

CHAPTER 47

Railroad-Highway Grade Crossings

Design Memorandum	Revision Date	Sections Affected
14-07	Apr. 2014	Entire Chapter 47
16-18	Apr. 2016	Section 47-1.05, Figure 47-1A

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RAILROAD-HIGHWAY GRADE CROSSINGS

[Rev. Apr. 2014]

47-1.0 DESIGN CRITERIA

The geometric design of railroad-highway grade crossings should be made jointly when determining the warning devices to be used. When only passive warning devices such as signs and pavement markings are used, the highway drivers are warned of the crossing location but must determine for themselves whether or not there are train movements for which they should stop. On the other hand, when active warning devices such as flashing light signals or automatic gates are used, the driver is given a positive indication of the presence or the approach of a train at the crossing.

Traffic control devices for railroad-highway grade crossings consist primarily of signs, pavement markings, flashing light signals, and automatic gates. Criteria for design, placement, installation, and operation of these devices are covered in the *IMUTCD* and the FHWA *Railroad-Highway Grade Crossing Handbook*.

A railroad-highway grade crossing on a 3R or 4R project should be in accordance with the design criteria as described in the following sections.

47-1.01 Horizontal Alignment

The highway should intersect the tracks at a right angle with no nearby intersections or driveways. To the extent practical, crossings should not be located on either highway or railroad curves.

The AASHTO *Policy on Geometric Design of Highways and Streets (Greenbook)* specifies that where highways that are parallel with main tracks intersect highways that cross the main tracks, there should be sufficient distance between the tracks and the highway intersections to enable highway traffic in all directions to move expeditiously. Where physically restricted areas make it impractical to obtain adequate storage distance between the main track and a highway intersection, the following should be considered:

1. interconnection of the highway traffic signals with the grade crossing signals to enable vehicles to clear the grade crossing when a train approaches; and

2. placement of a “Do Not Stop on Track” sign on the roadway approach to the grade crossing.

47-1.02 Vertical Alignment

The approach elevation should be the same elevation as the top of rails for a distance of 2 ft outside the rails.

The surface of the highway should not be more than 3 in. higher or lower than the top of the nearest rail at a point 30 ft from the rail unless track superelevation dictates otherwise.

47-1.03 Cross Section

There should not be a raised curb or obstruction within 10 ft of the rail. This guidance is to ensure the railroad company has access to the area adjacent the rail.

47-1.04 Sight Distance

Sight distance is a primary consideration at crossings without train-activated warning devices. Adequate stopping sight distance is needed so that a driver can see an approaching train and have sufficient distance to stop safely. Recommended sight distance values and additional discussion of sight distance at railroad-highway grade crossings can be found in the 2011 *Greenbook*, Section 9.12.

47-1.05 Crossing Warning Devices [Rev. Apr. 2016]

The Department must comply with 23 CFR §646.214 regarding railroad-highway grade crossing improvement for each Federal-aid project. The Department’s philosophy is to appropriately allocate limited resources and maximize system-wide improvements. This approach targets investment decisions to the roadway system as a whole. To reduce crash risk, uniform warning device configurations at all railroad-highway grade crossings are the best practice.

Where a railroad-highway grade crossing is located within or near the terminus of the project limits, the crossing must be evaluated for inclusion of railroad warning devices in the project scope of work. The limits also apply to maintenance of traffic. Near the terminus or “near terminus” is defined below. The Department’s *Policy for Railroad-Highway Grade Crossing Warning Devices* provides the evaluation procedures for determining the level of warning

protection, either passive or active (train-activated) that is required. The district or Central Office railroad coordinator should be contacted to assist in the evaluation. The evaluation recommendation must be reviewed and approved by the Utilities and Railroads Division Senior Rail Projects Engineer.

Warning Devices

A basic passive device upgrade is required for all projects that include a railroad-highway grade crossing within or near the terminus of a project. A passive device upgrade consists of replacing the existing cross bucks with high retro-reflectivity cross bucks, adding reflectorized striping to the post, and installation of a yield or stop sign, installing any required pavement markings, and installing or upgrading advance warning signage. Note that per the IMUTCD an engineering study is required prior to the installation of a stop sign.

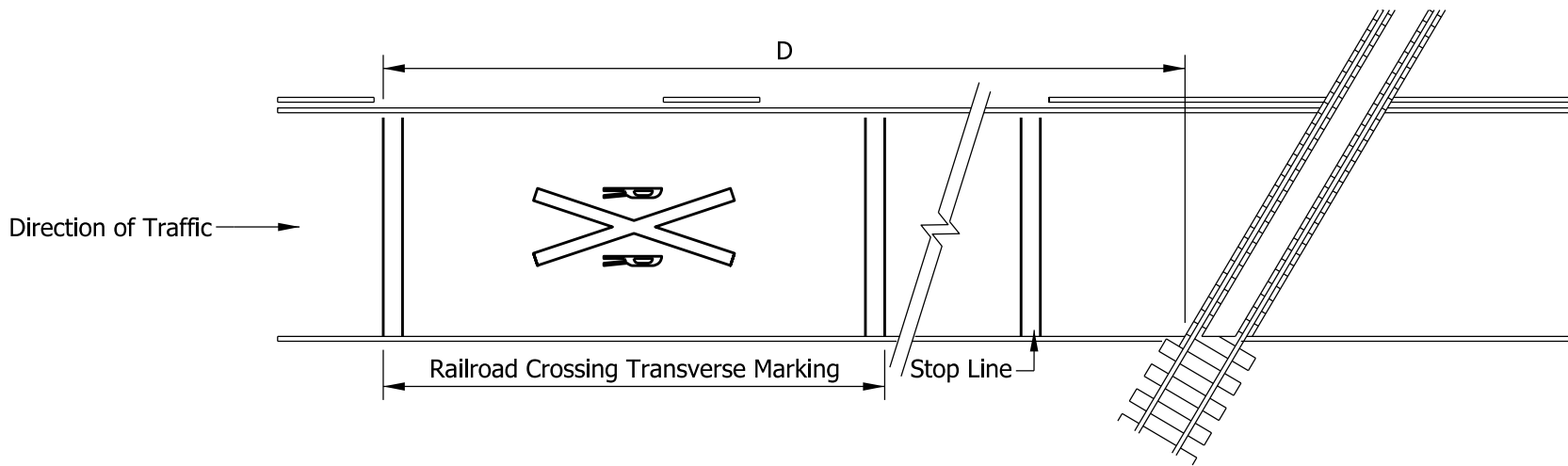
If active protection is deemed necessary based on the policy, then the upgrade or installation of gates, flashing lights, overhead cantilever, warning bell, and constant warning time (CWT) circuitry is the minimum acceptable level of active warning. No incremental or intermediate improvements to active warning devices are allowed.

Near Terminus

The decision point used to determine if the location of the crossing is near the terminus of a project is based on the transverse pavement markings from the nearest rail. The markings are shown in the INDOT *Standard Drawing* 808-MKPM-06. The decision point, or near terminus, is the leading perpendicular line of the railroad crossing pavement marking. The distance from the nearest rail to the near terminus varies with design speed, and is shown as dimension D in [Figure 47-1A](#). Where the project limits are within the distance D, the crossing must be included in the project scope of work. The near terminus applies regardless of the actual presence of pavement markings on the roadway.

47-2.0 COORDINATION WITH RAILROAD COMPANY

The designer should contact the Department railroad coordinator when there is a railroad within or near the proposed highway project. The railroad coordinator will determine the need for the railroad company's attendance at the preliminary field check. See Chapter 105 for railroad coordination.



Controlling Dimension For Determining Crossing Inclusion	
Roadway Design Speed	D = Distance from nearest rail to controlling pavement marking*
< 35 mph	131 Feet
40 mph	156 Feet
45 mph	206 Feet
50 mph	281 Feet
55 mph	356 Feet
60 mph	431 Feet

* Where the project limits are within the distance D from the nearest rail, the crossing must be included in the project scope.

Example: The design speed is 45 mph and the the project limits are 200 ft from the nearest rail. The crossing must be included in the project scope because 200 ft is less than D (206 ft).

NEAR TERMINUS DEFINITION

Figure 47-1A