

Measure Name Right-of-way fencing

Definition Installation of fencing along the railroad right-of-way to deter unauthorized access.

Tags

Incident Type Both trespass and suicide
Location Right-of-way only
Intervention Strategy Engineering: technological and physical deterrents
Measure Group Physical barriers

Description

Right-of-way (ROW) fencing aims to prevent pedestrians from entering the railroad ROW. The goal is to prevent vandalism, restrict pedestrians from using the ROW as a shortcut between destinations, and deter individuals from intentionally entering the path of an oncoming train. This measure is most effective when combined with other measures such as signage or detection systems. The signage should include prohibitive signs as well as wayfinding signs to direct pedestrians to legal crossing areas.

Fencing the entire U.S. rail network is not economically feasible. Therefore, fencing should be installed strategically using comprehensive hazard analyses that include all relevant sources of trespassing information; this information includes data on past trespass and suicide casualties, debris strikes, trespass observations, presence of homeless encampments, and locations where fencing has been breached in the past [1]. The presence of nearby schools, parks, high-traffic commercial establishments, and other spaces that can attract pedestrians should also be considered.

The type of fencing can range from basic fencing solutions such as standard chain link fence to bollard-enforced, expanded metal, high-security fencing. The most appropriate choice depends on a variety of factors, including cost, existing policy, community impact, needs assessment and potential for success [1]. There may be ways to augment each type of fencing to reduce the potential for vandalism and increase the effectiveness of it as a deterrent, including the addition of vegetation (e.g., bougainvillea, a thorny ornamental vine) [2].

The table below provides strengths and weaknesses of the most commonly used options for fencing choice [1].

Fencing System	Strengths	Weaknesses
Standard Chain Link	Low to medium cost, Ease of configuration	Easily cut, easily scaled
Intertrack	Low to medium cost, Ease of configuration	Easily cut, easily scaled
Welded-Wire	Medium to higher cost, Ease of configuration, Smaller mesh makes scaling difficult	Easily cut
Expanded Metal	Difficult to cut, Difficult to scale, Low maintenance cost	Higher initial cost

A 2011 empirical study from Finland investigated the effects of fencing on railroad trespasser activity and found a 94.6 percent reduction in the number of trespassers following the installation of fencing [3].

A 2023 study in Australia looked specifically at the impact of fencing on rail suicide rates and found the length of the fencing to be a critical factor [4]. Only fencing that was longer than 100 meters was found to be effective at reducing suicide rates. Locations with fencing less than 100 meters found no difference in the number of suicides within 1000 meters of the fencing location, however, a 57 percent reduction was found when the fencing was at least 100 meters in length.

Additional search terms: *chain link, barrier, deterrent, fence, ROW*

Advantages

- Fences are effective in reducing the number of people that trespass onto railroad ROW [3].
 - Fences clearly define the boundary line between public and restricted areas, thus providing law enforcement with a clear indication of whether an individual is trespassing or not.
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Drawbacks

- Fencing is relatively expensive to install and requires periodic maintenance.
 - In some cases, fencing may not eliminate the problem with trespassers, but rather may shift trespassers to nearby unfenced area accidentally diverting them to another unfavorable location to cross the tracks. [5].
 - Determined trespassers may find a way to defeat fencing (cut, climb, or knock over).
 - Potential for neighborhoods along the tracks to become closed off from the rest of the community.
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Notable Practices

- Fencing should be designed to prevent trespassing from all directions: over, around, under, and through [1].
- Paint or grease may be applied to the fence to discourage individuals from trying to climb over.
- A comprehensive hazard analysis should be conducted when planning fencing installation. This includes considering all relevant sources of trespassing information, such as past trespass and suicide casualties, debris strikes, trespass observations, presence of homeless encampments, and locations where fencing has been breached in the past [1].
- Consider designing fencing to redirect potential trespassers to the nearest legal pedestrian crossing.
- When installing fencing, always make sure the design does not trap individuals in the right-of-way [5].

- Review local ordinance and code requirements during the design phase to make sure that the fencing system meets the requirements [6].
- Consider adding entry gates along the fence for railroad workers to access the railroad ROW [7].
- Ensure that there are escape routes for train passengers during emergency evacuation [7].
- Ensure that fencing on electrified lines (e.g., third rail, overhead line electrification) is earthed [7].
- Fences should be at least 1600 feet (500 meters) and installed on both sides of the tracks to reduce the potential for trespassing to be displaced to neighboring areas [7].
- Build a cooperative relationship with local communities to establish community support and understand individual community needs and concerns [1].
- When installing fencing in a residential area, ensure that there is a safe, legal crossing location nearby for pedestrians to access destinations on the opposite side of the tracks.

References

[1] Stanchak, K., Foderaro, F., and DaSilva, M. (2015). [High-Security Fencing for Rail Right-of-way Applications: Current Use and Best Practices](#). Technical Report No. DOT/FRA/ORD-15/38. Washington, DC: U.S. Department of Transportation, Federal Railroad Administration.

Abstract. The Volpe Center investigated how high-security fencing is used to prevent right-of-way (ROW) trespassing at several urban transit and commuter rail agencies in the United States. Interviews, operations documentation, and site visits were used to gather information for this research, and it was found that the best high security fencing installations do the following: 1) prevent trespassing in all directions, i.e., over, under, and around; 2) are strategically placed in locations determined through rigorous hazard analysis and have community support; and 3) are part of a comprehensive railroad fencing program.

[2] Meade, J. (2024). Trespassing and suicide prevention efforts along the Brightline Corridor. Presentation at the workshop for Grade Crossing Safety and Railroad Trespass Prevention. Piscataway NJ.

Presentation description: In some fenced locations along their system, Brightline has added certain flowering thorny vines to the fences to deter vandalism. Initial impression is that this has worked quite well.

[3] Silla, A. and Luima, J. (2011). [Effect of three countermeasure against the illegal crossing of railway tracks](#). *Accident Analysis & Prevention*. Volume 43, issue 3, 1089-1094

Abstract: This study was designed to investigate the effects of three countermeasures – landscaping, building a fence and prohibitive signs – on the frequency of trespassing, which in this case means crossing the track at places where it is forbidden. At each location the official route was no more than 300 m away. The main results showed that the effect of each countermeasure on the frequency of trespassing was statistically significant. Specifically, the fencing reduced trespassing by 94.6%, followed by landscaping

(91.3%) and prohibitive signs (30.7%). The majority of illegal crossings were committed alone and the persons trespassing were mostly adults and men. In addition, the results demonstrated some tendencies of how the effects of the selected countermeasures can vary with the characteristics of the trespassers. The main implication of this study is that the building of physical barriers such as landscaping or fencing is recommended for reducing trespassing. However, if the required resources are not available or the site is not suitable for such measures, the use of prohibitive signs is recommended. Further, there is a need to tailor the countermeasures to the characteristics of the trespassers in order to ensure that the most appropriate countermeasures are applied.

[4] Clapperton, A., Dwyer, J., Spittal, M., & Pirkis, J. (2023). [The effectiveness of installing trackside fencing in preventing railway suicides: a pre-post study design in Victoria, Australia](#). *Injury prevention*, 29(6), 525-527.

Document Summary: Our study adds to knowledge about restricting access to means in the railway environment by examining the effectiveness of the installation of trackside fencing, and in particular, by examining whether differences in effectiveness exist depending on the length of the fencing installed. We identified a 57% reduction in suicides if the fencing was at least 100 metres long.

[5] Warner, J. E., Lee, D., Trueblood, A. B., Cline, J. C., Johnson, N. A., & Christjoy, A. (2022). Strategies for deterring trespassing on rail transit and commuter rail rights-of-way, volume 1: Guidebook. *Washington, D.C: The National Academies Press*.

Objective: This guidebook is intended to provide information on strategies to deter trespassing on rail transit and commuter rail exclusive and semi-exclusive rights-of-way, including within station areas outside designated pedestrian crossings. In general, trespassing is accessing rail transit and commuter rail restricted areas without permission or proper authorization, intentionally or unintentionally. The guidebook documents the extent of trespassing in the United States; existing decision-making guidance that agencies can utilize; causes, consequences, and risks associated with trespassing; mitigation countermeasures to reduce trespassing risks; and tools that agencies can utilize to identify possible mitigation strategies for a particular trespassing problem or concern.

[6] American Public Transportation Association. (2009). [Fencing Systems to Control Access](#). Washington, DC.

Abstract: This Recommended Practice provides guidance for the installation of fencing systems to control access to areas under the jurisdiction of a transit agency.

[7] RESTRAIL. (2016, April 29). [9.1 Fencing at hotspots](#). Restrail Toolbox.

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

Additional Resources

U.S. Department of Defense. (1993). [Military Handbook: Design Guidelines for Security, Fencing, Gates, Barriers, and Guard Facilities \(MIL-HDBK-1013 10\)](#).

Abstract: This military handbook, MIL-HDBK-1013/10, provides the latest state-of-the-art criteria for security fencing, gates, barriers, and guard facilities and is primarily intended for use by Naval Facilities Engineering Command (NAVFACENGCOM) design engineers and architectural and engineering firms. The

contents cover specific criteria to be used during the selection, design, and construction of security fencing, gates, barriers, and guard facilities.

Related Measures

- Anti-trespass panels
- Grade separation
- Identify funding opportunities
- Incident cost estimation
- Landscaping treatments to restrict access
- Physical barriers at bridges