



3. Managing risk at the platform-train interface

Purpose of this summary

The purpose of this document is to provide a repository of some of the most important areas of learning identified in RAIB's investigations to date, cross-referenced to relevant reports. It therefore provides a reference source for those looking to understand real-world railway safety issues and potential control measures.

When preparing this document, RAIB has selected those issues which:

- have recurred in different RAIB investigations
- have still to be fully addressed
- could be a factor in the cause of a fatal accident.

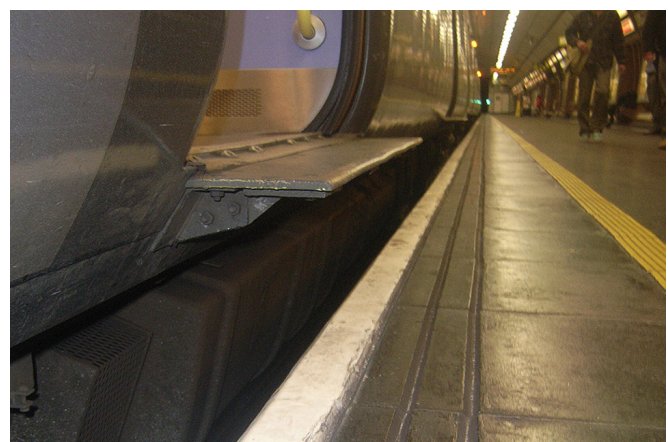
RAIB is aware that many of the issues raised have already been the subject of actions by duty holders when responding to RAIB recommendations, or are in the process of being addressed. The inclusion of a topic in this document should not be taken to mean that no action has been taken in response to relevant recommendations. However, its inclusion indicates that RAIB is of the view that the issue still needs to be actively managed by duty holders.

The current status of each recommendation made by RAIB can be checked by reference to the [Index of RAIB recommendations](#), and details of the actions taken are published by ORR.

It is not the purpose of this document to quantify the risk associated with each of the identified safety issues. Readers seeking to understand the overall risk of harm associated with various dangerous events should refer to RSSB's Annual Safety Performance Report. This presents historical information on actual harm caused and estimates of risk based on extensive modelling.

Overview

Every day, several million people get on and off trains at stations. While almost all of these events happen safely, there are several ways in which they can go wrong. As well as slips, trips and falls while getting on and off, people can be trapped in the train doors and dragged, and fall onto the track and be struck by the train. Passengers can also be hurt by falling through the gap between train and platform. The consequences of such events are often very serious.



Train doors, step, gap and platform - a hazardous area.

An important hazard that the railway is able to control is that from ‘trap and drag’ incidents. Checking that everyone and everything is clear of the train before it departs is crucial, but it can be challenging to manage the consequences of the way people behave, and the sheer numbers of people on platforms can also make it hard for staff to see all the train doors. If somebody is trapped and dragged by a departing train or tram, it is important that whoever is responsible for starting the vehicle can see what is happening and act quickly to stop the movement.

Important areas for safety learning

The areas of significant concern to RAIB fall into the six main themes described below.

Door control systems

Door control systems are not always capable of detecting thin objects trapped in closed and locked doors. If a trapped object is not detected, trains can move off dragging whatever is trapped along the platform, with a high risk of death or serious injury as a result.



Passenger with bag trapped in train doors at Notting Hill Gate.

At Notting Hill Gate in 2018, a passenger's bag became trapped in the doors as she attempted to board the train. The trapped bag was not detected by the door control system. The passenger was unable to free herself from the bag, and was dragged along the platform and into the tunnel as the train departed, suffering serious injuries ([report 14/2018](#)).

We believe that more needs to be done to enhance the ability of door control systems to detect the presence of a trapped object.

Technology such as sensitive edge and

anti-drag systems are already being used by some operators, and could be more widely adopted, particularly when new trains are being ordered and specified. We have recommended that these measures should be used on new London Underground trains, and trams.

Final safety checks

A number of RAIB investigations have found that railway and tramway staff were not aware of the limitations of door detection systems. Staff involved in train dispatch were relying on the door interlock indications to confirm that nothing was trapped, and that it was safe for the train or tram to depart. This reliance on interlock systems can lead staff to overlook the importance of a final safety check. Possibly as a consequence of this, we have seen staff making only a cursory final safety check and not detecting problems which can be seen when looking at CCTV images or along the outside of the train or tram to check that nothing is trapped in the doors.

At Bushey in 2018, a passenger's arm became trapped in the closing doors, and she was dragged along the platform. The train conductor believed that the extinguished body side lights and the illuminated interlock light in his cab showed that nothing was trapped in the closed doors. He told the passenger to stand clear of the train and signalled to the driver to start ([safety digest 07/2018](#)).

As a result of our Hayes & Harlington investigation ([report 12/2016](#)) we recommended that train and tram operating companies should introduce measures to address the risk of over-reliance on the door control system to detect trapped objects, and emphasise to their staff how the limitations of the detection systems reinforce the need for the final safety check by train dispatchers. We also called for measures to enhance the quality of the view of the platform-train interface, particularly in crowded conditions as a result of our Clapham South investigation ([report 04/2016](#)).



Pushchair trapped in tram doors at Radford Road, Nottingham in 2017.

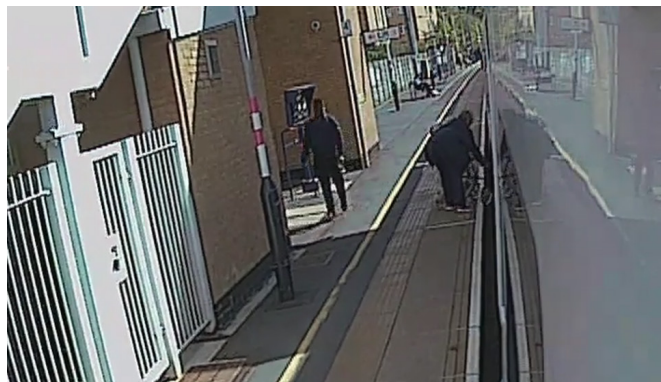
At Radford Road, Nottingham, in 2017, a pushchair, fortunately unoccupied, became trapped in tram doors and was dragged all the way to the next stop ([report 15/2018](#)). We recommended that the tram operator should review all aspects of its arrangements for minimising the risk of this happening. We found that there was a lack of understanding of risk in this area, which may extend across the tram industry.

At Shudehill in 2022, a passenger's bag became trapped in the doors of a tram. The passenger was dragged by the tram and fell onto the platform, sustaining injuries to their face and hand ([safety digest 04/2022](#)). The accident occurred because the driver did not complete a final safety check before starting the tram. The driver later stated that they were unaware that thin objects could be trapped in the closed doors and not be detected by the door interlock.

At Wood Street station ([safety digest 01/2022](#)), north-east London, in January 2022, a train travelled for 20 metres with a passenger's hand trapped in the door. The driver was unaware that the passenger was trapped and was unaware that a passenger's hand could be trapped in the closed doors and not be detected by the door interlock.

In June 2022, there were three further incidents of passengers becoming trapped in doors and dragged along the platform in north London ([safety digest 05/2022](#)). These further incidents involved the same class of train and operating company as the incident at Wood Street station. Despite a briefing note issued to all drivers following the accident at Wood Street, reminding them of the risk of relying on the interlock, one of the drivers involved in the June incidents was still unaware of the limitations of the interlock. RAIB also found that one of the trains involved had a misaligned camera which reduced visibility of one of the passengers involved.

Loss of attentiveness



Passenger tries to free dog trapped in train doors at Elstree & Borehamwood.

The repetitive nature of the driving task on metros, suburban trains and trams, particularly on trains that operate automatically, can lead to a loss of attentiveness on the part of drivers. This can result in important visual cues during the dispatch process being missed, and result in people being dragged when the vehicle moves off.

At Elstree & Borehamwood in 2018 ([report 03/2019](#)), a passenger and her dog were boarding a train. The doors closed in front of the passenger and the dog's lead became trapped in the doors. The train departed, dragging the dog off the platform and leading to its death, while the passenger remained on the platform. The driver was in the habit of carrying out the final safety check in significantly less time than other drivers on the same route and did so on this occasion. Carrying out the check in a shortened time meant that even a slight loss of attention could have led to him missing the passenger and her dog in the CCTV image.

We have recommended measures to support train and tram drivers in maintaining attention and awareness, particularly when associated with automatic train operations (Notting Hill Gate), and research and development of technology to assist staff responsible for train dispatch to determine that passengers are clear of the train (Elstree & Borehamwood).

Interaction of passengers with trains

Research from RSSB has shown that 58% of passengers mistakenly believe that the doors of a train will reopen like a lift door if they are obstructed. This misconception may mean that passengers do not fully understand the risk associated with becoming trapped in train doors.

At Notting Hill Gate, as described above, the passenger whose bag became trapped believed that the doors would reopen, as she had seen this happen to other people, probably on other types of train which are fitted with sensitive edge door control systems.



Passenger trapped in closing doors and dragged along the platform at Hayes & Harlington.

We saw another example of behaviour influenced by this belief at Hayes & Harlington in 2015, when a passenger placed her hand between the closing doors in the expectation that they would reopen and was subsequently dragged along the platform. In our report on this accident, we recommended research to better understand the way that passengers interact with rail vehicle/tram doors.

At Wood Street, as described above, the passenger attempted to board the train after the door closing sequence had begun. As she attempted to board the train, the passenger placed her hand between the closing doors.

Gaps between platforms and trains

Gaps between platforms and trains can occur in the following areas:

- door step plate to platform edge (also known as the stepping-gap)
- train bodyside and the platform edge
- inter-vehicle gap between coaches.

Curved platforms result in narrowed and enlarged gaps at different points along the train and platform edge.

At Waterloo station on the London Underground in May 2020 ([report 05/2021](#)), a passenger fell into the wide gap between a train and a curved platform, while the train was stationary. No one noticed him fall, and he subsequently died, and was found after the train departed and a following train had entered the station. This is not the first time RAIB has investigated accidents in which a significant gap between the train and the platform was a factor.

At James Street, Liverpool, in 2011, a passenger was killed when she fell under a train as it began to move ([report 22/2012](#)), and a similar accident, though its outcome was not fatal, occurred at Charing Cross station, London in 2012 ([report 10/2013](#)). In both cases there was a large gap between the platform and the side of the train. We have recommended that the industry considers the actions needed to mitigate the risk created by these large gaps and ensures that its risk assessments take account of platforms where such gaps exist. This is particularly important when considering the risk to passengers whose ability to negotiate the platform-train interface is impaired.

Managing risk to disabled passengers



Platform with no tactile surface markings at Eden Park.

Passengers with visual or mobility impairments may be at greater risk on station platforms and when boarding or alighting from trains.

At Eden Park ([report 01/2021](#)), a visually and mobility impaired person fell from the edge of a platform into the path of an approaching train. The platform had no tactile surface markings which could have alerted the person to how close they were to the edge, and our investigation found that the railway industry's approach to the provision of tactile surfaces had been ineffective.

We have recommended that the railway industry and the Department for Transport review their approaches to the management of risk to vulnerable passengers on station platforms.

Rail industry's strategic safety groups

Relevant rail industry groups working in this field include the cross-industry [Platform-Train Interface Working Group](#), which supports the delivery plan developed by the [People on Trains and in Stations Risk Group](#). The working group meets every quarter to identify, assess and mitigate existing and emerging risks associated with station platforms.

Relevant RAIB publications

- Fatal accident at James Street station, Liverpool, 22 October 2011 ([report 22/2012](#))
- Accident at Charing Cross station, London, 24 November 2012 ([report 10/2013](#))
- Passenger trapped in train doors and dragged at Clapham South station ([report 04/2016](#))
- Passenger trapped and dragged at Hayes & Harlington station ([report 12/2016](#))
- Dangerous train door incident at Bank station ([report 12/2017](#))
- Passenger trapped and dragged at Notting Hill Gate station ([report 14/2018](#))
- Pushchair trapped in tram doors and dragged, Radford Road, Nottingham ([report 15/2018](#))

- Passenger trapped in train doors and dragged at Bushey station ([safety digest 07/2018](#))
- Passenger trapped in tram doors and dragged at Bury tram stop, Greater Manchester ([safety digest 08/2018](#))
- Dangerous train despatch at Elstree & Borehamwood station ([report 03/2019](#))
- Person struck by a train at Eden Park station, London, 26 February 2020 ([report 01/2021](#))
- Fatal accident at Waterloo underground station, London, 26 May 2020 ([report 05/2021](#))
- Passenger trapped in doors and dragged at Wood Street station, north-east London, 14 January 2022 ([safety digest 01/2022](#))
- Passenger trapped by tram doors and dragged at Shudehill tram stop, Manchester, 27 May 2022 ([safety digest 04/2022](#))
- Passengers trapped in doors and dragged in north London, 23, 27 and 29 June 2022 ([safety digest 05/2022](#))