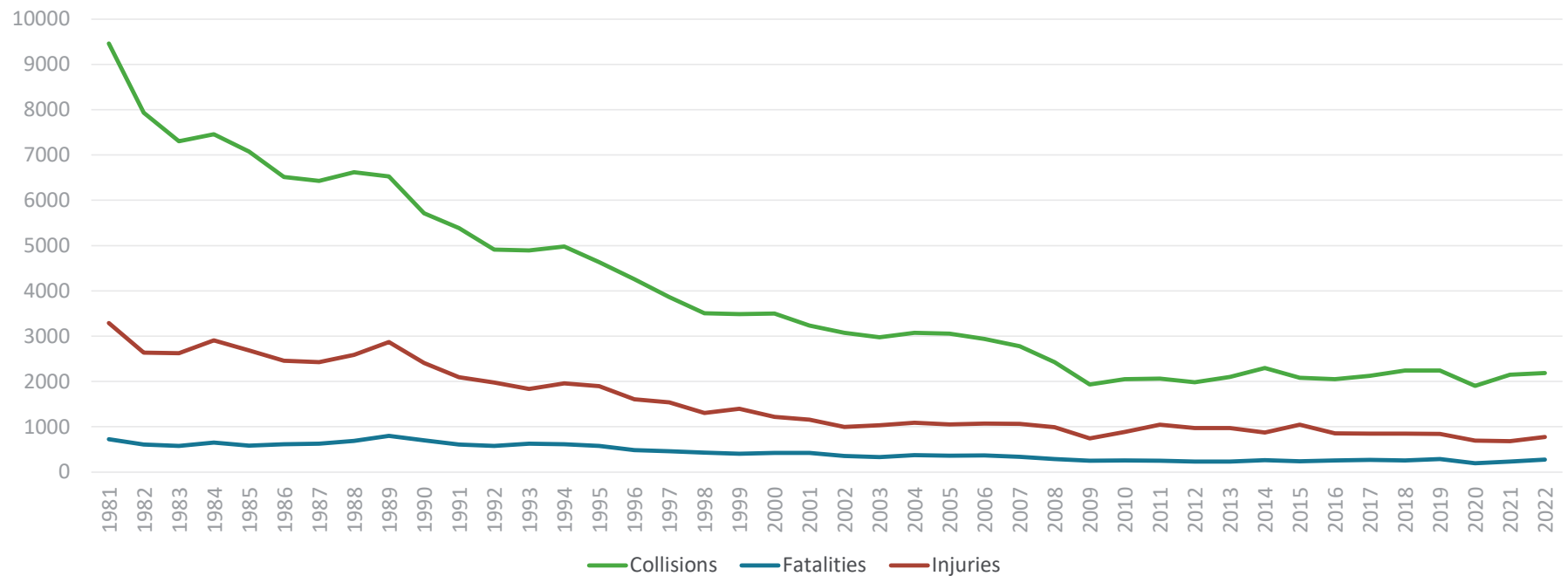




Traffic Signal Preemption & The 11th Edition of MUTCD

Background Information

Over the years, we've seen significant reductions in crashes at grade crossings.



Background Information

Some might say we have done all we can do

But do we really believe that?

**Are 2,174 Collisions, 250 Fatalities and 737 Injuries
acceptable?**

Source –FRA 2023 Data

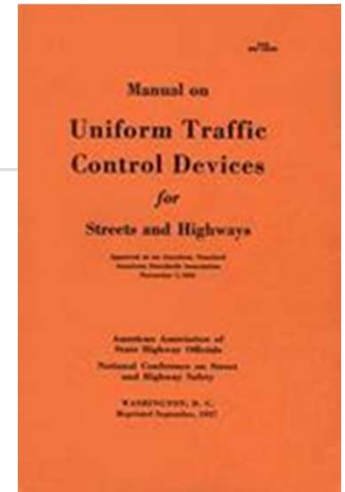
Background Information

- Since 2009, the number of collisions, fatalities and injuries have remained flat
- Year to year, we've seen some increases and some reductions
- What have we accomplished the last 15 years?
- What can we accomplish in coming years to further reduce collisions, fatalities and injuries at grade crossings?

11th Edition of the MUTCD

11th Edition of the MUTCD

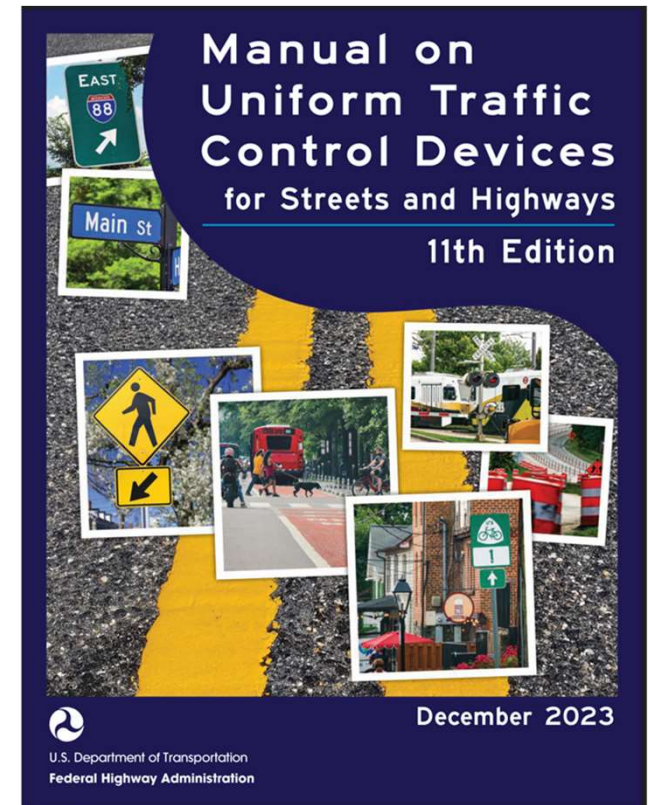
- The first edition of the MUTCD was published in 1935
- 10 editions have been published, the 11th Edition is now the current national version



11th Edition of the MUTCD

The 11th Edition of the MUTCD is now
the current National Manual

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



Diagnostic Teams

Diagnostic Teams

How should we implement effective grade crossing engineering?

It all begins with the Diagnostic Team

The definition of a diagnostic team dates back to the Federal Register Volume 40, April 9, 1975, which states:

(g) “A diagnostic team” means a group of knowledgeable representatives of the parties of interest in a railroad-highway crossing or a group of crossings

But the concept goes back even further to 1968 - 1969...

Diagnostic Teams

The Diagnostic Team Approach to Rail-Highway Grade Crossing Safety Evaluation

HOY A. RICHARDS and NEILON J. ROWAN, Texas Transportation Institute; and ERNEST W. KANAK, Texas Highway Department

Rail-highway grade crossing safety has received increasing emphasis since the creation of the Department of Transportation. As a part of an action program announced by the Secretary of Transportation in the fall of 1967, the Bureau of Public Roads has issued an instructional memorandum suggesting guidelines for the implementation of grade crossing safety programs within individual states. Included among the guidelines is a suggestion for the formation of diagnostic teams to conduct studies and recommend improvements for increasing safety at rail-highway grade crossings.

Diagnostic Teams

ASSIGNING THE DIAGNOSTIC TEAM

The primary factors for consideration in the assignment of the diagnostic team members is first, that the team is interdisciplinary in nature, and second, that it is representative of all groups having responsibility for the safe operation of rail-highway grade crossings.

In order that each of the vital factors relating to the operational and physical characteristics of the crossing may be properly identified, it is necessary that individual team members be selected on the basis of their specific expertise and experience.

Diagnostic Teams

Prior to the 11th Edition, not included in MUTCD

Section 1C.02 Definitions of Words and Phrases Used in this Manual

Standard:

A group of knowledgeable representatives of the parties of interest in a grade crossing or group of grade crossings (see 23 CFR Section 109, Part 646.204).

§ 646.204 Definitions.

For the purposes of this subpart, the following definitions apply:

A diagnostic team means a group of knowledgeable representatives of the parties of interest in a railroad-highway crossing or a group of crossings.

Diagnostic Teams

Section 8A.01 Introduction:

Support:

Grade crossings and the traffic control devices that are associated with them are unique in that in many cases, both the highway agency or authority with jurisdiction, the regulatory agency with statutory authority (if applicable), 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).**

Diagnostic Teams

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

Standard:

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.

Diagnostic Teams

Among the types of changes at a grade crossing for which a Diagnostic Team shall conduct an engineering study are:

1. Additions to or modifications of the lanes approaching or traversing the grade crossing
2. Addition or removal of tracks
3. Significant changes in the number or speed of trains
4. Significant changes in the number or speed of vehicles

Diagnostic Teams

5. Addition of vehicle access near the grade crossing
6. Additions or modifications to sidewalks
7. Additions or modifications to bicycle lanes, especially if a counter-flow bike lane is added on a one-way street
8. Changes to roadway use, including conversion to or from one-way operation or reversible lanes; implementation of quiet zones
9. The installation of or significant operational changes to traffic control signals that might affect the grade crossing.

Diagnostic Teams

Section 8A.05 Engineering Studies at Grade Crossings

Standard:

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

Diagnostic Teams

Section 8A.05 Engineering Studies at Grade Crossings

Guidance:

*Among the **factors that should be considered** in the determination 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)*

Diagnostic Teams

- *Adjacent driveways*
- *Traffic volume across the grade crossing*
- *Extent of queuing upstream or downstream from the grade crossing*
- *Train volume*
- *Pedestrian and bicycle volume*
- *Operation of passenger trains*
- *Presence of nearby passenger station stops*
- *Maximum allowable train speeds*

Diagnostic Teams

- *Variable train speeds*
- *Accelerating and decelerating trains*
- *Multiple tracks*
- *High-speed train operation*
- *Number of school buses or hazardous material haul vehicles*
- *The crash history at or near the location*

WHY ALL OF THE ATTENTION ON DIAGNOSTIC TEAMS AND GRADE CROSSING ENGINEERING?

WHO REMEMBERS?



Fox River Grove, IL

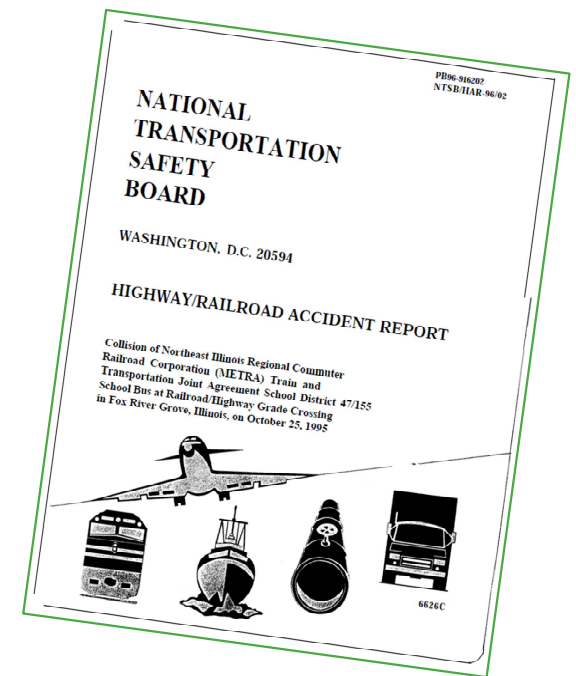
October 25, 1995

- 35 students / 1 driver on board school bus
- 120 passengers / 3 crew on board Metra train
- 7 deaths (all students)
- 24 injuries, many critical

Fox River Grove, Illinois

National Transportation Safety Board Investigation

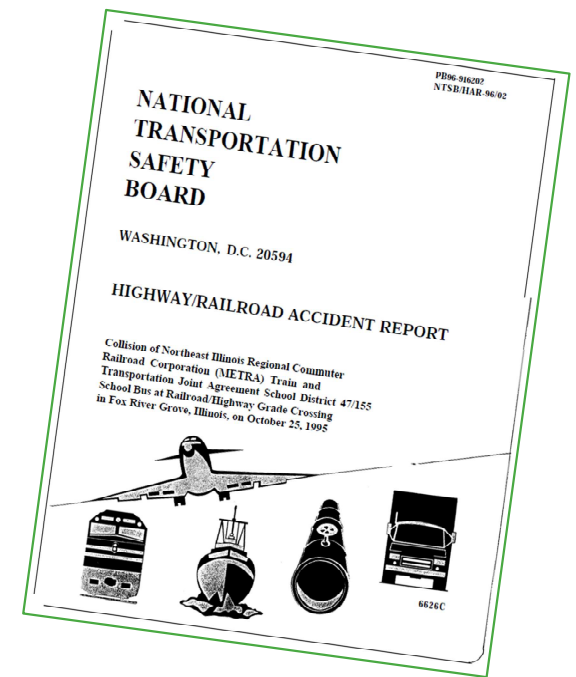
- Roadway and traffic signal design changes not communicated
- Numerous concerns regarding the design, operation and maintenance of traffic signals



Fox River Grove, Illinois

National Transportation Safety Board Investigation

- 29 recommendations made to 16 different organizations
- Many still not implemented to date
- In fact, recent studies indicate more than half preempted grade crossings do not provide adequate time for a 'worst case' vehicle



Fox River Grove, Illinois

What did we learn from this tragedy?

- Design and operation of preemption is much more complex than originally believed
- In most cases...
 - Little or no periodic preemption operation analysis conducted
 - Very little system testing conducted especially on traffic signal
 - Preemption design and operation not considered important by road authority until an incident occurs

Fox River Grove, Illinois

**WAS FOX RIVER GROVE AN
ANOMOLY?**

ARE THERE OTHER CRASHES?

IS IT A PROBLEM OR NOT?

Preemption

What role does preemption play?

It always involves an intersection with a traffic signal close to a grade crossing

FRA & TXDOT found 42% of grade crossings located within 75 feet of an intersection had multiple crashes

The complexity of the two systems when interconnected to one another requires in-depth understanding and analysis to design-related incidents

Stopped on the Tracks...And No Place To Go

- Through May 29, 2024, there have been 71 incidents with a vehicle stopped on the tracks at public grade crossings
- In 2023, there were 159 incidents with a vehicle stopped on the tracks at public grade crossings
- The reality is that crashes whether “Stopped on Track” or “Human Error” or “Abandoned Vehicle” continue to occur
- They represent an opportunity to take the next bite out of crash history

Preemption and the 11th Edition of MUTCD

The reality is that preemption design and operation is a bigger challenge in terms of **awareness and education** than it is a technical problem.

Compliance

The FHWA has the authority to establish other target compliance dates for implementation of particular changes to the MUTCD [23 CFR 655.603(d)(1)].

FHWA has mandated the review of preemption in the 11th Edition of the MUTCD Section 1B.03:

MUTCD Section	Subject Area	Specific Provision	Compliance Date
8D.09 through 8D.12	Highway Traffic Signals at or Near Grade Crossings	Assessment and determination of appropriate treatment to achieve compliance (preemption, movement prohibition, pre-signals, queue cutter signals)	10 years from the effective date of this edition of the MUTCD

Compliance

The final rule adopts the compliance date for Sections 8D.09 through 8D.12 to require an **assessment and determination** of appropriate treatment to reach compliance at specific locations.

It should be noted that this requirement is not a simple preemption operation check. In all likelihood, a Diagnostic Team should be convened to review the current design, note any changes in conditions and produce an engineering study per Section 8A.05 identifying any proposed improvements or changes.

Compliance

Agencies will be granted flexibility to determine the schedule for installation of improvements based on availability of funding and other safety priorities through the systematic replacement and upgrade of traffic control devices as currently prescribed in the MUTCD for other traffic control devices.

Preemption and the 11th Edition of MUTCD

Section 8D.09 Preemption of Highway Traffic Signals at or Near Grade Crossings

Support:

⁰¹ **Traffic signal preemption for grade crossings is a complex topic that requires a specific understanding of grade crossing warning systems and highway traffic signal operations.** While most traffic signal operations are governed only by the traffic signal controller unit and the associated traffic signal equipment, preemption for grade crossings is also governed by the grade crossing warning system. Active grade crossing warning systems include flashing light signals and possibly automatic gates, as well as various types of train detection equipment.

Preemption and the 11th Edition of MUTCD

1 + 1 = 3

Section 8D.09 Preemption of Highway Traffic Signals at or Near Grade Crossings

Where the traffic signal controller unit is interconnected with the grade crossing warning system for the purpose of preemption, a combined system is created. It is the combined system that requires a thorough understanding of the design and operating parameters in order to provide proper operation of the preemption system.

Preemption and the 11th Edition of MUTCD

Guidance:

⁰³ If a 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 Section 4F.19 unless otherwise determined by the Diagnostic Team.

Preemption and the 11th Edition of MUTCD

Guidance:

⁰⁶ If a highway traffic signal is installed 200 feet or less from a passive grade crossing, unless otherwise determined by the Diagnostic Team, an active grade crossing warning system should be installed at the grade crossing to provide a means to preempt the highway traffic signal in order to clear vehicles from the minimum track clearance distance (see Section 8A.07) upon approach of rail traffic.

Preemption and the 11th Edition of MUTCD

Guidance:

⁰⁷ If a highway traffic signal is interconnected with flashing-light signals, the flashing-light signals should be provided with automatic gates to prevent additional vehicles from being drawn into the minimum track clearance distance (see Section 8A.07) during the track clearance interval prior to the arrival of rail traffic unless a Diagnostic Team determines otherwise.

Preemption and the 11th Edition of MUTCD

Support:

⁰⁸ Regular joint inspections by the highway agency or authority with jurisdiction, the regulatory agency with statutory authority, if applicable, and the railroad company or transit agency are a best practice and typically include verification of the preemption operation, the amount of warning time and/or preemption time being provided by the grade crossing warning system, and the timing of highway traffic signals interconnected and/or coordinated with the flashing-light signals.

Preemption and the 11th Edition of MUTCD

Guidance:

²⁶ The decision to implement simultaneous or advance preemption should include consideration of the right-of-way transfer time, the queue clearance time, and the separation time in order to determine the maximum preemption time. These time periods should be compared to and verified with the operation of the grade crossing traffic control devices in order to evaluate the operation of the highway traffic signal and the preemption operation.

Preemption and the 11th Edition of MUTCD

Guidance:

These factors should be considered regardless of whether simultaneous or advance preemption operation is implemented as they are based on traffic signal minimum timing, vehicle acceleration characteristics, and physical distances along the roadway.

Preemption and the 11th Edition of MUTCD

Simultaneous Preemption*	
Minimum Warning Time	20
Clearance Time	32
Advance Preemption Time	0
Max Preemption Time	52

*Values are in seconds.

Advance Preemption*	
Minimum Warning Time	20
Clearance Time	0
Advance Preemption Time	32
Max Preemption Time	52

*Values are in seconds.

The Total Time Required from the railroad
is the SAME !

AREMA C&S Manual Updates

Recommended Functional/Operating Guidelines for Interconnection Between Highway Traffic Signals or Other Traffic Control Devices and Grade Crossing Warning Systems

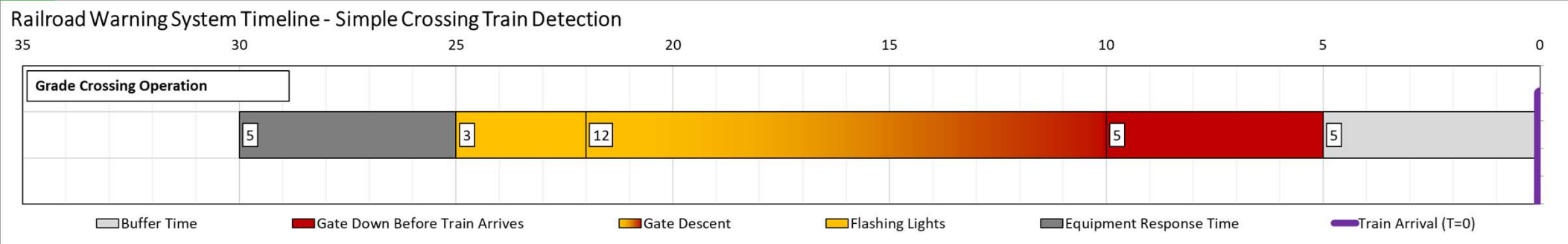
Revised 2025

AREMA C&S Manual Updates

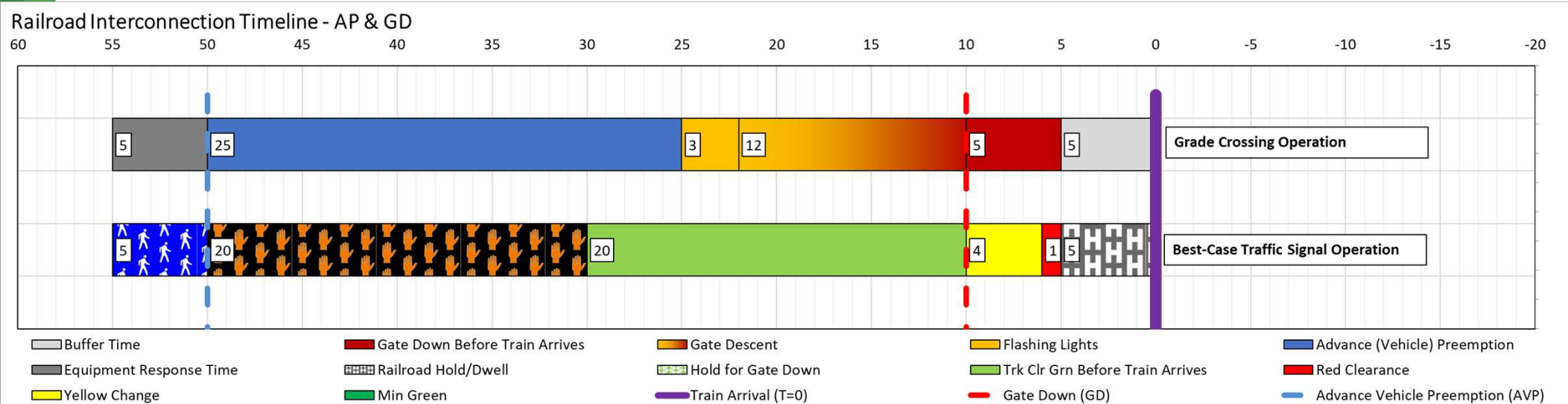
General

For grade crossing warning systems interconnected with highway traffic signals **using track circuit based constant warning time devices**, System Design Time minus Equipment Response Time shall not exceed 50 seconds. See Manual Part 3.3.10 Recommended Instructions for Determining Warning Time and Calculating Minimum Approach Distance for Grade Crossing Warning Systems. See this Manual Part, Section E for operational recommendations where preemption is used.

AREMA C&S Manual Updates



Preemption and the 11th Edition of MUTCD

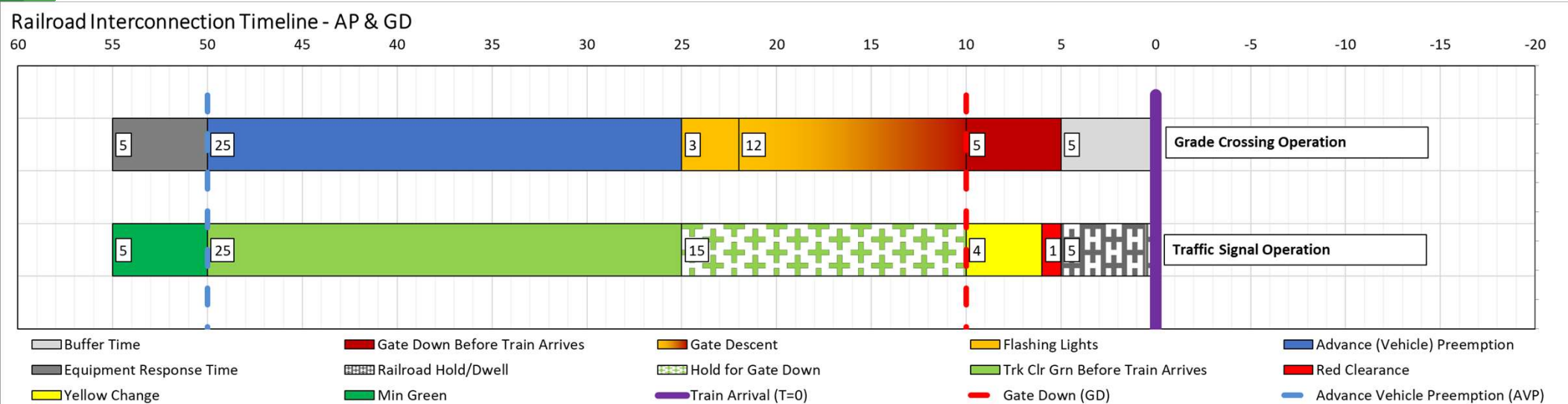


Preemption and the 11th Edition of MUTCD

Standard:

³² Where automatic gates are present and green signal indications are displayed at the downstream traffic control signal during the track clearance interval, the preemption sequence shall be designed such that the green signal indications are not terminated until the automatic gate(s) that controls access over the grade crossing toward the downstream intersection is fully lowered.

Preemption and the 11th Edition of MUTCD





AREMA C&S Manual Updates

Definitions

1. Advance Preemption – Notification of an approaching train that is forwarded to the highway traffic signal controller unit or assembly by an interconnection circuit in the railroad equipment in advance of the activation of the railroad warning devices. Advance Preemption can be separated into the following two parts:

AREMA C&S Manual Updates

Definitions

- a. Advance Vehicle Preemption (AVP) – An optional component of Advance Preemption where an independent interconnection circuit for vehicle preemption is used.
- b. Advance Pedestrian Preemption (APP) – An optional component of Advance Preemption where an additional independent interconnection circuit may be provided for terminating the walk interval, beginning or completing the pedestrian change interval and/or inhibiting new pedestrian service prior to the receipt of the advance vehicle preemption call.

AREMA C&S Manual Updates

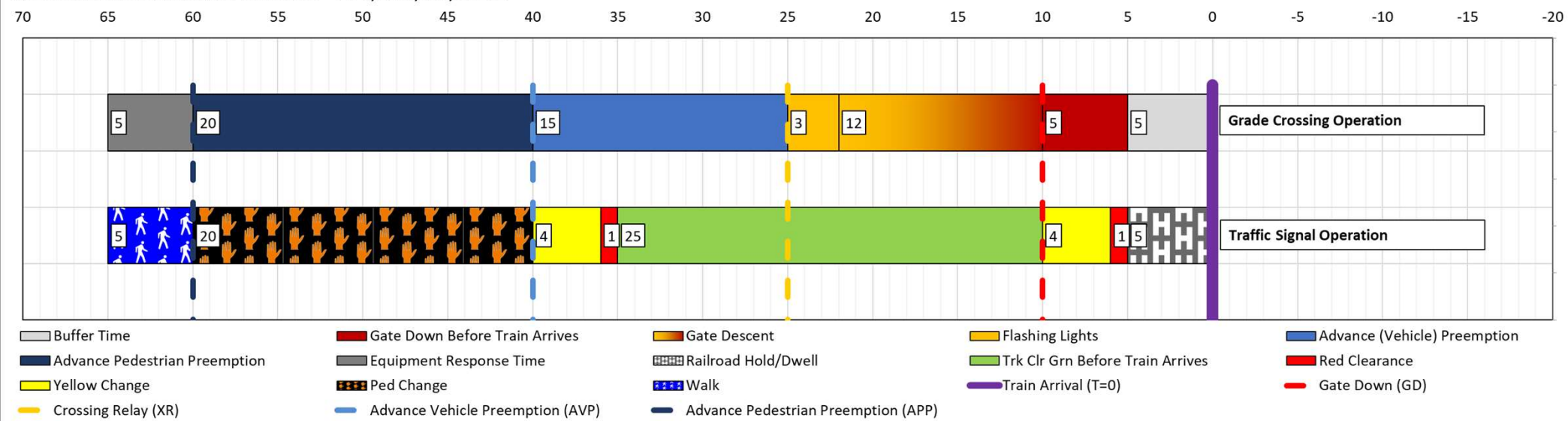
1. Advance Preemption Time (APT) - The period of time that is the difference between the required Maximum Highway Traffic Signal Preemption Time and the Prescribed Warning Time. Advance Preemption Time can be separated into the following two times:

AREMA C&S Manual Updates

- a. Advance Vehicle Preemption Time (AVPT) – A period of time for advance vehicle preemption.
- b. Advance Pedestrian Preemption Time (APPT) – A period of time in addition to the Advance Vehicle Preemption Time that is provided for advance pedestrian preemption.

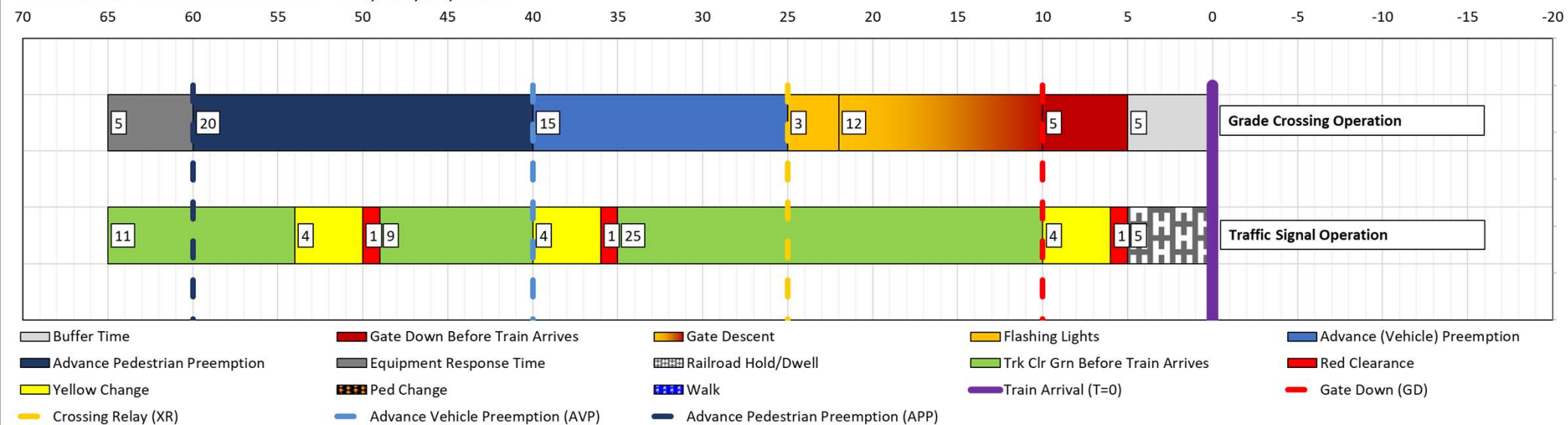
AREMA C&S Manual Updates

Railroad Interconnection Timeline - APP, AVP, XR, & GD



AREMA C&S Manual Updates

Railroad Interconnection Timeline - APP, AVP, XR, & GD



Preemption and the 11th Edition of MUTCD

Standard:

⁴⁰ Where traffic control signals are programmed to operate in a flashing mode during the preemption dwell interval (the period following the track clearance interval that lasts for the duration of the preemption interconnection activation), the beginning of the preemption dwell flashing mode shall not occur until the grade crossing equipment indicates that the rail traffic has entered the grade crossing.

NTSB Accident Report

**Collision Between
Metrolink Train 210 and
Ford Crew Cab, Stake Bed Truck
at Highway-Rail Grade Crossing,
Burbank, California,
January 6, 2003**



Highway Accident Report
NTSB/HAR-03/04

PB2003-916204
Notation 7580

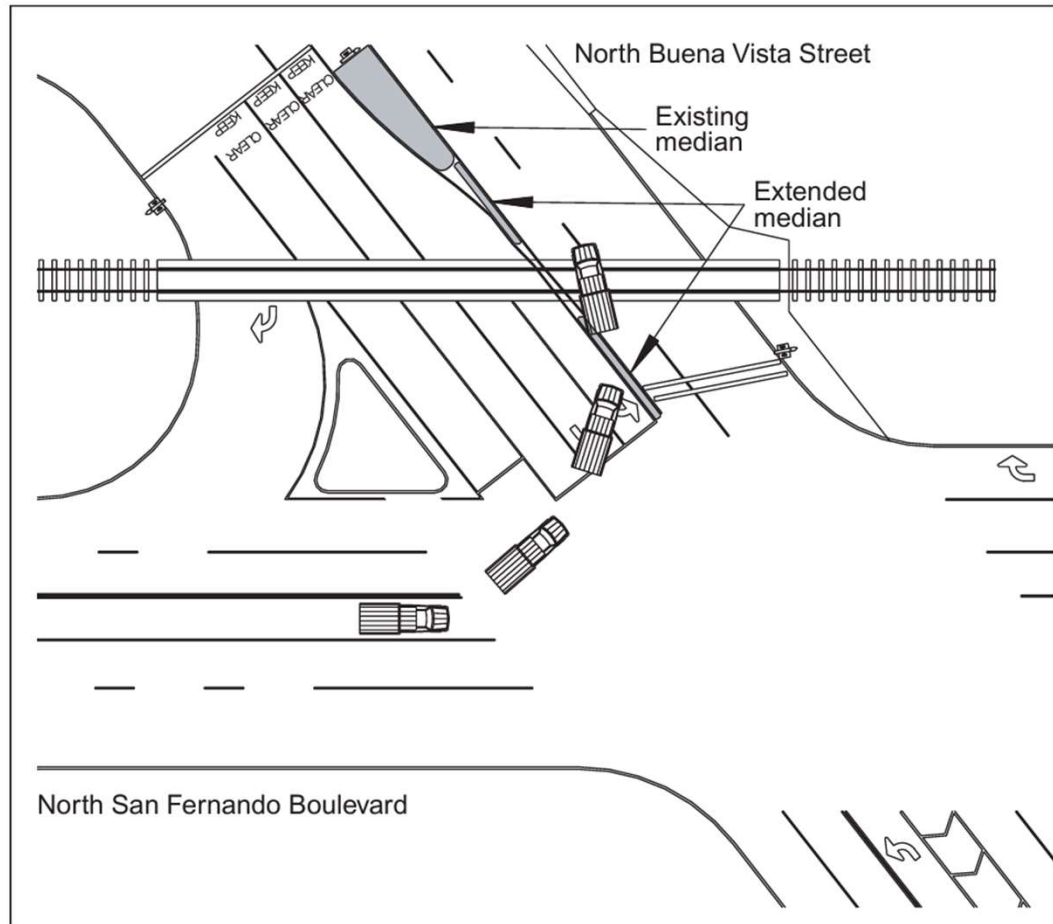


**National
Transportation
Safety Board**
Washington, D.C.

NTSB Accident Report



NTSB Accident Report



NTSB Accident Report

Findings

1. The weather, the track, the signal system, the mechanical condition of the train and accident truck, and the qualifications of the train crew and accident driver neither caused nor contributed to this accident; whether the driver was impaired by alcohol at the time of the accident could not be determined.
2. The accident truck collided with the Metrolink train when the truck driver made a shallow left turn onto North Buena Vista Street after activation of the flashing red left turn arrow.

NTSB Accident Report

Findings

5. Use of the all-red-flash mode for traffic signals at a railroad grade crossing has ambiguous meaning, can be confusing to motorists, and, as a result, creates unnecessary risks to life and property.
6. Had the limited-operation mode of traffic signal preemption been in place, giving the accident driver a solid red arrow and allowing traffic parallel to the railroad tracks to continue to move, the truck driver might have been discouraged from making a left turn onto the grade crossing.

NTSB Accident Report

Findings

9. Current information and guidelines for designing safe highway-rail grade crossings and traffic signals are available but can be difficult to find and expensive to obtain.

NTSB Accident Report

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the design of the traffic signals railroad hold interval, which displayed a flashing red arrow for the eastbound North San Fernando Boulevard left turn lane, improperly implying that, after stopping, the truckdriver was permitted to make a left turn onto North Buena Vista Street. Contributing to the accident was the lack of a raised median at the crossing that would have obstructed the path used by the truck driver to make the left turn.

Interconnection Circuits

Circuits for the Traffic Signal Interconnection Design



Advance Vehicle Preemption Circuit



Simultaneous/Crossing Active Circuit



Gate Down Circuit



Traffic Signal Health Circuit



Advance Pedestrian Preemption Circuit

Interconnection Circuits

Section 8D.09 Preemption of Highway Traffic Signals at or Near Grade Crossings

Support

²¹ A supervised preemption interconnection is one that incorporates both a normally-open and a normally-closed circuit from the grade crossing warning system to verify the proper operation of the interconnection.

Interconnection Circuits

Section 8D.09 Preemption of Highway Traffic Signals at or Near Grade Crossings

Option:

- ²² Instead of supervision, a double-break preemption interconnection circuit that uses two normally-closed circuits that open both the source and return energy circuits may be used.
- ²³ A preemption interconnection may incorporate both supervision and double-break circuits.

Pre-Signals & Queue Cutters

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Section 8D.11 Pre-Signals at or Near Grade Crossings

Guidance:

⁰¹ If a grade crossing is located in close proximity to an intersection controlled by a traffic control signal and the clear storage distance is less than the design vehicle length, the use of pre-signals to control traffic approaching the grade crossing in the direction toward the intersection should be considered.

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Pre-signals require thorough understanding of the message to be delivered and how the typical road user interprets it





Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Similarities between Pre-Signals and Queue-Cutter Signals:

Controls movement over the grade crossing

Can be upstream or downstream from the crossing

Generally the same signal indications

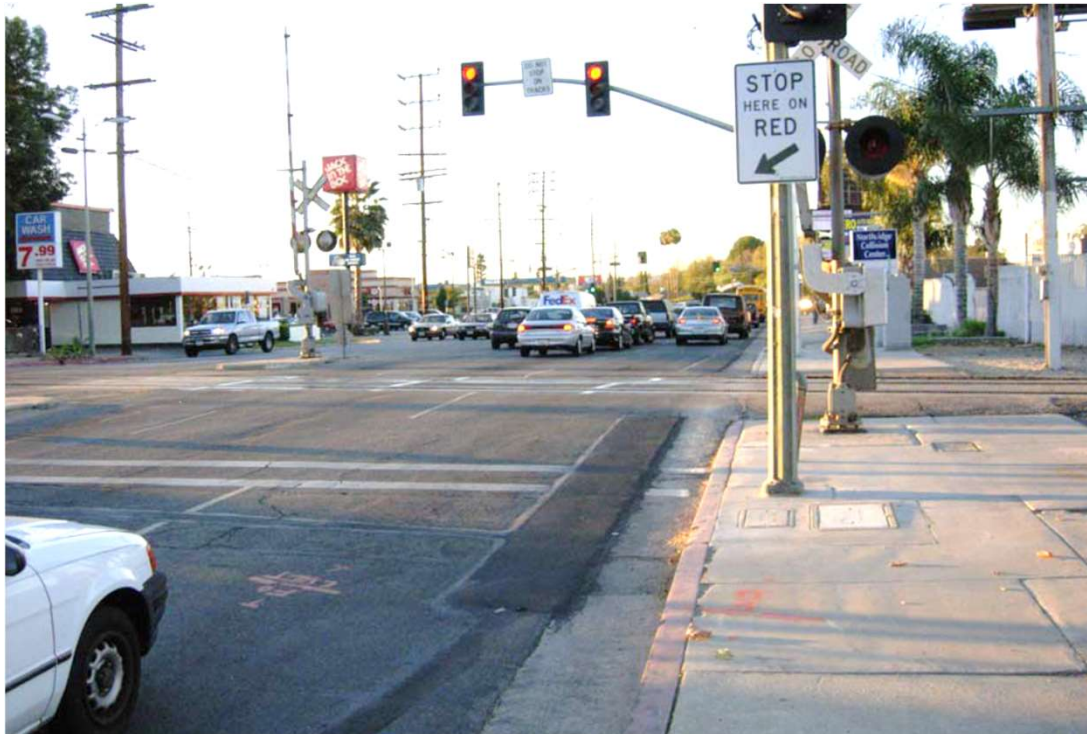
Look the same to road users

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD



Pre-Signal

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD



Queue-Cutter Signal

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

The difference between the two:

Support:

⁰¹ A queue cutter signal is a traffic control signal that controls one direction of traffic at a grade crossing to minimize the possibility of vehicles stopping within the minimum track clearance distance (see Section 8A.07). Although a queue cutter signal has a similar purpose as a pre-signal (see Section 8D.11), **the difference is that a queue cutter signal is independent from the downstream signalized intersection, whereas a pre-signal is part of the downstream signal.**

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Section 8D.11 Pre-Signals at or Near Grade Crossings

Guidance:

⁰⁷ Consideration should be given to using visibility-limited signal faces (see definition in Section 1C.02) at the intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD



Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Guidance:

A separate pre-signal face for the mandatory left-turn lane and/or right-turn lane should be provided in addition to the pre-signal signal faces provided for the through movement where both of the following conditions are met:

- A. The storage area for the turn lane extends from the downstream signalized intersection back to and across the grade crossing, and*
- B. The green interval for the turning movement at the downstream intersection does not always begin and end simultaneously with the green interval for the adjacent through movement at the downstream intersection.*

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD



Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Option:

⁰⁸ The duration of the extended green interval may be adjusted by vehicle detection located between the pre-signal and the downstream signalized intersection.

⁰⁹ The pre-signal phase sequencing may be timed with an offset from the downstream signalized intersection such that the pre-signal's green signal indication terminates prior to the downstream intersection's green signal indication to minimize the possibility of stopping motor vehicles within the minimum track clearance distance (see Section 8A.07) and the clear storage distance .

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Things to Consider

- Use of pre-signals for long clear storage distances must carefully consider driver expectancy for stopping traffic well in advance of the normal stopping point for the intersection, as well as, the inherent inefficiency of pre-signal operation;
- Use of pre-signals must carefully consider the location of the signal indications (downstream or upstream);
- Vehicles that are required to stop before proceeding

Federal Motor Carrier Requirements

Vehicles that are required to stop within 50 feet but no closer than 15 feet, listening and looking both ways for an approaching train before proceeding:

- Every bus transporting passengers
- Every commercial motor vehicle transporting any quantity of a Division 2.3 chlorine.
- Every commercial motor vehicle which, in accordance with the regulations of the Department of Transportation, is required to be marked or placarded with one of 18 classifications

Drivers may cross the railroad tracks once it is safe to do so, though they are not permitted to shift gears while crossing the tracks


Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Queue Cutter Signal Requirements

- A “safety critical” vehicle detection system using self check capabilities is used to activate the queue cutter control system.
- The vehicle detection system must detect the buildup of a queue of vehicles before the queue reaches MTCD.
- A queue cutter signal control system must have battery back-up.
- Any fault of the queue cutter system must result in a flashing red display.

Pre-Signals, Queue-Cutters and the 11th Edition of MUTCD

Queue Cutter Signal Requirements

- Like a pre-signal, the stop line location must be 40 ft in advance of a queue-cutter signal.
- Like a pre-signal, queue cutter signals can be located upstream or downstream from the railroad crossing similar to pre-signals.
- Like a pre-signal, the queue cutter signals and support structures must be located to maintain visibility of the railroad flashing-lights.
- Like a pre-signal, a Stop Line sign  must be installed near the queue cutter signal stop line.



A Sample of Additional Changes in Part 8 of the 11th Edition of MUTCD

MUTCD 11th Edition – Warning Beacons



MUTCD 11th Edition – Warning Beacons

Section 8D.13 Warning Beacons or LED-Enhanced Warning Signs at Grade Crossings

Standard:

⁰⁴ If a Warning Beacon or LEDs within the legend, symbol, or border of the sign is activated by the approach or presence of rail traffic in conjunction with a warning sign that includes the legend WHEN FLASHING either on the sign itself or on a supplemental plaque, the activation of the Warning Beacon or LEDs shall be accomplished by a supervised preemption interconnection using fail-safe design principles (see Section 8D.09) between the control circuits of the grade crossing warning system and the Warning Beacon or LED-enhanced sign.

MUTCD 11th Edition - ATC

**ANOTHER
TRAIN
COMING**

W10-16
Activated
Blank-Out

11th Edition MUTCD

Support:

Conflicts between vehicles or vulnerable road users and multiple trains can occur at multi-track crossings on sidewalks, pathways, and at crossings in station areas where grade crossing users might not consider the arrival of another train on a different track.

Guidance:

The decision to provide notification of another train should be made by a Diagnostic Team. In making this determination, the Diagnostic Team should consider the pedestrian usage, pedestrian collision history, train speeds and volumes, operating plans and/or schedules, and the presence of a nearby station or transit center.



NATIONAL SAFETY COUNCIL

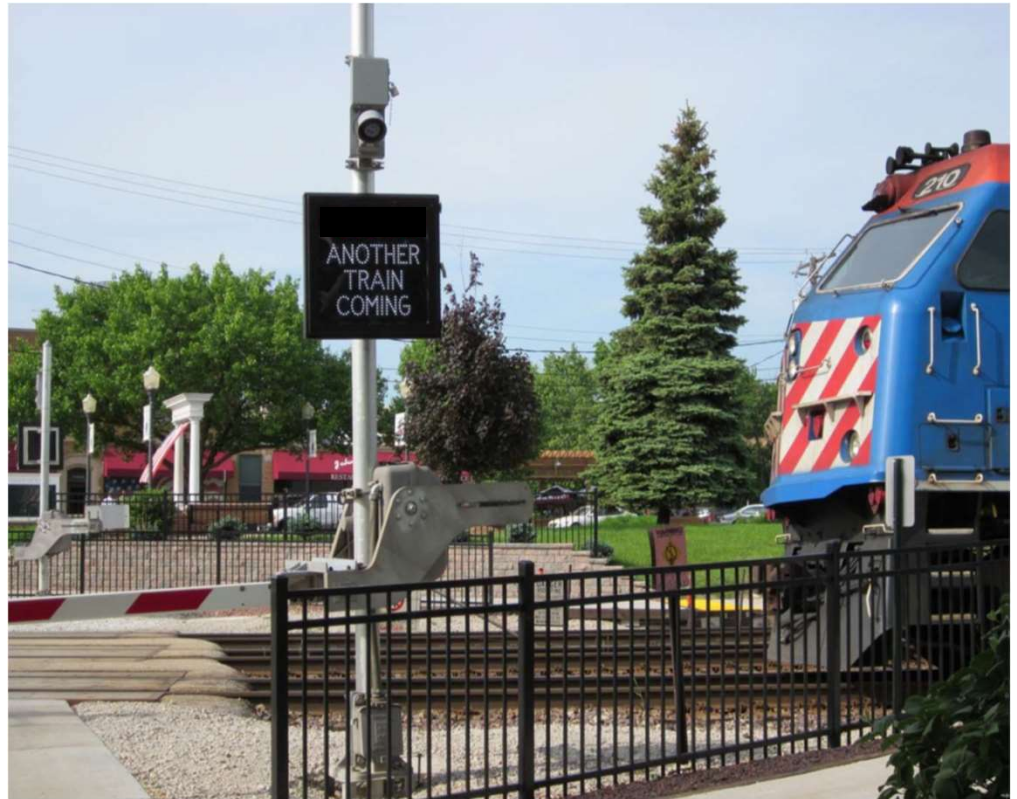
The term vulnerable road user (VRU) is used mainly to describe those unprotected by an outside shield, as they sustain a greater risk of injury in any collision with a vehicle and are therefore highly in need of protection against such collisions. This broad definition can include (but is not limited to): a pedestrian; a roadway worker; a person operating a wheelchair or other personal mobility device, whether motorized or not; a person operating an electric scooter or similar; and a person operating a bicycle or other nonmotorized means of transportation. Motorcycle operators can also be considered as VRUs due to their lack of vehicle enclosure and higher risk of injury in a collision. This expansive definition should be considered when understanding the scope of those interacting with roadways.

MUTCD 11th Edition - ATC

11th Edition MUTCD

Option:

An ANOTHER TRAIN COMING (W10-16) train-activated blank-out sign (see Figure 8B-4) may be used to provide notification of another train coming. For added sign conspicuity, a Warning Beacon may be used in accordance with the requirements of Section 4S.03.



MUTCD 11th Edition - Pedestrians

Guidance:

If used at a pathway or sidewalk grade crossing, an active traffic control system (see Section 8D.01) should include an audible device such as a bell that is operated in conjunction with the flashing-light signals.

Option:

Flashing-light signals, bells, and other audible warning devices may be omitted at pathway or sidewalk grade crossings that are located within 25 feet of an active warning device at a grade crossing that is equipped with those devices.

Additional pairs of flashing-light signals, bells, or other audible warning devices may be installed on the active traffic control devices at a grade crossing for pathway or sidewalk users approaching the grade crossing from the back side of those devices.

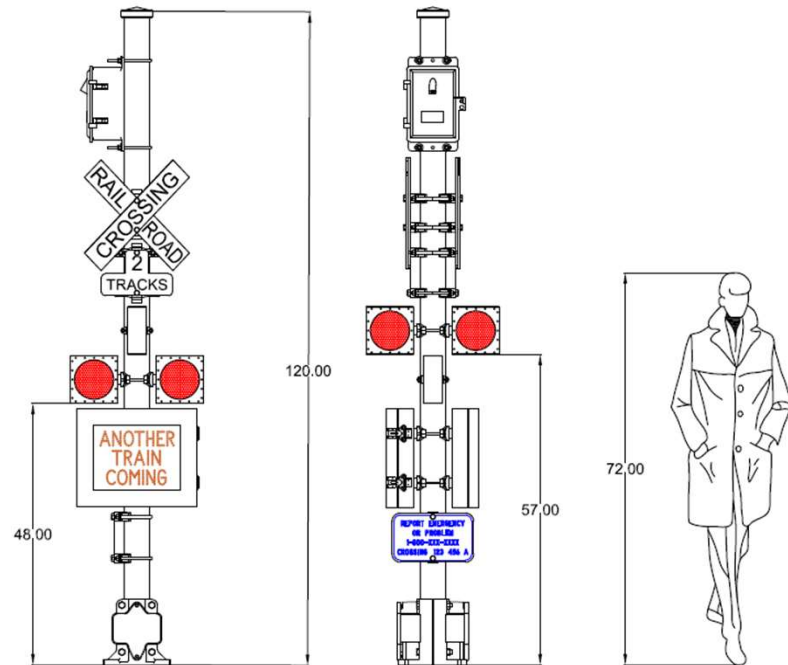
MUTCD 11th Edition - Pedestrians

Standard:

If used at a pathway or sidewalk grade crossing, flashing-light signals shall be aligned horizontally and the light units shall have a diameter of at least 4 inches. For 4-inch diameter light units, the light centers shall be spaced approximately 16 inches apart and, if used, the flashing light unit backgrounds shall be at least 8 inches in diameter.

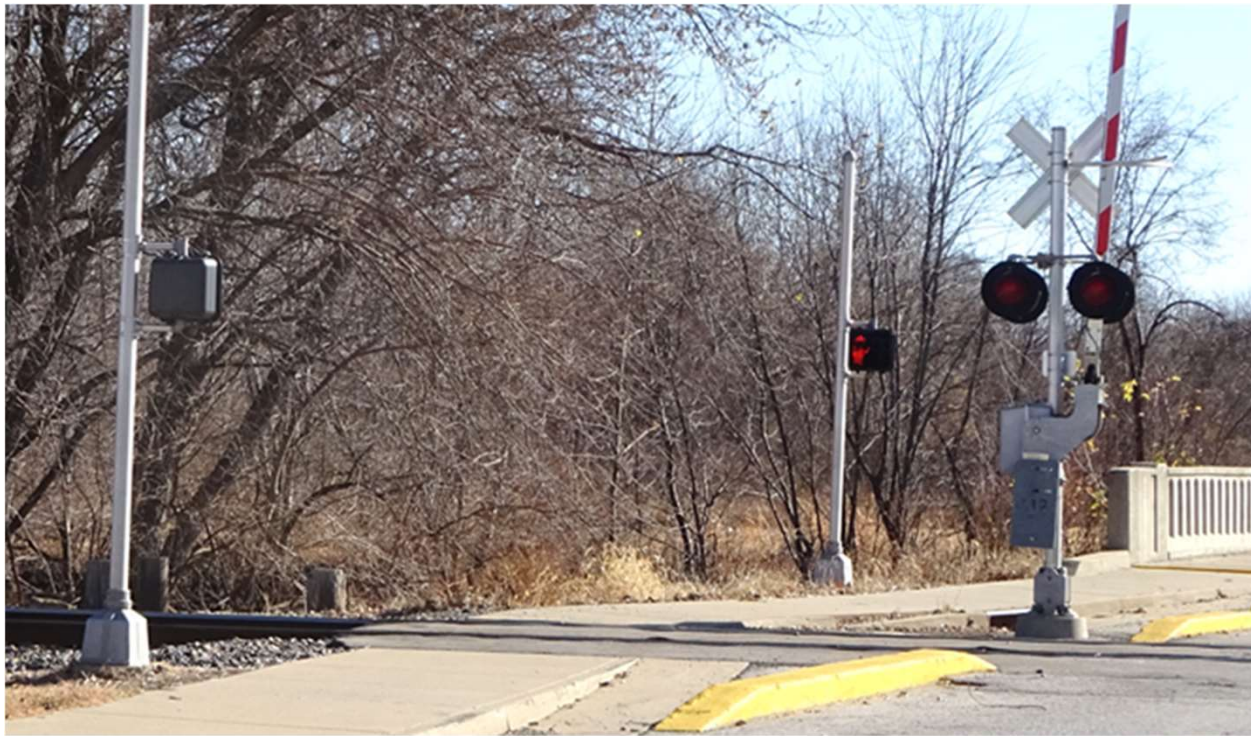
The minimum mounting height of the flashing-light signals shall be 4 feet, measured vertically from the bottom edge of the lights to the elevation of the near edge of the pathway or sidewalk surface.

MUTCD 11th Edition - Pedestrians



Example of Pedestrian Size Active Warning Devices

MUTCD 11th Edition - Pedestrians



Prohibition on the use of Hand/Man Pedestrian Signals at Grade Crossings – To be used at crosswalks on roadways only

Questions??

