

# Developing a Gap Safety Management Program

**Abstract:** This *Recommended Practice* specifies the minimum requirements for a rail car door threshold to platform edge gap safety management program (gap safety management program). The goal of this standard is to reduce injuries to railroad passengers resulting from the vertical and horizontal gap between the edge of the station high level platform and the rail car door threshold as passengers enter or leave the car.

**Keywords:** clearances, gap, platform, safety

**Summary:** Use a hazard management approach to set standards and minimum requirements for a passenger railroad's gap safety management program. The approach should include the following key elements:

- Develop and implement a hazard management program that supports decisions on setting and maintaining nominal gap requirements.
- Develop and implement visual and audible public awareness programs that communicate information about the railroad's gap.
- Develop and implement a training component for on-board railroad personnel in regard to their role in maintaining passenger safety while traversing the gap.
- Implement inspection procedures to monitor station platform conditions.
- Verify that maintenance procedures for track and vehicles maintain the system's nominal gap as required by the railroad.
- Develop and implement a training component for maintenance and construction personnel as necessary.

**Scope and purpose:** This standard supports the Federal Railroad Administration's "FRA Approach to Managing Gap Safety" and specifies the minimum requirements for a gap safety management program. This standard applies to passenger railroads that operate on the general railroad system of the United States. Railroads shall have a written plan to implement this standard no later than six months after the standard takes effect and be fully enacted with the standard within two years. The purpose of this standard is to minimize injuries and to recommend ways to improve access for railroad passengers resulting from the vertical and horizontal gap that exists between the edge of the station platform and the car door threshold that passengers

This Recommended Practice represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a rail transit system's operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual rail transit agencies, may be either more or less restrictive than those given in this document.

must cross as they enter or leave the car. This document does not supersede nor replace any requirements set forth in the Americans with Disabilities Act.



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The American Public Transportation Association greatly appreciates the contributions of the **Accessibility Consensus Standards Policy and Planning Committee**, which provided the primary effort in the drafting of this *Recommended Practice*.

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## 1. History of this standard

Partially in response to accidents related to the gap between the car door threshold and the platform, the Federal Railroad Administration (FRA) formed a Rail Safety Advisory Committee (RSAC) General Passenger Safety Task Force to look at a broad spectrum of passenger safety concerns. The gap safety issue fell under this group. APTA offered to assist FRA by developing an APTA gap safety standard based on the RSAC document titled “FRA Approach to Managing Gap Safety,” which was developed and approved by the RSAC General Passenger Safety Task Force.

This standard describes the steps that railroads should take to maintain a consistent nominal gap and to reduce injuries due to that gap. APTA intends this standard to also help railroads incorporate gap safety considerations during the construction of new station platforms.

A working group formed by the APTA Accessibility Consensus Standards Policy and Planning Committee (ACSPPC) developed this standard in accordance with the ACSPPC’s Standard Operating Procedures. The working group consisted of a broad representation of all stakeholders including passenger railroads, the disability community and regulators working together.

This standard is not a one-size-fits-all document. A gap that exists between equipment and a station platform is a direct result of variations in allowable track structure tolerances, platform tolerances, vehicle suspension and design characteristics, as well as clearance requirements for freight and passenger railroads to operate over the track. The resulting gap can fluctuate based on allowable tolerances. The working group developed this standard to assist passenger railroads to identify hazard mitigation and avoidance measures and to maintain a nominal gap throughout the railroad’s system.

There are many factors in the railroad operating environment that make it difficult to maintain a nominal gap from door threshold to edge of platform on tangent track as well as to define specific limitations for the gap on other than tangent track. These factors include, but are not limited to, the following:

- Shared use of track with freight rail (over dimension/high and wide)
- Train station configuration (tangent or curved track)
- Dimensional differences in rolling stock (commuter, intercity passenger, freight)
- Location of the car doors
- Wear and maintenance of equipment components
- Settling and movement of track bed
- Movement due to thermal expansion and contraction

## 2. Gap safety management program

Each railroad shall develop and implement a car door threshold to platform edge gap safety management program (gap safety management program) that includes conducting hazard analyses. Each railroad shall describe the components of this program in a separate section of the railroad’s system safety program plan devoted to car door threshold to platform edge gap safety management planning.

At a minimum, each railroad’s gap safety management program shall include a hazard management process with the following components to enhance safety and access:

- Identify contributing system design elements that define the nominal gap.
- Define nominal gap standards.
- Develop mitigation strategies.
- Implement the strategies.

The railroad shall review its gap safety management program shall be reviewed periodically.

## 2.1 Gap standards

Due to the many variables in the railroad operating environment discussed in Section 1 to this standard, establishing a single vertical or horizontal gap dimension as a standard for the industry under all conditions is not possible. Each railroad shall establish minimum component standards to control nominal gap dimensions, taking into account any federal or state regulatory requirements. The nominal gap that is determined at a particular station or stations is based on the geometries of the track, platform and the equipment that utilizes the station. Tolerances of the equipment, track and platforms will result in actual gap measurements that may vary from the nominal. The limitations of these variations will be defined by the railroad.

A railroad may determine that more than one nominal gap standard is required. For example, a railroad may share some lines with freight railroads, while other lines have exclusive passenger operations. If more than one nominal gap standard is required, then the railroad shall define the standard(s) and specify where that standard applies.

## 2.2 Inspection procedures

The railroad's gap safety management program shall include inspection procedures and define the inspection schedule to adequately monitor and manage the nominal gap within the tolerances for each component established to meet the requirements of Section 2.1. The railroad shall:

- Describe what components require inspection.
- Establish clear pass/fail criteria.
- Describe how the required inspections are to be made.
- Set minimum qualifications for inspectors.
- Train inspectors to have those minimum qualifications, if necessary.
- Set inspection period intervals.
- Require maintenance be performed based on the findings of the inspection.
- Audit the program.
- Comply with FRA track tolerances

The railroad shall establish limits for the components that trigger appropriate actions to ensure that the nominal gap is maintained.

## 2.3 Maintenance procedures

The railroad's gap safety management program shall include periodic maintenance procedures to maintain the gap within the acceptable tolerances established to meet the requirements of Section 2.1. The railroad shall establish maintenance procedures for the components that have been found to be out of tolerance.

Gap related maintenance procedures are described in the following sections.

### 2.3.1 Rolling stock maintenance

The railroad shall routinely maintain all components of rail vehicles that may affect the gap or impact gap safety. At a minimum, rolling stock maintenance shall include the following:

- wheels
- suspension system
- leveling systems
- signage

### 2.3.2 Track maintenance

The railroad shall routinely maintain the track in accordance with FRA mandates to ensure that the track-to-platform dimensions are in accordance with the standard. Track height also affects the vertical gap. Track maintenance procedures shall be established for:

- alignment
- surface
- cross level
- roadbed construction
- rail wear
- gage

### 2.3.3 Platform maintenance

The railroad shall routinely maintain the areas of the station that may affect the gap or impact gap safety. These include:

- platform modification
- platform edges
- surface treatments
- signage

Platform resurfacing and modifications should be performed only when their influence on the gap is understood. Platform edges also need to be maintained to preserve the established gap and ensure that a stable surface is available at the edge of the platform.

## 2.4 Hazard management

Railroads shall use comprehensive hazard analysis as the core of the hazard management process. Passenger railroads should already have hazard analysis techniques identified as part of their system safety program plans. The techniques identified in the system safety program plan should be appropriate for conducting a hazard analysis on the gap safety issue. If the current hazard analysis techniques are not appropriate for analyzing the gap issue, then the passenger railroad should develop a new hazard analysis approach.

The hazard analysis guidelines are based on the United States Department of Defense 1993 document “System Safety Program Requirements,” Mil-Std-882C, and the hazard identification and resolution process described in APTA publication “Manual for the Development of System Safety Program Plans for Commuter Railroads.” The APTA document and Mil-Std-882 are excellent methods for conducting hazard analyses in a disciplined, structured manner. A disciplined and structured approach is valuable because it allows hazards to be systematically identified, inventoried, analyzed and addressed. The methodology ensures that all hazards and mitigation strategies are adequately reviewed. The process provides a permanent record of the hazard analysis and serves as a reference document to review and analyze future accidents or changes in system operations.

## 2.5 Mitigation strategies

The railroad’s gap safety management program shall include a description of any mitigating actions necessary at existing stations to reduce the risk of gap-related injuries. System safety and hazard management techniques are used to identify additional steps necessary to further reduce the risk to passengers. Using a hazard analysis approach to identify and mitigate hazards is an appropriate way to proceed, as it documents the hazard as well as the hazard mitigation.

Larger gaps generally pose a greater risk to passengers falling through a gap. Therefore, stations with larger gaps will likely need more hazard mitigations than stations with smaller gaps. However, regardless of the size of the gap, minimum hazard mitigations (hardware and technological solutions) must be provided to ensure consistency and standardization throughout the system. Consistency is important in facilitating expectations in the general population, including people with disabilities. The uniformity provides the necessary predictability for passenger awareness of potential hazards throughout a transit system. Once a railroad establishes its platform standards, it should identify and institute mitigation strategies to reduce the risks to all passengers.

The following should be considered as part of the hazard mitigation strategy:

- Describe what mitigation is required.
- State who is responsible to establish the mitigation.
- Provide training to those responsible.
- Perform frequent spot checks to ensure that the mitigating actions or features remain in place.
- Perform periodic trend analysis to determine the effectiveness of the program.
- Identify and integrate hardware and technological solutions (e.g., detectable warnings such as visual color contrasting warning striping at the edge of car door thresholds/stair treads).

## 2.6 Design of new stations

The railroad's gap safety management program shall identify design guidelines for all new stations and/or upgrades to design platforms with the intent to reduce the risk of gap-related injuries and improve access for passengers with disabilities. Systems station design guidelines should incorporate the standards set forth by the railroad's gap safety management program.

## 2.7 Employee training

The railroad's gap safety management program shall include policies and procedures developed to address gap safety, which may include training components for train crews, maintenance staff, station personnel, station supervision and station security/police, as appropriate.

The type of training provided will vary depending on the requirements for hazard mitigation. For example, employees may need training in such areas as:

- door operations
- assisting passengers needing assistance on and off the train
- platform monitoring

Training for door operations may be necessary because of new policies or procedures developed as hazard mitigation strategies. Door operation may include procedures such as look-back procedures as a train leaves a platform or continuous monitoring of door openings and closings.

Track, vehicle, and platform maintenance workers may require training in the following:

- critical maintenance procedures that affect the gap
- approved inspection procedures for monitoring the gap
- quality control during and after maintenance procedures that affect the gap

A training component is essential to ensure proper implementation of any new procedures developed as part of the hazard mitigation strategies.

## 2.8 Passenger outreach

In order to inform the public about gap safety and reduce the risk of gap-related injuries, the railroad's gap safety management program shall include an effective passenger outreach program using a variety of media. For example:

- Create and broadcast announcements warning of a gap's existence.
- Place signage in conspicuous places on board and in the station identifying the gap's existence.
- Explore the use of focusing customer's attention to the dangers of the gap with different media such as posters, brochures, videos and seat drops.

## 2.9 Policies and procedures

Policies and procedures are an important component of safe operation. A passenger railroad shall have policies or procedures that serve as hazard mitigation strategies. The passenger railroad should use a hazard analysis to identify the specific types of policies and procedures that are needed.

Policies used as hazard mitigation strategies shall be enforced. The passenger railroad shall use internal controls and observations to ensure that employees consistently follow the policies.

## 3. Corrective actions

Railroads shall take corrective action for any deficiencies uncovered by the inspections required in Section 2.

## 4. Gap safety management program audits and review

Each railroad shall conduct periodic internal audits of its gap safety management program as appropriate, but no less often than once every three years. The audit shall determine how well the railroad complies with its gap safety management plan.

The audit shall result in a report to railroad senior management that highlights where the railroad is doing well and where the railroad needs to improve in complying with its gap safety management program. The audit shall clearly spell out deficiencies as findings and clearly make recommendations for the correction of deficiencies.

The railroad shall take steps to address all audit findings. The railroad shall track the progress made to correct each deficiency. The subsequent gap safety management audit shall place emphasis on reviewing the progress made to correct previously identified deficiencies.

The gap safety management program and the hazard management program described in this document should be reviewed periodically, as well as when changes occur in the configuration or operation of the passenger rail system, or as the external environment changes. Changes that can affect the analysis include the following:

- new or expanded passenger service
- revised operations procedures
- use of new or modified equipment
- changes to existing stations, building new stations or track
- gap incident data

It is important to maintain a program with documentation that can be modified and updated as new information is collected about the gap safety issue. The review of the gap analysis is conducted to confirm that all aspects of the gap safety program remain relevant and accurate.



## 5. Recordkeeping

Recordkeeping shall be in accordance with established railroad recording procedures and included in the railroad's gap safety management program.

## 6. Recommendations for passenger awareness

### 6.1 Awareness of passenger behavior

It is recommended that railroads should train on-board employees who interact with passengers to recognize disruptive or unsafe behaviors. The railroad may also identify procedures to handle those behaviors.

To analyze gap hazards related to passenger behavior, it is recommended that the passenger railroad identify the situations or types of behavior present on the railroad that can lead to gap safety hazards. For example, the passenger railroad may be concerned with the following types of behavior:

- unmonitored children
- disruptive and unsafe behavior

Passenger railroads may establish passenger behavior policies. The railroads may determine if there are adequate existing policies in place to address the types of behavior that lead to gap safety issues. Railroads may consider establishing a policy to address issues of disruptive and unsafe behavior on the station platforms or trains.

### 6.2 Awareness of passenger needs

It is recommended that the railroad train all employees who interact with passengers on its policies for dealing with passengers requesting further assistance, and identify procedures on how to assist those passengers. For example, the passenger railroad may consider the following types of passengers needing assistance:

- passengers with impaired mobility
- passengers with visual and hearing impairments
- passengers requesting additional assistance for any other reason

## References

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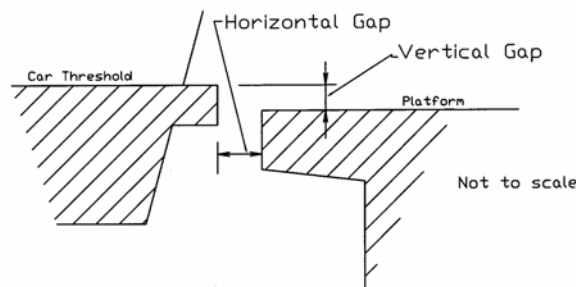
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## Definitions

**gap:** The horizontal space between the edge of a rail car door threshold plate and the high-level platform edge and the vertical difference from the top of the high-level platform and the top of the rail car door threshold.

**FIGURE 1**  
Coordination of Vehicle Floor with Boarding Platform



**horizontal gap dimension:** The horizontal space between the platform edge and the car door threshold.

**high-level platform:** A platform that does not require stairs for boarding. Also called a *mini-high platform*.

**mini-high platform:** A platform that does not require stairs for boarding. Also called a *high-level platform*.

**nominal gap:** The gap resultant of platform construction and car dimensions.

**nominal gap standard:** The gap that results from railroad-specific component goals based on platform construction, track geometry, equipment design and operating characteristics.

**platform:** The horizontal surface passengers use for passenger boarding and alighting.

**signage:** Displayed symbolic, pictorial information, and other forms of visual directional and informational text that provide direction to or information about interior spaces and facilities of the site (shall comply with section 703.5 of the ADA and ABA Accessibility Guidelines for Buildings and Facilities, 49 CFR Part 37).

**vertical gap dimension:** The vertical distance between the top of the platform edge and the car door threshold.

## Abbreviations and acronyms

<b>ACSPPC</b>	Accessibility Consensus Standards Policy and Planning Committee
<b>APTA</b>	American Public Transportation Association
<b>CFR</b>	Code of Federal Regulations
<b>FRA</b>	Federal Railroad Administration
<b>RSAC</b>	Rail Safety Advisory Committee