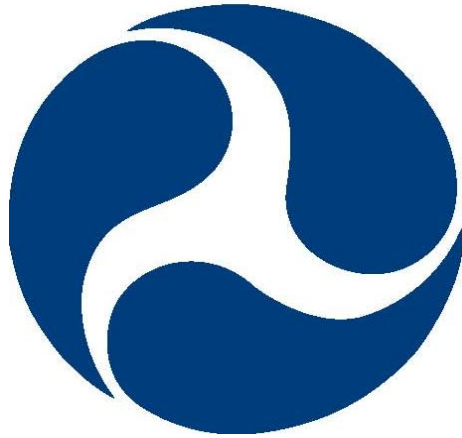


GUIDANCE ON PEDESTRIAN CROSSING SAFETY AT OR NEAR PASSENGER STATIONS

April 2012



U.S. Department of Transportation
Federal Railroad Administration
Office of Railroad Safety

This page intentionally left blank

CONTENTS

Background	1
Depiction of Items Not Currently Included in the Manual on Uniform Traffic Control Devices ...	2
Risk-Based Hazard Analysis Approach to Enhancing Safety	3
Train-Borne Audible and Visual Warnings	5
Station-Sited Audible and Visual Warnings	5
Swing Gates	6
Infrastructure within Passenger Stations–Americans with Disabilities Act Considerations	7
Providing Safe Access for All Users	7
Infrastructure At Pedestrian Crossings to Improve Safety	9
Infrastructure Improvements to Accommodate High Passenger and Train Volumes	10
Infrastructure and Safety Issues At or Near Passenger Stations in Multi-Track Territory	11
Station Signing and the Importance of Maintenance	16
Fencing At or Near Passenger Platforms	16
Other Strategies and Methods to Enhance Pedestrian Safety	21
Enforcement Initiatives At or Near Passenger Stations	22
Public Outreach and Crossing Safety Education Programs	23
Summary	23
Appendix A: Summary of Comments Received on Pedestrian Crossing Safety At or Near Passenger Stations Guidance Document.....	1

Background

On October 16, 2008, President George W. Bush signed into law the Rail Safety Improvement Act of 2008 (RSIA), which in Title II, Division A, contains 10 safety initiatives related to grade crossing safety and trespass prevention. In Section 201 of the statute, the Federal Railroad Administration (FRA)—by delegation from the Secretary of Transportation—is directed to provide guidance to railroads concerning pedestrian safety that addresses four specific pedestrian safety areas. Section 201 reads as follows:

SEC. 201. PEDESTRIAN CROSSING SAFETY.

Not later than 1 year after the date of enactment of this Act, the Secretary shall provide guidance to railroads on strategies and methods to prevent pedestrian accidents, incidents, injuries, and fatalities at or near passenger stations, including—

- (1) providing audible warning of approaching trains to the pedestrians at railroad passenger stations;
- (2) using signs, signals, or other visual devices to warn pedestrians of approaching trains;
- (3) installing infrastructure at pedestrian crossings to improve the safety of pedestrians crossing railroad tracks;
- (4) installing fences to prohibit access to railroad tracks; and
- (5) other strategies or methods as determined by the Secretary.

FRA has worked with its rail safety partners in government, industry, and labor to assemble the material that is intended to form the basis of the guidance that is required by the RSIA. In fact, prior to the RSIA, FRA and the Federal Transit Administration (FTA) sponsored a 2-day “ROW Fatality and Trespasser Reduction Workshop” in April 2008 that dealt with trespasser fatalities, passengers in or around stations, and general railroad right-of-way safety.

Workshop participants included the Association of American Railroads (AAR), Union Pacific Railroad Company, CSX Transportation, BNSF Railway Company, New Jersey Transit, Southeastern Pennsylvania Transportation Authority, National Railroad Passenger Corporation (Amtrak), and several other U.S. and international passenger railroads. Several of the Railroad Safety Advisory Committee’s (RSAC) General Passenger Safety Task Force (Task Force) members and international rail representatives actively participated in the workshop by presenting projects that their railroad organizations had undertaken to improve right-of-way trespasser and passenger station safety using hazard and risk analysis processes.

A detailed summary report titled, “ROW Fatality and Trespass Reduction Workshop 2008 – Summary of Results” was prepared, which included all the presentations made during the workshop. (This report and the other FRA reports referenced in this guidance document are available on FRA’s Web site.)

The Task Force also produced a passenger station gap management guide titled, “FRA Approach to Managing Gap Safety,” which was based upon a systems hazard management approach to station gap management.

A draft version of this pedestrian crossing safety guidance document was introduced to members of the Task Force at a meeting in October 2009, at which time FRA solicited input and comments from Task Force members. Members of the Task Force had already assisted in the 2-day “ROW Fatality and Trespasser Reduction Workshop” in April 2008 on trespasser fatality reduction and passenger station safety concerns associated with the railroad right-of-way. The Task Force then worked to refine the draft pedestrian crossing safety guidance document, and a preliminary version of the draft guidance document was posted on FRA’s Web site in January 2011. After receiving comments from Amtrak, New Jersey Transit, and the AAR, in early 2011 (which have been summarized in Appendix A), FRA made additional revisions to the preliminary version of the draft pedestrian crossing safety guidance document.

Although FRA was directed by Congress to address this guidance to the railroads, comments submitted by the Association of American Railroads underscore the need for cooperation among the many different organizations involved in providing railroad passenger service, including State and Local agencies and other stakeholders to address pedestrian crossing safety. Therefore, in order to facilitate cooperation among these different organizations, FRA recommends that railroads convene hazard management teams to review the passenger stations under evaluation. Members of the hazard management team should include knowledgeable interdepartmental, operational, technical, and safety experts from the railroads and third parties that will identify and implement passenger crossing safety management programs. The hazard management team—using hazard management techniques, crossing safety management principles, and evaluation of individual conditions at or near passenger rail stations to make determinations—perform engineering evaluations to develop hazard mitigation strategies and recommendations for the organizations responsible for pedestrian crossing safety.

Depiction of Items Not Currently Included in the Manual on Uniform Traffic Control Devices

It should be noted that several of the devices depicted in this document are not included in the Manual on Uniform Traffic Control Devices (MUTCD). Public agencies rely on the MUTCD to help them ensure uniformity in the messages conveyed to road users. The MUTCD is the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel.¹ Noncompliance with the MUTCD can ultimately result in the loss of Federal-aid funding, as well as in a significant increase in tort liability incurred by the use of non-standard traffic control devices.

While the MUTCD standards and guidance do not pertain to all conditions at or near passenger stations, for situations in which MUTCD-compliant devices are applicable, use of MUTCD-compliant devices is recommended by FRA. For all other situations in which MUTCD-

¹ The MUTCD, which has been incorporated by reference in Subpart F to 23 CFR Part 655, is recognized as the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel, in accordance with 23 U.S.C. §§ 109(d) and 402(a).

compliant devices are not applicable, it would still be advantageous to use shapes, fonts, and colors that are consistent with the MUTCD to communicate warnings and other information to pedestrians, as user familiarity with, and recognition of, these elements will enhance safety.

The Federal Highway Administration (FHWA), which is the custodial agency for the MUTCD, has established a process for the incorporation of new devices. This process involves rulemaking procedures that are published in the Federal Register and that encourage public involvement. Any interested person or organization may participate by submitting comments to the docket.

Generally speaking, State and local agencies that use non-standard traffic control devices are in the best position to initiate the MUTCD incorporation process. This incorporation process is described in detail in Section 1A.10 of the MUTCD titled, “Interpretations, Experimentations, Changes, and Interim Approvals.” This section (and the entire MUTCD) is available on FHWA’s MUTCD Web site.

The incorporation process enables agencies desiring the experimental use of traffic control devices that show promise in the enhancement of safety and mobility to evaluate these devices. Should they prove successful, the wider transportation community may then more readily enjoy the benefits. Such non-standard devices that have been shown to be effective in more than one geographic area through scientific evaluation studies can be proposed for inclusion in the MUTCD through the formal rulemaking process.

As envisioned in Section 201 of the RSIA, this document is intended as guidance to railroads on strategies and methods to prevent pedestrian accidents, incidents, injuries, and fatalities at or near passenger stations. FRA hopes that the illustrative examples of the pedestrian safety concepts described in this document will foster the exchange of information and experiences among railroads and other organizations that are involved with enhancing pedestrian safety in and around passenger stations. Inclusion of any device identified herein should not, in itself, be considered a requirement for its use.

Risk-Based Hazard Analysis Approach to Enhancing Safety

FRA recommends that passenger rail operators use risk-based proactive hazard analysis methods to evaluate the risk associated with the movement of pedestrians at or near passenger stations, in light of the history of tragic incidents that have resulted in serious pedestrian injuries and fatalities. These unfortunate events have the potential to be reduced in number if the steps outlined in this document are applied using the risk-based hazard analysis process that takes into account the specific requirements and conditions of every passenger rail operation.

Passenger rail operators should perform their own risk-based hazard analyses and identify methods that they can use to make their operations safer, especially for pedestrians in or near stations. While improvements at or near passenger stations on host railroads may require commuter and intercity passenger rail support, risk-based hazard analysis should include an evaluation of funding-related issues. Using this risk-based hazard management approach, passenger railroads can realize improvements in passenger rail safety. All passenger railroads

will benefit from sharing of the hazard management experiences of individual railroads among all operators.

The hazard management and risk-based hazard analysis approach promoted by FRA in its October 2007 publication titled, “Collision Hazard Analysis Guide: Commuter and Intercity Passenger Rail Service,” represents one method of conducting a risk-based hazard analysis. However, there are many other techniques for conducting a risk-based hazard analysis, and additional information on how to apply risk-based hazard analysis techniques to railroad operations is readily available.

FRA recommends that the first step of an effective risk-based hazard identification and resolution process is to define the individual system under consideration. A good system definition is important to understand the environment and interfaces that occur during operation of trains in and around passenger stations. Such a system definition is best accomplished by individuals who are intimately familiar with the specific passenger rail operation.

The system definition should be a narrative statement that fully describes train operations and the passenger station environment. The system definition will vary depending on the specific conditions and circumstances that exist on a particular passenger railroad. The system definition is best developed by a group of knowledgeable representatives of the parties involved, who have expertise in pedestrian safety and passenger railroading. Many organizations form hazard management teams to develop the system definition, develop the hazard model, identify the hazards related to the operation, evaluate the risk associated with these hazards, and identify appropriate mitigation strategies.

The second step in the risk-based hazard analysis process is hazard identification; this means looking for potential hazards or undesired events that may involve pedestrians walking in or near passenger rail stations. Practitioners should use the hazard management team to identify these hazards. 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 the risk-based hazard analysis. The hazard management team should consider the physical characteristics of the passenger station platforms and associated walking paths in or near the station when identifying these hazards.

Hazard assessments should use severity and frequency rankings, which will lead to the hazard resolution procedures defined in the passenger railroad’s system safety program plan or established by the hazard management team. The hazard resolution procedure should be established before beginning the hazard assessment process to prevent unnecessary disagreements on hazard assessment.

The results of the hazard identification and hazard assessment steps should be captured on a risk-based hazard analysis worksheet. The risk-based hazard analysis worksheet contains all of the information collected on each hazard and serves as the record of how hazards are to be controlled or mitigated. Practitioners should use the worksheet for hazard management to ensure that all identified hazards are systematically addressed.

Another good example of the hazard management process can be found in the FRA document titled, “FRA Approach to Managing Gap Safety.” This document provides guidance on how to address safety issues posed by the gap between railcars and high-level station platforms.

Train-Borne Audible and Visual Warnings

Title 49 Code of Federal Regulations (CFR) Section 222.21 requires that a train horn be sounded while trains approach and enter public highway-rail grade crossings. However, horn sounding upon approach to pedestrian-only crossings at or near rail passenger stations is generally governed by State law.

On the other hand, horn sounding at passenger stations is usually performed in accordance with a railroad-issued instruction or operating rule. In order to supplement the audible warning provided to rail passengers by the locomotive horn, some railroads also require sounding of the locomotive bell on approach and while moving through passenger stations. FRA recommends adoption of this practice, whether or not the train will service the station.

FRA also recommends that locomotive alerting lights, displayed in a triangular pattern, be illuminated while trains approach and enter passenger stations. (Any lead locomotive that traverses a grade crossing at a speed in excess of 20 mph is already required by FRA regulation to be equipped with these alerting lights.)

Station-Sited Audible and Visual Warnings

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. The audible warning can consist of announcements that specify train arrival track, eventual train destination, and the location of certain cars within the train, such as food service cars, “quiet cars,” or deluxe accommodation cars. FRA recommends that such audible announcements be supplemented by a display of the text of the announcement on a changeable message sign using a light-emitting diode display or other high-legibility technology that meets or exceeds the standards for Communication Elements and Features provided in Chapter 7 of the Architectural and Transportation Barriers Compliance Board’s (Access Board) Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAAG). The ADAAG are available on the Access Board’s Web site.

The types of information useful to pedestrians wishing to cross the tracks in a station prior to train arrival include the arrival track of any trains entering the station, the direction of travel of any trains moving within the station, and the location of the desired train relative to the pedestrian’s current location.

Given the wide range of potential messages needed to provide this information, passenger railroads and State and local agencies should consider systems that are able to accept several types of message inputs, such as a stored library of standard safety messages, as well as accept typed, recorded, or spoken messages from station personnel as the situation may warrant. This

system should also allow the operator to preview and edit any messages prior to their being given to passengers. Any such station-sited audible warning system will likely require some method of detecting the approach of a train and then determining its direction, whether it will stop at the station, and, possibly, its speed.

Railroads (including Amtrak) should work with the State and local agencies that are responsible for establishing or operating commuter rail service to implement a system of audible warning of the approach of a train to pedestrians at or near rail passenger stations, where appropriate. This system should be capable, in combination with simultaneous visual displays, of communicating the direction of the approaching train, and which platform it will either service or pass alongside, if the train does not serve the station in question. This system should be given high priority when high-speed trains are present or when visibility of approaching trains is impeded by track curvature or physical sight distance obstructions.

Passenger railroads with station platforms in multiple-track territory should work cooperatively to develop a standardized system to clearly and accurately communicate to passengers in station areas and on platforms that a second train (in addition to any train currently occupying or approaching any station track) is approaching the station and that its arrival may be obscured by the train in the station. Such a system should have both an audio and visual component, and its messages should be distinctive enough to attract attention in what may be a very busy and noisy environment. This system should be able to indicate tracks occupied, direction of travel, and whether any approaching train will stop at the station.

Swing Gates

Swing gates have three distinct functions: providing entry to or exit from the track areas, as well as emergency exit under dire circumstances. Swing gates open away from the track area and are designed to return to the closed position after use.

The entry or exit swing gate is used to slow pedestrians approaching the track area by encouraging them to stop, and then pull open the gate. The gate is placed so that a user will face down the tracks and look for approaching trains during the motion required to open the gate prior to entering the track area.

A corresponding exit gate is pushed open away from the track area, allowing pedestrians to leave the track area without delay, while then returning to the closed position for use by the next person.

At stations with high passenger flows, multiple entry and exit gates should be used side by side. An emergency exit swing gate may also be used. Emergency exit gates are clearly designated for use only as an escape route for pedestrians that find themselves between the track area and a lowered automatic pedestrian gate upon approach of a train.

Infrastructure within Passenger Stations–Americans with Disabilities Act Considerations

Title II of the Americans with Disabilities Act (ADA), which applies to public entities (including Amtrak, State and local governments, and commuter authorities), prohibits discrimination on the basis of disability in public accommodations and services, including transportation. Private entities, such as the freight railroads, are required to provide reasonable cooperation to the responsible public entity's efforts to comply with the ADA. Section 504 of the Rehabilitation Act of 1973 also prohibits discrimination on the basis of disability by recipients of Federal funds.

The Access Board, an independent Federal agency established by Section 502 of the Rehabilitation Act, develops and maintains accessibility guidelines and standards under several different laws, including the ADA. The Access Board's original 1991 guidance has been revised several times, including the most recent ADAAG published in 2004. The ADAAG has the force of regulation once adopted by the Federal agency responsible for its enforcement. In 2006, the U.S. Department of Transportation (DOT) adopted the revised ADAAG, subject to certain modifications that are set forth in Appendix A to 49 CFR Part 37. Chapter 8 of the revised ADAAG is specifically applicable to transportation facilities. However, several chapters, including Chapter 2 (Accessible Route Location, Scoping Requirements), Chapter 3 (Building Blocks), Chapter 4 (Accessible Routes), and Chapter 7 (Communication Elements and Features) contain guidance applicable to safe railroad crossings near passenger stations. The Access Board is also in the process of developing standards specifically related to public rights-of-way, including railroad crossings, and issued a Notice of Proposed Rulemaking on this topic in July 2011. See Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, 76 Fed. Reg. 44664 (2011) and Correction to the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, 76 Fed. Reg. 45481 (2011).

Providing Safe Access for All Users

In order for safe access to be provided for all users, the following standards should be incorporated into the design of stations:

- Accessible routes should coincide with, or be located in, the same area as general circulation paths. Where circulation paths are interior, required accessible routes should also be interior. Elements such as ramps, elevators, or other circulation devices, fare vending or other ticketing areas, and fare collection areas should be placed to minimize the distance that wheelchair users and other persons who cannot negotiate steps may have to travel compared to the general public. See 49 CFR Part 37, Appendix A (modifying ADAAG Section 206.3).
- Where it is necessary to cross tracks to reach boarding platforms, the route surface should comply with the standards for Accessible Routes. In addition, for safely traversing pedestrian at-grade rail crossings in or near passenger stations, the crossings' flangeway gaps should be set at a maximum of 64 millimeters (2.5 inches). See ADAAG Section 810.10. Where gap reduction is not practicable, an above-grade or below-grade

accessible route should be provided. The purpose of the maximum cap on flangeway gaps is to prevent a wheelchair's front caster wheels from becoming wedged in a flangeway gap and trapping the wheelchair's occupant on the tracks ahead of oncoming trains. Since this circumstance is more likely to occur when front caster wheels are turned sideways to the track, right-of-way fencing is recommended (such as that depicted below in Figure 6) to channelize pedestrians using wheelchairs to a desired crossing location straight across the tracks.

- Revolving doors, revolving gates, and turnstiles should not be part of an accessible route. See ADAAG Section 404.3.7.
- Swing gates can be difficult to operate by some persons using wheelchairs. Care should be taken to avoid a situation in which a person using a wheelchair could become trapped between two gates if he or she were unable to open the gate on the opposite side of a crossing. Automatic openers complying with ADAAG Section 404.3 can be used. If manual gates are used, maneuvering clearances, gate hardware, closing speed, and opening force should comply with ADAAG Sections 309.4 and 404. Swinging door and gate surfaces within 10 inches (255 millimeters) of the floor or ground, measured vertically, should have a smooth surface on the push side extending the full width of the door or gate (i.e., a kick plate). Parts creating horizontal or vertical joints in these surfaces should be within one-sixteenth of an inch (1.6 millimeters) of the same plane as the other. Cavities created by added kick plates should be capped. See ADAAG Section 404.2.1.
- Detectable warnings consisting of raised, truncated domes that comply with ADAAG Section 705 should be installed on either side of the tracks at pedestrian crossings. 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. In addition, the edge of the detectable warning surface closest to the track should be located next to the warning sign or device, but no closer than 12 feet from the nearest rail on either side of the crossing.
- Where audible systems are used to communicate train arrival and track assignments to the public, a means of conveying the same or equivalent information to persons with hearing disabilities should also be provided. FRA recommends that audible announcements be supplemented by a display of the text of the announcement on a changeable sign using a light-emitting diode display or other high-legibility technology that meets or exceeds the standards for Communication Elements and Features provided in Chapter 7 of the ADAAG.
- In consideration of the length of station platforms on high-density passenger rail lines, State and local agencies and railroads should consider installing multiple audible/visual message display systems to ensure that all message formats can be clearly perceived and understood by passengers waiting anywhere along the portion of the platform open to public access.

- Unmanned stations can be accommodated by a system based upon a stored library of messages and software that can receive inputs from the train detection system and generate the appropriate set of audible and visible messages to advise pedestrians within station areas on current train arrival status, track, and direction of approach.
- Supplemental warnings can be provided by crossing bells or flashing lights that are connected to a train detection system so that upon train arrival, the bell sounds and flashing lights display to indicate when it is not safe to cross. A wayside bell or half-gates can be installed to help get the pedestrian's attention.
- All signs should comply with the appropriate subsections of ADAAG Section 703 including, as necessary, raised characters, lettering contrast and spacing, character size and proportion, Braille, appropriate international symbols, and pictogram text descriptors.

Infrastructure At Pedestrian Crossings to Improve Safety

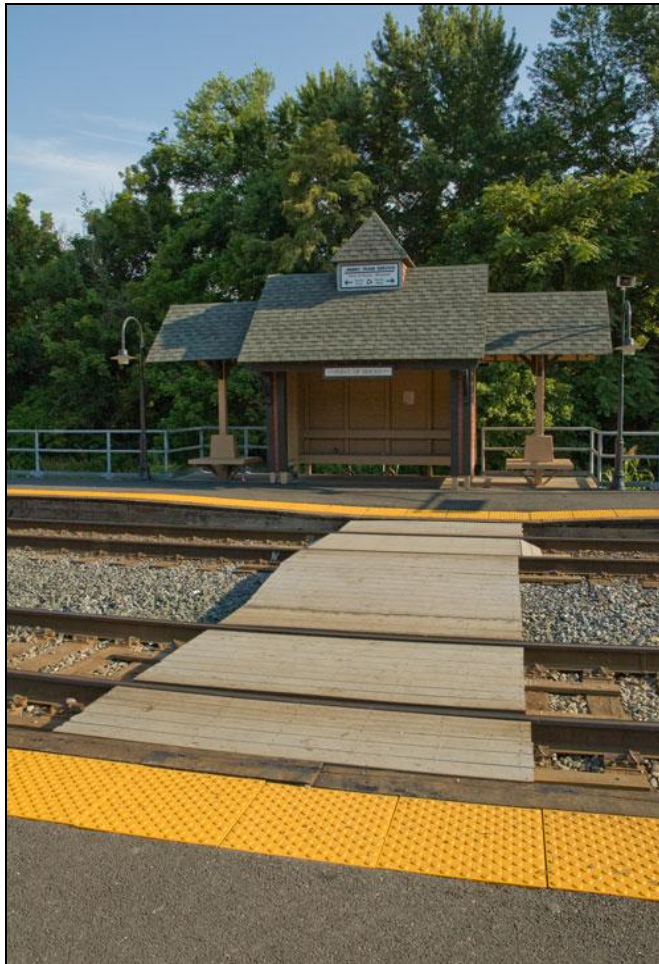


Figure 1: Example of visually contrasting surface materials used at a pedestrian crossing.

Figure 1 illustrates the use of visually contrasting surface materials to assist detection by the visually impaired.

Infrastructure Improvements to Accommodate High Passenger and Train Volumes



Figure 2: Example of a high-volume passenger station with grade separation structure.

Special situations involving stations serving both local commuter and intercity passenger rail service can justify greater expenditures for pedestrian access features. The station illustrated above in Figure 2 serves a busy schedule of local commuter trains along with frequent intercity passenger service, with trains in both directions stopping at the station all day long. In addition, this three-track railroad is the freight mainline for a major Class I rail carrier.

The combination of high passenger train volumes and mainline freight service necessitated the construction of this well-used grade separation structure. Wide stairways combine with elevator service to provide high-capacity crossover access for large volumes of passengers. In concert with the substantial intertrack fencing, this pedestrian overcrossing keeps pedestrian traffic away from a very busy three-track railroad.

FRA recommends that railroads with busy passenger stations located on multi-track rail lines (particularly those with three or more main tracks) with frequent freight service should investigate the application of a high-capacity grade separation structure to carry large volumes of pedestrians to and from their busy passenger platforms, separated from the potential hazards of crossing a multi-track railroad at grade.

Infrastructure and Safety Issues At or Near Passenger Stations in Multi-Track Territory



Figure 3: This multi-track railroad features local and limited-stop passenger service.



Figure 4: Pedestrians going to or coming from a stopped train should be reminded to be watchful for other trains on adjacent tracks as shown here.

Figures 3 and 4 illustrate the potential hazards associated with the movement of more than one train within station limits. Pedestrians wishing to cross the tracks are in need of specialized information displays that clearly indicate the position and direction of trains moving on adjacent tracks.



Figure 5: An example of a “Second train coming” display sign used on a passenger station platform.

An example of a “Second train coming” display is shown above in Figure 5. In this sample, the crossing prohibition is communicated by the traditional “hand/man” pedestrian signal display as shown on the left. The companion display on the right uses a simplified representation of a train that is capable of communicating train direction of travel as well as train location relative to the intended crossing point.

An unintended consequence of the provision of changing train arrival and departure information can be the sudden movement of passengers from one platform to another to meet their train, if its track assignment has been changed. Announcements or sign displays of such updated information can result in confusion and hurried movements across tracks by passengers at low-platform stations. In cases like this, the effective provision of “second train coming” warnings can become critical to ensuring passenger safety when the attention of those very passengers is focused on the changing train arrival or departure information. In addition, such situations can also result in passenger injuries as passengers move quickly along or across station platforms or stairways in an attempt to catch a train that has arrived on a different track or platform than was originally anticipated.

Supplementary use of convex mirrors can be a simple way to provide pedestrians with a clearer view along the tracks, or to enhance their ability to see a train approaching from behind them. These mirrors may also serve to provide additional warning of a second train coming on a different track.



Figure 6: Example of a warning sign combined with right-of-way fencing to channelize pedestrians to the desired crossing location.

As shown in Figure 6, a warning sign with a clear message has been effectively combined with channelizing or right-of-way fencing to direct pedestrians to the intended crossing point. In addition, the “LOOK” sign on the left and the walkway formed by the fencing combine to alert pedestrians of the need to look in both directions in anticipation of a train coming in either direction on any track.



Figure 7: Example of the use of streetscape features, such as the “Information” sign, to enhance the effectiveness of a pedestrian gate by making it more difficult to walk around the warning device.



Figure 8: Example of railing used to delineate the desired crossing path for pedestrians.

Figure 7 is an example of the use of streetscape features, such as the decorative map sign shown to the far left that helps block people from walking around the short, pedestrian gate arm, thus reducing violations of the lowered gate arm.

As illustrated by Figures 7 and 8, FRA recommends the use of fencing and other barrier materials, such as landscaping plantings, to funnel pedestrian traffic to the desired crossing point, where grade crossing warning devices are located. Fencing and other barrier materials on approaches to the desired crossing point should be so arranged as to reduce or prevent crossing warning device violations.



Figure 9: Example of a clear, concise warning message communicated by this pavement marking.

Pavement markings can be used effectively to remind hurried passengers of the need to be wary of trains approaching on any track and in either direction. One example of such a warning is shown in Figure 9.

This combination of a clear warning legend with the crosshatch pattern provides a good warning at the decision point for a crossing.

Repetition of such a warning pavement marking helps create a clear delineation of the intended crossing path, while also giving the warning message at each individual track, in both directions of pedestrian travel.

FRA recommends that when such pavement marking warning messages are used, 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.

Station Signage and the Importance of Maintenance



Figure 10: Examples of poor sign maintenance (left) and good sign condition (right).

The provision of signing at intended pedestrian crossings is now a fairly common practice. Maintenance of these signs is unfortunately overlooked sometimes, and the exposure to the elements can rapidly degrade sign clarity and reduce sign effectiveness, as the two photographs shown in Figure 10 illustrate. The difference in effectiveness between a clean, well-maintained guide sign and a worn-out sign is evident. FRA recommends that railroads follow the practice of maintaining a sign inventory for purposes of regular sign upkeep and replacement when necessary.

Fencing At or Near Passenger Platforms

In light of the effectiveness of fence lines installed between tracks within station platform areas, FRA recommends that railroads work to establish a program of station assessments within multiple-track territories to evaluate potential benefits associated with fencing installation and determine the most effective fencing material and fence height for that railroad's unique physical plant. The use of panelized fencing units can facilitate installation as well as minimize track time needed for maintenance.



Figure 11: Example of intertrack fencing with crossing surface providing for desired pedestrian movement between passenger platforms.

Fencing should extend far enough beyond the end of station platforms to serve as a deterrent, particularly where platforms are staggered (not directly across from each other for their full length). Fencing between tracks and along platform edges (where needed) should be designed to channelize passenger flows toward clearly-marked, smooth crossing surfaces where passengers may cross safely and with minimal delay while within and adjacent to the track area.

The use of vandal-resistant, “dense-mesh” fencing can enhance safety by resisting cutting or other damage as well as proving to be more difficult to climb over. Regular inspection of fencing installations is recommended as part of the overall pedestrian safety and channelization effort.



Figure 12: Installation of station signing and channelizing fencing to guide pedestrians away from the station platform and toward the desired safe crossing point at the end of



Figure 13: Example of intertrack fencing with warning message posted that clearly indicates both the nature of the hazard, and the intended action to be followed.

After a grade crossing fatality, a risk-based hazard analysis was performed at the accident site shown in Figure 12. This process resulted in the development of a fencing design that channels passengers moving from the station platform to the front of the grade crossing lights and gates at one end of the platform.

One of the primary goals was to develop an effective design solution that would also be economical enough to be implemented at several stations with similar configurations.

As part of this focused effort, railroad operations staff performed an evaluation of each station location in order to prioritize the installation of this fencing. Each of the stations involved in this project met the key criteria for which the fencing and related improvements would be considered i.e., stations with two or more tracks that were also adjacent to a highway-rail grade crossing at one end of the platform.



Figure 14: Example of station signing clearly indicating areas from which pedestrians are prohibited.

These crossings should also be well delineated and marked by station signing clearly indicating the intended direction of travel and any areas from which pedestrians are prohibited (see Figure 14).

An important element in an intertrack fencing program is to provide clear, consistent warning signing (see Figure 14) that communicates to passengers that entry onto track areas or off platform ends constitutes trespassing (depending on local statutes) and is strictly prohibited. One of the many potential hazards for trespassing passengers while illegally crossing multiple tracks

is presented when a second train is approaching the station from either the same direction as, or the opposite direction from, the train from which the passengers have just alighted. Other treatments can supplement intertrack fencing, such as the installation of fencing along platform edges where boarding or alighting is to be discouraged. As seen in Figure 15, platform edge fencing helps to channelize passengers toward intended boarding locations on longer low platforms.



Figure 15: Example of platform edge fencing.

Figure 16 shows an example of a strategy that has been used by some commuter railroads to help dissuade regular passengers from attempting to use a perceived shortcut across the tracks to get from their train to the parking lot or pickup area. Commuter agencies have applied lubricants or other coatings designed to dissuade “fence-jumping” by presenting the threat of damage to clothing if climbing on or over the fence is attempted. Surprisingly, however, some commuters have persisted in trying to climb over the intertrack fencing rather than using the intended crossings.



Figure 16: Example of signing and strategy to reduce “fence-jumping” by regular commuters who stubbornly insist on using a favorite shortcut.

In addition, FRA recommends the use of fencing outside of immediate station areas to channelize pedestrian traffic toward desired entry points. Fencing and other channelizing features, such as landscaping along pedestrian walkways from parking areas to station entrances and platforms, should be installed to prevent “shortcut” trespassing by hurrying commuters who cross the tracks to avoid missing their train. Arranging the fencing or landscaping in Z-shaped “zig-zag” forms, adjacent to tracks, can point approaching pedestrians in the direction of approaching trains (“forcing” them to look for trains) as they walk toward the passenger station.

Other Strategies and Methods to Enhance Pedestrian Safety

FRA recommends that the railroads use hazard management techniques, such as risk-based hazard analysis, to identify appropriate hazard mitigation strategies to address the risk posed by specified hazards. Risk-based hazard analysis is a process where hazards are identified, evaluated, and recorded, and corresponding hazard mitigation strategies are identified, recorded, and tracked to completion. The hazard mitigation strategies should be designed to eliminate, or control access to, railroad tracks at or near stations except at the designated crossing locations.

Hazard management is designed to be both comprehensive and continuous. Passenger railroads should be prepared to develop and support a long-term, right-of-way access control and safety management program. A hazard management team should include knowledgeable interdepartmental, operational, and technical and safety experts from the railroads and third parties (State and local agencies, and other stakeholders) that will identify and implement passenger crossing safety management programs. The hazard management team’s primary role would be to identify the hazards and agree on the mitigation strategies. Hazard management is not a one-time task but requires the affected parties to go back and periodically reevaluate pedestrian crossing safety at or near passenger stations.

Enforcement Initiatives At or Near Passenger Stations

FRA recommends that railroads work cooperatively with law enforcement officials to develop locally focused legal sanctions for pedestrians who illegally enter onto or cross railroad tracks at or near passenger stations. One State recently considered a bill supported by the local commuter railroad that would have provided a fine of as much as \$500 for crossing the tracks at any crossing if a train is approaching and flashing lights and gates have been activated. In addition, this State's laws currently prohibit vehicles from driving past any lowered crossing gate at a highway-rail grade crossing; the vehicle operator can get up to 1 year in jail and a \$2,500 fine.

Figure 17 shows the signing component of a localized grade crossing safety campaign. The sign clearly indicates the fine amount for any violation of any railroad grade crossing warning devices. FRA recommends that any such crossing safety enforcement campaign be supplemented by clear, conspicuous signing that is visible and legible for pedestrians in and around all passenger stations within the campaign area. Similar, larger signing will be needed to provide the same warning to motorists and other road users in the campaign area.

Figure 17: Example of a targeted local enforcement campaign.



Safety research has shown that one of the most effective education and enforcement programs has been one of focused law enforcement efforts, often known as “crossing safety blitzes.” A crossing safety blitz consists of police officers being present at selected highway-rail grade crossings within a community. These officers focus on encouraging safe crossing behaviors while enforcing the laws concerning pedestrians and vehicles around grade crossings. Violation rates have been reduced during blitz activity. Pedestrians generally respond more positively than motorists to the crossing safety blitzes; indeed, these programs were especially effective for commuters who were regularly exposed to enhanced education and enforcement programs.

Another method that has proven valuable in station monitoring for safety and security is the use of a system of cameras designed to provide video surveillance of the station platforms and associated public areas within the station facility.

Public Outreach and Crossing Safety Education Programs

The time spent by passengers while waiting on station platforms is available for education and safety outreach messages. FRA recommends the use of audio and video messaging to communicate important safety messages and reminders. Any station-specific safety concerns or special safety instructions should also be communicated in this manner, in addition to the more traditional station signing and station kiosk handouts.

FRA recommends that these messages be brief and to the point, with each treating a single important safety message. Audio announcements should be coordinated with the placement of posters that reinforce the safety message being broadcast within the station environment. These efforts will have a cumulative effect on regular users of the station—precisely those with the greatest long-term exposure to potential hazards at or near passenger stations.

Many commuter railroads regularly distribute service update newsletters on their trains or through targeted email messages. FRA recommends that railroads always include grade crossing and station safety messages in each of these communications, along with the latest service changes or updates.

FRA recommends that railroads take the opportunity to participate in cooperative research projects that investigate the applicability, here in the United States, of ideas presented in Transport Canada's report titled, "Pedestrian Safety at Grade Crossing Guide (Final Draft)," issued in September of 2007. This comprehensive report is available from Transport Canada on its Web site under the "Pedestrians and Grade Crossings" section.

Summary

FRA has intended this guidance primarily for both passenger railroads and freight railroads that operate trains over trackage that also supports passenger operations. The presence of pedestrians within station areas and moving toward or across tracks to access station platforms can create numerous potential conflict areas where pedestrian movement must be restricted once an approaching train is detected.

This guidance is also intended to provide railroads, as well as State and local agencies and other stakeholders, with strategies and methods that can help them to prevent pedestrian incidents and fatalities specifically in areas within or near passenger stations.

Measures that will assist in providing audible warning of approaching trains to the pedestrians at railroad passenger stations will need to maximize message accuracy, brevity, clarity, and timeliness.

Visual warning of approaching trains can be communicated to pedestrians at or near passenger stations using a combination of signs, signals, or other visual devices.

Infrastructure at pedestrian crossings, as well as along approaches to desired crossing points, should be carefully selected and installed to improve the safety of pedestrians crossing railroad tracks.

Installing fences and other barrier materials, such as landscape plantings, can be very effective in prohibiting access to railroad tracks, while funneling passengers away from potential hazards and toward desired crossing points that are equipped with appropriate warning devices.

In addition to these areas of emphasis, FRA has also put forth ideas for other strategies and methods that may prove effective when undertaken by railroads in partnership with State and local agencies, safety advocates, and law enforcement officials. If you have any questions and/or would like to obtain additional information about these proposed strategies and methods, please contact FRA's Highway-Rail Grade Crossing and Trespasser Prevention Division at (202) 493-6299.

Appendix A: Summary of Comments Received on Pedestrian Crossing Safety At or Near Passenger Stations Guidance Document

Commenter	Comment
National Railroad Passenger Corporation (Amtrak)	<p>Sources of funds:</p> <ul style="list-style-type: none"> -Improvements at stations on host railroads may require Amtrak sponsorship and funding? -Funding for alerting lights on freight locomotives -Funding for providing and maintaining PIDS, programming for audible/visible warnings of approaching trains, at all stations, including unmanned ones - perhaps technically challenging, too -Undergrade tunnels and overhead bridges are expensive to construct.
	<p>Swing gates</p> <ul style="list-style-type: none"> -Use of swing gates for controlled access may be problematic with ADA requirements for Stations
	<p>Gaps</p> <ul style="list-style-type: none"> -Maintaining a maximum gap of 2.5" between running rail and pedestrian grade crossing may not be possible
New Jersey Transit (NJT)	<p>NJT submitted pictures and an overview document describing their fencing and signing initiative and why it was implemented. NJT also submitted the Assessment and Rating Criteria that was used as part of the initiative.</p>
Association of American Railroads (AAR)	<p>I.A. Development of the Guidance</p> <p>The draft guidance has been developed without any discussion with AAR's members. Many AAR member railroads operate passenger trains and/or operate over tracks that pass through passenger stations. While AAR appreciates the opportunity to make written comments, AAR suggests that FRA also meet with AAR (and any other interested party) to discuss the draft guidance. AAR believes that discussions would enhance the final guidance.</p>
	<p>B. Need to Differentiate Between Types of Stations</p> <p>The draft guidance makes no attempt to differentiate between different types of stations. Passenger stations and their environments, as they pertain to pedestrian safety, vary greatly. For example, some stations are used by many passengers throughout the day, with a comparatively large number of trains. Other stations are used by few passenger trains, with a comparatively small number of trains. Pertinent station features also vary significantly. Yet, the guidance makes no effort to differentiate between stations. In this respect, the guidance is open to criticism as being overly simplistic.</p>
	<p>C. Responsibility for Pedestrian Safety</p> <p>One peculiar aspect of the draft guidance is its exclusive focus on railroads. While FRA's statutory obligation is to "provide guidance to railroads," it must be recognized that in many cases other government agencies bear responsibilities for stations and still others bear the responsibility for crossings located apart from stations. In that vein, FRA should include in its guidance document a discussion of how the various entities involved in pedestrian crossing safety should work together. AAR recommends using the concept of diagnostic teams, which are used for highway-rail grade crossings. (See the discussion of diagnostic teams in the "Railroad-Highway Grade Crossing Handbook – Revised Second Edition August 2007.") Certainly, railroads on their own are incapable of implementing many of the suggestions set forth in the draft guidance.</p>

Commenter	Comment
	<p>II. Risk Analysis</p> <p>On pp. 2 and 3, FRA discusses applying "hazard analysis" to pedestrian crossing safety. AAR generally endorses approaching safety issues through risk analysis. In this context, however, AAR is unsure what is contemplated in terms of a risk analysis. Recognizing that railroads often do not have the responsibility for pedestrian crossing safety at stations, as discussed above, those that do bear the responsibility might not see the value in a complex risk analysis targeted at a comparatively small number of risks. In other words, FRA might be making this problem more complex than it actually is. In any case, if this section were to be retained, FRA would need to explain what it has in mind. Leaving aside the issue of whether there needs to be a risk analysis, if such an analysis were to be undertaken it should be a "risk" analysis, not a "hazard" analysis. There is a significant difference between the two. "Risk" takes into account not only hazards, but also potential consequences and the probability that they would occur. A focus on hazards instead of risks would lead to wasted opportunities to improve safety and wasted resources. For example, at a passenger station a potential hazard is a paper cut from handling tickets. But this hazard would not lead to significant consequences and the overall risk is small. On the other hand, if there is a hazard that has a significant chance of leading to a passenger tripping and falling onto the tracks, the risk would be significant. Surely, in this hypothetical, resources should be devoted to the tripping hazard instead of the paper cut on a comparative risk basis. A risk analysis would lead to such a result. But a hazard analysis by itself would not.</p>
	<p>A. Changeable Message Signs and Warnings</p> <p>On pp. 3 and 4 of the document, FRA recommends "changeable message signs" and audible warnings. There are a wide variety of passenger stations, some of which are very low volume stations in terms of the number of passengers using the station. Recognizing that passenger railroads generally operate on tight budgets, it is unrealistic to expect that they will universally fund the installation of changeable message signs and audible warning systems. AAR suggests that instead of "recommending" the installation of changeable message signs and audible warning systems, FRA instead suggest that changeable message signs and audible warning systems be considered where appropriate. In a similar vein, with respect to the capabilities of changeable message signs and audible warning systems, FRA should change its approach and instead of stating what features the signs should incorporate, FRA should suggest features passenger carriers should consider. There is no indication that the feasibility of the various features FRA is recommending has actually been analyzed. At stations with multiple tracks and multiple operating railroads, AAR suspects that it would be especially challenging, if feasible at all, to implement FRA's recommendations. If that is the case, FRA should at a minimum qualify its recommendations. AAR has the same concerns with respect to the recommendations on p. 6 concerning audible and visual messages and the recommendation on p. 10 concerning second-train coming messages.</p>
	<p>B. Swing Gates</p> <p>On p. 5, first bullet, it states that swing-gate kick plates should extend from 2 inches above the floor to 27 inches above the floor. A swing gate reaching down to 2 inches above the floor might not be able to swing open in the midst of a snowstorm. AAR does not understand the basis for the recommended dimensions.</p>

Commenter	Comment
	<p>C. Flangeway Gap</p> <p>On p. 5, second bullet, the recommendations call for a maximum 2 ½-inch flangeway gap. In order to accommodate the flanges of railway wheels, the gap for the flange (flangeway) needs to be 3 inches to account for all the tolerances allowed in interchange freight equipment and in new track components. Otherwise, the wheel of a freight car could contact the part of the crossing between the rails, causing a derailment or damage and wear to the crossing. When a flangeway is built new at the minimum width of 3 inches, it will of course start to widen with use from different factors. As the sides of the rail heads wear, the distance between them (gage) gets greater, allowing more play in the lateral placement of the wheels and axles, and the inside of the flangeway will wear, causing the flangeway to widen. This is even more significant on curves. As the crossties holding the rail age, and the rail bases and tie plates wear, the dynamic forces of the trains will also cause the gauge to get greater, again widening the flangeway. At grade-crossings, motor vehicle usage over the crossing can also widen flangeways by impacting against the rail. Based on FRA allowable gage widening of 1.5 inches on class one track, the flangeway gap could be as large as 4.5 inches.</p>
	<p>D. Signs</p> <p>It is important that the guidance be consistent with the MUTCD. In a number of respects, the guidance is inconsistent with the MUTCD. There is an illustration of a pavement marking on p.13 that is not an MUTCD-approved pavement marking. The signs pictured on p. 14 are not MUTCD-approved signs. The guidance should not be referring to signs that are not MUTCD approved.</p>
	<p>E. Fencing</p> <p>On p. 15, FRA states that fencing should extend 200 feet beyond the end of station platforms. AAR is unaware of any research justifying the specific recommendation of 200 feet. Furthermore, there are cases where clearly that will not work, such as where there are adjacent highway grade crossings. Finally, the fencing shown in the picture would not work where there is freight traffic including wide loads.</p>