Measure Name: Traffic channelization

Definition: Installation of barrier walls, raised medians or mountable raised curbs with flexible delineators between opposing lanes of traffic on approach to a grade crossing.

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

Traffic channelization refers to the installation of barrier walls, raised medians or mountable raised curbs with flexible delineators between opposing lanes of traffic on approach to grade crossings. The installation of traffic channelization devices at crossings with active warning systems (i.e., flashing lights and/or gate arms) provides a visual and physical barrier to deter drivers from entering the opposing traffic lane to circumvent the gate arms.

Studies conducted at locations where they have been installed show positive changes in unsafe driver behavior as a result of the treatments [1] [2]. The *Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings* states that channelization devices have an effectiveness rating of 0.75, and non-traversable curbs have an effectiveness rating of 0.80 [3]. The effectiveness rating is the reduction in likelihood of a collision at the crossing as the result of the measure. The rule permits the use of traffic channelization devices or non-traversable curbs that meet specific requirements as Supplemental Safety Measures (SSMs) for the establishment of quiet zones.

Traffic channelization treatments can consist of permanent installations such as concrete barrier systems and raised medians or temporary installations such as traversable raised curb systems with vertical panels or bollards. Traffic channelization devices are low cost and make them an attractive option for improving safety at highway-rail grade crossings.

Additional search terms: *median barriers, raised median, bollards, curb island, concrete barriers, traversable raised curb, tubular markers, vertical panels*

Advantages

- Traffic channelization devices provide a visual and physical barrier to deter motorists from entering the opposing traffic lane to circumvent the gate arms. [1]
- When meeting certain requirements, traffic channelization devices and median barriers are an approved supplemental safety measure for the establishment of quiet zones. [1]
- Traffic channelization is a low-cost improvement. [1]
- Permanent traffic channelization devices such as barrier wall systems and wide raised medians are effective and durable. [1]
- When used on the roadway, traffic channelization devices are often used as a means of traffic calming. Traffic calming devices aim to reduce vehicular speeds and promote safe conditions for motorists, bicyclists, and pedestrians. [1]

Drawbacks

- There may be maintenance concerns with flexible vertical panels and bollards, and overall weathering of the retroreflective material.

- "Break-away" channelization devices must be frequently monitored to replace broken elements. [3]
- Permanent traffic channelization devices such as barrier wall systems and wide raised medians require a lot of space on the roadway and may introduce crossing sight distance issues. [1]
- Additions such as trees, flowers, and other vegetation higher than three feet above the roadway can restrict drivers' views of approaching trains. [4]
- Access limitations created by channelization can cause property owner complaints, particularly for businesses. [4]

Notable Practices

- Prior to installation of a traffic channelization device, an engineering analysis of roadway usage should be conducted to ensure that the installation does not result in unsafe conditions. [1]
- The median barriers or channelization devices must extend 100 feet from the crossing gate arm, or if an intersection is within 100 feet of the crossing, the channelization device must extend 60 feet to qualify as an SSM. [3]
- The *Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings* permits the use of channelization devices within quiet zones with less than 60 feet clearance to be applied as an alternative safety measure (ASM). [3]
- The gap between the lowered gate and the curb or channelization device must be one foot or less, measured horizontally across the road from the end of the lowered gate to the curb or channelization device or to a point over the curb edge or channelization device. [3]
- Wide raised medians, although more costly, provide the most aesthetically pleasing option since they provide an area to include landscaping. [2]
- If the crossing is on a route that is used by emergency vehicles or heavy trucks, it may be necessary to accommodate a U-turn for these vehicles. [1]
- Barrier wall systems must be equipped with an energy absorbing end treatment. [2]
- Non-traversable curb islands should be used on roadways with posted speed limits of 40 MPH or below. [2]
- Channelization of road users should be accomplished using pavement markings, signing, and crashworthy, detectable channelizing devices. [5]
- If used to channelize vehicular traffic at night, longitudinal channelizing devices shall be retroreflective or internally illuminated. [5]
- Ensure that the traffic channelization device does not interfere with rail operations or track maintenance activities.

References

[1] Horton, S. (2012). Use of Traffic Channelization Devices at Highway-Rail Grade Crossings. Technical Report No. DOT/FRA/ORD-12/11. Washington, DC: U.S. Department of Transportation, Federal Railroad Administration.

Abstract: Traffic channelization devices have found new applications at highway-rail grade crossings with active warning devices. Numerous studies conducted at locations where they have been installed and show positive changes in unsafe driver behavior as a result of the treatments. When meeting certain requirements, traffic channelization devices and median barriers are an approved supplemental safety measure for the establishment of quiet zones. Traffic channelization devices are low cost and make them an attractive option for improving safety at highway-rail grade crossings.

[2] U.S. Department of Transportation Federal Railroad Administration. (2008). Guidance on the use of Traffic Channelizing Devices at Highway-Rail Grade Crossings.

Excerpt: Several types of traffic channelizing devices are finding new application at highway-rail grade crossings that are equipped with flashing light signals and crossing gates. These channelizing devices, when used appropriately, can reduce the risk of a collision between a vehicle and a train by 75%! This high level of risk reduction makes traffic channelizing devices a good choice to enhance safety and greatly reduce gate violations at highway-rail grade crossings.

[3] U.S. Department of Transportation Federal Railroad Administration. (2006). Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule.

Description: The Final Rule on the Use of the Locomotive Horns at Highway Rail Grade Crossings (Code of Federal Regulations Title 49 Parts 222 and 229) permits the use of traffic channelization devices or non-traversable curbs that meet specific requirements as supplemental safety measures (SSM).

[4] U.S. Department of Transportation. (2019). Highway-Rail 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.

[5] Federal Highway Administration. (2023). Manual on Uniform Traffic Control Devices.

Excerpt: The purpose of the MUTCD is to establish uniform national criteria for the use of traffic control devices that meet the needs and expectancy of road users on all streets, highways, pedestrian and bicycle facilities, and site roadways open to public travel.

Additional Resources

Association of State Highway and Transportation Officials' publication A Policy on Geometric Design of Highway and Streets, 7th Edition. (2018)

Excerpt: A Policy on Geometric Design of Highways and Streets, 7th Edition, 2018, commonly referred to as the Green Book, contains the current design research and practices for highway and street geometric design.

State of North Carolina Department of Transportation, Guidelines for Median Separation at Highway/Railway At-Grade Crossings. Raleigh, NC: NCDOT, February 2008.

> Excerpt: The intent of this guide is to establish the desirable conditions for the uniform and consistent layout and construction of median separations where it has been determined that a median separation is appropriate. This guide/design tool should be utilized with sound engineering judgment, sound design, and attention to costs.

Southern California Regional Rail Authority, SCRRA Highway-Rail Grade Crossing Manual. January 2021.

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

Related Measures

- Barrier gates

Images

Figure 1. Example of traffic channelization device at a crossing in Medford, MA
Image Credit: Volpe Center

Figure 2. Example of traffic channelization device at a crossing in NC
Image Credit: Volpe Center

Figure 3. Example of traffic channelization device at a crossing in NC
Image Credit: NCDOT, authorized and published in Volpe Report

Figure 4. Example of traffic channelization device at a crossing in NC
Image Credit: NCDOT, authorized and published in Volpe Report