Measure Name: Peripheral blinking lights

Definition: Lights located in the periphery to encourage driver attention to both rail approaches of a passive 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

Peripheral blinking lights are intended to increase the likelihood that drivers will look both ways when approaching a passive grade crossing. These lights are installed on the periphery of passive grade crossings where risk of driver failure to look both ways for incoming rail traffic is high [1]. When approaching a passive grade crossing equipped with just crossbucks or crossbucks with a YIELD sign, drivers should reduce speed and look both ways to make sure it is safe to cross before proceeding through the crossing. However, in a study of driver behavior on approach to grade crossings, results showed that drivers failed to look either left or right on approach to passive grade crossings approximately 35 percent of the time [2].

This measure, which could either consist of constantly flashing or traffic activated lights, has been shown to increase driver visual scanning on approach to passive crossings in several studies in Europe. A simulator study confirmed that drivers would reduce speed and increase visual scanning of the tracks on approach to a passive crossing [3]. Results from a field test of this measure confirmed the simulator results, documenting an increase in looking behavior during daytime conditions, and an even larger increase in nighttime conditions [4].

Lighting can be installed by rail carriers along the right-of-way on approach to passive crossings or by roadway authorities along the roadway approach.

Additional search terms: *illumination, drawing motorist attention*

Advantages

- Peripheral blinking lights increase probability of driver detection of an oncoming train at a passive grade crossing. [1]
- No connection to railroad circuity is needed. [1]
- Lights can be either connected to commercial power or installed in a solar-powered stand-alone configuration.
- In locations with access to electricity, peripheral blinking lights may offer a low-cost option to increase safety at passive crossings.

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. Care should be taken to direct the lights toward the approaching roadway, and not directly down the tracks.
- Lights may require regular inspection and maintenance, including vegetation control.

Notable Practices

- The position of the blinking lights should be adjusted to the respective crossing to optimize the visibility from vehicles with different heights and front vehicle structure. [1]
- Optimal application of this measure is at crossings with a crossing angle around 90 degrees. [1]
- The prototyping and testing so far involved a road sensor for motorized vehicles. With a suitable alternative sensor, this measure can also be used for pedestrians and cyclists. [1]
- Ensure that the brightness and placement of the lights do not impair the vision of train crews.
- Before installing new lights, coordinate with nearby communities to ensure that the installation will not be disruptive.

References

[1] SAFER-LC. (2022, May 23). Peripheral Blinking Lights. SAFER-LC Toolbox.

Description: This webpage provides information on implementing skirts under the crossing gates in Europe, including recommendations, considerations for implementation, and relevant research results.

[2] Ngamdung, T., & daSilva, M. (2013). Driver Behavior Analysis at Highway-Rail Grade Crossings using Field Operational Test Data – Light Vehicles. Technical Report No. DOT/FRA/ORD-13/28. Washington, DC: U.S. Department of Transportation, Federal Railroad Administration.

Abstract: The U. S. Department of Transportation's (U.S. DOT) Research and Innovative Technology Administration's (RITA) John A. Volpe National Transportation Systems Center (Volpe Center), under the direction of the U.S. DOT Federal Railroad Administration (FRA) Office of Research and Development (R&D), conducted a research study focused on collecting and analyzing data related to driver behavior at or on approach to highway-rail grade crossings. Volpe Center reviewed and coded 4,215 grade crossing events involving light vehicle drivers collected during a recent field operational test of vehicle safety systems. The data collected for each grade crossing included information about drivers' activities, driver and vehicle performance, driving environment, and vehicle location at or on approach to highway-rail grade crossings.

One of the findings of the data analysis was that, on average, drivers were likely to engage in secondary tasks 46.7 percent of the time. Additionally, results showed that drivers failed to look either left or right on approach to passive grade crossings approximately 35 percent of the time. The ultimate objective of this research study is to assess basic driver behavior at highway-rail grade crossings so as to identify potential driver education/awareness strategies that would best mitigate risky driver behavior at grade crossings.

[3] Silla, A., et al. (2019). Results of the evaluation of the pilot tests. Deliverable D4.4 of the SAFER-LC project.

Except: This deliverable collects the main results obtained from evaluations of the piloted safety measures selected in earlier phases of the SAFER-LC project. This deliverable reports the descriptions of the piloted measures, method and data to evaluate the safety effects of the selected measures, as well as the results of evaluations together with their discussion.

[4] Grippenkoven, J., et al. (2016). *PeriLight – effektive Blicklenkung am Bahnübergang*.

Abstract: International level crossing statistics reveal that the majority of level crossing accidents are caused by errors of road users. Most often attentional deficits are quoted as the main cause. Several studies show that drivers display a deficient visual search of the peripheral regions at level crossings, especially at passive level crossings. In this article, the system PeriLight is presented, as well as results of an empirical evaluation of the system. PeriLight consists of two strobe-LED flash lights, which are positioned in the periphery of the level crossing to the left and right. The pulsating lights of the system are triggered by a road-side sensor when the road user approaches the level crossing. The light stimuli draw the driver's attention to the peripheral regions of the level crossing in order to increase the probability of the detection of an approaching train.

Additional Resources

Grippenkoven, J., et al. (2015). *Gaze direction and driving behavior of drivers at level crossings*. Journal of Transportation safety & Security.

Related Measures

- Removal of obstructions to increase visibility
- LED-enhanced signage

Images

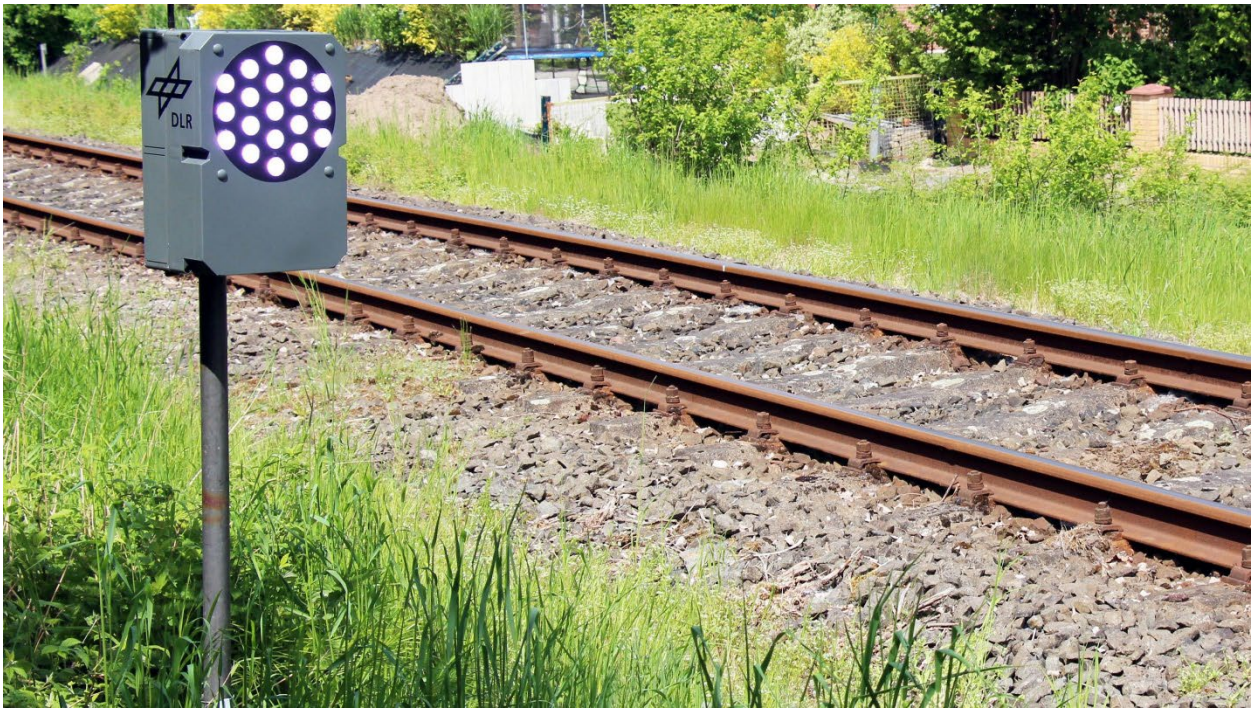

Figure 1. Example of peripheral blinking lights at a passive crossing
Image Credit: Safer-LC Toolbox