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HERITAGE RAILWAY ASSOCIATION

GUIDANCE NOTE

LEVEL CROSSING SIGHTING DISTANCES

for Footpath and Vehicular User-Worked Crossings

Purpose

This document describes good practice in relation to its subject to be followed by Heritage Railways, Tramways and similar bodies to whom this document applies.

Endorsement

This document has been developed with and is fully endorsed by Her Majesty's Railway Inspectorate (HMRI), a directorate of the Office of Rail Regulation (ORR).

Disclaimer

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Supply

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Copies are available electronically via its website www.heritagerailways.com

Users of this Guidance Note should check the HRA website to ensure that they have the latest version.

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1. Introduction

This Guidance has been provided to assist the duty holder of heritage railways and tramways in the assessment and measurement of the minimum necessary Sighting Distances for Footpath and Vehicular User-Worked Crossings.

Duty holders will be aware that they have a legal obligation to passengers, contractors, other visitors, staff and volunteers under the Health and Safety at Work etc Act, 1974. It is therefore important that they relate and interpret this part of the Regulations relative to the safe operation of their railway.

The term ‘man’ or ‘men’ in this Guidance Note should be read as applying equally to men and women and ‘he’ and ‘him’ should be similarly interpreted.

The term ‘staff’ in this Guidance Note should be taken to include unpaid volunteer workers as well as paid staff.

2. Recommendations

This guidance note is issued as recommendations to railway and tramway duty holders with regard to the assessment and measurement of the minimum necessary Sighting Distances for Footpath and Vehicular User-Worked Crossings..

Many railways are already operating systems which are to higher standards than those set out in this guidance note. This highlights the fact that it is the responsibility of duty holders to implement a level of risk assessments and controls which they feel are applicable and necessary relative to the operating conditions on their railway or tramway.

Where railways decide to take actions that are not in agreement with these recommendations, following appropriate risk assessments or for other reasons, it is recommended that those decisions are reviewed by the senior management body of the organisation and a formal minute is recorded of both the decision reached and the reasons for reaching it.

3. General

a) The Office of Rail Regulation (Her Majesty’s Railway Inspectorate) has produced a guidance note for the use of duty holders entitled ’Level crossings: A guide for managers, designers and operators‘, reference RSP007, 2011

b) The ORR guidance is intended to cover all railways in the United Kingdom. However, as a result the guidance regarding the minimum necessary sighting distance for footpath and user-worked crossings requires precautions that, in the case of a heritage railway operating at 25 mph (40 km/h) or less may be considered as greater than is reasonably practicable. This guidance note is intended to help the duty holder of a heritage railway with a maximum speed of no more than 25 mph (40 km/h) to assess what safe sighting distance for a footpath or user-worked crossing may be considered as reasonably practicable.

c) RSP007 defines a footpath crossing, a user worked crossing, a decision point and the sighting distance. This document uses these definitions throughout.

   i) A ‘Decision point’ applies to user worked crossings, footpath crossings and bridleway crossings. It is a point where guidance on crossing safely is visible and at which a decision to cross or wait can be made in safety

   ii) ‘Sighting distance’ is the distance measured along the railway from a decision point to the point at which an approaching train becomes visible in any direction from which a train may approach.

d) A boning rod comprises two pieces of timber fixed together in the shape of a T. The cross arm is about 300 mm long and must be at right angles to the upright arm, which should be 1.050 m long.

e) This document is designed to give specific guidance for establishing and measuring sighting distances on footpath crossings and user-worked crossings where vehicles cross the line on heritage railways that operate at speeds of 40kph (25mph) or less. It does not in any way relieve the duty holder of his duties to risk assess the crossing.

f) THIS GUIDANCE CANNOT BE USED TO CALCULATE A SAFE TIME FOR FARM ANIMALS TO CROSS A RAILWAY LINE

g) The basic requirement of RSP007, for both a footpath crossing and a vehicular user-worked crossing, is that the duty holder should, if reasonably practicable, provide a minimum sighting distance such that:

i) for a pedestrian crossing, a pedestrian who cannot see a train approaching when he is standing at the decision point can cross the line at a normal walking pace to a point clear of the track on the far side of the crossing without risk of being struck by a train; or

ii) for a user worked vehicular crossing, the driver of a vehicle that is parked with its front at the decision point can cross the line at a slow driving speed so that the rear of the vehicle is clear of the far decision point without risk of being struck by a train.

h) If the minimum sighting distance cannot be maintained, for example because of a wall or a bridge abutment obstructing the visibility, then the duty holder should investigate and provide alternative means to ensure the safe operation of the crossing, as laid down in RSP007. These means might include:

i) Slowing down the trains to give a sighting distance commensurate with the reduced speed of the trains; or

ii) Provision of audible warning by approaching trains.

i) Whilst this document shows a method of calculating the visibility requirements, and checking the adequacy of sighting distances at footpath and user-worked level crossings, it is not mandatory, and a duty holder may use other methods that produce an equal level of risk control.

4. Assessment of sighting distance - principles

a) The duty holder should assess the sighting distance at a height of 1.05m above ground level. This height allows for the vision of a child of sufficient age to be out alone standing at the decision point, and the vision of the driver of a car seated at the steering wheel.

b) The duty holder should have four pegs installed at the foot of the cess ballast shoulder on both sides of the track at the minimum sighting distance from the crossing in each direction (see sections 4 and 5 below). The head of the pegs should be no higher than level of the nearest rail; if pegs are left permanently in situ then they should be made visible by painting to minimise any tripping risk.

c) The person assessing the sighting distance should use a 1.05 metre high boning rod (Diagram 1).

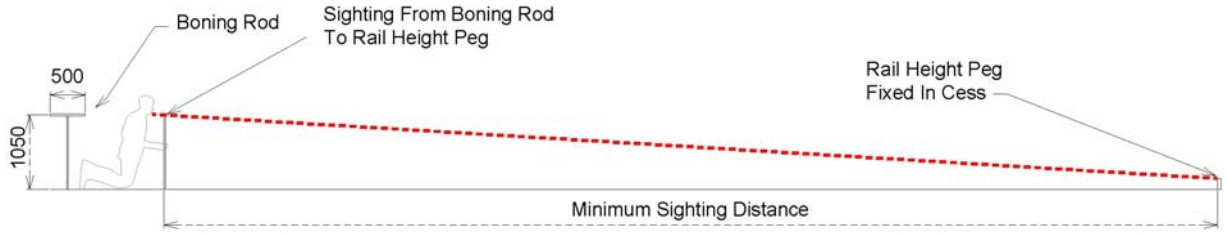

Diagram 1 – Boning Rod and sighting pegs

d) If the person assessing the sighting distance on any crossing can see the head of all four sighting pegs with his eyes place level with the top of the boning rod then the visibility of the track on that side of the crossing is adequate, as the whole of the front of a train will be visible from this point (Diagrams 2 & 3).

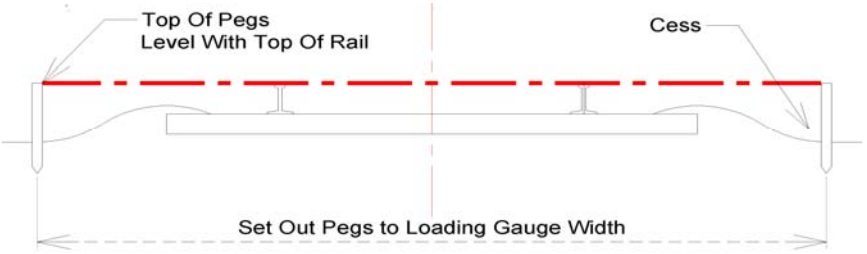

Diagram 2 – position of pegs

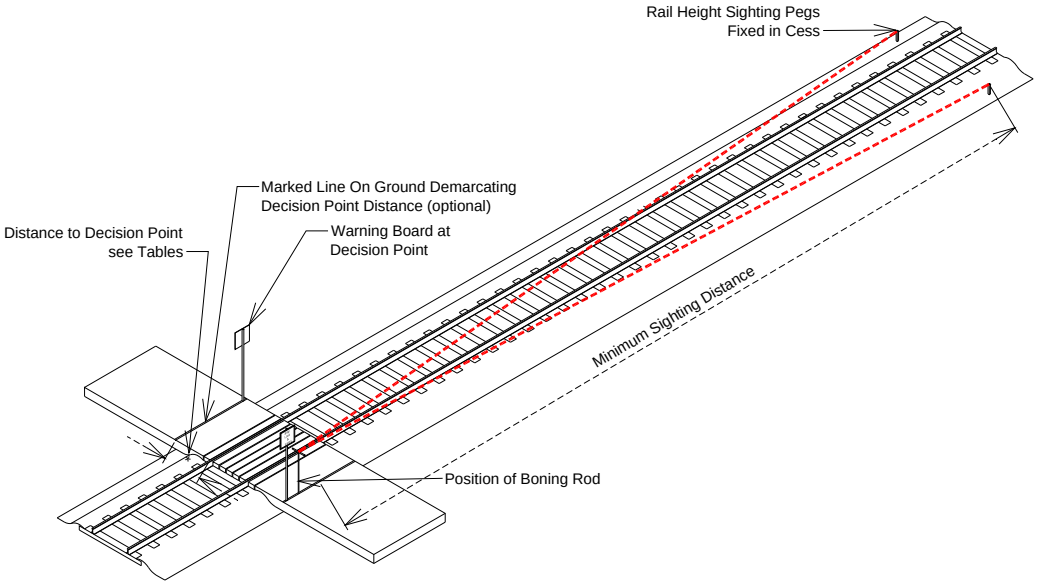

Diagram 3 – sighting from boning rod to peg on a single track

e) If the person assessing the sighting distance cannot see the head of a peg that should be visible with his or her eyes placed at the boning board then the visibility at that crossing is not adequate, as a person at the decision point may not see the whole of an approaching train: the person assessing the sighting distance should report this fact, and the reasons for the obstruction of the visibility, to the duty holder as soon as possible.

f) The person assessing the crossing should also carry out a visual check from the decision point at adult eye level (and at 3m height if the crossing is used by horses) to check that no overhanging branches can interfere with visibility.

5. Maintenance of sighting distance

a) It is essential that the clear visibility of the minimum sighting distance is maintained at all times. Accordingly, the duty holder should arrange for the safe sighting distance to be checked at least twice a year, with one of these checks taking place towards the end of the spring, when vegetation is likely to be at its maximum.

b) A major risk of obstructing the visibility of the minimum sighting distance is growing vegetation. The duty holder should arrange for vegetation to be cut back as often as is necessary, throughout the year, to maintain the minimum sighting distance.

6. Calculation of minimum sighting distances - footpath crossings

a) RSP007, Appendix A and paragraph 155, requires that a decision point is marked by a sign at the point at which the pedestrian can make a final decision as to whether or not it is safe to cross the line. It states that the decision point shall be a minimum of 2 metres from the nearest running edge for a footpath crossing, and 3m for a bridleway crossing.

b) The minimum distance to the decision point specified in RSP007 allows for a train passing at high speed, and possible aerodynamic effects. For a heritage railway with a maximum speed of 25 mph (40 km/h) such aerodynamic effects are greatly reduced, and the distance from the nearest running edge to the decision point can be lower. The individual railway should decide what distance to a decision point is appropriate for a particular crossing, but it should not normally be so small that a child under the age of ten years standing at the decision point could reach out and touch a passing train.

   i) For a standard gauge line, the duty holder should not consider a decision point for a footpath crossing at less than 1.5 metres from the nearest rail.

ii) For a narrow gauge line, the duty holder should not consider a decision point for a footpath crossing at less than 1.25 metres from the nearest rail

c) As specified in RSP007, the duty holder should, wherever possible, lay out footpath crossings at right angles to the track so as to minimise crossing time.

d) For a **right angled footpath crossing over a single track railway** a range of typical minimum sighting distances is as shown in the table below:

Crossing speed and gauge Gauge	10 mph / 16km/h 1432 mm	25 mph / 40 km/h 1432 mm	10 mph / 16 km/h 600 mm	25 mph / 40 km/h 600 mm
Minimum sighting distance in metres if decision point is 1.25 metres from track	N/A	N/A	35	87
Minimum sighting distance in metres if decision point is 1.5 metres from track	40	100	37	92
Minimum sighting distance in metres if decision point is 2 metres from track	44	110	41	102

Other circumstances can be interpolated from these tables, or the duty holder can obtain the spreadsheets behind these table from the Heritage Railway Association on application, and re-calculate the figures for their own circumstances

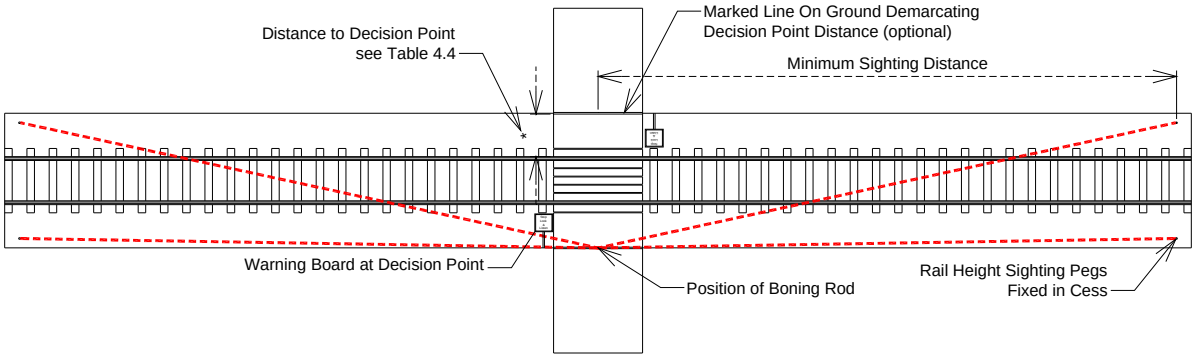

Diagram 4 – sighting for a right angled footpath crossing on a single track railway

e) For a **right angled footpath crossing over a double track railway**, a range of typical minimum sighting distances is given in the table below:

Crossing speed and gauge Gauge	10 mph / 16km/h 1432 mm	25 mph / 40 km/h 1432 mm	10 mph / 16 km/h 600 mm	25 mph / 40 km/h 600 mm
Minimum sighting distance in metres if decision point is 1.25 metres from track	N/A	N/A	45	111
Minimum sighting distance in metres if decision point is 1.5 metres from track	53	133	47	116
Minimum sighting distance in metres if decision point is 2 metres from track	57	143	51	127

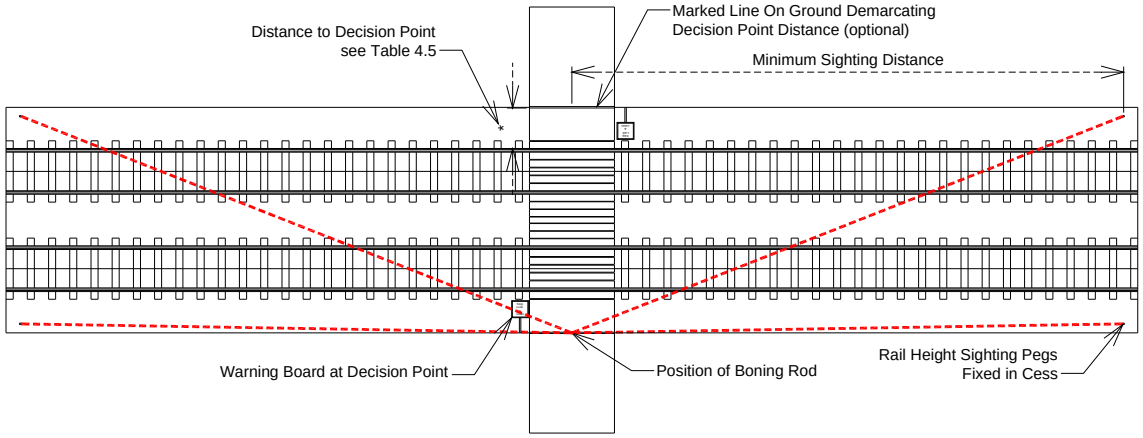

Diagram 5 – sighting for a right angled footpath crossing on a double track railway

7. Calculation of minimum sighting distances – vehicular user worked crossings

a) Whilst the same basic principle applies to user worked crossings, the following extra issues have to be taken into account:

   i) Whereas a pedestrian can be considered as a single point, a road vehicle, and in particular an agricultural vehicle, has a length. RSP007 gives an example of an 18 metre long agricultural vehicle, which figure is used in the tables in this guidance note. Another length, either longer or shorter can be substituted in the supporting spreadsheet if local assessment shows it to be appropriate

   ii) The driver of a road vehicle is normally set back from the front of the vehicle, assumed to be 1.66 metres. Accordingly the boning rod needs to be used at the position of the driver rather than the decision point.

   iii) The road vehicle driver takes additional time to start the vehicle after making the decision to cross.

b) The duty holder should not reduce the decision point for a road vehicle crossing below 2 metres **square to the line** in any circumstances, as the driver of a train should be able to see that a road vehicle that is stationary at the decision point is clear of the train.

c) If a road vehicle crossing is angled to the track then the distance from the decision point to the track increases for the road vehicle driver, with a consequent increase in the crossing distance and the time to cross the line

d) Allowing for these factors, for a **user-worked vehicular single track crossing** a range of typical minimum sighting distances is given in the table below:

Train Speed	10 mph / 16km/h	25 mph / 40 km/h
Minimum sighting distance in metres with a crossing angle of 90°	112	280
Minimum sighting distance in metres with a crossing angle of 60°	125	312
Minimum sighting distance in metres with a crossing angle of 45°	147	366

The effect of the criteria that increase crossing distance for user-worked crossings is to reduce the effect of track gauge on the minimum sighting distance, so this guidance is given for standard gauge only. The duty holders of narrow gauge lines may follow this guidance, or recalculate for the narrower gauge if the exact figure is critical for a particular crossing

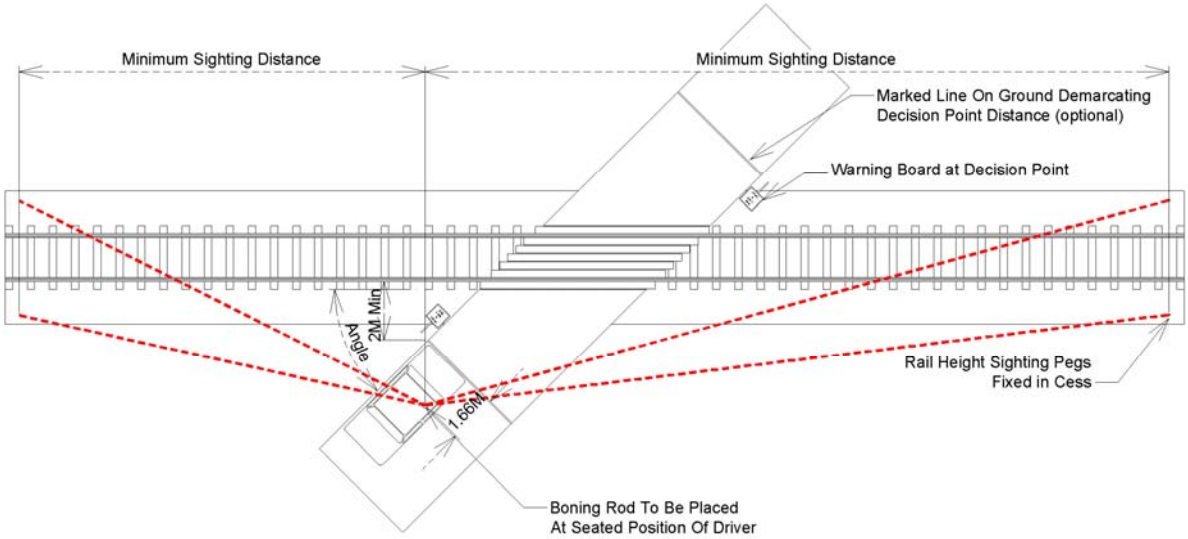

Diagram 6 – sighting for a user-worked crossing on a single track railway

e) For a **vehicular user-worked double track crossing** a range of typical minimum sighting distances is given in the table below:

Train Speed	10 mph / 16km/h	25 mph / 40 km/h
Minimum sighting distance in metres with a crossing angle of 90°	123	307
Minimum sighting distance in metres with a crossing angle of 60°	137	344
Minimum sighting distance in metres with a crossing angle of 45°	162	405

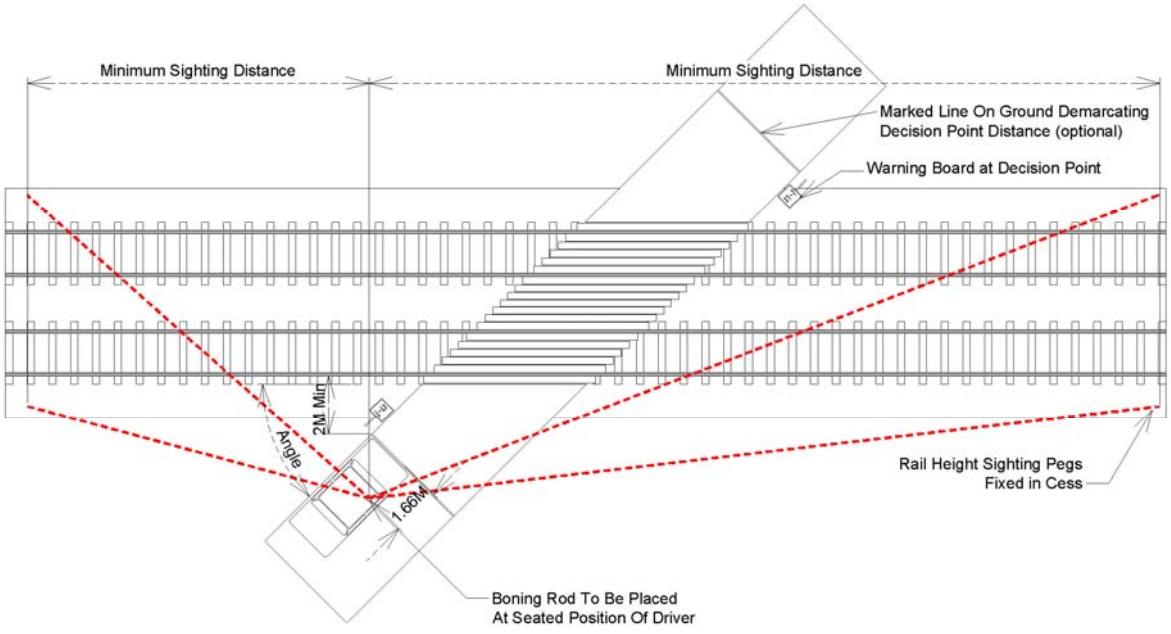

Diagram 7 – sighting for a user-worked crossing on a double track railway

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Appendix A: Criteria used in this document for assessing a footpath crossing

Footpath crossings are set at right angles to the track(s).

Pedestrian crossing speed is 1.1 metres per second (2.5 mph)

A pedestrian who crosses the line when no train is visible from the decision point will be clear of the far decision point at least five seconds before any train arrives at the crossing

Warning time is the time taken to make a crossing over the distance defined in section 3(f) I plus 5 seconds

Sighting distance = Train Speed (metres / sec) x warning time (sec)

Formula for calculating distances for differing gauges & line speeds

The figures given in the body of the text cover the majority of uses. Where conditions are significantly different duty holders may calculate the distances by applying the following formula:

Warning time = (Crossing distance in metres / 1.1) + 5 seconds

Crossing distance = Distance from the decision point on one side of a crossing to the decision point on the other side measured on the centreline of the crossing over all tracks.

Appendix B: Criteria in this document for assessing a vehicular user-worked crossing

Vehicle crossing speed is 1.34 metres per second (3 mph)

The vehicle is at least 2 metres from the crossing when the vehicle driver decides whether or not to cross the line

The vehicle driver is located 1.66 metres behind the front of his vehicle

The vehicle is 18 metres long (Figure should be confirmed and values adjusted if justified locally)

The vehicle will not start to move for 1.5 seconds after the driver reaches a decision to cross the line

If a vehicle driver decides to cross the line when no train is visible from the driving position, when the front of the vehicle is at the decision point, then the rear of the vehicle will be at least 2 metres clear of the tracks five seconds before any train arrives at the crossing

Warning time is the time taken to make a crossing over the distance defined in section 3(f) ii plus 6.5 secs.

Safe Sighting distance = Train Speed (metres / sec) x warning time (sec)

Formula for calculating distances for differing gauges & line speeds

The figures given in the body of the text cover the majority of uses. Where conditions are significantly different duty holders may calculate the distances by applying the following formula:

For vehicular crossings:

Warning time = (Crossing distance in metres / 1.34) + 6.5 seconds.

Crossing distance = (Distance from the decision point on one side of a crossing to the decision point on the other side measured on the centreline of the crossing over all tracks + overall length of vehicle and any trailer).

end of appendices

