

U.S. Department of Transportation  
Highway-Railroad Grade Crossing Technical Working Group  
Guidance on Traffic Control at Highway-Rail Grade Crossings

## INTRODUCTION

The Technical Working Group (TWG) established by the U.S. Department of Transportation, is led by representatives from the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), and the National Highway Traffic Safety Administration (NHTSA). The cooperation among the various representatives of the TWG represents a landmark effort to enhance communication between highway agencies, railroad companies and authorities, and governmental agencies involved with developing and implementing policies, rules and regulations.

The report is intended to provide guidance to assist engineers in selection of traffic control devices or other measures at highway-rail grade crossings. It is not to be interpreted as policy or standards and is not mandatory. Any requirements that may be noted in the report are taken from the Manual on Uniform Traffic Control Devices (MUTCD)<sup>1</sup> or other document identified by footnotes. A number of measures are included which may not have been supported by quantitative research, but are being used by States and local agencies. These are included to inform practitioners of an array of tools used or being explored.

The goal is to provide a guidance document for users who understand general engineering and operational concepts of public highway-rail grade crossings. The document will serve as a reference to aid in decisions to install traffic control devices or otherwise improve such crossings, and also provide information on additional references.

The report includes discussion of a number of existing laws, regulations and policies of the FHWA and FRA concerning highway-rail grade crossings and railroad operations, driver needs concerning various sight distance, and highway and rail system operational requirements and functional classification. There is extensive description of passive and active traffic control devices, including supplemental devices used in conjunction with active controls. Traffic control devices in the 2000 edition of the MUTCD are listed, together with a few experimental devices. An appendix provides limited discussion on the complex topic of interconnection and preemption of traffic signals near highway-rail grade crossings. There is also discussion concerning closure, grade separation and consideration for installing new grade crossings. Finally, an extensive list of quantitative recommend guidance is provided. (Please note that the term grade crossings is synonymous with highway-rail grade crossings in this document.)

## EXISTING LAWS, RULES, REGULATIONS AND POLICIES

Several documents provided by the Federal Highway Administration, the Federal Railroad Administration, and other organizations, provide some guidelines for selecting traffic control devices. For example, the MUTCD, published by the Federal Highway

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1 MUTCD is available at the following URL: <http://mutcd.fhwa.dot.gov>

Administration, contains detailed guidance on the design and placement of traffic control devices. The MUTCD is a Federal standard under title 23, United States Code 109(d) and is incorporated by reference into the Code of Federal Regulations (CFR). If a particular device is selected for use, the MUTCD will indicate what the size, color, and placement of that device should be. Considered by the FHWA as a national standard, the MUTCD has the force of law. Another document frequently used to assist in determining the need for certain traffic control devices is the *Railroad-Highway Grade Crossing Handbook - Second Edition, (RHGCH)*<sup>2</sup>, also published by the FHWA. The handbook draws on a number of different sources (including the MUTCD and the AASHTO *A Policy on Geometric Design of Highways and Streets*<sup>3</sup> [Greenbook]) to provide an overview of highway-rail grade crossing legal and jurisdictional considerations. Included is a brief discussion of grade crossing design issues involving the physical and geometric characteristics of the crossing, and risk assessment formulas. The *RHGCH* provides guidelines for the identification and selection of active control devices. Also included are discussions of issues surrounding shortline railroads, high-speed rail corridors, and special vehicles such as trucks carrying hazardous materials and trucks having low-ground clearance.

These source documents provide limited guidance, mostly in the form of lists of factors “to be considered” for installing either flashing-lights or flashing-lights and gates; however, they lack specific guidance on how to determine the most appropriate type of highway traffic control at a given highway-rail crossing. For example, the *RHGCH* cites “high speed trains” as a factor, but does not define the conditions under which a train is considered “high speed.” In another instance, the presence of school buses or vehicles carrying hazardous materials is cited as a factor, but every public crossing has the potential to carry both of these types of traffic. “Past collision history” is also frequently cited as a rationale for upgrading passive grade crossings to active control, or adding gates to “flasher only” grade crossings, but no specific guidance is provided.

Several previous attempts have been made to quantify the relative emphasis these factors should have in evaluating the need to improve a crossing. The *RHGCH* contains several examples of formulae that have been developed to help determine the likelihood of a collision occurring at a particular crossing. Use of these formulae, however, is far from universal. Some States use either exposure factors or a minimum expected accident frequency (EAF) to determine whether a given crossing “qualifies” for public funding for improved traffic control devices. Illinois, for example, uses a modified New Hampshire formula to “qualify” crossings for improvement or upgrade whenever the EAF exceeds 0.02; Iowa gives “priority” to those crossings having a USDOT Accident Predictor Model EAF of 0.075 or higher. A number of States have established their own criteria for determining when or where active devices are deployed, but their rationale for establishing such criteria is not commonly known nor is there much consistency from State to State.

Current FHWA regulations specifically prohibit at-grade intersections on highways with full access control. The FRA’s rail safety regulations require that crossings be separated or closed where trains operate at speeds above 125 mph (49 CFR

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2 Railroad-Highway Grade Crossing Handbook - Second Edition is available at the following URL:  
<http://www.fhwa.dot.gov/tfhrc/safety/pubs/86215/intro.htm>

3 A Policy on Geometric Design of Highways and Streets is available at the following URL:  
<http://www.ite.org/bookstore/lp323b.html>

213.347(a)). Additionally, if train operation is projected at FRA track class 7 (111 – 125mph) an application must be made to the FRA for approval of the type of warning/barrier system. The regulation does not specify the type of system, but allows the petitioner to propose a suitable system for FRA review.

In 1998, the FRA issued an Order of Particular Applicability for high-speed rail service on the Northeast Corridor. In the Order, the FRA set a maximum operating speed of 80 mph over any highway-rail crossing where only conventional warning systems are in place and a maximum operating speed of 95 mph where 4-quadrant gates and presence detection are provided and tied into the signal system. Grade crossings are prohibited on the Northeast Corridor if maximum operating speeds exceed 95 mph.

Current statutory, regulatory and Federal policy requirements are summarized in Table 1.

TABLE 1  
FEDERAL LAWS, RULES, REGULATION & POLICIES

	<b>Active</b>	<b>Warning/Barrier W/FRA Approval</b>	<b>Grade Separate or Close</b>
Controlled Access Highways	Not allowed	Not allowed	Required
High Speed Rail	> 79 MPH	111-125 MPH	> 125 MPH

Note: 1 mph = 1.61 km/h