

# Chapter 11: Schools near Railroad Crossings

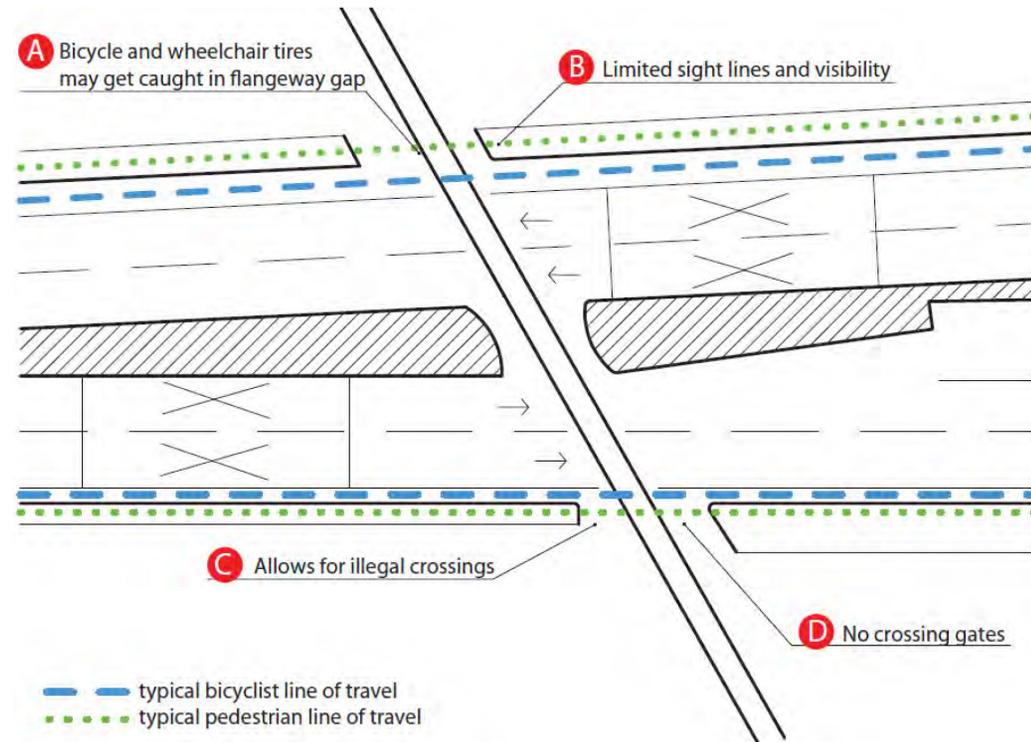


There are over 1,000 miles of light and commuter railroad tracks and 2,400 miles of freight railroad tracks crisscrossing New Jersey. These tracks run throughout the state, in major cities, small towns, residential and commercial areas and near parks and schools. Almost 44% of the 3,765 schools in New Jersey are located within a half mile of either active freight or passenger rail. Many students attending the 1,644 schools located within a half mile of an active rail line must cross rail tracks while walking or bicycling to and from school.

## Common Issues at Railroad Crossings

Common issues at railroad-highway grade crossings include:<sup>1</sup>

- A. Bicyclists and pedestrians in wheelchairs may catch a wheel in the flange way gap if the crossing is not perpendicular to the roadway.
- B. Limited sight lines and visibility may not allow pedestrians and bicyclists to see approaching trains.
- C. Some pedestrians cross tracks illegally.
- D. Crossing gates for pedestrians or bicyclists may not be provided.



Graphic: Caltrans, *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians*

<sup>1</sup>California Department of Transportation (Caltrans), *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians* (2010). [www.dot.ca.gov/hq/traffops/engineering/investigations/docs/intersection-guide-bicycles-pedestrians.pdf](http://www.dot.ca.gov/hq/traffops/engineering/investigations/docs/intersection-guide-bicycles-pedestrians.pdf)

## Safety at Highway-Grade Pedestrian Crossings

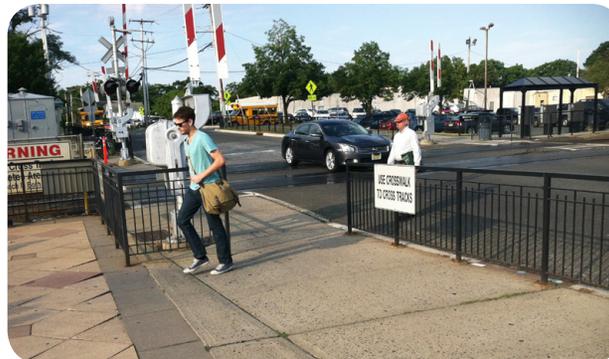
A wide variety of passive and active devices may be used to supplement highway-related active control devices to improve pedestrian and bicyclist safety at highway-rail crossings. All pedestrian and bicyclist facilities should be designed to minimize crossing time, and devices should be designed to avoid trapping pedestrians and bicyclists between sets of tracks. The following devices should be considered at crossings within school zones as well as areas with high pedestrian traffic volumes, high train speeds, frequent rail service, extremely wide crossings, complex highway-rail grade crossing geometry, inadequate sight distance, and/or multiple tracks.

### Passive Traffic Control Devices

Passive traffic control devices do not indicate the approach or presence of a train. Rather, their purpose is to identify and direct attention to the location of a crossing and provide static messages of warning or guidance to permit drivers and pedestrians to take appropriate action. Passive traffic control devices consist of regulatory signs, warning signs, guide signs, and supplemental pavement markings.

Passive devices include:

- **Sidewalks** should lead pedestrians to designated railroad crossings. Lack of sidewalks at rail crossings can be hazardous to pedestrians. This often results in pedestrians either walking over the rails outside the paved crossing, which could result in tripping, or walking in the roadway which presents the risk of collision with roadway traffic.
- **Fencing** and other barrier materials, such as landscaping, are recommended by the Federal Railroad Administration (FRA) to funnel pedestrian traffic to the desired crossing point where grade crossing warning devices are located.



Fencing at NJ TRANSIT's Aberdeen-Matawan Station.  
Image: The RBA Group



Example of a clear, concise warning message communicated by this pavement marking. Image: FRA, *Guidance on Pedestrian Safety at or Near Passenger Stations*

- **Pavement markings** can be used effectively to remind pedestrians of the need to be aware of trains approaching on any track and in either direction. When pavement marking messages are used, FRA recommends that the pavement marking should extend the full width of the pathway or sidewalk, so as to maximize the conspicuity and applicability of the warning message.

- **Swing gates** (sometimes used in conjunction with flashing lights and bells) alert pedestrians to the tracks they will cross and force them to pause. Swing gates deter people from continuing unimpeded across the tracks without unduly restricting their ability to exit from the railroad right-of-way. The swing gate requires pedestrians to pull the gate to enter the crossing and push the gate to exit the protected track area; therefore, a pedestrian cannot physically cross the track area without pulling and opening the gate. It is recommended that the gates be designed to return to the closed position after the pedestrian has passed. Swing gates should be supplemented with proper signage mounted on or near the gates.

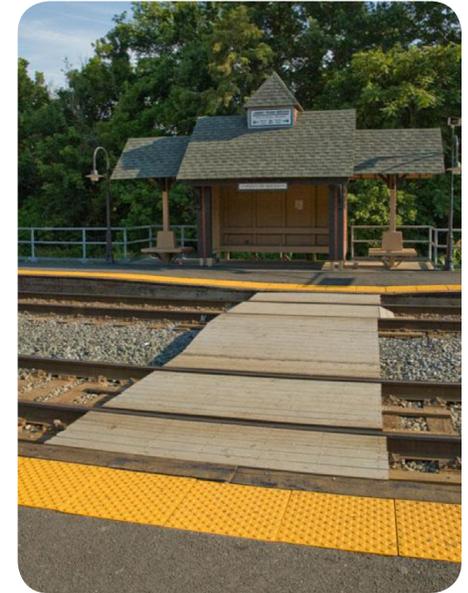


Example of a swing gate. Image: California Public Utilities Commission, *Pedestrian-Rail Crossings In California*



An emergency exit swing gate is used in conjunction with an automatic pedestrian gate. It is designated for use only as an escape route for a pedestrian that remains between the track and a lowered automatic pedestrian gate. Image: FHWA

- **Detectable warnings** consisting of raised, truncated domes that comply with ADA Accessibility Guidelines (ADAAG) should be installed at pedestrian crossings on either side of the tracks to indicate to a pedestrian when they have entered and exited the track area. A detectable surface in advance of the crossing provides warning to visually impaired individuals of the presence of a crossing. The detectable warning should extend 24 inches in the direction of travel covering the full width of the designated pedestrian pathway.



Example of visually contrasting surface materials at a pedestrian crossing. Image: FRA, *Guidance on Pedestrian Safety at or Near Passenger Stations*

- **Standard Signs** notify pedestrians and bicyclists of regulations and provide warning and needed guidance at crossings. According to the MUTCD, the minimum mounting height for post-mounted signs on pathways is four feet (Section 8D.03). At light rail crossings used by school children, NJDOT has installed lowered warning signs (at three and a half feet) along with signs at the regular height.<sup>2</sup>

#### Examples of MUTCD Standard Signs



R15-1

The Grade Crossing (R15-1) sign, commonly identified as the Crossbuck sign, requires road users to yield the right-of-way to rail traffic at a grade crossing. At a minimum, one Crossbuck sign shall be used on each approach to every highway-rail grade crossing, alone or in combination with other traffic control devices.



R15-2P

If automatic gates are not present and if there are two or more tracks at a grade crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) plaque.



R15-8

At grade crossings, the LOOK (R15-8) sign may be mounted as a supplemental plaque on the Crossbuck support, or on a separate post in the immediate vicinity of the grade crossing on the railroad or light rail track (LRT) right-of-way.

<sup>2</sup> Metaxatos, P., & Sriraj, P. S. (2013). *Pedestrian/bicyclist warning devices and signs at highway-rail and pathway-rail grade crossings*. Informally published manuscript, University of Illinois, Chicago, IL, Retrieved from [www.utc.uic.edu/research/projects/GradeCrossingSafety.html](http://www.utc.uic.edu/research/projects/GradeCrossingSafety.html)

- **Nonstandard Signs**– There is a wide variety of nonstandard signage in use near stations and along the railroad right-of-way. These nonstandard signs are intended to discourage pedestrians from trespassing on the railroad right-of-way, encourage pedestrians to utilize designated crossing points, and warn pedestrians of the possibility that trains may be approaching.



Example of a nonstandard sign in Garfield, NJ. Photo also shows how the sidewalk leads pedestrians up to the designated, desired crossing point. Image: The RBA Group

## Younger Pedestrians

Studies have found that younger pedestrians are more likely to pay attention to active signs (flashing lights and gates that activate or change upon the approach or presence of a train)<sup>3</sup> while older pedestrians notice passive signs more frequently (signs, pavement markings and other devices that do not indicate the approach or presence of a train). Another study examining violations at gated highway-rail grade crossings found that children younger than eight years old were more likely to violate gated highway-rail grade crossings and cross in the absence of older children and adults. However, the presence of more people increased the likelihood of a violation for individuals older than eight years old.<sup>4</sup>

<sup>3</sup> Metaxatos, P., & Sriraj, P. S. (2013). *Pedestrian/bicyclist warning devices and signs at highway-rail and pathway-rail grade crossings*. Informally published manuscript, University of Illinois, Chicago, IL, Retrieved from [www.utc.uic.edu/research/projects/GradeCrossingSafety.html](http://www.utc.uic.edu/research/projects/GradeCrossingSafety.html)

<sup>4</sup> Khattak A., and Z. Luo (2010). *Pedestrian and Bicyclist Violations at Highway-Rail Grade Crossings*. Transportation Research Board Annual Meeting, Paper 11-1443. <http://trb.metapress.com/content/vph5x824407160x8/>

### Active Traffic Control Devices

Active traffic control devices inform pedestrians, bicyclists and motorists of the approach or presence of a train. Audible and visual warnings should be used at or near passenger stations, where appropriate, to guide pedestrians to proper crossing points and also to indicate when it is appropriate to cross the tracks in order to get to the correct station platform to board the desired train.

Active devices include:

- A **flashing light signal assembly** can be used in conjunction with entry/exit swing gates or alone. An **audible warning device** (mechanical or electronic bell) is required with a flashing light signal assembly warning device. The audible warning device is sounded while the warning device (flashing light signals) is activated to provide notice to pathway users and bicyclists. Flashing-light signals shall operate for at least 20 seconds before the arrival of any rail traffic (MUTCD Section 8C.08).

Figure 8C-4. Example of Flashing-Light Signal Assembly for Pedestrian Crossings

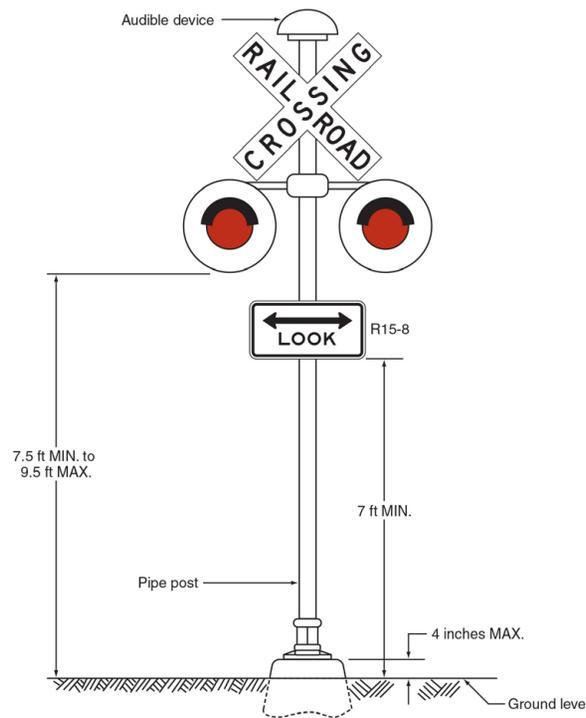


Image: MUTCD

## Railroad – Highway Engineering Standards and Guidelines

FHWA's *Railroad-Highway Grade Crossing Handbook* (2007) provides guidance on pedestrian crossings. Additional guidance is provided by the MUTCD (USDOT/FHWA 2009b, Part 8), and Code of Federal Regulations 49. Crosswalks at intersections where pedestrians cross light rail tracks in mixed-use alignments are covered by the provisions of MUTCD Section 3B.18 rather than by the provisions of Chapter 8. New Jersey follows the MUTCD and FHWA's *Railroad-Highway Grade Crossing Handbook* for engineering standards and guidelines.

- A **pedestrian gate** is an automatic gate that offers an active, positive barrier to discourage pedestrians from entering the rail right-of-way during train movements. When used at pedestrian-rail at-grade crossings, each automatic gate should be approximately three feet above the pathway when in the horizontal position. NJ TRANSIT is currently evaluating the effectiveness of “gate skirts,” which create an additional barrier below an activated grade-crossing gate to deter pedestrians from “ducking” under. Gate arms should be fully retro-reflectorized on both sides and should have vertical stripes alternately red and white at 16-inch intervals measured horizontally.

In the normal sequence of operation, unless constant warning time detection or other advanced system requires otherwise, the flashing-light signals and the lights on the gate arm (in its normal upright position) shall be activated immediately upon detection of approaching rail traffic. The gate arm shall start its downward motion not less than 3 seconds after the flashing-light signals start to operate, shall reach its horizontal position at least 5 seconds before the arrival of the rail traffic, and shall remain in the down position as long as the rail traffic occupies the grade crossing. When the rail traffic clears the grade crossing, and if no other rail traffic is detected, the gate arm shall ascend to its upright position, at which point the flashing-light signals and the lights on the gate arm shall cease operation (MUTCD Section 8C.04).



Students waiting behind a pedestrian gate to cross the tracks in Garfield, NJ. Image: The RBA Group



Pedestrian gate with “gate skirt” being tested at the Aberdeen-Matawan Train Station. Image: The RBA Group

## Spotlight: “Another Train Coming” Warning System at Plauderville Rail Station in Garfield, NJ

In September 2012, NJDOT and NJ TRANSIT installed the “Another Train Coming” warning system at the Outwater Lane grade crossing adjacent to the Plauderville Rail Station as part of a pilot safety program.

The warning system consists of active signs in all four quadrants of the rail crossing, with an LED text message that reads, “DANGER, Another Train Coming,” as well as an audio component that repeatedly sounds the same message. The “Another Train Coming” warning system is activated whenever two trains are in the immediate vicinity of the crossing. For example, if one train is already in the station, and another is approaching on the other track (out of view), the system will provide a warning to pedestrians who might consider crossing the tracks illegally with the gates in the down position. The system reinforces the fact that just because one train is leaving the station

does not mean it is “safe” to walk around the downed crossing gates. The system is designed to provide an additional warning to pedestrians to remain behind the crossing gates even after the one train they may be aware of has left the station.

NJDOT and NJ TRANSIT are conducting the “Another Train Coming” pilot program at Plauderville Station to test the effectiveness of the signs and determine whether this type of system should be used on other grade crossings in the NJ TRANSIT rail system.

In addition to the “Another Train Coming” signs, NJDOT and NJ TRANSIT have made several other enhancements to the Outwater Lane grade crossing at Plauderville Station, including an additional pedestrian gate, a delineated sidewalk and 300 feet of additional fencing along the railroad right of way.

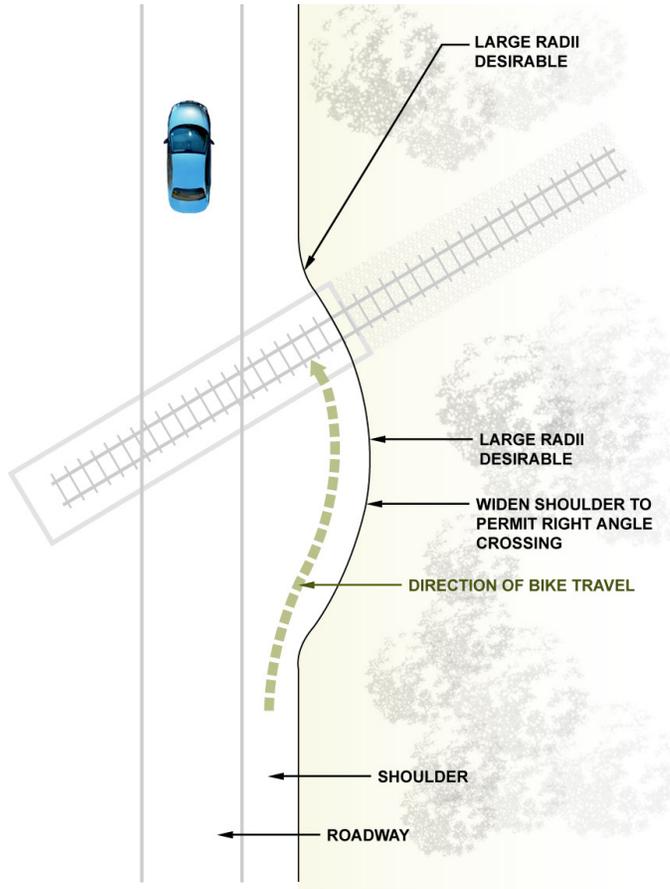
The pilot program is a result of the *New Jersey Safety Along Railroads: Short-Term Action Plan* created in February 2012.



“Another Train Coming” system installed at Plauderville Station. Image: Marco DeSilva, Volpe Center

## Modifying the Intersection

Crossing rail tracks on a bike or in a wheelchair can often be tricky, especially with narrow wheels that can get caught between the rails. Bicyclists and pedestrians in wheelchairs can be accommodated at an at-grade railroad crossing by modifying the intersection to provide for a close to 90-degree crossing. This will help keep a front wheel from getting caught in the tracks.



Railroad Crossing Treatment

Image: The RBA Group



Green pavement markings in Tuscon, AZ indicate where cyclists may cross streetcar tracks at as close to perpendicular as possible. Image: bicycletuscon.com



Kansas City has installed signs warning of track hazards. Image: BikeWalkKC.org



Bicycle tires can get stuck on the grooves between tracks. The safest way to cross rail tracks is as close as possible to a 90 degree angle. Image: BicycleGermany.com

## National Center for SRTS Position on Railroad Crossings

In keeping with NHTSA and other federal guidelines, the National Center for Safe Routes to School does not advise students to avoid crossing railroad tracks, but recommends that if the need for crossing the tracks does arise, that to the greatest extent possible, the following conditions be met:

1. appropriate at-grade crossings are implemented in accordance with relevant federal, state, and local guidelines;
2. appropriate supplemental safety devices (e.g., pedestrian signals, pavement markings) be incorporated into the project; and
3. that children be accompanied by a responsible adult and use extreme caution when traveling over such areas.

## How are recommendations for pedestrian and bicyclist safety improvements made?

The appropriate traffic control system to be used at a pedestrian-rail at-grade crossing should be determined by an engineering study performed by a diagnostic team. The diagnostic team should include representatives from the railroad companies, the roadway authority, and the regulatory authority (state and/or federal). In general, the railroad is responsible for the crossbucks, flashing light signals, and gate mechanisms and the roadway authority is responsible for all advance warning signals and markings, and other supplemental signs.

Diagnostic teams are typically convened when:

- there has been a federal or state grant allocated,
- there are proposed or imminent changes to the physical or operating characteristics of the railroad or roadway,
- there have been complaints/requests for safety evaluations (railroad, local agencies, school districts, citizens), or
- it has been recommended by routine inspections.

## Criteria used to Select Warning Devices

There is no commonly accepted method to quantify the risk to a pedestrian of being struck by a train at a highway-rail crossing with pedestrian access. However, the Federal Railroad Administration promotes utilizing a risk-based analysis approach.<sup>5</sup> This means looking for potential hazards or undesired events that may involve pedestrians walking in or near passenger rail stations. Hazard identification is a “What if?” activity that looks for potential causes and results of incidents.

The hazard management team “brainstorms” to come up with as many credible hazards as possible for use in a risk-based hazard analysis. The multidisciplinary team should consider the physical characteristics of the station area and associated walking paths in or near the station when identifying these hazards. This includes pedestrian attractors. Destinations include schools, train stations, bus stops, retail/commercial centers, and residential communities. Planned development and zoning should be considered as indicators of future pedestrian activity with special consideration to accessibility needs for individuals with disabilities.

Criteria for selecting warning devices are usually determined on a case-by-case basis. In New Jersey, the diagnostic review process examines several criteria to determine the need for safety upgrades including:<sup>6</sup>

- train speed;
- number of trains;
- railroad traffic patterns;
- surface conditions;
- pedestrian volumes;
- proximity to schools;
- sight distance for pedestrians approaching the crossing;
- pedestrian collision experience at the crossing;
- skew angle of the crossing relative to the railroad tracks; and
- surrounding land use.

<sup>5</sup> USDOT FRA (2012). Guidance on Pedestrian Crossing Safety at or Near Passenger Stations.

<sup>6</sup> Metaxatos, P., & Sriraj, P. S. (2013). *Pedestrian/bicyclist warning devices and signs at highway-rail and pathway-rail grade crossings*. Informally published manuscript, University of Illinois, Chicago, IL, Retrieved from [www.utc.uic.edu/research/projects/GradeCrossingSafety.html](http://www.utc.uic.edu/research/projects/GradeCrossingSafety.html)

## Resources: Rail Safety Education Programs

### Operation Lifesaver

Operation Lifesaver is a non-profit, international, public education program. Educational brochures and videos, coloring books for children and other materials are available on the Operation Lifesaver Web site. In addition, every state has an Operation Lifesaver coordinator who can provide information about highway-rail grade crossing safety and trespass prevention activities, including scheduling a free safety presentation at your school. If you are interested in arranging a presentation, please visit Operation Lifesaver's Web site at [oli.org/state\\_coordinators/](http://oli.org/state_coordinators/)

### NJ TRANSIT's School Safety Program

Schools and community groups can take advantage of NJ TRANSIT's free statewide safety education presentations for all age groups. High school driver education teachers can request a free program package for the classroom developed to help teen motorists safely share the road with trains, buses and light rail. Contact the NJ TRANSIT Safety Education Program to learn more about the program. E mail [safety@njtransit.com](mailto:safety@njtransit.com) or visit [www.njtransit.com/rg/rg\\_servlet.srv?hdnPageAction=SafetyTo](http://www.njtransit.com/rg/rg_servlet.srv?hdnPageAction=SafetyTo)

