Measure Name: Queue cutter

Definition: A traffic control signal that is located just upstream from a grade crossing to prevent traffic from queuing across railroad tracks.

Tags:

Type of Incident:

- ☐ Non-Motorized Users Only
- ☒ Motor Vehicles Only
- ☐ Both

Intervention Strategy:

- ☐ Data: application and planning
- ☐ Education: outreach and messaging
- ☐ Enforcement: policy development and rulemaking
- ☒ Engineering: technological and physical deterrents

Type of Problem:

- ☐ Non-Motorized Users Violating Warning Devices
- ☒ Motor Vehicles Violating Warning Devices
- ☐ Vehicle ROW Incursion
- ☒ Vehicle Congestion
- ☐ Blocked Crossing
- ☐ Vehicle Hang-up

Measure Category:

- ☐ Risk Assessment
- ☐ Policy and Enforcement
- ☐ Collaboration, Training, and Education
- ☐ Public Communication
- ☐ Physical Barriers
- ☒ Detection and Lighting
- ☒ Infrastructure Modification
- ☐ Post-Incident Management
- ☒ Warning Devices

Description

A queue cutter is a traffic control signal located just upstream of a grade crossing and is typically installed where traffic queueing across the crossing is likely to occur due to a downstream condition. Queue cutters activate and flash a red signal for one direction of travel when a traffic queue is detected downstream or when a train is approaching the crossing; it is intended to prevent traffic from queuing onto the tracks by storing excess vehicular demand upstream of the rail crossing. A queue cutter is not operated as part of a downstream intersection traffic signal but is independently controlled with interconnection to the grade crossing warning signal system [1][2].

The operation of a queue cutter can be based on timed operations, downstream vehicle detection loops, or a combination of the two [1]. If a detection loop is deemed to be necessary for a signal system, care should be taken to properly place the detection loop where the signal will prevent queueing over the tracks but will not be excessively obstructive to traffic flow [1]. Placement of signal heads (downstream or upstream or rail crossing) and stop line placement should also be considered [1].

Queue cutters are most suitable where the clear storage distance (CSD) is large. The Manual on Uniform Traffic Control Devices (MUTCD) recommends queue cutters where the CSD is more than 450 feet. For sites with shorter CSD's, pre-signals and hybrid pre-signal/queue cutters may be more suitable [1].

Additional search terms: *storage issue, traffic jam, congestion*

Advantages

- Reduces the likelihood that vehicles queue within the minimum track clearance distance. [1]

Drawbacks

- Can cause confusion for drivers due to conflicting signal directions in line of sight. [3]
- Installation of new traffic signal can be expensive.

Notable Practices

- Queue cutters should be connected to the railroad crossing warning system to display a red stop signal when a train is approaching. [3]
- A queue cutter signal control system should have a battery backup. [4]
- Faults in the queue cutter signal control system should result in a flashing red light signal. [4]
- Louvers or programmable-visibility heads can be installed to eliminate confusion caused by several traffic signals in a road user's field of vision. These devices should be used to limit the visibility of downstream signals. [1]
- Queue-cutter signal operation may be based on downstream queue loop detectors, timed operations, or a combination of the two. [1]

- Generally, a queue cutter signal is installed where the CSD exceeds 450 feet. It is interconnected with the railroad warning system with a 3 to 5 second advance preemption time. [5]
- Queue cutters may also be considered where the CSD is between 200 and 450 feet if they operate in a hybrid mode as a combination pre-signal and queue-cutter signal. [1]

References

[1] U.S. Department of Transportation. (2019). Highway-Rail Grade Crossing Handbook – Third Edition.

> Abstract: The purpose of the *Highway-Rail Crossing Handbook, 3rd Edition* is an information resource developed to provide a unified reference document on prevalent and best practices as well as adopted standards relative to highway-rail grade crossings. The handbook provides general information on highway-rail crossings; characteristics of the crossing environment and users; and physical and operational changes that can be made at crossings to enhance the safety and operation of both highway and rail traffic over such intersections. The guidelines identified and potential alternative improvements presented in this handbook reflect current best practices nationwide.

[2] National Cooperative Highway Research Program. (2022). Traffic Signal Preemption at Intersections Near Highway–Rail Grade Crossings.

> Excerpt: Traffic signal operations near highway–rail grade crossings are important from both safety and mobility perspectives, but practice varies widely. The goal of this synthesis is to document the state of practice of traffic signal preemption deployed at intersections adjacent to highway–rail grade crossings in the United States and Canada.

[3] Southern California Regional Rail Authority. (2021). SCRRA Highway-Rail Grade Crossings Recommended Design Practices and Standards Manual.

> Excerpt: This Manual was developed in 2009 and issued as a Recommended Design Practices and Standards Manual.

[4] CTC, Inc. (2015). National Highway-Rail Grade Crossing Safety Training Conference Preemption Workshop.

> Excerpt: The purpose of this workshop is to highlight a number of design elements typically encountered to successfully implement railroad preemption operation.

[5] Ohio Department of Transportation. (2022). Traffic Engineering Manual.

> Excerpt: The Traffic Engineering Manual (TEM) has been developed to assure uniformity in application of ODOT traffic engineering policies, guidelines, standards and practices. The OMUTCD establishes the basic, minimum traffic control standards for any street, highway, bikeway or private road open to public travel in Ohio, and all supplemental ODOT traffic engineering design, construction and operations related information is either contained in the TEM or referenced from it.

Additional Resources

Related Measures

- Pre-signal
- Traffic signal preemption

Images

No image available