PART 8
TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL TRANSIT GRADE CROSSINGS

CHAPTER 8A. GENERAL

Section 8A.01 Introduction

Support:

01 Where the acronym "LRT" is used in Part 8, it refers to "light rail transit."

02 Chapters 8A, 8B, 8C, and 8D describe the traffic control devices that are used at highway-rail and highway-LRT grade crossings. Unless otherwise provided in the text or on a figure or table, the provisions of Part 8 are applicable to both highway-rail and highway-LRT grade crossings. Where the phrase "grade crossing" is used by itself without the prefix "highway-rail" or "highway-LRT," it refers to both highway-rail and highway-LRT grade crossings.

03 Chapter 8E describes the traffic control devices that are used at pathway and sidewalk grade crossings.

04 Traffic control for grade crossings includes all signs, signals, markings, other warning devices, and their supports along highways approaching and at grade crossings. The function of this traffic control is to promote safety and provide effective operation of rail and/or LRT and highway traffic at grade crossings.

05 For purposes of design, installation, operation, and maintenance of traffic control devices at 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 or LRT traffic.

06 Grade crossings and the traffic control devices that are associated with them are unique in that in many cases, the highway agency or authority with jurisdiction, ~~the regulatory agency with statutory authority (if applicable)~~ California Public Utilities Commission (CPUC), and the railroad company or transit agency are jointly involved in the development of engineering judgment or the performance of an engineering study. This joint process is accomplished through the efforts of a Diagnostic Team made up of the highway agency with jurisdiction, the regulatory agency with statutory authority (if applicable), and the railroad company and/or transit agency (if applicable). CPUC is the state regulatory agency with statutory authority over grade crossings.

06a The role of the Diagnostic Team is to evaluate and recommend traffic control devices at the grade crossing.

07 In Part 8, the combination of traffic control devices selected or installed at a specific grade crossing is referred to as a "traffic control system."

08 The combination of railroad or LRT active traffic control devices used to inform road users at a grade crossing of the approach or presence of rail traffic and the necessary control equipment for the devices are referred to as a "grade crossing warning system." The "2023 AREMA Communications and Signals Manual" published by the American Railway Engineering and Maintenance-of-Way Association (AREMA) contains further information about grade crossing warning systems.

Standard:

09 **Except at grade crossings of privately-owned roadways, pathways, and sidewalks, the traffic control devices, systems, and practices described in this Manual shall be used at all grade crossings open to public travel (see Section 1B.01 and 1C.02 for applicability of CA MUTCD), consistent with Federal, State, and local laws and regulations.**

Option:

09a At grade crossings of privately-owned roadways, pathways, and sidewalks, the traffic control devices, systems, and practices described in CA MUTCD may be used, consistent with Federal, State, and local laws and regulations.

Support:

10 23 CFR 655.603 contains information on the applicability of this Manual at private grade crossings.

11 Public Utilities Code Section 7537 and 7538, and CPUC General Order 75, as amended, contain information on State laws and regulations for private grade crossings in California.

Section 8A.02 Highway-LRT Grade Crossings

Support:

01 Part 8 also describes the traffic control devices that are used in locations where light rail transit (LRT) vehicles are operating along streets and highways in mixed traffic with road users.

02 LRT is a mode of public transportation that employs LRT vehicles (commonly known as light rail vehicles, streetcars, or trolleys) that operate on rails in streets in mixed traffic, and LRT traffic that operates in semi-exclusive rights-of-way, or in exclusive rights-of-way. Where the phrase "LRT" is used in Part 8, it refers to light rail vehicles, streetcars, and trolleys. Grade crossings with LRT can occur at intersections or at midblock locations, including public and private driveways.

03 An initial educational campaign along with an ongoing program to continue to educate new drivers is beneficial when introducing LRT operations to an area and, hence, new traffic control devices.

04 LRT alignments can be grouped into one of the following three types (see definitions in Section 1C.02):

A. Exclusive: An LRT right-of-way that is grade-separated or protected by a fence or traffic barrier. Motor vehicles, pedestrians, and bicycles are prohibited within the right-of-way. This type of alignment does not have grade crossings and is not further addressed in Part 8.
B. Semi-exclusive: An LRT alignment that is in a separate right-of-way or along a street or railroad right-of-way where motor vehicles, pedestrians, and bicyclists have limited access and cross at designated locations only, such as at grade crossings where road users must yield the right-of-way to the light rail transit traffic.
C. Mixed-use: An alignment where LRT operates in mixed traffic with all types of road users. In a mixed-use alignment, the light rail transit traffic does not have the right-of-way over other road users at grade crossings and intersections. If the LRT traffic is controlled by traffic control signals or LRT signal faces at an intersection with a roadway, the alignment is considered to be mixed-use even if some of the approaches to the intersection are used exclusively by LRT traffic.

Guidance:

05 *If a highway-LRT grade crossing is equipped with flashing-light signals and is located 200 feet or less from an intersection or midblock location controlled by a traffic control signal, a pedestrian hybrid beacon, or an emergency-vehicle hybrid beacon, the intersection should be provided with rail preemption in accordance with Sections 4F.19 and 8D.09 ~~unless otherwise determined by the Diagnostic Team~~.*

Option:

06 Where LRT vehicles are operating in a mixed-use alignment, traffic signal priority or preemption may be used as determined by CPUC and recommended by a Diagnostic Team.

Standard:

07 **Where LRT and railroads use the same tracks or adjacent tracks, the traffic control devices, systems, and practices for highway-rail grade crossings shall be used.**

Section 8A.03 Traffic Control Systems and Practices at Grade Crossings

Support:

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

Standard:

02 **~~Before any new grade crossing traffic control system is installed or before modifications are made to an existing system, approval shall be obtained from the highway agency with jurisdiction, the regulatory agency with statutory authority (if applicable), and the railroad company and/or transit agency~~.**

02a **The removal, reduction, addition, or change in the type of warning devices at each public grade crossing, or publicly-used private grade crossing (as determined by CPUC or a court of competent jurisdiction), shall not be permitted unless authorized by CPUC.**

Support:

02b This includes any changes that can affect interconnections with adjacent traffic signals, or any other modification that can impact the safety of the grade crossing.

02c Refer to Public Utilities Code Sections 1201 through 1205, 7537, 7538 and 99152 and CPUC General Orders 75 and 143, as amended.

Standard:

02d **The highway agency with jurisdictional and/or statutory authority, and the railroad company and/or transit agency shall be consulted during the planning, design and installation of traffic control devices at grade crossings.**

03 **The Diagnostic Team members shall make a recommendation, documented in an engineering study (see Section 8A.05), on new grade crossing traffic control systems and on proposed changes to an existing grade crossing traffic control system. The Diagnostic Team recommendation shall be made based on the Diagnostic Team's site visits, meetings, conference calls, or a combination of some or all of these methods.**

04 **Except as provided in Paragraph 7 of this Section, operational changes made to a grade crossing traffic control system shall be evaluated by a Diagnostic Team.**

05 **Among the types of changes at a grade crossing for which a Diagnostic Team shall conduct an engineering study are: additions, removals, or modifications of the lanes approaching or traversing the grade crossing; addition or removal of tracks; significant changes in the number or speed of trains; significant changes in the number or speed of vehicles; addition of vehicle access near the grade crossing; additions or modifications to sidewalks; additions or modifications to bicycle lanes, especially if a counter-flow bicycle lane is added on a one-way street; changes to roadway use, including conversion to or from one-way operation or reversible lanes; and the installation of or significant operational changes to traffic control signals that might affect the grade crossing.**

Option:

06 A Diagnostic Team may conduct an engineering study and make recommendations as part of the Quiet Zone establishment process (see Section 8A.11).

07 Where determined by the responsible public agency, the railroad company, and/or the transit agency, general maintenance activities or minor operational changes to the grade crossing traffic control system that do not have a negative impact on the overall operation of the traffic control system may be made without a review and determination by a Diagnostic Team.

Support:

08 Many other details of grade crossing traffic control systems that are not set forth in Part 8 are contained in publications such as the "2023 AREMA Communications and Signals Manual" published by the American Railway Engineering and Maintenance-of-Way Association (AREMA), the Third Edition of "Highway-Rail Crossing Handbook" published by the FHWA and the FRA, and the 2nd Edition of "Preemption of Traffic Signals Near Railroad Crossings" published by the Institute of Transportation Engineers (ITE).

Section 8A.04 Traffic Control Systems at Highway-LRT Grade Crossings

Support:

01 The combination of devices selected or installed at a specific highway-LRT grade crossing is referred to as a "Light Rail Transit Traffic Control System."

02 The normal rules of the road and traffic control priority identified in the "Uniform Vehicle Code" (see Section 1A.06) govern the order assigned to the movement of vehicles at an intersection unless the local agency determines that it is appropriate to assign a higher priority to LRT vehicles. Examples of different types of LRT priority control include separate traffic control signal phases for LRT movements, restriction of movement of roadway vehicles in favor of LRT operations, and preemption of highway traffic signal control to accommodate LRT movements.

Standard:

03 **Highway-LRT grade crossings in semi-exclusive alignments outside of a roadway shall be equipped with flashing-light signals, with or without automatic gates, unless a Diagnostic Team recommends and CPUC determines that the use of Crossbuck Assemblies, STOP signs, or YIELD signs alone would be adequate.**

Section 8A.05 Engineering Studies at Grade Crossings

Standard:

01 **The appropriate traffic control system to be used at a grade crossing shall be ~~determined~~ evaluated and recommended based on an engineering study conducted by a Diagnostic Team involving the highway agency with jurisdiction, ~~the regulatory agency with statutory authority (if applicable)~~ CPUC, and the railroad company and/or transit agency (as applicable).**

Option:

02 ~~The regulatory agency with statutory authority (if applicable)~~ CPUC may ~~approve~~ determine and prescribe the grade

crossing traffic control system.

Guidance:

03 *Among the factors that should be considered in the ~~determination~~ evaluation and recommendation by a Diagnostic Team of which traffic control devices would be appropriate to install at a grade crossing are road geometrics, stopping sight distance, clearing sight distance, the proximity of nearby roadway intersections (including the traffic control devices at the intersections), adjacent driveways, traffic volume across the grade crossing, extent of queuing upstream or downstream from the grade crossing, train volume, pedestrian and bicycle volumes, operation of passenger trains, presence of nearby passenger station stops, maximum allowable train speeds, variable train speeds, accelerating and decelerating trains, multiple tracks, high-speed train operation, number of school buses or hazardous material haul vehicles, and the crash history at or near the location.*

Option:

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

Support:

05 More detail on Highway-Rail Intersection components is available from the USDOT's Federal Railroad Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590, or www.fra.dot.gov.

Section 8A.06 Uniform Provisions

Standard:

01 **All signs used in grade crossing traffic control systems shall be retroreflective or illuminated as described in Section 2A.21 to show the same shape and similar color to an approaching road user during both day and night.**

02 **No sign or signal shall be located in the center of an undivided highway, unless it is crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) or unless it is placed on a raised island.**

Guidance:

03 *Any signs or signals placed on a raised island in the center of an undivided highway should be installed with a clearance of at least 2 feet from the outer edge of the raised island to the nearest edge of the sign or signal, except as permitted in Section 2A.16.*

04 *Where a raised median island is installed supplemental to an automatic gate to discourage road users from driving around a lowered gate, the Diagnostic Team should consider the length of the vehicle queues that typically form on the approach to the grade crossing when ~~determining~~ evaluating and recommending how far in advance of the grade crossing to extend the island.*

05 *If the roadway at a grade crossing includes a two-way left-turn lane (see Section 3B.05), the two-way left-turn lane should be discontinued in the immediate vicinity of the grade crossing by installing median islands, by designating the lane for left turns in one direction only, or by installing yellow diagonal markings in the lane (see Figure 3B-5). If yellow diagonal markings are used, the use of channelizing devices (see Section 3I.01), such as supplemental tubular markers, should also be considered.*

Option:

06 If yellow diagonal markings are used, extending the automatic gate across the lane may be considered.

Section 8A.07 Minimum Track Clearance Distance and Clear Storage Distance

Support:

01 The upstream point of the minimum track clearance distance is determined in the following manner:

A. If an automatic gate is present on the approach, the upstream point is the portion of the automatic gate arm that is farthest from the nearest rail.
B. If an automatic gate is not present on the approach, the upstream point is the portion of the stop line that is farthest from the nearest rail.
C. If the roadway is not paved, the upstream point is the point that is farthest from the nearest rail that is 10 feet measured perpendicular from the nearest rail.

02 The downstream point of the minimum track clearance distance is 6 feet beyond the track(s) or the edge of the downstream highway-highway intersection, whichever is closer, and is measured perpendicular to the farthest rail, along the center line or edge line of the highway, as appropriate, to obtain the longer distance. Where an Exit Gate system (see

Section 8D.05) is present, the downstream point is the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is not perpendicular to the highway, the distance is measured either along the center line or edge line of the highway, as appropriate, to obtain the longer distance.

03 Where two adjacent grade crossings (see Section 8A.08) are located within 200 feet of each other as measured along the highway, the minimum track clearance distance is measured from a point that is upstream of the first grade crossing to a point that is downstream from the second grade crossing.

04 Where a highway-highway intersection is located beyond a grade crossing, the clear storage distance defines on a lane-by-lane basis the area of the roadway between the downstream point of the minimum track clearance distance and the intersection stop line, yield line, or normal stopping point on the highway.

05 The Highway-Rail Crossing Handbook contains an illustration of the minimum track clearance distance and the clear storage distance.

06 The minimum track clearance distance and the clear storage distance are used by the Diagnostic Team to determine the appropriate traffic control devices and/or roadway treatments to be used at the grade crossing, and to determine the queue start-up and queue clearance time necessary where a traffic signal or hybrid beacon is interconnected with a grade crossing active warning system.

Section 8A.08 Adjacent Grade Crossings

Support:

01 Adjacent grade crossings sometimes exist within 200 feet of each other as measured along the highway between the inside rails. These closely-spaced grade crossings sometimes result from separate railroads or from a railroad and an LRT alignment operating in parallel corridors.

Guidance:

02 *Where adjacent grade crossings are located within 200 feet of each other along the highway as measured along the highway between the inside rails, the Diagnostic Team should consider the possibility that rail traffic might arrive at a grade crossing when rail traffic is already occupying the adjacent grade crossing.*

03 *Where the shortest distance between the tracks at adjacent grade crossings, measured along the highway between the inside rails, is 100 feet or less, the grade crossings should be treated as one individual grade crossing.*

04 *Where the shortest distance between the tracks at adjacent grade crossings, measured along the highway between the inside rails, is more than 100 feet and less than 200 feet, additional signs or other appropriate traffic control devices should be used to inform approaching road users of the long distance to cross the tracks.*

05 *Where active traffic control devices are installed between adjacent grade crossings that are more than 100 feet apart and less than 200 feet apart as measured along the highway between the inside rails, the operation of the devices should provide additional time for vehicles to clear the extended minimum track clearance distance (see Section 8A.07) that results from the closely-spaced grade crossings.*

06 *Where the shortest distance between the tracks at adjacent grade crossings, measured along the highway between the inside rails, is more than 200 feet, the grade crossings should be treated as individual grade crossings and traffic control devices should be installed between the grade crossings.*

Support:

07 The "2023 AREMA Communications and Signals Manual" published by the American Railway Engineering and Maintenance-of-Way Association (AREMA) contains further information and recommendations about the location and operation of active traffic control devices at adjacent grade crossings that are located within 200 feet of each other.

Section 8A.09 Grade Crossing Elimination

Option:

01 If a particular grade crossing appears to be redundant or unnecessary for motor vehicle, pedestrian, and bicycle traffic, an engineering study may be conducted to determine the costs and benefits of eliminating the crossing.

Guidance:

02 *If an engineering study is conducted, any necessary improvements to adjacent grade crossings and the surrounding roadway network to accommodate diverted traffic should also be included in the analysis.*

03 *If the conclusion of the engineering study is that the grade crossing should be eliminated, a Diagnostic Team should use the engineering study to ~~determine~~ evaluate and recommend the appropriate steps that need to be taken to accomplish the grade crossing elimination.*

Standard:

04 **Where a grade crossing is eliminated, the traffic control devices for the crossing shall be removed, and shall be covered or turned from view in the interim period prior to removal**.

Support:

04a Refer to FHWA's "Highway-Rail Crossing Handbook" regarding how a crossing is eliminated, such as replacing the crossing with a grade separated facility, removing the roadway, or removal of the tracks.

~~*Guidance:*~~

Standard:

05 **If the existing traffic control devices at a multiple-track grade crossing become improperly placed or are no longer applicable because of the removal of some of the tracks, the existing devices ~~should~~ shall be relocated and/or modified.**

Guidance:

06 *Where a roadway is removed from a grade crossing, the roadway approaches in the railroad or LRT right-of-way should also be removed and appropriate signs and object markers should be placed at the roadway end in accordance with Section 2C.73.*

07 *Where a railroad or LRT is eliminated at a grade crossing, the tracks should be removed or paved over.*

Option:

08 Based on engineering judgment, the TRACKS OUT OF SERVICE (R8-9) sign (see Figure 8B-1) may be temporarily installed until the tracks are removed or covered. The length of time before the tracks will be removed or covered may be considered in making the decision as to whether to install the sign.

Section 8A.10 Illumination at Grade Crossings

Support:

01 Illumination is sometimes installed at or adjacent to a grade crossing in order to provide better nighttime visibility of trains or LRT equipment and the grade crossing (for example, where a substantial amount of railroad or LRT operations are conducted at night, where grade crossings are blocked for extended periods of time, or where crash history indicates that road users experience difficulty in seeing trains or LRT equipment or traffic control devices during hours of darkness).

02 Recommended types and locations of luminaires for illuminating grade crossings are contained in the American National Standards Institute's "ANSI/IES RP-8-22, Recommended Practice: Lighting Roadway and Parking Facilities," which is available from the Illuminating Engineering Society.

03 Delineators can be placed on the right side of all approaches to non-illuminated rural grade crossings. If needed, place the delineators from the location of the Grade Crossing Advance Warning (W10-1) sign to the Crossbuck (R15-1) sign and extend an equal distance downstream, spacing no more than 50 feet apart.

04 Other devices can be added to supplement the existing devices and device spacing can be adjusted to provide additional reaction time or delineation.

Section 8A.11 Quiet Zone Treatments at Highway-Rail Grade Crossings

Support:

01 49 CFR Part 222 (Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule) prescribes Quiet Zone requirements and treatments.

Standard:

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

Support:

03 Refer to FHWA's List of Known Errors for error in Paragraph 2 text. Refer to Section 1A.04 for more details.

Section 8A.12 Grade Crossings Within or In Close Proximity to Circular Intersections

Support:

01 At circular intersections, such as roundabouts and traffic circles, that include or are within close proximity to a grade crossing, a queue of vehicular traffic could cause motor vehicles to stop on the grade crossing.

Standard:

02 **Where circular intersections include or are within 200 feet of a grade crossing, an engineering study shall be made to determine if queuing could impact the grade crossing.**

Guidance:

03 *The Diagnostic Team should review the findings of the engineering study and ~~determine~~ recommend the appropriate measures to clear highway traffic from the grade crossing prior to the arrival of rail traffic.*

03a *If traffic queues impact the grade crossing, provisions should be made to keep the grade crossing clear of highway traffic or to clear highway traffic from the grade crossing prior to the arrival of rail traffic. Factors to be considered should include traffic volumes, highway vehicle mix, highway vehicle and train approach speeds, frequency of trains, and number of travel lanes at the circular intersection.*

Support:

04 Among the actions that can be taken to keep the grade crossing clear of traffic or to clear traffic from the grade crossing prior to the arrival of rail traffic are the following:

A. Grade crossing regulatory and warning devices;
B. Highway traffic signals;
C. Traffic metering devices;
D. Activated signs;
E. Geometric design revisions, including reconstruction or elimination of the circular intersection; or
F. A combination of these or other actions.

Section 8A.13 Temporary Traffic Control Zones

Support:

01 Temporary traffic control planning provides for continuity of operations (such as movement of motor vehicle traffic, pedestrians, and bicyclists, transit operations, and access to property/utilities) when the normal function of a roadway at a grade crossing is suspended because of temporary traffic control operations. Temporary traffic control planning is also needed when traffic is detoured over an existing grade crossing.

Standard:

02 **Traffic controls for temporary traffic control zones that include grade crossings shall be as provided in Part 6.**

Guidance:

03 *Where a temporary traffic control zone extends over an active grade crossing (see Section 6N.17), and where the direction of traffic in any lane is reversed over the grade crossing, the railroad company or transit agency should be part of the temporary traffic control planning process. Where a grade crossing warning system is not modified to support the temporary traffic control operation, at least one uniformed law enforcement officer or flagger should be in place at all times that rail traffic might approach or occupy the grade crossing.*

04 *Where traffic is detoured over an existing passive grade crossing, a temporary traffic control plan (see Section 6B.01) should be prepared.*

05 *Public and private agencies, emergency services, businesses, and railroad companies or transit agencies should meet to plan appropriate traffic detours and the necessary signing, marking, signalization, and flagging requirements for operations during temporary traffic control zone activities or during the period when traffic is being detoured over an existing passive grade crossing. Consideration should be given to the length of time that the grade crossing is to be closed, the length of time that a detour is to be in place, the type of rail or LRT and highway traffic affected, the time of day, and the materials and techniques of repair.*

06 *The agencies responsible for the operation of the LRT and highway should be contacted when the initial planning begins for any temporary traffic control zone that might directly or indirectly influence the flow of traffic on facilities where LRT vehicles operate on a mixed-use alignment.*

07 *Temporary traffic control operations should minimize the inconvenience, delay, and crash potential to affected traffic. Prior notice should be given to affected public or private agencies, emergency services, businesses, railroad companies or transit agencies, and road users before the free movement of road users or rail traffic is infringed upon or blocked.*

Support:

08 Section 6N.17 contains additional information regarding temporary traffic control zones in the vicinity of grade

crossings, and Figure 6P-46 shows an example of a typical situation that might be encountered.

Section 8A.101(CA) Relation to Other Documents

Support:

01 The following rules and regulations govern traffic control devices at highway-rail grade crossings in the State:

A. General Order No. 75, as amended, REGULATIONS GOVERNING STANDARDS FOR WARNING DEVICES FOR AT-GRADE HIGHWAY-RAIL CROSSINGS IN THE STATE OF CALIFORNIA, Public Utilities Commission of the State of California.

B. General Order No. 143, as amended, SAFETY RULES AND REGULATIONS GOVERNING LIGHT-RAIL TRANSIT, Public Utilities Commission of the State of California.