Measure Name: Pedestrian channelization

Definition: Installation of fencing, bedstead barriers, bollards, short posts with chains, landscaping, or oversized ballast on a sidewalk approach to a grade crossing to increase pedestrian safety.

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

Pedestrian channelization refers to the installation of safety treatments primarily designed to keep pedestrians on the sidewalk on approach to a grade crossing. These include fencing, bedstead barriers, bollards, short posts with chains, landscaping, and oversized ballast. Implementing these treatments in an offset pattern creates a "maze", forcing users to slow down and look both ways when approaching a crossing [1]. Another configuration known as Z-crossing is designed to turn pedestrians towards the oncoming rail traffic to get them to look in that direction before they cross.

The installation of pedestrian channelization devices at crossings with automatic gates provides a visual and physical barrier to deter pedestrians from circumventing the gate arms. The installation of a maze or Z-crossing pattern forces pedestrians to look in the direction of oncoming trains before they cross, which is especially important at passive crossings. Studies conducted at locations with pedestrian channelization installed showed positive changes in pedestrian behavior because of the treatments [2] [3].

Additional search terms: *fencing, barriers, offset crossing, Z-crossing, zig-zag, Z-gate, bedstead barriers, oversized ballast, railing, landscaping, chicane*

Advantages

- Pedestrian movements are channelized to designated engineered crossing locations that provide warnings and controls designed for pedestrian use. [1]
- Pedestrian and bicyclists are slowed down on approach to the crossing. [4]

Drawbacks

- Pedestrian barriers are less effective where trains operate in both directions in single or double-track territory because pedestrians may be looking the wrong way in some instances. [1]
- Standard configuration Z-crossings are not suitable for single- or double-track locations where trains operate in both directions on a regular basis. [1]
- Pedestrian channelization treatments may require regular inspection and maintenance.

Notable Practices

- Current practice used by commuter rail and transit extends fencing 50 to 100 feet back from designated pedestrian crossings to direct pedestrians to the crossing. [1]

- Where fencing is used, the height should be reduced to 3.5 feet maximum within 100 feet of the crossing to avoid restricting sight distance. [1]
- Pedestrian barriers should be designed to permit the passage of wheelchairs and power-assisted mobility devices, and if bicycles are permitted, to permit the passage of dismounted bicyclist with tandem bicycles or bicycles with trailers. [1]
- Agencies that plan on using fencing extensively need to plan on performing regular maintenance to maintain effective channelization as well as a pleasing appearance to the area. [5]
- Ensure installed measures do not block or impede maintenance access to railroad signal devices. [8]
- Sufficient right-of-way width is needed to construct the fencing in compliance with Americans with Disabilities Act (ADA) guidelines. [4]
- Fence heights should be greater than 4 feet, and preferably 8 feet, high to act as a significant barrier to pedestrians and prevent trespassing onto the rail right-of-way. [6]
- Chain link fencing is not recommended because the higher cost of its maintenance and lower vandal resistance, compared to other types of fencing. [6]
- Consider using barriers to reduce spacing to force bicyclists to walk their bicycles across the tracks but should have enough space for wheelchairs to maneuver. [7]
- Landscaping may take a few years before it becomes an effective channelization measure. [8]
- Landscaping must be maintained so it does not impede the visibility of any warning devices or signage by road users or railroad personnel. [8]

References

[1] 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.

[2] 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.

[3] University of Illinois at Chicago. (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.

[4] 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.

[5] US Department of Transportation Federal Railroad Administration. (2008). Compilation of Pedestrian Safety Devices In Use at Grade Crossings.

Excerpt: The FRA has worked to gather information on any signs, signals, pavement markings, or other devices used to enhance the safety of pedestrians at grade crossings. State DOTs and rail transit operators have made several submissions, which have included background information and illustrations. These are presented here so that the larger grade crossing safety community might benefit from the work of others in this important area.

[6] California Public Utilities Commission. (2008). Pedestrian-Rail Crossings In California.

Excerpt: This document reviews design and placement of warning devices that are currently used at pedestrian-rail at-grade crossings in California.

[7] 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.

[8] 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.

Additional Resources

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.

Related Measures

- Automatic pedestrian gates
- Anti-trespass panels
- Rock treatments to restrict access

Images

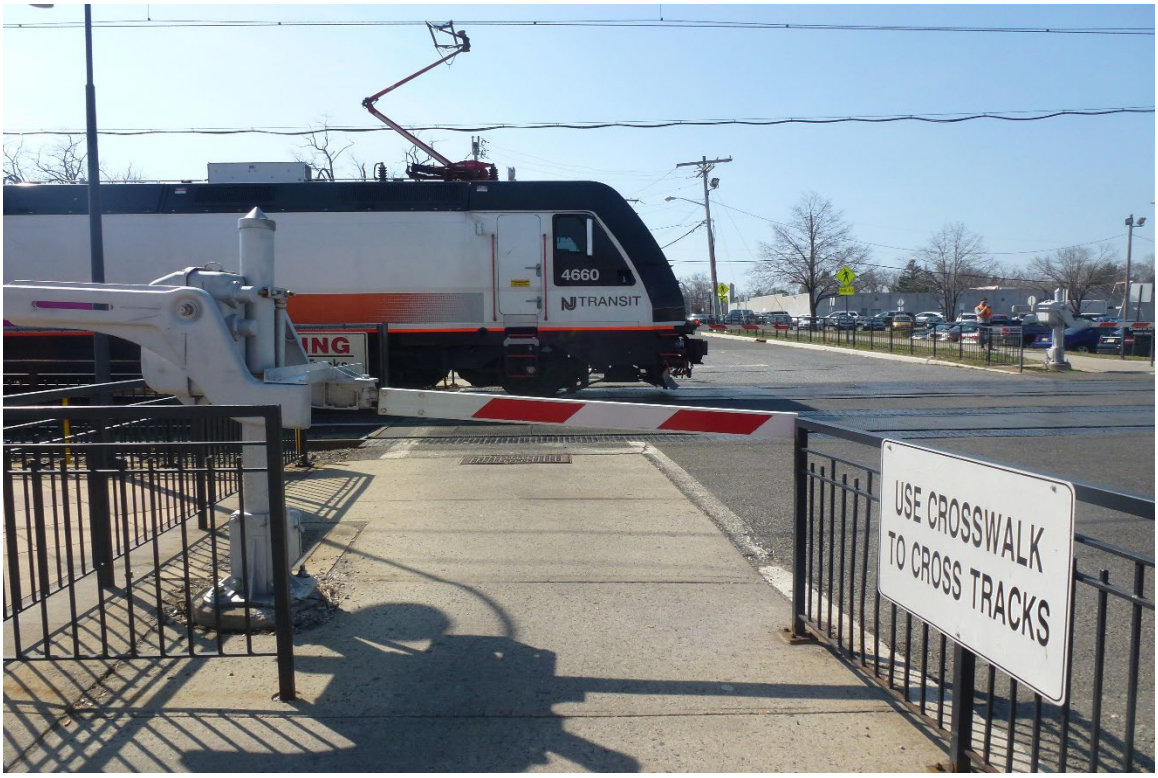

Figure 1. Example of pedestrian channelization at a grade crossing in Matawan, NJ
Image Credit: Volpe Center

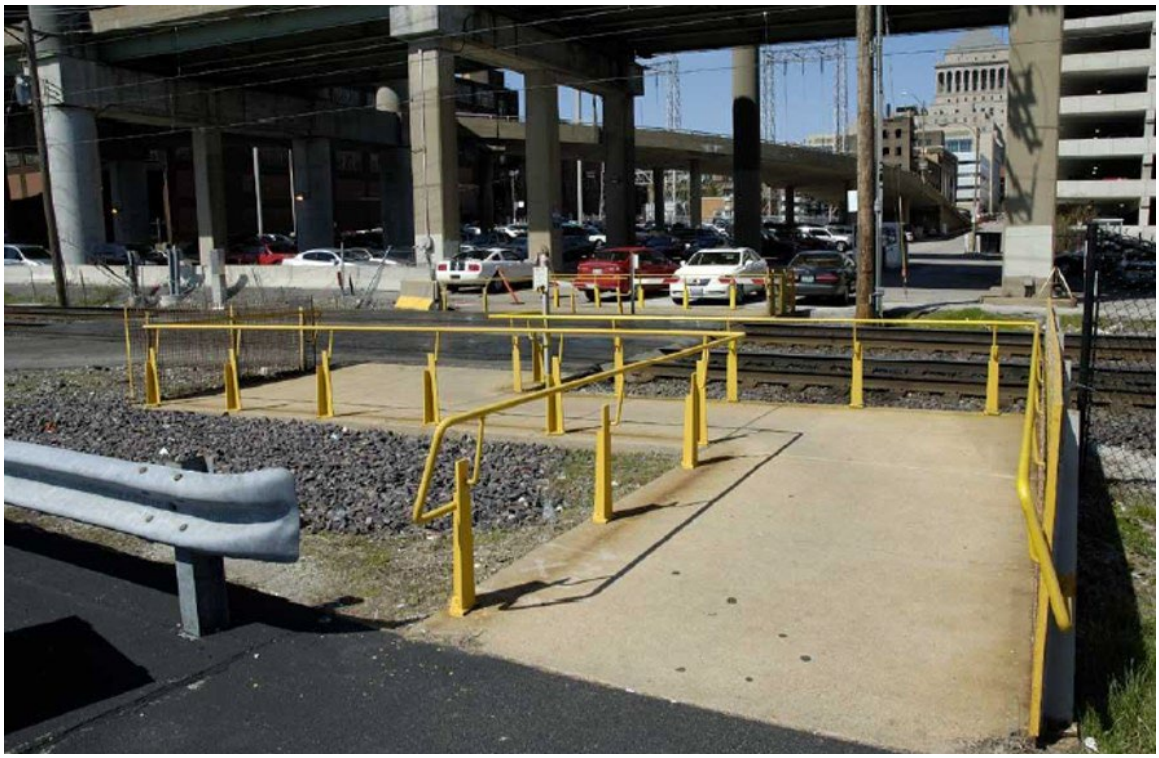

Figure 2. Example of pedestrian channelization
Image Credit: FRA, Compilation of Pedestrian Safety Devices In Use at Grade Crossings

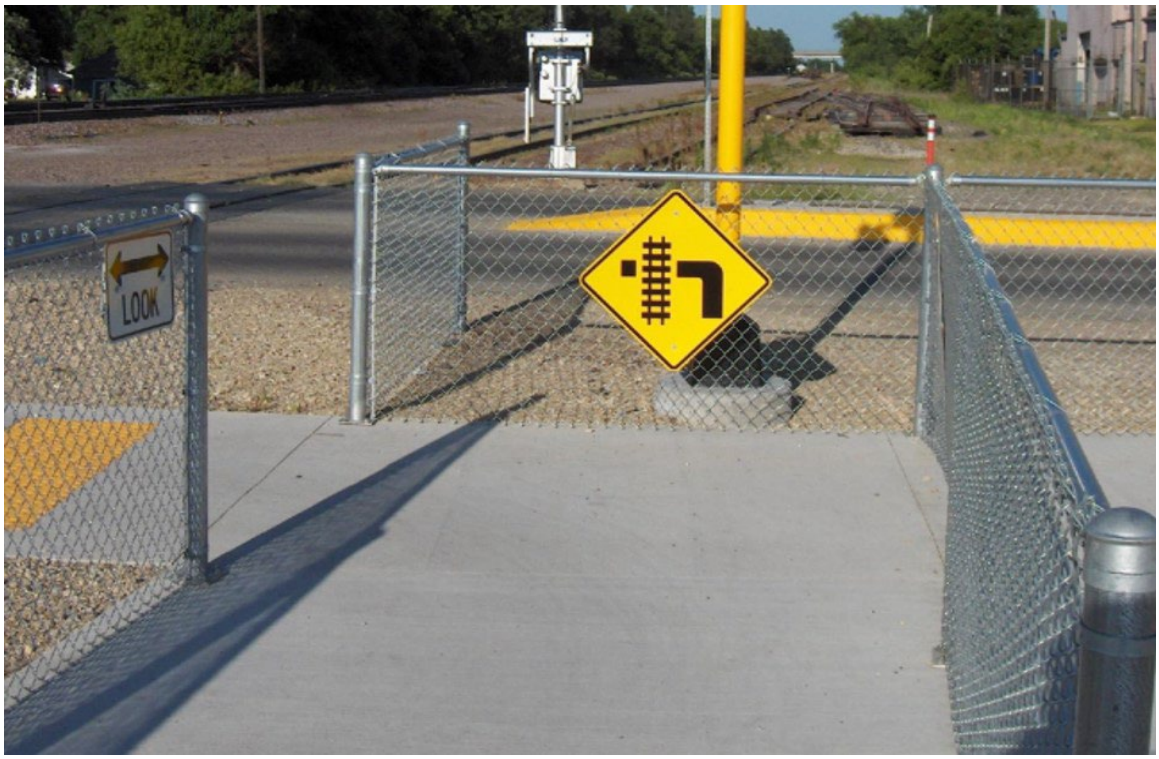

Figure 3. Example of pedestrian channelization
Image Credit: FRA, Guidance on Pedestrian Crossing Safety at or near Passenger Stations, 2012

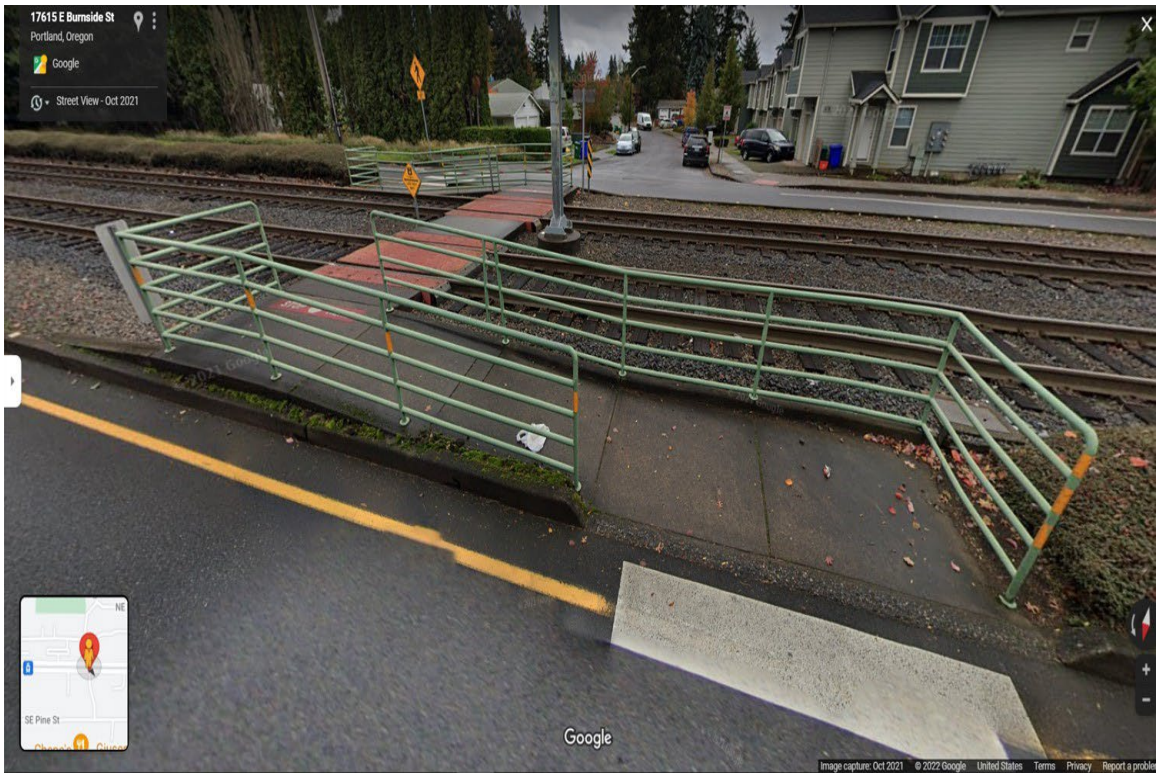

Figure 4. Example of pedestrian channelization from Google Street View

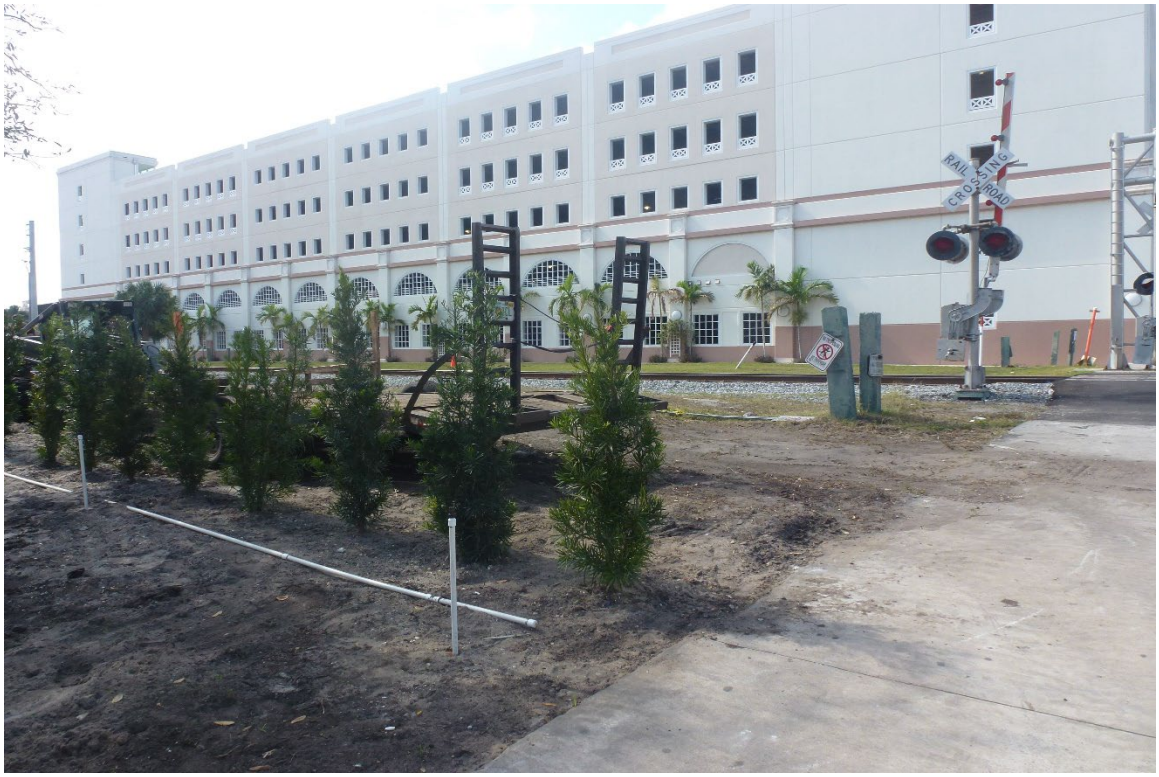

Figure 5. Example of pedestrian channelization using landscaping in West Palm Beach, FL
Image Credit: Volpe Center

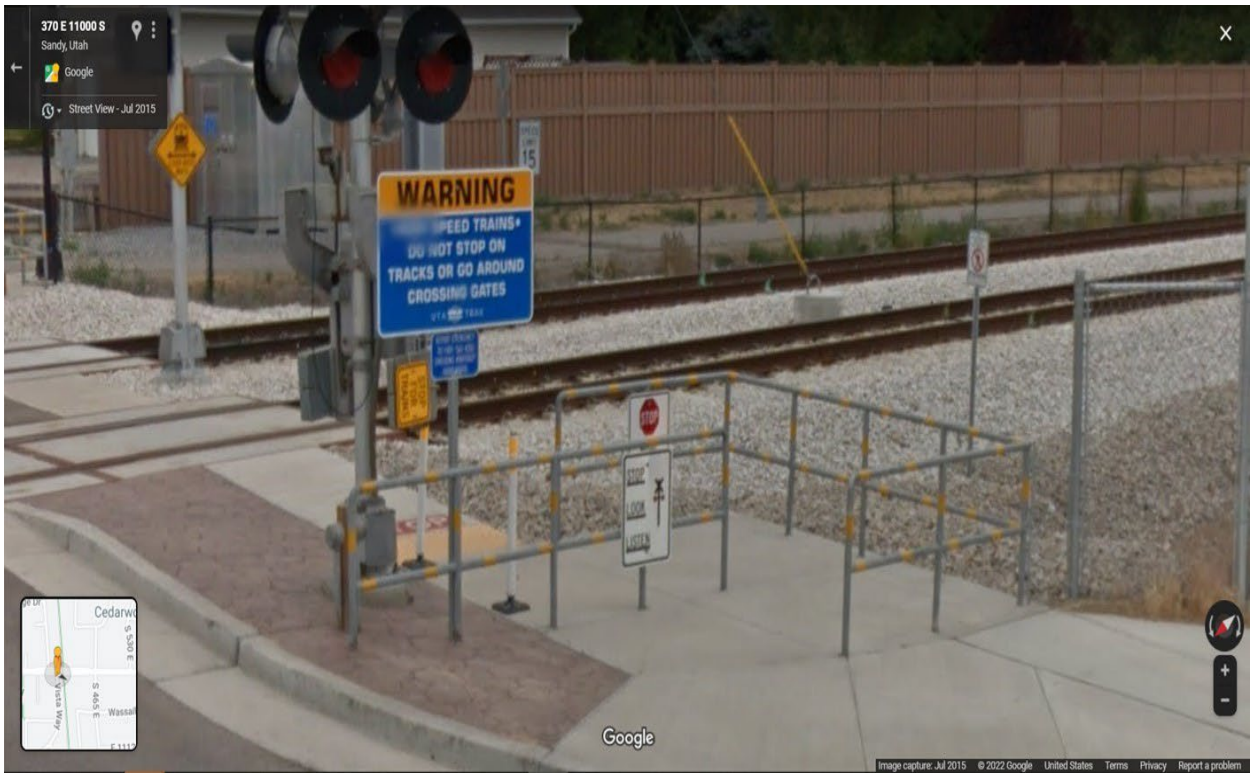

Figure 6. Example of pedestrian channelization from Google Street View

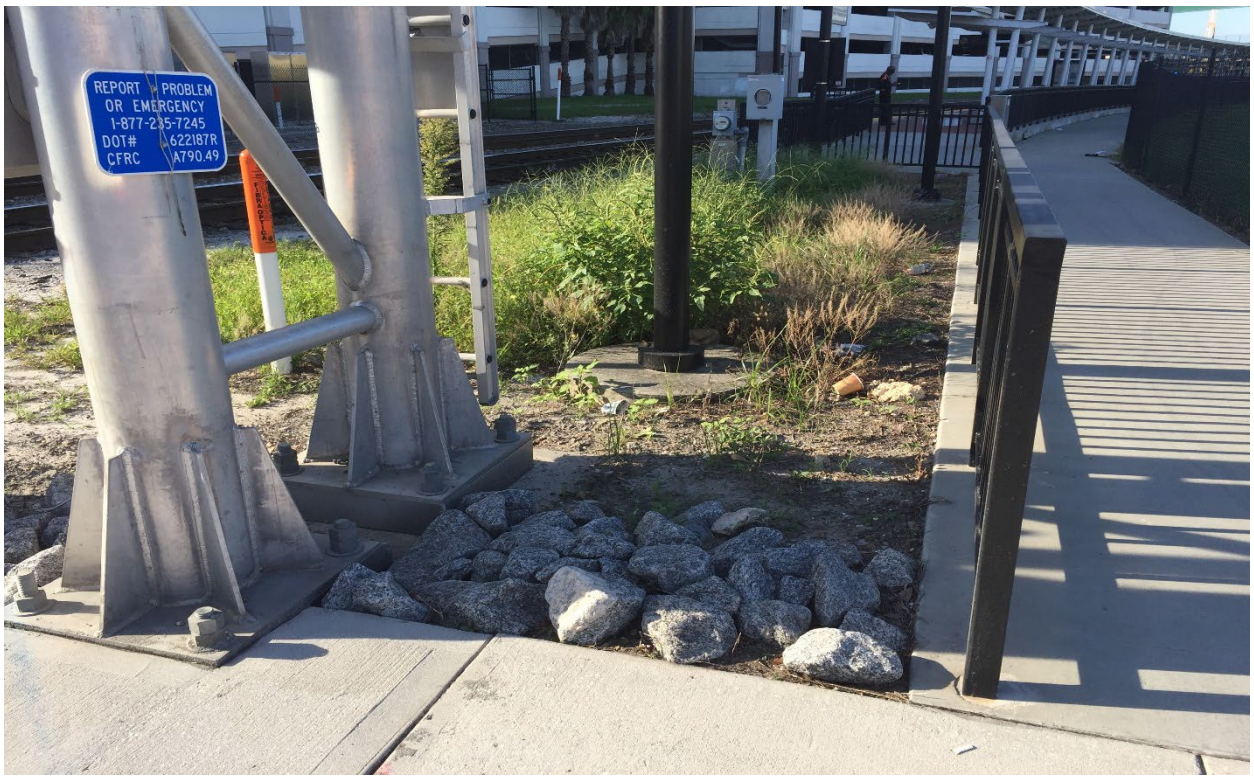

Figure 7. Example of pedestrian channelization using oversized ballast at a grade crossing in Orlando, FL
Image Credit: Volpe Center