Measure Name: Automatic pedestrian gate

Definition: Installation of automatic pedestrian gates at active grade crossings.

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

Automatic pedestrian gate refers to the installation of separate gates along a sidewalk or pathway to block access to the grade crossing during an activation. This measure, consisting of a drive unit and a gate arm, is specifically aimed at pedestrians and other non-motorized users. The height of the gate arm when in the down position is also typically lower than that of the roadway gate arm, ranging from a minimum of 2.5 feet and a maximum of 4 feet above the sidewalk [1].

This measure is primarily a pedestrian control device that provides a dedicated warning and physical barrier to sidewalk and pathway users. The gates are mounted on a mechanism separate from the roadway gates, which prevent a pedestrian from raising the vehicular gate if they try to lift the pedestrian gate. This measure should be implemented along with pedestrian channelization to deter users from walking around the gates either onto the street or rail right-of-way [3] [4].

Additional search terms: *gate arm, barrier*

Advantages

- Automatic pedestrian gates are highly effective in protecting pedestrians of all levels of ability from entering the crossing when a train is present. [7]
- The propensity of pedestrians to be in violation of activated devices and signs while crossing the tracks decreases when crossings are equipped with pedestrian gates. [8]
- These gates provide an automatic warning and restriction when a train is approaching.

Drawbacks

- Pedestrians can walk around or under gate if no channelization is used. [3] [4]
- Vision-impaired users may have difficulty locating and using the emergency escape paths. [7]
- May be a high-cost treatment. [6]
- Gates require regular maintenance, inspection, and testing.

Notable Practices

- When an automatic gate is used at a sidewalk crossing, a separate mechanism should be provided for the sidewalk gate, instead of a supplemental or auxiliary gate arm installed as a part of the same mechanism. [1] [2]
- If a separate automatic gate is used for a sidewalk, the height of the gate arm when in the down position should be a minimum of 2.5 feet and a maximum of 4 feet above the sidewalk. [1]

- If used at a pathway grade crossing, the height of the automatic gate arm when in the down position should be a minimum of 2.5 feet and a maximum of 4 feet above the sidewalk. [1]
- If used at a pathway or sidewalk crossing, automatic gate arms should be provided with a minimum of one light as shown in MUTCD Figure 8C.6. This light should be continuously illuminated whenever the warning system is active. [2]
- If used, additional lights on the automatic gate arm should be installed in pairs and flashed alternately in unison with other flashing-light units. [2]
- Where automatic pedestrian gates are installed across pathway or sidewalk crossings, an emergency escape route should be available to provide egress away from the track area when the gates are activated. [2]
- An emergency exit route can be provided by use of a swing gate in combination with a pedestrian automatic gate. In this circumstance, the swing gate should be signed as an "Emergency Exit" on the track side and provided with a "DO NOT ENTER" (R5-1) sign on the side facing away from the tracks. [2]
- Pedestrian crossing gates should be used in conjunction with pedestrian channelization to prevent users from going around or under the down gate. [3] [4] [5]
- A second gate is required on the downstream side of the rail crossing for pedestrians approaching the crossing from the opposite direction. [6]

References

[1] Federal Highway Administration. (2012). Manual on Uniform Traffic Control Devices.

> Document Excerpt: The Manual on Uniform Traffic Control Devices (MUTCD), by setting minimum standards and providing guidance, ensures uniformity of traffic control devices across the nation. The use of uniform TCDs (messages, locations, sizes, shapes, and colors) helps reduce crashes and congestion, and improves the efficiency of the surface transportation system. Uniformity also helps reduce the cost of TCDs through standardization. The information contained in the MUTCD is the result of years of practical experience, research, and/or the MUTCD experimentation process. This effort ensures that TCDs are visible, recognizable, understandable, and necessary. The MUTCD is a dynamic document that changes with time to address contemporary safety and operational issues.

[2] 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.

[3] Chase, S., Gabree, S. H., & daSilva, M. P. (2013). Effect of Gate Skirts of Pedestrian Behavior at Highway-Rail Grade Crossing.

> Abstract: The Federal Railroad Administration was interested in evaluating one type of pedestrian safety device, commonly known as gate skirts, that consists of a secondary horizontal hanging gate under the

existing pedestrian gate to better block access to the crossing by pedestrians who gain unauthorized entry by going under the down gates. The Volpe Center participated in a New Jersey Transit rail pilot project to evaluate a prototype design installed at a grade crossing in Matawan, NJ, on May 30, 2012. The purpose of this evaluation was to determine if the addition of gate skirting would result in fewer pedestrians attempting to violate the crossing on the sidewalk after the gates began to descend. Data were collected over a 2-week period before and a 2-week period after the installation of the gate skirts. Pedestrian actions were coded during all train activations that occurred during this 4-week period. The research team found that the total number of pedestrian violations decreased while the gates were descending (78 percent reduction) and horizontal (55 percent reduction), but increased while the gates were ascending (12 percent increase). Additionally, after the installation of the gate skirts, more pedestrians who violated while the gates were descending or horizontal chose to do so in the adjacent street where there were no gate skirts, as opposed to on the sidewalk where the safety enhancement had been added.

[4] daSilva, M. (2020). Gate Skirts Research at a Highway-Rail Grade Crossing in Ramsey, NJ.

Excerpt: Results of the gate skirts design tested during this study, along with ROW fencing, indicate a positive safety benefit of this improvement. Violations were completely eliminated on the crossing's northeast quadrant after the fencing addition.

[5] Utah Department of Transportation. (2013). UDOT Pedestrian Grade Crossing Manual.

Excerpt: The information provided in this manual is a compilation of standards, conclusions, recommendations, and best practices from a variety of sources.

[6] Transportation Research Board. (2009). TCRP Report 137: Improving Pedestrian and Motorist Safety Along Light Rail Alignments.

Excerpt: TCRP Report 137: Improving Pedestrian and Motorist Safety Along Light Rail Transit Alignments addresses pedestrian and motorist behaviors contributing to light rail transit (LRT) safety and describes mitigating measures available to improve safety along LRT alignments.

[7] Victoria, Australia Department of Infrastructure. (2003). Rail Crossing Disability Access Toolkit.

Excerpt: This Toolkit presents a range of treatments for enhancing safety for people with disabilities at rail crossings.

[8] Federal Highway Administration. (2013). Pedestrian/bicyclist warning devices and signs at highway-rail and pathway-rail grade crossings.

Abstract: Federal reporting shows a relatively constant number of pedestrian and bicycle fatalities at highway-rail and pathway-rail grade crossings over the past 10 years. This is in contrast to a marked decrease in train–vehicle collisions at highway-rail crossings. Although engineering solutions and education and enforcements initiatives have been proposed and implemented, little is known about their effectiveness to mitigate such incidents. This study reports on findings from the literature, discussions with professionals in the public and private sectors involved in safety at rail grade crossings, and pedestrian/non-motorized user behavior and attitudes toward safety at such crossings. The study highlights the multitude of factors related to pedestrian safety in this context and provides an informed discussion for stakeholders to advance safety initiatives.

Additional Resources

Southern California Regional Rail Authority, "SCRRA Highway-Rail Grade Crossings Recommended Design Practices and Standards Manual", January 2021.

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

Related Measures

- Barrier gates
- Gate skirts
- Pedestrian channelization

Images

Figure 1. Example of automatic pathway gate with emergency escape gate in New Britain, CT
Image Credit: Volpe Center

Figure 2. Example of automatic pedestrian gate with emergency escape gate.
Image Credit: FRA, Grade Crossing Handbook

Figure 3. Example of automatic pedestrian gate in Ramsey, NJ
Image Credit: Volpe Center

Figure 4. Automatic pedestrian gate from Google Street View