

INTERIM ADVICE NOTE 149/17

EXISTING MOTORWAYS: ADDITIONAL REQUIREMENTS AND RELAXATIONS

Summary

This document describes requirements and relaxations for the modification of existing motorways in England.

Instructions for Use

The document is to be used in conjunction with:

- TD 9/93 Highways Link Design
- TD 22/06 Layout of Grade Separated Junctions
- TD 27/05 Cross-Sections and Headrooms
- TD 46/05 Motorway Signalling
- IAN 144 Directional Signs on Motorway and All-Purpose Trunk Roads - Grade Separated Junctions

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SUPERSEDED

1. Introduction

Scope and Purpose

1.1. This document describes geometrical relaxations which may be applied when modifying existing trunk roads in England where motorway regulations apply (herein referred to as 'existing motorways'). These relaxations would generally be approved if they were submitted as a Departure from Standard (DfS) for modifying existing motorways. The following is a list of documents that relaxations have been provided for:

- a) TD 9/93: Highways Link Design [1]
- b) TD 22/06: Layout of Grade Separated Junctions [2]
- c) TD 27/05: Cross-Sections and Headrooms [3]

1.2. This document provides requirements for direction signs when modifying existing motorways. These requirements supersede elements of Interim Advice Note 144: Directional Signs on Motorway and All-Purpose Trunk Roads - Grade Separated Junctions [4], and TD 22/06.

1.3. This document also provides requirements for signals when modifying existing motorways. These requirements supersede elements of TD 46/05: Motorway Signalling [5].

Implementation – Motorway Types

1.4. The geometrical relaxations contained in Chapters 2, 3 and 4 may be used for the modification of existing motorways, with the exception of smart motorways and hard shoulder running schemes. For the modification of existing smart motorways, refer to Interim Advice Note (IAN) 161: Smart Motorways [6]. For the modification of existing hard shoulder running schemes, refer to IAN 111: Managed Motorways Implementation Guidance – Hard Shoulder Running [7].

1.5. The direction sign requirements contained in Chapter 5 shall be used when modifying any existing motorway.

1.6. The signalling requirements contained in Chapter 6 shall be used for the modification of existing motorways with the exception of smart motorways and hard shoulder running schemes, unless invoked by the appropriate document referenced in paragraph 1.4.

Implementation – Application

1.7. For Chapters 2, 3 and 4, the requirements of the documents listed in paragraph 1.1 shall be applied in the first instance. Only where it is not practicable to comply with the requirements of those documents may the relaxations contained in Chapters 2, 3 and 4 be applied.

- 1.8. The relaxations contained in Chapters 2, 3 and 4 may only be applied when modifying existing elements of a motorway, e.g. modifying mainline cross-section to accommodate a new junction. For the construction of new elements, e.g. a new slip road, this document shall not be used.
- 1.9. The requirements contained in Chapters 5 and 6 shall be applied when the scope of modifying existing motorways involves the modification of signs and / or signals, or the introduction of new elements of signs and signals, e.g. installing a new technology scheme.
- 1.10. Where a paragraph within this document relaxes or supersedes the requirement or requirements of another document, the relevant paragraph(s) are noted at the end of the text.
- 1.11. If there is a discrepancy between the current version of the document being superseded or relaxed and the version referenced in this document, the designer shall determine the most appropriate document to apply.
- 1.12. No DfS are permitted from the relaxations in this document. Where a DfS is required it shall be made against the original requirement in one of the documents listed in paragraph 1.1.
- 1.13. This document shall be implemented immediately, except where:
 - a) The procurement of works, at any stage from conception through design to completion of construction, has reached a stage at which, in the opinion of the Overseeing Organisation, use of this document would result in significant additional expense or delay progress (in which case the decision shall be recorded in accordance with the Overseeing Organisation's procedure); or
 - b) A contract has terms which apply specifically to the implementation of new requirements.

Consultation

- 1.14. The Overseeing Organisation shall be consulted in the following circumstances:
 - a) If the width of the central reserve is reduced to 3.4m or less, in order that the impact this may have on maintenance can be considered.
 - b) If resultant wheel tracks from altered lane widths are within 100mm of existing pavement joints, so that a maintenance plan can be jointly developed for the treatment of these.
 - c) If a hard shoulder below 3.0m wide is proposed. Consultation shall also be undertaken with the emergency services in this situation.
 - d) If verge widths at structures are reduced to zero, in order to consider the implications for routeing and maintenance of underground equipment, and to

consider the safety implications for road workers and any pedestrians who may exit a stricken vehicle.

- e) If a merge layout is amended in accordance with either paragraph 3.7 or 3.9 of this document.
- f) If a diverge layout is amended in accordance with paragraph 3.12 of this document.

Design Strategy Record

1.15. When applying this document in whole or in part the designer shall develop a Design Strategy Record (DSR). The DSR shall be maintained from the operational concept stages through to project completion. The purpose of the DSR is to record key design decisions, constraints and assessments, in support of using the relaxations within this document in lieu of the requirements in the documents listed in paragraph 1.1. The DSR content shall include the rationale behind the designer's decision making process.

1.16. As a minimum, the DSR shall record the following:

- a) Subject to paragraph 1.17, a causal analysis of the local collision history to identify any performance issues or trends, comprising the most recently available 36 months of collision data.
- b) The consultation that has taken place in accordance with paragraph 1.14.
- c) The strategy for determining traffic flows to be used in design (including data source and design year).
- d) Where the relaxations outlined in the following paragraphs have been applied and the justification for using them:
 - 3.7
 - 3.9
 - 3.12
 - 3.15 and 3.16
 - 3.17
 - 4.3
 - 4.4 d)
 - 5.6 (if not using priorities 1 or 2 from Table 5-2)
 - 6.14
 - 6.16
- e) Any judgements on the application of this document in accordance with paragraph 1.11.
- f) The assessment detailed in paragraph 2.9 if required by paragraph 2.8 a).
- g) The options for increasing mainline capacity and the reasons for including or excluding these if required by paragraph 3.17.

- 1.17. If the project is following the Project Control Framework (PCF) it is acceptable for the DSR to cross reference the relevant sections in the Safety Plan PCF Product if this includes a collision history and causal analysis fulfilling the requirements in paragraph 1.16 a).

Abbreviations

- | | | |
|-------|-----|--------------------------|
| 1.18. | ADS | Advance Direction Sign |
| 1.19. | DfS | Departure from Standard |
| 1.20. | DSR | Design Strategy Record |
| 1.21. | IAN | Interim Advice Note |
| 1.22. | VMS | Variable Message Sign |
| 1.23. | VRS | Vehicle Restraint System |

Feedback and Enquiries

- 1.24. Users of this document are encouraged to raise any enquiries and/or provide feedback on its content and usage. The email address for general enquiries and feedback is:

standards_enquiries@highwaysengland.co.uk.

2. Highway Link Design

General

2.1. This chapter shall be read in conjunction with TD 9/93: Highways Link Design.

2.2. Relaxations are provided for the following paragraphs in TD 9/93:

- 1.6 and 1.7
- 1.24
- 1.26
- 2.9 and 2.10
- 2.13
- 3.1 and 3.2
- 3.16
- 4.13
- 4.17

Design Speed

2.3. Design Speed shall be derived in accordance with TD 9, however all Design Speeds may be classed as Band B.

This is a relaxation of TD 9/93 paragraphs 1.6 and 1.7.

2.4. The relaxations below Desirable Minimum for the following parameters may be used in combination:

- a) Stopping sight distance.
- b) Horizontal curvature.
- c) Vertical crest curves.
- d) Absolute minimum for sag curves.
- e) Superelevation.

This is a relaxation of TD 9/93 paragraph 1.24.

2.5. The relaxations below Desirable Minimum for the following parameters may be used on the immediate approaches to junctions:

- a) Stopping sight distance.
- b) Vertical crest curves.
- c) Absolute minimum for sag curves.

This is a relaxation of TD 9/93 paragraphs 1.26, 2.13, 4.13 and 4.17.

Stopping Sight Distance

2.6. The relaxations of one Design Speed step described in TD 9/93 paragraphs 2.9 and 2.10 for Band A roads may also be applied to Band B roads.

This is a relaxation of TD 9/93 paragraphs 2.9 and 2.10.

Road Camber & Drainage

- 2.7. Crossfall shall be measured across the paved surface of a road's cross-section. This comprises the carriageway, hard shoulder and hard strips.
- 2.8. The existing crossfall may be retained unless:
- The assessment described in paragraph 2.9 of this document indicates that the existing crossfall is not suitable (if that assessment is required).
 - The variation in crossfall for any given cross-section does not meet the criteria given in paragraph 2.10 of this document.
 - The review of the existing operational performance described in paragraph 1.13 a) of this document highlights a collision problem relating to the existing crossfall, e.g. standing water.

This is a relaxation of TD 9/93 paragraphs 3.1 and 3.2.

- 2.9. Where the total width of the running lanes will be increased, the existing drainage flow paths shall be assessed to determine their suitability. If this assessment identifies a benefit of doing so, crossfall may be increased by 0.5% above the requirements of TD 9/93 Table 3 to mitigate excessive depths of water.

This is a relaxation of TD 9/93 paragraph 3.1.

- 2.10. Crossfall shall satisfy the following criteria:
- The change of gradient shall not exceed 5% (for example, a hard shoulder with a 2.5% fall towards the verge adjacent to lane one with a 2.5% fall towards the central reserve, is acceptable as the overall change is 5%).
 - Changes in crossfall that create a sag shall only occur within hatched markings that have solid edge lines.
 - Where a sag creates a low point the associated surface water flow width shall not enter a traffic lane.
 - Crossfall shall not change within a lane.
 - Adverse camber shall not be provided on horizontal radii less than 2000m.

Transitions

- 2.11. The basic transition length shall be no shorter than the existing transition.

This is a relaxation of TD 9/93 paragraph 3.16.

3. Layout of Grade Separated Junctions

General

3.1. This chapter shall be read in conjunction with TD 22/06: Layout of Grade Separated Junctions.

3.2. Relaxations are provided for the following paragraphs and figures in TD 22/06:

- 2.29
- 2.30 and Figure 2/4.5
- 2.34 and 2.35
- 2.46 and 2.47
- 4.1
- 4.7
- 4.16 to 4.19
- 4.22
- 4.35

3.3. Cross sections for the mainline and connector roads may be relaxed in accordance with Chapter 4 of this document.

This is a relaxation of TD 22/06 paragraph 4.1.

3.4. Horizontal and vertical alignment and stopping sight distances for the mainline through a grade separated junction and for the connector roads may be relaxed in accordance with Chapter 2 of this document.

This is a relaxation of TD 22/06 paragraph 4.7.

3.5. Where the requirements of TD 22 are expanded upon by TD 39: The Design of Major Interchanges [8] or TD 40: Layout of Compact Grade Separated Junctions [9] the relaxations in this document may also be applied.

Merge Layouts

3.6. Figure 2/3 MW of TD 22/06 shall be used to determine an appropriate merge layout based on the traffic flows recorded in the DSR in line with paragraph 1.13 c) of this document.

3.7. If the merge layout derived in accordance with paragraph 3.6 of this document cannot be accommodated it may be amended by one of the following options:

- a) The Road Class in TD 22/06 Table 4/3 may be relaxed to 'Rural All-Purpose 120kph' (subject to paragraph 3.8 of this document); or
- b) The layout may be substituted as described below:
 - i) Layout E may be used instead of Layout F.
 - ii) Layout B or A may be used instead of Layout C.
 - iii) Layout A may be used instead of Layout B.

This is a relaxation of TD 22/06 paragraph 2.29.

- 3.8. Where the Option (a) relaxation in paragraph 3.7 of this document is applied then all design parameters given in TD 22/06 Table 4/3 shall be in accordance with the 'Rural All-Purpose 120kph' Road Class.
- 3.9. Where no lane gains are to be introduced, Layouts E and F may be substituted as follows:
- a) Layout B may be used instead of Layout E.
 - b) Layout C or Layout H may be used instead of Layout F. No DfS is required for the use of Layout H in these circumstances.

Option (b) is a relaxation of TD 22/06 paragraph 2.30 and Figure 2/4.5.

- 3.10. If a Layout B or Layout A merge is to be provided from a 2 lane slip road, the slip road shall be reduced to a single lane using the reduction taper + 50m length prior to the nose as shown in Layout D.

Diverge Layouts

- 3.11. Figure 2/5 MW of TD 22/06 shall be used to determine an appropriate diverge layout based on the traffic flows recorded in the DSR in line with paragraph 1.13 c) of this document.
- 3.12. If the diverge layout derived in accordance with paragraph 3.11 of this document cannot be accommodated then it may be amended by relaxing the Road Class in TD 22/06 Table 4/4 to 'Rural All-Purpose 120kph'.

This is a relaxation of TD 22/06 paragraph 4.22.

- 3.13. Where the relaxation in paragraph 3.12 of this document is applied then all design parameters given in TD 22 Table 4/4 shall be in accordance with the 'Rural All-Purpose 120kph' Road Class.

Stopping Sight Distance

- 3.14. On all connector roads where the stopping sight distance requirements of TD 22 cannot be achieved the existing stopping sight distance shall be maintained as a minimum.

This is a relaxation of TD 22/06 paragraphs 4.16 to 4.19.

Near Straights

- 3.15. On existing slip roads, if the near straight is substandard (including there being no near straight at all), the existing provision may be maintained if the review of the operational performance described in paragraph 1.16 a) of this document does not highlight a problem with it.
- 3.16. Near straight and nose lengths may be different.

Paragraphs 3.15 and 3.16 of this document are a relaxation of TD 22/06 paragraphs 2.34, 2.35, 2.46 and 2.47.

Weaving Lengths

- 3.17. If the existing weaving length is less than 2 kilometres, TD 22/06 Figure 4/14 shall be used to derive what the minimum length should be. If the existing weaving length is less than the length derived from Figure 4/14, options for reducing weaving (such as introducing dedicated lanes between junctions) shall be assessed and implemented where practicable.

This is a relaxation of TD 22/06 paragraph 4.35.

4. Cross-Sections

General

- 4.1. This chapter shall be read in conjunction with TD 27/05: Cross-Sections and Headrooms.
- 4.2. Relaxations are provided for the following paragraphs, figures and tables in TD 27/05:
- 4.2.1
 - 4.6.2
 - 4.7.2
 - 4.7.6
 - 4.11.13
 - 4.12.2
 - 5.5.1
 - 5.6.1
 - Annex B 1.3.1
 - Annex B 2.1.1
 - Annex B 2.5.3
 - Annex B 2.9.1
 - Annex B Figure 3

Cross Sections

- 4.3. Subject to paragraph 4.4, the dimensions of the highway cross-section components given in TD 27 Figure 4-1a and Figure 4-2a may be relaxed in accordance with the hierarchy outlined in Table 4.1 of this document. The hierarchy shall be applied in sequence starting at 'priority 1'. The cross section components given in Table 4.1 are illustrated in Figure 4.3.

This is a relaxation of TD 27/05 paragraphs 4.2.1, 4.6.2, 4.7.2, 4.7.6, 4.11.13, 5.5.1, 5.6.1 and Annex B paragraphs 1.3.1, 2.1.1 and 2.9.1.

- 4.4. When applying the cross-section relaxations described in paragraph 4.3 the following requirements and advice applies:
- a) No lane lines shall taper at gradients steeper than 1:100 when transitioning from one cross section to another, in order to avoid sharp changes in direction.

This supersedes TD 27/05 paragraph 4.12.2.
 - b) Where verge width is reduced and Emergency Roadside Telephones are provided, the design should incorporate the principles in TA 73/97: Motorway Emergency Telephones, Annex A2 [10].
 - c) The central reserve width shall accommodate the working widths of the Vehicle Restraint System (VRS) and any equipment that may be present or required.

- d) Where the hard shoulder width is reduced to 3.0m or less for a distance of over 100m a safety risk assessment shall be undertaken in accordance with GD 04: Standard for Safety Risk Assessment on the Strategic Road Network [11], to determine if CCTV or an alternative monitoring / verification system should be provided.
- e) Lengths of hard shoulder less than 3.0m wide shall be limited to 30% of the overall length of a link.
- f) Hard shoulders shall be at least 3.0m wide for a distance of 300m downstream from merge datum points.
- g) Subject to paragraph 4.4 h), hard shoulders less than 3.0m wide shall be hatched out as illustrated in Figure 4.1. The taper at the start of the hatching shall be 1:15.

This is a relaxation of TD 27/05 Annex B paragraph 2.5.3

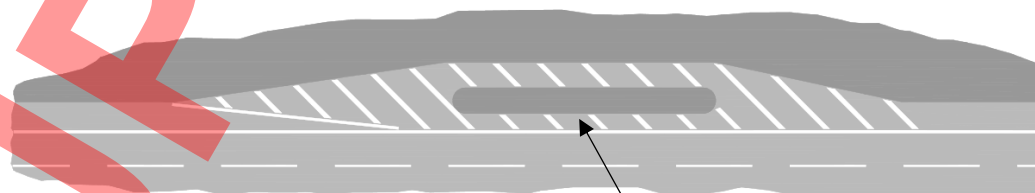
Figure 4.1 – Layout of hatching for hard shoulders less than 3.0m wide



- h) Where the hard shoulder is less than 3.0m wide and there is a bridge with an open side-span, it may be possible to construct an access route for emergency vehicles behind the pier. If an access route is to be provided, the dimensions shall be derived from swept path analysis using the largest emergency vehicle likely to use the link. The hard shoulder shall then be hatched out as illustrated in Figure 4.2. The taper at the start of the hatching shall be 1:15.

This is a relaxation of TD 27/05 Annex B Figure 3.

Figure 4.2 – Layout of hatching at an emergency access route behind a bridge pier



Bridge Pier and VRS

- 4.5. Subject to the outcome of the consultation required in accordance with paragraph 1.15 d) of this document, the verge width at structures may be reduced to zero at overbridges.

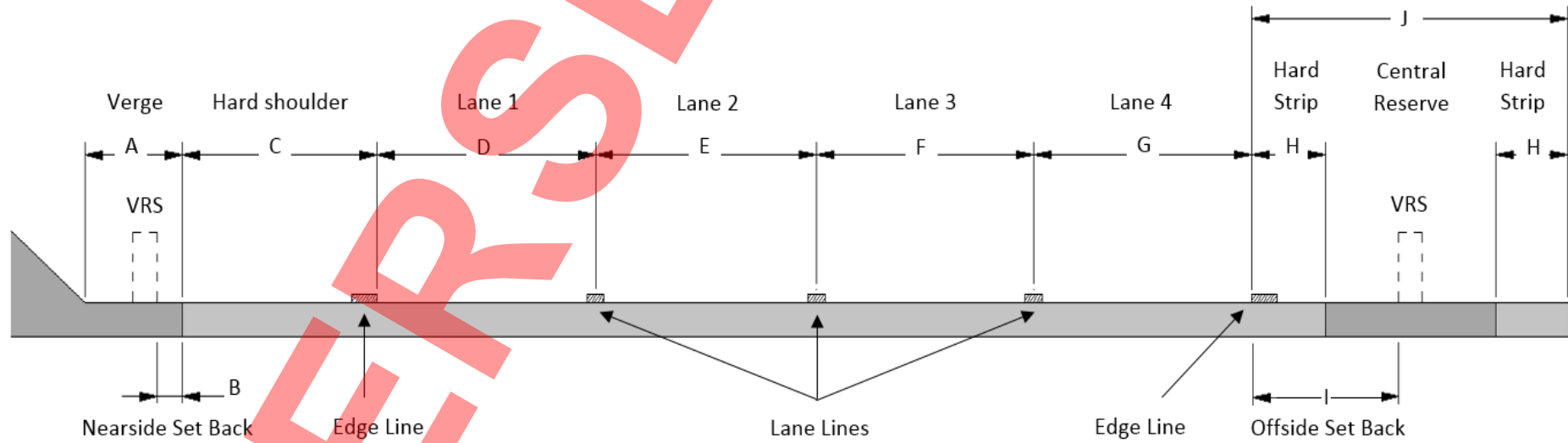
This is a relaxation of TD 27/05 paragraph 5.6.1.

Table 4.1 – Reduced Cross Sections Hierarchy for Widening on Existing Motorways

Priority Order	Reference to Figure 4.3: Reduced Element	A Nearside Verge (m)	B Nearside set back (m) (see note v)	C Hard shoulder / Emergency access width (m) (see note v)	Lane widths (m)												H Offside Hard strip (m)	I Offside set back (m)	J Central reserve including hardstrips (m)
					D2M		D3M			D4M									
					D	E	D	E	F	D	E	F	G						
					Lane 1	Lane 2	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 4						
1	Nearside Verge	See note iii	0.60	3.30	3.65	3.65	3.65	3.70	3.65	3.65	3.70	3.70	3.65	0.70	1.20	4.50			
2	Central reserve (see note ii)	See note iii	0.60	3.30	3.65	3.65	3.65	3.70	3.65	3.65	3.70	3.70	3.65	0.70	1.00	3.40			
3	Setback to nearside VRS (see note iv)	See note iii	0.00	3.30	3.65	3.65	3.65	3.70	3.65	3.65	3.70	3.70	3.65	0.70	1.00	3.40			
4	Lane widths	See note iii	0.00	3.30	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	3.40			
5	Lane widths & central reserve	See note iii	0.00	3.30	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	3.00			
6	Hard shoulder (see note v)	See note iii	0.00	3.00	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	3.00			
7	Central reserve	See note iii	0.00	3.00	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	2.60			
8	Emergency access	See note iii	0.00	2.50	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	2.60			
9	Emergency access	See note iii	0.00	2.00	3.65	3.55	3.65	3.55	3.30	3.65	3.60	3.40	3.30	0.70	1.00	2.60			

- i. Grey shading indicates the reduced dimension(s) compared to the next highest priority.
- ii. Minimum required for temporary traffic management.
- iii. As required to accommodate both underground and over-ground equipment, including Emergency Roadside Telephones (refer to paragraph 4.4 b) of this document).
- iv. Priority 3 may be used before Priority 2 over lengths of less than 100m.
- v. Where a 600mm raised verge is provided at an underbridge, the raised verge width shall be excluded from the measurement of the hard shoulder width but it may be included in the measurement of an emergency access width.

Figure 4.3 – Layout of the components detailed in Table 4-1



5. Datum Points and Direction Signs

General

- 5.1. This chapter provides requirements for datum points and direction signs when modifying existing motorways.
- 5.2. The following paragraphs in TD 22/06 are superseded:
2.51 and 5.37
- 5.3. The following paragraphs in IAN 144 are superseded:
2.5 and 2.6
2.9 and 2.10
- 5.4. Figures 5.1 and 5.2 illustrate the requirements outlined in this chapter.

Entry and Exit Datum Points

- 5.5. For the purposes of locating signs and signals, datum points for TD 22 merge and diverge layouts shall be as defined in Table 5.1.

Table 5.1 – Entry and Exit Datum Points for TD 22 Layouts

Merge Layout	Entry Datum
A, B C, D F (option 2) and H	End of downstream taper
E	Tip of nose
F (option 1) and G	Tip of ghost island tail
Diverge Layout	Exit Datum
A, B (options 1 and 2), C and D (option 2)	Start of upstream taper
D (option 1)	200m upstream of tip of ghost island head
E	200m upstream of tip of nose

Direction Signs

- 5.6. A primary and secondary advance direction sign (ADS) shall be provided on the approach to each junction exit in accordance with the hierarchy outlined in Table 5.2. The hierarchy shall be applied in sequence starting at 'priority 1'. Only when it is not practicable to provide a combination of signs within the tolerances given in paragraph 5.7 of this document shall a lower priority combination be used.

This supersedes IAN 144/16 paragraphs 2.5 and 2.6 and TD 22/06 paragraph 5.37.

Table 5.2 – ADS Combinations

Priority	Primary ADS	Secondary ADS
1	1 mile	1/2 mile
2	2/3 mile	1/3 mile
3	1 mile	1/3 mile
4	1 1/4 mile	1/2 mile
5	1 1/3 mile	1/2 mile
6	1 1/4 mile	1/3 mile
7	1 1/3 mile	2/3 mile
8	1 1/3 mile	1/3 mile

- 5.7. ADS shall be positioned as close as practicable to the distances they sign within a tolerance of 10% upstream and 20 metres downstream, except for 1 ¼ mile ADS which shall be positioned between 115 metres upstream and 20 metres downstream of the signed distance (upstream of this tolerance a 1 ⅓ mile ADS is more accurate). All distances shall be measured from the Exit Datum point.

This supersedes IAN 144/16 paragraphs 2.9 to 2.10.

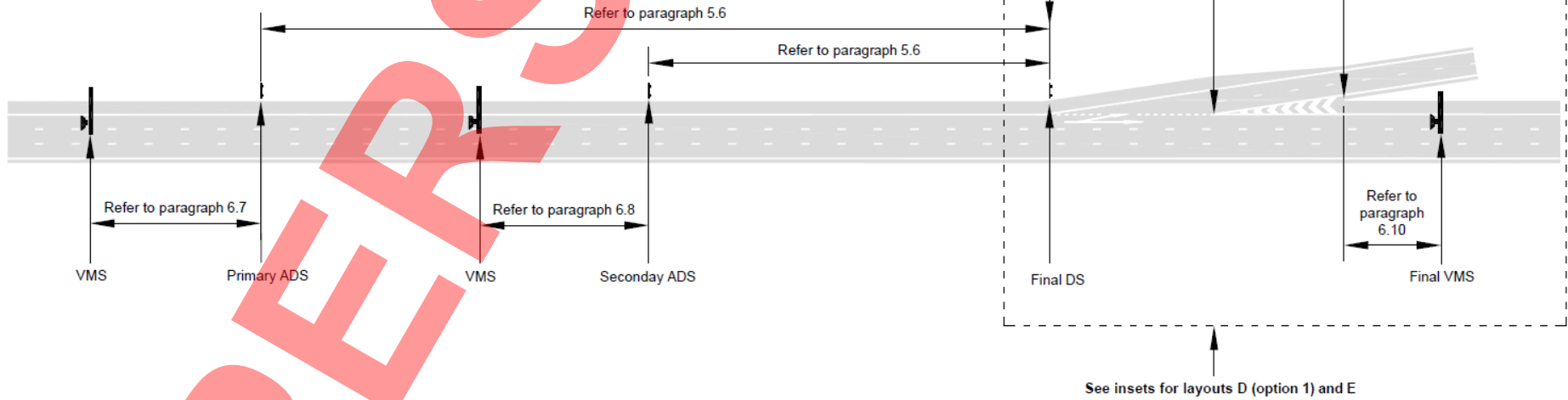
- 5.8. A final direction sign shall be positioned at the exit datum or up to 50 metres upstream of it.
- 5.9. For ghost island diverges, verge mounted signs in accordance with Diagram 2904.2 of TSRGD shall be provided between the primary and secondary ADS and between the secondary ADS and the final ADS. These signs shall be positioned as close as practicable to the midpoint between the relevant ADSs.

This supersedes TD 22/06 paragraph 2.51.

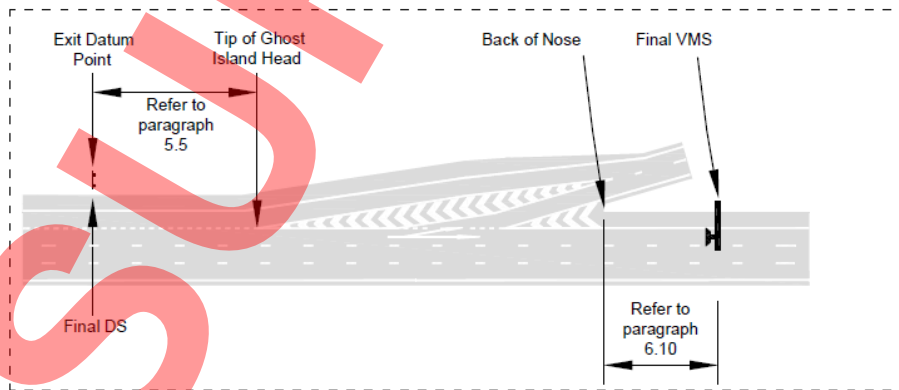
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Figure 5.1 – Illustrative Diverge Layouts

Diverge layout A illustrating the exit datum point at the start of the upstream taper (also applicable to diverge layouts B (options 1 and 2), C and D (option 2))



Inset: Diverge layout D option 1 illustrating the exit datum point 200m upstream of tip of ghost island head



Inset: Diverge layout E illustrating the exit datum point 200m upstream of tip of nose

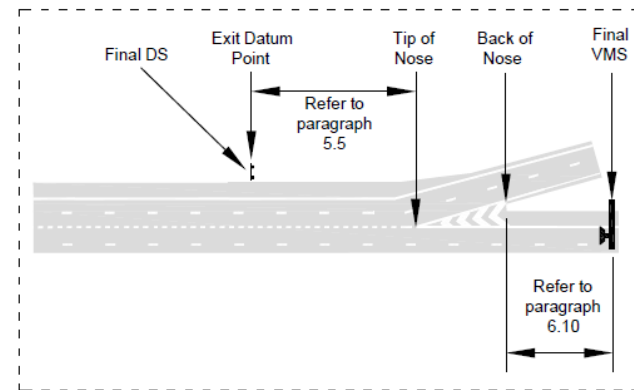
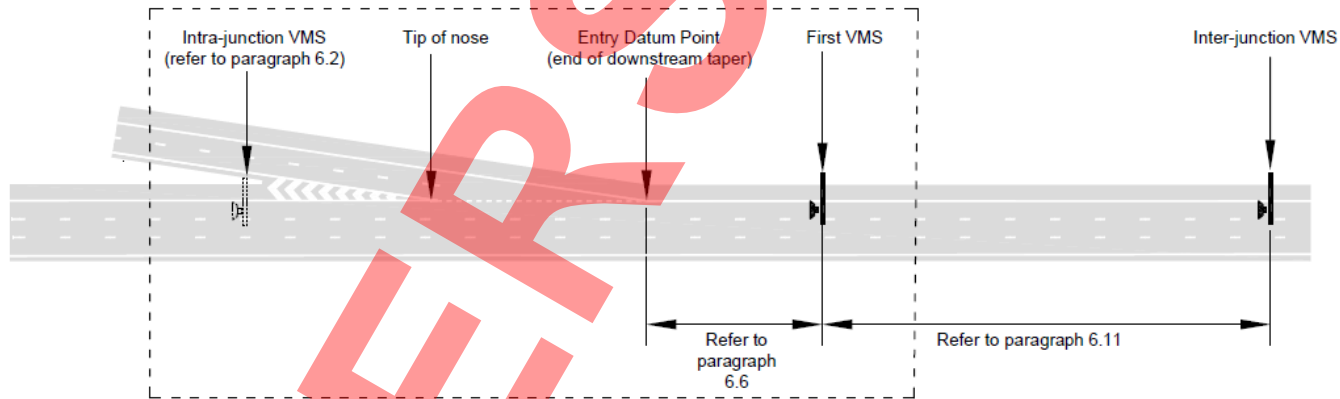


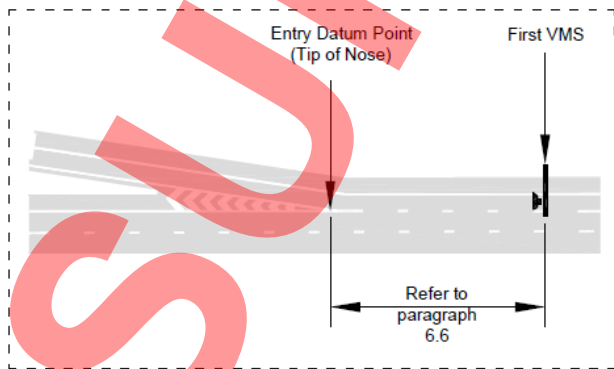
Figure 5.2 – Illustrative Merge Layouts

Merge Layout A illustrating the exit datum point at the end of the downstream taper (also applicable to merge layouts B C, D F (option 2) and H)

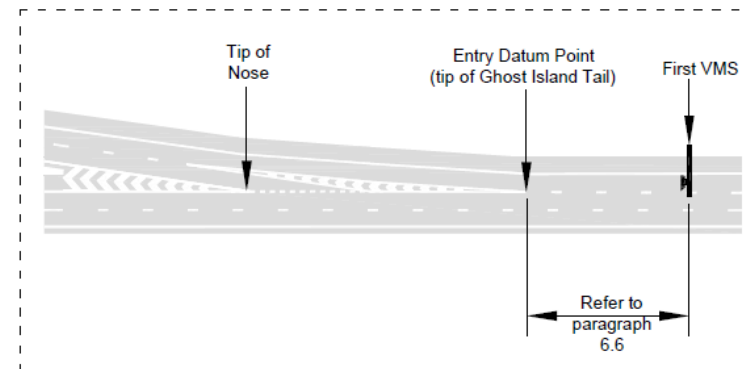


See insets for layouts E, F (option 1) and G

Inset: merge layout E illustrating the entry datum point at the tip of nose



Inset: Diverge layout F (option 1) illustrating the exit datum point at the tip of ghost island tail (also applicable to merge layout G)

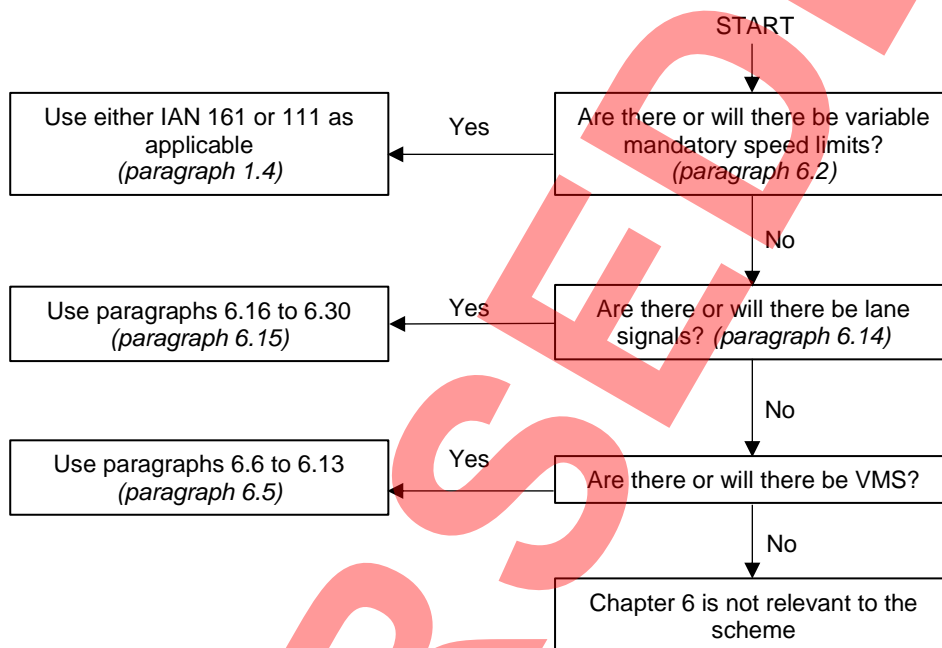


6. Motorway Signalling

General

- 6.1. This chapter provides requirements for signalling when modifying existing motorways. The flow chart in Figure 6.1 illustrates how to use this chapter for a particular scheme type.

Figure 6.1 – How to use IAN 149 Chapter 6 for particular scheme types



- 6.2. The modification of existing motorways that utilise variable mandatory speed limits, or modification of existing motorways to introduce variable mandatory speed limits, shall be in accordance with most appropriate document referenced in paragraph 1.4 of this document.

- 6.3. The following paragraphs and drawings in TD 46/05 are superseded:

3.14 b)
3.23
3.24
3.26 and 3.27
3.28.
Drawings 1 to 6

- 6.4. Figures 5.1 and 5.2 also illustrate the VMS requirements outlined in this chapter.

This supersedes TD 46/05 paragraph 3.24, 3.28 and Drawings 1 to 6.

Variable Message Signs

- 6.5. Where a new variable message signs (VMS) system is to be provided and lane signals are not or will not be present, VMS shall be located in accordance with paragraphs 6.6 to 6.13 of this document. Where lane signals are or will be present, VMS shall be located in accordance with paragraphs 6.26 to 6.29 of this document.
- 6.6. The first VMS shall be provided between 200 and 400 metres downstream of the entry datum point but as close to the 300 metres point as practicable.
- 6.7. Subject to paragraph 6.9 of this document, a primary VMS shall be provided between 200 and 400 metres upstream of the primary ADS but as close to the 300 metres point as practicable.
- 6.8. Subject to paragraph 6.9 of this document, a secondary VMS shall be provided between 200 and 400 metres upstream of the secondary ADS, but as close to the 300 metres point as practicable and a minimum of 180 metres downstream of the primary ADS.
- 6.9. Where it is not practicable to locate primary or secondary VMS in accordance with paragraphs 6.7 or 6.8, the VMS may be co-located with the relevant gantry mounted ADS.
- 6.10. A final VMS shall be provided as close as practicable to the back of the diverge nose.
- 6.11. Between the first VMS and the primary VMS, inter-junction VMS shall be spaced between 600 and 1,500 metres apart.
- 6.12. An intra-junction VMS shall be provided if the distance between the first VMS and the upstream VMS is greater than 1,500 metres. It shall be located as near to the midpoint of the upstream VMS and first VMS as practicable.
- 6.13. There shall be unobstructed forward visibility to each VMS for at least two thirds of the distance between the VMS in question and the upstream VMS. Visibility shall be measured to the centre of the VMS from the centre of the left-hand lane on left-hand curves with radii up to 2,880m, from the centre of the right-hand lane on right-hand curves with radii up to 2,880m, and from the centre of the lane closest to the signal elsewhere.

Paragraphs 6.6 to 6.13 of this document supersede TD 46/05 paragraph 3.23.

Lane Signalling

- 6.14. The operational need for lane signalling on the approach to each junction shall be assessed (including where lane signals currently exist). Lane signals shall only be provided or retained on the approach to junctions if the assessment of operational need establishes that the benefits of lane signals justifies the costs and potential environmental impacts.

This supersedes TD 46/05 paragraph 3.14 b).

- 6.15. Subject to paragraph 6.16, the location of lane signals (and associated VMS) shall be in accordance with paragraphs 6.17 to 6.30 of this document.
- 6.16. Where lane signals currently exist, an assessment shall be undertaken to determine the impact of modifying their layout in accordance with paragraphs 6.17 to 6.30. Where the assessment shows that application of these requirements would lead to operational inconsistencies (such as a short length with a different signal layout) or lead to disproportionate cost, then the original lane signal layout may be retained.
- 6.17. The first lane signals shall be provided between 200 and 400 metres downstream of the entry datum point but as close to the 300 metres point as practicable.
- 6.18. Lane signals shall be co-located with the primary, secondary and final direction signs.
- 6.19. Confirmatory lane signals shall be provided between 30 and 50 metres downstream of the diverge nose tip.
- 6.20. Where a confirmatory direction sign is to be provided, it shall be co-located on the confirmatory lane signal gantry.
- 6.21. Where the distance between the final lane signal gantry and the confirmatory lane signal gantry exceeds 800 metres a supplementary lane signal gantry or gantries shall be added so that there is no more than 800 metres between lane signals.
- 6.22. Subject to paragraph 6.23 of this document, where inter-junction lane signals are to be provided, they shall be spaced between 600 and 1,500 metres apart between the first lane signal gantry and the primary lane signal gantry.
- 6.23. If existing inter-junction lane signals are present and the existing minimum spacing is less than 600 metres, and the structure or foundations are suitable for reuse with new lane signals, the existing spacing may be retained.
- 6.24. Intra-junction lane signals shall be provided if lane signals are to be provided on the downstream link and where the distance between the confirmatory lane signal gantry and the first lane signal gantry is greater than 1,500 metres. Intra-junction lane signals should be located as near to the midpoint of the confirmatory and first lane signal gantries as practicable.
- 6.25. There shall be unobstructed forward visibility to each set of lane signals for at least two thirds of the distance between the lane signals in question and the lane signals upstream. Visibility shall be measured to the two least obstructed signals, from the centre of the left-hand lane on left-hand curves with radii up to 2,880m, from the centre of the right-hand lane on right-hand curves with radii up to 2,880m, and from the centre of the lane closest to the signals elsewhere.
- 6.26. A primary VMS shall be provided between 200 and 400 metres upstream of the primary ADS lane signal gantry but as close to the 300 metres point as practicable.

- 6.27. A secondary VMS shall be provided between 200 and 400 metres upstream of the secondary ADS lane signal gantry but as close to the 300 metres point as practicable. The secondary VMS shall be located at least 180 metres downstream of the primary ADS lane signal gantry.
- 6.28. A VMS shall be co-located on the first, confirmatory and all inter-junction and intra-junction gantries, unless this would result in ahead signs, exit signs, lane signals and VMS being mounted on a single gantry.
- 6.29. Visibility to each VMS shall be in accordance with paragraph 6.13 of this document.

Paragraphs 6.15 to 6.29 of this document supersede TD 46/05 paragraphs 3.26 and 3.27.

- 6.30. Where lane signals are provided on the mainline, an entry slip road signal shall be provided on the offside verge at the start of the entry slip road.

7. Normative references

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- 7.1. Highways Link Design. Design Manual for Roads and Bridges, Volume 8, Section 1, Part 1: TD 9/93. Department for Transport and Highways Agency, 1993.
- 7.2. Layout of Grade Separated Junctions. Design Manual for Roads and Bridges, Volume 8, Section 2, Part 1: TD 22/06. Department for Transport and Highways Agency, 2006.
- 7.3. Cross-Sections and Headrooms. Design Manual for Roads and Bridges, Volume 8, Section 2, Part 2: TD 27/05. Department for Transport and Highways Agency, 2005.
- 7.4. Directional Signs on Motorways and All-Purpose Trunk Roads – Grade Separate Junctions. Interim Advice Note: 144. Highways England, 2016.
- 7.5. Motorway Signalling. Design Manual for Roads and Bridges, Volume 9, Section 1, Part 1: TD 46/05. Department for Transport and Highways Agency, 2006.
- 7.6. Smart Motorways. Interim Advice Note: 161. Highways Agency, 2015.
- 7.7. Managed Motorways Implementation Guidance – Hard Shoulder Running. Interim Advice Note: 111. Highways Agency, 2009.
- 7.8. The Design of Major Interchanges. Design Manual for Roads and Bridges, Volume 6, Section 2, Part 4: TD 39/94. Department for Transport and Highways Agency, 1994.
- 7.9. Layout of Compact Grade Separated Junctions. Design Manual for Roads and Bridges, Volume 6, Section 2, Part 5: TD 40/94. Department for Transport and Highways Agency, 1994.
- 7.10. Motorway Emergency Telephones. Design Manual for Roads and Bridges, Volume 9, Section 4, Part 2: TA 73/97. Department for Transport and Highways Agency, 1997.
- 7.11. Standard for Safety Risk Assessment on the Strategic Road Network. Design Manual for Roads and Bridges, Volume 0, Section 2, Part 3: GD 04/12. Department for Transport and Highways Agency, 2012.

8. Informative references

[None]