

Project: Proposed Network Rail Essex Level Crossing Reduction Order

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Subject: Visibility on Station Hill, Bures and Chilternditch Lane

1 Visibility on Station Hill, Bures and Chilternditch Lane

1.1 Introduction

- 1.1.1** This note addresses a dispute which appears to have arisen between Network Rail and the Ramblers' Association as to how forward visibility falls to be assessed for the purpose of considering whether there is sufficient visibility for the recommended stopping sight distances to be achieved in a particular location. The dispute became apparent during consideration of E54 Bures on Day 29 of the Public Inquiry into the Order and further differences were highlighted during consideration of E29 Brown and Tawse on Day 33 of the Public Inquiry.
- 1.1.2** This note sets out how the guidance in Manual for Streets (MfS), Manual for Streets 2 (MfS 2), Design Manual for Roads and Bridges (DMRB) and the Highway Code should be applied to assess forward visibility.
- 1.1.3** Commentary is given on the assessment carried out by the Ramblers' Association (entitled Technical Note 1: Visibility Technical Note dated 03 December 2018), which was submitted to the Inquiry on 05 December 2018, noting points of agreement and where dispute still remains.

2 Guidance for Stopping Sight Distances (SSD)

2.1 Overview

- 2.1.1** SSD is the distance drivers need to be able to see ahead and can stop within when driving at a given speed. It is calculated from the speed of the vehicle, the time required for a driver to identify a hazard and then begin to brake (the perception-reaction time), and the vehicle's rate of deceleration. For existing streets, MfS at Section 7.5.2 recommends that the 85th percentile wet-weather speed is used.
- 2.1.2** Guidance regarding visibility is set out in DMRB (which is principally directed towards motorways and all-purpose trunk roads), and in MfS and MfS 2. It is understood to be common ground that DMRB is less relevant to the nature of the roads that the proposed diversion routes interface with in the Order than MfS and MfS2.

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2.1.3 Guidance is also provided in Assessment of Walked Routes to School, which has been relied upon by Essex County Council (ECC) in its appraisal of the proposed diversion routes in the Order which interface with the public highway. Therefore, this Note focuses on MfS, MfS2 and Assessment of Walked Routes to School, rather than DMRB.

2.2 Manual for Streets (MfS) and Manual for Streets 2 (MfS 2)

2.2.1 For roads relevant to MfS, the SSDs have been derived and included in Table 7.1 of MfS on Page 91 (see Figure 1 below). These SSDs have been calculated using the reaction time and deceleration rates set out in Table 10.1 of MfS 2; a copy of which is provided in the rebuttal proof of John Russell (OBJ/148/019 JNR Rebuttal) at Paragraph 4.15.

Table 7.1 Derived SSDs for streets (figures rounded).

Speed	Kilometres per hour	16	20	24	25	30	32	40	45	48	50	60
	Miles per hour	10	12	15	16	19	20	25	28	30	31	37
SSD (metres)		9	12	15	16	20	22	31	36	40	43	56
SSD adjusted for bonnet length. See 7.6.4		11	14	17	18	23	25	33	39	43	45	59
Additional features will be needed to achieve low speeds												

Figure 1: Extract from Manual for Streets

2.3 The Assessment of Walked Routes to School Guidelines

2.3.1 The assessment of Walked Routes to School Guidelines used by ECC states at Page 10:

If a road needs to be crossed the visibility at the location should allow a vehicle to stop, given the 85%ile speed (the speed at which 85% of the vehicles travel below) of the traffic flow. Vehicle stopping distances should be taken as those given in the Highway Code.

2.3.2 The relevant extract from the Highway code is shown in Figure 2.

Typical Stopping Distances

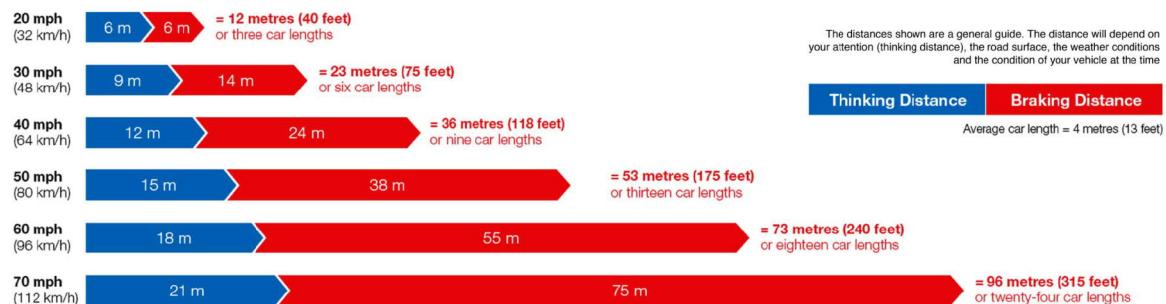


Figure 2: Extract of Typical Stopping Distances from the Highway Code

3 Horizontal Visibility at E54 Bures

3.1 Requirements

- 3.1.1** MfS states at Paragraph 7.6.1 that '*visibility should be checked at junctions and along the street. Forward visibility is measured horizontally and vertically.*'
- 3.1.2** There is agreement between Network Rail and the Ramblers' Association regarding the methodology that should be used to assess visibility and construct a visibility envelope as set out in the Ramblers' Association Visibility Technical Note dated 03 December 2018 in Paragraphs 2.1 to 2.3.
- 3.1.3** Visibility splays are an important feature of an access or junction as it allows traffic to see other vehicles and non-motorised users. Unobstructed visibility allows a motorist to see and be seen, and with appropriate visibility splays road users have time to see and react to any potential incident. However, as no changes are proposed to the layout at the junction of Colne Road / Station Hill / Lamarsh Hill as part of the proposed pedestrian diversion route, there is no requirement to check the visibility splays for that junction.
- 3.1.4** There are no proposals to provide an uncontrolled or controlled pedestrian crossing point on the west side of the railway bridge, and therefore, there is no requirement to provide SSD in advance of a crossing point. In accordance with the Highway Code pedestrians should find a position to cross the road where they can see in all directions. It is accepted that visibility for pedestrians is limited to the stopping distance given in the Highway Code at the point when a pedestrian (crossing from south to north) has to decide if it is safe to cross.

3.2 Assessment

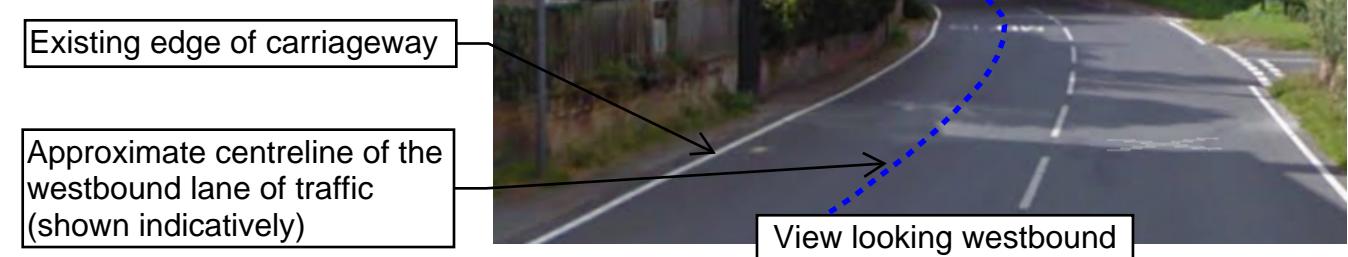
- 3.2.1** In developing the proposals for the Order, Mott MacDonald has considered the available visibility through the Station Hill underbridge. To assess the horizontal visibility splays and sight lines, Mott MacDonald has used Ordnance Survey (OS) mapping.
- 3.2.2** At E54 Bures, on Station Hill a horizontal visibility assessment was undertaken to consider the site constraint which exists due to the existing bridge supports. For vehicles traveling westbound on Station Hill, the forward visibility is limited due to the geometry of the bridge in relation to the highway which creates a pinch point on the southwest corner of the bridge.
- 3.2.3** The 85th percentile speed recorded during the ATC undertaken in December 2016 was 26.6mph in the eastbound direction and 25.7mph in the westbound direction. The westbound direction of travel for vehicles is under consideration for pedestrians crossing Station Hill from South to North.
- 3.2.4** Network Rail does not agree with the SSD used by Mr Russell on behalf of the Ramblers' Association to carry out the visibility assessment at this location.
- 3.2.5** Mr Russell has used a SSD value of 39m SSD for a vehicle travelling westbound. This SSD relates to a rounded speed of 28mph as set out in Table 7.1 Derived SSDs for streets (figures rounded) on Page 91 of MfS (See Figure 1 above). However, the SSD equates to 34.6m (adjusted for bonnet length) when accurately calculated for the recorded 85th percentile speed

of 25.7mph using the formula set out in Section 7.5.3 of MfS. SSD of 34.6m has been used for the assessment work carried out by Mott MacDonald (MM) on behalf of Network Rail.

- 3.2.6** The forward visibility plan at Appendix B of the Ramblers Visibility Technical Note has been reviewed against the visibility splay calculated by Mott MacDonald.
- 3.2.7** Forward visibility is checked by measuring between points on a curve along the centreline of the inner lane of traffic.
- 3.2.8** There is a difference in the forward visibility splays / envelopes calculated by Mott MacDonald and the Ramblers' Association due to the different approach taken to establish the centreline of the westbound lane of traffic.
- 3.2.9** The Mott MacDonald assessment has taken into account the edgeline and centreline of Station Hill in order to assess the driving line for westbound vehicles in the westbound lane along which the visibility should be checked (the centre of the westbound lane). The edgeline can be seen in the photograph inset in Figure 3 below and it has been provided to delineate the edge of carriageway in this location in line with the guidance set out at Paragraph 4.31 in Chapter 5 of the Traffic Signs Manual (see Appendix A).
- 3.2.10** The Ramblers' Association assessment appears to use the boundary wall features to the east of and through the railway bridge, and the kerbline into the side road on the west side of the bridge as the edge of carriageway. These features do not represent the edge of carriageway for Station Hill. In addition, the offset used by the Ramblers' Association does not appear to represent the centre of the westbound lane. This approach is not considered to represent a realistic drivers' eye point for drivers travelling along the main carriageway for assessment of forward visibility in accordance with Section 7.8.1 of MfS. It should also be noted that the drive line into the side road, Parsonage Hill, does not need to be considered.
- 3.2.11** The Mott MacDonald assessment has concluded that a minimum forward visibility of 34.6m is achievable for drivers travelling westbound along Station Hill on approach to the vicinity in which existing users of the level crossing would need to cross Station Hill (see Figure 3) when checked in accordance with MfS and MfS2.
- 3.2.12** Furthermore, the minimum SSD distances in the Highway Code can be achieved at the point when a pedestrian (crossing from south to north) has to decide if it is safe to cross.
- 3.2.13** Based on the above, the visibility assessment undertaken by Mott MacDonald during the design development using Computer-aided Design (CAD) modelling concluded that a vehicle travelling along the street has appropriate SSD in advance of a pedestrian crossing Station Hill, and hence, the diversion route is considered suitable.



Figure 3: Plan view of visibility splays on Station Hill and view looking westbound from the east side of the railway



4 Vertical Visibility at E29 Brown and Tawse

- 4.1.1** On review of the Ramblers' Association Visibility Technical Note dated 03 December 2018, there is common ground between Network Rail and the Ramblers' Association regarding the requirements of MfS and MfS2 in respect of the eye height and target height to be considered when checking forward visibility in the vertical plane in highway design.
- 4.1.2** There is a difference, however, in the approach taken by Network Rail and the Ramblers' Association in who needs to be considered when assessing visibility in the vertical plane on the proposed route for E29 Brown and Tawse.
- 4.1.3** The Ramblers' Association consider that no relaxation or departure from MfS or MfS2 can be applied and therefore all road users, including small children should be considered in the visibility assessment.
- 4.1.4** The Mott MacDonald assessment considers only existing users of the level crossing and there is no evidence that small children use E29 Brown and Tawse. Therefore, a target height of 1.05m as referred to in the Network Rail note to the Inquiry *NR-152 - Note regarding visibility and steps at Crossing E29 Brown and Tawse* is considered appropriate.
- 4.1.5** Based on the above, the vertical visibility assessment undertaken by Mott MacDonald concluded that a vehicle travelling along Childerditch Lane has appropriate SSD in advance of a pedestrian using the proposed route and that the diversion route is considered suitable.

Appendix A: Extract from Traffic Signs Manual Chapter 5

Traffic Signs Manual

CHAPTER
5

Road Markings

2003

4.29 Diagram 1010 is used instead of diagram 1009 at lay-bys and at acceleration and deceleration splays, and also for emphasising lane drops. Details of the various prescribed uses are set out in table 4-5. The marking may be supplemented with uni-directional reflecting road studs, at the spacing shown in table 4-5. Green reflectors should be used at lane drops, along acceleration and deceleration lanes and at lay-bys.

4.30 Further guidance on the use of diagram 1010 can be found in:

- section 7 for major/minor junctions,
- section 10 for grade separated junctions,
- section 17 for bus lanes,
- section 18 for tram markings, and
- section 22 for low bridges.

4.31 Diagram 1012.1 is intended for general use to delineate the edge of carriageway, particularly on unlit classified roads and those not having clearly defined raised kerbs. It should also normally be used on all-purpose roads with hard shoulders or hard

strips, on motorways, unless profiled edge lines are used (see paras 4.39 to 4.48) and to delineate footways at level crossings (see para 19.9).

4.32 Trials have shown that edge markings have merit as a safety measure despite their efficiency sometimes being impaired by dirt because of their location near the edge of the carriageway. They can also help to protect verges on narrow rural roads.

4.33 The marking should be laid with a gap of approximately 225 mm to the near side edge of the carriageway. The continuous line should not be carried across the mouths of side roads, acceleration or deceleration splays, gaps in the central reservation or lay-bys, where lines to diagrams 1009 or 1010 should be used.

4.34 Where the carriageway is less than 5.5 m in width, the centre line should be omitted (see para 4.6) but edge lines, where used, continued. Where edge lines are not already in use, their introduction over the length where the centre line is interrupted will help draw attention to the hazard.

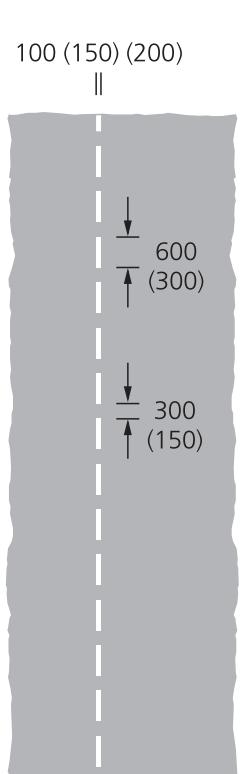


Diagram 1009

Figure 4-6

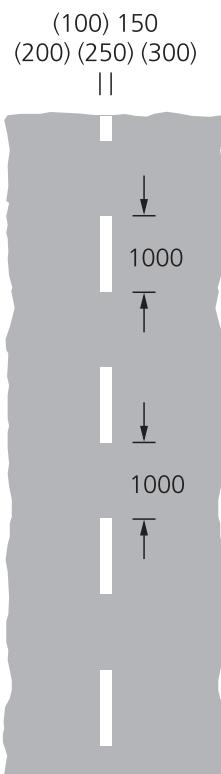


Diagram 1010

Figure 4-7



Diagram 1012.1

Figure 4-8