Measure Name: Crossing illumination

Definition: Lighting to increase grade crossing visibility and discourage unsafe activity.

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

Crossing illumination refers to the installation of lighting at grade crossing locations where the risk of grade crossing violations or right-of-way (ROW) incursions is high. This includes vehicles striking the side of railroad equipment and pedestrians trespassing onto the ROW. Increased lighting is believed to decrease the risk of drivers mistakenly turning onto the tracks, risk of hitting the side of rolling railroad equipment, reduce crime, and is also consistent with law enforcement best practices [1] [5]. Although increased lighting of the entire ROW is not possible, focusing on known grade crossing hotspot locations can help to improve safety.

Lighting can be static and constantly illuminate a specific area, or it can be dynamic and activated by a sensor. Dynamic lighting can be activated at specific times, such as from sunset to sunrise, or it can be activated by motion or heat sensors. Lighting at hotspots can help enhance surveillance of an otherwise dark location and deter trespassers, and sensor-activated lighting can have an added benefit of warning individuals that they have entered a restricted area. When lighting activates, it gives the appearance of active monitoring and may cause individuals to move to a safer place. Additionally, it has been shown that individuals considering suicide on the rail network often seek seclusion [6], suggesting that making an individual more visible could help to disrupt this thinking and prevent an individual from taking action [7].

Lighting can be installed by rail carriers along the ROW, at crossings, or at stations where existing lighting is not sufficient, such as at the ends of a platform. Communities or rail carriers can also install lighting at hotspots, for example at bridges or other areas where tracks meet municipal property.

Additional search terms: *lighting*

Advantages

- Lighting may increase a motorist's ability to see rail equipment occupying the crossing. [1]
- Lighting may be effective in reducing collisions at night; as it will assist road users, including bicyclists and pedestrians, in traversing the crossing at night. [2]
- In locations with access to electricity, lighting may offer a low-cost option.
- Increased lighting may also help train operators to see and react to vehicles stuck on the tracks or individuals who are trespassing near the grade crossing by slowing the train on approach or sounding the train horn.
- Lighting can be used in a wide variety of hot spot locations throughout the rail system.
- Lighting may also increase the perception of safety in an area, which may increase customer or public satisfaction.

Drawbacks

- There is the potential for light pollution to affect nearby people and animals.
- Light levels that are too high may limit the ability for train operators to see clearly and interfere with safe train operation. Excessive brightness can cause a glare and make it difficult for train operators to adjust back to nighttime conditions.

Notable Practices

- Illumination at grade crossings should be implemented when an engineering analysis determines that better visibility of the train is needed. Factors considered are substantial railroad operations at night, slow train speeds, crossings blocked for long periods, or accident history indicating that highway users are having difficulty seeing trains or traffic control devices during hours of darkness. [2] [3]
- The lighting should illuminate passive and/or active warning devices, the pavement surface and markings, and the presence or absence of a train in or approaching the crossing. Luminaires should be aligned toward the railroad tracks instead of the roadway. [4]
- Ensure that the brightness and placement of the lighting do not impair the vision of train crews.
- Before installing new lighting or increasing the brightness of existing lighting, coordinate with nearby communities to ensure that the installation will not be disruptive.
- When considering the implementation of lighting at hotspots, it is helpful to understand the time of day (e.g., daylight/night) that trespassing tends to occur and the potential reasons behind trespassing at the hotspot location(s).

References

[1] Knable, N. (1995). The Use of Illumination of Railroad Grade Crossings to Reduce Collision Risks. U.S. Department of Transportation.

Abstract: An assessment of the requirements for illumination at a railroad grade crossing reveals two principal needs: the need to illuminate the sides of railroad cars by in-place lighting at the crossing so that they can be recognized by a motorist at a stoppable distance, and the need to provide characteristic lighting of the horizontal crossing area for the purpose of forewarning the motorist of the approach to a crossing. This paper examines the problem of determining the illumination required for recognizing railroad cars, and presents recommendations for illumination standards and compliance verification. It includes some designs, using available equipment, which can provide the necessary illumination. It also estimates the cost of lighting installations where electrical power is available and makes some observations on the utility of using stored energy packages where electric power is not available.

[2] 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.

[3] Coleman III, F. (Date unknown). *Railroad-Highway Grade Crossings: A Look Forward*. Transportation Research Board Committee on Railroad-Highway Grade Crossings.

Excerpt: Illumination at grade crossings should be implemented when an engineering analysis determines that better visibility of the train is needed. Factors considered are substantial railroad operations at night, slow train speeds, crossings blocked for long periods, or accident history indicating that highway users are having difficulty seeing trains or traffic control devices during hours of darkness.

[4] Michigan Department of Transportation. (2017). MDOT Guidelines for Highway-Railroad Grade Crossings, 2017 Edition.

Excerpt: This document provides an overview of typical practices and devices used at highway-railroad grade crossings throughout the state. These guidelines are based upon proven and sound safety management principles and are intended to ensure consistent and reasonable crossing safety determinations.

[5] Clarke, R. V. G. (2008). *Improving street lighting to reduce crime in residential areas*. U.S. Department of Justice, Office of Community Oriented Policing Services.

Excerpt: This guide is written to help community policing officers decide whether improved lighting is an appropriate response to a crime or disorder problem that might be confronting a particular neighborhood or community. It assumes that a detailed problem analysis has been conducted and that police, community and business leaders, and other stakeholders are exploring ameliorative responses, particularly improved street lighting. It explains why better street lighting can help reduce fear, crime, and disorder, and summarizes the literature on the effectiveness of better lighting. It discusses the considerations that should be weighed in pursuing this approach, suggests questions that should be asked, and lists the steps that should be followed in improving lighting. Finally, it suggests measures that can be used to assess the effectiveness of the lighting solutions that have been implemented.

[6] Debbaut, K., Krysinska, K., & Andriessen, K. (2014). Characteristics of suicide hotspots on the Belgian railway network. *International journal of injury control and safety promotion, 21*(3), 274-277.

Abstract: In 2004, railway suicide accounted for 5.3% of all suicides in Belgium. In 2008, Infrabel (Manager of the Belgian Railway Infrastructure) introduced a railway suicide prevention programme, including identification of suicide hotspots, i.e., areas of the railway network with an elevated incidence of suicide. The study presents an analysis of 43 suicide hotspots based on Infrabel data collected during field visits and semi-structured interviews conducted in mental health facilities in the vicinity of the hotspots. Three major characteristics of the hotspots were accessibility, anonymity, and vicinity of a mental health institution. The interviews identified several risk and protective factors for railway suicide, including the training of staff, introduction of a suicide prevention policy, and the role of the media. In conclusion, a comprehensive railway suicide prevention programme should continuously safeguard and monitor hotspots, and should be embedded in a comprehensive suicide prevention programme in the community.

[7] Rådbo, H., Svedung, I., & Andersson, R. (2012). Suicide and potential for suicide prevention on the swedish rail network; a qualitative multiple case study. In C. Bérenguer, A. Grall & C. Soares (Eds.), *Advances in Safety, Reliability and Risk Management*.

Abstract: Acts of suicide on railways represent a serious public health and railway safety problem. Suicides constitute about 75% of all deaths in person-train collisions in Sweden. The aim of the study is to evaluate existing police and rail administration reports on railway suicide incidents from a preventive perspective, and to identify and categorize additional preventive-oriented information. Twenty-two cases of railway suicide have been reviewed, based on regular police and rail administration reports plus observations from complementary site visits. Findings: Neither police nor rail administration reports include sufficient information to guide future safety work. Findings from site visits show that structured preventive-oriented investigation routines may add important complementary details. Relevant data on behavioural, technical and environmental circumstances facilitating railway suicide need to be collected and analyzed by those responsible on a regular basis as an integral part of their safety work.

Additional Resources

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

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Related Measures

- Risk assessment using Closed-Circuit Television (CCTV)
- Identify and monitor hotspots
- Rail corridor risk assessment
- Removal of obstructions to increase visibility
- Peripheral blinking lights

Images

Figure 1. Example of illuminated grade crossing in Ramsey, NJ
Image Credit: Volpe Center