall use either 200 mm (8 in) or 300 mm (12 in) nominal**  
22 **diameter lenses.**

23 Guidance:

24 In choosing between the 200 mm (8 in) or 300 mm (12 in) nominal diameter lenses for use in highway-  
25 rail grade crossing flashing-light signals, consideration should be given to the principles stated in Section  
26 4D.05.

27 **Standard:**

28 **Highway-rail grade crossing flashing-light signals shall operate at a low voltage using storage**  
29 **batteries either as a primary or stand-by source of electrical energy. Provision shall be made to provide**  
30 **a source of energy for charging batteries.**

31 Option:

32 Additional pairs of flashing-light units may be mounted on the same supporting post and directed toward  
33 vehicular traffic approaching the highway-rail grade crossing from other than the principal highway route,  
34 such as where there are approaching routes on highways closely adjacent to and parallel to the railroad.

### 35 **Section ~~8D.03~~ 8C.03 Flashing-Light Signals, Overhead Structures**

36 Option:

37 Flashing-light signals may be installed on overhead structures or cantilevered supports as shown in Figure  
38 8C-1 where needed for additional emphasis, or for better visibility to approaching traffic, particularly on  
39 multi-lane approaches or highways with profile restrictions.

40 If it is determined by an engineering study that one set of flashing lights on the cantilever arm is not  
41 sufficiently visible to road users, one or more additional sets of flashing lights may be mounted on the  
42 supporting post and/or on the cantilever arm.

43 **Standard:**

44 **Breakaway or frangible bases shall not be used for overhead structures or cantilevered supports.**  
45 **Except as noted in this Section, flashing-light signals mounted overhead shall comply with the**  
46 **applicable provisions of Section 8C.02.**

### 47 **Section ~~8D.04~~ 8C.04 Automatic Gates**

48 Support:

49 An automatic gate is a traffic control device used ~~as an adjunct to~~ in conjunction with flashing-light  
50 signals.

51 **Standard:**

1       The automatic gate (see Figure 8C-1) shall consist of a drive mechanism and a fully  
2 retroreflectorized red- and white-striped gate arm with lights. When in the down position, the gate arm  
3 shall extend across the approaching lanes of highway traffic.

4       In the normal sequence of operation, unless constant warning time or other advanced system  
5 requires otherwise, the flashing-light signals and the lights on the gate arm (in its normal upright  
6 position) shall be activated immediately upon detection of the approaching train. The gate arm shall  
7 start its downward motion not less than 3 seconds after the flashing-light signals start to operate, shall  
8 reach its horizontal position at least 5 seconds before the arrival of the train, and shall remain in the  
9 down position as long as the train occupies the highway-rail grade crossing.

10       When the train clears the highway-rail grade crossing, and if no other train is detected, the gate  
11 arm shall ascend to its upright position, following which the flashing-light signals and the lights on the  
12 gate arm shall cease operation.

13       Gate arms shall be fully retroreflectorized on both sides, have ~~45-degree diagonal~~ vertical stripes  
14 alternately red and white at 400 mm (16 in) intervals measured horizontally, and shall have at least  
15 three red lights as indicated in Figure 8C-1.

16       When activated, the gate arm light nearest the tip shall be illuminated continuously and the other  
17 lights shall flash alternately in unison with the flashing-light signals.

18       The entrance gate arm mechanism shall be designed to fail safe in the down position.

19 Guidance:

20       The gate arm should ascend to its upright position in not more than 12 seconds.

21       In its normal upright position, when no train is approaching or occupying the highway-rail grade crossing,  
22 the gate arm should be either vertical or nearly so (see Figure 8C-1).

23       In the design of individual installations, consideration should be given to timing the operation of the gate  
24 arm to accommodate large and/or slow-moving vehicles.

25       The gates should cover the approaching highway to block all motor vehicles from being driven around the  
26 gate without crossing the ~~centerline~~ center line.

27 Option:

28       Automatic gate installations may include median islands between opposing lanes on an approach to a  
29 highway-rail grade crossing.

30       Where gates are located in the median, additional median width may be required to provide the minimum  
31 clearance for the counterweight supports.

## 32 Section ~~8D.05~~ 8C.05 Four-Quadrant Gate Systems

33 Option:

34       Four-Quadrant Gate systems may be installed to improve safety at highway-rail grade crossings based on  
35 an engineering study when less restrictive measures, such as automatic gates and median islands, are not  
36 effective.

37 Standard:

38       A Four-Quadrant Gate system shall consist of a series of automatic gates used ~~as an adjunct to~~ in  
39 conjunction with flashing-light signals to control traffic on all lanes entering and exiting the highway-  
40 rail grade crossing.

41       The Four-Quadrant Gate system shall consist of a drive mechanism and fully retroreflectorized  
42 red- and white-striped gate arms with lights, and when in the down position the gate arms extend  
43 individually across the entrance and exit lanes of highway traffic as shown in Figure 8C-2. Standards  
44 contained in Sections 8C.01 through 8C.03 for flashing-light signals shall be followed for signal  
45 specifications, location, and clearance distances.

46       In the normal sequence of operation, unless constant warning time or other advanced system  
47 requires otherwise, the flashing-light signals and the lights on the gate arms (in their normal upright  
48 positions) shall be activated immediately upon detection of the approaching train. The gate arms for  
49 the entrance lanes of traffic shall start their downward motion not less than 3 seconds after the flashing-  
50 light signals start to operate and shall reach their horizontal position at least 5 seconds before the  
51 arrival of the train. Exit gate arm activation and downward motion shall be based on detection or

1 **timing requirements established by an engineering study of the individual site. The gate arms shall**  
2 **remain in the down position as long as the train occupies the highway-rail grade crossing.**

3 **When the train clears the highway-rail grade crossing, and if no other train is detected, the gate**  
4 **arms shall ascend to their upright positions, following which the flashing-light [signals](#) and the lights on**  
5 **the gate arms shall cease operation.**

6 **Gate arm design, colors, and lighting requirements shall be in accordance with the Standards**  
7 **contained in Section 8C.04.**

8 **Except as noted in the Option below, the exit gate arm mechanism shall be designed to fail-safe in**  
9 **the up position.**

10 **At locations where gate arms are offset a sufficient distance for vehicles to drive between the**  
11 **entrance and exit gate arms, median islands shall be installed in accordance with the needs established**  
12 **by an engineering study.**

13 **Guidance:**

14 The gate arm should ascend to its upright position in not more than 12 seconds.

15 Four-Quadrant Gate systems should only be used in locations with constant-warning-time train detection.

16 The operating mode of the exit gates should be determined based upon an engineering study, with input  
17 from the affected railroad company.

18 If the Timed Exit Gate Operating Mode is used, the engineering study, with input from the affected  
19 railroad company, should also determine the Exit Gate Clearance Time (see Section 8A.01).

20 If the Dynamic Exit Gate Operating Mode is used, vehicle intrusion detection devices should be installed  
21 to control exit gate operation based on vehicle presence within the minimum track clearance distance.

22 Regardless of which exit gate operating mode is used, the Exit Gate Clearance Time should be considered  
23 when determining additional time requirements for the Minimum Warning Time.

24 If a Four-Quadrant Gate system is used at a location that is adjacent to an intersection that could cause  
25 vehicles to queue within the minimum track clearance distance, the Dynamic Exit Gate Operating Mode  
26 should be used unless an engineering study indicates otherwise.

27 If a Four-Quadrant Gate system is interconnected with a highway traffic signal, backup or standby power  
28 should be considered for the highway traffic signal. Also, circuitry should be installed to prevent the highway  
29 traffic signal from leaving the track clearance green interval until all of the gates are lowered.

30 At locations where sufficient space is available, exit gates should be ~~set back~~ [positioned downstream](#) from  
31 the track a distance that provides a safety zone long enough to accommodate at least one design vehicle  
32 between the exit gate and the nearest rail.

33 Four-Quadrant Gate systems should include remote health (status) monitoring capable of automatically  
34 notifying railroad signal maintenance personnel when anomalies have occurred within the system.

35 **Option:**

36 Exit gate arms may fail in the down position if the highway-rail grade crossing is equipped with remote  
37 health (status) monitoring.

38 Four-Quadrant Gate installations may include median islands between opposing lanes on an approach to a  
39 highway-rail grade crossing.

40 **Guidance:**

41 Where sufficient space is available, median islands should be at least 18 m (60 ft) in length.

## 42 [Section 8C.06 Wayside Horn Systems](#)

43 [Option:](#)

44 [Wayside horn systems may be installed to provide directional audible warning at highway-rail grade](#)  
45 [crossings, including pedestrian or other non-motorized facility grade crossings or other applications, as](#)  
46 [determined by a diagnostic team. Wayside horn systems may either be installed to provide supplemental](#)  
47 [audible warning where the locomotive-mounted horn is sounded or as an alternative to the sounding of a](#)  
48 [locomotive-mounted horn.](#)

49 [Standard:](#)

1 A wayside horn system shall consist of a horn or series of horns used in conjunction with train-  
2 activated warning systems to provide audible warning of an approaching train for traffic on the  
3 highway approaches to the highway-rail grade crossing.

4 The wayside horn system shall be designed using fail-safe principles. A means shall be employed to  
5 verify the sound output from the wayside horn system.

6 If a wayside horn system is used at a highway-rail grade crossing where the locomotive-mounted  
7 horn is not sounded, the highway-rail grade crossing shall be equipped with flashing-light signals and  
8 gates.

9 Wayside horn systems used at highway-rail grade crossings where the locomotive-mounted horn is  
10 not sounded shall be equipped with a confirmation indicator and shall operate in conformance with 49  
11 CFR Part 222. For other applications, the wayside horn minimum sound level shall be determined by a  
12 diagnostic team.

13 The wayside horn system shall simulate a train horn and produce sound output for a minimum of  
14 15 seconds prior to the train's arrival at the highway-rail grade crossing, or simultaneously with the  
15 activation of the flashing-light signals or the descent of the gate, and shall continue to produce sound  
16 output until the lead locomotive has traversed the crossing. Where multiple tracks are present, the  
17 wayside horn system shall immediately reactivate when another train is detected before the previous  
18 train clears the crossing.

19 The wayside horn system shall be directed toward approaching road users; however, directing the  
20 wayside horn system toward approaching road users on adjacent roadways whose movement toward  
21 the crossing is controlled by a STOP sign or traffic control signal shall not be required.

22 The highway-rail grade crossing shall be equipped with constant warning time train detection  
23 circuitry unless conditions at the crossing would prevent the proper operation of the constant warning  
24 time device.

25 Guidance:

26 Wayside horn systems should be installed to provide audible warning for each roadway approach to the  
27 highway-rail grade crossing. The same lateral clearance and roadside safety features should apply to wayside  
28 horn systems as described in the Standards contained in Section 8C.01. Wayside horn systems, when  
29 mounted on a separate pole assembly, should be installed no closer than 4.6 m (15 ft) from the center of the  
30 nearest track and should be positioned to not obstruct the motorists' line of sight of the flashing-light signals.

31 Prior to installing any wayside horn system, the responsibility for maintenance of the system and all of the  
32 appurtenances, hardware, and software should be clearly established. The responsible agency should provide  
33 for the maintenance of the system and the appurtenances to retain the proper functioning of the device.

34 Option:

35 Wayside horn systems may include a delay of 3 to 5 seconds after the activation of the flashing-light  
36 signals before sounding.

37 Wayside horn systems may include remote health (status) monitoring capable of automatically notifying  
38 maintenance personnel when anomalies have occurred within the system.

39 Wayside horn systems may be equipped with a back-up power system.

## 40 **Section ~~8D.06~~ 8C.07 Train Detection**

41 **Standard:**

42 **The devices employed in active traffic control systems shall be actuated by some form of train**  
43 **detection.**

44 **Train detection circuits, insofar as practical, shall be designed on the fail-safe principle.**

45 **Flashing-light signals shall operate for at least 20 seconds before the arrival of any train, except as**  
46 **noted in the Option below.**

47 **Option:**

48 **On tracks where all trains operate at less than 30 km/h (20 mph) and where ~~flagging is performed by~~ an**  
49 **employee on the ground manually stops road users from entering the crossing, a shorter signal operating time**  
50 **for the flashing-light signals may be used.**

51 **Additional warning time may be provided when determined by an engineering study.**

52 **Guidance:**



1 Where the speeds of different trains on a given track vary considerably under normal operation, special  
2 devices or circuits should be installed to provide reasonably uniform notice in advance of all train movements  
3 over the highway-rail grade crossing. Special control features should be used to eliminate the effects of  
4 station stops and switching operations within approach control circuits to prevent excessive activation of the  
5 traffic control devices while trains are stopped on or switching upon the approach track control circuits.

6 **Section ~~8D.07~~ 8C.08 Traffic Control Signals at or Near Highway-Rail Grade Crossings**

7 Option:

8 Traffic control signals may be used instead of flashing-light signals to control road users at industrial  
9 highway-rail grade crossings and other places where train movements are very slow, such as in switching  
10 operations.

11 **Standard:**

12 **The appropriate provisions of Part 4 relating to traffic control signal design, installation, and**  
13 **operation shall be applicable where traffic control signals are used to control road users instead of**  
14 **flashing-light signals at highway-rail grade crossings.**

15 **Traffic control signals shall not be used instead of flashing-light signals to control road users at a**  
16 **mainline highway-rail grade crossing.**

17 Guidance:

18 If a highway-rail grade crossing is equipped with a flashing-light signal system and is located within 60 m  
19 (200 ft) of an intersection or midblock location controlled by a traffic control signal, the traffic control signal  
20 should be provided with preemption in accordance with Section 4D.27.

21 Coordination with the flashing-light signal system, queue detection, or other alternatives should be  
22 considered for traffic control signals located farther than 60 m (200 ft) from the highway-rail grade crossing.  
23 Factors to be considered should include traffic volumes, vehicle mix, vehicle and train approach speeds,  
24 frequency of trains, and queue lengths.

25 Except for traffic control signals interconnected with light rail transit systems, traffic control signals with  
26 railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up  
27 power supply.

28 The highway agency or authority with jurisdiction, and the regulatory agency with statutory authority, if  
29 applicable, ~~and the railroad company~~ should jointly determine the preemption operation and the timing of  
30 traffic control signals interconnected with ~~at~~ highway-rail grade crossings adjacent to signalized highway  
31 intersections.

32 **Standard:**

33 Information regarding the type of preemption and any related timing parameters shall be provided  
34 to the railroad company so that they can design the appropriate train detection circuitry.

35 **If preemption is provided, the normal sequence of traffic control signal indications shall be**  
36 **preempted upon the approach of trains to avoid entrapment of vehicles on the highway-rail grade**  
37 **crossing by conflicting aspects of the traffic control signals and the highway-rail grade crossing**  
38 **flashing-light signals.**

39 **This preemption feature shall have an electrical circuit of the closed-circuit principle, or a**  
40 **supervised communication circuit between the control circuits of the highway-rail grade crossing**  
41 **warning system and the traffic control signal controller. The traffic control signal controller preemptor**  
42 **shall be activated via the supervised communication circuit or the electrical circuit that is normally**  
43 **energized by the control circuits of the highway-rail grade crossing warning system. The approach of a**  
44 **train to a highway-rail grade crossing shall de-energize the electrical circuit or activate the supervised**  
45 **communication circuit, which in turn shall activate the traffic control signal controller preemptor. This**  
46 **shall establish and maintain the preemption condition during the time the highway-rail grade crossing**  
47 **warning system is activated, except that when crossing gates exist, the preemption condition shall be**  
48 **maintained until the crossing gates are energized to start their upward movement. When multiple or**  
49 **successive preemptions occur, train activation shall receive first priority.**

50 Guidance:

51 If a highway-rail grade crossing is located within 15 m (50 ft) (or within 23 m (75 ft) for a highway that is  
52 regularly used by multi-unit vehicles) of an intersection controlled by a traffic control signal, the use of pre-  
53 signals to control traffic approaching the grade crossing should be considered.

1 **Standard:**

2 If used, the pre-signals shall display a steady **added to increase accuracy** red signal indication  
3 during the track clearance portion of a signal preemption sequence to prohibit additional vehicles from  
4 crossing the railroad track.

5 Guidance:

6 Consideration should be given to using visibility-limited signal faces (see Section 4A.02) at the  
7 intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

8 Option:

9 The pre-signal phase sequencing may be timed with an offset from the downstream signalized intersection  
10 such that the railroad track area and the area between the railroad track and the downstream signalized  
11 intersection is generally kept clear of stopped vehicles.

12 **Standard:**

13 If a pre-signal is installed at an interconnected highway-rail grade crossing near a signalized  
14 intersection, a STOP HERE ON RED (R10-6) sign shall be installed near the pre-signal or at the stop  
15 line if used. If there is a nearby signalized intersection with insufficient clear storage distance for a  
16 design vehicle, or the highway-rail grade crossing does not have gates, a No Turn on Red (R10-11, R10-  
17 11a, or R10-11b) **added to increase accuracy** sign (see Section 2B.59) shall be installed for the approach  
18 that crosses the railroad track.

19 Option:

20 At locations where a highway-rail grade crossing is located more than 15 m (50 ft) (or more than 23 m (75  
21 ft) for a highway regularly used by multi-unit vehicles) from an intersection controlled by a traffic control  
22 signal, a pre-signal may be used if an engineering study determines a need.

23 If highway traffic signals must be located within close proximity to the flashing-light signal system, the  
24 highway traffic signals may be mounted on the same overhead structure as the flashing-light signals.

25 Support:

26 Section 4C.10 describes the Intersection Near a Highway-Rail Grade Crossing signal warrant that is  
27 intended for use at a location where the proximity to the intersection of a highway-rail grade crossing on an  
28 intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a  
29 traffic control signal.

30 Section 4D.27 describes additional considerations regarding preemption of traffic control signals at or  
31 near highway-rail grade crossings.

32 **Section 8C.09 Highway-Rail Grade Crossing(s) Within or In Close Proximity to Roundabouts,**  
33 **Traffic Circles, or Circular Intersections**

34 Support:

35 At roundabouts, traffic circles, or circular intersections that include or are within close proximity to a  
36 highway-rail grade crossing, a queue of vehicular traffic could cause vehicles to stop on the highway-rail  
37 grade crossing.

38 **Standard:**

39 **Where roundabouts, traffic circles, or circular intersections include or are within close proximity to**  
40 **a highway-rail grade crossing, an engineering study shall be made to determine if queuing could impact**  
41 **the highway-rail grade crossing. If traffic queues impact the highway-rail grade crossing, provisions**  
42 **shall be made to clear highway traffic from the highway-rail grade crossing prior to the arrival of a**  
43 **train.**

44 Guidance:

45 Among the provisions that should be considered for keeping the crossing clear of traffic or for clearing  
46 traffic from the crossing prior to the arrival of a train are the following:

- 47 A. Elimination of the roundabout,
- 48 B. Geometric design revisions,
- 49 C. Highway-rail grade crossing warning devices,
- 50 D. Highway traffic signals,
- 51 E. Traffic metering devices,
- 52 F. Activated signs, or

1 [G. A combination of these or other actions.](#)  
2



1 **CHAPTER 8D. QUIET ZONE TREATMENTS AT HIGHWAY-RAIL GRADE CROSSINGS**

2 **Section 8D.01 Introduction**

3 **Support:**

4 49 CFR Part 222 (Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule) prescribes  
5 Quiet Zone requirements and treatments.

6 **Standard:**

7 Any traffic control device and its application where used as part of a Quiet Zone shall comply with  
8 all applicable provisions of the MUTCD.

9

## CHAPTER 8E. PATHWAY-RAIL GRADE CROSSINGS

### Section 8E.01 Purpose

#### Support:

Traffic control for pathway-rail grade crossings includes all signs, signals, markings, other warning devices, and their supports at pathway-rail grade crossings and along pathway approaches to a grade crossing. The function of this traffic control is to promote safety and provide effective operation of both rail and pathway traffic at pathway-rail grade crossings.

Except as specifically noted in this Chapter, sidewalks are considered to be part of a highway-rail grade crossing rather than a pathway-rail grade crossing, and are not covered by this Chapter.

### Section 8E.02 Use of Standard Devices, Systems, and Practices

#### Guidance:

The public agency with jurisdiction over the pathway and the regulatory agency with statutory authority, if applicable, should jointly determine the need and selection of devices at a pathway-rail grade crossing.

The appropriate traffic control system to be used at a pathway-rail grade crossing should be determined by a diagnostic team.

### Section 8E.03 Pathway-Rail Grade Crossing Signs and Markings

#### Standard:

Pathway-rail grade crossing signs shall be standard in shape, legend, and color.

Traffic control devices mounted adjacent to pathways at a height of less than 2.4 m (8 ft) measured vertically from the bottom edge of the device to the elevation of the near edge of the pathway surface shall have a minimum lateral clearance of 0.6 m (2 ft) from the near edge of the device to the near edge of the pathway (see Figure 9B-1).

The minimum mounting height for post-mounted signs on pathways shall be 1.2 m (4 ft), measured vertically from the bottom edge of the sign to the elevation of the near edge of the pathway surface (see Figure 9B-1).

Pathway-rail grade crossing traffic control devices shall be located a minimum of 3.7 m (12 ft) from the center of the nearest track.

The minimum sizes of pathway-rail grade crossing signs shall be as shown in the shared-use path column in Table 9B-1.

When overhead traffic control devices are used on pathways, the clearance from the bottom edge of the device to the pathway surface directly under the sign or device shall be at least 2.4 m (8 ft).

#### Guidance:

If pathway users include those who travel faster than pedestrians, such as bicyclists or skaters, the diagnostic team should consider the use of warning signs and pavement markings in advance of the pathway-rail grade crossing (see Figure 9B-7).

### Section 8E.04 Stop Lines and Detectable Warnings

#### Guidance:

If used at pathway-rail-grade crossings, the stop line should be a transverse line at the point where a pathway user is to stop. The stop line should be placed at least 0.6 m (2 ft) upstream from the gate or counterweight (if present), and at least 3.7 m (12 ft) from the nearest rail.

If used on pathway-rail grade crossings or sidewalks at highway-rail grade crossings, detectable warnings (see Section 3B.18) should extend across the full width of the pathway or sidewalk and should be 0.6 m (2 ft) wide in the pedestrian direction of travel. Detectable warnings should be placed at least 0.6 m (2 ft) upstream from the gate or counterweight (if present), and no closer than the stop line (if present) or 3.7 m (12 ft) from the nearest rail.

### Section 8E.05 Passive Devices for Pathway-Rail Grade Crossings

#### Standard:

1 Except as noted in the Option below, where active traffic control devices are not used, a Crossbuck  
2 Assembly shall be installed on each approach to a pathway-rail grade crossing.

3 Option:

4 The Crossbuck Assembly may be omitted at station crossings and on the approaches to a pathway-rail  
5 grade crossing that is located within 7.6 m (25 ft) of the traveled way at a highway-rail grade crossing.

6 Guidance:

7 The pathway user's ability to detect the presence of an approaching train should be considered in  
8 determining the type and placement of traffic control devices or design features (such as fencing or swing  
9 gates).

10 Nighttime visibility should be considered if design features (such as fencing or swing gates) are used to  
11 channelize pathway users.

12 When automatic gates and swing gates are used, the pathway should be channelized to direct users to the  
13 entrance to and exit from the pathway-rail grade crossing.

14 Standard:

15 If used, swing gates shall open away from the track(s) and return to the closed position after use.

16 Option:

17 When used in conjunction with automatic gates at pathway-rail grade crossings, swing gates may be  
18 equipped with a latching device that permits the gate to be opened only by pedestrians who are on the track  
19 side of the gate.

20 Refuge areas may be provided to provide a place for large numbers of pedestrians to congregate during  
21 the passage of a train.

22 Guidance:

23 Where refuge areas are provided, fencing should be installed to limit access to only the pathway-rail grade  
24 crossing.

## 25 Section 8E.06 Active Traffic Control Systems for Pathway-Rail Grade Crossings

26 Standard:

27 If an active traffic control system is used at a pathway-rail grade crossing, flashing-light signals and  
28 a bell or other audible warning device shall be provided for each direction of the pathway.

29 Support:

30 If a pathway-rail grade crossing is located within 7.6 m (25 ft) of the traveled way at a highway-rail grade  
31 crossing equipped with an active traffic control system, a separate active traffic control system for the  
32 pathway is usually not provided.

33 Standard:

34 If used at pathway-rail grade crossings, flashing-light signals shall be alternately flashing red lights  
35 that are aligned horizontally and the light units shall have a diameter of at least 100 mm (4 in). The  
36 mounting height for flashing red lights installed at pathway-rail grade crossings shall be a minimum of  
37 1.2 m (4 ft), measured vertically from the bottom edge of the lights to the elevation of the near edge of  
38 the pathway surface.

39 Option:

40 At station crossings where more than one track is present, additional traffic control devices may be  
41 installed between the tracks as recommended by a diagnostic team.

42 Standard:

43 The mounting height for flashing red lights installed between the tracks at station crossings shall be  
44 a minimum of 0.3 m (1 ft), measured vertically from the bottom edge of the lights to the elevation of the  
45 near edge of the pathway surface.

46 Option:

47 Automatic gates may be used at pathway-rail grade crossings as recommended by a diagnostic team.

48 Guidance:

49 If used at a pathway-rail grade crossing, each automatic gate should be installed to rest a minimum of 0.9  
50 m (3 ft) above the pathway when in the down position.

1 If used, the gate configuration should provide for full width coverage of the pathway on both approaches  
2 to the track.

3 **Standard:**

4 **Where sidewalks are located between the edge of a roadway and active traffic control devices, the**  
5 **location, placement, and height prescribed for roadway gates shall be used (see Section 8C.04).**

6 **Guidance:**

7 Separate automatic gates used at sidewalks should be installed to rest a minimum of 0.9 m (3 ft) above the  
8 sidewalk when in the down position.

9 If separate automatic gates are used for a sidewalk, a separate gate mechanism should be provided for the  
10 sidewalk gate, instead of a supplemental or auxiliary gate arm installed as a part of the same mechanism as the  
11 vehicular gate, in order to prevent a pedestrian from raising the vehicular gate at a highway-rail grade  
12 crossing.

13

**Table 8B-1. Grade Crossing Sign and Plaque Sizes (Sheet 1 of 2)**

Sign or Plaque	Sign Designation	Section	Conventional Road	Expressway	Minimum	Oversized
No Right Turn Across Tracks	R3-1a	8B.08, 10C.09	600 x 750* (24 x 30)	—	—	—
No Left Turn Across Tracks	R3-2a	8B.08, 10C.09	600 x 750* (24 x 30)	—	—	—
Do Not Stop on Tracks	R8-8	8B.09, 10C.05	600 x 750 (24 x 30)	900 x 1200 (36 x 48)	—	900 x 1200 (36 x 48)
Tracks Out of Service	R8-9	8B.10, 10C.06	600 x 600 (24 x 24)	900 x 900 (36 x 36)	—	900 x 900 (36 x 36)
Stop Here When Flashing	R8-10	8B.11, 10C.07	600 x 900 (24 x 36)	—	—	750 x 1050 (30 x 42)
Stop Here When Flashing	R8-10a	8B.11, 10C.07	600 x 750 (24 x 30)	—	—	—
Stop Here on Red	R10-6	8B.12, 10C.08	600 x 900 (24 x 36)	—	—	900 x 1200 (36 x 48)
Stop Here on Red	R10-6a	8B.12, 10C.08	600 x 750 (24 x 30)	—	—	—
Highway-Rail Grade Crossing (Crossbuck)	R15-1	8B.03, 10C.02	1200 x 225 (48 x 9)	—	—	—
Number of Tracks (plaque)	R15-2P	8B.03, 10C.02	675 x 450 (27 x 18)	—	—	—
Exempt (plaque)	R15-3P	8B.07, 10C.10	600 x 300 (24 x 12)	—	—	—
Light Rail Only Right Lane	R15-4a	10C.13	600 x 750 (24 x 30)	—	—	—
Light Rail Only Left Lane	R15-4b	10C.13	600 x 750 (24 x 30)	—	—	—
Light Rail Only Center Lane	R15-4c	10C.13	600 x 750 (24 x 30)	—	—	—
Light Rail Do Not Pass	R15-5	10C.14	600 x 750 (24 x 30)	—	—	—
Do Not Pass Stopped Train	R15-5a	10C.14	600 x 750 (24 x 30)	—	—	—
Light Rail Do Not Drive On Tracks Symbol	R15-6	10C.12	600 x 600 (24 x 24)	—	—	—
Do Not Drive On Tracks	R15-6a	10C.12	600 x 750 (24 x 30)	—	—	—
Light Rail Divided Highway Symbol	R15-7	10C.11	600 x 600 (24 x 24)	—	—	—
Light Rail Divided Highway Symbol (T-Intersection)	R15-7a	10C.11	600 x 600 (24 x 24)	—	—	—
Look	R15-8	8B.16, 10C.03	900 x 450 (36 x 18)	—	—	—
Highway-Rail Grade Crossing Advance Warning	W10-1	8B.06, 10C.15	900 Dia. (36 Dia.)	1200 Dia. (48 Dia.)	—	1200 Dia. (48 Dia.)
Exempt (plaque)	W10-1aP	8B.07, 10C.10	600 x 300 (24 x 12)	—	—	—
Highway-Rail Grade Crossing Advance Warning	W10-2,3,4	8B.06, 10C.15	900 x 900 (36 x 36)	1200 x 1200 (48 x 48)	—	1200 x 1200 (48 x 48)
Low Ground Clearance Highway-Rail Grade Crossing	W10-5	8B.17, 10C.16	900 x 900 (36 x 36)	1200 x 1200 (48 x 48)	—	1200 x 1200 (48 x 48)
Low Ground Clearance (plaque)	W10-5P	8B.17, 10C.16	600 x 450 (24 x 18)	—	—	—
Light Rail Activated Blank-Out Symbol	W10-7	10C.17	600 x 600 (24 x 24)	—	—	—
Trains May Exceed 130 km/h (80 MPH)	W10-8	8B.14	900 x 900 (36 x 36)	1200 x 1200 (48 x 48)	—	1200 x 1200 (48 x 48)
No Train Horn (plaque)	W10-9P	8B.15	600 x 450 (24 x 18)	—	—	—
No Signal (plaque)	W10-10P	8B.06, 10C.15	600 x 450 (24 x 18)	—	—	—
Storage Space Symbol	W10-11	8B.18, 10C.18	900 x 900 (36 x 36)	1200 x 1200 (48 x 48)	—	1200 x 1200 (48 x 48)

\* See Table 2B-2 for minimum size required for signs facing traffic on multi-lane conventional roads

Notes: 1. Larger signs may be used when appropriate.

2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.

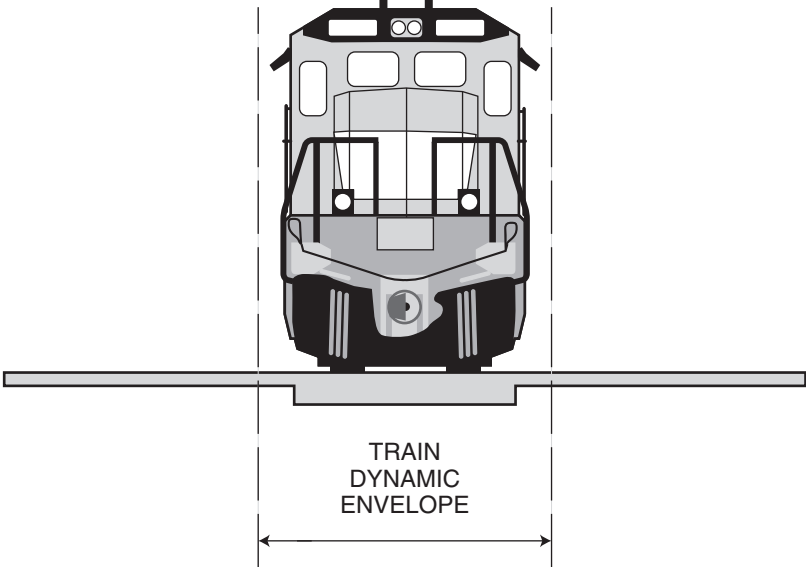
**Table 8B-1. Grade Crossing Sign and Plaque Sizes (Sheet 2 of 2)**

Sign or Plaque	Sign Designation	Section	Conventional Road	Expressway	Minimum	Oversized
Storage Space XX Meters (Feet) Between Tracks & Highway	W10-11a	8B.18, 10C.18	750 x 900 (30 x 36)	—	—	—
Storage Space XX Meters (Feet) Between Highway & Tracks Behind You	W10-11b	8B.18, 10C.18	750 x 900 (30 x 36)	—	—	—
Skewed Crossing	W10-12	8B.19, 10C.19	900 x 900 (36 x 36)	1200 x 1200 (48 x 48)	—	1200 x 1200 (48 x 48)
Next Crossing (plaque)	W10-14P	8B.17	750 x 600 (30 x 24)	—	—	—
Use Next Crossing (plaque)	W10-14aP	8B.17	750 x 600 (30 x 24)	—	—	—
Rough Crossing (plaque)	W10-15P	8B.17	750 x 600 (30 x 24)	—	—	900 x 750 (36 x 30)
Signal Ahead (plaque)	W10-16P	8B.06, 10C.15	750 x 600 (30 x 24)	—	—	—
Light Rail Station Symbol	I-12	10C.20	600 x 600 (24 x 24)	—	—	—
Emergency Notification	I-13	8B.13, 10C.21	750 x 450* (30 x 18)	—	—	—

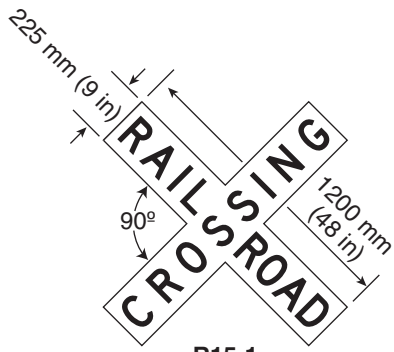
\* The size shown is for a typical sign. The size should be appropriately adjusted based on the amount of legend required for the sign.

- Notes: 1. Larger signs may be used when appropriate.  
 2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.

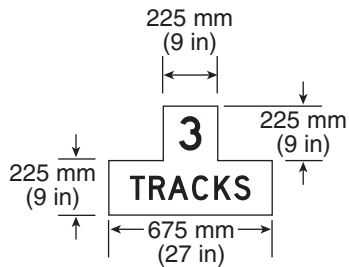
**Figure 8A-1. Train Dynamic Envelope**



**Figure 8B-1. Highway-Rail Grade Crossing Regulatory Signs and Plaques**



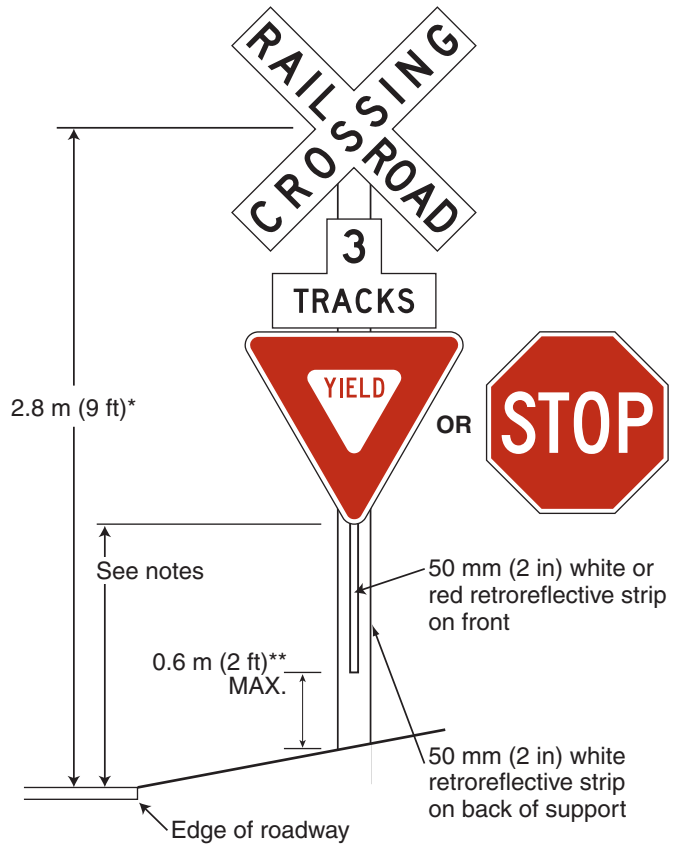
**R15-1**



**R15-2P**

\* Height may be varied as required by local conditions

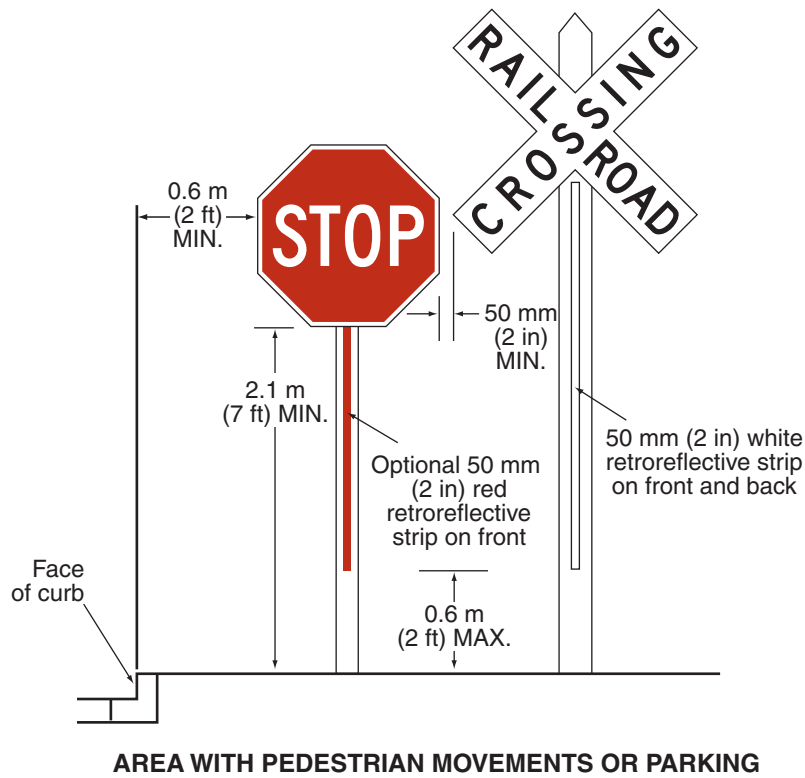
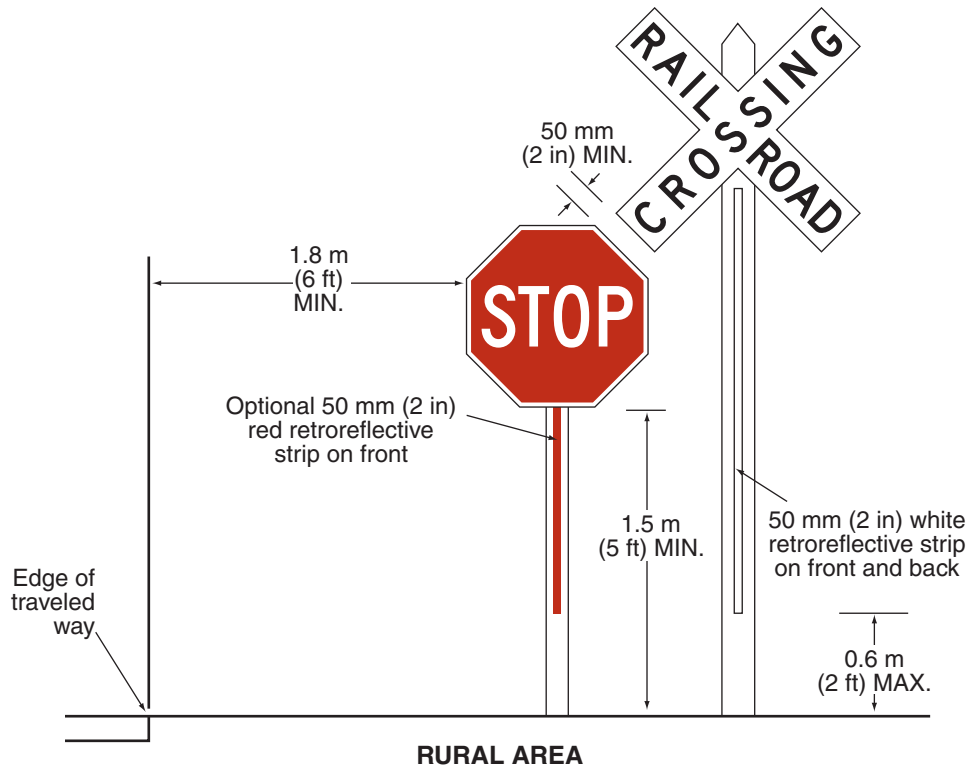
\*\* Measured to the ground level at the base of the support



- Notes:
1. YIELD or STOP sign used only at passive crossings
  2. Mounting height of at least 1.2 m (4 ft) for installations of YIELD or STOP signs on existing Crossbuck sign supports
  3. Mounting height of at least 2.1 m (7 ft) in areas with pedestrian movements or parking

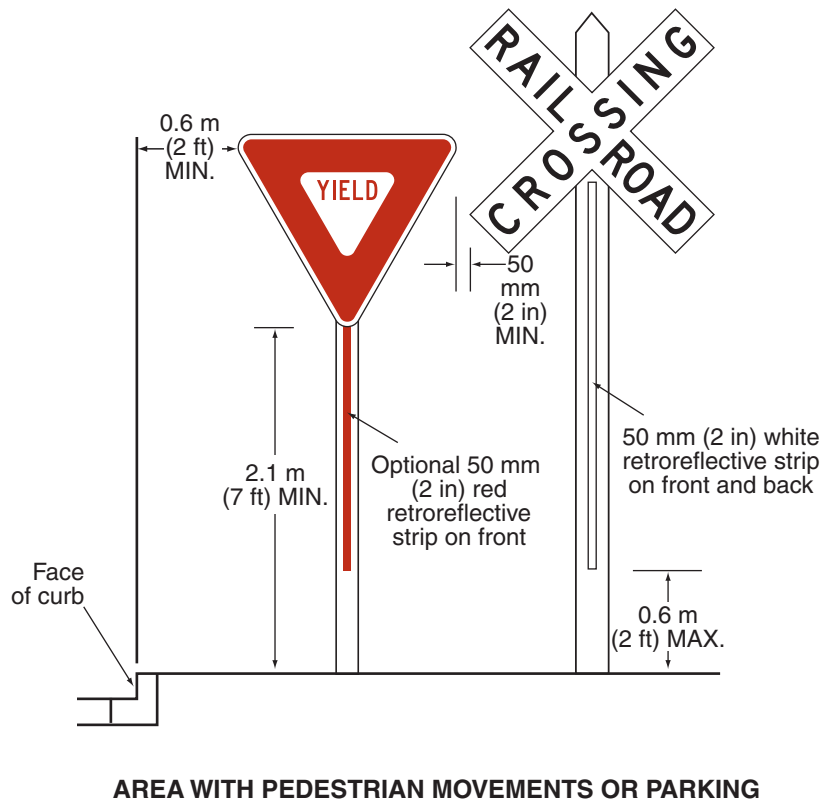
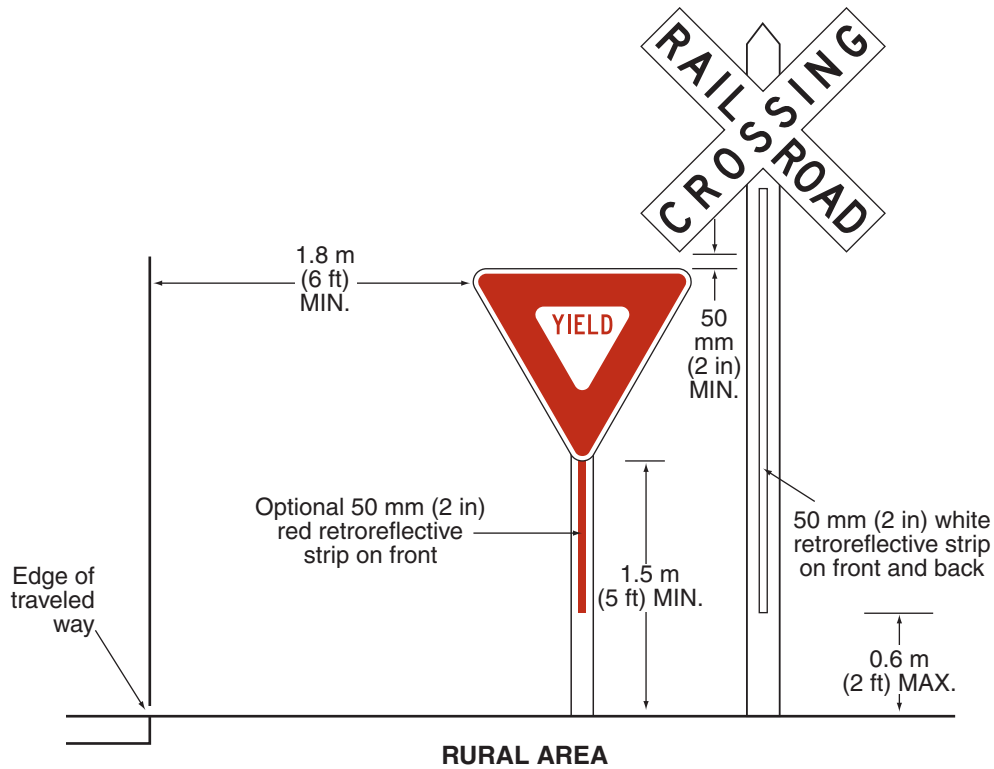


**Figure 8B-2. Highway-Rail Grade Crossing (Crossbuck) Regulatory Signs with Separate Posts (Sheet 1 of 2)**



Note: Place the face of the signs in the same plane and place the STOP sign closest to the traveled way. Provide a 50 mm (2 in) minimum separation between the edge of the Crossbuck sign and the edge of the STOP sign.

**Figure 8B-2. Highway-Rail Grade Crossing (Crossbuck) Regulatory Signs with Separate Posts (Sheet 2 of 2)**



Note: Place the face of the signs in the same plane and place the YIELD sign closest to the traveled way. Provide a 50 mm (2 in) minimum separation between the edge of the Crossbuck sign and the edge of the YIELD sign.

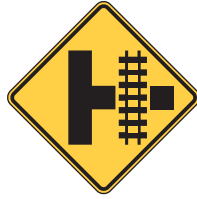
**Figure 8B-3. Advance Warning Signs and Plaques**



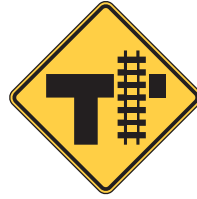
W10-1



W10-2



W10-3



W10-4



W10-10P



W10-16P

*Figure 8B-4. Regulatory Signs and Plaques*



R3-1a  
Activated Blank-Out



R3-2a  
Activated Blank-Out



R8-8



R8-9



R8-10



R8-10a



R10-6



R10-6a



R15-3P



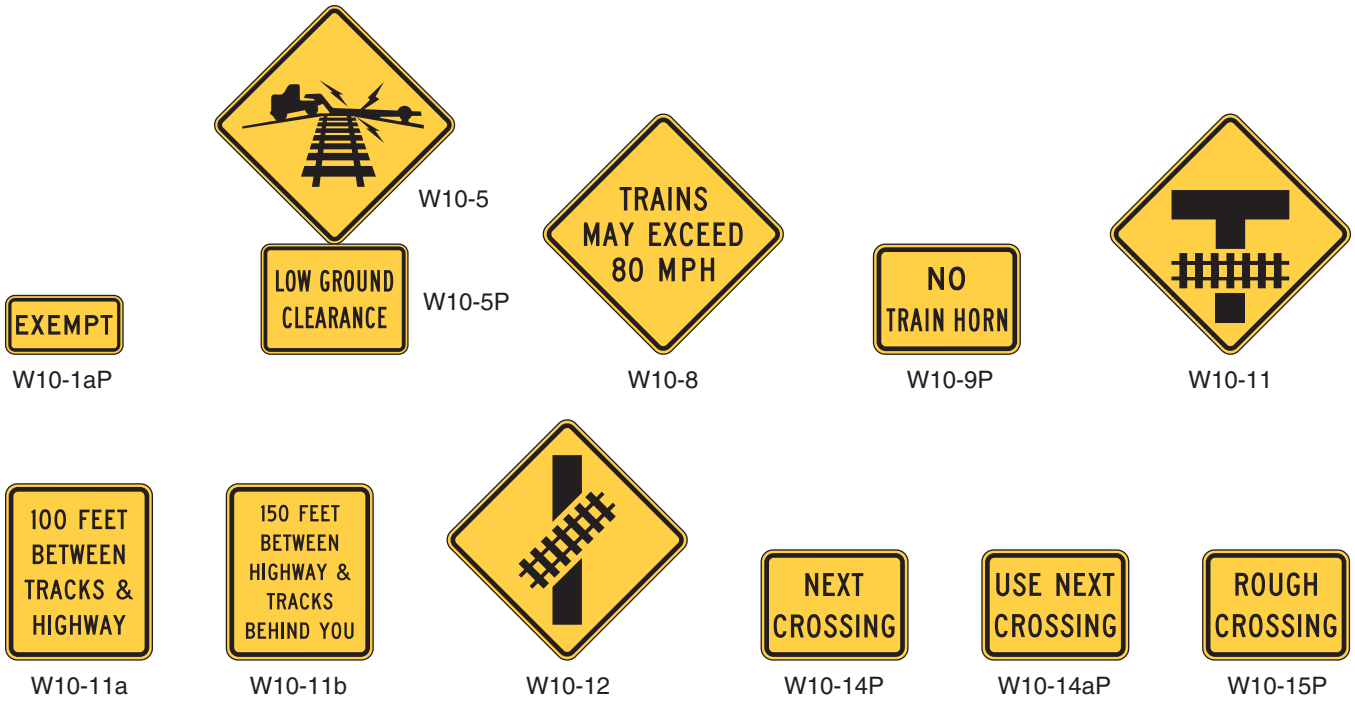
R15-8

**Figure 8B-5. Example of Emergency Notification Sign**



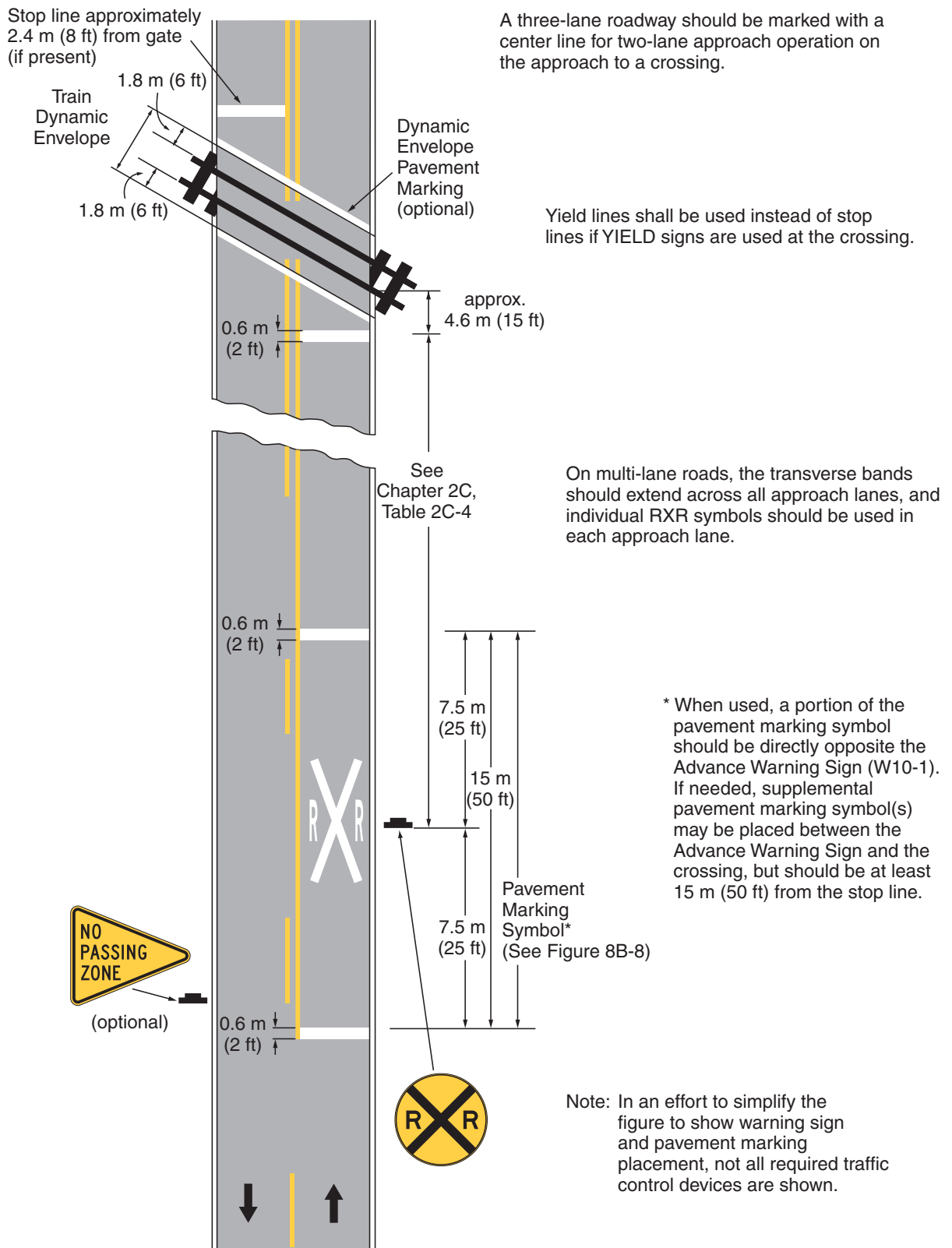
I-13

Figure 8B-6. Warning Signs and Plaques



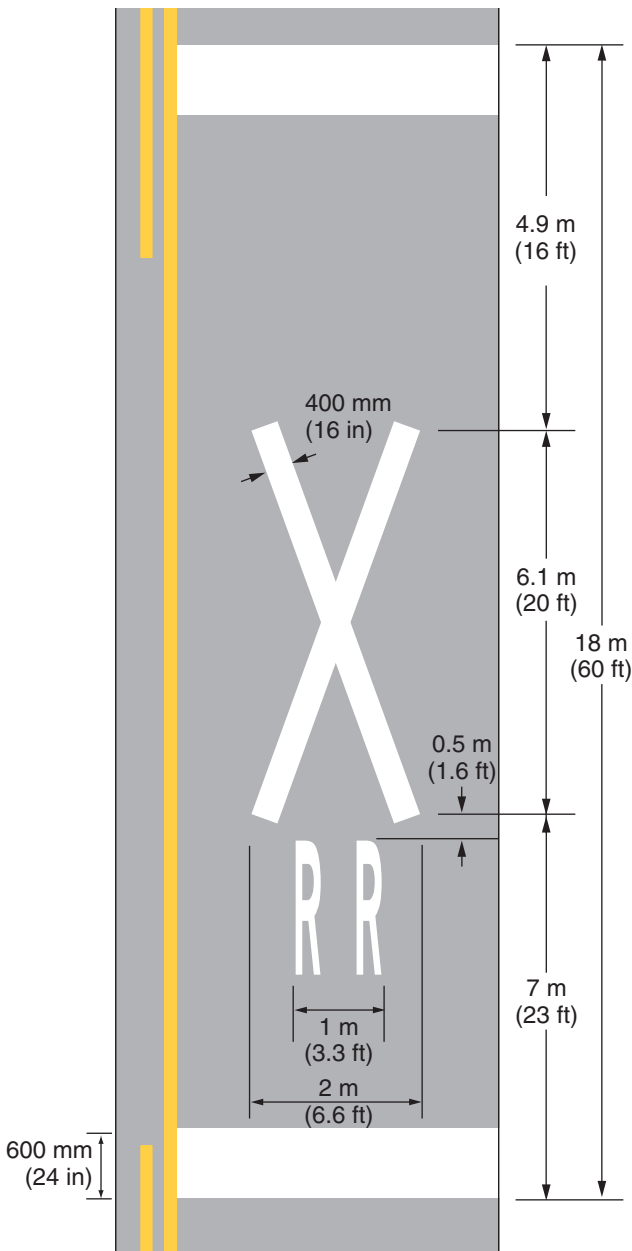
Note: The W10-11 sign is a W10-3 sign modified for geometrics. Other signs can be oriented or revised as needed to satisfy the geometrics of the roadways and the railroad tracks.

**Figure 8B-7. Example of Placement of Warning Signs and Pavement Markings at Highway-Rail Grade Crossings**



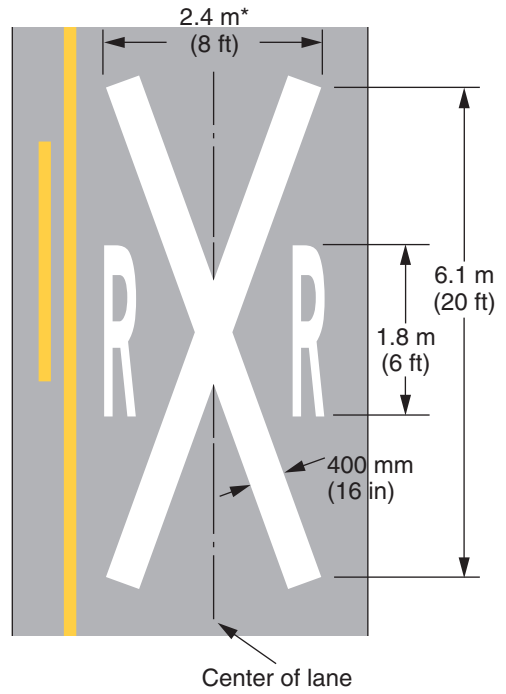
Legend  
 → Direction of travel

**Figure 8B-8. Highway-Rail Grade Crossing Pavement Markings**



**Highway-rail grade crossing alternative (narrow) pavement markings**

Note: Refer to Figure 8B-7 for placement

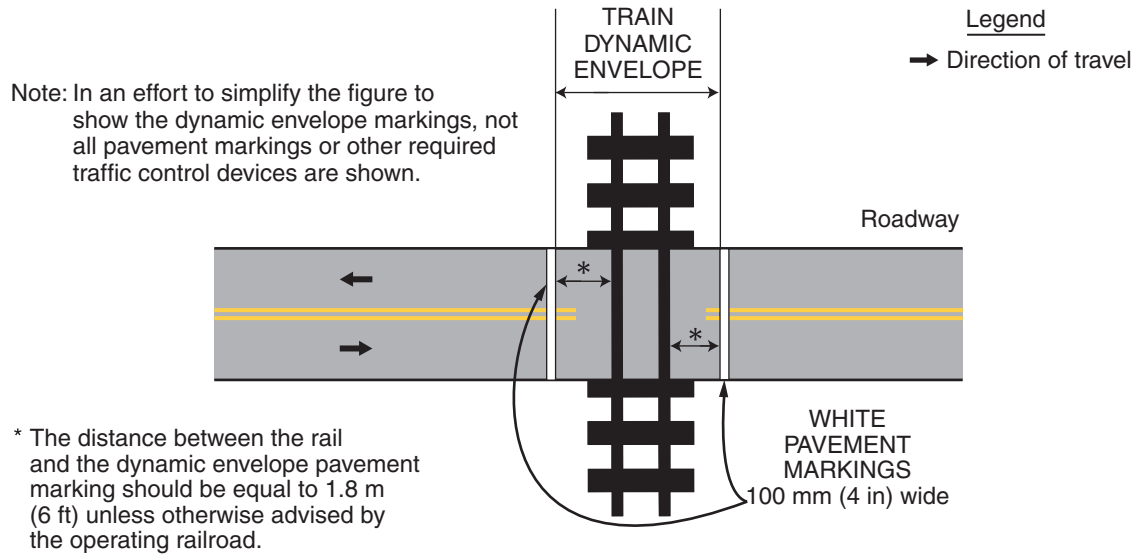


**Highway-rail grade crossing pavement markings**

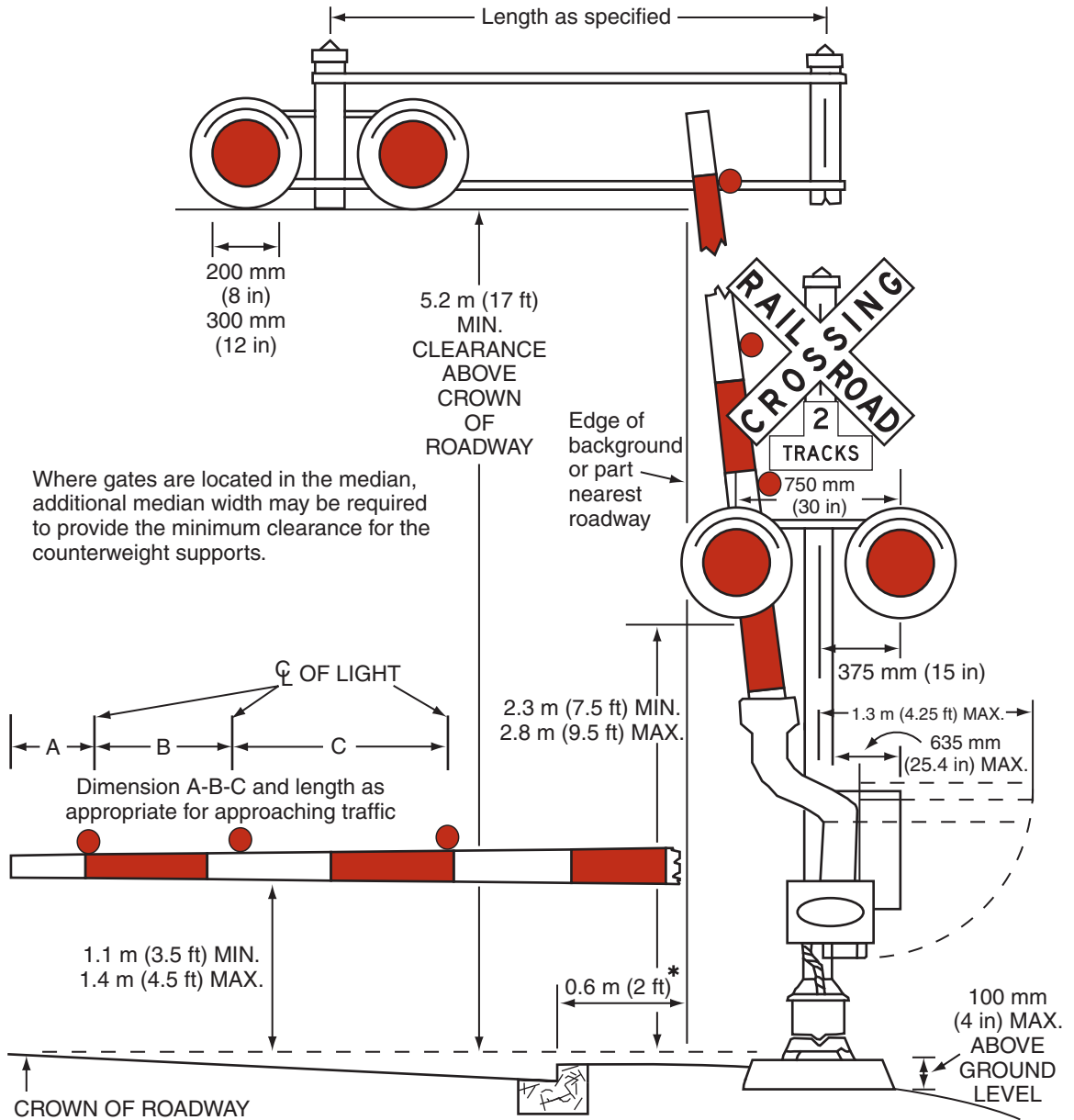
\*Width may vary according to lane width



**Figure 8B-9. Typical Train Dynamic Envelope Pavement Markings**

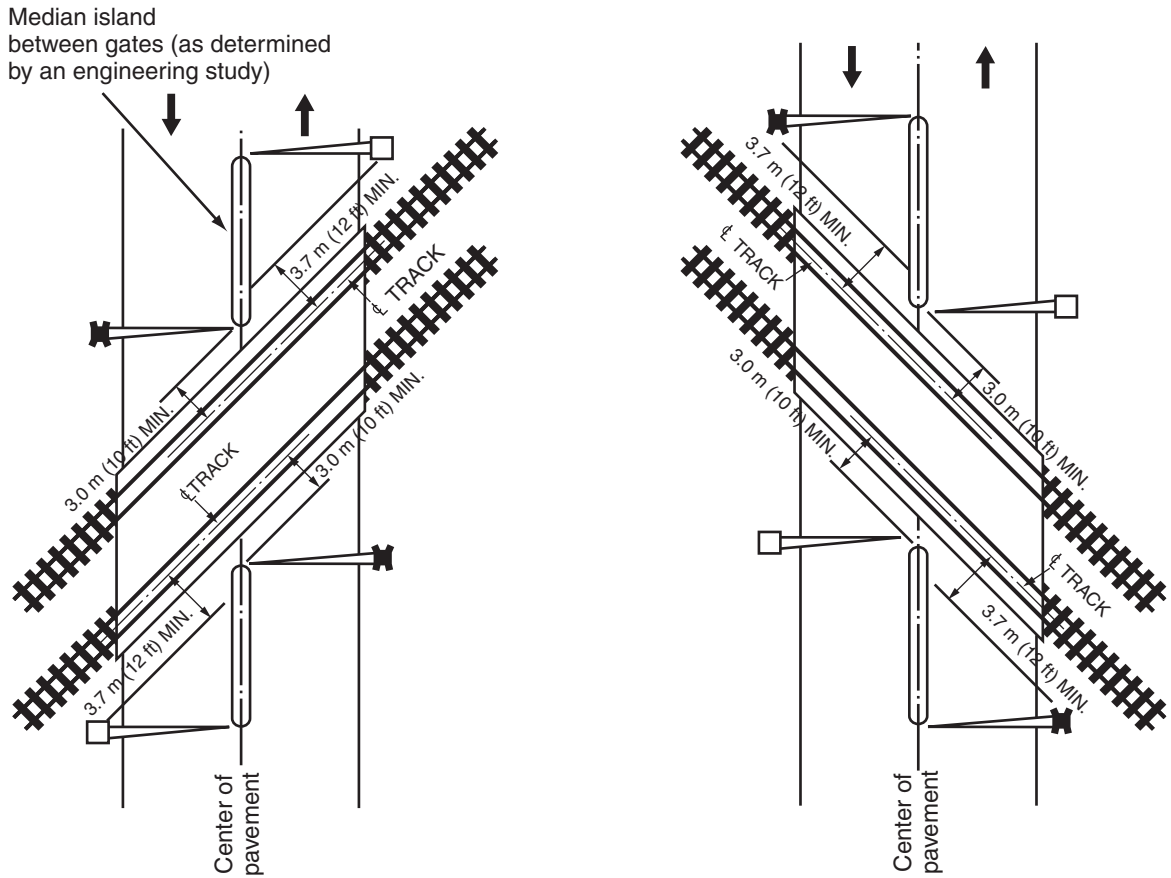


**Figure 8C-1. Composite Drawing of Active Traffic Control Devices for Highway-Rail Grade Crossings Showing Clearances**



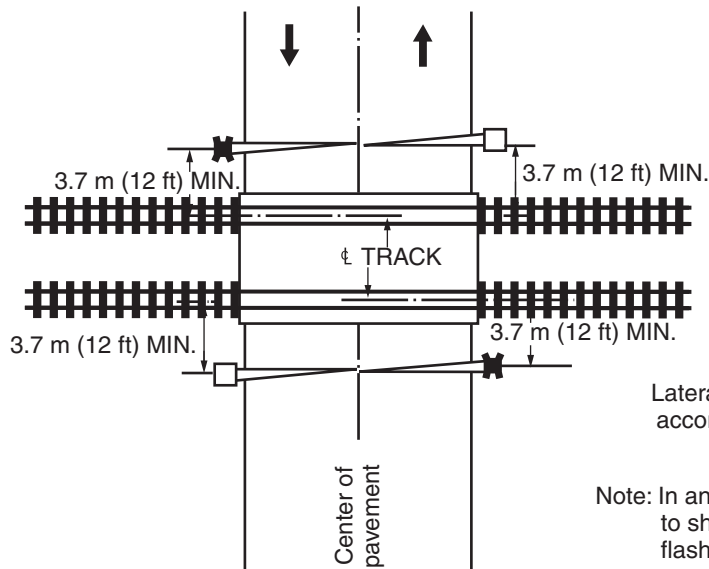
\* For locating this reference line at other than curb section installation, see Section 8C.01.

**Figure 8C-2. Example of Location Plan for Flashing-Light Signals and Four-Quadrant Gates**



**OBTUSE ANGLE**

**ACUTE ANGLE**



**RIGHT ANGLE**

Legend  
 → Direction of travel

Lateral clearances shall be in accordance with Figure 8C-1 and Chapter 8C.

Note: In an effort to simplify the figure to show typical location plans for flashing-light signals and four-quadrant gates, not all traffic control devices are shown on this figure.