RAIB

Rail Accident Investigation Branch

Rail Accident Report

Train/vehicle collision on the Leighton Buzzard Narrow Gauge Railway 25 March 2007

Department for Transport

Report 45/2007
December 2007

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Fax: 01332 253301
Website: www.raib.gov.uk

This report is published by the Rail Accident Investigation Branch, Department for Transport.

Train/vehicle collision on the Leighton Buzzard Narrow Gauge Railway, 25 March 2007

Contents

Introduction

1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and incidents and improve railway safety.

2 The RAIB does not establish blame, liability or carry out prosecutions.

3 Access was freely given by Leighton Buzzard Railway Ltd to their staff, data and records in connection with the investigation.

4 Technical terms (shown in *italics* the first time they appear in the report) are explained in Appendix A.

5 All diagram numbers for road traffic signs are as defined in the Traffic Signs Regulations and General Directions 2002, and recommended in Railway Safety Principles and Guidance Part 2E (Health and Safety Executive, 1996), Diagram 6 (Appendix D).

Summary

6 At approximately 13:08 hrs on 25 March 2007 a train on the Leighton Buzzard Railway (LBR), collided with a road vehicle at low speed on a level crossing at Shenley Hill Road on the outskirts of Leighton Buzzard, Bedfordshire.

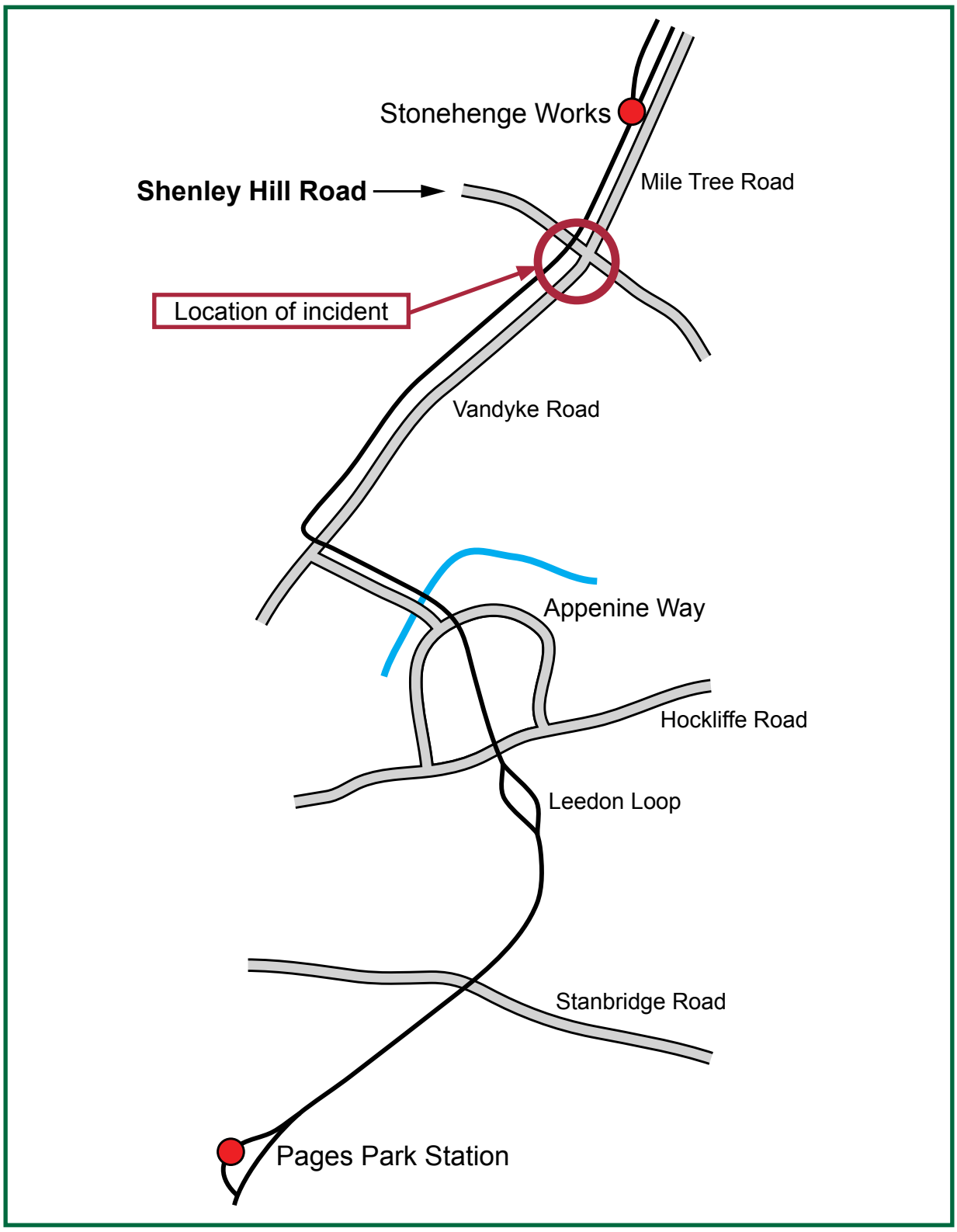


Figure 1: Route map of Leighton Buzzard Narrow Gauge Railway and location of incident

The Incident

Leighton Buzzard Railway

7 The Leighton Buzzard Railway (LBR) was built in 1919, without any statutory powers, and was originally used for the transportation of sand from local quarries. The Leighton Buzzard *Narrow Gauge* Railway Preservation Society was formed in 1967 and ran its first passenger service in 1968, although the sand traffic continued until 1977. The line runs from Pages Park station in Leighton Buzzard to Stonehenge Works, a distance of approximately 3 miles (4.8 km) away (see Figure 1).

8 The line incorporates a number of level crossings; in the town of Leighton Buzzard a *flagman* is generally used to ensure road traffic is stopped to allow a train to pass over the highway. There are also a number of *open level crossings* over the highway and *footpath crossings* where the train travels over the line at low speed operating on line of sight without the service of a flagman. The priority at all crossings is with the train. Because the line has operated continuously since 1919 without statutory powers there are no *level crossing orders* for any of the crossings, although an agreement dated 28 August 1919 between Bedford County Council and Leighton Buzzard Light Railway Limited governs the construction, operation and maintenance of the crossings.

The crossing

9 Shenley Hill Road railway crossing is located to the north side of a road junction between Shenley Hill Road and Mile Tree Road (see Figures 2 and 3). Shenley Hill Road runs north to south, and is to the north of Mile Tree Road. The rail crossing has been the location of five near misses in 2006 and one near miss incident in 2007. Two separate fatal road traffic accidents occurred at the road junction in 2001 and 2004 respectively. All of these road traffic incidents and accidents were reported to and dealt with by Bedfordshire Police.

10 Road traffic travelling on Mile Tree Road runs parallel to the rail track either side of the turning on to Shenley Hill Road. The visibility of the crossing from either direction on Mile Tree Road is sufficient to observe the train and allow motorists time to brake safely and turn left or right into Shenley Hill Road (see Figures 8 and 9).

11 Shenley Hill Road is a de-restricted road with a 60 mph (96 km/h) road speed limit. However, the proximity of the level crossing to Mile Tree Road junction will slow cars below this speed in this area.

12 The approach to the crossing from Shenley Hill Road is by a 300 - 400 m straight after a right-hand curve. Throughout the straight there is clear and unobstructed visibility of the road signage for the level crossing.

13 There is one advance sign on Shenley Hill Road indicating the level crossing, albeit not compliant to Diagram 771, and this is followed by two signs warning motor vehicles to give way, one for the crossing and one for the road junction. Both give way signs are accompanied by white stop lines painted on the road. The road markings are not clear and are in need of repair (see Figures 2 and 3).

Figure 2: View approaching Shenley Hill Road level crossing from North to South. A vehicle can be seen in space between the two give way areas waiting to turn right onto Mile Tree Road. The red line indicates the location, 40 m from the junction when the train can be partially seen from the left-hand side (LHS) in the direction of travel

14 There is space to allow a car to safely pass over the level crossing, stop and wait at the second give way signs, whilst still allowing a LBR train to safely pass behind the road vehicle (see Figure 2).

Figure 3: View from east to west of Shenley Hill crossing

Events during the incident

15 The weather at the time of the incident was dry, warm with cloud. The visibility was good.

16 At approximately 13:05 hrs, the train departed Stonehenge Works station, en route to Pages Park station. There were approximately forty passengers and four staff on board.

17 The train involved in the incident comprised diesel locomotive number 80 'Beaudesert' and carriages numbers 11, 9, 7, 12.

18 The train driver was accompanied by the *duty operations manager* (DOM) acting as the flagman and *driver's assistant* on the *footplate*. The *guard* was travelling with a trainee guard in coach 11, immediately behind the locomotive.

19 The locomotive was running reverse with the locomotive cab at the front. The driver was positioned sideways, facing the right in the direction of travel; he had to look to his right, the normally front aspect of the cab to see the engine controls and speedometer, and look to his left, the normally rear windows of the cab, to see the line ahead.

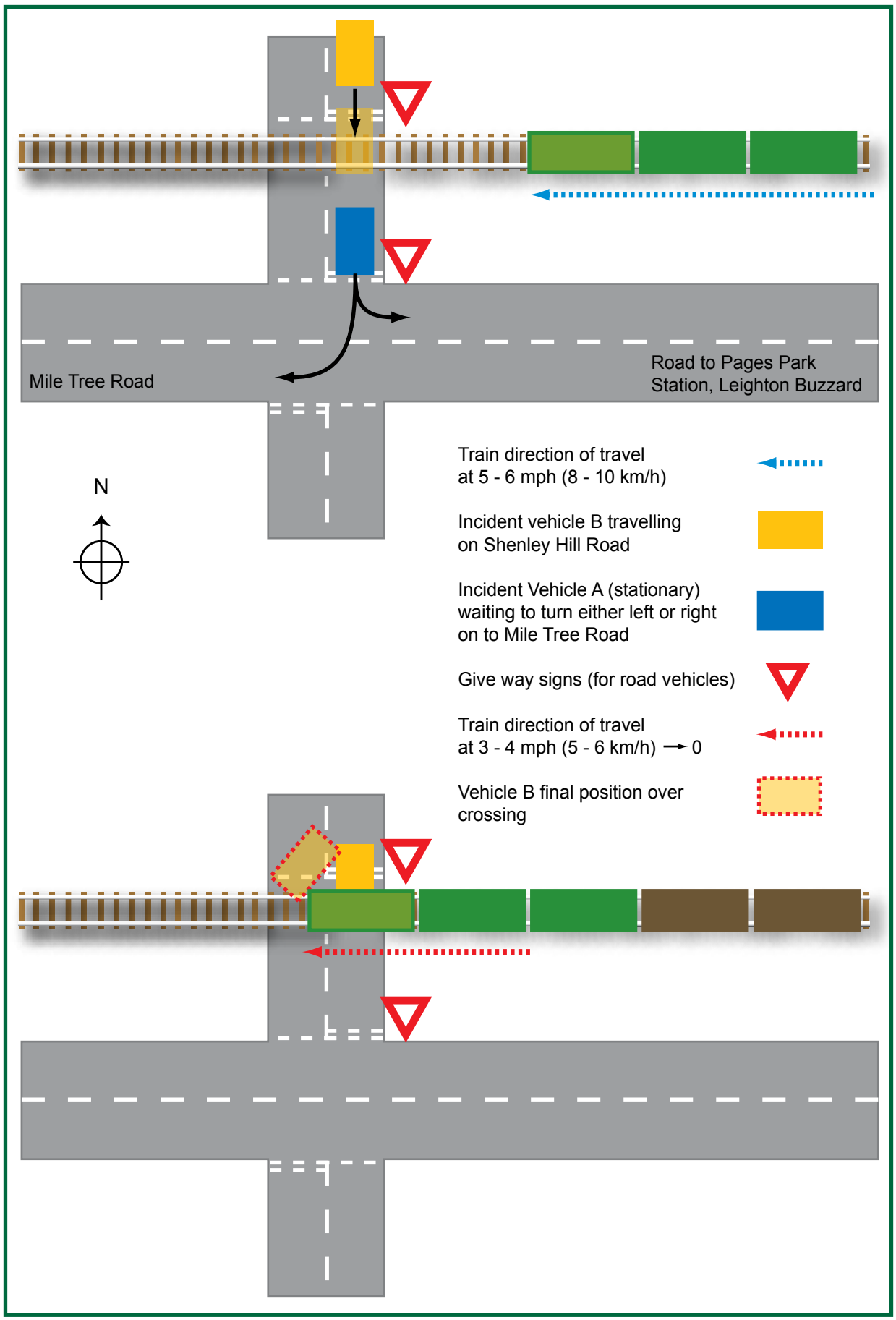


Figure 4: Plan view showing train and motor vehicle (a) and (b) positions before and at the point of collision

20 A Mercedes 4x4 motor vehicle was travelling along Shenley Hill Road en route from Leighton Buzzard to Luton at a reported speed of 30 mph (48 km/h) as it approached the level crossing (see Figure 4).

21 Two witnesses state that the train driver sounded his locomotive horn at least twice, giving a long and short audible warning to pedestrians and road vehicles. This was in accordance with the LBR rule book procedures.

22 The train driver was aware of the permanent speed restriction (PSR) of 5 mph (8 km/h) in place for the level crossing. When the train was approximately 6 m away from the level crossing, it was travelling at 4 - 5 mph (6 - 8 km/h). The driver sounded his horn for the first time at this point.

23 Both the train driver and the driver's assistant observed two road vehicles on Shenley Hill Road, approaching the crossing from the right to left in the direction of the trains travel (see Figure 4).

24 The first vehicle passed over the level crossing and stopped at the junction with Mile Tree Road clear of the crossing and whilst waiting for an opportunity to turn onto Mile Tree Road (see Figure 4, vehicle (a)). The second vehicle, the Mercedes 4x4, (see Figure 4 vehicle (b)) did not stop at the 'give way' sign for the railway, and moved onto the level crossing.

25 When the train driver saw the Mercedes come to a stop on the level crossing, the locomotive was approximately 6 m from the vehicle and he applied the emergency brake. However, the train driver was unable to stop the locomotive and avoid a collision. The train pushed the Mercedes vehicle at low speed sideways onto the right hand carriageway (see Figures 6 and 7).

Events following the incident

26 There were no reported injuries to anyone in the train or the car. The train and the car effectively blocked Shenley Hill Road in both directions. The train driver and the guard positioned LBR staff to protect the train by warning road traffic approaching the junction.

27 The DOM, acting as the driver's assistant contacted the *controller* to ask for police attendance. There was no requirement to protect the running line as no other trains were in service on the day and thus there was no other risk from other trains.

28 The passenger carriages had not entered the road area and all passengers remained safely in them (see Figure 5).

29 The only witnesses to the accident were the train driver, the driver's assistant, the Mercedes vehicle driver and the passengers in the car. No other staff or passengers on the train were aware anything was amiss until the collision.

30 Bedfordshire Police attended. Details of the train and vehicle were given to each party. Bedfordshire Police officers visually examined the Mercedes motor vehicle and allowed the Mercedes driver to continue on his journey. The RAIB were not notified of this decision, contrary to regulation 8 of The Railways (Accident Investigation and Reporting) Regulations 2005.

31 The Mercedes vehicle's front offside wing and wheel were damaged but the car remained roadworthy. The locomotive suffered superficial damage to its paint work, but was fit for traffic.

32 The RAIB were notified at 13:30 hrs and deployed an inspector, who lived locally and arrived at 13:35 hrs and undertook a preliminary examination of the site and the locomotive.

33 The Mercedes vehicle was not at the scene when the RAIB arrived. The passengers had not been detrained. A *functional brake test* was completed at the scene by the LBR under the supervision of the RAIB and all brake systems found to be working correctly. At 13:40 hrs the train returned to Pages Park Station with the passengers onboard.

Evidence and Analysis

Handling of the train

34 The LBR rule book, Section P, Clause 4 and Appendix 1 of the LBR general operating procedures outline the procedure at open crossings where no flagman is required.

35 The railway has four open crossings between Pages Park and Stonehenge Works. Shenley Hill Road is a crossing where no flagman is required and road vehicles must give way to the train passing over the level crossing. The LBR had agreed with Her Majesty's Railway Inspectorate (HMRI) early in their period of operation that the risk of providing a flagman at this crossing was unacceptable because of the speed and density of road traffic. To ensure safe operation the LBR rule book states that:

- audible warning **must** be sounded approaching and adjacent to the crossing;
- drivers must ascertain the crossing is clear;
- that drivers of road traffic vehicles and pedestrians in the vicinity are aware of the presence of the train; and
- the speed over the crossing must not exceed 5 mph (8 km/h).

36 There is evidence that the train driver and driver's assistant both had good visibility on the approach to the crossing at Shenley Hill Road, and that the train was travelling at 5 - 6 mph (8 - 9 km/h) as it approached the crossing, braking to below 5 mph (8 km/h) as it reached it.

37 The train driver's view of vehicles approaching the crossing from right to left on Shenley Hill Road may have been partially obstructed by the second man who was standing adjacent to the driver in the cab.

38 The train was being driven in accordance with the LBR rules and the driver could not have prevented the accident as the crossing was clear as he approached it and only obstructed after he had committed to driving onto it.

Figure 5: South view looking at incident train and position of incident vehicle. A vehicle can be seen on Shenley Hill Road approaching the level crossing

Handling of the motor vehicle

39 The motor vehicle driver was a local man and had a good knowledge of the Leighton Buzzard area, and in particular the town. He was aware of the LBR but assumed that all crossings were protected by a flagman. At the time of the incident he was travelling with young passengers.

40 As the motor vehicle driver approached Shenley Hill open level crossing he observed a vehicle waiting at the crossing to turn onto Mile Tree Road. He did not see a train and assumed that, as there was no flagman and a motor vehicle waiting to turn onto the main road, there was no train present. For this reason, he did not see a need to anticipate or brake for the first give way road marking; he drove his vehicle over the give way line without stopping and drew up to the rear of the motor vehicle waiting to turn (see Figures 6 and 7).

Figure 6: View from the east travelling towards Shenley Hill Road crossing

41 The motor vehicle driver alleged that he did not hear any audible warnings as the train approached from Stonehenge Works station. The motor vehicle driver alleged his attention may have been distracted by passenger noise from within the motor vehicle.

42 The driver only became aware of the presence of the train when a passenger in the vehicle warned him of the train approaching from the road vehicle's front offside. This was immediately before the collision occurred, and too late to take any evasive action.

43 There is no evidence that the car driver was driving at a speed that was excessive for the circumstances.

44 The motor vehicle not stopping at the first give way sign and line was the immediate cause of the accident.

Level crossing behaviour on LBR

45 The unusual layout of the crossing from the Shenley Hill Road approach, with two immediately adjacent give way signs, may lead a road vehicle driver coming from this direction to assume that a train is not approaching the crossing if a vehicle is present in the road space between the further sign and the crossing.

46 The population in Leighton Buzzard has increased significantly in recent years. Many of the new home owners are not familiar with the LBR level crossing locations, or the distinction between flagged and non-flagged open crossings (see Figure 1).

47 In accordance with the LBR rule book, where a flagman is required, the flagman, wearing high visibility clothing, gets out of the stationary train. At a safe opportunity the flagman enters onto the road highway presenting a red flag to motor vehicles approaching the open railway crossing. When motor vehicles from both directions have come to a stationary position the flagman will indicate to the train driver that it is clear to proceed across the open crossing. The train driver will sound an audible warning and the train will proceed across the highway. The flagman will then rejoin the train when the train has stopped on the other side of the highway.

48 The RAIB examination of the LBR route showed that where a flagman was provided at an open crossing, the train was able to pass safely over the crossing. However, the flagman has to stand in the carriageway to stop traffic and this is, in itself, a safety risk to the flagman.

49 At the Apennine Way and Shenley Hill Road open level crossings, where no flagman is provided, the RAIB observed road vehicles ignore the railway crossing give way signs and increase their speed. This was in an attempt to cross the railway line ahead of an approaching train and avoid any delay in waiting for the train to safely pass over the road highway.

Figure 7: View on approach to Shenley Hill Road crossing (incident locomotive approached crossing from left of image)

50 As part of the investigation the LBR operated a test train over the Shenley Hill Road level crossing so that it came to a stand two metres away from the highway. On each occasion that the train was brought to a stand, road vehicle traffic, having observed the locomotive stationary at the crossing, stopped behind the northern give way sign, and in Mile Tree Road (see Figures 7, 8 and 9).

Railway Safety Principles and Guidance

Principles of RSPG

51 Section 9 of Railway Safety Principles and Guidance (RSPG), part 2E, published by the Health and Safety Executive (HSE) and now adopted by the Office of Rail Regulation (ORR), sets out the basic requirements for an open crossing (Appendix C). This document is not retrospective for existing crossings, and hence does not apply to Shenley Hill Road crossing. The following reviews the crossing against the guidance in RSPG using it as a basis of good practice.

Open crossings

52 Section 2, paragraph 22, (RSPG), Table 1 gives guidance on the factors to be considered for any given location and conditions for suitability. Section 9, concerning Open Crossings paragraph 3 states 'The 85 %ile road speed at the crossing to be less than 35 mph (60 km/h)'. Because of the effect of the road junction this condition is met at Shenley Hill Road crossing, and it is appropriate for an open crossing.

RSPG and methods of operation of an open crossing

53 At the commencement of Section 9, paragraph 121 of RSPG part 2E states:

> 'This type of crossing does not have barriers or road traffic light signals, and only road traffic signs are provided. Road users are required to stop and give way to trains at the crossings. Road users can see approaching trains in sufficient time for them to be able to cross the railway or stop safely. Train drivers are required to stop the train short of the crossing unless they have observed the crossing is clear. Train drivers are also required to sound the horn of the trains between 07.00 and 23.30.'

54 Section 9, paragraph 123 states the method of operation as:

> 'Trains normally approach the crossing at a steady speed, known as the crossing speed, so that trains can be halted short of the crossing from a point at which it clearly comes into the train drivers view.'

55 Section 9, paragraph 126 limits the maximum speed on an open crossing of all railways to 15 km/h (10 mph).

56 The accompanying footnote for Section 9, paragraph 123 states:

> 'The preferred arrangement is for trains not to stop before passing over a crossing unless it is not practicable to arrange otherwise'.

57 Section 9, paragraph 124 states that:

> 'Trains are required to stop before proceeding over the crossing where:
>
> (a) road users cannot see the approaching trains across the viewing zones (defined in Appendix B); or
>
> (b) the train driver cannot see the crossing from the point at which the brake should be applied to stop short of the crossing'.

58 Appendix B of RSPG Part 2E lays down viewing zones for road drivers to see an approaching train, depending on the length of the crossing. Distance 'X' is the distance of the road vehicle from the crossing give way line and distance 'Y' is the distance along the railway where a road driver should be able to see a train approaching the crossing. Appendix D shows the required distances for a crossing with a carriageway width of 7 m, as at Shenley Hill Road.

59 The viewing zones are not dependent on the speeds of trains, which are limited as in paragraph 55, or of road vehicles, but on the distances when the driver of the train observes the motor vehicle. Actual views from a road vehicle approaching from Shenley Hill Road, and trains approaching in both directions, are given in Figures 8 – 11.

Figure 8: Train driver's view 40 m from crossing as viewed from the west

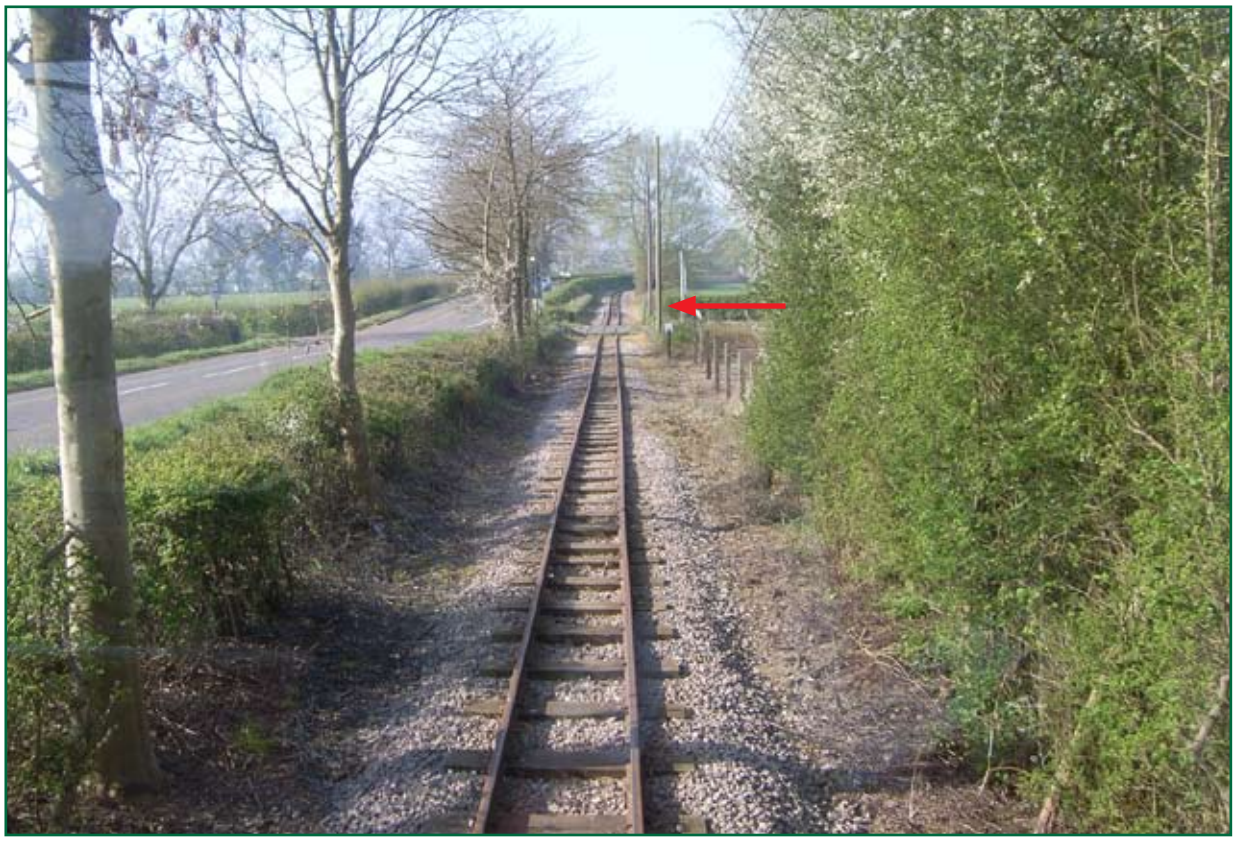


Figure 9: Train driver's view 20 m from crossing as viewed from the east

Figure 10: View from the train APPROACHING Stonehenge Works station

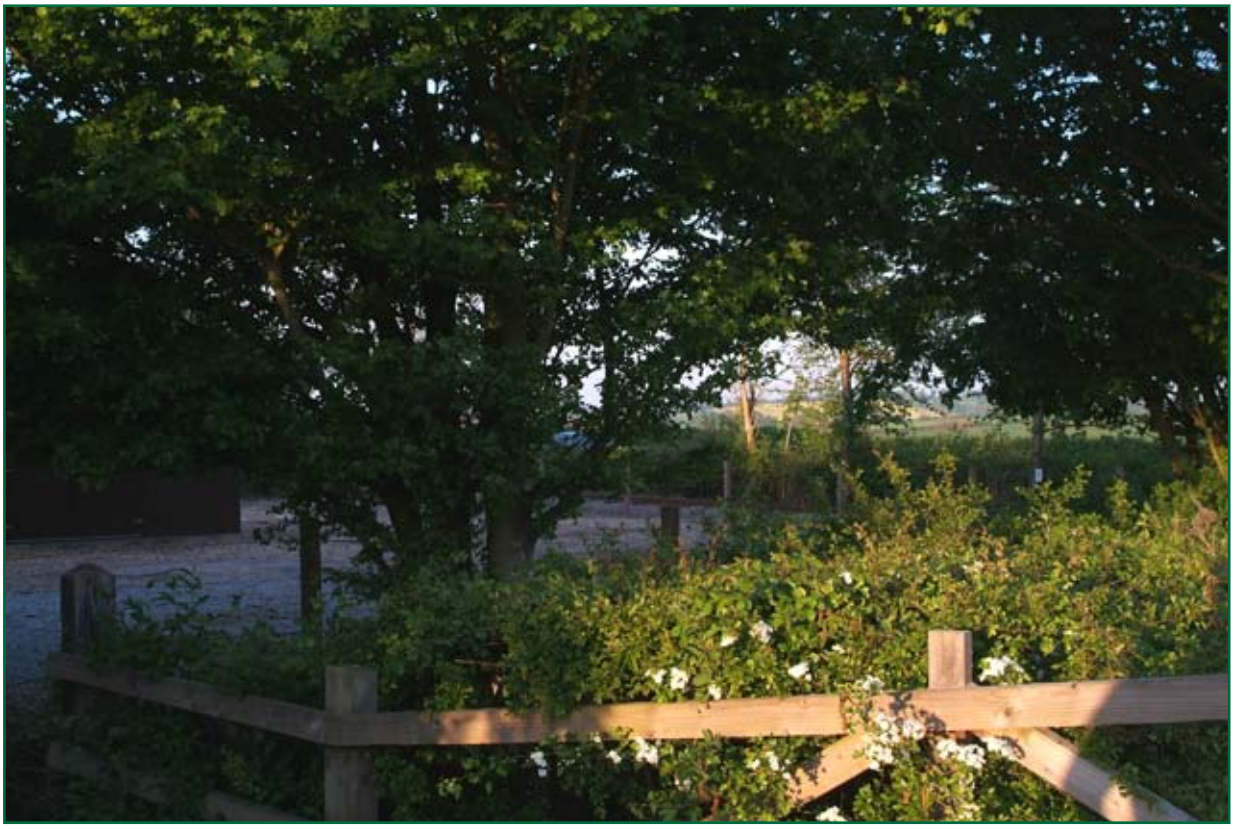


Figure 11: View from the train travelling FROM Stonehenge Works station

60 Vegetation and trees obstruct the visibility for motor vehicles 20 - 40 m from the crossing on Shenley Hill Road and subsequently give intermittent visibility of the train approaching from Stonehenge Works Station.

61 Much of the vegetation that obstructs the visibility of approaching trains is outside the boundaries of both the railway and highway.

62 This limited visibility means that Shenley Hill Road crossing would not comply with requirements of RSPG Part 2E for viewing zone distances for motor vehicles and trains (see Appendix D and Figures 10 and 11). This lack of visibility may have contributed to the accident.

Signage

63 The signs on the approach to the crossing from Shenley Hill Road do not comply with RSPG (see paragraph 13).

64 At the crossing there is no sign warning vehicles to 'Keep crossing clear' (Diagram 775) and no sign giving contact details for the railway (Diagram 785). RSPG part 2E would recommend both (see Appendix D).

65 The current signage of the crossing would not comply with the requirements of RSPG.

66 Observation of other level crossings on the LBR shows similar signing deficiencies with respect to the RSPG.

Previous occurrences

67 ORR (HMRI) reported that in August 2001 a road vehicle collided with a train at the crossing. The vehicle had approached the crossing from Mile Tree Road and turned left into Shenley Hill Road. The driver stated that she had not heard or seen the train and she presumed she had the right of way.

68 It is an offence under Section 36 of the Road Traffic Act 1988 (Failing to give way) and Section 36 of the Malicious Damage Act 1861 (Obstruction of the railway) for a road driver not to give way to a train. LBR report 'near miss' incidents to Bedfordshire Police, who, as a result, issue warning letters to all vehicle owners involved in such incidents. If the vehicle is involved in a further incident, action could result in a Fixed Penalty Notice or being summonsed to appear at Magistrates court.

69 Bedfordshire Police supplied details of incidents occurring at Shenley Hill Road and the associated junction. There were five reported incidents at the crossing in 2006. One incident which did not result in a collision, occurred in identical circumstances to the accident of 25 March 2007. Two near miss incidents occurred where vehicles turned onto Shenley Hill Road from Mile Tree Road.

70 Incidents on the LBR in 2006-2007 were reported to Bedfordshire Police as 'near miss' incidents but not reported as a 'near miss' incidents to the RAIB in accordance with the Railways (Accident Investigation Reporting) Regulations (RAIR) 2005 schedule 1.9.

71 LBR have now implemented a system where all incidents reported to Bedfordshire Police are reported to the RAIB.

Discussion

72 Motor vehicle drivers are travelling at speeds of 40 - 60 mph (64 - 96 km/h) on the straight road approaching the crossing, although slowing because of the give way signs at the junction. With the presence of the trees and foliage along Shenley Hill Road, the layout of the crossing and drivers not obeying the prescribed road signage, there is a likelihood of a collision occurring although the train is travelling at 5 mph (8 km/h) or below.

73 The possibility of a road vehicle being pushed onto the other carriageway exists and the speed of oncoming traffic approaching the crossing could contribute to a more significant event occurring.

74 The RAIB evaluated the use of 'box junction' markings from the northern give way line until clear of the crossing on Shenley Hill Road (Diagram 1045 Traffic Signs Regulations and General Directions 1994). The layout of the crossing and dimension of vehicles that use the crossing preclude this from being an effective solution, because the distance between the two give way lines and a box marking road layout would cause a long vehicle such as an articulated lorry to disobey the law by default (see Figure 7).

75 Shenley Hill Road is frequently used by articulated lorries travelling to and from working quarries in Leighton Buzzard.

76 The RAIB evaluated, but does not recommend, the provision of a flagman at Shenley Hill Road open level crossing because of the risk to anyone discharging those duties, who would have to stand in a road that is liable to high speed driving and has a record of road accidents.

77 Provision of lights and barriers at the crossing would need to take account of the proximity of the road junction, and in the view of the RAIB is not a reasonably practicable solution to the problems.

78 Observations conducted during an RAIB visit concluded that bringing the train to a stationary position before crossing the highway ensures that road vehicle drivers are fully aware of the presence of the train and its driver's intention to pass over the crossing (see Figure 7).

79 Accordingly the RAIB is of the opinion that the best practicable way to reduce risk on the crossing is for all trains to stop and ensure that road traffic has halted before entering the crossing.

Conclusions

Cause

80 The immediate cause of the accident was the motor vehicle driver not stopping at the give way sign immediately to the north of the level crossing.

Contributory factors

81 The motor vehicle driver did not stop before the level crossing because of:

- inability to see the train due to vegetation;
- the possible distraction of his attention by his passengers;
- his perception of the crossing in reference to the non-use of a flagman; and
- the presence of another road vehicle on his first view of the level crossing as he approached the level crossing on Shenley Hill Road.

82 The viewing zones for the road vehicle driver do not comply with the requirements of RSPG, part 2E, Appendix B, which although not retrospective, represent good practice.

Recommendations

83 The following safety recommendations are made[1]:

1 Leighton Buzzard Railway Ltd should change the method of working of Shenley Hill Road open crossing to require the train to stop and allow road traffic to halt before entering the level crossing.

2 Bedfordshire County Council should cut down the vegetation around Shenley Hill Road open crossing and introduce a process of vegetation management in order to meet the viewing zone requirements of RSPG 2E Appendix B.

3 Bedfordshire County Council and Leighton Buzzard Railway Limited, as appropriate should ensure that traffic signs and road surface markings for which they are each responsible at LBR level crossings comply with diagrams 771, 775 and 785 as defined in the Traffic Signs Regulations and General Directions 2002, and recommended in Railway Safety Principles and Guidance Part 2E (Health and Safety Executive, 1996), Diagram 6.

[1] Responsibilities in respect of these recommendations are set out in the Railways (Accident Investigation and Reporting) Regulations 2005 and the accompanying guidance notes, which can be found on RAIB's web site at www.raib.gov.uk

Glossary of abbreviations and acronyms — Appendix A

DOM	Duty Operations Manager
HSE	Health and Safety Executive
HMRI	Her Majesty's Railway Inspectorate
LBR	Leighton Buzzard Railway
ORR	Office of Rail Regulator
PSR	Permanent Speed Restriction
RAIB	Rail Accident Investigation Branch
RAIR	Railways (Accident Investigation and Reporting) Regulations
RSPG	Railway Safety Principles and Guidance

Glossary of terms — Appendix B

All definitions marked with an asterisk, thus (*), have been taken from Ellis' British Railway Engineering Encyclopaedia © Iain Ellis. www.iainellis.com

Controller	The central point of contact for information and decisions relating to the day-to-day operation of the LBR railway.
Drivers Assistant	When circumstances require it, a second driver is provided to carry out other duties as required. This may be in addition to the provision of a Guard.
Duty Operations Manager	On-call manager delaing with operational issues on railways.
Flagman	Colloquial alternative for a hand signaller.*
Fireman	Person primarily employed to attend the fire of a steam locomotive.*
Footpath Crossing	A Level Crossing (LC) provided solely for use by pedestrians.*
Footplate	The platform in the cab of a locomotive on which the engineer stands to operate the controls.
Functional brake test	A mandatory test of train or vehicle brakes following certain types of incident to determine the functionality against the standard.*
Guard	Senior Conductor, Conductor or Train Man.
Heritage Railway	A railway operated as a tourist or museum operation, predominantly using equipment from bygone times.*
Level Crossing Order	A statutory instrument describing the application of the Railway Safety Principles and Guidance (RSPG) to a particular Level Crossing (LC).
Narrow Gauge	Track laid to a Gauge less than Standard Gauge (1435 mm, 4 feet 8 ½ inches).
Open Level crossing	A type of Level Crossing (LC) with no Barriers, Gates, warning system (apart from a Whistle Board) or monitoring.

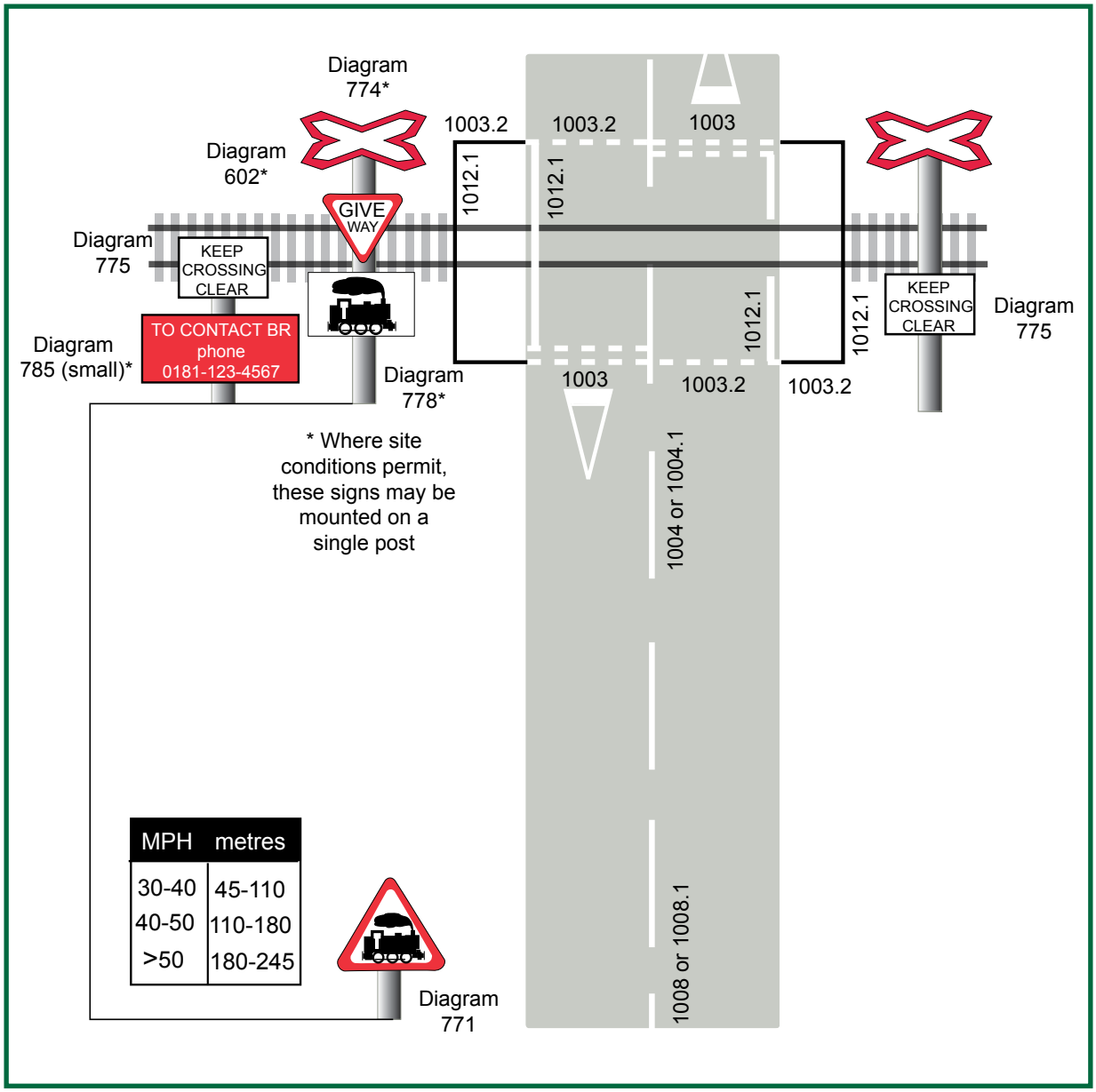
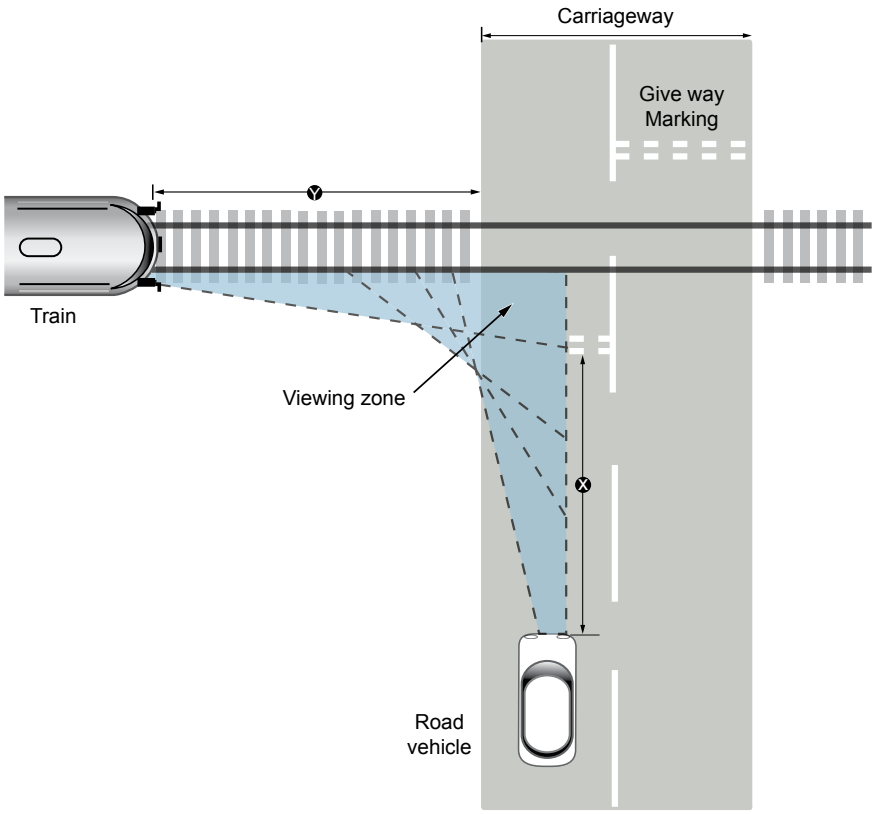


Diagram 774*
Diagram 602*
GIVE WAY
Diagram 775
KEEP CROSSING CLEAR
TO CONTACT BR phone 0181-123-4567
Diagram 785 (small)*
Diagram 778*
* Where site conditions permit, these signs may be mounted on a single post
1003.2
1003.2
1003
1012.1
1012.1
1012.1
1012.1
1003
1003.2
1003.2
KEEP CROSSING CLEAR
Diagram 775
1004 or 1004.1
1008 or 1008.1
MPH metres
30-40 45-110
40-50 110-180
>50 180-245
Diagram 771

Definition of viewing zones at Open Crossings Appendix D

1. The viewing zone (as shown in the shaded area) is defined by lines connecting points 'X' and 'Y' given in Table 13



DISTANCES 'X' (metres)	DISTANCES 'Y' (metres) FOR CROSSING LENGTHS OF:
	7 m
2	**140**
10	**40**
20	**25**
40	**20**

2. Distance 'X' is the distance of road vehicle users from the 'give way' line on the approach. Distance 'Y' is the distance of an approaching train from the crossing. A crossing which crosses the railway at right angles over a single line is normally considered as 7 m long, but at longer crossings it should be possible to see trains earlier. Where road gradients are steep, distances 'X' should be varied accordingly. Where the 85%ile road speed is less than 25 km/h (15 m/h), the maximum value of 'X' may be 20 m.

Key standards current at the time — Appendix E

Railway Safety Principles: and Guidance (RSPG)	Traffic Sign Regulations and General Directions 1994, and recommended in Railway Safety Principles and Guidance Part 2E (Health and Safety Executive, 1996)

This report is published by the Rail Accident Investigation Branch,
Department for Transport.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Telephone: 01332 253300
Fax: 01332 253301
Email: enquiries@raib.gov.uk
Website: www.raib.gov.uk