Measure Name: Long arm gate

Definition: Extension of gate arm to restrict vehicles from entering the opposite traffic lane to go around a lowered gate.

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

This measure is similar to Automatic gates but with longer arm gates to discourage motorists from driving around lowered gates. It works by blocking access to the crossing by extending across the approaching lane as well as part of opposing lane to reduce motorist ability to drive around lowered gates. The longer-arm gate system must cover at least three quarters of the roadway [1].

The measure is best suited for two-lane road grade crossings where motorists regularly drive around lowered gates. These may also be useful in urban locations where grade crossings tend to be closed for an extended period. Heavy vehicle traffic (large trucks, buses, etc.) should be considered when implementing this measure as gates on the exit side could get snagged on a heavy vehicle and break off. The North Carolina Department of Transportation (NCDOT) recommends against installing long-arm gates at crossings with more than 1 or 2 percent truck traffic [2].

NCDOT evaluated the effectiveness of upgrading from a standard two-gate system to a long-arm gate system in reducing motorists' ability to drive around the gates. The test was conducted at the Orr Road crossing in Charlotte, and it showed reduction in grade crossing violations between 67 and 84 percent. [2]

Additional search terms: *automatic gate, gate arm, extended barrier*

Advantages

- Upgrade from standard arm gates to long arm gates is a low-cost treatment. The average cost of an upgrade has been estimated at $5,000 per application. [1]
- Long-arm gates result in increased motor vehicle compliance with activated grade crossing signals. The effectiveness of upgrading a crossing from a standard two-gate system to long-arm gates has been estimated to reduce violations between 67 to 84 percent. [3]

Drawbacks

- Long-arm gates are more prone to being broken off by motor vehicles at crossings with lot of heavy vehicle traffic (large trucks, buses, etc.). [2]
- The longer-arm gate does not completely block the crossing. Narrower vehicles (e.g. motorcyclists) could drive around lowered gate. [4]

Notable Practices

- Ensure that longer-arm gate system covers at least three quarters of the roadway. [1]
- This measure can be used with traffic channelization devices, but not at where they would block a street or driveway intersection close to the crossing. [1]
- Consider commercial vehicle traffic over the crossing when installing long-arm gates as the gate extending to part of the exit side lane could get snagged on larger vehicles and break off. NCDOT

recommends against installing long-arm gate at crossing with more than 1 or 2 percent truck traffic. [2]

- Measure is only applicable for two-lane roads. [2]
- Ensure that "shoulder is wide enough to allow a perceived escape route so that vehicles can get around it on the exit side of the crossing". [3]

References

[1] Bien-Aime, P. (2009). North Carolina "Sealed Corridor" Phase I, II, and III Assessment.

Abstract: The Federal Railroad Administration (FRA) tasked the John A. Volpe National Transportation Systems Center to document the further success of the North Carolina DOT "Sealed Corridor" project through Phases I, II, and III. The Sealed Corridor is the section of the designated Southeast High Speed Rail (SEHSR) Corridor that runs through North Carolina. The Sealed Corridor program aims at improving or consolidating every highway-rail grade crossing, both public and private, along the Charlotte to Raleigh rail route in North Carolina. The research on the Sealed Corridor assessed the progress made at the 189 crossings that have been treated with improved warning devices or closed between Charlotte and Raleigh, from March 1995 through September 2004. Two approaches were used to describe benefits in terms of lives saved: a fatal crash analysis to derive lives saved, and prediction of lives saved based on the reduction of risk at the treated crossings. Both methods estimated that more than 19 lives have been saved as a result of the 189 improvements implemented through December 2004. Analysis also shows that the resulting reduction in accidents, due to the crossing improvements, is sustainable through 2010, when anticipated exposure and train speeds along the corridor will be increased.

[2] Cooper, D., & Ragland, D. (2012). Applying Safety Treatments To Rail-Highway At-Grade Crossings.

Abstract: The best solution to rail crossing crashes is to remove the need for the driver to engage in a potentially faulty decision-making process by making it impossible, or at least very difficult, for the driver to bypass lowered gates. Two methods, median separators and long-arm gates, have been deployed in many locations and shown to prevent deaths and injuries while remaining economically feasible. Any comprehensive safety program must begin by first identifying crossings where the risk of collision is unacceptably high, and where safety countermeasures are most warranted. Since this process is highly dependent on the accuracy of our state's inventory database, bringing it up to date and putting it into a readily accessible format should be the top priority for all involved in California rail.

[3] U.S. Department of Transportation. (2007). Highway-Rail Grade Crossing Handbook – Revised Second Edition.

Abstract: The purpose of the Railroad-Highway Grade Crossing Handbook – Revised Second Edition is to provide a single 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 the physical and operational improvements that can be made at highway-rail grade crossings to enhance the safety and operation of both highway and rail traffic over crossing intersections. The guidelines and alternative improvements presented in this handbook are primarily those that have proved effective and are accepted nationwide.
This handbook supersedes the Railroad-Highway Grade Crossing Handbook, published in September 1986. This update includes a compendium of materials that were included in the previous version of the handbook, supplemented with new information and regulations that were available at the time of the

update. Updates were drawn from the current versions of relevant legislation, policy memoranda, Federal Register notices, and regulatory actions.

[4] SAFER-LC. (2021, April 21). Extended Barriers. SAFER-LC Toolbox.

Description: This webpage provides information on implementing extended barriers in Europe, including recommendations, considerations for implementation, and relevant research results.

Additional Resources

Related Measures

- Traffic channelization
- Automatic gates
- Barrier gates
- Four-quadrant gate

Images

Figure 1. Example of longer arm gate at a grade crossing in Charlotte, NC
Image Credit: Volpe Center