

CHAPTER 8C. MARKINGS

Section 8C.01 Purpose and Application

Support:

- 01 Passive traffic control systems, consisting of signs and pavement markings only, identify and direct attention to the location of a grade crossing and advise road users to reduce their speed or stop at the grade crossing as necessary in order to yield to any rail traffic occupying, or approaching and in proximity to, the grade crossing.
- 02 Signs and pavement markings regulate, warn, and guide the road users so that they, as well as LRT vehicle operators on mixed-use alignments, can take appropriate action when approaching a grade crossing.
- 03 Unless otherwise provided in this Chapter, the provisions of Part 3 are applicable to the design and location of pavement markings at grade crossings.

Section 8C.02 Grade Crossing Pavement Markings

Standard:

- 01 **On paved roadways, grade crossing pavement markings shall consist of an X, the letters RR, a no-passing zone marking (on two-lane, two-way highways with center line markings in compliance with Section 3B.01), and certain transverse lines as shown with detailed dimensions in Figures 8C-1, 8C-1(CA), and 8C-2 Example A.**

Support:

- 01a The grade crossing advance warning pavement markings consisting of an X, the letter R on each side of the X, and a transverse line before and after the X, is referred to as an "RXR marking".

Standard:

- 02 **Except as provided in Paragraphs 3 and 4 of this Section, grade crossing pavement markings shall be placed in each approach lane on all paved approaches to highway-rail grade crossings where signals or automatic gates are located, and at all other grade crossings where the posted or statutory highway speed is 40 mph or higher.**
- 03 ~~Grade crossing pavement markings shall not be required at highway-rail grade crossings where the posted or statutory highway speed is less than 40 mph if the Diagnostic Team determines that other installed devices provide suitable warning and control.~~
- 04 ~~Grade crossing pavement markings shall not be required at highway-rail grade crossings in urban areas if the Diagnostic Team determines that other installed devices provide suitable warning and control.~~
- 05 **Grade crossing pavement markings shall be placed in each approach lane on all paved approaches to highway-LRT grade crossings where a Crossbuck (R15-1) signs, flashing-light signals, or automatic gates are is placed at the grade crossing.**
- 06 **If grade crossing pavement markings are used on a multi-lane approach to a grade crossing, identical markings shall be placed in each approach lane that crosses the tracks.**
- 07 **All grade crossing pavement RXR markings, stop lines and yield lines shall be retroreflective white. All other markings shall be in accordance with Part 3.**

Guidance:

- 08 *Where grade crossing pavement markings are used, a portion of the X symbol should be directly opposite the Grade Crossing Advance Warning (W10-1) sign.*
- 08a *RXR markings should be omitted between the tracks and parallel highway if the distance from the stop line or yield line to the edge of the parallel highway is less than 100 feet and W10-2, W10-3, or W10-4 signs are used on the approaches of the parallel highway.*
- 08b *If the W10-2, W10-3, or W10-4 sign is installed along the parallel highway, RXR markings should be placed along the parallel highway within mandatory turn lanes for movements toward the crossing and RXR markings should be omitted from any other lanes on the parallel highway that do not turn toward the tracks.*

Support:

- 08c *Figure 8C-1(CA) provides examples of grade crossing pavement markings and signage in the vicinity of intersections.*

Option:

- 09 **Where determined recommended by the Diagnostic Team, supplemental pavement marking symbol(s) may be placed between the Grade Crossing Advance Warning sign and the grade crossing.**

Guidance:

10 ~~If supplemental pavement marking symbol(s)~~ **RXR markings** are placed between the Grade Crossing Advance Warning sign and the grade crossing, the downstream transverse line should be at least 50 feet upstream from the stop or yield line at the grade crossing.

11 **If used, the no-passing zone marking should extend at least 100 feet upstream of the stop or yield line.**

Support:

12 **Refer to Section 3B.03 for additional details regarding no-passing zone markings.**

Section 8C.03 Stop and Yield Lines

Guidance:

01 *On paved roadway approaches to passive grade crossings where a STOP sign is installed in conjunction with the Crossbuck sign, a stop line should be installed to indicate the point behind which motor vehicles are required to stop or as near to that point as practicable.*

Option:

02 *On paved roadway approaches to passive grade crossings where a YIELD sign is installed in conjunction with the Crossbuck sign, a yield line (see Section 3B.19) ~~or a stop line may~~ **should** be installed to indicate the point behind which motor vehicles are required to yield or stop or as near to that point as practicable.*

~~*Guidance:*~~

03 *If a yield line (see Figure 3B-16) or stop line is used at a passive grade crossing, it should be a transverse line at a right angle to the traveled way and should be placed no closer than 15 feet in advance of the nearest rail.*

Standard:

04 **On paved roadways at grade crossings that are equipped with active control devices such as flashing-light signals, automatic gates, or traffic control signals, a stop line (see Section 3B.19) shall be installed to indicate the point behind which motor vehicles are or might be required to stop.**

04a **Stop lines shall be 24 inches wide.**

Guidance:

05 *If a stop line is used at an active grade crossing where road users are controlled by flashing-light signals, it should be a transverse line at a right angle to the traveled way and should be placed approximately 8 feet in advance of the flashing-light signals or automatic gate (if present), whichever is farther from the track(s), but no closer than 15 feet in advance of the nearest rail (see Figure 8C-1 and 8C-1(CA)).*

06 *If a stop line is used at an active grade crossing where road users are controlled by a traffic control signal, it should be a transverse line at a right angle to the traveled way and should be placed no closer than 15 feet in advance of the nearest rail.*

Standard:

07 **If a stop line is used at an active grade crossing where road users are controlled by a traffic control signal, it shall be placed such that the lateral and longitudinal positions of the signal faces for the approach comply with the provisions of Sections 4D.07 and 4D.08.**

Section 8C.04 Lane-Use Arrow Markings

Standard:

01 **Lane-use arrow markings (see Section 3B.23) that indicate that a turning movement must be made or is permitted to be made from a lane that crosses a grade crossing shall not be placed between the stop line for the grade crossing and the track(s).**

Guidance:

02 *Lane-use arrow markings that indicate that a turning movement must be made or is permitted to be made from a lane that crosses a grade crossing should not be placed less than 100 feet upstream from the stop line for the grade crossing or less than 20 feet beyond the farthest rail.*

Section 8C.05 Edge Lines, Lane Lines, Center Lines, Raised Pavement Markers, and Tubular Markers

Guidance:

01 *Except as provided in Paragraphs ~~3 through 4~~ **4 and 5** of this Section, if edge lines (see Section 3B.09), lane lines (see Section 3B.06), or center lines (see Section 3B.01) are used on an approach to a grade crossing, the edge lines, lane*

lines, and center lines should extend up to and across the grade crossing to reduce the likelihood that road users might inadvertently turn into the track area.

02 If crossing surface maintenance or highway approach maintenance is performed that alters the markings, the removal or replacement of the markings, raised pavement markers, and/or tubular markers should be coordinated with the road authority and the railroad company or transit agency.

Option:

03 ~~Edge lines, lane lines, and center lines may be omitted on or between the rails to conform to the requirements of the railroad company and/or transit agency.~~

04 Edge lines, lane lines, and center lines may be omitted on or between the rails where the highway profile is sufficiently abrupt to create a hang-up situation for pavement marking equipment with low ground clearance.

05 The edge lines, lane lines, and center lines may be omitted from the highway surface at a grade crossing if the surface cannot retain the application of the edge line, lane line, or center line marking.

06 If recommended by a Diagnostic Team, raised pavement markers (see Section 3B.16) may be used to supplement the edge lines, lane lines, or center lines that extend up to and across the grade crossing.

07 If recommended by a Diagnostic Team, tubular markers (see Section 3I.02) may be used to supplement the edge lines that extend up to and across the grade crossing.

Guidance:

08 Tubular markers should be installed in accordance with the clearance requirements of the railroad company and/or transit agency and CPUC.

Standard:

09 **The color under both daytime and nighttime conditions of raised pavement markers or tubular markers that are used at a grade crossing shall be the same color as the edge line, lane line, or center line that they supplement.**

Section 8C.06 Dynamic Envelope and Do Not Block Pavement Markings

Option:

01 Dynamic envelope markings may be installed at a grade crossing to mark the edges of the train dynamic envelope.

Standard:

02 **If used, pavement markings for indicating the dynamic envelope shall comply with the provisions of Part 3 and shall be a solid white line not less than 4 inches nor greater than 24 inches in width.**

Option:

03 Contrasting pavement color (see Section 3A.03 and Chapter 3H) and/or contrasting pavement texture may be used alone or in combination with pavement markings to indicate the dynamic envelope.

Guidance:

04 *If a solid white line is used to convey the dynamic envelope, the line should be placed completely outside of the dynamic envelope. If used, dynamic envelope pavement markings should be placed parallel to the nearest rail in accordance with the railroad company or transit agency and CPUC requirements. If used, dynamic envelope pavement markings should extend across the roadway as shown in Figure 8C-3. Dynamic envelope pavement markings should not be placed perpendicular to the roadway at skewed grade crossings.*

Option:

05 If solid white lines are used to indicate the dynamic envelope, white cross-hatching lines (see Figure 8C-3) may also be placed on the highway pavement within the dynamic envelope as a supplement to, but not as a substitute for, the solid white lines. White cross-hatching lines (see Section 3B.26) may also be placed on the pavement to mark areas adjacent to the dynamic envelope where vehicles are not intended to stop or stand as shown in Figure 8C-4.

06 In semi-exclusive LRT alignments, the dynamic envelope markings may be along the LRT trackway between intersections where the trackway is immediately adjacent to travel lanes and no physical barrier is present.

07 In mixed-use LRT alignments, the dynamic envelope markings may be continuous between intersections (see Figure 8C-5).

08 In mixed-use LRT alignments, pavement markings for adjacent travel or parking lanes may be used instead of dynamic envelope markings if the lines are outside the dynamic envelope.

Figure 8C-1. Example of Placement of Warning Signs and Pavement Markings at Grade Crossings

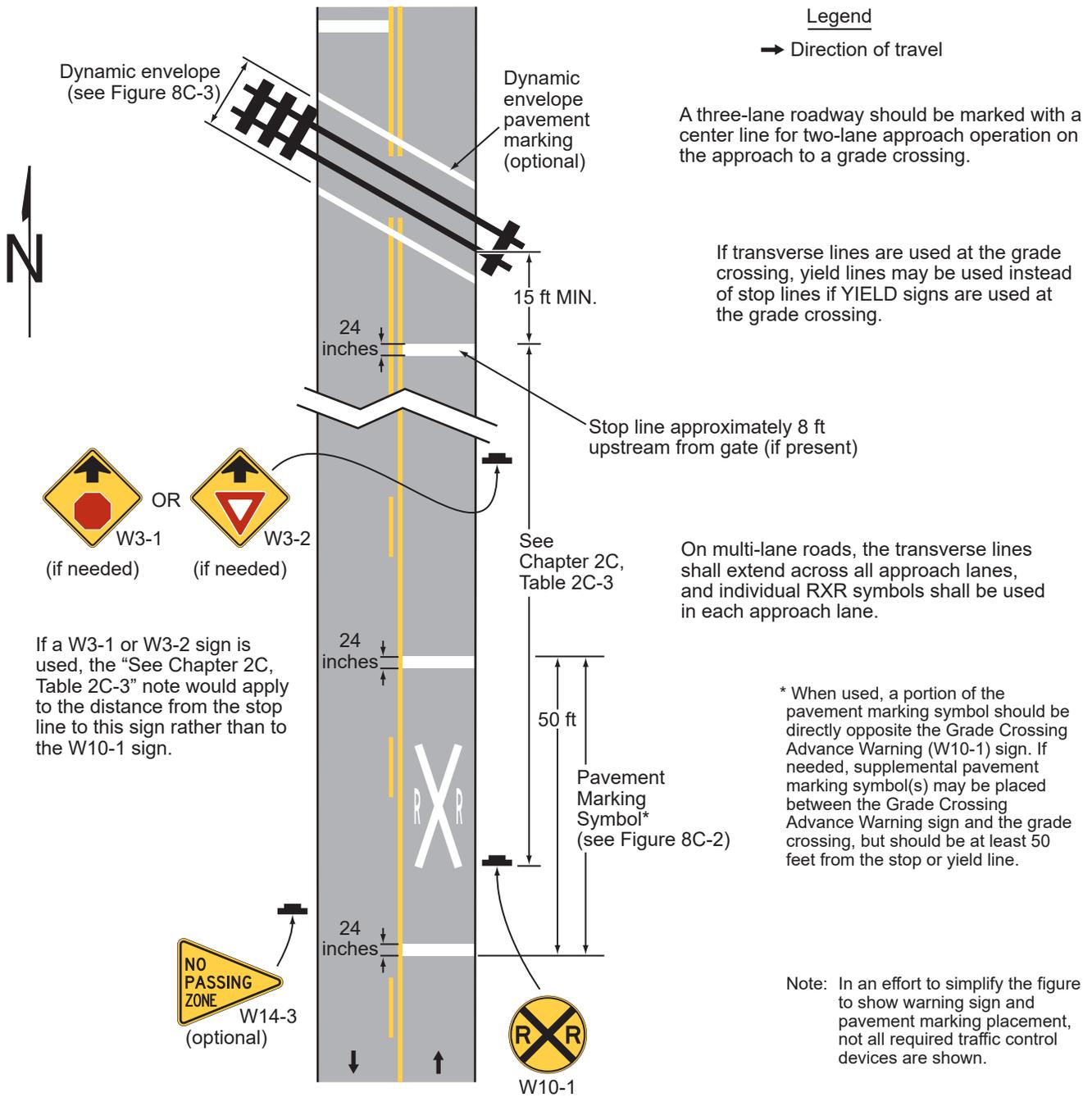
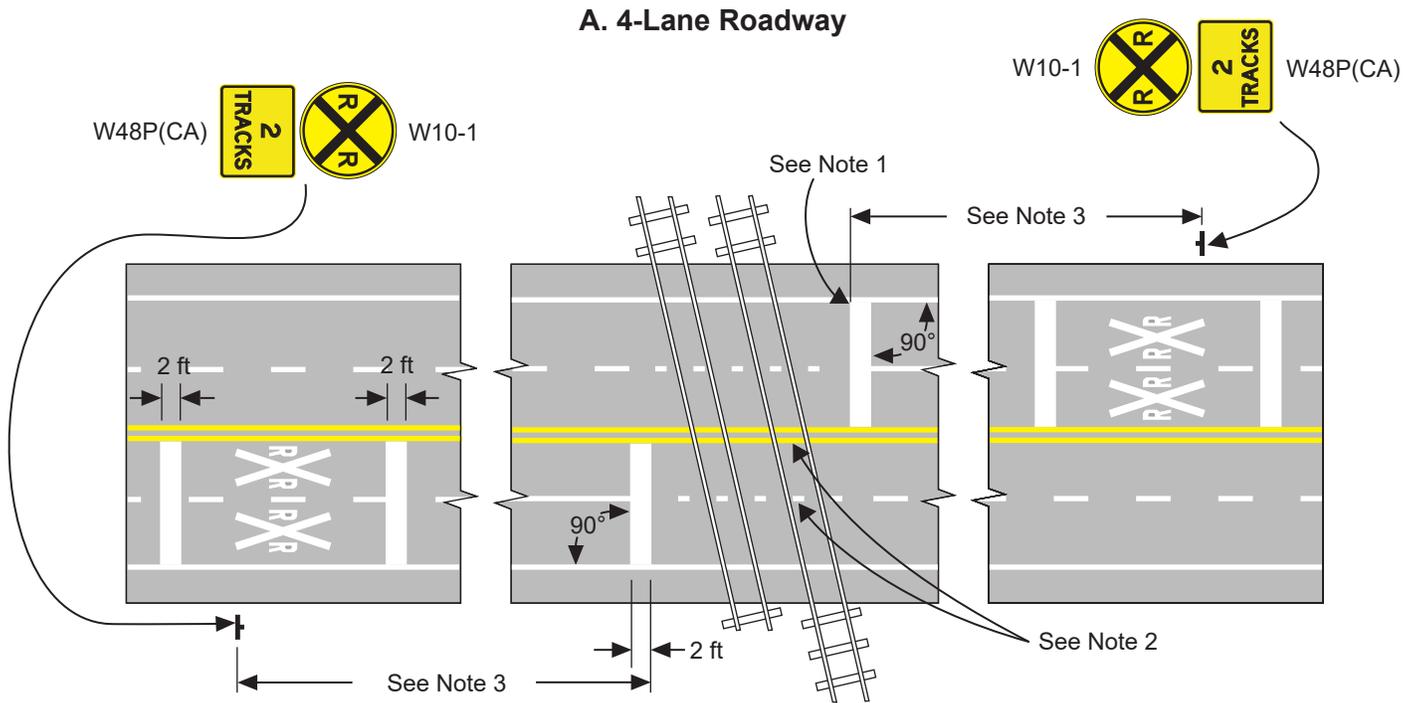


Figure 8C-1(CA). Example of Placement of Warning Signs and Pavement Markings at Grade Crossings (Sheet 1 of 3)



General Note:
 In an effort to simplify the figure to show warning sign and pavement marking placement, not all required traffic control devices are shown.

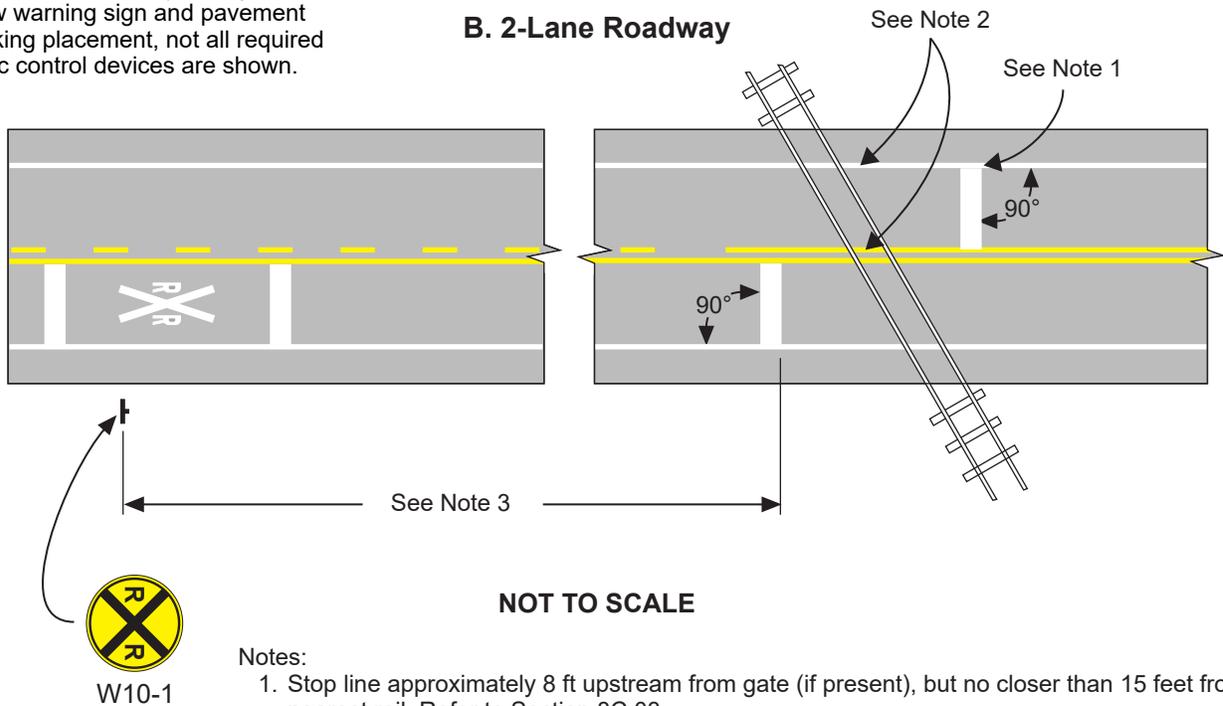
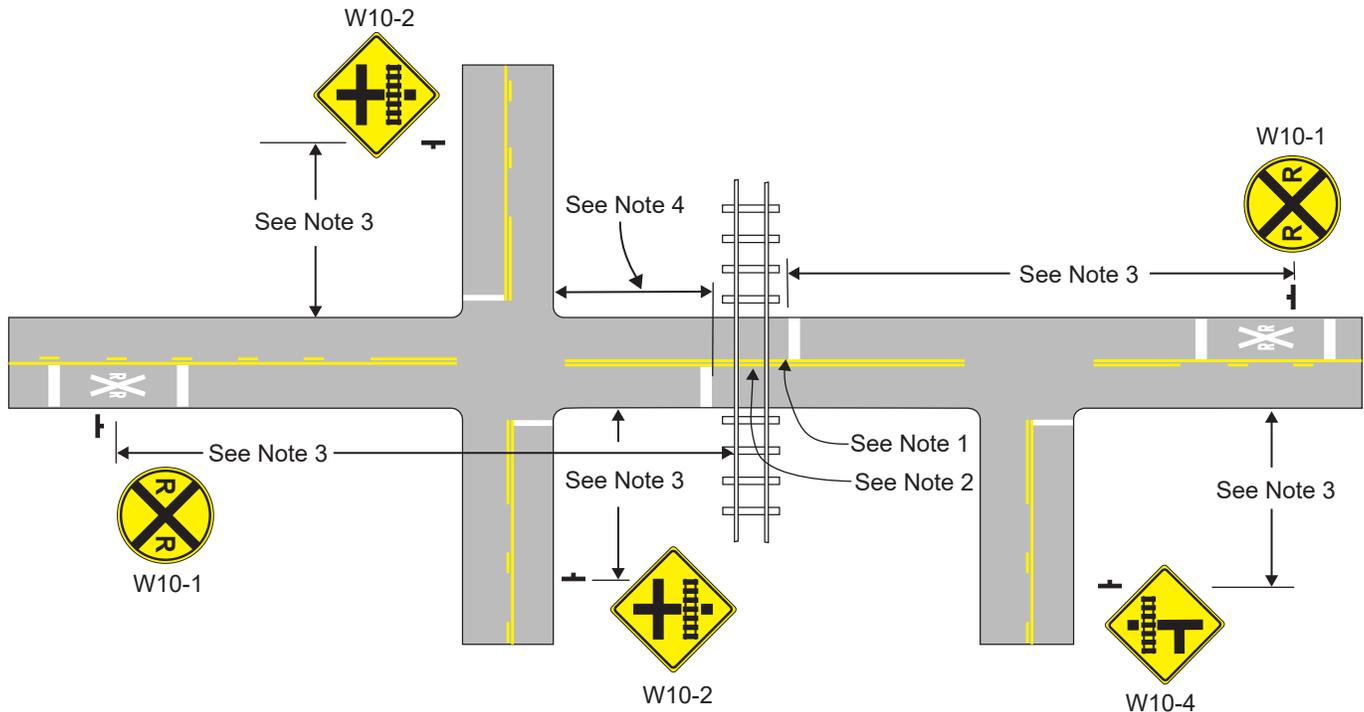
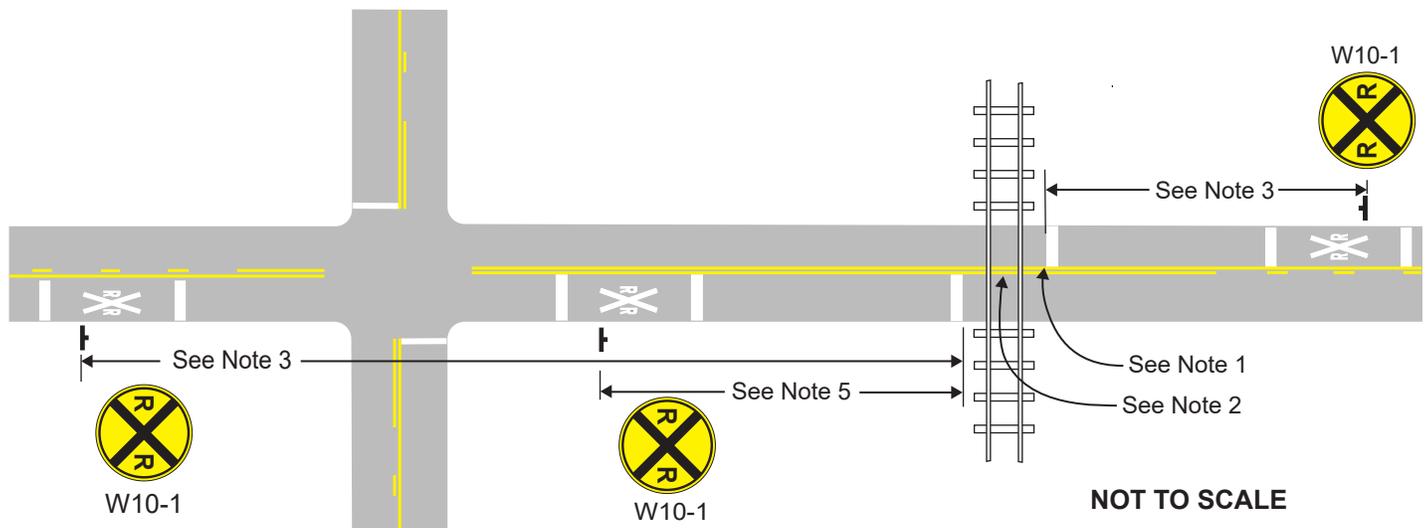


Figure 8C-1(CA). Example of Placement of Warning Signs and Pavement Markings at Grade Crossings (Sheet 2 of 3)

C. Parallel Roadway less than 100 feet



D. Parallel Roadway greater than 100 feet

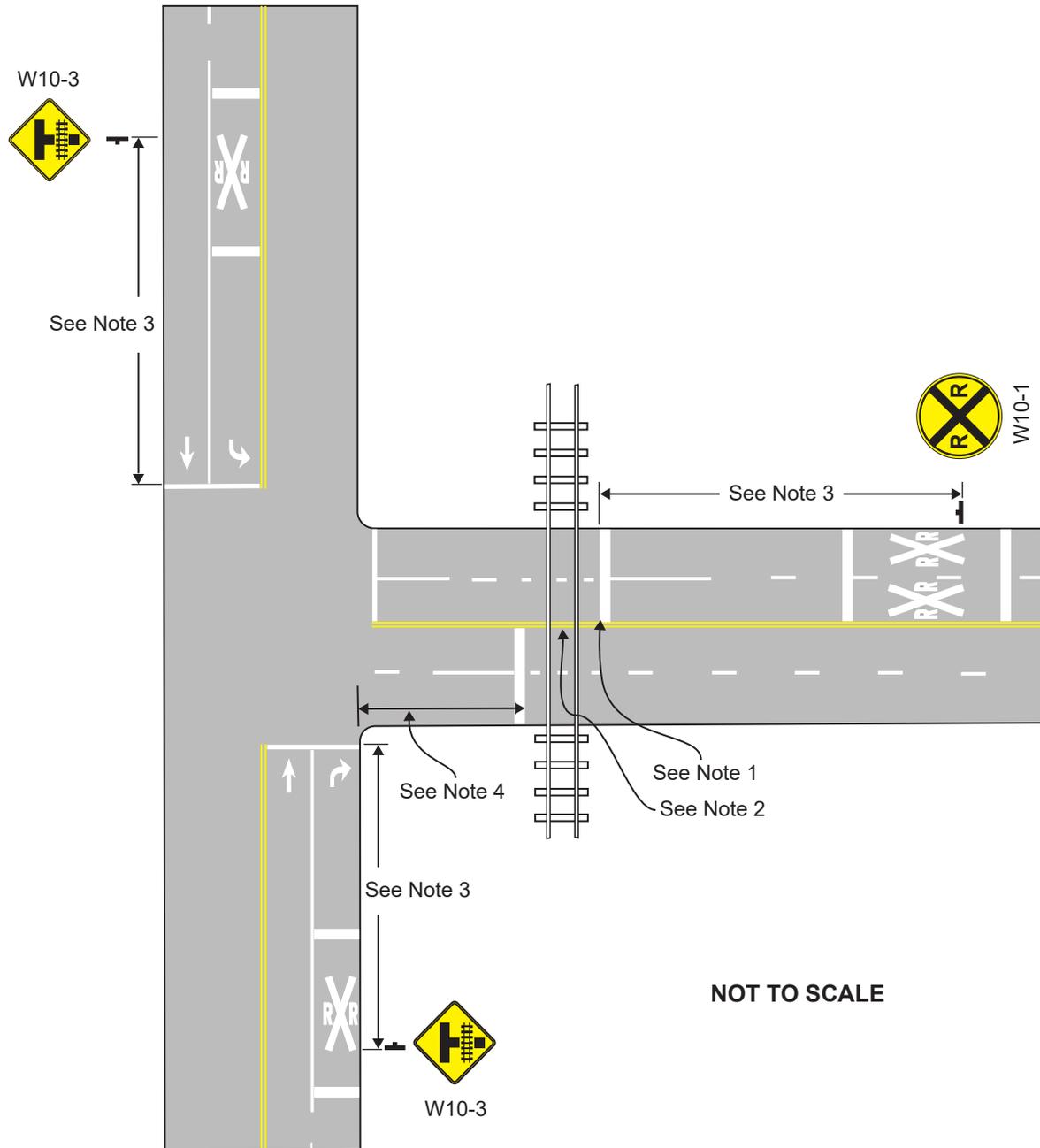


Notes:

1. Stop line approximately 8 ft upstream from gate (if present), but no closer than 15 feet from nearest rail. Refer to Section 8C.03.
2. Edge lines, lane lines, and center lines should extend up to and across the grade crossing. Refer to Section 8C.05.
3. Refer to Section 2C.04. The distances contained in Table 2C-3 should be applied with engineering judgment.
4. RXR marking should be omitted between the intersection and the crossing where the distance is less than 100 feet and W10-2, W10-3, or W10-4 signs are used on the approaches of the parallel highway. Refer to Section 8C.02.
5. W10-1 sign between the tracks and the parallel highway should be placed within 50 feet of the intersection. Refer to Section 8B.06.

Figure 8C-1(CA). Example of Placement of Warning Signs and Pavement Markings at Grade Crossings (Sheet 3 of 3)

E. Parallel Roadway less than 100 feet - Mandatory Turn Lanes

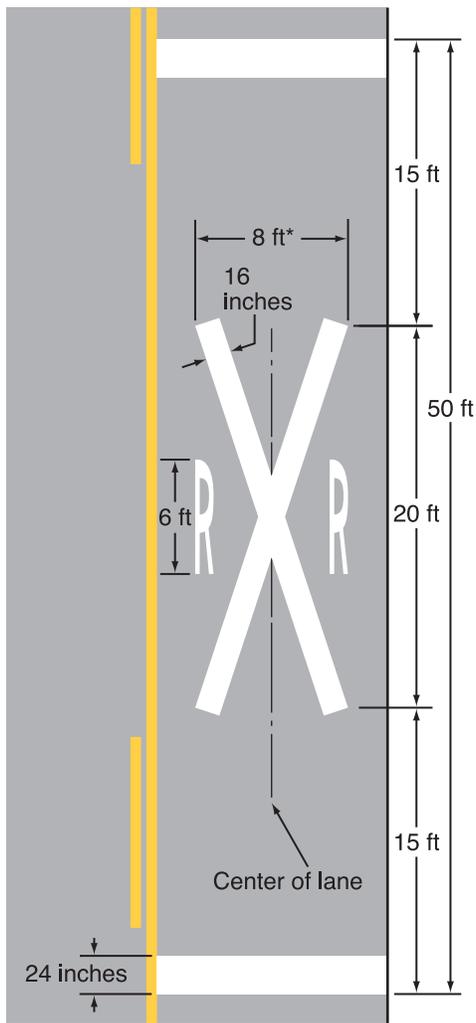


Notes:

1. Stop line approximately 8 ft upstream from gate (if present), but no closer than 15 feet from nearest rail. Refer to Section 8C.03.
2. Edge lines, lane lines, and center lines should extend up to and across the grade crossing. Refer to Section 8C.05.
3. Refer to Section 2C.04. The distances contained in Table 2C-3 should be applied with engineering judgment.
4. RRR marking should be omitted between the intersection and the crossing where the distance is less than 100 feet and W10-2, W10-3, or W10-4 signs are used on the approaches of the parallel highway. Refer to Section 8C.02.

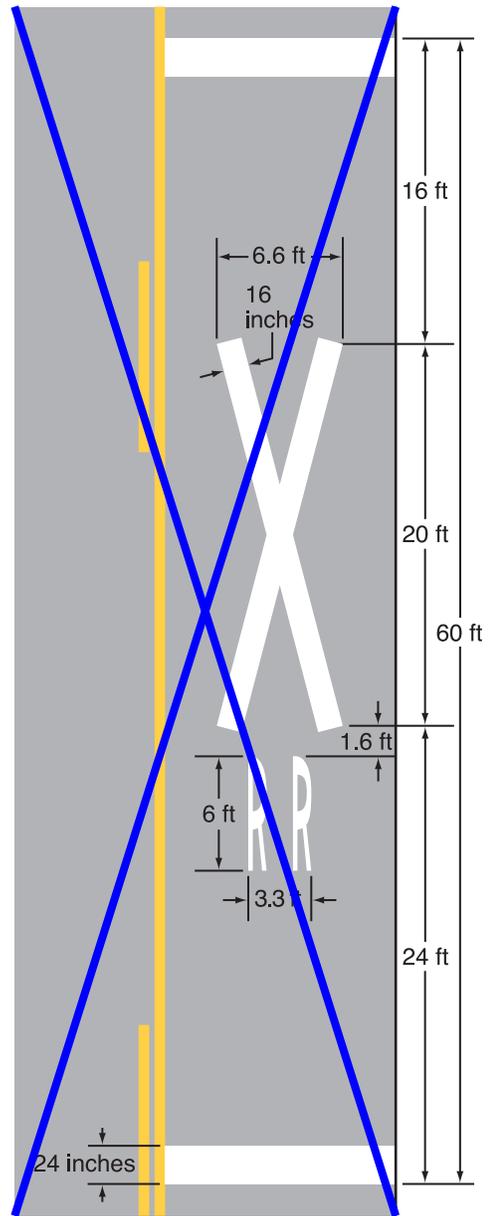
Figure 8C-2. Grade Crossing Pavement Markings

A – Grade crossing pavement marking symbol



* Width may vary according to lane width

B – Grade crossing alternative (narrow) pavement marking symbol



Note: Refer to Figure 8C-1 for placement

Figure 8C-3. Example of Dynamic Envelope Pavement Markings at Grade Crossings

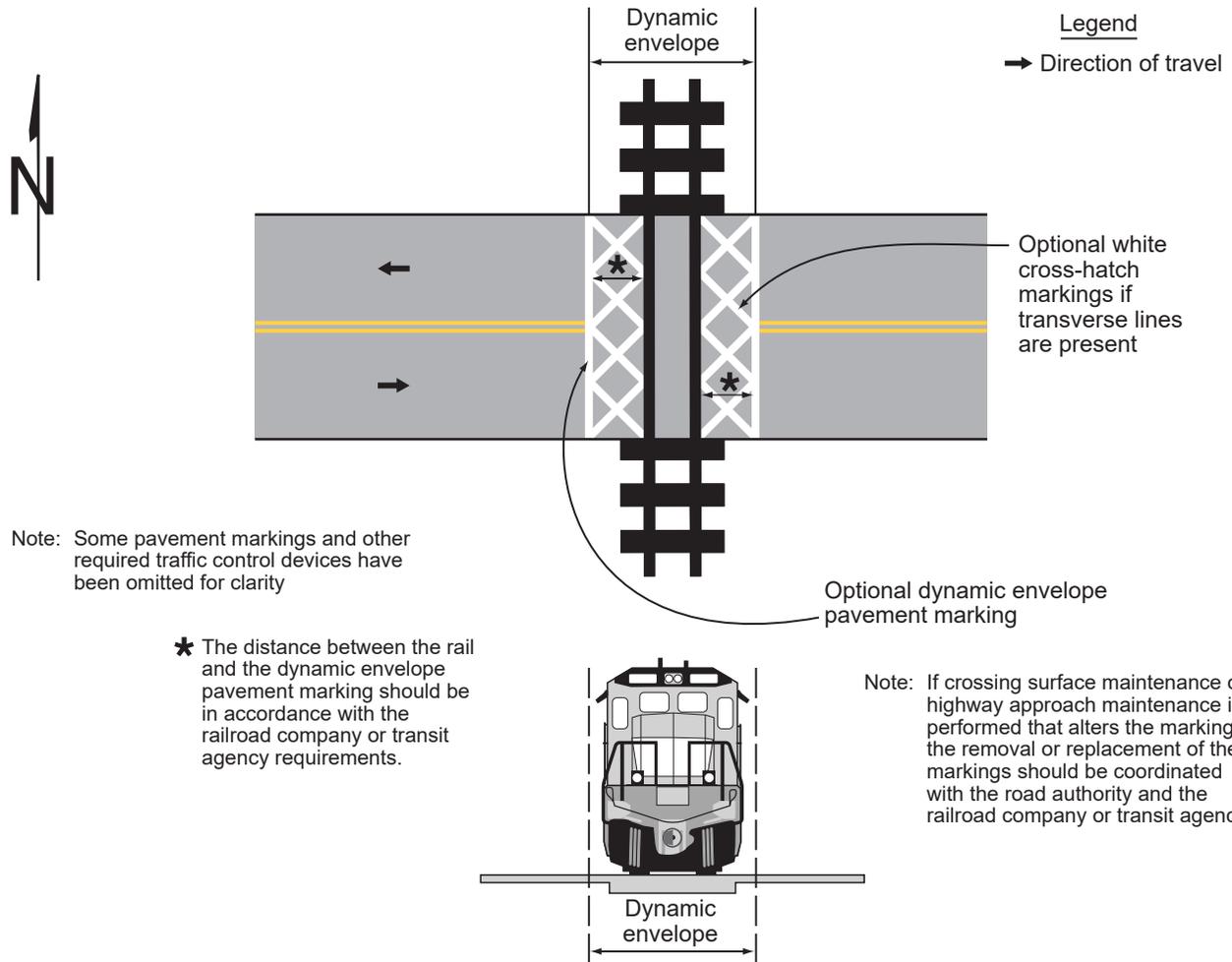


Figure 8C-4. Example of Dynamic Envelope and Do Not Block Pavement Markings at Grade Crossings

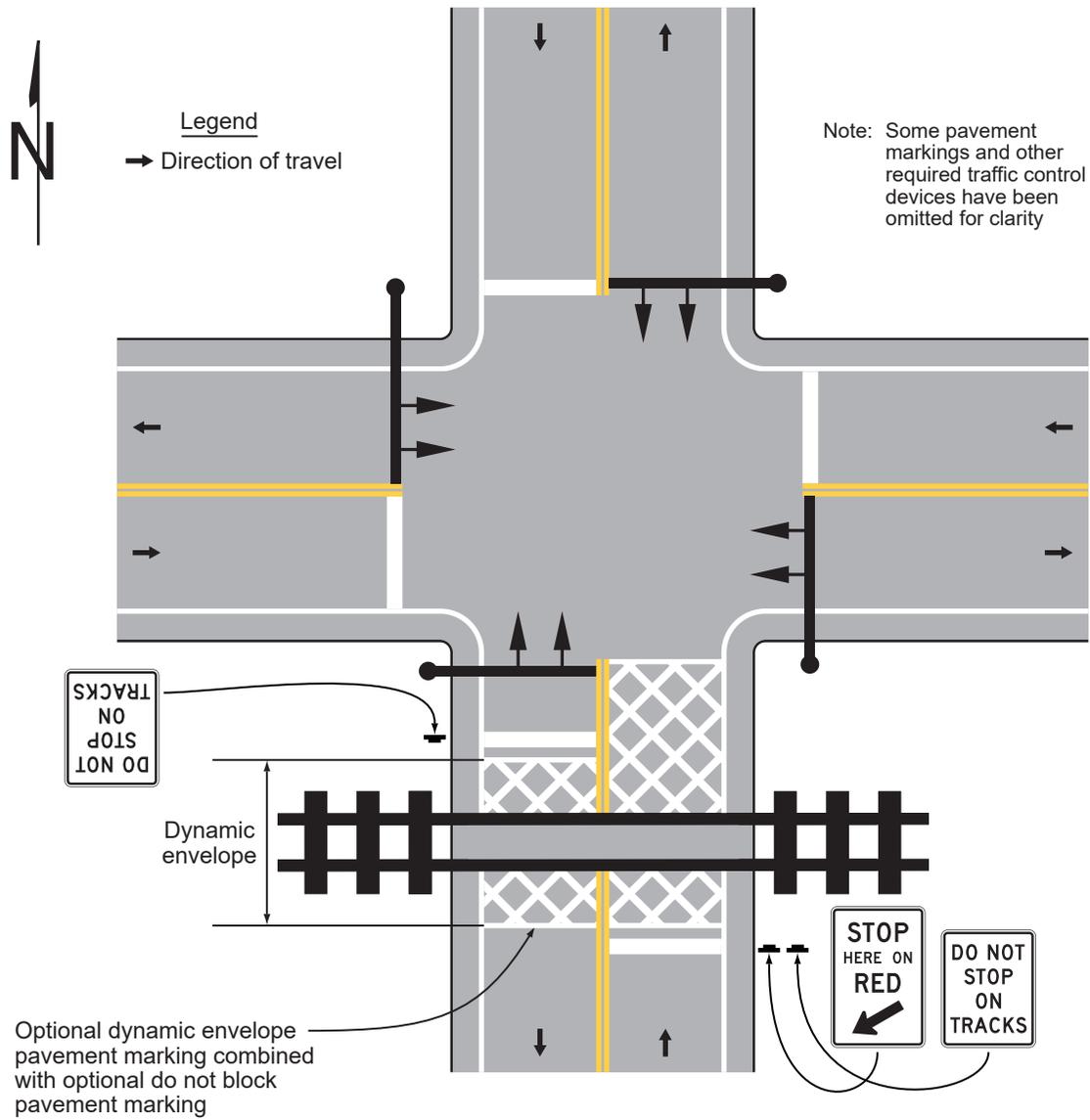


Figure 8C-5. Examples of Light Rail Transit Vehicle Dynamic Envelope Markings for Mixed-Use Alignments

