

Rail Safety and Standards Board (RSSB) - Annual Safety Performance Report - 2015/16 - A reference guide to safety trends on GB railways (Chapter 7)

Level crossings

7.1 This chapter covers the risk related to level crossings. The Safety Risk Model (SRM) modelled risk of 11.4 Fatalities and Weighted Injuries (FWI) per year falls within the remit of the Level Crossing Strategy Group (LCSG) and comprises 8% of the total mainline system FWI risk. The majority of risk is borne by members of the public with most casualties occurring to road vehicle occupants and pedestrians. Network Rail has put significant resource into reducing the risk at level crossings and successfully met their target of 25% reduction in risk at the end of Control Period 4 (CP4) (March 2014).

2015/16 Headlines

7.2 There were three fatalities at level crossing during 2015/16, all were pedestrian users. This is the lowest number of level crossing fatalities recorded since 1996/97. The overall level of harm at level crossing was 3.7 FWI, compared with 11.8 FWI for 2014/15.

7.3 At four, the number of train collisions with vehicles at level crossings was the lowest over the past ten years. The number of such accidents is relatively low, and shows quite some variability, but the generally lower numbers over the duration of CP4 are reflective of an improvement in level crossing risk. This is supported by a reducing trend in the recorded number of near misses with road vehicles at level crossings.

7.4 Improving level crossing safety is a major focus for the industry. Network Rail has substantial safety improvements planned for CP5, which runs from April 2014 to March 2019, and which build upon the 31% reduction in level crossing risk achieved during the course of CP4.

Level crossing risk profile

7.5 The modelled risk at level crossings is 11.4 FWI per year, and this accounts for 8% of the total system FWI risk of 139.6 FWI (including Yards, depots and sidings (YDS) and excluding suicide). Level crossings are an open interface between the road and the railway, so there is increased potential for pedestrian and road user behaviour to affect train operations.

7.6 Collisions at level crossings are the largest single cause of train accident risk. However, level crossing safety in the UK compares favourably with that in other European countries.

7.7 A considerable amount of research has been undertaken on level crossing safety, covering station and footpath crossings, as well as road crossings. Details of the research carried out can be found on the RSSB website at <https://www.rssb.co.uk/research-development-and-innovation/research-and-development/research-project-catalogue#k=level%20crossing>

7.8 Most of the risk at level crossings (62%) is to pedestrians, with pedestrian members of the public accounting for 57% and passenger pedestrians on station crossings accounting for the remaining 5%.

- 7.9 Train collisions with road vehicles contribute 32% of the risk at level crossings, of which 29% affects members of the public in road vehicles, and 3% affects people on board trains.
- 7.10 Slips, trips and falls on level crossings account for around 4% of the total level crossing risk, and accidents in which people are struck by level crossing equipment account for 1%.
- 7.11 The remaining 1% of the risk arises from road traffic accidents that occur in relation to level crossings, but do not result in train accidents (e.g. collisions with barriers) and members of the workforce injured at level crossings.

Level crossing fatalities, injuries and train accidents in 2015/16

Fatalities

- 7.12 Excluding suicides and suspected suicides, three people (all pedestrians) died in accidents at level crossings in 2015/16.
- On 15 February 2016 at Tide Mills (East Sussex) a man was fatally struck by a train while on the crossing. He was reported to be wearing a coat with the hood up, and distraction was recorded as a potential factor.
 - On 23 February 2016 at Grimston Lane (Suffolk) an elderly man was fatally struck by a train while on the crossing. RAIB have initiated an investigation into the incident.
 - On 27 February 2016 at Shoreham Station (West Sussex) a man was struck by a train after attempting to cross after the barriers had been lowered. He was taken to hospital but succumbed to his injuries.

Major injuries

- 7.13 There were five major injuries at level crossings in 2015/16. Three were slips, trips and falls, one was a member of the public struck by a train, and one was a crossing keeper who was struck by a crossing gate, after a car hit it while driving across as they were being lowered.

Minor injuries

- 7.14 There were 65 reported minor injuries, most of which resulted from falls or being struck by crossing equipment.

Shock & trauma

- 7.15 There were 28 reports of shock or trauma, mostly affecting train drivers involved in accidents or near misses.

Collisions between trains and road vehicles

- 7.16 There were four collisions between trains and road vehicles at level crossings during the year, none of which resulted in fatality.

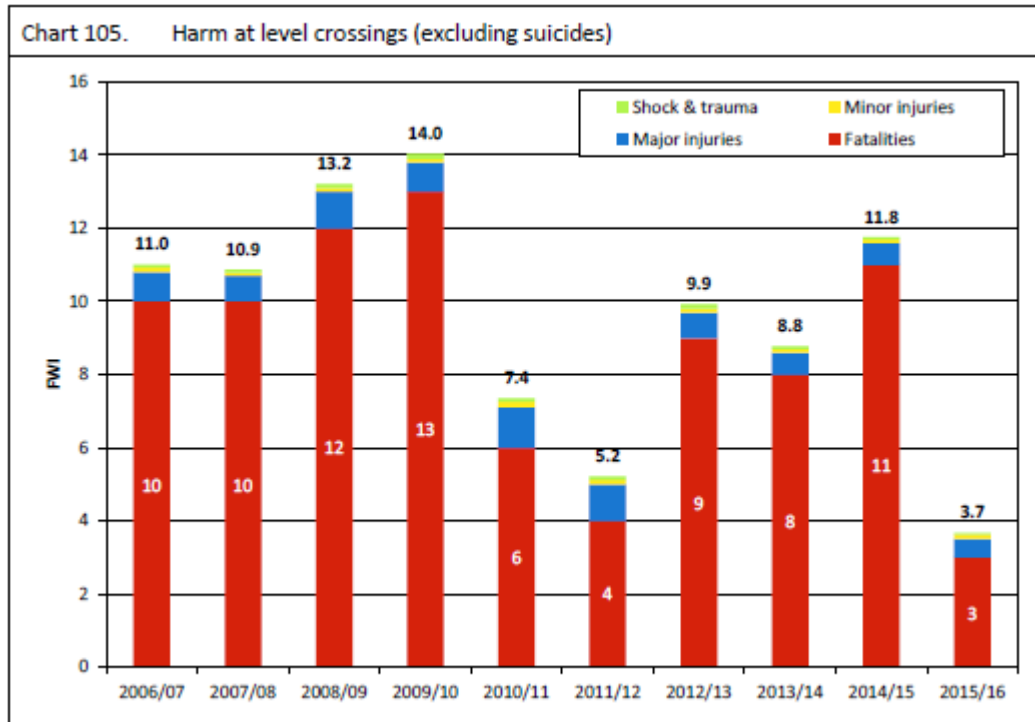
Trains striking level crossing gates or barriers

- 7.17 Usually, trains strike barriers only when a previous incident, such as a road traffic accident, has caused the barrier to be foul of the line immediately prior to the train's arrival. Crossing gates may be struck when high winds cause them to blow open, either due to defective clasps or users failing to close or secure them properly after passing.

7.18 There were three instances of trains striking level crossing gates in 2015/16, and no occasions where barriers were struck. None of the collisions resulted in injury.

Trend in harm at level crossings

7.19 Most of the harm at level crossings arises from pedestrians, cyclists and road vehicles being struck by trains. Some people are also injured each year as a result of slips, trips and falls, or striking, or being struck by, crossing barriers.



Level crossing fatalities

7.20 The 10 years to March 2016 have seen 86 fatalities on level crossings, excluding suicides. This figure comprises 66 pedestrians (including three passengers using station crossings) and 20 road vehicle users. Most collisions involve cars or vans, as shown in Chart 109. There has been no significant trend in the types of vehicles involved in collisions at level crossings.

7.21 The last level crossing accident resulting in train occupant fatalities occurred at Ufton in 2004, when a passenger train derailed after striking a car that had been deliberately parked on the crossing by its driver, as a suicidal act. The train driver and five passengers were killed, in addition to the car driver.

7.22 The three pedestrian fatalities in 2015/16 occurred on different types of crossing: a user worked crossing with telephone, a footpath crossing and a manually (by signaller) controlled barrier crossing protected by CCTV. Since 2005/06, more than half of pedestrian fatalities have occurred on footpath level crossings. However, this does not take into account differences in usage levels of different crossing types.

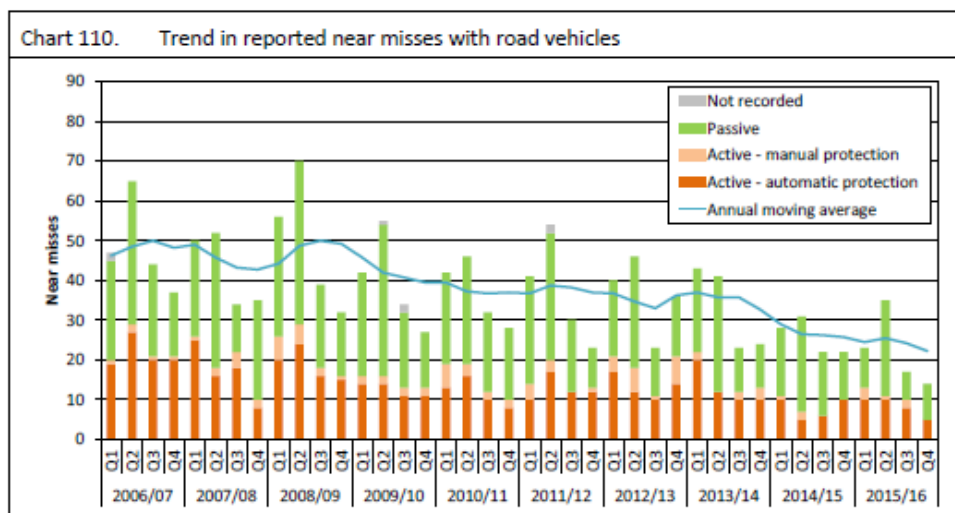
7.23 Of the 101 collisions in the 10 years from April 2006, 23 (23%) occurred at automatic open crossing, locally monitored (AOCL) crossings, 30 (30%) at automatic half-barrier crossing (AHB) crossings and 34 (34%) at user-worked crossings (UWCs)

(with or without telephones). The remaining types of crossing each contributed between 1% and 5% of events.

Near misses with road vehicles and pedestrians

7.24 Due to the relatively small number of accidents at level crossings, it is hard to monitor trends and identify patterns from accident data alone. The industry also collects data on near misses. Near misses are typically reported by train drivers who feel that they have had to take action to avoid a collision, or that they came close to striking a road vehicle or pedestrian. Near miss reporting is necessarily subjective, and is likely to be influenced by factors such as the ease of making a report and its perceived effect. It is also likely that many near misses go unobserved due to prevailing light and visibility conditions.

Near misses with road vehicles by crossing type



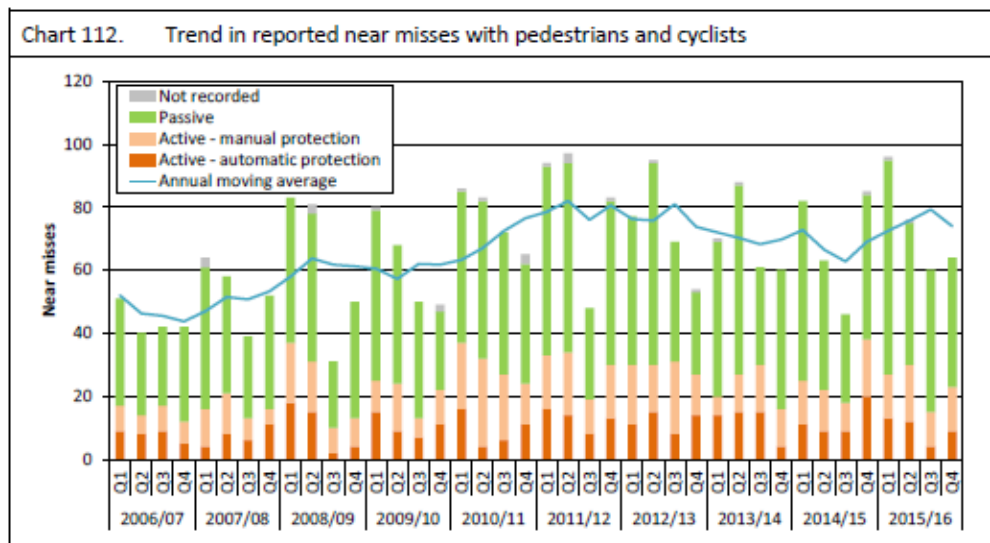
7.25 The number of near miss reports in 2015/16 decreased from the previous year. There appears to be a long-term downward trend in near misses with road vehicles.

7.26 There is clear seasonality in near miss reporting, with a higher incidence in spring and summer. This may be due to heavier traffic (particularly on farm crossings around the times of haymaking and harvest), and train drivers may be more likely to identify that a near miss has occurred during daylight hours.

7.27 Other seasonal factors that affect level crossing risk include ice and snow and sunlight, which can make it harder for the motorist to see warning lights.

7.28 The majority of near misses occur on UWCs (with or without telephones). The chart also shows that a disproportionate number of near misses occur at AOCL crossings.

Near misses with pedestrians and cyclists by crossing type



7.29 After a period of increase up to 2011/12, there appears to be no clear trend up or downwards.

7.30 As with road vehicle near misses, reporting is seasonal. It is likely that there are more pedestrians and cyclists using level crossings during spring and summer when the weather tends to be better, and, as with road vehicle near misses, train drivers are more likely to see crossing users during daylight hours.

7.31 Around 10% of the near misses shown in the chart involve cyclists.

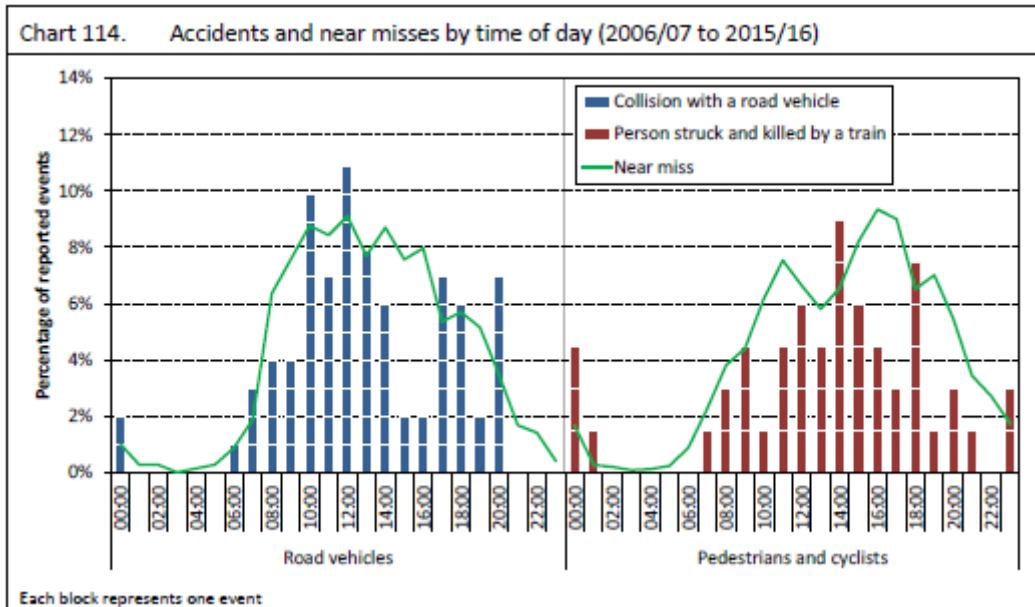
7.32 A qualitative review of accident data suggests that dog walkers may be particularly vulnerable to accidents at level crossings. Around 12% of near misses over the past ten years have mentioned a person walking a dog, and a number of fatal incidents during the same period have related to dogs running onto the line. In July 2015, Network Rail launched a new campaign in partnership with Dogs Trust, urging people to keep their dogs on a lead near level crossings.

7.33 Auditory distractions, such as personal stereos, also have the potential to increase the risk to level crossing users and have been mentioned in relation to a number of events over recent years.

7.34 UWCs (with or without telephones) account for a large proportion of near misses with both pedestrians and road vehicle users. Telephones may be provided at crossings where there are a high number of near misses reported or where sighting times are reduced.

Near misses by time of day

7.35 Chart 114 shows the proportion of accidents and near misses at level crossings reported in each hour of the day over the period 2005/06 to 2015/16.



7.36 Accidents and reported near misses with road vehicles tend to peak in the late morning and early afternoon. Accidents and near misses with pedestrians most often occur a little later in the day and the peak hours for pedestrian fatalities over the past 10 years has been between 14:00-15:00 and 18:00-19:00.

7.37 Accidents and reported near misses tend to occur at broadly similar times of the day. The main exception to this is that a higher proportion of pedestrian/cyclist fatalities occurs in the late evening (21:00 to 23:00) than would be anticipated from near miss reporting. One explanation is that near misses may go unseen (and therefore unreported) during hours of darkness.

Factors affecting the risk at level crossings

Level crossing equipment failure

7.38 Equipment failure can range from minor component defects to more serious disruptions caused by power cuts and technical faults. Damage to equipment is also caused by vandals, thieves, road traffic accidents and the weather (particularly wind, floods and lightning).

7.39 Equipment failure accounts for a small proportion of the risk at level crossings, the risk being mitigated by the fact that equipment is designed to 'fail safe'. For example, if the equipment fails at an automatic level crossing, the warning lights operate and the barriers lower.

7.40 The number of level crossing equipment failures reported into Safety Management Information System (SMIS) that are identified as Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) reportable has increased over the past decade (from 616 in 2006/07 to 1,074 in 2015/16). This is due to improved reporting and does not reflect a genuine increase in equipment failure rates. The trend in all reported level crossing equipment failures, which includes those that are not reportable under RIDDOR, reduced in 2015/16 compared with the previous year.

Railway crime

7.41 Crime at level crossings is a serious issue, which has the potential to cost lives, as well as cause delays and cost to the industry. These incidents include the defacing of

signs and criminal damage to gates, barriers, and telephones. The number of recorded incidents of interference with crossing equipment decreased in 2015/16, and is the lowest over the period.

2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
99	38	40	44	14	28	28	32	26	19

Actions by level crossings users

- 7.42 Although level crossings are usually used safely, each year there are a number of events where this is not the case, and the crossing event does not take place safely. Reasons include:
- Deliberate action on the part of the user, who was aware the action was incorrect and carried risk
 - Deliberate action on the part of the user, who was not aware that the action was incorrect, or was not aware of the risk-related consequences of the action
 - Unintentional action of the part of the user, which was not compliant with the crossing rules.
- 7.43 Around 40% of reported events occur at UWCs. Overall the most commonly recorded type of event is the user leaving the gates open. Additionally, for user-worked crossing with telephone (UWC-T), the most common occurrence is the user failing to contact the signaller, either before using the crossing, or once they are clear of the crossing.
- 7.44 The number of reported events at UWCs in 2015/16 showed a small decrease compared to the previous year. This is largely due to the number of pedestrians/cyclists reported to have crossed unsafely reducing from 323 to 102.
- 7.45 Around 43% of reported events occur at manually protected crossings. The majority of these events relate to users crossing while it is unsafe to do so. Events at these crossings are more likely to be observed (and therefore reported) by railway personnel.
- 7.46 The period 2010/11 to 2014/15 saw a significant increase in the number of reported events at manually protected crossings since 2010/11, which was driven by increased reports of users crossing unsafely. In 2015/16 the trend somewhat reversed, with the number of reported road vehicles crossing unsafely decreasing by 541, compared with the previous year.

Initiatives to reduce the risk at level crossings

- 7.47 Improving level crossing safety is a major focus for the industry. Network Rail has substantial safety improvements planned for CP5, which runs from April 2014 to March 2019, and which build upon the 31% reduction in level crossing risk achieved during the course of CP4. Investment in level crossing safety will exceed more than £230m by the end of the current control period (CP).
- 7.48 Among the safety projects currently underway are:
- The 100+ dedicated Level Crossing Managers continue to support sustained improvement in level crossing safety through engagement with users, asset inspection and risk assessment. Their subject matter expertise, local knowledge

and focus on stakeholder engagement, which includes building relationships with authorised users and wider local communities, improves capability to understand and target risks. The experience and maturity of the organisation, underpinned by enhanced guidance and policy, has enabled a truly balanced qualitative and quantitative risk management approach to level crossing safety.

- Continuous improvement is not limited to investment in people; it also extends to understanding level crossing risk. Investment in camera technology for example, has led to improved intelligence about users of level crossings (census data). Consequently, this knowledge has generated increased accuracy within risk assessments and enabled better targeting of risk reduction measures. Furthermore, the narrative risk assessment, which blends the quantitative risk model output with the qualitative structured judgement of the Level Crossing Manager, has succeeded as a catalyst for safety improvement.
- Network Rail is continually improving safety through design during asset renewals. Opportunities to enhance level crossing safety further by embracing innovation and technology within the Digital Railway programme are also being explored.
- With a secured CP5 risk reduction fund of £99m to support the delivery of a risk based closure programme, 194 legal closures have been achieved during the first two years of CP5. A further 13 crossings were also downgraded in status, so reducing risk. This takes the total number of crossings closed since the start of CP4 to 998.
- Network Rail has invested in improving the light output of all its 36W filament bulb road traffic light signals by converting them to LED units. Enhancement of the road traffic light signals has resulted in improved asset visibility at 494 level crossings across the network.
- Half-barrier overlay systems have now been installed at 66 automatic open level crossings locally monitored by train drivers. The addition of half-barriers enhances user safety and the approach enabled a modular design to be deployed at significantly lower cost than traditional alternatives.
- Significant work has been undertaken to assess the effectiveness of whistle board protected crossings and to optimise whistle board positions, or as appropriate, provide additional controls to help users decide when it is safe to cross. This programme of work impacted on some 1,600 level crossings across the network. The challenge now for Network Rail and the rail industry is to manage safety where crossings are used during the hours which train drivers are instructed not to sound train horns except in emergencies (23:00 and 07:00); known as the night-time quiet period (NTQP). Network Rail is working with RSSB to review the NTQP duration and is investing in technology to mitigate risks.
- Network Rail is making progress installing audible warning systems at passive footpath crossings protected by whistle boards. The technology uses radar equipment to detect approaching trains and wayside horns to provide a localised audible warning at the crossing. The system is the first step in a three phase strategy towards eradicating whistle boards as a means of protection.
- Work to deliver additional red light safety equipment (RLSE) at public road level crossings is progressing. RLSE is a camera system with number plate recognition technology which is designed to deter users from traversing when they are not permitted to do so. RLSE has been installed at 28 level crossings around the country. There are three suppliers, one of which is still in the final stages of attaining Home Office Type Approval. Further installations in 2016 will measure levels of deliberate misuse before and after installation to quantify the safety benefits of RLSE. This intelligence will facilitate decision making about future investment in the technology.

- The fleet of fifteen mobile safety vehicles staffed by British Transport Police (BTP) provides another means to raise awareness and detect deliberate misuse. They have detected and prosecuted in excess of 1,500 motorists responsible for red light violations since 2012.
- Two new overlay miniature stop light (MSL) systems have recently been product approved for use on the network. They provide an alternative to conventional but more expensive MSL solutions, warning users of approaching trains by providing a red light and audible warning at footpath and private vehicle crossings.
- Power operated gate openers (POGO) are installed at 80 private vehicle crossings around the country. Commissioning of the equipment is now underway. The POGO system opens and closes the vehicle gate via user operated push button mechanisms. This safety enhancement avoids the need for users to leave their vehicles to open and close gates and eliminates the need to traverse over a crossing on foot. Overall it reduces the traverse for a single user from five to one.
- Network Rail continues to be transparent in its management of level crossing safety, sharing risk information through its Transparency website (www.networkrail.co.uk/transparency/).
- A level crossing safety strategy which sets Network Rail's direction until 2040 has been developed and is reflected in a level crossing asset policy for CP6. These documents establish the medium and long term strategic direction and focus on level crossings for Network Rail. The strategy has been endorsed by both Network Rail and stakeholder representatives through the Level Crossing Strategy Group (LCSG).