

Measure Name: Wayside horn

Definition: A stationary horn located at a grade crossing that provides an audible signal to warn crossing users of an oncoming train.

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

A wayside horn is a warning device that includes one or more horns mounted on a pole at the highway grade crossing to alert drivers and pedestrians of a train's impending arrival [1]. The horn is positioned toward roadway traffic to focus the sound away from neighboring houses near the crossing while still giving an equivalent warning of a train horn activated by the train crew. When a train approaches, the wayside horn gives the train operator a signal that the horn is operational and is about to sound. If this signal is seen by the train operator, they will not use their train horn when passing through the crossing unless it is an abnormal or risky situation such as a vehicle or pedestrian near the tracks [2]. The [Code of Federal Regulations \(CFR\) Appendix E to Part 222 Requirements for Wayside Horns](#) under Title 49 contains the minimum requirements for wayside horns at grade crossings [3].

Noise pollution is a problem in communities across the United States. Some communities with active train lines apply for a "quiet zone" which does not allow a horn to be sounded in normal conditions [1]. However, wayside horns can be used within a quiet zone when a particular crossing is not in an optimal location for a quiet zone, or as an alternative to a quiet zone when it is too costly to establish and maintain [4]. There has been success implementing wayside horns in several states where train horns have been a contentious topic in order to lower the noise to nearby neighborhoods [1][4].

Installation of the horn and related equipment can cost between \$65,000 [4] to \$500,000 per crossing [2]. Additional costs for upgraded circuitry can increase the cost of installation [2]. Ongoing costs of additional maintenance associated with the devices can amount to \$1500 to \$2500 per crossing per year. [2]

Additional search terms: *bell, sound warning, wig-wag, audible warning*

Advantages

- Wayside horns reduce noise pollution caused by both freight and passenger train horns [1], and are 10 to 25 decibels quieter in adjacent neighborhoods than locomotive-mounted horns. [4]
 - This measure may provide an alternative to establishing quiet zones in communities where the cost is prohibitive. [4]
 - Wayside horns provide a quieter alternative to train horns for surrounding communities, without compromising safety. [4]
 - Wayside horns have been accepted positively by train crews, nearby residents, and vehicle drivers. [4]
-

Drawbacks

- Crossing signal systems without constant warning time devices need to be upgraded before installing a wayside horn, as wayside horns require crossing controllers with constant warning time devices. [4]

- Coordination that includes several parties may take time to complete. Parties may include the railroad company, rail operator, local highway jurisdiction as well as the state public utilities commission, and others.
 - There are some instances where drivers have not noticed the sound from the wayside horn but did notice train-mounted horns in nearby locations. [4] This may indicate a need to focus on other safety measures at a grade crossing.
 - If a wayside horn is very loud (near 100dB) it may startle drivers, and some may inadvertently stop on the railroad tracks. [1]
-

Notable Practices

- Create an ongoing maintenance plan and conduct community outreach before and after installation.
 - Make sure to get buy in from those involved in providing permissions and financial support for a new wayside horn system and installation.
 - Choose the location carefully for installation. Locations without enough traffic volume may not see a high-cost benefit for the community. [4]
 - When a wayside horn system is used at highway-rail crossings where the locomotive-mounted horn is not sounded, the highway-rail crossings should be equipped with flashing-lights and gates, power- out indicator, and constant warning circuitry—where practical. [5]
 - Wayside horn systems should include a 3- to 5-second delay after activation of flashing-lights signals before sounding. [5]
 - Wayside horn systems, when mounted on a separate pole assembly, should be installed no closer than 15 feet from the center of the nearest track and should be positioned to not obstruct the motorists' line of sight of the flashing-light signals. [6]
 - The [Code of Federal Regulations \(CFR\) Appendix E to Part 222 Requirements for Wayside Horns](#) Under Title 49 contains the minimum requirements for wayside horns at grade crossings. [3]
 - The effectiveness of this measure can be estimated by collecting data on driver behavior at the crossing and by surveying local drivers and nearby community members before and after installation. [4]
-

References

[1] Lucke, R. E., Raub, R. A., & Thunder, T. E. (2004). Improving road safety and residential quality of life: evaluating the automated wayside horn system. *Applied Health Economics and Health Policy*, 3(2), 71–78.

Abstract: The automated wayside horn system is designed to replace the train horn as a means of alerting motorists to danger and thus enhancing safety at highway-rail grade crossings. Furthermore, the wayside horn directionality is such that the warning sound is broadcast over a smaller sector than the train horn, thereby reducing residential noise. This article examines the results of an evaluation comparing train horns with wayside horns in the village of Mundelein, Illinois, USA. The study derived from previous work in Gering, Nebraska, and Ames, Iowa. During the 3 months covering the 'before' (train horn) period and through to 'after' (wayside horn), more than 19 500 crossing gate closures were recorded on videotape at three crossings. Analysis showed motorist violation of level-crossing laws decreased 68%, from an average

FRA Grade Crossing Toolkit: Wayside horn

rate of 3.53 per 100 gate closings when train horns were in use to 1.12 per 100 with the wayside horn. The decrease was statistically significant. Of equal importance was the decrease in residential noise. Sound measurements taken in a sample of residential yards showed a decrease in sound levels by more than 10 decibels (dB) at most locations. When plotted as sound contours, decreases in the area of coverage ranged from 85% at the 90dB level to 65% at the 70dB level. However, there are two issues with the use of wayside horns that need to be resolved. First, and most important, is that the wayside horn starts sounding when the warning lights begin to flash. This startles motorists, and some stop on the rail tracks. A second issue is the frequent unwarranted activation of the system, which encourages people to ignore the gate.

- [2] City of Palo Alto. (2017). [City Council Rail Committee Staff Report: Receive and Review Rail Program Briefing Paper from March-April 2017](#).

Description: At the April 26, 2017, the City of Palo Alto Rail Committee received additional information regarding the option of Wayside Horn use as an alternative to Quiet Zone designation.

- [3] Code of Federal Regulations. (2006). [Appendix E to Part 222 – Requirements for Wayside Horns](#).

Description: Provides federal regulations for the installation of wayside horns.

- [4] Hummer, J. & Jafari, H. E. (2007). [Railroad Crossing Wayside Horn Evaluation](#), FHWA/NC/2006-36, North Carolina Department of Transportation.

Abstract: One potential solution for reducing horn noise from a locomotive is a stationary horn mounted at the crossing. This “wayside horn” is sounded in place of the locomotive horn when a train approaches and is positioned to direct the sound precisely down the intersecting roadways rather than along the track. A wayside horn can therefore operate at a lower sound level than a locomotive horn and produce less area sound exposure. The objective of this project was to evaluate a wayside horn produced by Railroad Controls Limited. We conducted the evaluation through observation of a test installation in Rocky Mount before and after wayside horn installation. Before wayside horn installation, the site had a typical array of safety devices (gates, lights, signs, and marking). The site was a nearly ideal crossing of a road with one through lane in each direction of a single track with low train volumes and speeds in a moderate density suburban area. We examined the reliability of the system and also measured sound in the area, motorist behavior, motorist opinion, area resident opinion, and train engineer opinion. Based on the results from previous studies and the results from our test, the study team concluded that the wayside horn offers significant sound relief to residents and others in the area around a crossing. The team also concluded that the wayside horn has led to slight, if any, shifts in driver behavior and opinion. Finally, the study team concluded that the wayside horn appears to be reliable and acceptable to train engineers. The team recommends that the NCDOT, other relevant agencies, and railroads continue to allow wayside horns.

- [5] 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.

[6] 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

[Code of Federal Regulations \(CFR\) Title 49 Appendix E to Part 222 Requirements for Wayside Horns](#)

Description: This appendix sets forth the following minimum requirements for wayside horn use at highway-rail grade crossings.

Related Measures

Images



Figure 1. Example of a wayside horn at a grade crossing in Escalon, CA from Google Street View

FRA Grade Crossing Toolkit: Wayside horn



Figure 2. Example of a wayside horn at a grade crossing in Meriden, CT from Google Street View

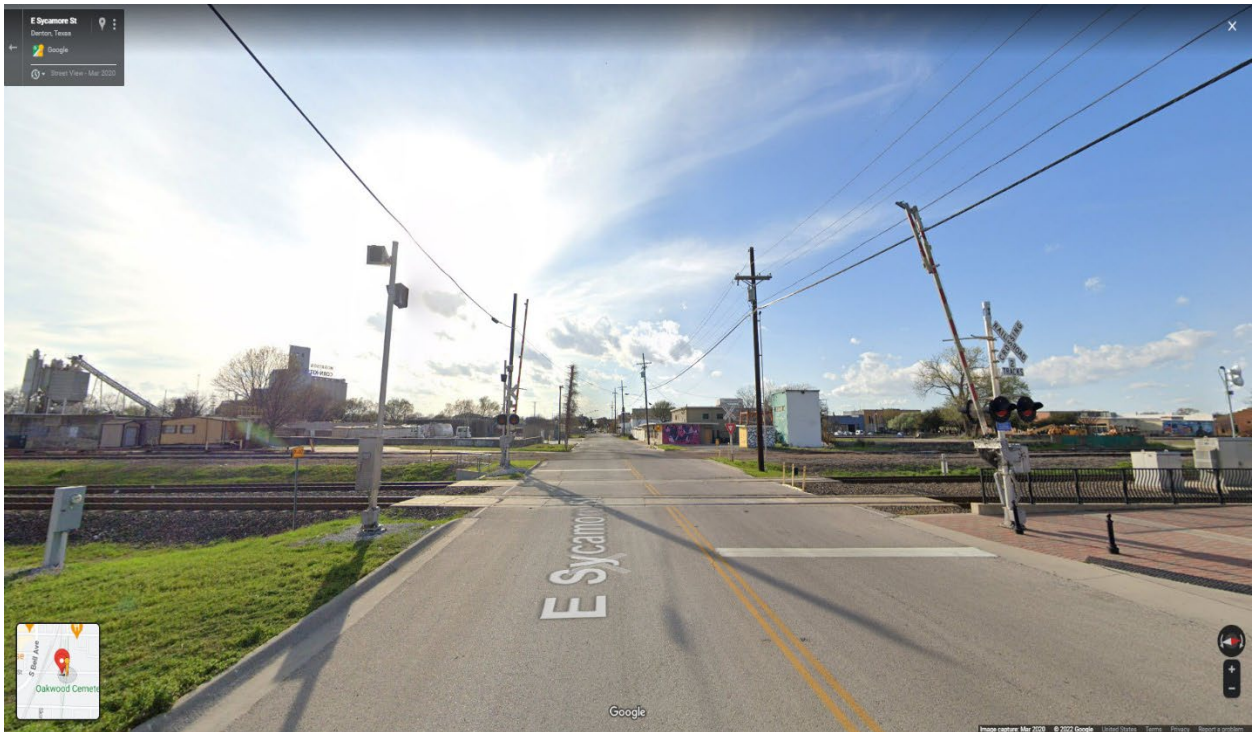


Figure 3. Example of a wayside horn at a grade crossing in Denton, TX from Google Street View