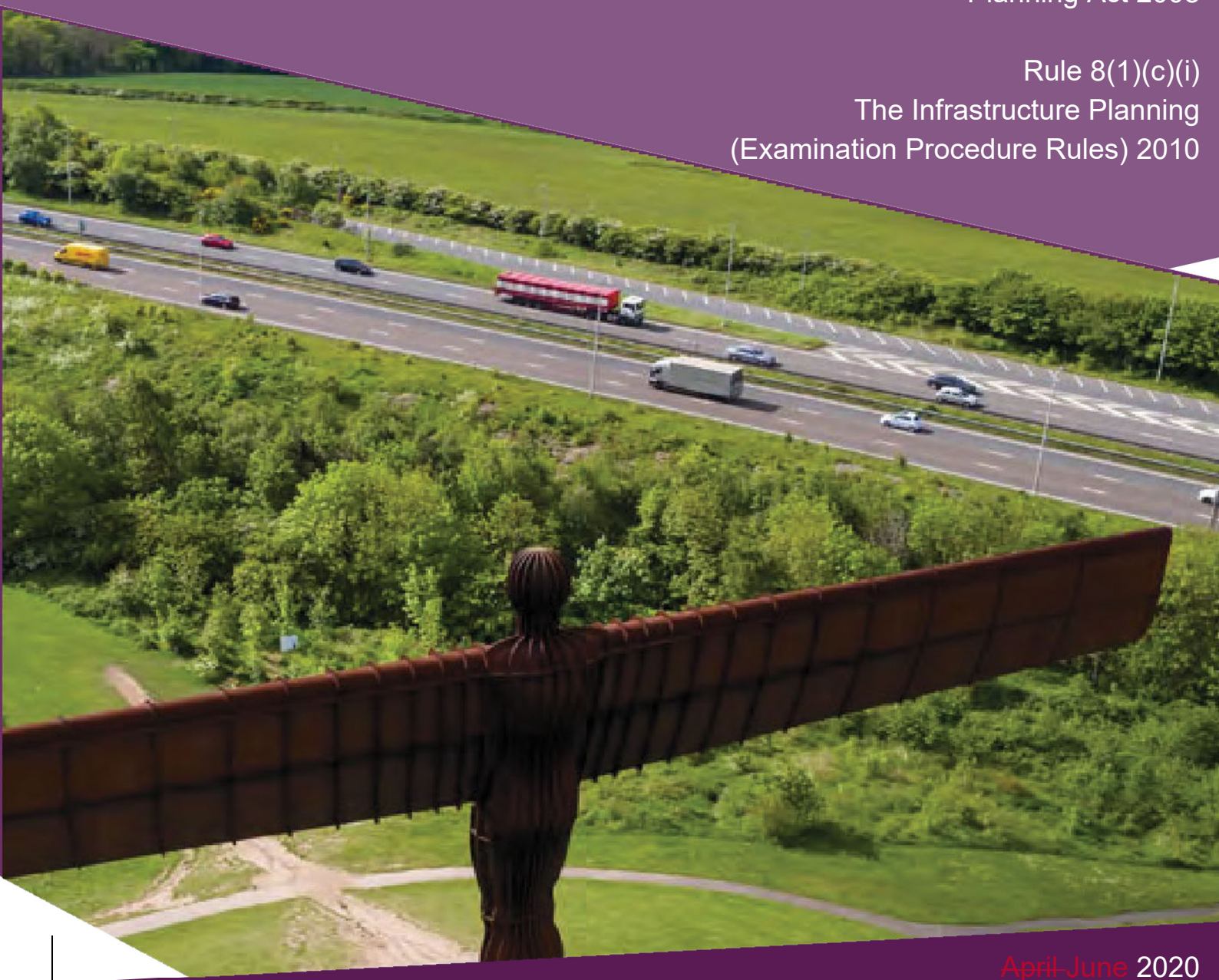
A1 Birtley to Coal House

Scheme Number: TR010031

Gantry Details

Planning Act 2008

Rule 8(1)(c)(i)
The Infrastructure Planning
(Examination Procedure Rules) 2010



~~April~~ June 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Examination Procedure Rules) 2010

The A1 Birtley to Coal House
Development Consent Order 20[xx]

Gantry Details

Rule Number:	Rule 8(1)(c)(i)
Planning Inspectorate Scheme Reference	TR010031
Application Document Reference	Appendix 3.6 A~~2.0B~~
Author:	A1 Birtley to Coal House Project Team, Highways England

Version	Date	Status of Version
Rev 0	20 April 2020	For Issue
Rev 1	9 June 2020	For Issue

CONTENTS

1 Introduction

1.1.1 This appendix details the justification for the provision and location of 14 gantry mounted direction signs proposed for the A1 Birtley to Coal House Scheme.

1.1.2 The gantry design has been developed in accordance with the following Highways England's guidance which was current at the time of design:

- Design Manual for Roads and Bridges Technical Directive (TD) 18/85 'Criteria for the Use of Gantries for Traffic Signs and Matrix Traffic Signals on Trunk Roads and Trunk Roads Motorways' (hereafter referred to as TD 18) – included within in Appendix C.
- Design Manual for Roads and Bridges Interim Advice Note (IAN) 144/16 'Directional Signs on Motorway and All-Purpose Trunk Roads: Grade Separated Junctions' (hereafter referred to as IAN 144) – included within Appendix D.

1.1.3 This document refers to the relevant sections of standards which support the justification for the need, number and location of gantries.

2 Common Details

2.1.1 This section gives common details which relate to the direction signs proposed for the scheme. Specific details for each gantry mounted direction sign are given in Chapter 3.

2.2 Sign fundamentals

2.2.1 Signs are a fundamental aspect of UK highway network and are used to provide information to drivers to enable them to traverse the highways safely and effectively. Direction signs are used to provide driver information about the location, type and layout of junctions, and the destinations available.

2.3 Destinations

2.3.1 A sign strategy for the scheme has been developed to define the destinations to be used on the signs. It has been prepared with appropriate skill and care by a qualified organization (The Applicant) to achieve the purpose of the operation of the scheme as part of the strategic road network.

2.4 Sign Face Design

2.4.1 The sign face design complies with legislation and associated guidance Statutory Instrument 2016 No. 362 The Traffic Signs Regulations and General Directions 2016; and the Traffic Signs Manual.

2.4.2 During the Preliminary Design the sign face design has been rationalised to reduce the size of the sign faces. The sign faces are shown on the Gantry General Arrangement Drawings within Appendix B.

2.5 Sign locations

2.5.1 At grade separated junctions, multiple direction signs are required to provide an acceptable level of safety. This scheme meets the following criteria set out in TD18/85 Paragraph 3.1(a) *"when side-mounted signs would be obscured for a significant proportion of a driver's reading time"*, and (b) *"when the demands on the driver's concentration are such that it is unreasonable and possible dangerous to divert his attention away from the traffic ahead and behind"*. The following is also relevant to this scheme; TD18/85 Paragraph 5.1.1 *"The carriageway has or will have 4 running lanes"*, 5.2.1 *"At junctions where the number of lanes available to a driver going ahead reduces after the junction"* and 5.2.2 *"Where a series of*

junctions are (an average of) less than 3km apart, measured between junctions". ~~These~~ The required gantries are listed below:

- 1 Mile (or $^{2}/_{3}$ mile) Advanced Direction Sign;
- $^{1}/_{2}$ Mile (or $^{1}/_{3}$mile) Advanced Direction Sign;
- Final Direction Sign; and
- Confirmatory Direction Sign.

2.5.2 The Advanced and Final Direction Signs are located relative to the Exit Datum Point (EDP), this is defined based on the junction type as below:

- At junctions with no lane drop such as a Taper Diverge at J66 (Eighton Lodge) southbound, it is located at the start of the taper to the diverge lane as shown on Figure 1 in accordance with IAN 144 Paragraph 2.2;

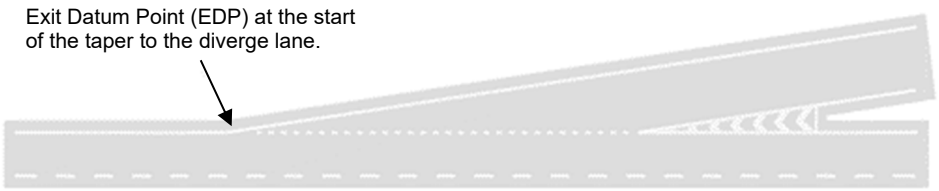


Figure 1: Location of the Exit Datum Point at a Taper Diverge layout.

- At junctions with a lane drop where a single lane widens to two lanes prior to the diverge tip of the nose markings it is the greater upstream of 200 metres from the diverge tip of the nose markings and the start of the taper where the carriageway widens from a one lane to a two lane drop in accordance with IAN 144 Paragraph 2.3, such as:;
  - A Lane Drop at Parallel Diverge at J65 (Birtley) southbound and J67 (Coal House) northbound (as per Figure 2); or
  - A Lane Drop at Taper Diverge at J66 (Eighton Lodge) northbound (as per Figure 3).

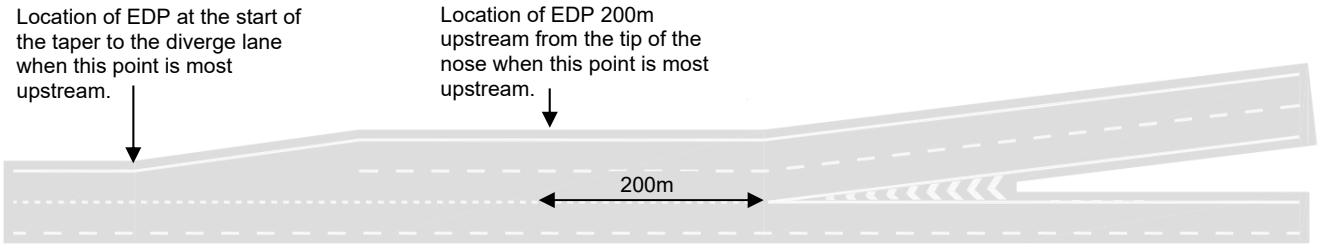


Figure 2: Location of the Exit Datum Point at a Lane Drop at Parallel Diverge layout.

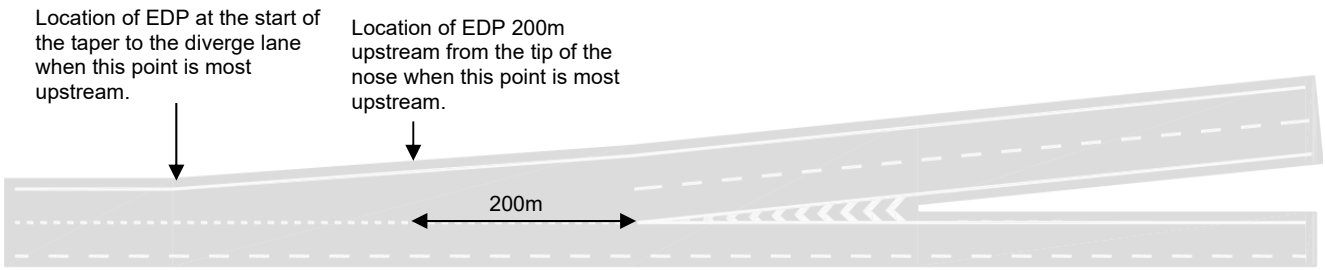


Figure 3: Location of the Exit Datum Point at a Lane Drop at Taper Diverge layout.

2.5.3 The Advanced Direction Signs (ADS) have the following hierarchy for their required locations as detailed in IAN 144 Paragraphs 2.5, 2.6, 2.9, 2.10 and shown on Figure 4, in reducing order of preference:

- Signs at 1 mile (1609m) and $^{1}/_{2}$ mile (804m) from the EDP; or
- Signs within a tolerance of 10% upstream and 20m downstream of 1 mile and $^{1}/_{2}$ mile from the EDP; or
- Signs at $^{2}/_{3}$ mile + 10% (1180m) and $^{1}/_{3}$ mile + 10% (590m) from the EDP; or
- Signs within a tolerance of 10% upstream and 20m downstream of $^{2}/_{3}$ mile and $^{1}/_{3}$ mile from the EDP

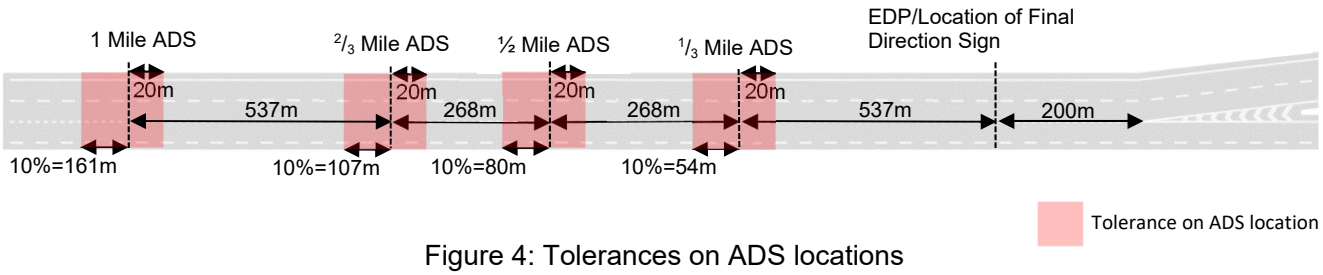


Figure 4: Tolerances on ADS locations

2.5.4 Reductions between levels in the hierarchy is only permitted due to site or construction constraints.

2.5.5 The preferred location for the Final Direction Sign is at the EDP as detailed in IAN 144 Paragraph 2.4 and 2.5. If this is not feasible, the sign should be located within a tolerance of the EDP and up to 50m upstream of the EDP as shown on Figure 5 as detailed in IAN 144 Paragraph 2.9, 2.10 and 2.11.

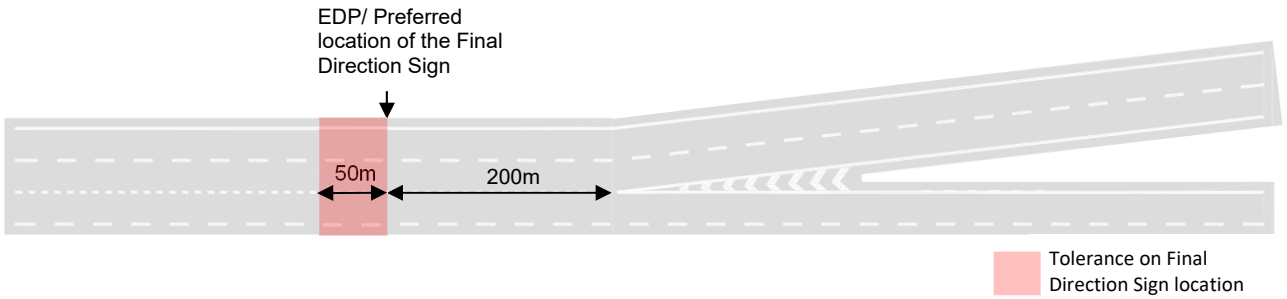


Figure 5: Preferred location and the permitted tolerance on the location of the Final Direction Sign.

2.5.6 The Confirmatory Direction Sign is located relative to the diverge nose. The preferred location is within a tolerance of between 30m and 50m from the tip of the nose as detailed in

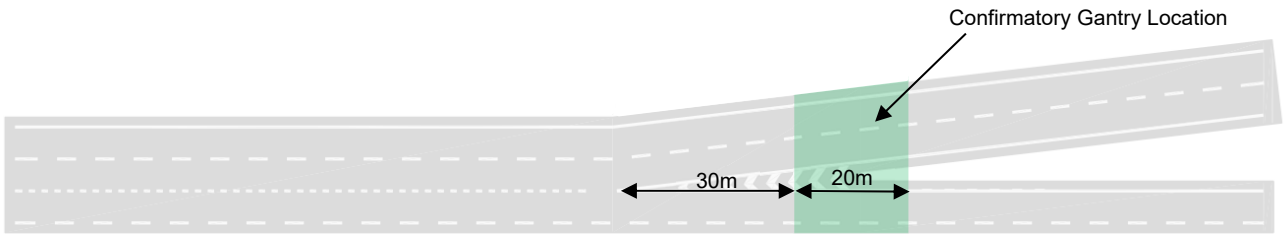


Figure 6: Location of the Confirmatory Direction Sign

IAN 144 Paragraph 2.8 and shown on Figure 6.

2.6 Provision of Gantries

2.6.1 Direction signs are most commonly provided on posts and mounted in the verge (verge signs), however there are several factors where provision of verge signs increases the risk of

vehicular accidents. These are:

- On roads of more than two lanes, verge signs may be obscured by high sided vehicles in the nearside lane ~~in accordance with~~as noted in TD 18/85 Paragraph 3.1 a). This~~, which~~ introduces a risk of driver confusion, late manoeuvres and consequent side swipe / rear shunt accidents; and
- On roads which have closely spaced grade separated junctions; and / or junctions with lane drops, verge signs divert driver's attention away from traffic ahead and behind ~~in accordance~~as noted in ~~with~~ TD18/85 Paragraph 3.1 b), increasing the risk of a loss of driver awareness and consequent rear shunts / side swipe accidents.

2.6.2 The diverges at J66 (Eighton Lodge) southbound, J65 (Birtley) southbound, J66 (Eighton Lodge) northbound and J67 (Coal House) northbound have:

- A 4 lane mainline;
- The below spacings between junctions (3km spacing is considered closely spaced):
  - 2km between J67 (Coal House) and J66 (Eighton Lodge);
  - 1.5km between J66 (Eighton Lodge) and J65 (Birtley); and
- Lane drops (with the exception of J66 southbound diverge (Eighton Lodge)

2.6.3 Gantries are required to mitigate the above risks associated with verge signs as described in paragraph 2.5.1 above.

3 Specific Details

3.1.1 The specific locations proposed for each gantry sign are described within this section in relation to the preferred sign locations given within section 2.4 and are shown on the Gantry Locations and Tolerances Plan within Appendix A.

3.1.2 To allow the applicant to respond appropriately to unknown constraints being encountered during further design development and construction, an allowance for variation of the gantry locations has been included within the DCO. This is as per the tolerance for each sign as described in paragraphs 2.5.3, 2.5.5 and 2.5.6. Examples of unknown constraints include poor ground conditions and unknown 3rd party assets. The tolerances are shown on the Gantry Locations and Tolerances Plan within Appendix A.

3.1.3 The applicant has endeavoured to use the minimum number of gantry mounted signs whilst remaining in accordance with standards.

3.2 J66 (Eighton Lodge) Southbound Diverge

SG001 – 1 Mile ($^2/_3$) Advanced Direction Sign

3.2.1 A $^1/_3$ Mile sign is proposed instead of a $^1/_2$ Mile sign (detailed in 3.2.2), as such a $^2/_3$ mile sign is proposed at the preferred location.

SG002 - $^1/_2$ Mile ($^1/_3$) Advanced Direction Sign

3.2.2 The location (including tolerances) of the $^1/_2$ Mile sign would be within the extents of the proposed 3, 6 and 7 span Allerdene Viaduct Options. As such a $^1/_3$ Mile sign is proposed at the preferred location.

SG003 - Final Direction Sign

3.2.3 The final direction sign is proposed at its preferred location.

SG004 - Confirmatory Direction Sign

3.2.4 The confirmatory direction sign is proposed at its preferred location.

3.3 J65 (Birtley) Southbound Diverge

SG005 - 1 Mile (2/3) Advanced Direction Sign

3.3.1 As a 1/3 Mile sign is proposed instead of a 1/2 Mile ADS (detailed in 3.3.2), as such a 2/3 mile sign is proposed at the preferred location..

SG006 - 1/2 Mile (1/3) Advanced Direction Sign

3.3.2 The location of a 1/2 Mile sign (including tolerances) would be upstream of the J66 (Eighton Lodge) merge. As such vehicles joining at the merge would only have the final direction sign to provide junction information, increasing the risk of late manoeuvres and associated accidents. A 1/3 Mile sign is proposed at its most downstream tolerance to provide the maximum opportunity for drivers to assimilate the sign information and reduce the risk of late manoeuvres.

SG007 - Final Direction Sign

3.3.3 The final direction sign is proposed at its preferred location.

SG008- Confirmatory Direction Sign

3.3.4 The confirmatory direction sign is proposed at its preferred location.

3.4 J66 (Eighton Lodge) Northbound Diverge

1 Mile (2/3) Advanced Direction Sign

3.4.1 The location of both the 1 Mile and 2/3 Mile sign (including tolerances) would be upstream of the J65 (Birtley) Merge. Due to the merge and diverge layouts proposed there is no sign face layout available which would comply with standards. Any attempted provision would be unusual and increase the risk of driver confusion / associated accidents.

SG009- 1/2 Mile (1/3) Advanced Direction Sign

3.4.2 The location of a 1/2 Mile sign (including tolerances) would be obscured by North Side Overbridge. As such, the 1/3 Mile direction sign is proposed at its preferred location.

SG010 - Final Direction Sign

3.4.3 The final direction sign is proposed at its preferred location.

SG011 -Confirmatory Direction Sign

3.4.4 The confirmatory direction sign is proposed at its preferred location.

3.5 J67 (Coal House) Northbound Diverge

1 Mile (2/3) Advanced Direction Sign

3.5.1 The location of a 1 Mile sign (including tolerances) would be upstream of the J66 (Birtley) Merge. Due to the merge and diverge layouts proposed there is no sign face layout available which would comply with standards. Any attempted provision would be unusual and increase the risk of driver confusion / associated accidents.

3.5.2 The location of a 2/3 Mile sign would be within the merge extents and may not be perceived / comprehended by merging drivers. As such, it is considered that a 1/2 Mile sign would maximise the opportunity for drivers to assimilate the junction information.

SG012 - 1/2 Mile (1/3) Advanced Direction Sign

3.5.3 The 1/2 Mile direction sign is proposed at its preferred location.

SG013 - Final Direction Sign

3.5.4 The Final Direction Sign location (including tolerances) would be mid span for the various viaduct options. This would require amendments to the lengths of the spans and may require an additional pier and foundations, which would incur significant additional cost. The final direction sign is proposed 10m downstream of its preferred location / tolerance to minimise these impacts to the proposed Allerdene Viaduct.

SG014 - Confirmatory Direction Sign

3.5.5 The confirmatory direction sign is proposed at its preferred location.

4 Gantry Structural Requirements

4.1.1 The highway upgrade requires the installation of 14No. gantry mounted direction signs between A1 Birtley to Coalhouse.

4.1.2 The ~~proceeding~~ following information provides details of some of the key constraints considered when developing the gantry structural forms.

4.2 Cost Effective Forms

4.2.1 The ~~applicant's policies~~policies of the Applicant necessary for a safe and consistent network require that the gantries should be simple cost-effective solutions that are easy to build. This inclines toward gantries comprising light weight steel type construction that can be prefabricated and readily transported/assembled and lifted into position. The lightweight superstructure will also reduce the size and complexity of foundations further simplifying construction and thereby having a positive impact on cost.

4.3 Access Provisions For Maintenance

4.3.1 Initial discussions with the ~~HE SES and the Area 14 MAC team~~responsible teams within Highways England's organisation show both are in agreement regarding the provision of non-access ADS gantries, which determines the type of gantry to be installed. Justification for this is that access is considered critical only for gantries which will be supporting technology. Those supporting ADS type signs are generally non access on the basis that maintenance access (to urgently repair VMS type signs and inform traffic) is not anticipated.

4.3.2 Any maintenance for the ADS gantry superstructure would be carried out within traffic management for which the level of risk to both workers and members of the public would be assessed and controlled prior to the commencement of the works.

4.3.3 ~~The HE SES and Area 14 MAC have also expressed a~~It is also preferable for safety reasons ~~preference~~ to avoid gantry leg supports being located within the carriageway central reserve thereby minimising the health and safety risk to operatives and motorists, and disruption to traffic associated with necessary access to undertake essential maintenance. ~~Avoiding~~to ~~gantry supports within the central reserve and removes the health and safety risk to maintenance operatives resulting from the need to access the central reserve.~~

4.4 VRS Arrangements

4.4.1 Vehicle Restraint System (VRS) ~~is the "vehicle restraint system that~~ is essential to the safe operation of Highways England's network. They are classified as to the level of containment such as H1 (high containment) and working width such as W1 (less than 0.6m). The level of containment and working width is determined by the obstruction to be protected and the distance of the obstruction from the front face of the barrier. ~~protection afforded, including the standards "H1" (steel) and "H2" (concrete), which have [*an equivalent performance standard* and are] appropriate for the Scheme.~~

~~4.4.1~~4.4.2 The ~~most economic~~ verge arrangement making best use of land and resources where

space allows, is the for a gantry foundation to be ~~being~~ set back behind a detached 'H1' barrier. ~~Where sufficient space is not available, a 'H1' or 'H2' system can be attached to the foundation but this is considered to be suboptimal~~more ~~costly.~~

4.4.24.4.3 The redline boundary at the majority of the gantry locations limits additional land take.~~, t~~ Therefore the latter option to attach VRS to the gantry foundation is currently applied at all locations.

4.4.34.4.4 Sufficient headroom clearance (5.7m including allowance for sag and deflection) will be provided at the gantries to remove the need to design the superstructure for vehicle impact loading. However, it is anticipated that the edge of carriageway at all gantry locations is <4.5m. Therefore, the foundation plinth shall be designed for the effects of vehicular collision loading.

4.5 Environmental Considerations

4.5.1 The scheme is in an environmentally sensitive zone (i.e. adjacent to Angel of the North, built up residential areas etc.). Therefore, the structural form should comprise light open type gantry structures which provide some visibility through the structure. This approach favours steel truss type as oppose solid concrete structural gantry forms. During the detailed design the size of structural steel members shall be rationalised to further minimise visual intrusion.

4.5.2 The number of gantries potentially impacting the sight lines of the Angel of the North has been rationalised from 20No. to 14No. via refinements in the highway and technology design during the preliminary design. In addition, the gantry height shall be at the optimum level to inform traffic and provide safe clearance of abnormal loads (in accordance with standards) beneath the structure. These refinements further limit potential visual obstruction of the Angel of the North.

4.6 Gantry Structural Forms

4.6.1 The proposed form of gantries are based on the assumptions/constraints listed below, some of which have been referred to previously:

- Gantries ~~shall~~ should comprise ~~simple, cost effective structural~~simple structural forms
- Gantries sh~~all~~ould comprise light weight steel type construction that can be prefabricated and readily transported/assembled and lifted into position
- All gantries sh~~all~~ould be non-access type
- The gantries will support no equipment other than fixed text ADS signs
- Due to additional land take restrictions, the VRS ~~shall~~ should be tied into gantry foundation plinths which ~~shall~~ should be designed to sustain vehicle impact loads
- The Location of gantry support legs in the central reservation will be avoided

4.6.2 The gantries ~~shall~~ should comprise one of the following type, commonly used on the Highways England network;

- Long Span Truss Type Cantilever Gantries – for span up to 19m
- Super Span Truss Portal Gantries – with supports positioned either side of the A1 verge

4.6.3 Long Span Truss Type Cantilever Gantries: For span lengths between 14m-19m a long span truss cantilever gantry is normally provided. They typically consist of a truss boom structure supporting the signboard over a single carriageway as shown in Figure 7:

Figure 7

4.6.4 Super span Truss Portal Gantries: For spans greater than 19m, a portal gantry is more likely to be ~~a cost effective~~an appropriate option compared to a cantilever gantry. They comprise a truss boom superstructure capable of spanning both carriageways without intermediate supports within the central reserve. Refer to Figure 8 and 9:

Figure 8

Figure 9

4.6.5 The proposed steel truss type cantilever and portal gantry structures are proprietary gantry types that satisfy design standards and can be easily installed with reduced initial capital cost. They also provide good value with regards with limited long-term maintenance liabilities whilst providing a light weight open structural form that is less visually intrusive, particularly with regard to sight lines of the Angel of the North.

4.6.6 Refer to Appendix A for the proposed Gantry Locations and Tolerances plan.

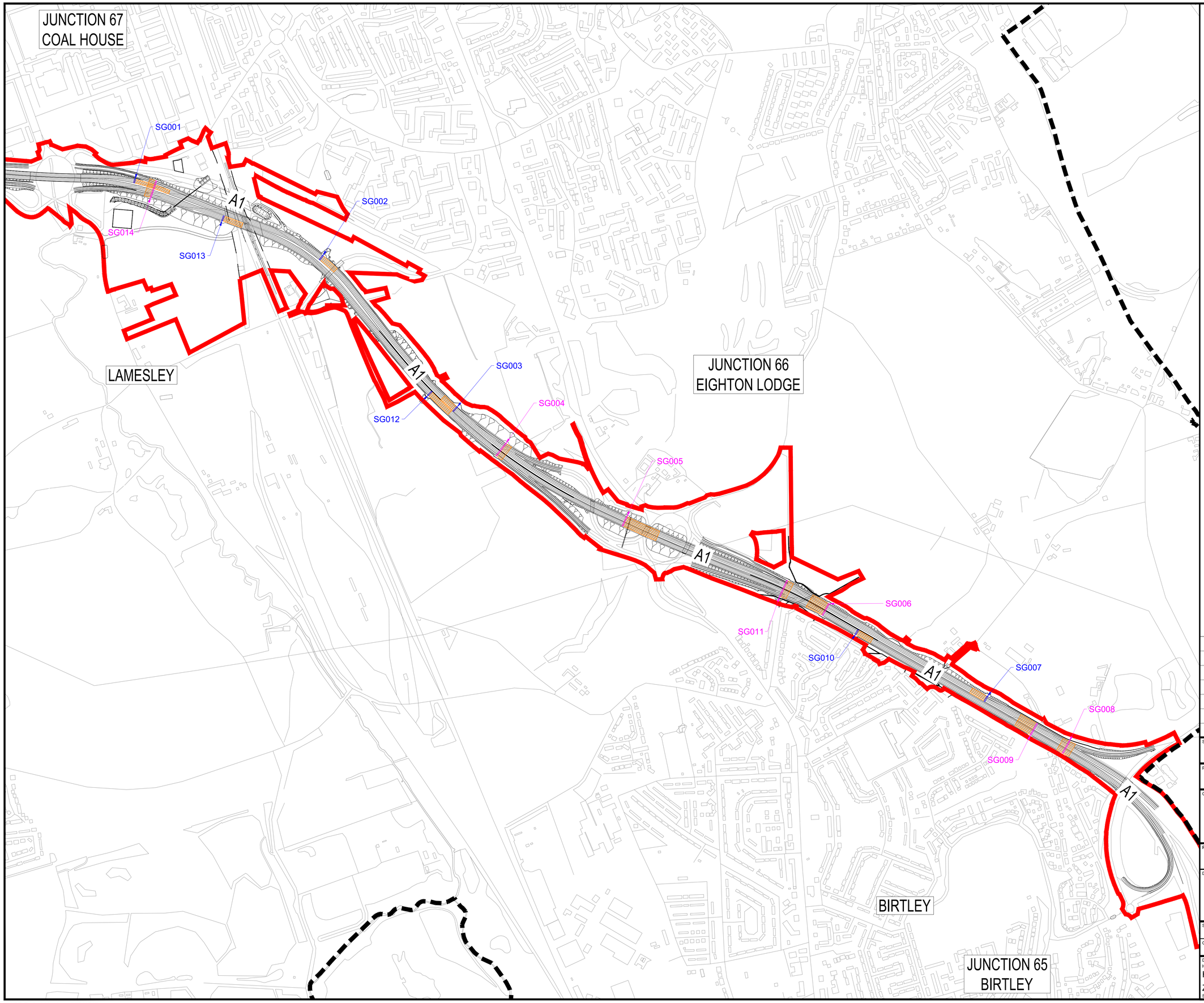
4.6.7 Refer to Appendix B for outline Gantry General Arrangement drawings.

5 Conclusion

5.1.1 Based on the information outlined in the paper, it was determined at the preliminary design stage that all gantries on this scheme should be either a Long Span Truss Cantilever Gantries for spans up to 19m or Super Span Truss Portal Gantries for spans in excess of 19m. The cantilever option ensures that the gantry only spans a single lane. The super span gantry is only introduced where the span is too great to place signs in the appropriate location for each lane on the carriageway.

5.1.2 Both options remove the need for a gantry support in the central reserve which removes the risks to operatives and motorists associated with future maintenance.

Appendix A – Gantry Locations and Tolerances Plan



KEY

- ORDER LIMITS
- LOCAL AUTHORITY BOUNDARY
- THE SCHEME (SHOWN FOR ILLUSTRATIVE PURPOSES ONLY)
- PROPOSED CANTILEVER GANTRY
- PROPOSED SUPERSPAN GANTRY
- PROPOSED GANTRY TOLERANCE

SCALE 1:10000

0m 100m 200m 500m 1000m

Rev.	Date	Description	By	Eng' Ch'k	Disc' Ch'k	App'd
0	20/04/20	APPLICATION ISSUE	JS	PG	PG	NGR

Suitability: Post Acceptance Changes

Status: S0

PINS Reference Number: TR010031/APP/2.3(A)

Client: highways england

Project Title: A1 BIRTLEY TO COAL HOUSE

Drawing Title: GANTRY LOCATIONS AND TOLERANCES

Scale	Drawn	Eng. Check	Approved	Authorised
NTS	C.Cooper	M.Birkett	M.Birkett	N.Rawcliffe
Original Size	**Date**	**Date**	**Date**	**Date**
A1	20/04/20	20/04/20	20/04/20	20/04/20

Drawing Number

HE PIN	Originator	Volume	Revision
HE551462	WSP	LSI	0

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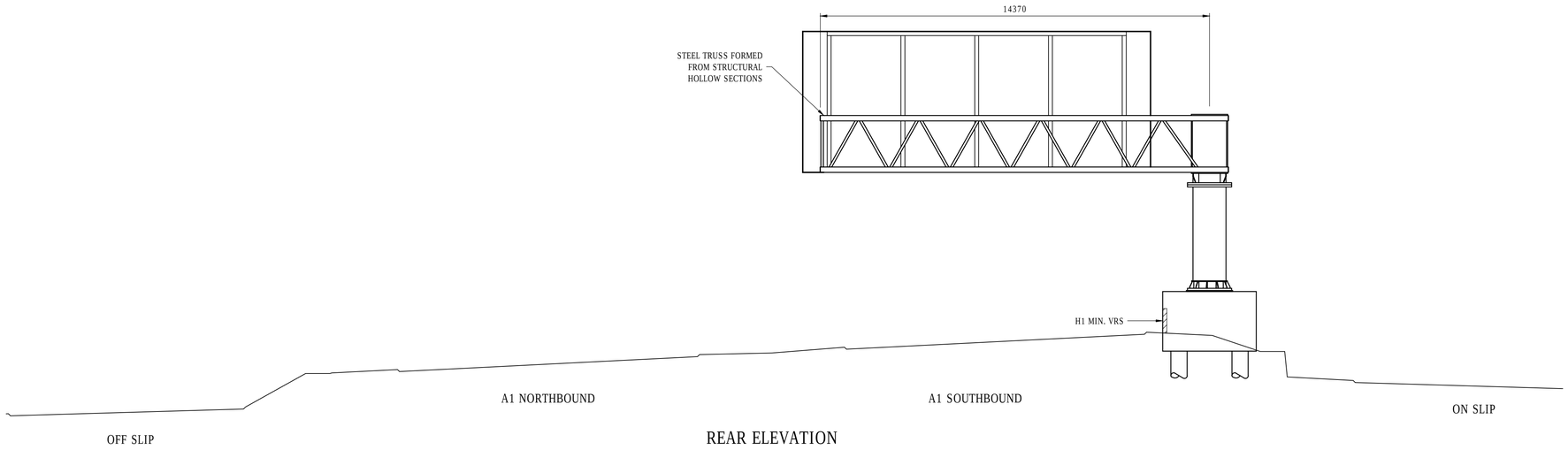
Appendix B – Gantry General Arrangement drawings



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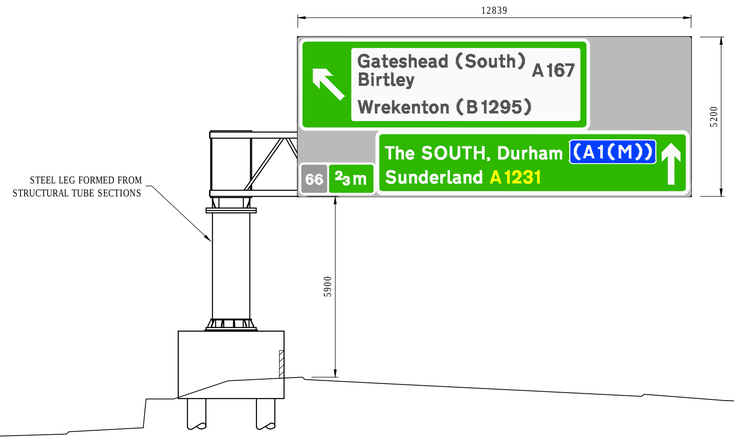

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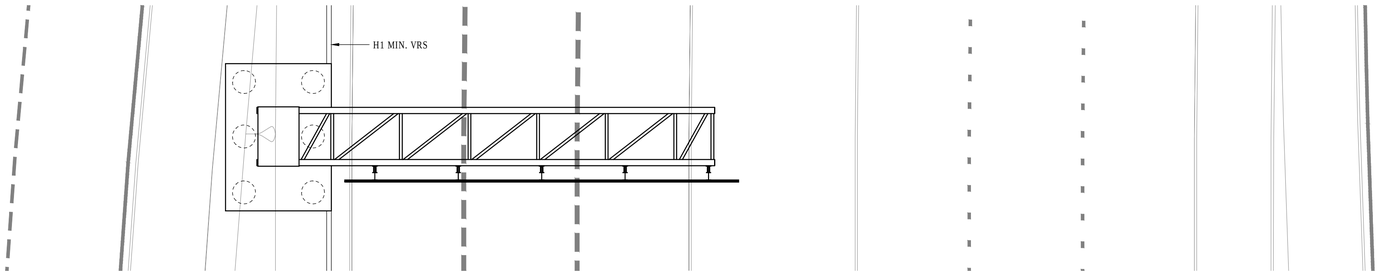

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client: Working on behalf of highways england

Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG001

INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number

Project	Originator		Volume	Project Ref. No.
HE551462	RAM		SGY	
SG001	SK	CB	0001	Revision
Location	Type	Role	Number	P01.1

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Millimetres
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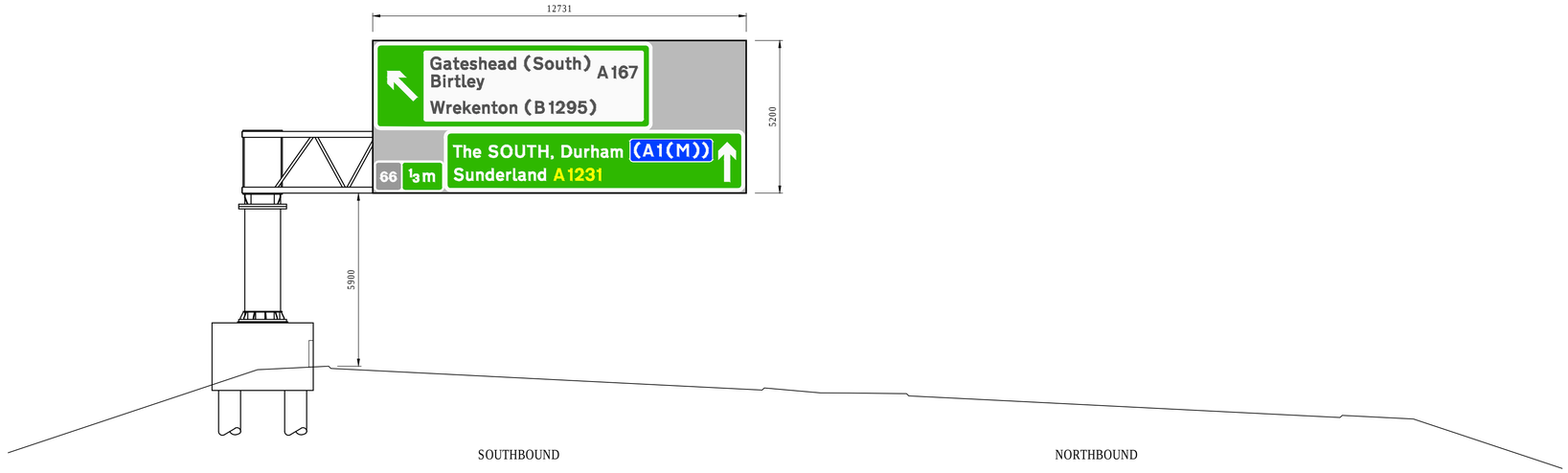

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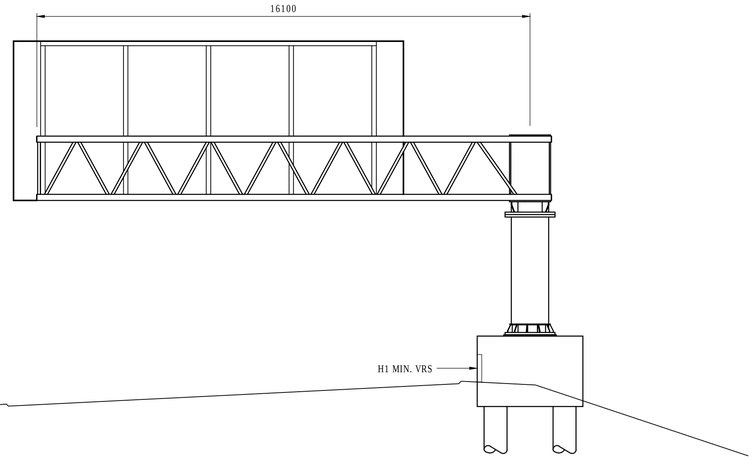

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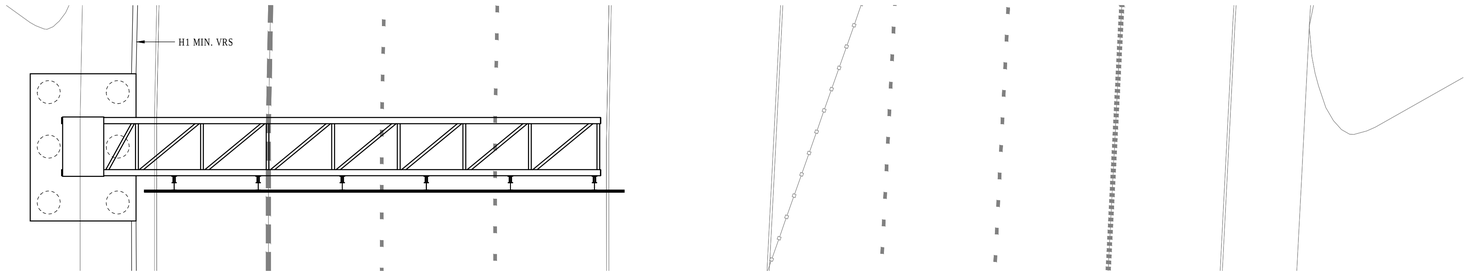

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P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title
A1 BIRTLEY TO COALHOUSE

Drawing Title
GANTRY SG002
INDICATIVE ARRANGEMENT

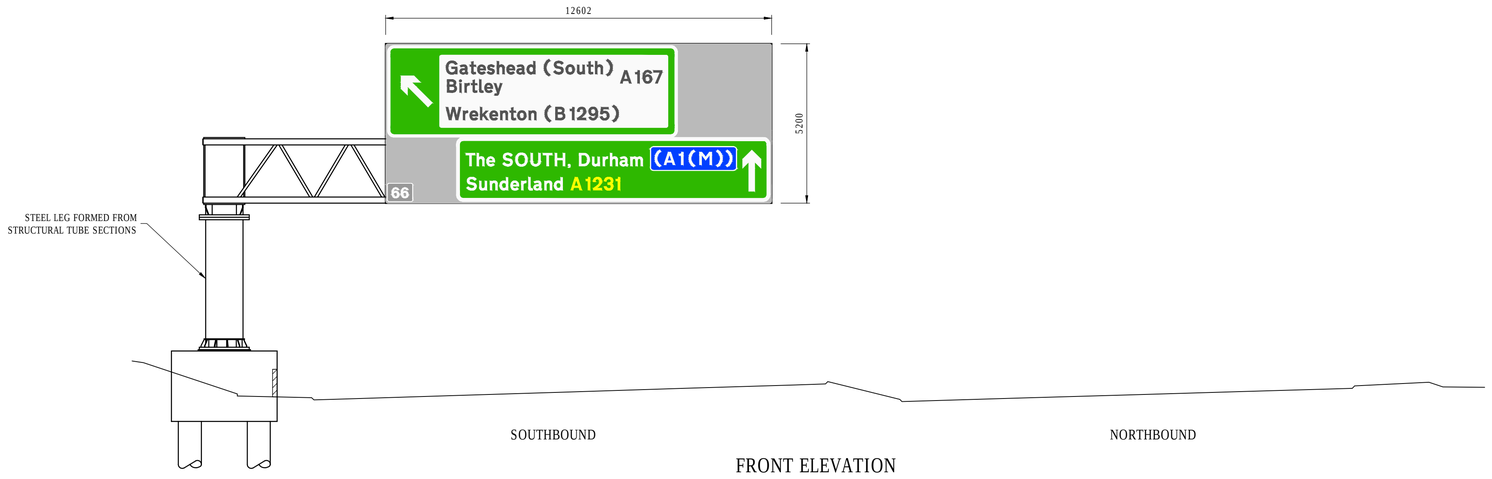
Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY
Suitability: S0

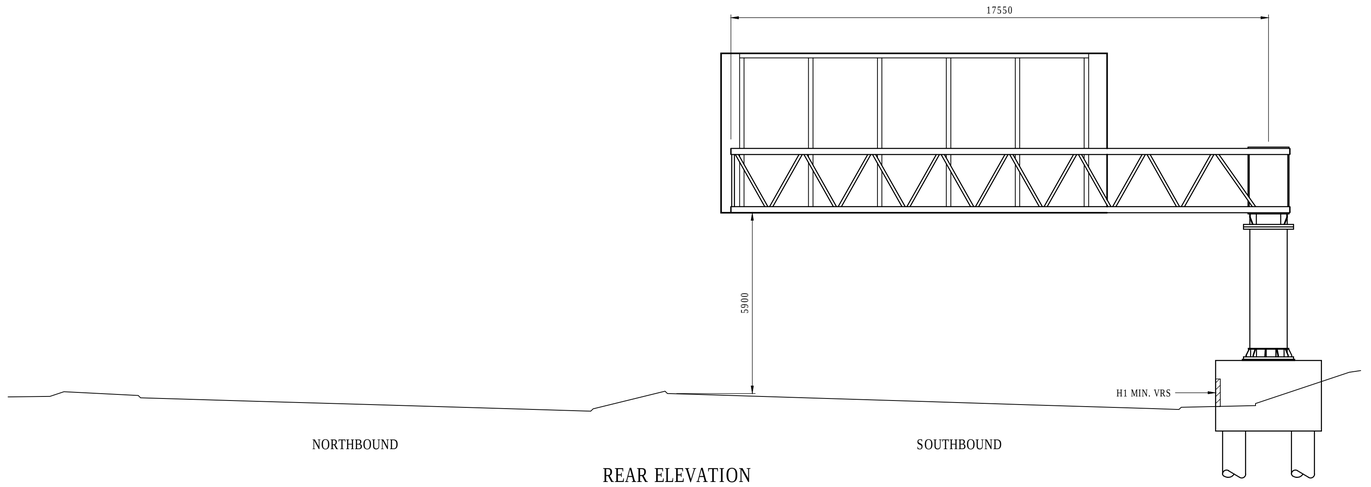
Drawing Number
Project: HE551462 | Originator: RAM | Volume: SGY
Location: SG002 | Type: SK | Role: CB | Number: 0001
Project Ref. No.
Revision: P01.1

RAMBOLL

100
Millimetres
0 10
DO NOT SCALE



FRONT ELEVATION



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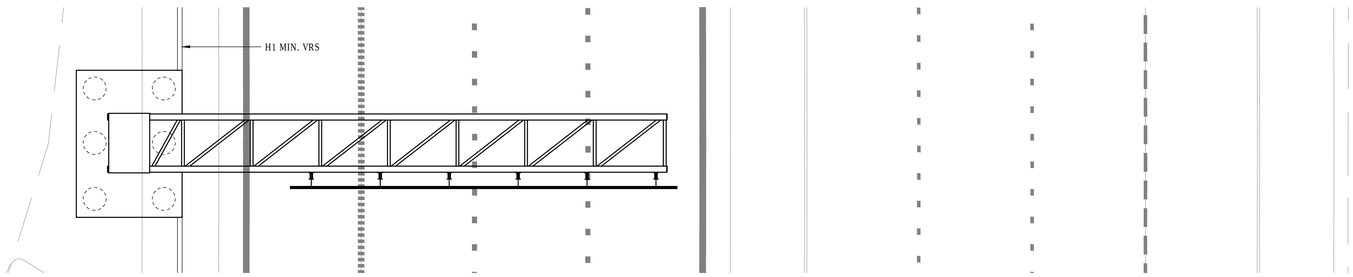

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client
Working on behalf of
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Project Title
A1 BIRTLEY TO COALHOUSE

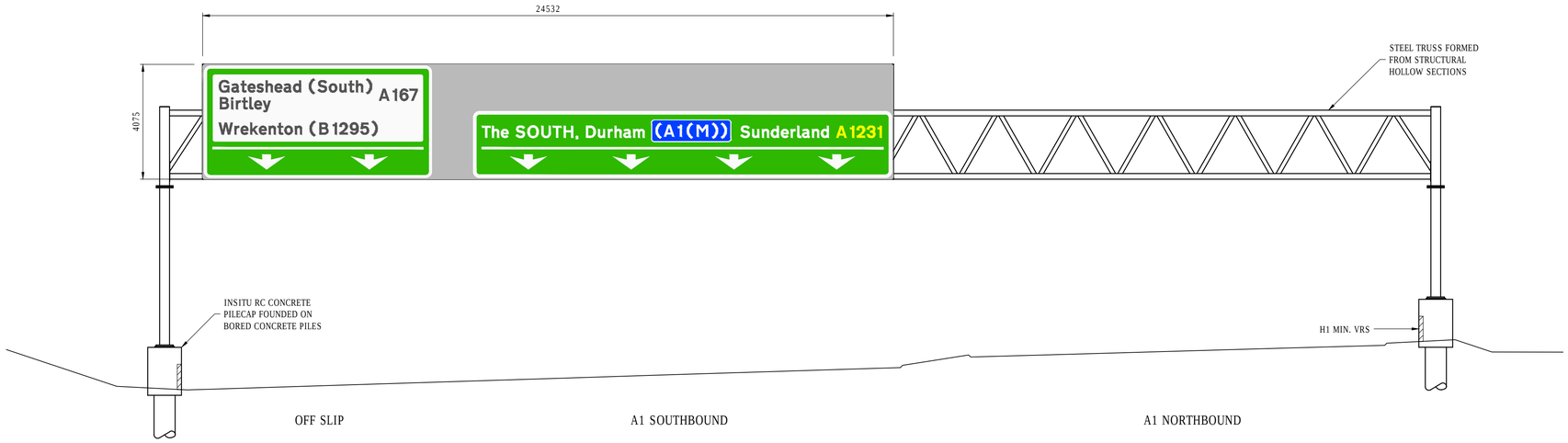
Drawing Title
GANTRY SG003
INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	ACL	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY
Suitability: S0

Drawing Number
Project: HE551462
Originator: RAM
Volume: SGY
Location: SG003
Type: SK
Role: CB
Number: 0001
Project Ref. No.:
Revision: P01.1

RAMBOLL



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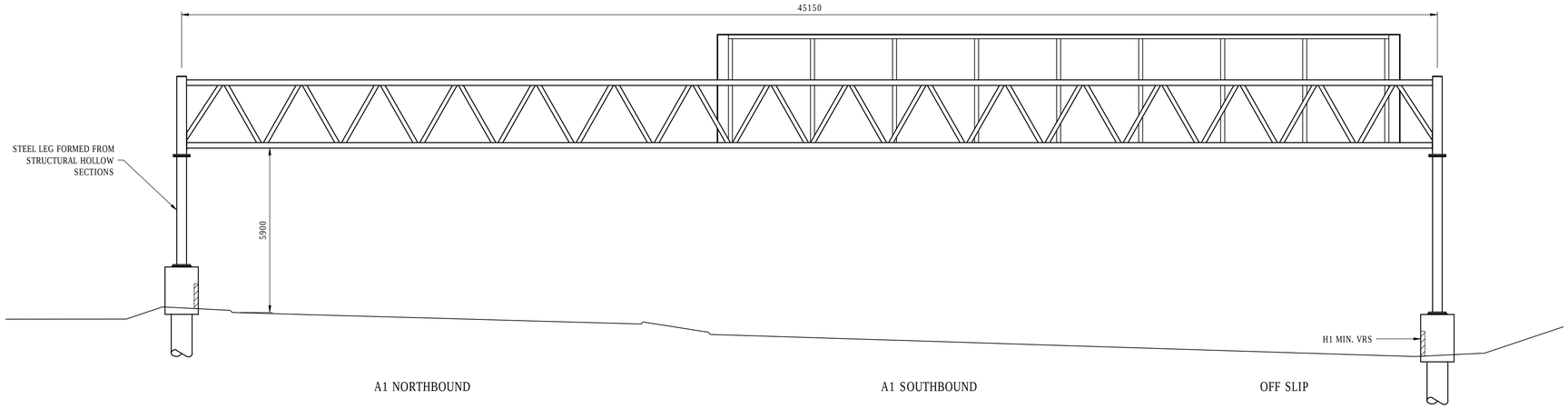

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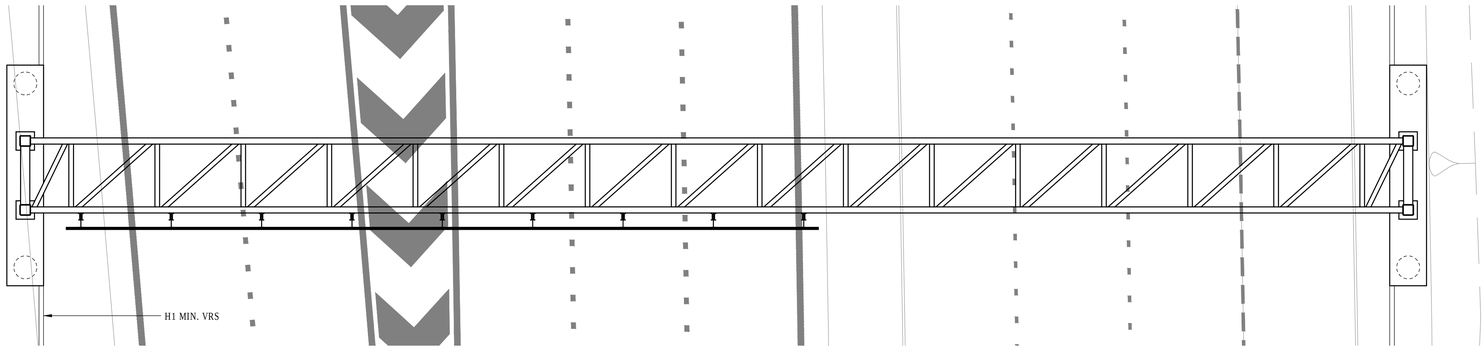

PLAN

NOTES

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P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG004

INDICATIVE ARRANGEMENT

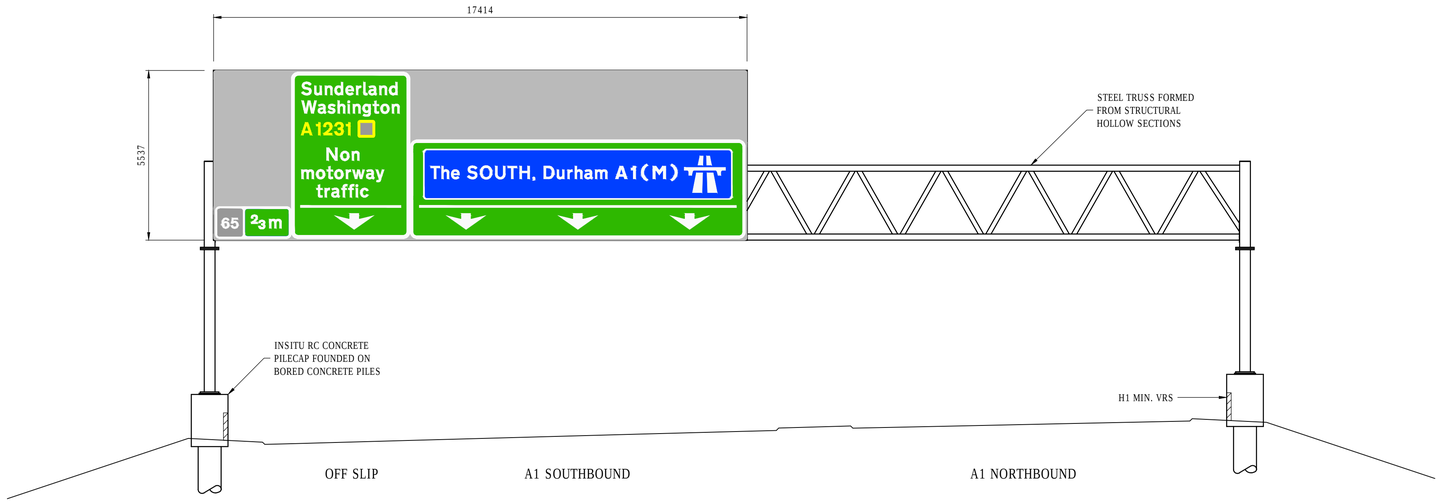
Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number Project	Originator	Volume	Project Ref. No.
HE551462	RAM	SGY	
SG004 (Location)	SK (Type) CB (Role)	0001 (Number)	Revision P01.1

RAMBOLL



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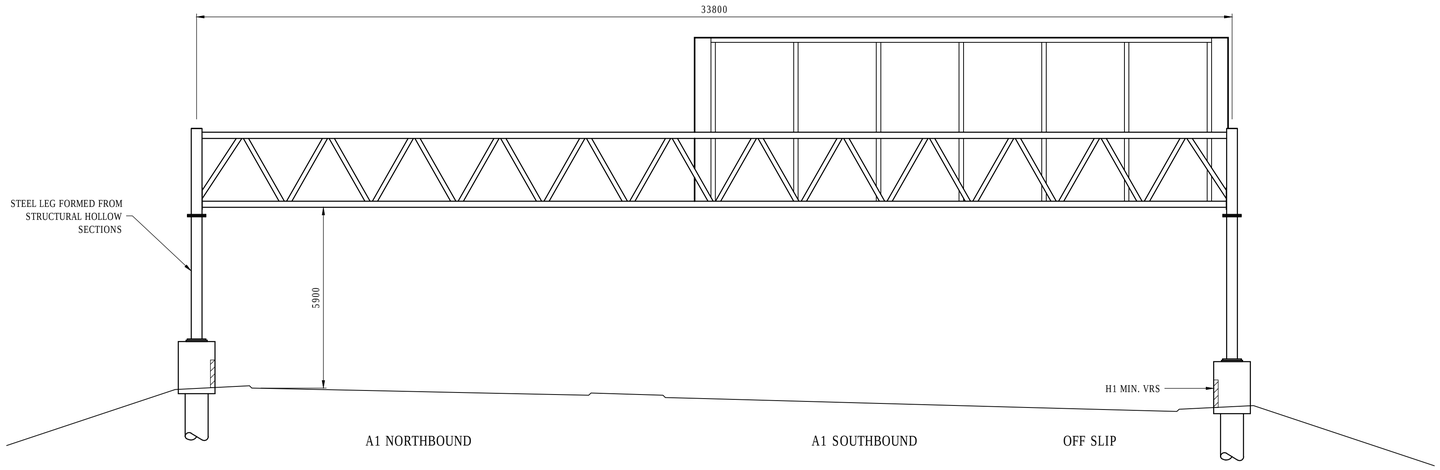

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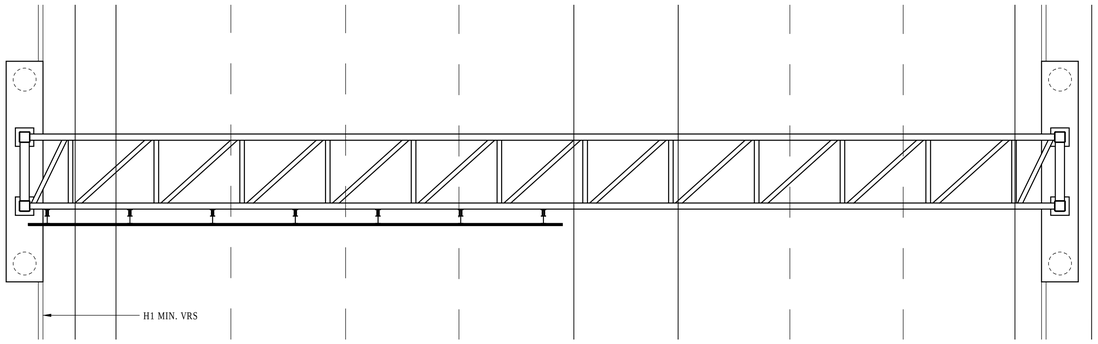

PLAN

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P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title
A1 BIRTLEY TO COALHOUSE

Drawing Title
GANTRY SG005
INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

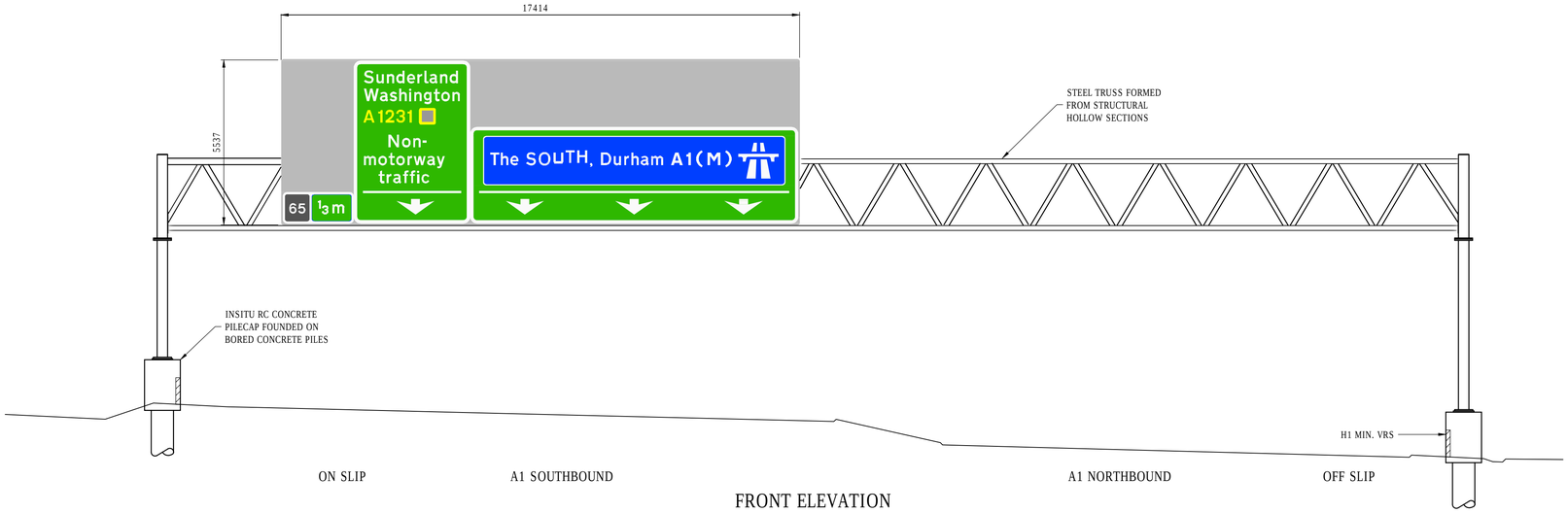
Drawing Status: PRELIMINARY
Suitability: S0

Drawing Number

Project	Originator	Volume	Project Ref. No.
HE551462	RAM	SGY	
SG005 (Location)	SK (Type)	CB (Role)	0001 (Number)

Revision: P01.1

RAMBOLL



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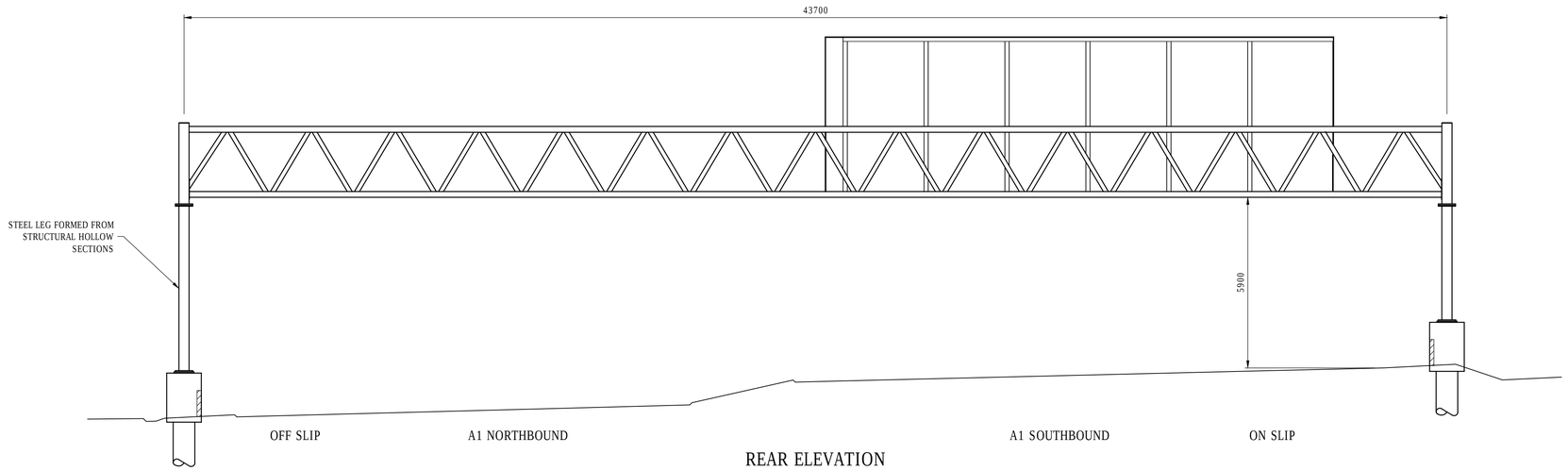

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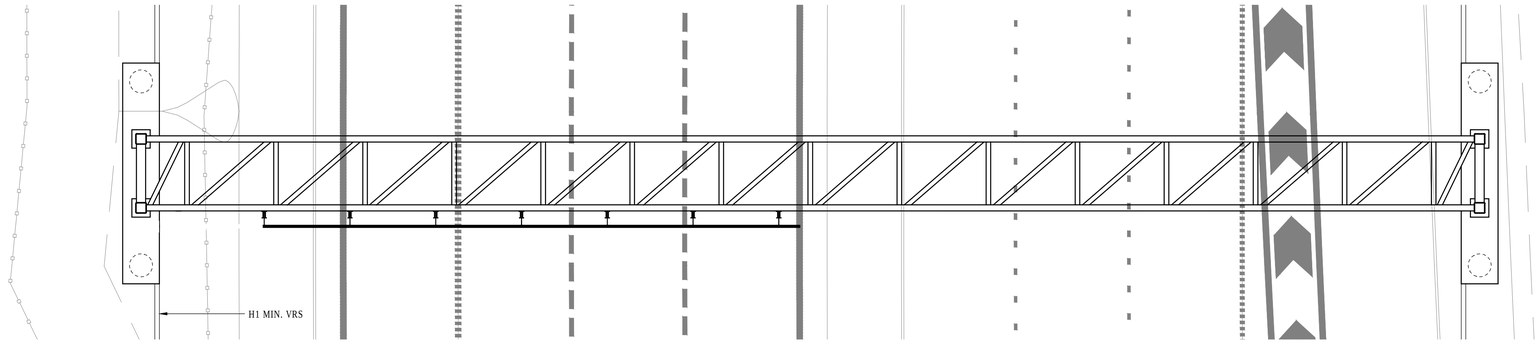

PLAN

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client: Working on behalf of highways england

Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG006
INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY

Suitability: S0

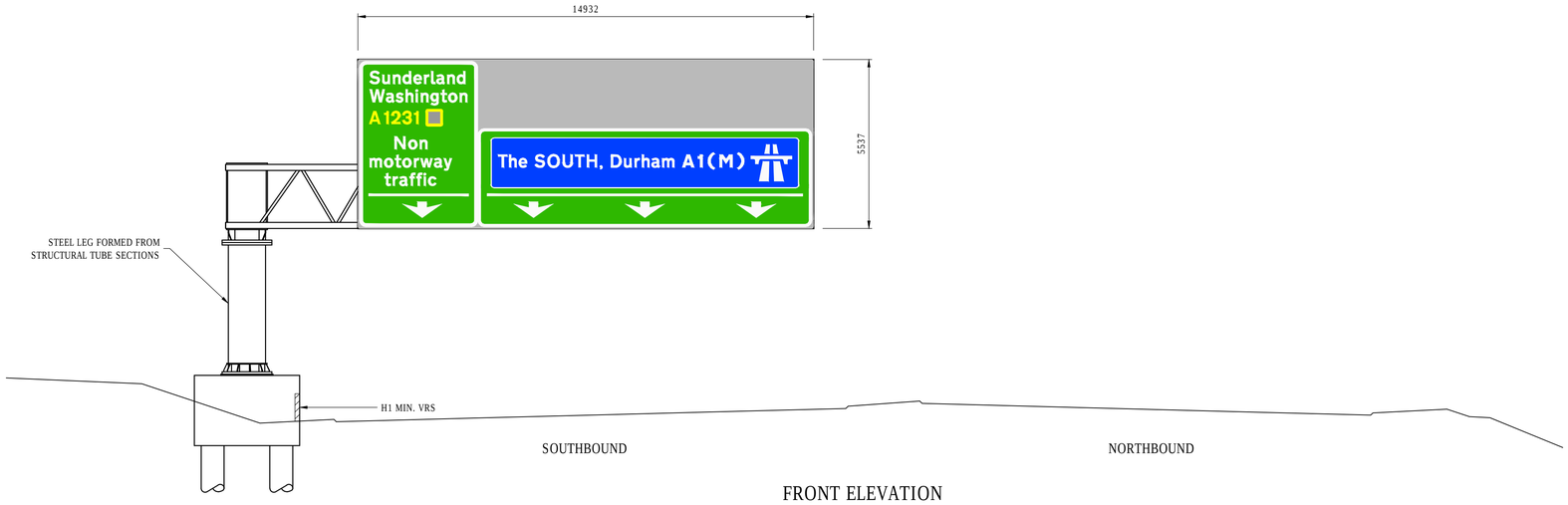
Drawing Number

Project	Originator	Volume		Project Ref. No.
HE551462	RAM	SGY		
SG006	SK	CB	0001	Revision: P01.1
Location	Type	Role	Number	

RAMBOLL

100 Millimetres 0 10

DO NOT SCALE



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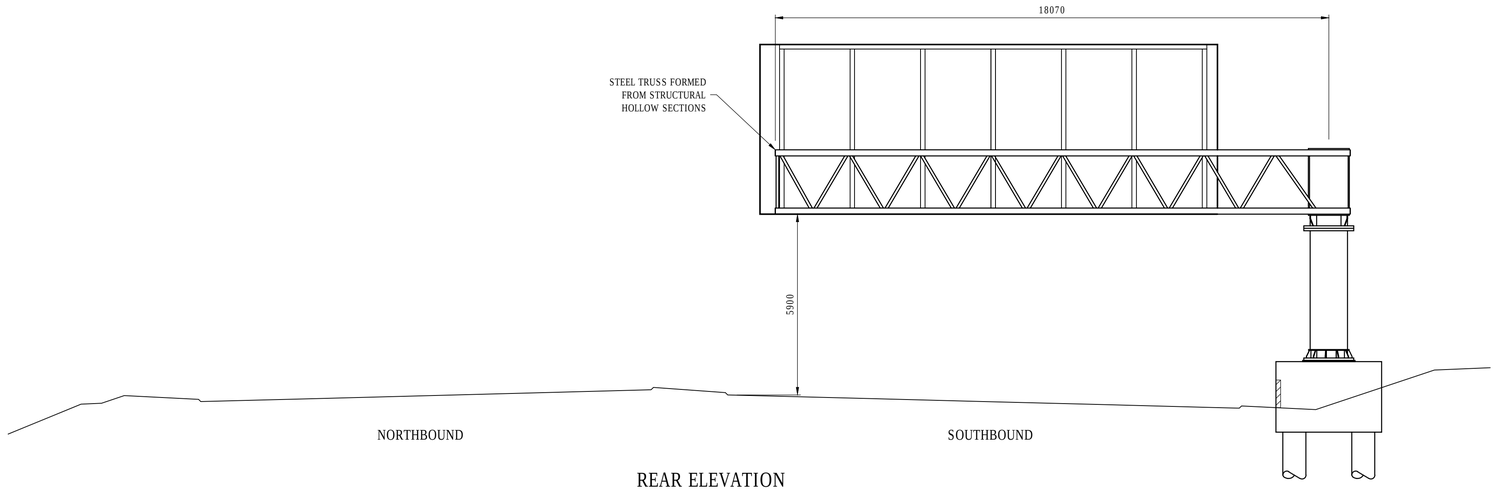

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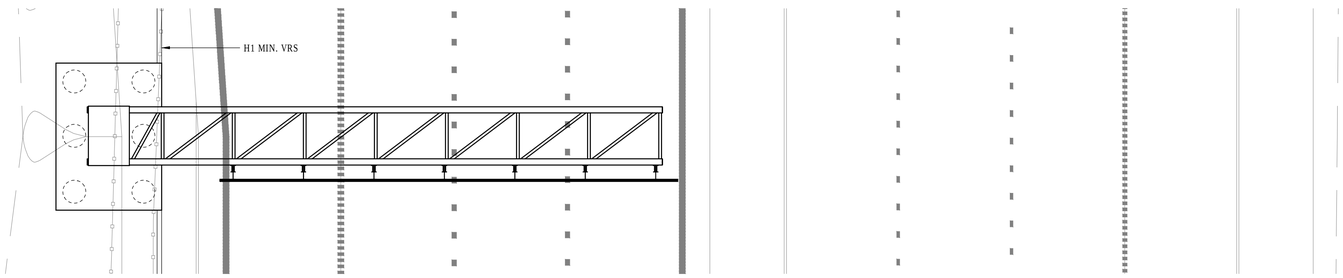

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client: Working on behalf of highways england

Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG007

INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	ACL	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY

Suitability: S0

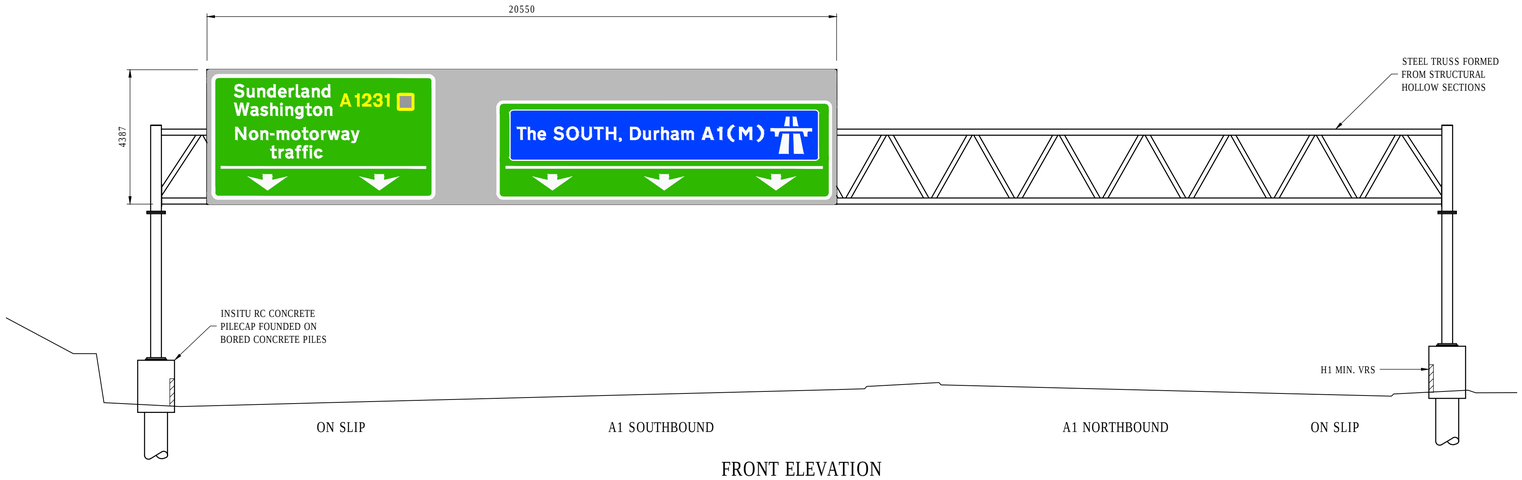
Drawing Number

Project	Originator	Volume	Project Ref. No.
HE551462	RAM	SGY	
SG007	SK	CB 0001	Revision P01.1
Location	Type	Role Number	

RAMBOLL

100 Millimetres 0 10

DO NOT SCALE



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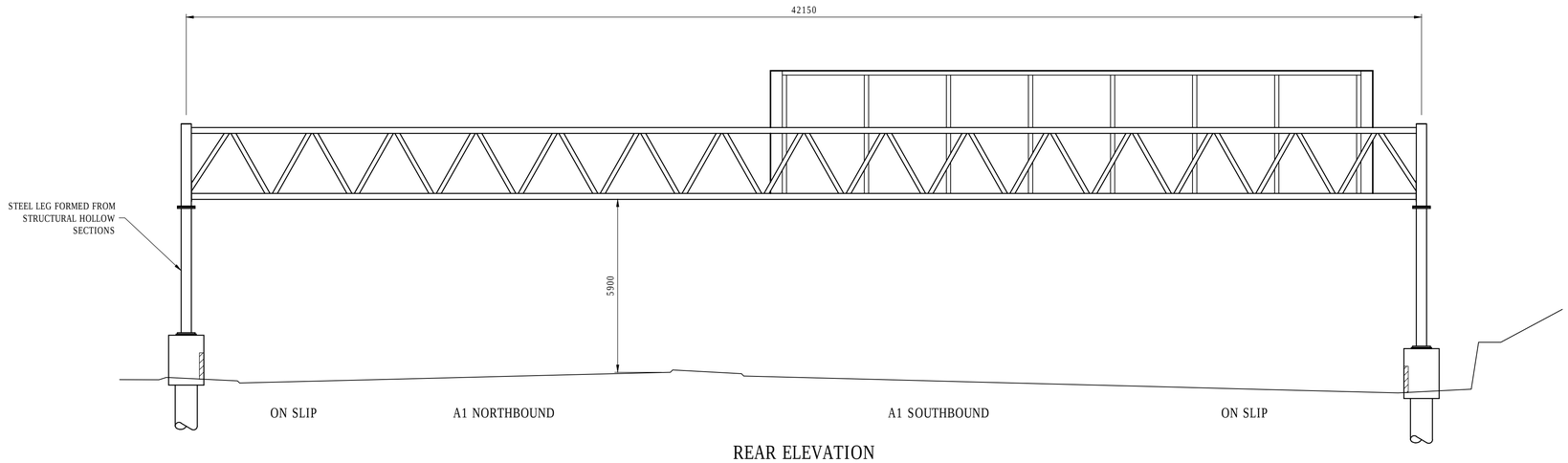

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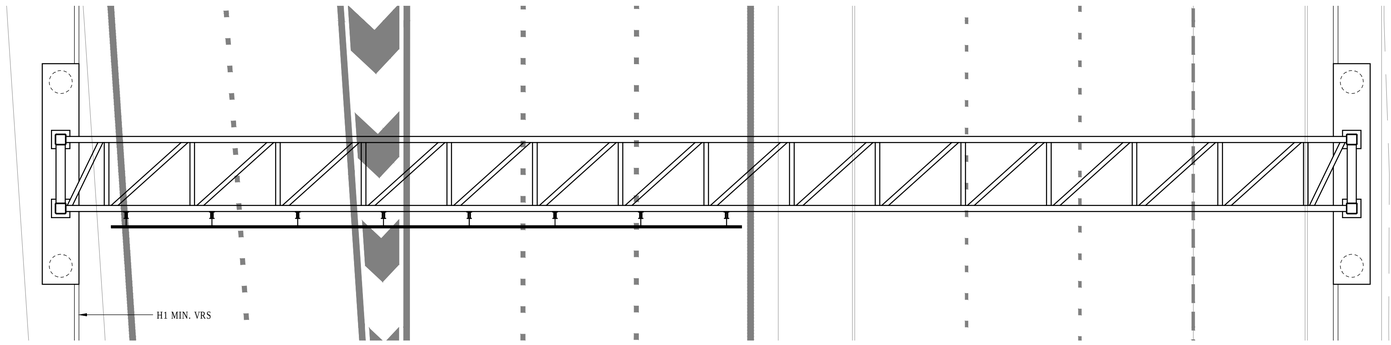

PLAN

RAMBOLL

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG008

INDICATIVE ARRANGEMENT

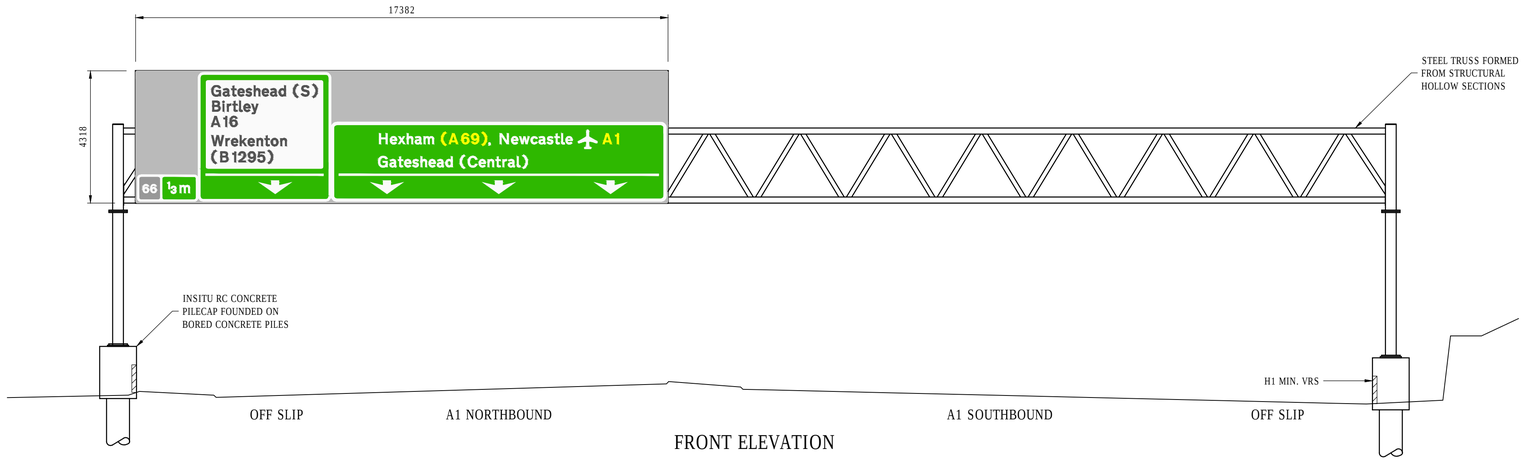
Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date Nov 2017	Date ---	Date Nov 2017	Date ---

Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number

Project	Originator	Volume		Project Ref. No.
HE551462	RAM	SGY		
SG008	SK	CB	0001	Revision P01.1
Location	Type	Role	Number	



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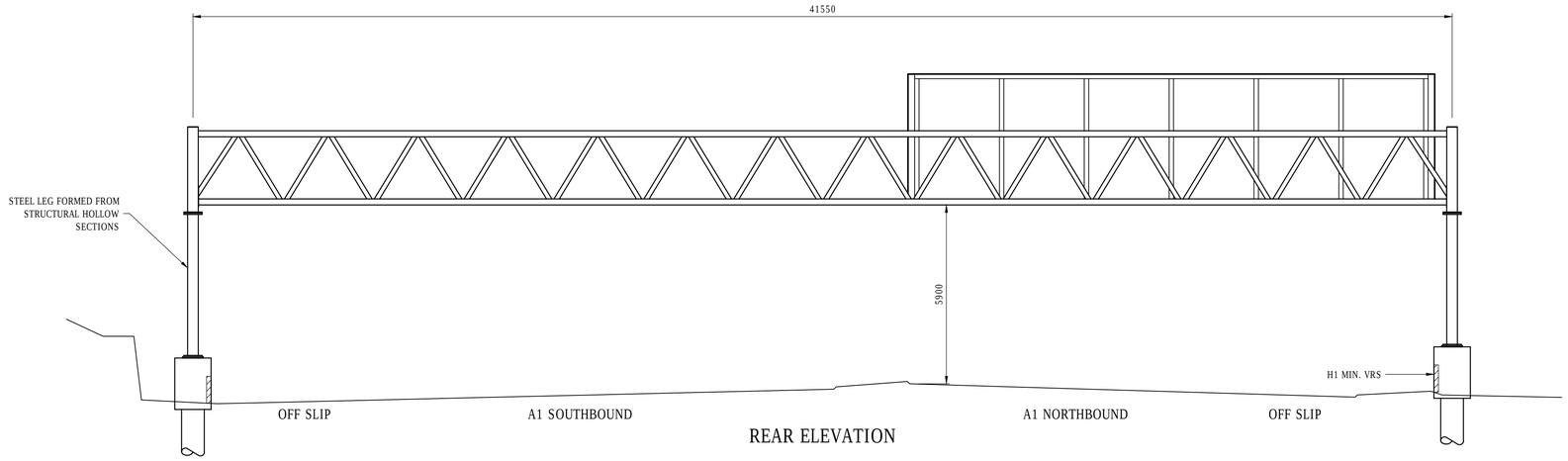

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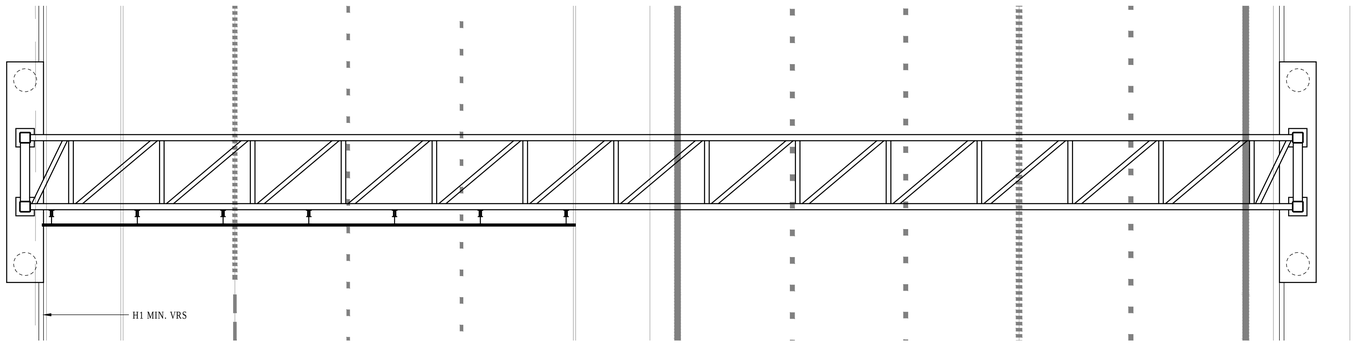

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG009

INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

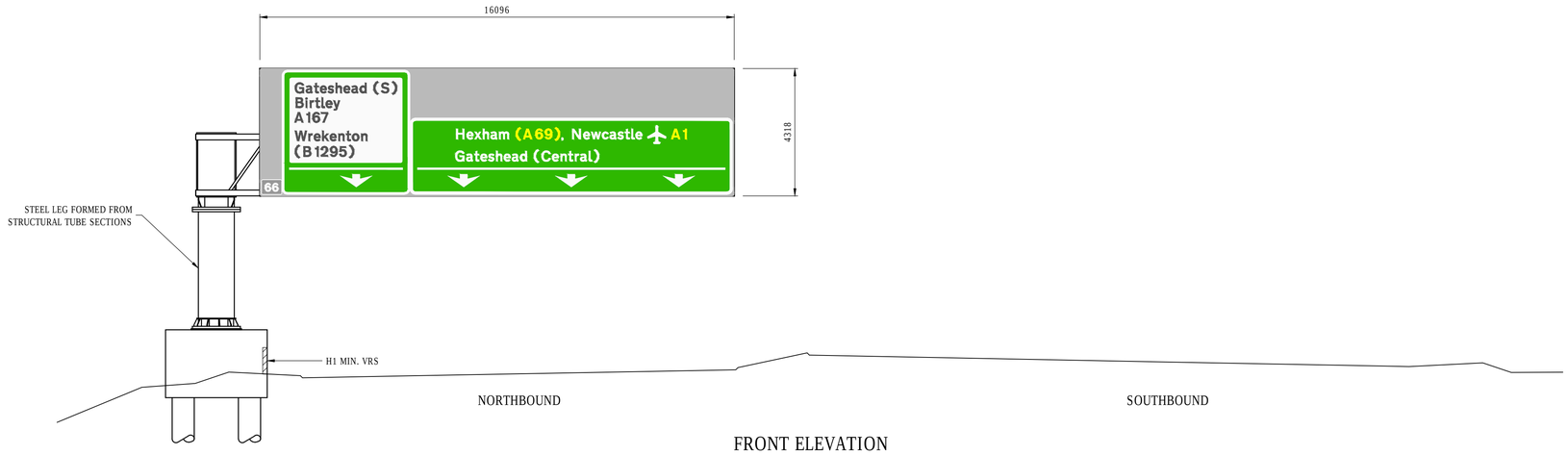
Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number

Project	Originator		Volume	Project Ref. No.
HE551462	RAM		SGY	
SG009	SK	CB	0001	Revision P01.1
Location	Type	Role	Number	

RAMBOLL



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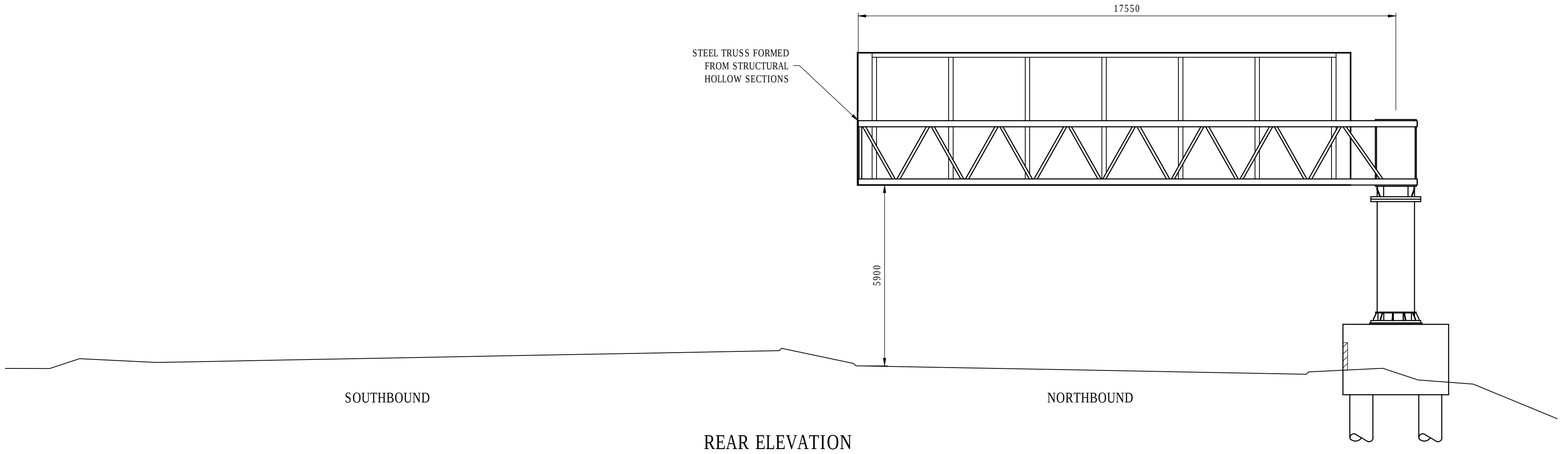

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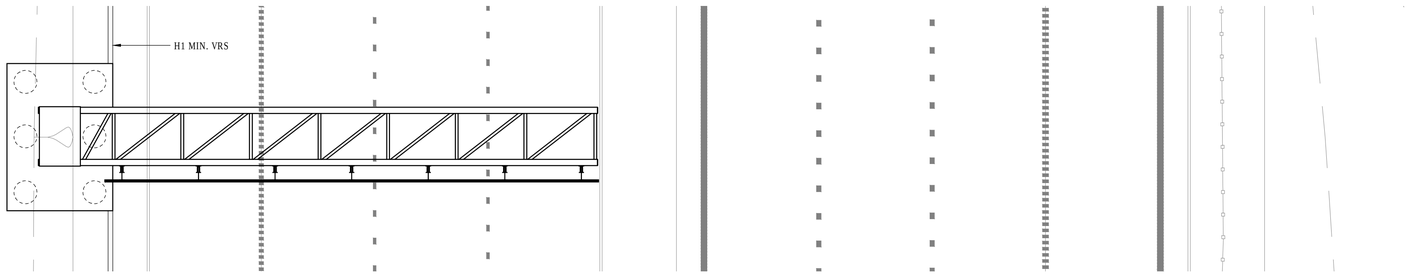

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Project Title
A1 BIRTLEY TO COALHOUSE

Drawing Title
GANTRY SG010
INDICATIVE ARRANGEMENT

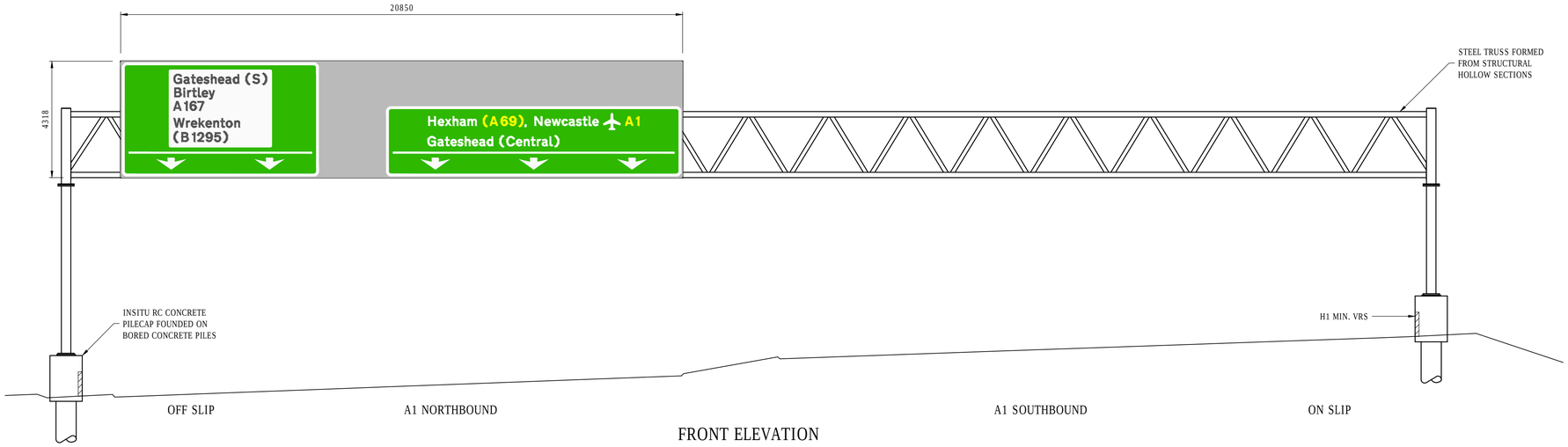
Scale	Drawn	Checked	Approved	Authorised
1:100	ACL	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY
Suitability: S0

Drawing Number
Project: HE551462
Originator: RAM
Volume: SGY
Location: SG010
Type: SK
Role: CB
Number: 0001
Project Ref. No.
Revision: P01.1

RAMBOLL

100
Millimetres
0 10
DO NOT SCALE



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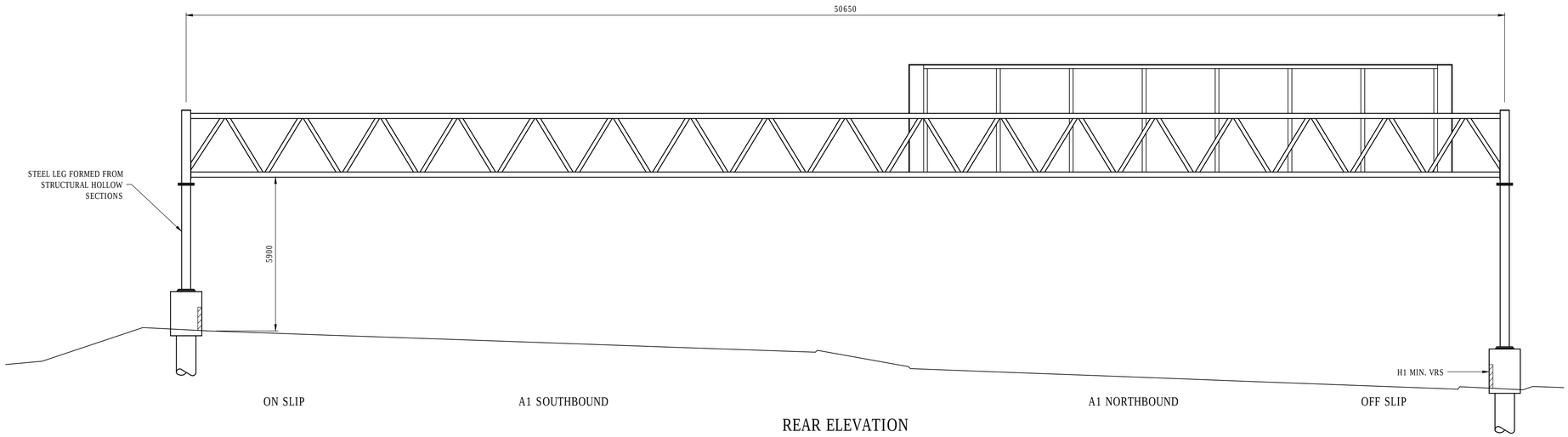

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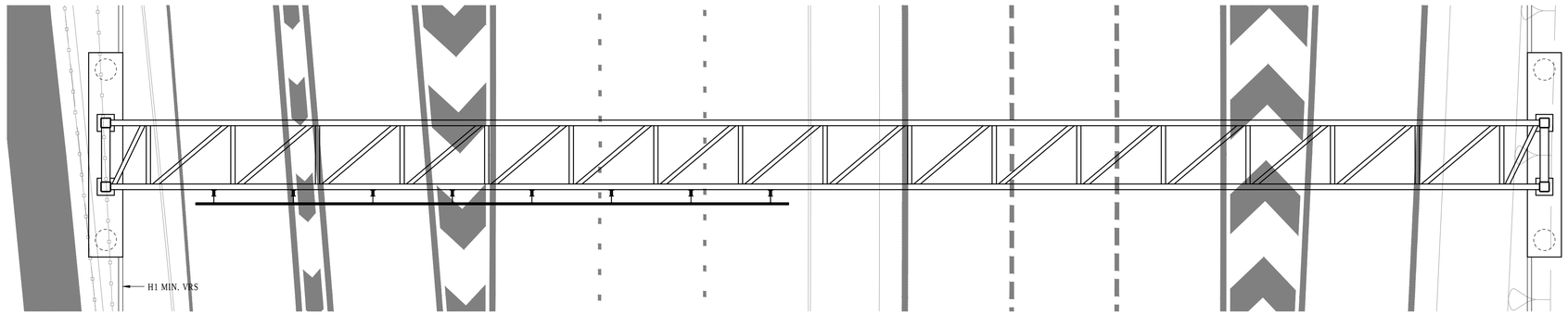

PLAN

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client: Working on behalf of highways england

Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG011

INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

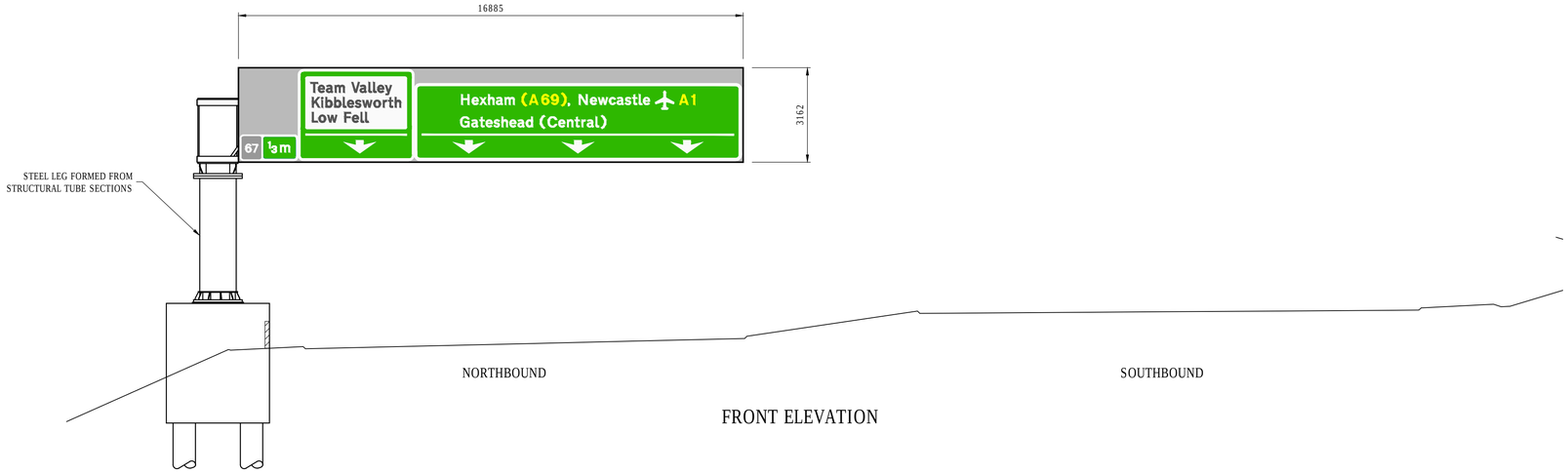
Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number

Project	Originator		Volume	Project Ref. No.
HE551462	RAM		SGY	
SG011	SK	CB	0001	Revision
Location	Type	Role	Number	P01.1

RAMBOLL



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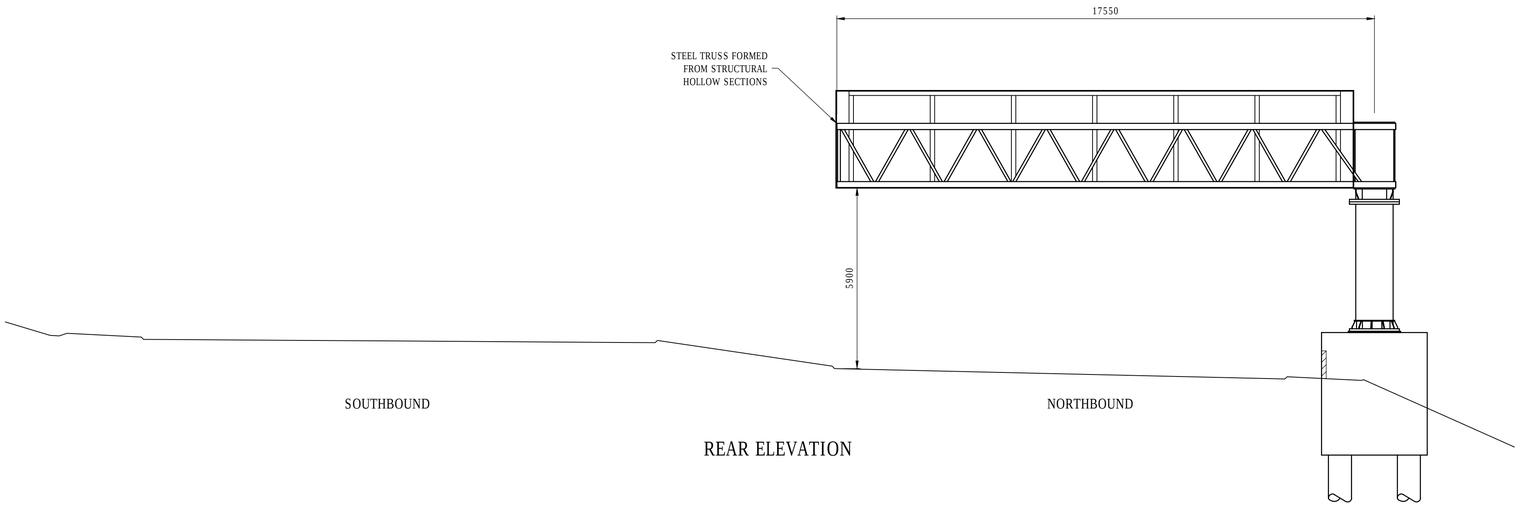

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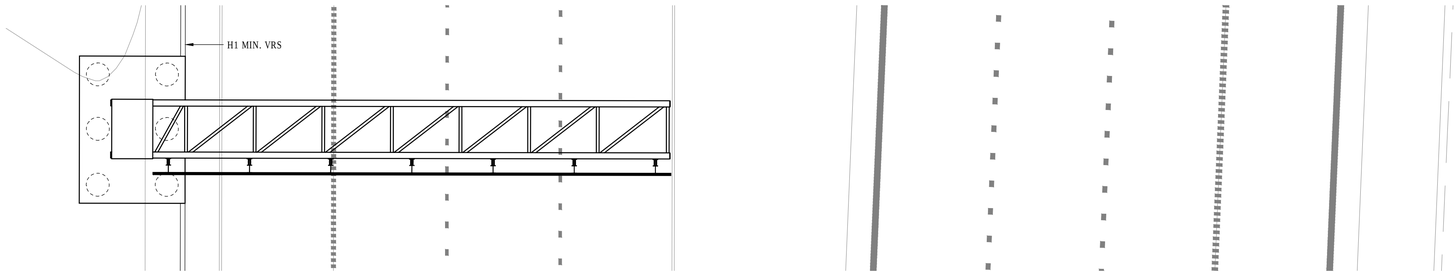

PLAN

NOTES

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2. ALL LEVELS ARE IN METRES RELATED TO SITE DATUM UNLESS NOTED OTHERWISE.
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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client
Working on behalf of
highways england

Project Title
A1 BIRTLEY TO COALHOUSE

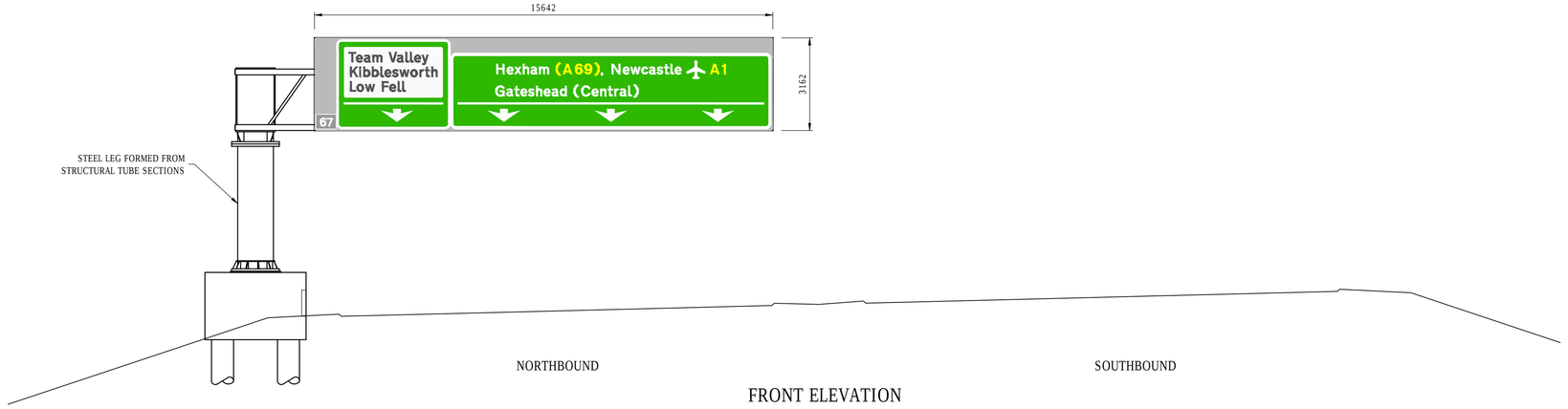
Drawing Title
GANTRY SG012
INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	ACL	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY
Suitability: S0

Drawing Number
Project: HE551462
Originator: RAM
Volume: SGY
Location: SG012
Type: SK
Role: CB
Number: 0001
Project Ref. No.
Revision: P01.1

RAMBOLL



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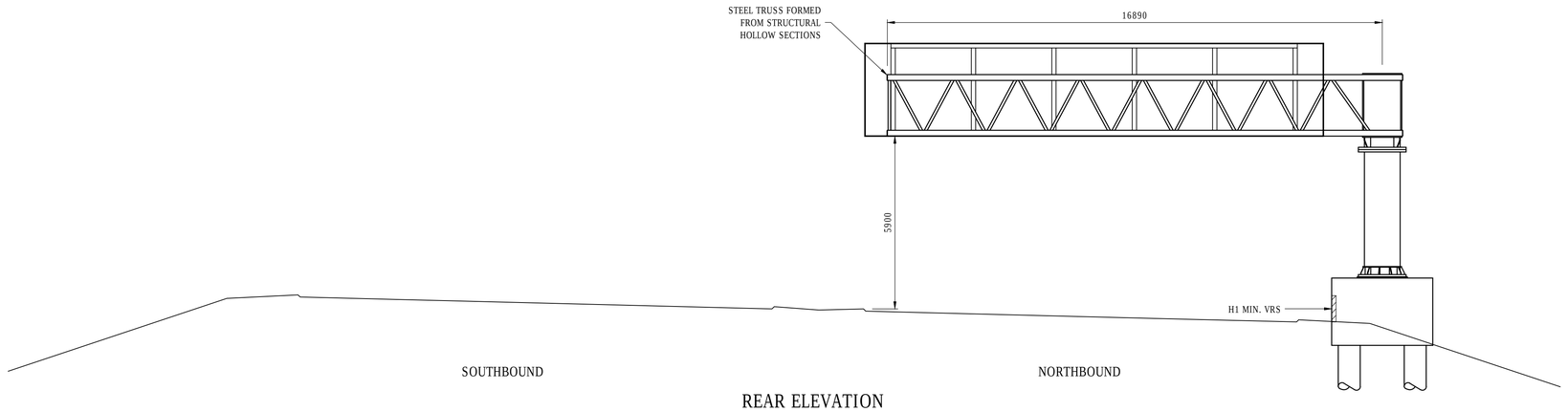

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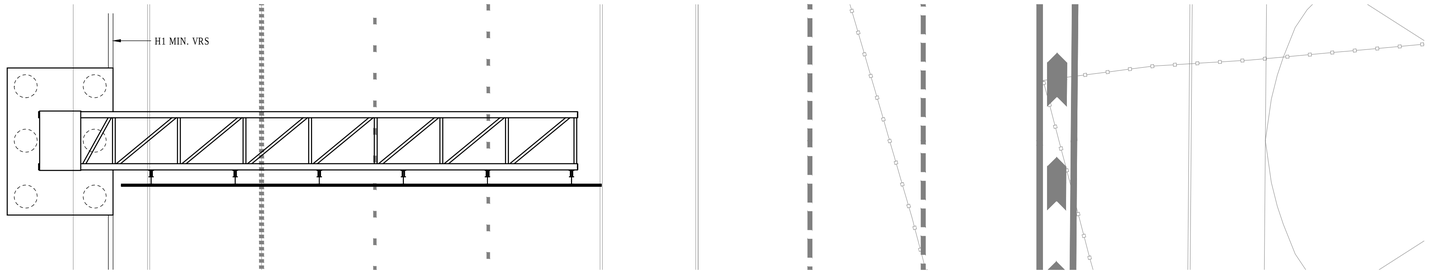

PLAN

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Rev.	Date	Description	By	Chk'd	App'd
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Client: Working on behalf of highways england

Project Title: A1 BIRTLEY TO COALHOUSE

Drawing Title: GANTRY SG013

INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY

Suitability: S0

Drawing Number

Project	Originator		Volume	Project Ref. No.
HE551462	RAM		SGY	
SG013	SK	CB	0001	Revision
Location	Type	Role	Number	P01.1

RAMBOLL

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Millimetres
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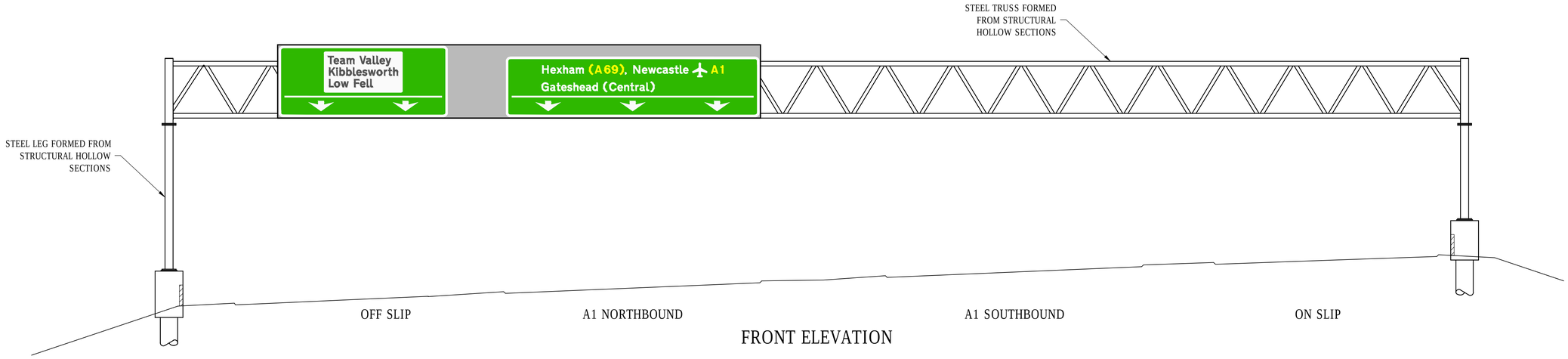

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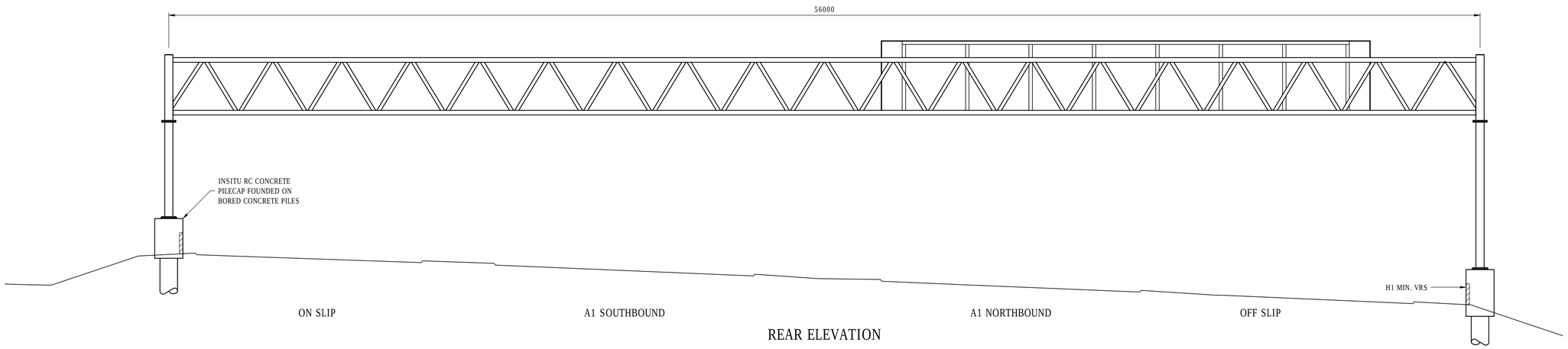

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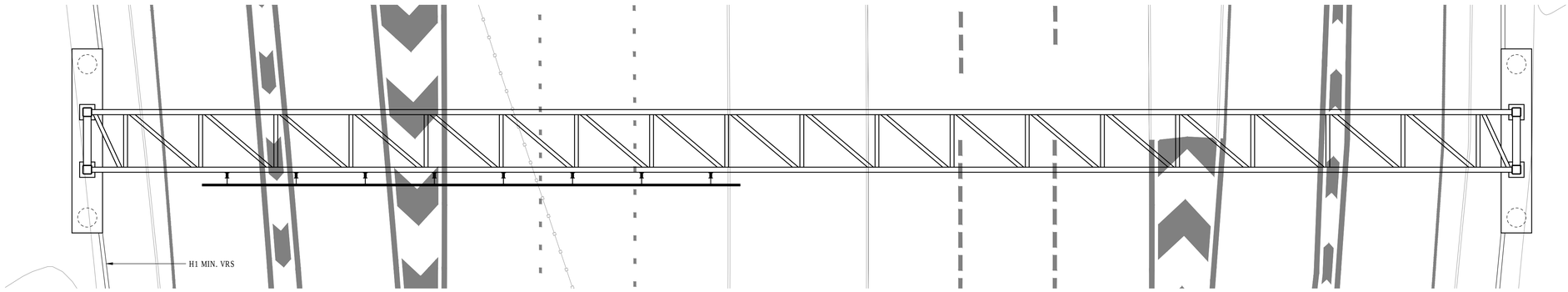

PLAN

NOTES

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Rev.	Date	Description	By	Chk'd	App'd
P01.1	05/12/17	PRELIMINARY	SB	---	SJB

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Client
Working on behalf of
highways england

Project Title
A1 BIRTLEY TO COALHOUSE

Drawing Title
GANTRY SG014
INDICATIVE ARRANGEMENT

Scale	Drawn	Checked	Approved	Authorised
1:100	SB	---	SJB	---
Original Size	Date	Date	Date	Date
	Nov 2017	---	Nov 2017	---

Drawing Status: PRELIMINARY
Suitability: S0

Drawing Number

Project	Originator		Volume	Project Ref. No.
HE551462	RAM		SGY	
SG014	SK	CB	0001	Revision
Location	Type	Role	Number	P01.1

RAMBOLL

Appendix C – Design Manual for Roads and Bridges Technical Directive (TD) 18/85

THE HIGHWAYS AGENCY

THE SCOTTISH OFFICE DEPARTMENT

THE WELSH OFFICE
Y SWYDDFA GYMREIG

THE DEPARTMENT OF
THE ENVIRONMENT FOR NORTHERN IRELAND

Criteria for the use of Gantries for Traffic Signs and Matrix Traffic Signals on Trunk Roads and Trunk Road Motorways

Summary:	This Standard describes the situations where portal or cantilever gantries may be provided for the purpose of supporting overhead directional traffic signs/signals on dual-carriageway, trunk-roads, and trunk road motorways.

VOLUME 9 NETWORK - TRAFFIC CONTROL AND COMMUNICATIONS

SECTION 1 STANDARDS OF PROVISION

PART 2

TD 18/85

CRITERIA FOR THE USE OF GANTRIES FOR TRAFFIC SIGNS AND MATRIX TRAFFIC SIGNALS ON TRUNK ROADS AND TRUNK ROAD MOTORWAYS

Contents

Chapter

1. INTRODUCTION

1.1 The criteria for mounting traffic signs on overhead gantries was given in DTp Standard TD 15/83.

1.2 Overhead gantries, portal or cantilever, can also be used to carry matrix traffic signals mounted over each traffic lane so as to provide a finer degree of traffic control than might be obtained by post-mounted signals.

1.3 This Departmental Standard supersedes TD 15/83, and extends its scope to provide criteria and siting information for gantries which carry either directional signs or matrix traffic signals or both.

2. SCOPE

2.1 This Departmental Standard describes situations where portal or cantilever gantries may be required and prescribes criteria where they may be provided for the purpose of supporting overhead directional traffic signs or matrix traffic signals or both.

3. THE SITUATIONS WHERE GANTRY MOUNTED SIGNS ARE BENEFICIAL

3.1 There are situations which can lead to the need for signs to be mounted on gantries. These are:

(a) when side-mounted signs would be obscured for a significant proportion of a driver's "reading time".

This condition is likely to occur when the traffic volume is high and when the proportion of HGV's is high. It is also a function of the width of the road because it is the driver in the extreme right-hand lane who has the highest probability of poor visibility because of the traffic in the other lanes.

(b) when the demands on the drivers concentration are such that it is unreasonable and possibly dangerous to divert his attention away from the traffic ahead and behind. This condition is likely to occur at junctions where the number of lanes reduces after the junction and also when junctions follow in quick succession or on elevated roads.

c) where it is difficult to mount the signs on the left-hand side of the road.

4. THE SITUATIONS WHERE GANTRY MOUNTED MATRIX TRAFFIC SIGNALS ARE BENEFICIAL

4.1 Matrix signals may be mounted on gantries on motorways where there is a need to display different restrictions over individual lanes in order to divert traffic to adjacent lanes, divert traffic from the motorway or to stop traffic in any or all of the lanes.

5. CRITERIA TO BE MET BEFORE USING GANTRIES FOR TRAFFIC SIGNS

5.1 To alleviate obscuring the side mounted signs.

The provision of gantries on this account shall only be considered for dual-carriageway roads with 3 or more running lanes per carriageway and the following criteria shall be met before gantries are used to overcome the problem of obscuring side mounted signs.

5.1.1 The carriageway has or will have 4 running lanes.

5.1.2 The carriageway has 3 running lanes and carries (or will carry within 15 years of opening) 33,000 VPD (1-way) (high growth estimate) and the proportion of HGV's is greater than 20%.

5.2 To alleviate possible dangerous situations.

The following criteria shall be met before gantry mounted signs are used to alleviate possibly dangerous situations.

5.2.1 At junctions where the number of lanes available to a driver going ahead reduces after the junction.

5.2.2 Where a series of junctions are (an average of) less than 3 km apart measured between centres of junctions.

5.2.3 Where the load is on a structure but does not have a hard shoulder.

5.3 When it is difficult to mount signs on the left-hand side of the road.

When a road is on a steep embankment, deep cutting or on an elevated structure it is often very difficult to have post-mounted signs on the left-hand side of the carriageway. However, by making special foundations or other provisions it might be possible to do so.

Thus, before gantries are used to overcome these difficulties, it shall be demonstrated that they are the cheaper option.

6. CRITERIA TO BE MET BEFORE USING GANTRIES FOR MATRIX TRAFFIC SIGNALS

6.1 Gantry mounted matrix traffic signals may only be used on motorways in locations where it is necessary to give lane specific information to drivers. These are:

6.1.1 On the approaches to motorway/ motorway interchanges, where there is an extended parallel deceleration lane, with or without loss of lane at the bifurcation.

6.1.2 On the approaches to motorway/ motorway interchanges, where a traffic diversion strategy is planned.

6.1.3 In conjunction with 6.1 and 6.2 above, at the divergent points of a link road within the interchange.

6.1.4 On a motorway with a carriageway which has or will have 4 or more running lanes.

6.1.5 On elevated urban motorways.

6.1.6 On approaches to motorway tunnels.

6.1.7 For motorway tidal flow schemes.

6.1.8 Between adjacent sections of motorway where lane signalling has been provided under 6.1 to 6.7 above and where normally only a single post mounted signal (which would not present a viable signalling sequence) would be authorised.

7. USE OF GANTRIES FOR BOTH TRAFFIC SIGNS AND MATRIX TRAFFIC SIGNALS

7.1 Where the construction of an overhead gantry, portal or cantilever, is justified in accordance with either the criteria defined in sections 5 or 6, then the gantry shall be used for mounting both signs and matrix traffic signals when it is economical to do so.

8. PROVISION OF GANTRIES FOR TRAFFIC SIGNS

8.1 The half-mile Advance Direction and Final Direction Sign locations shall be checked individually against the criteria in paragraphs 5.1 to 5.3 to see if gantries are required. The one-mile Advance Direction Sign locations shall be checked against the criteria in paragraphs 5.2.2, 5.2.3 and 5.3 only to see if a gantry is required.

9. PROVISION OF GANTRIES FOR MATRIX TRAFFIC SIGNALS

9.1 Gantries for matrix traffic signals are not considered for provision on an individual basis but as a sequence forming part of a signalling scheme. Proposed schemes shall be checked against the criteria in section 6.

10. SITING OF GANTRIES

10.1 Traffic sign gantries used to give separate directional information for individual lanes should be on a stretch of road having a fairly straight alignment. If this type of sign is used on a sharp curve, the panels may appear over the wrong lanes, thus giving misleading information. The possible effect of nearby overbridges causing an obstruction to the sighting of overhead signs shall be considered.

10.2 Where gantries are used to carry matrix traffic signals, guidance on their siting is given in the Motorway Communications Manual (MCH 1302A) Volume II, Our-station Scheme Design Brief. Whenever possible, gantries should be located to enable their joint use to display both signs and matrix traffic signals.

10.3 The use of overbridges shall also be considered as a possible alternative for mounting overhead signs/matrix traffic signals, but due regard shall also be given to the suitability of the bridge structure and the possibility of vandalism.

11. TECHNICAL APPROVAL

11.1 All gantries for signs and matrix traffic signals (including overbridges on which it is proposed to mount traffic signs/matrix traffic signals) are to be dealt with in accordance with the Technical Approval Procedures given in Departmental Standard BD 2/79.

12. ENQUIRIES

All technical enquiries about this Department Standard should be sent in writing to:-

For Traffic Signs to:
Head of Division
HCSL Division
Department of Transport
St Christopher House
Southwark Street
LONDON
SE1 0TE

For Traffic Signals to:
Head of Division
TCC Division
Tollgate House
Houlton Street
BRISTOL
BS2 9DJ

Orders for further copies of this Departmental Standard should be accompanied by the remittance shown on the cover and addressed to:

DOE/DTp Publications Sales Unit
Building One
Victoria Road
South Ruislip
Middlesex
HA4 0NZ

Telephone No: 01-845-7788 ext 200

K SRISKANDAN
Chief Highway Engineer
Department of Transport
2 Marsham St
LONDON
SW1P 3EB

Appendix D – Design Manual for Roads and Bridges Interim Advice Note (IAN) 144/16

INTERIM ADVICE NOTE 144/16

DIRECTIONAL SIGNS ON MOTORWAY AND ALL-PURPOSE TRUNK ROADS GRADE SEPARATED JUNCTIONS

Summary
This document sets out guidance for the use of directional signs at motorway and all-purpose trunk road grade separated junctions.

Instructions for Use
This guidance applies to construction, improvement and renewal schemes for all-purpose and motorway trunk roads. It supplements existing standards and guidance, and replaces all elements of **TA 58/92 (DMRB 8.2.1)** [Ref 23] relating to permanent signing of lane gains.

Table of Contents

Page No

1. INTRODUCTION

General

1.1 Directional signs are provided to assist road users to identify the correct route to travel to their destination or to a facility of particular value or interest. The aim is to provide signs that direct road users safely and efficiently to their destinations, whilst minimising environmental impact. The signs must be understood easily, especially by road users who have never travelled along the route before. Poorly designed or maintained signs can lead to poor lane utilisation, late lane changes and congestion. The message must be unambiguous and understood easily. It must not be given too soon or too late to enable safe manoeuvres. Key elements are:

- Legibility
- Appropriate contrast with surroundings and background
- Simplicity of content
- Effective layout
- Visibility in all light conditions
- Affordability.

Clear signing is an essential component of all junction layouts, and especially those which require maximum use of available road space in a safe manner.

1.2 This document sets out guidance for the use of directional signs at motorway and all-purpose trunk road grade separated junctions. Guidance for signing at compact grade separated junction layouts referred to in **TD 40/94 (DMRB 6.2.5)** [Ref 12] and guidance for the signing of at grade junction interfaces of grade separated junctions, such as roundabouts, is covered in **IAN 145/15** [Ref 5].

1.3 Although this document provides information on the detailed layout of direction sign faces, its primary purpose is to provide guidance on the location, type and number of signs to be provided. Additional guidance on destination signing strategies and sign face layout is given in **LTN 1/94** [Ref 4] and in **Chapter 7** of the **Traffic Signs Manual (TSM)** (2003) [Ref 2].

1.4 This document deals specifically with directional signs at grade separated junctions, and covers junction diverge and merge arrangements detailed in **TD 22/06 (DMRB 6.2.1)** [Ref 3]. It includes guidance on signing for Tiger Tail diverge layouts. It does not deal with layouts for Smart Motorways designed to (**IAN 161/15**[Ref 1]), or **IAN 111/09** [Ref 8], but cross-references information from those documents where it is pertinent to generic signing layouts.

Scope

1.5 This document sets out design guidance, requirements and methodology for the location of directional signs at trunk road and motorway diverges, merges, links and slip roads at grade separated junctions. It is a supplement to **LTN 1/94** [Ref 4], which is still valid, and draws together experience gained since it was published from a number of sources. It also cross-references mandatory standards from DMRB and existing legal requirements, where pertinent. Warning and Regulatory signs are not generally shown in this document and should be provided as required by the Traffic Signs Manual.

1.6 The design guidance is focused on layouts used in **TD 22/06 (DMRB 6.2.1)** [Ref 3].

1.7 Use is made of guidance or, in the case of item 3 below, requirements set out in the following documents which are cross-referenced within this guidance:

- **IAN 145/15** – Directional Signs on Motorway and All-Purpose Trunk Roads – At Grade and Compact Grade Separated Junctions [Ref 5]
- **The Traffic Signs Regulations and General Directions 2002** (TSRGD) and subsequent amendments [Ref 6]
- **The Traffic Signs Manual (TSM) Chapter 7** [Ref 2]
- **The Traffic Signs Manual (TSM) Chapter 5** [Ref 7]
- **Department for Transport Working Drawings for Traffic Signs** [Ref 24].

Implementation

1.8 The Design Organisation must confirm application of this document to particular schemes with the Overseeing Organisation. This guidance applies to construction, improvement and renewal schemes for all-purpose and motorway trunk roads currently being prepared, except where 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 would delay progress (in which case the decision must be recorded in accordance with the Highways England's Departures from Standards procedure).

Definitions

1.9 The following terms have been defined for use in this guidance.

Overseeing Organisation - The highway, road or traffic authority for the road construction or improvement scheme.

Design Organisation - The organisation commissioned to undertake the various phases of scheme preparation.

Auxiliary Lane - An additional lane at the side of the mainline carriageway to provide increased merge or diverge opportunity, or additional space for weaving traffic. See **TD 22/06 (DMRB 6.2.1)** [Ref 3] Figure 2/4.1B and Figure 2/6.3D Option 2.

Connector Road - A collective term for interchange links, link roads, slip roads and loops.

Fork - An at grade junction of two roads, usually within an interchange, which diverge from the approach road at similar angles. Usually both diverging roads have equal status.

Gantry – Unless otherwise stated, gantry means a portal gantry containing signs and/or signals.

Ghost Island - An area of the carriageway suitably marked to separate lanes of traffic travelling in the same direction on both merge and diverge layouts. The purpose of the ghost island at a merge is to separate the points of entry of two slip road traffic lanes. At a diverge it is to separate the points of exit to a slip road.

Interchange - A grade separated junction that provides free flow from one mainline to another.

Interchange Link - A connector road, one or two way, carrying free flowing traffic within an interchange between one level and/or direction and another.

Lane Gain - A layout where a merging connector road becomes a lane or lanes of the downstream main carriageway.

Lane Drop - A layout where a lane or lanes of the upstream carriageway becomes the diverging connector road.

Link Road - In the context of junctions, a one way connector road adjacent to but separate from the mainline carriageway carrying traffic in the same direction, which is used to connect the mainline carriageway to the local highway network where successive direct connections cannot be provided to an adequate standard because the junction spacing is too close.

Mainline - The carriageway carrying the main flow of traffic; generally traffic passing straight through the junction or interchange.

Message Sign (MS3 and MS4) – Motorway Signal Mark 3 (MS3) is a standard motorway Light Emitting Diode (LED) signal which can convey two or three rows of textual information in one colour, warning drivers of incidents ahead. MS4 signs can display both text and two colour (red and yellow) bitmap images (e.g. lane closures) as prescribed by the **TSRGD** [Ref 6].

Nose - A paved area, approximately triangular in shape, between a connector road and the mainline at a merge or diverge, suitably marked to discourage drivers from crossing it.

Parallel Merge/Diverge - A layout where an auxiliary lane is provided alongside the mainline carriageway.

Slip Road - A connector road within a junction between a mainline carriageway and the local highway network, or vice versa, which meets the local highway network at grade. Traffic using a slip road usually has to give way to traffic already on the mainline or on the local highway network.

Smart Motorways - Formally known as Managed Motorways, Smart Motorways make the hard shoulder available to traffic either permanently or at particularly busy times of the day. Guidance on Managed Motorways - All Lanes Running (SM-ALR) is given in **IAN 161/15** [Ref 1] and Managed Motorways - Hard Shoulder Running (SM-HSR) in **IAN 111/09** [Ref 8].

Special Road Order – A Statutory Order/Instrument defining the proposed route of a motorway/other road with restrictions in place, stating which classes of vehicle can use the road.

Taper Merge/Diverge - A layout where merging or diverging traffic joins or leaves the mainline carriageway through an area forming a funnel to, or flare from, the mainline carriageway.

Tiger Tail - A ghost island layout at a diverge utilising diagram 1042 to separate the points of exit to a slip road, so called because the vertical sign, used to inform drivers of the layout, incorporates an illustration that resembles a tiger's tail.

Upstream - That part of the carriageway(s) where traffic is flowing towards the section in question.

Downstream - That part of the carriageway(s) where traffic is flowing away from the section in question.

Urban Motorway - A motorway with a speed limit of 60 mph or less within a built up area.

Variable Message Sign (VMS) - A device capable of displaying, at different times, a sign, message or blank grey/ black face (as prescribed by **TSRGD** [Ref 6]), used to direct and inform drivers where there are changing traffic conditions.

Weaving Section - The length of the carriageway between a successive merge or lane gain and diverge or lane drop, where vehicles leaving the mainline at the diverge or lane drop have to cross the paths of vehicles that have joined the mainline at the merge or lane gain.

Advance Direction Sign (ADS) – Signs giving route information in respect of a junction ahead. These can be either post mounted on the verge or footway, or gantry mounted.

Final Advance Direction Sign (Final ADS) – Signs placed at the commencement of the part of the junction where separation from the main carriageway commences at a grade separated junction. It is normally at the start of the diverge taper at taper-diverge junctions, and 200m in advance of the nose at lane drop junctions.

Confirmatory Direction Sign – Directional signs placed on a confirmatory sign gantry over the carriageway, or verge mounted in the form of a rectangular direction sign at the nosing diverge of a slip road and main carriageway at a grade separated junction.

Route Confirmation Signs – Signs placed after a junction giving confirmation as to the route being followed and, in most cases, destinations that can be reached together with the appropriate distances. These are generally placed after junctions where the advance direction signs do not give distances to the various destinations.

Primary Definitions

1.10 This document gives design guidance and recommended good practice. It does not introduce new requirements. Users should apply this guidance as necessary to minimise safety risks to road users, improve journey time reliability, and improve driver understanding of road layouts and signs.

1.11 The word **'must'** indicates an existing legal requirement which must be complied with, **'shall'** indicates a requirement of compliance with an existing standard cross-referenced by this document, and '**should**' indicates a course of action that is strongly recommended. The word **'may'** is used to indicate an option which requires consideration depending on the circumstances. Any reference to a sign diagram number is a reference to the sign type or equivalent diagram number given in the TSRGD [Ref 7].

Signs Authorisation

1.12 From time to time, circumstances arise for which no suitable signs are prescribed in **TSRGD** [Ref 7]. The use of any sign which is not prescribed in **TSRGD** [Ref 7] and its amendments is unlawful unless it has received Authorisation from the Secretary of State under Sections 64 (motorways and all-purpose trunk roads) or 65 (local road network) of the **Road Traffic Regulation Act 1984** [Ref 9]. Applications for authorisations must be sought through the Overseeing Organisation. Non-prescribed signs must not be installed without prior authorisation. Applications for authorisations on the Highways England network must be sought through the Safer Roads – Design team (ptstrafficsigns@highwayengland.co.uk) Gantry signs marked * in the drawings in this guidance will be authorised on Highways England roads if the signs otherwise meet the design requirements in **TSM Chapter 7** [Ref 2]. **Check with the Safer Roads – Design team that location specific or network wide authorisations are in place before specifying.**

Departures from Standards

1.13 Although this document contains design guidance, in some cases requirements and standards are cross-referenced from other existing standards. In exceptional situations, the Overseeing Organisation might be prepared to agree to a Departure from Standard, where the standard is not achievable. Design Organisations wishing to consider pursuing this course of action must discuss options proposed at an early stage in design with the Overseeing Organisation. Proposals for Departures from Standard must be submitted by the Design Organisation to the Overseeing Organisation, and formal approval received before incorporation into a design layout. Where the source of the requirement given in this document is referenced to another **DMRB**, **MCHW** or **IAN** document then the departure should be referenced as a departure from the source document rather than this document.

2. GENERAL PRINCIPLES

2.1 In this document, diverge layouts shown in **TD 22/06 (DMRB 6.2.1)** [Ref 3] are covered and the final direction signs are shown at the relevant exit datum points.

Exit Datum Point

2.2 An exit datum point (EDP) is a fixed point defined by the highway geometry, on which all sign and signal spacing is based. In generic terms, the EDP is located at the start of the taper to the diverge lane at junctions where there is no loss of lane through the junction. At lane drop junctions, except as stated in paragraph 2.3 below, the EDP is 200 metres in advance of the diverge tip of the nose markings. Where there is a double diverge, the EDP is positioned relative to the first diverge or lane drop.

2.3 At lane drop junctions, where a single lane drop widens to two lanes prior to the diverge tip of the nose markings, the final sign gantry should be located at the start of the taper where the carriageway widens from a one lane to a two lane drop. In some locations this point is closer than 200 metres from the diverge tip of the nose markings and the EDP would therefore still be located as stated in paragraph 2.2

Location of Final ADS

2.4 The final ADS shall be located at the EDP. If this cannot be achieved due to site constraints, then the final ADS shall be provided at a location between the EDP and 50 metres upstream of the EDP (**IAN 111/09** section 10.11 paragraph 3 [Ref 8]).

Final ADS and 1/2 (1/3) Mile ADS

2.5 At grade separated junction diverges from the main carriageway on both motorway and all-purpose trunk roads, a final advance direction sign (final ADS) shall be provided together with a 1/2 mile (ADS) (**TD 22/06 (DMRB 6.2.1)**, paragraph 5.36 and 5.37 [Ref 3]). Where there is inadequate space or there are other constraints such as the positions of bridges, the 1/2 mile ADS shall be replaced by a 1/3 mile ADS (refer to paragraphs 2.9 to 2.12 for tolerances on ADS locations).

1 Mile (2/3) ADS

2.6 At every motorway and some all-purpose road junction diverges from the main carriageway, a 1 mile ADS shall be provided (**TD 22/06 (DMRB 6.2.1),** paragraph 5.36 and 5.37 [Ref 3]). Where there is inadequate space or there are other constraints such as the positions of bridges, the 1 mile ADS shall be replaced by a 2/3 mile ADS (refer to paragraphs 2.9 to 2.12 for tolerances on ADS locations).

2.7 At grade separated junction diverges on all-purpose roads, a 1 mile ADS (2/3 mile where there is inadequate space or there are other constraints such as the positions of bridges) should be provided where the road has a speed limit of 50mph or more, and more than two lanes, or the designer feels it is necessary for other reasons such as volume of traffic or safety.

Confirmatory Direction Sign

2.8 A confirmatory direction sign shall be placed over the 'diverge' (gantry mounted signs) or on the nosing (verge mounted signs) (**TD 22/06 (DMRB 6.2.1)** paragraph 5.37 [Ref 3]). When the sign is mounted on a gantry, it shall be located between 30 metres and 50 metres downstream of the tip of the nose of the road marking (**TD 46/05 (DMRB 9.1.1)**, [Ref 9]). Where a verge mounted ADS is used, the confirmatory sign takes the form of a rectangular direction sign, and shall be located on the 'diverge' island not more than 30 metres beyond the physical nose (**TD 22/06 (DMRB 6.2.1)** paragraph 5.37 [Ref 3]). If there is inadequate space to provide a verge mounted sign within the required distance, then mounting the sign on a cantilever gantry located on the nearside verge should be considered.

Tolerances on ADS Locations

2.9 Where the 1 mile and 1/2 mile ADS distances cannot be achieved due to site or construction constraints, then a tolerance of +10% increase / or 20 metres reduction is permitted (see **IAN 111/09** Table 10-1 [Ref 8]). For roads other than Smart Motorways, where site constraints mean that none of the listed options on tolerances can be met, there is no formal departure process for the use of site-specific designs. The designer should retain evidence of the factors and assessments used to identify specific designs in the asset safety file.

2.10 Where even this cannot be achieved, then the ADS may be may be placed 1/3 mile and 2/3 mile in advance of the final ADS. When this is necessary it should be remembered that this gives drivers less time to carry out the weaving manoeuvre prior to the EDP. Consequently, the +10% tolerance should be applied in the placing of signs at 2/3 mile and 1/3 mile, where possible. A mixture of these distances, e.g. 1 mile followed by 1/3 mile should not be used.

2.11 On carriageways with 4 or more lanes, the first ADS should be located at 1 mile, owing to the additional time required to carry out the weaving manoeuvre prior to the EDP. At 70 mph, a motorist travels 1 mile in 51 seconds, but takes only 34 seconds to travel 2/3 mile. If it is necessary to use a 2/3 mile ADS on a carriageway with 4 lanes or more, then the provision of an additional ADS, for example at 11/2 miles, should be considered.

2.12 In some cases, motorway junctions are closely spaced, and there may be a need for overlap between advance direction signs for successive junctions. Section 5 gives examples of signing provision at closely spaced motorway junctions.

Countdown Marker Signs

2.13 Countdown marker signs (diagram 823, 824 & 825) shall be provided on the approach to taper diverge junctions, but shall not be provided at 'Lane Drop' junctions. Where provided, countdown marker signs are measured back from the EDP (**TD 22/06 (DMRB 6.2.1)** paragraph 5.38 [Ref 3]).

Road Markings

2.14 Road markings are indicated in this document for completeness, but for detailed marking layout requirements, reference should be made to the **TSM Chapter 5** [Ref 7] and the **MCHW Volume 3 (HCD)** [Ref 10].

2.15 At 'lane drop' junctions, the lane marking between lanes 1 and 2 changes to a diagram 1004.1 marking at the 1 (2/3) mile ADS and to a diagram 1010 marking at the 1/2 (1/3) mile ADS. The road studs provided between lanes 1 and 2 remain at the standard 18 metre centres between the 1 (2/3) mile ADS and the final ADS, but change from white to green at the 1/2 (1/3) mile ADS. (Full details of the road marking requirements are given in **TSM Chapter 5** [Ref 7] and **HCD** [Ref 10]). Where a designer identifies a site specific risk at the approach to a taper diverge junction, then all of the lane markings should be changed to diagram 1004.1, not just those between lane 1 and lane 2.

Sightline Requirements

2.16 The minimum clear visibility required to an ADS is 180m when a 300mm x-height is used, and 240m when a 400mm x-height sign is used. The standard x-height for a verge mounted sign on a 3 lane (plus hard shoulder) carriageway is 300mm. It is normal to provide gantry mounted signs for wider carriageways (refer to **TD 18/85 (DMRB 9.1.2)** [Ref 17] for guidance on when gantries should be provided). A driver in lane 4 does not need to look across three lanes plus hard shoulder to read a gantry mounted sign, so it is normal to use a 300mm x-height for gantry mounted signs even on wider carriageways. Hence, the minimum clear visibility required to ADS is usually 180 metres on motorways.

2.17 It is important that the minimum "clear visibility" should be applied to the whole sign face, and this should be checked in relation to vertical and horizontal alignment, particularly where an intervening structure such as an overbridge, parapet or another sign could reduce minimum visibility. It is also important to ensure that no part of the sign gantry structure, including any luminaires, obstructs this sightline **TSM Chapter 7**, paragraph 9.7 [Ref 2]).

2.18 Most gantry mounted signs have signals as well as ADS, and the clear visibility requirements of these signals are greater than for ADS. Hence, when ADS are mounted on gantries it is the clear visibility requirements for the signals that will be the determining factor. **TA 74/05 (DMRB 9.4.3)** Table A4.3a [Ref 11] recommends a minimum clear distance to signals of 300 metres when a 320mm character height message sign is used, and 350 metres for a 400mm character height sign.

2.19 When locating gantry mounted signs it is essential to ensure that the information is clearly visible to approaching drivers. Gantry mounted signs should not be located such that they are obscured by bridges. Care should be taken locating 'Lane Discipline' signs on curved alignments to ensure the sign appears centrally over its associated lane to motorists approaching.

2.20 Where a bridge makes it difficult to locate a sign correctly, then consideration should be given to locating the sign on the bridge structure (**TD 18/85 (DMRB 9.1.2)**, paragraph 10.3 [Ref 17]). Due regard shall also be given to the suitability of the bridge structure (a skewed bridge may not be suitable for sign legibility reasons), the possibility of vandalism, and the need to provide equipment to illuminate the sign (where necessary) in a safe manner. Permission to mount any signs shall be sought from the designated owner of the structure.

Restricted Verge Width – Verge Mounted Signs

2.21 Where verge space is inadequate or not available, the sign may be moved to a location where the verge width is greater if this is within the allowable distance tolerances (see paragraphs 2.9 to 2.12 of this document). Alternatively, the provision of cantilever or portal gantry mounted signs should be considered if this allows the signs to be placed close to their correct locations (refer to **TD 18/85 (DMRB 9.1.2)** [Ref 17] for further information).

Placement of Gantry Signs Relative to Carriageway - Taper Diverge

2.22 At taper diverge junctions (non lane drop), the ADS assembly comprises two signs, one above the other (diagram 2908 for a motorway). The lower sign should normally be centred over the main carriageway (see also paragraph 2.23). The upper sign is offset to the left by the dimensions shown in **TSM Chapter 7**, Figure 9.1 [Ref 2], so that the inclined arrow is not directly above the lower sign. The upper sign may overhang the hard shoulder, hard strip or verge (See **TSM Chapter 7**, paragraph 9.4 [Ref 2]).

2.23 Where the lower (forward) direction sign contains a limited number of destinations (for instance, London M1), the width of the sign may not be sufficient to cover the traffic lanes. In these cases, the width of the blue area (green on all-purpose primary routes) of the lower (forward) direction sign may be increased to cover the lane widths (a minimum of 3/4 of the width of each of the outer lanes is required), to improve lane use. In these circumstances, contact the Safe Roads – Design team to confirm if Signs Authorisation will be required (see Figure 2.1).

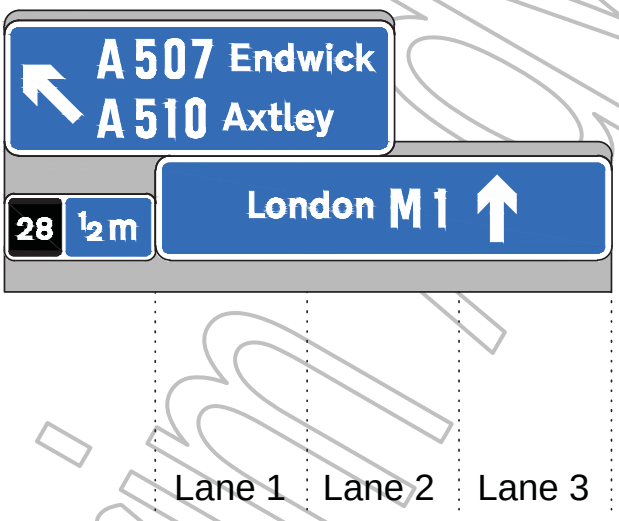


Figure 2.1 – Widened lower panel – taper diverge ADS gantry sign

2.24 The downward pointing arrows used on signs for lane drop junctions must not be used on ADS or final ADS at taper diverge junctions, but should be used on gantry mounted supplementary final ADS and gantry mounted confirmatory signs at these junctions (see Figure 3.3 for an example). Paragraphs 2.25 to 2.29 provide guidance on the layout of these signs.

Placement of Gantry Signs Relative to Carriageway - Lane Drop Diverge

2.25 At lane drop diverges, lane specific gantry signs shall be used. The downward pointing arrows on the gantry signs should be centred over the traffic lanes to which they apply. Where a lane is shared by traffic leaving at the next junction and traffic continuing through the junction, a second (upper) tier of lane specific signs should be used to show the destinations reached by leaving at the junction. This is relevant particularly to Tiger Tail layouts (see Figures 4.3 and 4.4 for examples). The width of the sign should cover at least three-quarters of the width of any lane to which it applies (See **TSM Chapter 7**, paragraph 9.3 [Ref 2]). Where the width of the sign required to accommodate the destinations does not

cover the required portion of the lane (s), the blue area (green on all-purpose primary routes) should be widened accordingly.

2.26 Where a single lane is indicated, the width of the sign may be greater than the lane width. In this case the sign may extend over part of the adjoining lane(s), but by no more than a quarter of a lane width. The sign may also be extended over any adjoining hard strip or up to the equivalent of a quarter of a lane width over the hard shoulder. The width of the sign should be extended, where necessary, to cover at least three quarters of the lane width to which it applies (**TSM Chapter 7** paragraph 9.4 [Ref 2]). Upper and lower tier panels referring to the same lane should be aligned vertically. In all of the Figures in this document which show lane specific information over a single lane on motorways (for instance, Figure 4.1), route numbers centred above the destinations. This alternative follows the format of the upper panel (junction exit destinations) of diagram 2908, where the route number appears before the destinations. This layout option applies to motorways only. Where single panel lane specific gantry signs are used on all-purpose roads, the route number should be placed under the destinations (see Figure 6.2).

2.27 When displaying lane arrows on gantry mounted signs, one of two alternative methods shall be used. The current prescribed method is to have the arrows displayed on patches above each lane, on a grey panel beneath the sign. The second option is to include the arrows within the sign panel. This second option is now considered to be the preferred design on the Highways England network; however, for some signs, including those with active elements, the prescribed option still needs to be used for reasons of practicality. This is at the discretion of the designer. For the second option signs authorisation is required as specified in paragraph 1.12. These arrows will be authorised if the signs otherwise meet the design requirements in **TSM Chapter 7** [Ref 2]. The alternatives are shown in Figure 2.2.

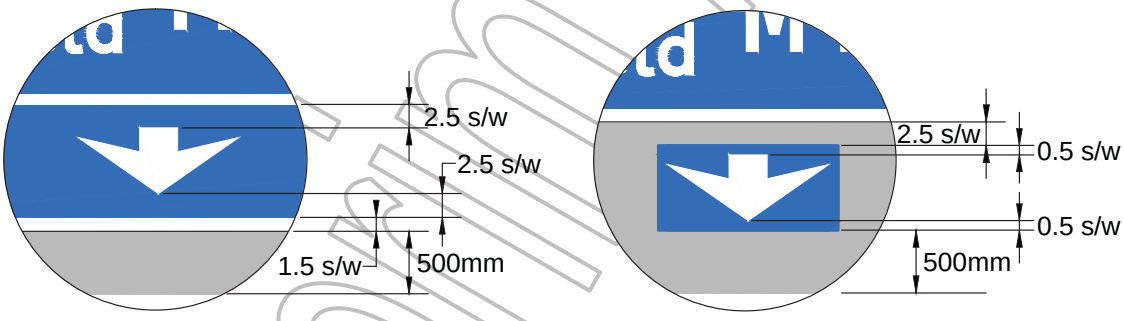


Figure 2.2 - Alternative methods of displaying gantry arrows on lane drop signs

2.28 Gantry arrows must not be shown beneath matrix or variable speed limit indicator signs mounted on the fascia of gantries.

2.29 Where a second (upper) tier of lane signs is required, as described in paragraph 2.25, arrows should be shown for the upper sign and centralised over the relevant traffic lanes, in addition to those on the lower sign. In exceptional cases, for instance where the layout design results in excessive sign height and it is not possible to omit destinations or to rationalise the volume required by using ‘for x follow y’ signs, it may be possible to obtain authorisation for signs with the upper tier of arrows omitted (see Figure 2.3). See paragraph 1.12 for the contact point for signs authorisations.

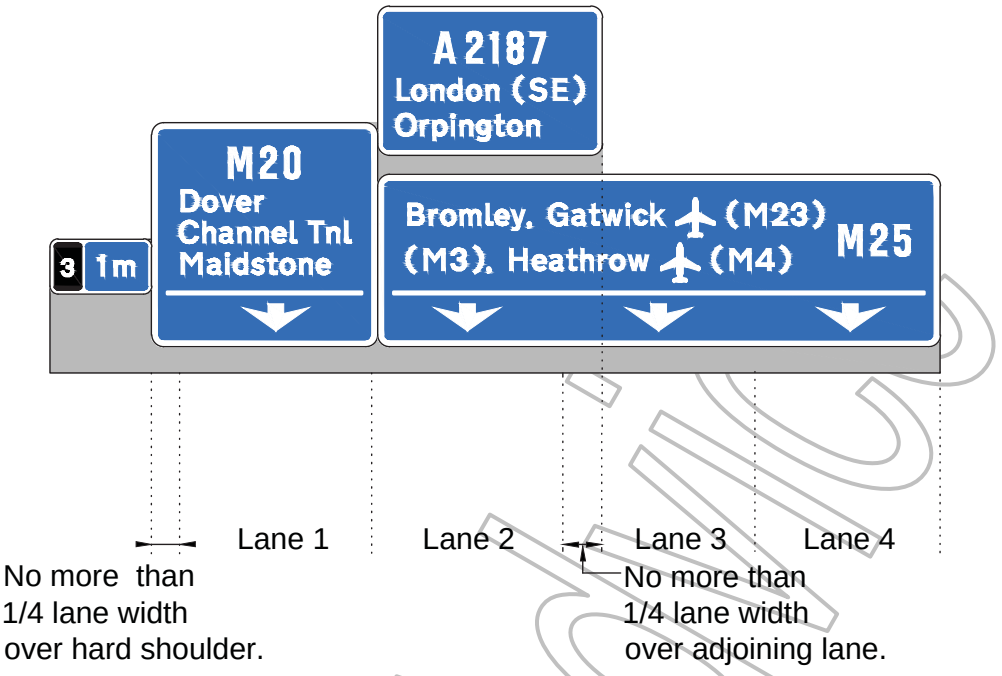


Figure 2.3 – Omission of lane arrow for upper tier sign (exceptional cases)

Route Confirmation Signs

2.30 Route confirmation signs to diagrams 2030, 2128 or 2911 (dependent on route classification) are placed after a junction to confirm the route number and the distance to destinations ahead. These should be located at least 200m downstream of the merge of the on slip (or auxiliary lane taper, if applicable) and should not be located within 200 metres of any other directional sign.

2.31 Where junctions are over 12 miles apart a second sign is recommended, ideally placed midway between junctions, but for junctions less than three miles apart route confirmation signs should be omitted. Where there are several closely spaced junctions in succession, consideration should be given to providing a route confirmation sign at a strategic location.

Variable Message Signs

2.32 Further guidance on the provision of these signs is given in **TD 46/05 (DMRB 9.1.1), IAN 149/11, IAN 111/09** and **IAN 112/08** [References 9, 14, 8 and 15]. They are mentioned in this IAN because of their interface with direction and information signs, and particularly their locations.

2.33 Variable Message Signs (MS3 VMS) are provided normally at strategic junctions on motorways and primary routes to warn of delays, and to provide alternative route information. These signs are situated 300 metres (+/- 100m) in advance of the 1 mile and 1/2 mile ADS.

2.34 Where MS3 are not provided on the approach to a junction, tactical diversion signing can still be provided on the gantry mounted 2x12 VMS, if available.

2.35 If a motorway or primary route has to be closed for a planned or emergency situation, these signs can provide the first set of signs of a diversion route established around the route closure, utilising route symbols from **TSRGD** Schedule 13 Part VII [Ref. 6]. Further guidance on the provision of these signs is given in **TD 46/05 (DMRB 9.1.1)** [Ref 9].

Flap-Type Diversion Signs

2.36 A pair of verge mounted, flap-type message diversion route signs to diagram 2716 may be used for motorways or all-purpose roads. These are placed 100m and 200m prior to the point where traffic starts to turn onto the slip road, as detailed in **TSM Chapter 8**, Part 1, Plan DCC1, page 232 [Ref 16], which also shows the additional signing and guarding that should be provided in support of a carriageway closure. These signs also utilise route symbols from **TSRGD** Schedule 13, Part VII [Ref 6].

2.37 It is acceptable to co-locate flap signs with the countdown markers at taper diverge junctions.

2.38 Layout drawings are shown in Figures 3.7 and 3.8 which illustrate the use of flap-type diversion route signs.

Sign Face Layouts

2.39 The sign face layouts shown in the Figures in this guidance are indicative. For requirements and guidance on sign face design refer to **TSM Chapter 7** [Ref 2] and **Department for Transport Working Drawings for Traffic Signs** [Ref 24].

3. SIGNING LAYOUT DIAGRAMS FOR MOTORWAY AND ALL-PURPOSE ROAD DIVERGES

Introduction

3.1 The design processes for signing and signalling should be co-ordinated. For example, where a gantry is provided for signals, signs should also be gantry mounted.

3.2 Layout drawings, where appropriate, show alternative verge and gantry signing layouts. These are shown as Option 1, verge mounted and Option 2, gantry mounted. Gantry mounted signs shall be used where the location meets the criteria in **TD 18/85 (DMRB 9.1.2)** or **IAN 149/11** [Ref 17 and 14].

3.3 Where gantries are provided, the 1/2 mile ADS and the final ADS shall be gantry mounted (**TD 18/85 (DMRB 9.1.2)** [Ref 17]). The 1 mile ADS may also be gantry mounted (**LTN 1/94** [Ref 4]). The confirmatory sign may be gantry mounted in combination with verge mounted ADS and final ADS.

3.4 Typical layouts are illustrated in Figures 3.1, 3.2 and 3.3 for motorways, and Figures 3.4 and 3.5 for all-purpose roads. This will cover most situations.

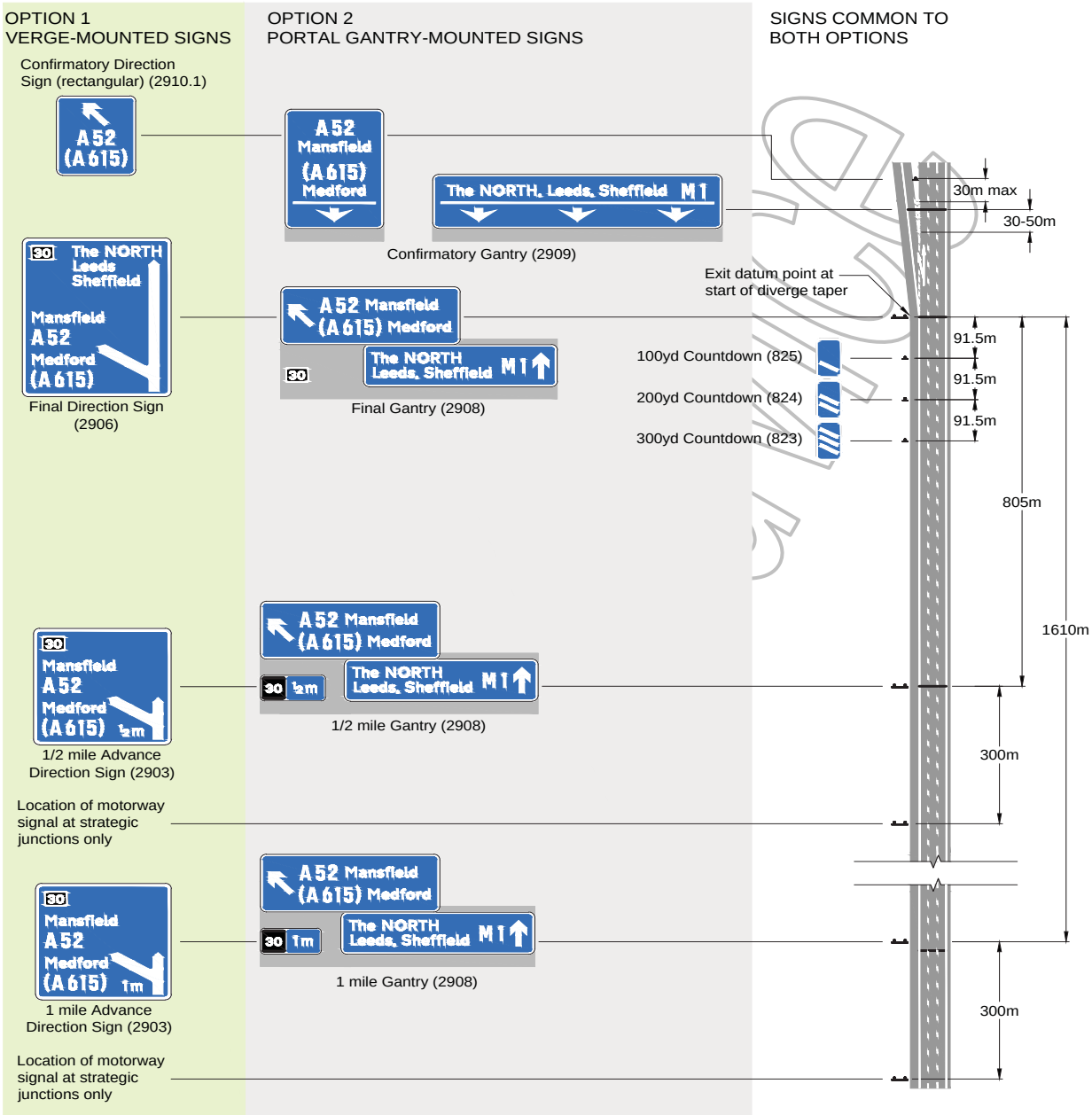
3.5 On verge mounted map type ADS, forward destinations should be shown on the final ADS but not routinely included on the 1 mile (2/3 mile) and 1/2 mile (1/3 mile) ADS. However, they may be added to the 1/2 mile and 1 mile ADS, where it would improve road user comprehension. Examples of situations where this may be desirable are:

- Where the destination splits between egress and forward destinations at the junction such as Leicester (S) and Leicester (N)
- At junctions where a new forward destination is introduced
- Where junctions are closely spaced and gantries are not provided.

All dedicated lane advance direction signs to diagram 2904 should include ahead destinations. The junction number should be present on all ADS and direction signs except the confirmatory direction signs.

Simple Motorway Taper Diverge (Type A) (Figure 3.1)

3.6 A taper diverge layout is one where diverging traffic leaves the mainline carriageway through an area forming a flare from the mainline carriageway. The number of lanes through the junction remains the same and, in Figure 3.1, traffic enters the slip road in one traffic lane. The layout is based on the highway layout shown in Figure 2/6.1 A - **TD 22/06 (DMRB 6.2.1)** [Ref 3].



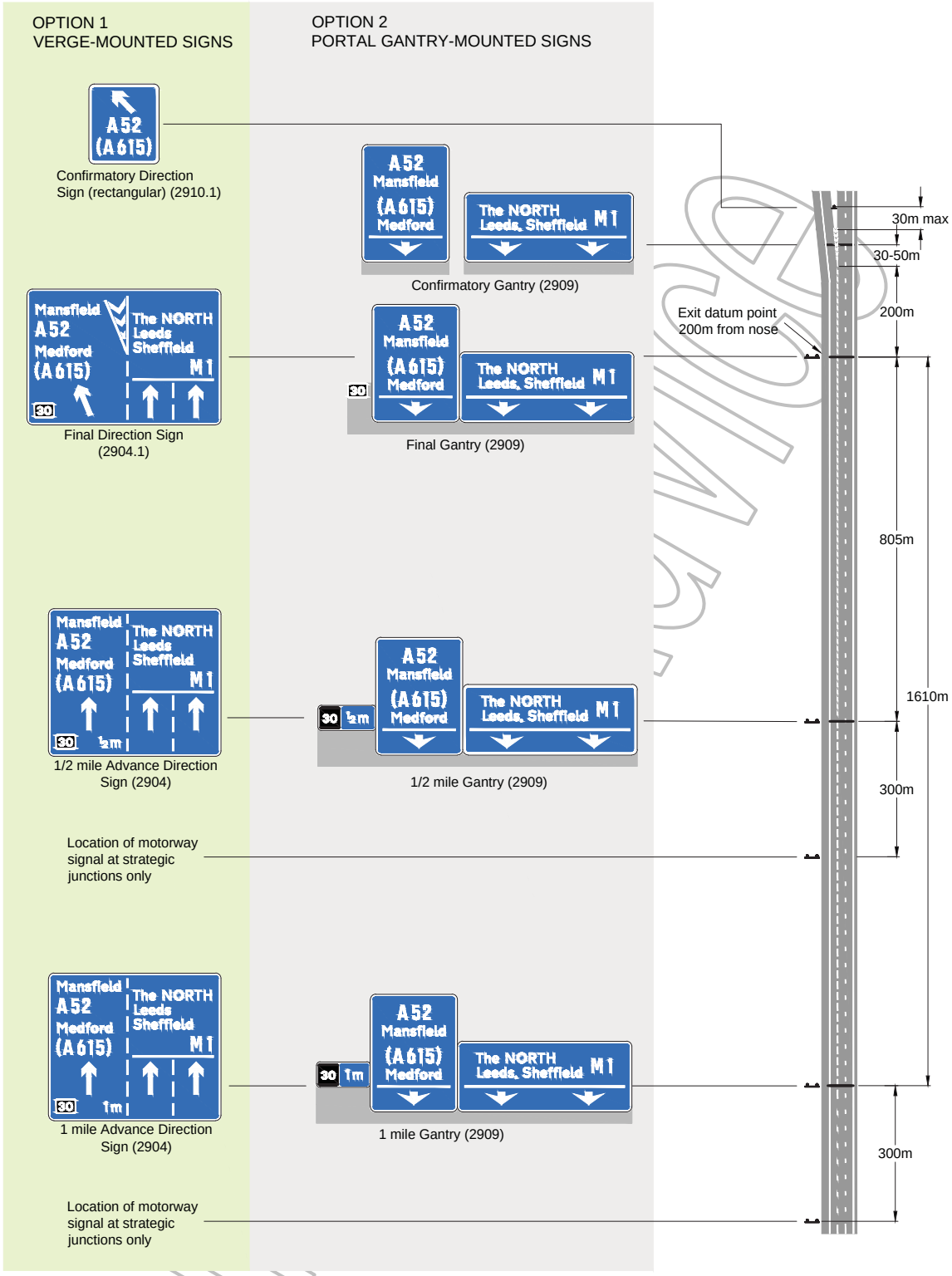
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.
Forward destinations may be shown on the 1 mile and 1/2 mile verge mounted AD signs (see paragraph 3.5).

TAPER DIVERGE ON A MOTORWAY
(TYPE A)

FIGURE 3.1

Typical Motorway Lane Drop Diverge (Type C) (Figure 3.2)

3.7 A lane drop layout is one where the nearside lane, or lanes, of a carriageway lead directly to the slip road at the junction. This layout incorporates a lane drop, so lane specific signs should be used throughout. The through lanes are divided from the diverging lane (s) with markings to diagram 1010 between the nose and the 1/2 mile gantry, and diagram 1004.1 between the 1/2 mile and 1 mile gantry. In the example shown in Figure 3.2, traffic enters the slip road in one lane, fed directly from the lane drop. The layout is based on the highway layout shown in Figure 2/6.2 C **TD 22/06 (DMRB 6.2.1)** [Ref 3].



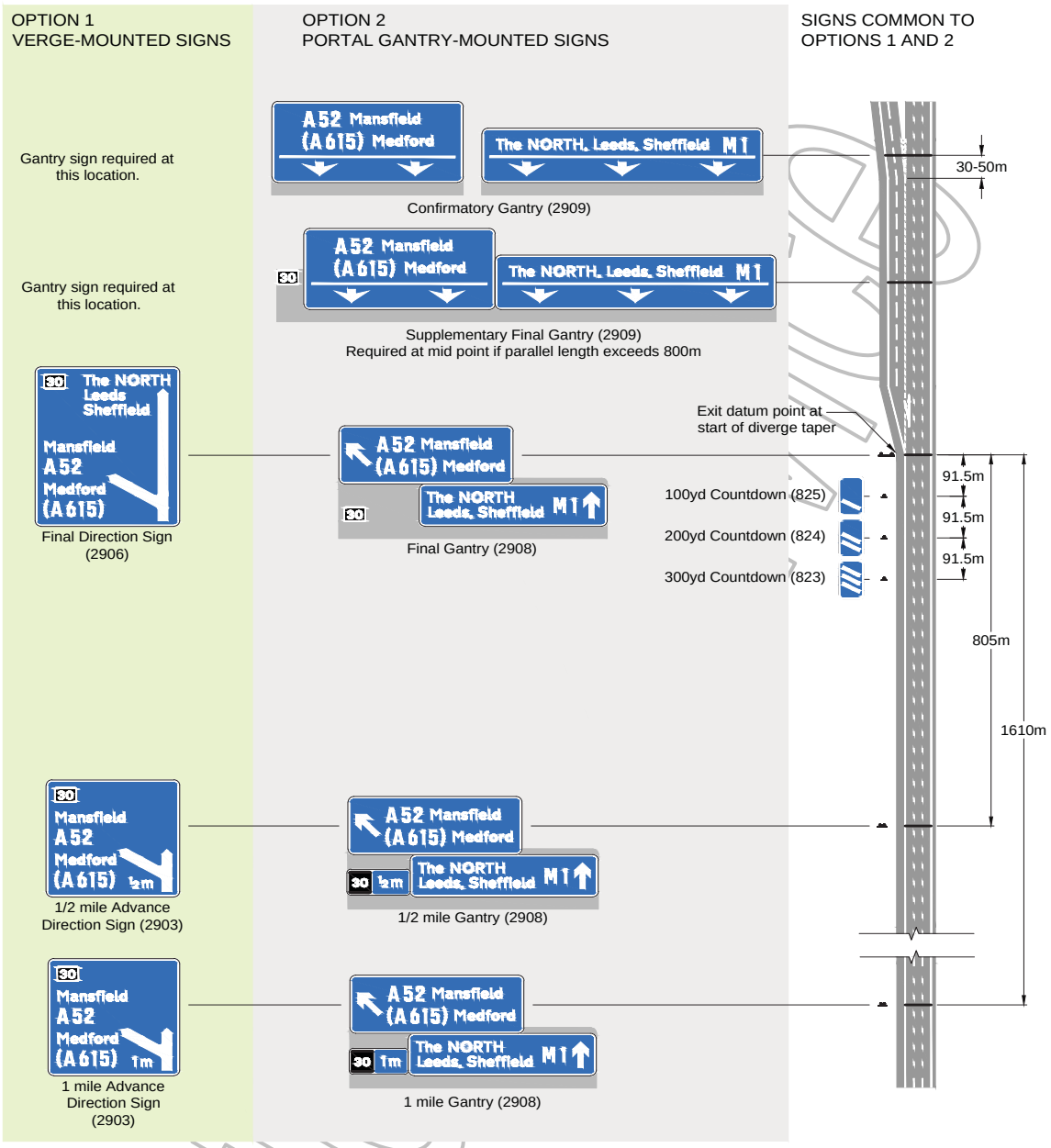
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.

LANE DROP ON A MOTORWAY
(TYPE C)

FIGURE 3.2

Parallel Diverge on a Motorway (Type B) (Figure 3.3)

3.8 A parallel diverge layout is one where the diverge flare widens out in advance of the slip road to form an auxiliary lane, thus providing two lanes running parallel to the main carriageway for a minimum length of 150m in order to increase junction capacity. The number of lanes on the mainline carriageway through the junction remains the same. Where the parallel diverge length exceeds 800 metres, a supplementary lane-specific final ADS gantry should be provided at the mid-point of the parallel diverge as shown in Figure 3.3. Traffic enters the slip road from the parallel diverge in two lanes. In the example shown, either lane of the slip road can be used for either destination shown – where the slip road has dedicated lanes for different destinations, the signs at the supplementary final ADS and confirmatory locations should be single panels showing lane-specific destinations. The layout is based on the highway layout shown in Figure 2/6.1B (Option 2 Not preferred) - **TD 22/06 (DMRB 6.2.1)** [Ref 3].



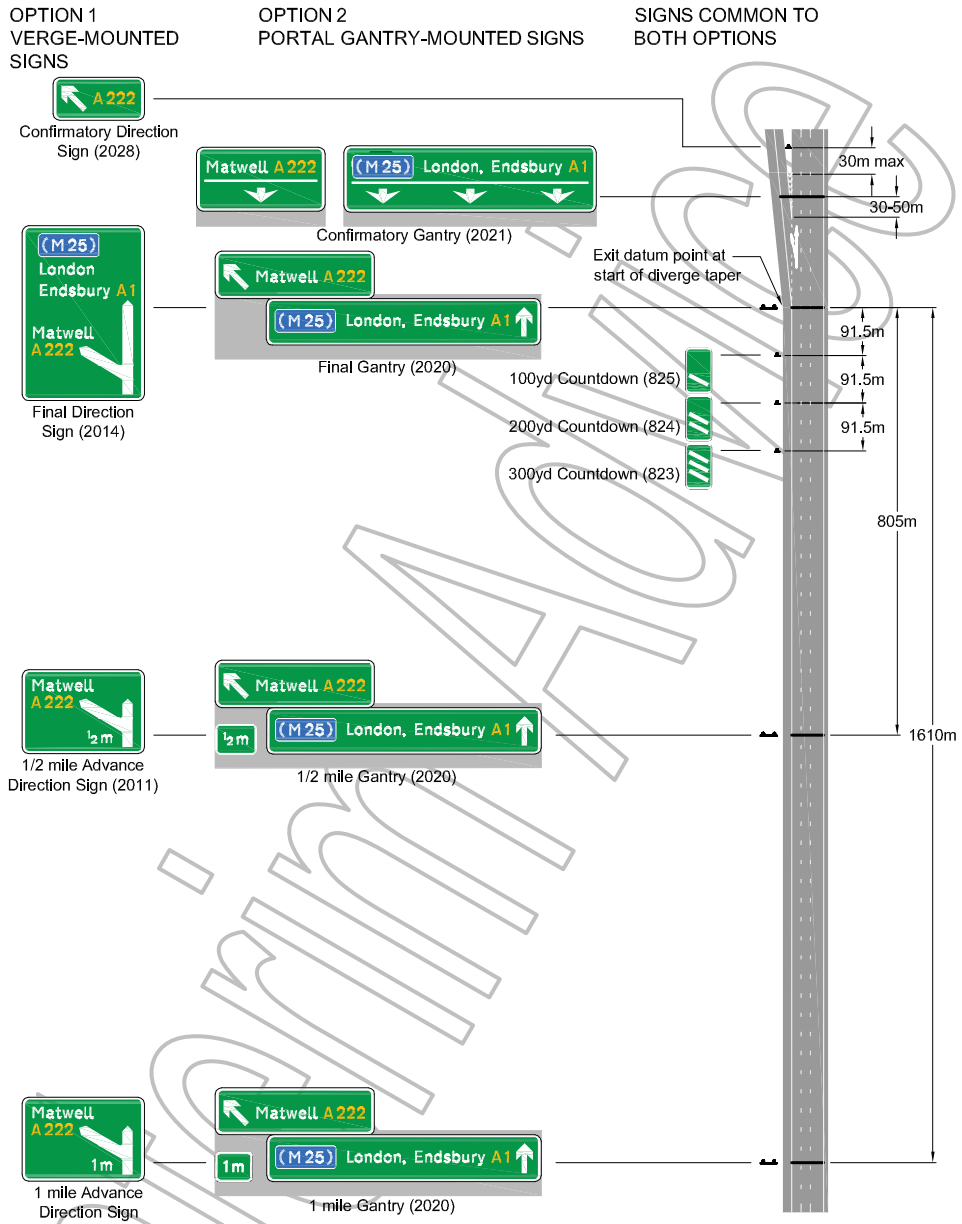
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.
Forward destinations may be shown on the 1 mile and 1/2 mile verge mounted AD signs (see paragraph 3.5).
See paragraph 2.23 regarding the width of the forward panel of diagram 2908.

PARALLEL DIVERGE ON A MOTORWAY
(TYPE B)

FIGURE 3.3

Simple All-Purpose Road Taper Diverge (Type A) (Figure 3.4)

3.9 The description is as given for the motorway layout in paragraph 3.6 above. The sign diagram layouts will be appropriate for the category of route appropriate (primary or non primary). The number of lanes through the junction remains the same and, as in Figure 3.1, traffic enters the slip road in one traffic lane. It is necessary to accept lower standards of geometry sometimes on all-purpose roads than is the case for motorways.



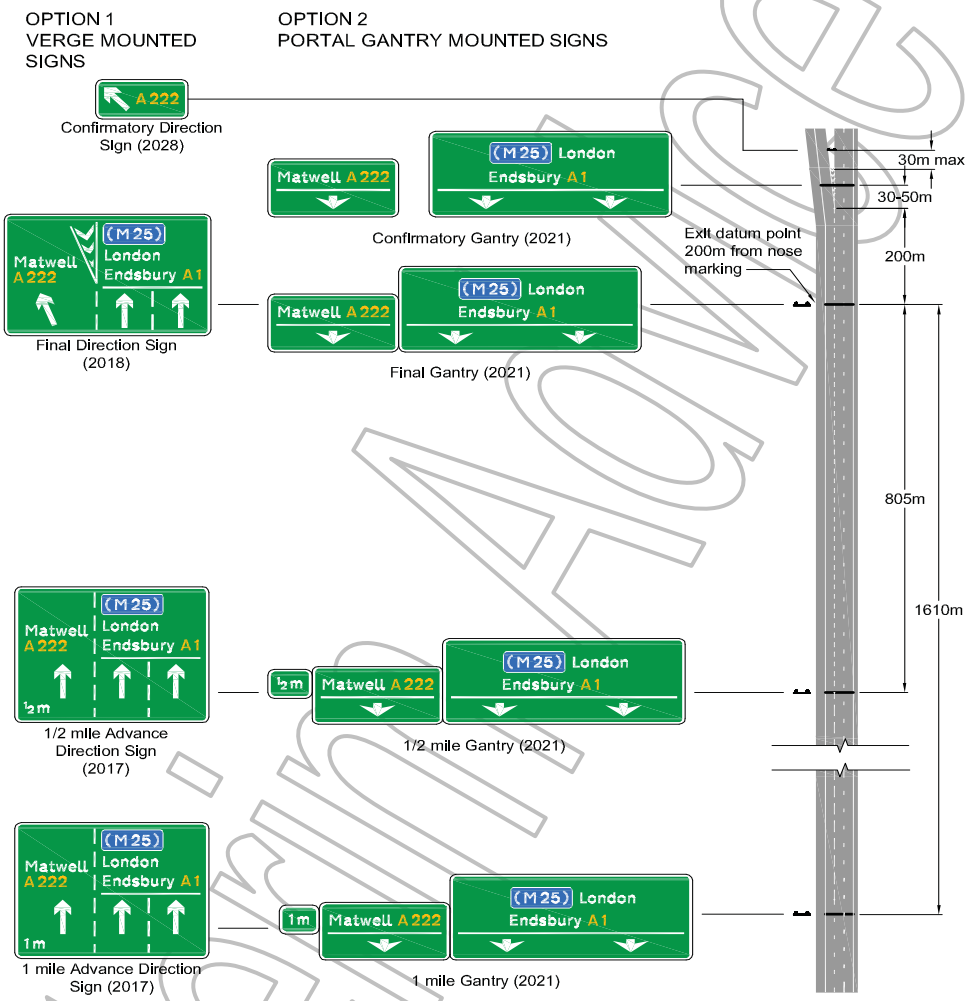
Forward destinations may be shown on the
1 mile and 1/2 mile verge mounted AD sign faces.

TAPER DIVERGE ON AN ALL-PURPOSE ROAD
(TYPE A)

FIGURE 3.4

Typical All-Purpose Road Lane Drop Diverge (Type C) (Figure 3.5)

3.10 This layout incorporates a lane drop so lane specific signs should be used throughout. The description is as given for the motorway layout in paragraph 3.7 above. The sign diagram layouts will be appropriate for the category of route appropriate (primary or non primary). In the example shown in Figure 3.5, traffic enters the slip road in one lane, fed directly by the lane drop. It is necessary to accept lower standards of geometry sometimes on all-purpose roads than is the case for motorways.



LANE DROP ON AN ALL-PURPOSE ROAD
(TYPE C)

FIGURE 3.5

Supplementary and Tourist Signs (Figures 3.6 to 3.8)

3.11 Where applicable and where space is available, supplementary/tourist signs, for example tourist destination, park and ride, and lorry route signs may also be provided (as diagrams 2921.1, 2924, 2929 on motorways). Up to three destinations may be shown where the sign is on a road with a speed limit of 50mph or more, and up to four destinations on lower speed roads **TD 52/04 (DMRB 8.2.4)** [Ref 18], paragraph 14.1 and 14.3). Supplementary and tourist signs may be co-located in a set of signs placed between the 1 mile and 1/2 mile ADS, and repeated after the 1/2 mile ADS. On all-purpose roads without a 1 mile ADS, supplementary/tourist signs should be provided at the location between the 1/2 mile ADS and final ADS only.

3.12 Layouts for supplementary/tourist signs and their interactions with the locations for core direction signs are shown in Figure 3.7 (motorway junction diverge) and Figure 3.8 (all-purpose road junction diverge). Supplementary/tourist signs may also be used within Tiger Tail layouts (Section 4) and Complex Motorway Junctions (Section 5). For Complex Motorway Junctions the ability to locate additional signs is likely to be restricted and will be dependent on site specific factors; however, the guidance in this section can be used to identify where it would be acceptable to site additional signs without causing an unacceptable distraction to drivers.

3.13 Supplementary/tourist direction signs must not be included on gantry signs, and must be verge mounted.

3.14 **TD 52/04 (DMRB 8.2.4)** paragraph 10.5 [Ref 18] states that tourist signs shall be provided normally at 3/4 mile and 1/4 mile in advance of the final ADS (EDP). These signs should be co-located except when the locations clash with the siting of MS3 or Tiger Tail signs. Where MS3 and or Tiger Tail signs are provided reference should be made to the section on signing hierarchy in paragraphs 3.16 to 3.25.

3.15 Additional information not accommodated elsewhere may be shown on “for x follow y” signs (diagram 2915). These signs may be used for approved, qualifying additional destinations, park and ride information, tourist destinations or for lorry route signs (diagram 2929.1). “For x follow y” signs are placed 500 to 600 metres in advance of the 1 mile ADS, where x is the destination that cannot be accommodated elsewhere and y is the major route or destination to be followed, or the junction number to leave the motorway.

Signing Hierarchy

3.16 On the approach to every junction, there are core signs that shall be provided. On motorways these are the 1 (2/3) mile ADS, the 1/2 (1/3) mile ADS, the final ADS, the confirmatory sign and, at taper diverge junctions, 300 yard, 200 yard and 100 yard countdown marker signs.

3.17 On all-purpose roads the same core signs shall be provided, with the exception that the 1 (2/3) mile ADS is not required at certain locations (see paragraph 2.7). The sign location guidance given below is based on the provision of all of the core signs, including the 1 mile ADS.

3.18 In addition, at Tiger Tail diverge layouts two verge mounted Tiger Tail signs must be provided. At strategic junctions, variable message diversion route signs (usually MS3 or MS4) should be provided. These signs, together with the supplementary signs detailed above, form a non-core group of signs that need to be located in accordance with the following advice.

Non Core Sign Locations (Based on 1 Mile and 1/2 Mile ADS Locations) - Approach to 1 Mile ADS

3.19 At strategic junctions an MS3 should be located 300m in advance of the 1 mile ADS. Where provided, for x follow y signs should be located 500m to 600m in advance of the 1 mile ADS.

Non Core Sign Locations - Between the 1 Mile and the 1/2 Mile ADS

3.20 At Tiger Tail junctions the Tiger Tail sign shall be provided 3/4 mile in advance of the final ADS (i.e. 400m in advance of the 1/2 mile ADS).

3.21 At strategic junctions an MS3 should be provided 300m in advance of the 1/2 mile ADS, except where the diverge arrangement takes the form of a ghost island diverge. In this case the MS3 should be located 200m in advance of the 1/2 mile ADS to make room for the Tiger Tail sign, which is itself located 400m in advance of the 1/2 mile ADS.

3.22 Where provided, the set of supplementary/tourist signs should be located 3/4 mile in advance of the final ADS (i.e. 400m in advance of the 1/2 mile ADS), except at junctions where MS3 and/or Tiger Tail signs are provided. In such cases the supplementary signs are located 200m downstream of the 1 mile ADS (i.e. approx 600m in advance of the 1/2 mile ADS). For all-purpose road junctions without 1 mile (2/3 mile) ADS, supplementary/tourist signs are not required at this location.

Non Core Sign Locations - Between the 1/2 Mile ADS and the Final ADS

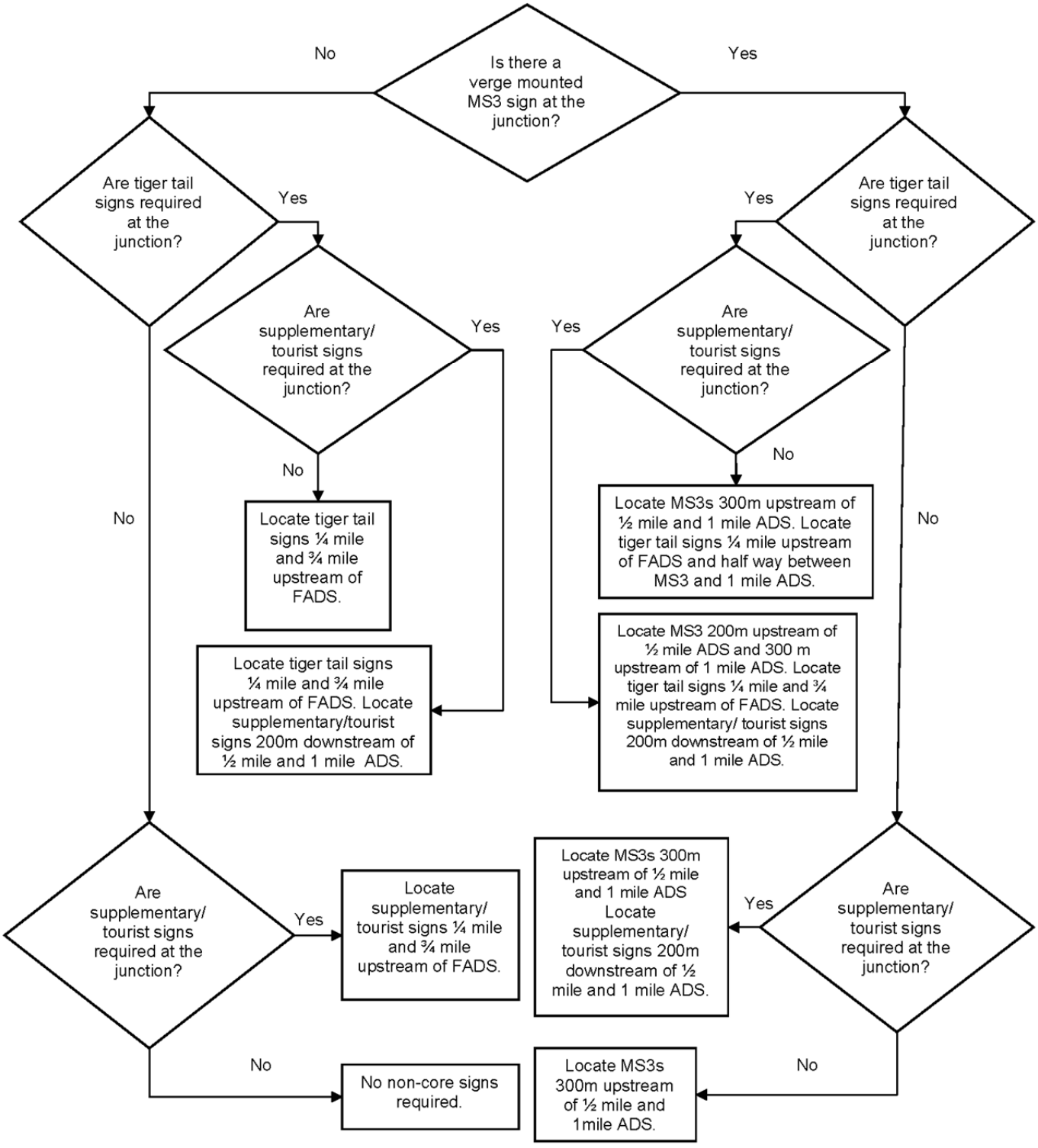
3.23 Where provided, the set of supplementary signs should be positioned 1/4 mile in advance of the final ADS, except at ghost island diverge junctions where this location (1/4 mile in advance of the final ADS) is taken by a Tiger Tail sign. In this case the supplementary signs are positioned half way between the Tiger Tail sign and the 1/2 mile ADS (i.e. 200m downstream of the 1/2 mile ADS).

Sign Location Flow Charts (Figures 3.6a and 3.6b)

3.24 Flow charts are provided at Figures 3.6a and 3.6b to assist with the location of non-core signs on the approaches to grade separated junctions on motorway and all-purpose roads. They are applicable to lane drop and taper diverges. Figure 3.6a is based on core ADS located at 1 mile and 1/2 mile and Figure 3.6b shows the required spacing based on core ADS located at 2/3 mile and 1/3 mile.

3.25 For all-purpose road junctions without 1 mile (2/3 mile) ADS, supplementary/tourist signs are only required between the 1/2 mile (1/3 mile) ADS and final ADS (referred to in Figures 3.6a and 3.6b as 'FADS'. The "for x follow y" sign should be located 500m to 600m in advance of the 1/2 (1/3 mile) mile ADS.

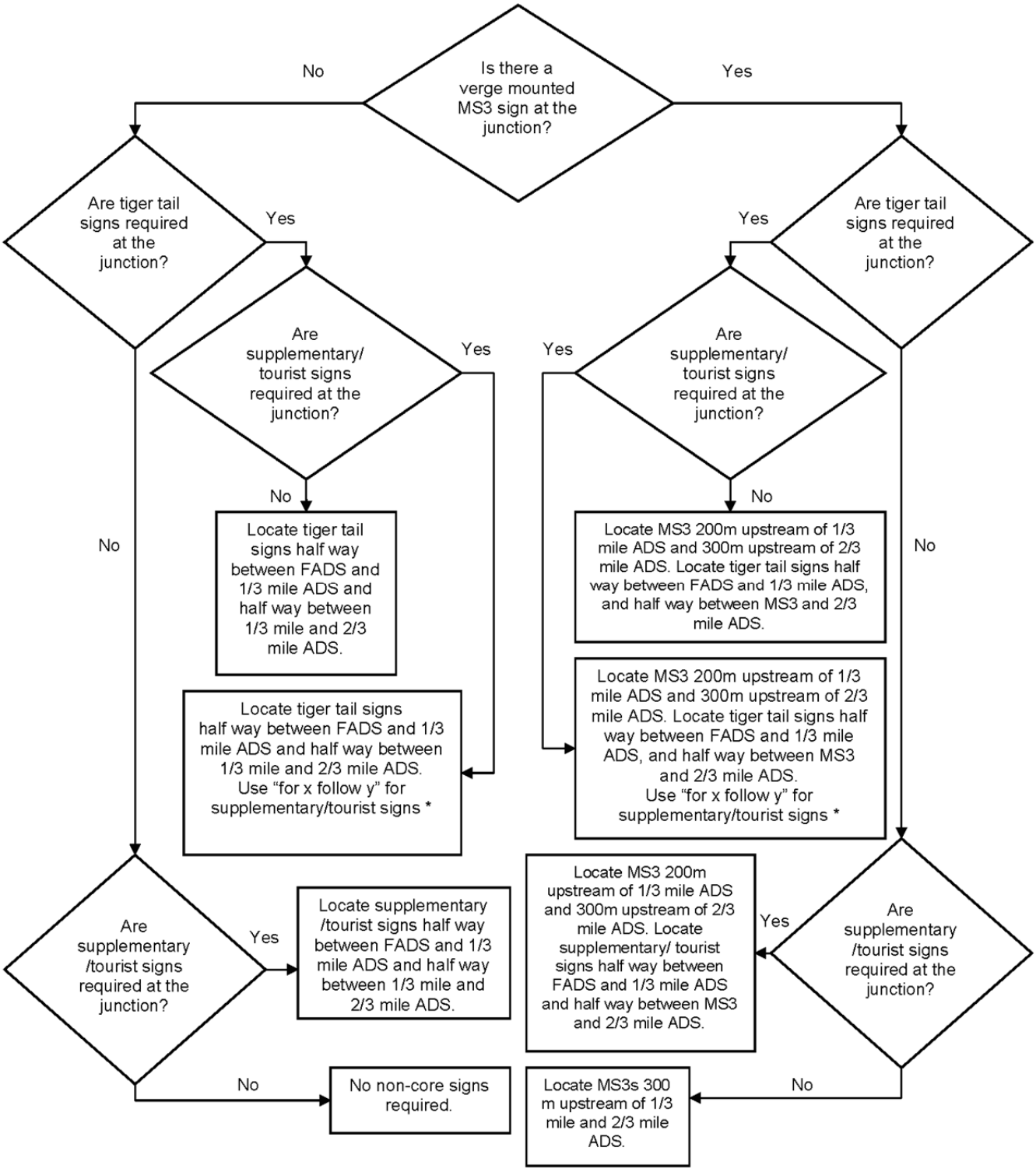
Selection of Locations for Verge Mounted Tiger Tail and Supplementary/Tourist Signs – Flow Diagram (Core ADS at ½ mile and 1 mile from FADS)



NB. The distances shown are for use when the core ADS are sited at 1/2m and 1m from the FADS. When the core ADS are sited 2/3m and 1/3m from the FADS, see figure 3.6b.

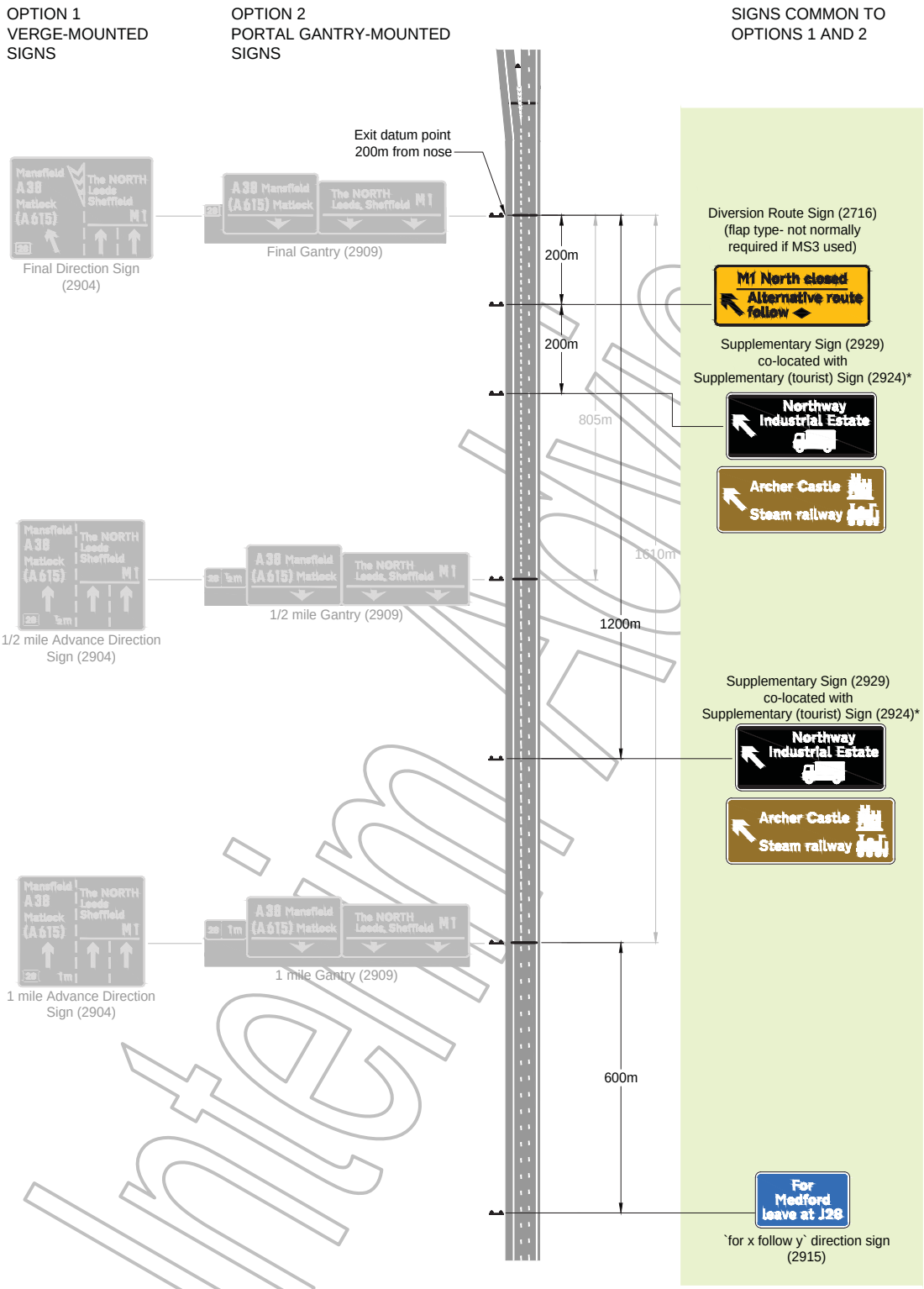
FIGURE 3.6a

Selection of Locations for Verge Mounted Tiger Tail and Supplementary/Tourist Signs – Flow Diagram (Core ADS at 1/3 mile and 2/3 mile from FADS)



* With only 535 metres between 2/3 mile and 1/3 mile ADS, there is insufficient room to place both tiger tail and supplementary/tourist ADS.

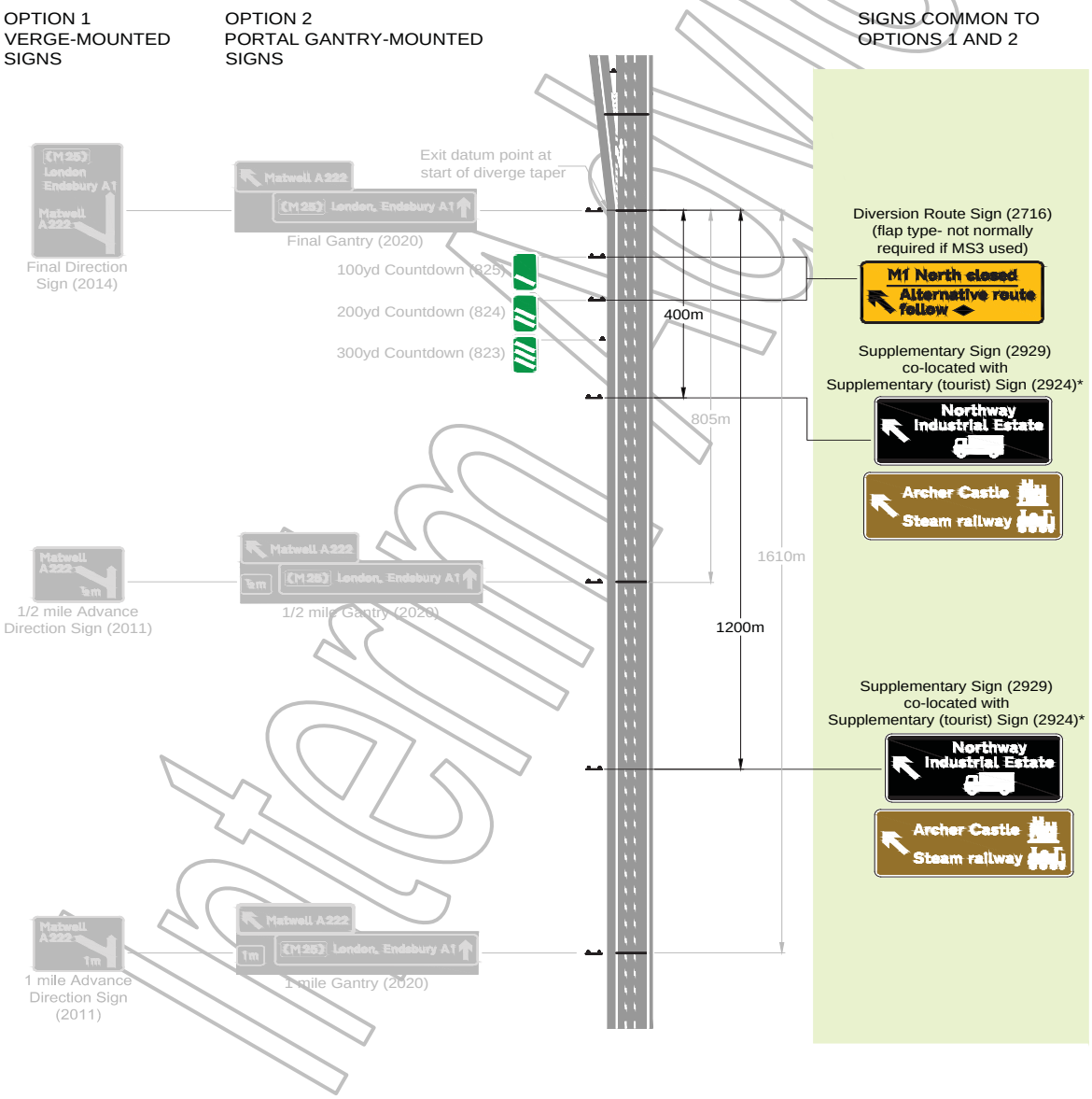
FIGURE 3.6b



Refer to figures 3.6a and 3.6b for further information on the siting of supplementary and tourist signs. Signs shown in grey are core direction signs, shown in outline, for information.
*See paragraph 3.11 regarding criteria for tourist signs. Where space permits, these signs could be located separately, if desired.
See paragraphs 2.36 to 2.38 for further details on the use of diagram 2716.

LOCATION OF VERGE MOUNTED SUPPLEMENTARY AND TOURIST SIGNS (MOTORWAY JUNCTION)

FIGURE 3.7



Refer to figures 3.6a and 3.6b for further information on the siting of supplementary and tourist signs. Signs shown in grey are core direction signs, shown in outline, for information.
*See paragraph 3.11 regarding criteria for tourist signs. Where space permits, these signs could be located separately, if desired. See paragraphs 2.36 to 2.38 for further details on the use of diagram 2716.
The supplementary and tourist direction signs located at 1200m from the EDP are omitted when a 1 mile ADS is not provided.

LOCATION OF VERGE MOUNTED SUPPLEMENTARY AND TOURIST SIGNS (HIGH SPEED ALL-PURPOSE ROAD JUNCTION)

FIGURE 3.8

4. TIGER TAIL LAYOUTS

Introduction

4.1 Four typical Tiger Tail signing layouts are illustrated in this section of **IAN 144/15**.

4.2 The first is based on the highway layout shown in **TD 22/06 (DMRB 6.2.1)** [Ref 3] Figure 2/6.1 B (Option 1 Preferred) - Ghost Island Taper Diverge, and is shown in Figure 4.1.

4.3 The other three layouts are based on the highway layout shown in **TD 22/06 (DMRB 6.2.1)** Figure 2/6.3 D (Option 1 Preferred) [Ref 3], Ghost Island Diverge for Lane Drop, but with different direction signing requirements on the slip road. Where traffic on the slip road needs to use specific lanes for signed destinations and there is insufficient length of slip road to accommodate all expected lane change activity, the directional signing on the mainline and for the ghost island may need to be designed so that different destinations are signed for the routes either side of the ghost island. The capacities of each diverge or lane drop should be assessed against the expected traffic flow. The sign layout examples in Figures 4.1 to 4.4 cover various alternatives.

4.4 The four Tiger Tail layouts provided in Figures 4.1 to 4.4 are applicable equally to the all-purpose road network, but using signs of an appropriate background colour.

Background

4.5 Ghost island diverge layouts are preferred to the equivalent auxiliary lane layouts and should be selected in preference to the auxiliary lane layouts except where the ghost island layout may be unsuitable (see **TD 22/06 (DMRB 6.2.1)** paragraph 2.52 [Ref 3] and paragraph 4.8 below).

4.6 Ghost island diverge layouts are for use when the diverge flow is high and have been proven to reduce the likelihood of queues of slow moving traffic in Lane 1 together with 'swooping' movements (late manoeuvres from Lane 2 or 3) to the slip road. By providing two access points to a two-lane exit slip road, the capacity of the diverge is increased, congestion on the mainline is reduced, and swooping is discouraged.

4.7 A full sequence of gantry direction signing is essential for a ghost island diverge layout. In addition, drivers should be informed of the lane discipline required at a ghost island diverge. Two verge mounted Tiger Tail signs (**TD 22/06 (DMRB 6.2.1)** Figure 2/7 [Ref 3] or similar), must be provided (NB. A Department for Transport Working Drawing is available [Ref 24] which supersedes Figure 2/7 of **TD 22/06 (DMRB 6.2.1)** [Ref 3]). The first of these signs is located between the 1 mile gantry and the 1/2 mile gantry; the second sign is located between the 1/2 mile gantry and the final gantry. The main objective of these signs is to highlight to drivers the existence of the second exit point and to encourage its use. It has been found that the installation of these verge mounted signs improves the utilisation of the second exit with the effect of balancing the vehicle flows on the slip road lanes. Authorisation will be required for these signs.

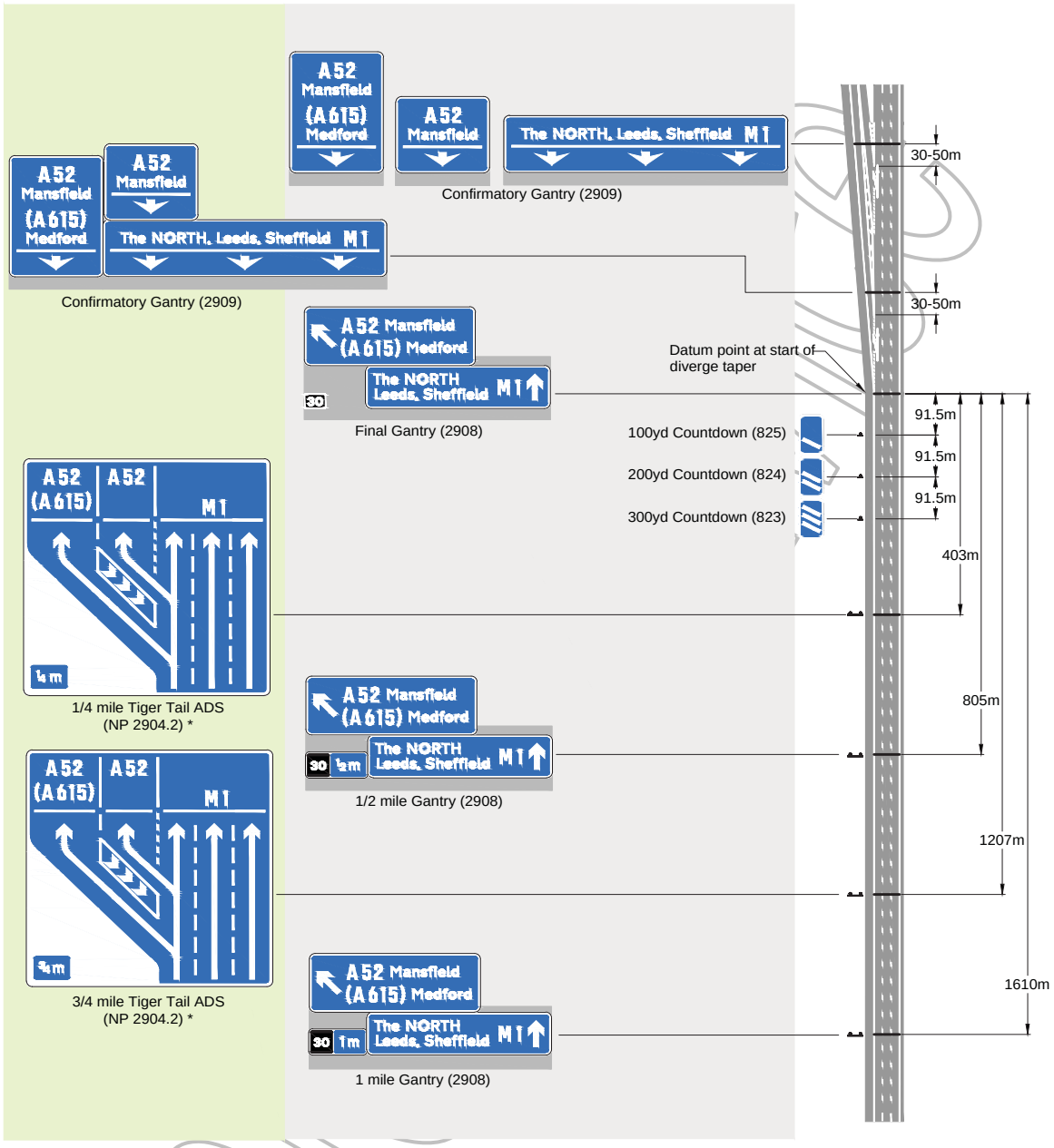
4.8 There may be occasions when the ghost island diverge layout is not suitable, for instance if signing is difficult to implement or if a high turning movement at the junction downstream of the diverge may lead to slip road queues in one or more lanes tailing back towards the mainline. In such cases auxiliary lane layouts may be used instead. Note that for a Lane Drop at Parallel Diverge (**TD 22/06 (DMRB 6.2.1),** Figure 2/6.3 Layout D Option 2 [Ref 3]), a full sequence of gantry direction signing should be provided in order to encourage utilisation of Lane 2 by diverging traffic. The layouts have also been developed for use at existing junctions and there may be constraints at a particular site that prevent the dimensions of the recommended layouts from being achieved. Designers may need to consider amendments to the lengths and widths of the various elements of the layouts. Further advice can be found in **TD 22/06 (DMRB 6.2.1)**, paragraph 2.52 [Ref 3].

4.9 Layout drawings are provided in Figures 4.1 to 4.4.

Tiger Tail Ghost Island with Double Taper Diverge (Figure 4.1)

4.10 In Figure 4.1, the lanes of the slip road are dedicated to particular traffic directions downstream of the diverge tapers. As a result, traffic leaving the motorway for A615 is required to enter Lane 1 of the slip road at the first taper diverge. A52 traffic can use either lane on the slip road downstream of the taper, and thus can leave at either the first or second taper diverge. An upper tier lane specific sign is shown at the first taper diverge confirmatory gantry, to indicate that A52 traffic may use either the first taper to leave the main carriageway, or share Lane 1 of the main carriageway with through traffic at this point, to leave at the second taper. A615 is shown dedicated to the first taper and Lane 1 of the slip road only on both confirmatory gantries.

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



* Authorisation is required for tiger tail sign with double taper diverge.
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and
see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

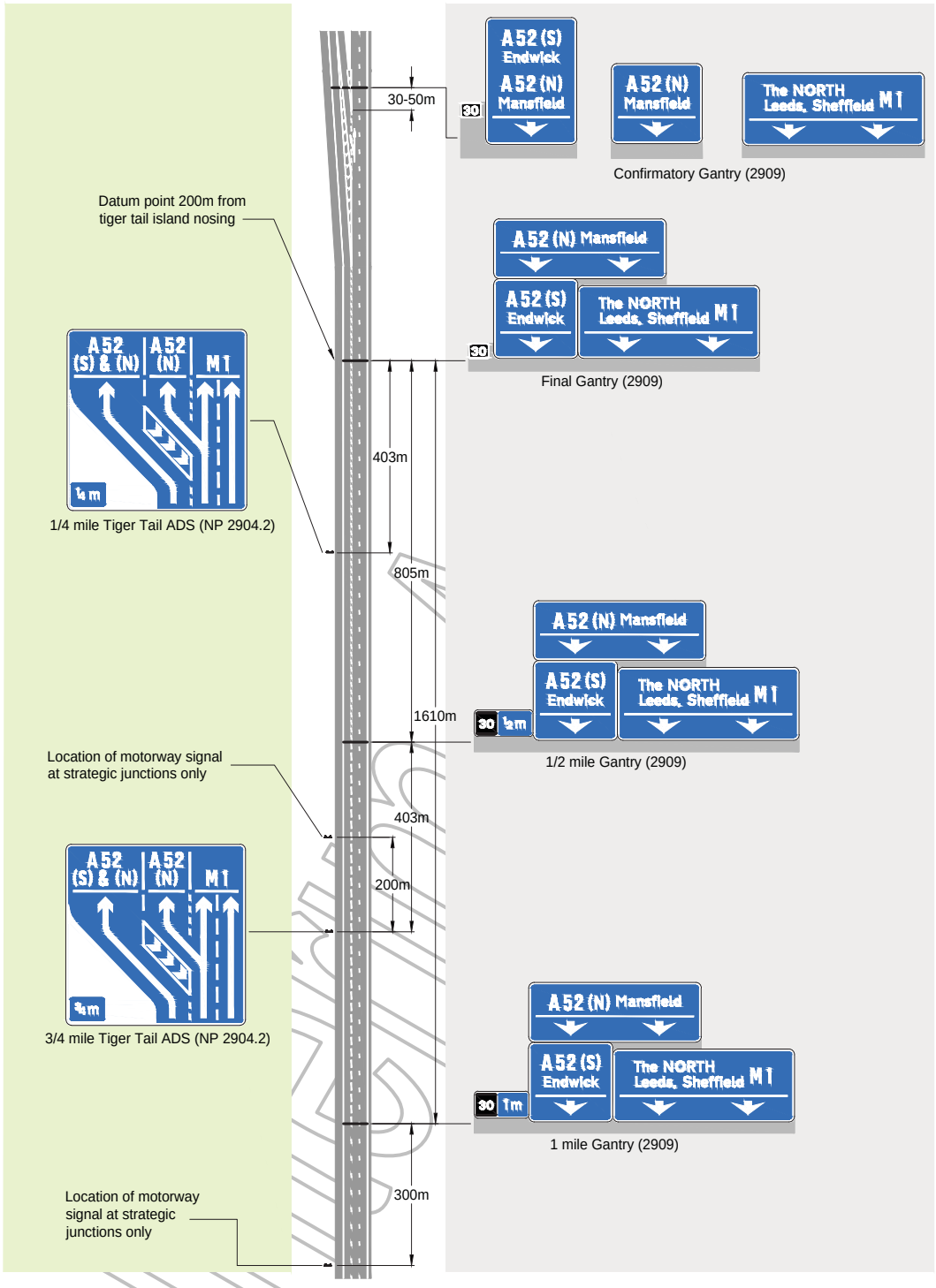
TIGER TAIL GHOST ISLAND
WITH DOUBLE TAPER DIVERGE

FIGURE 4.1

Tiger Tail Ghost Island with Lane Drop and Taper Diverge (Figure 4.2)

4.11 In Figure 4.2, all of the signs shown are lane specific, because the layout has a lane drop. The lanes of the slip road are dedicated to particular traffic directions downstream of the lane drop and taper diverge. As a result, traffic leaving the motorway for A52 (S) is required to enter Lane 1 of the slip road directly from the lane drop, whereas A52 (N) traffic can use either lane on the slip road, and thus can leave at either the lane drop or taper diverge. An upper tier lane specific sign is shown at each location to indicate that A52 (N) traffic may use either the lane drop to leave the main carriageway, or share Lane 2 of the main carriageway with through traffic, to leave at the taper diverge. Refer to Figure 4.3 if A52 (N) traffic cannot share Lane 1 and is required to use Lane 2 only.

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

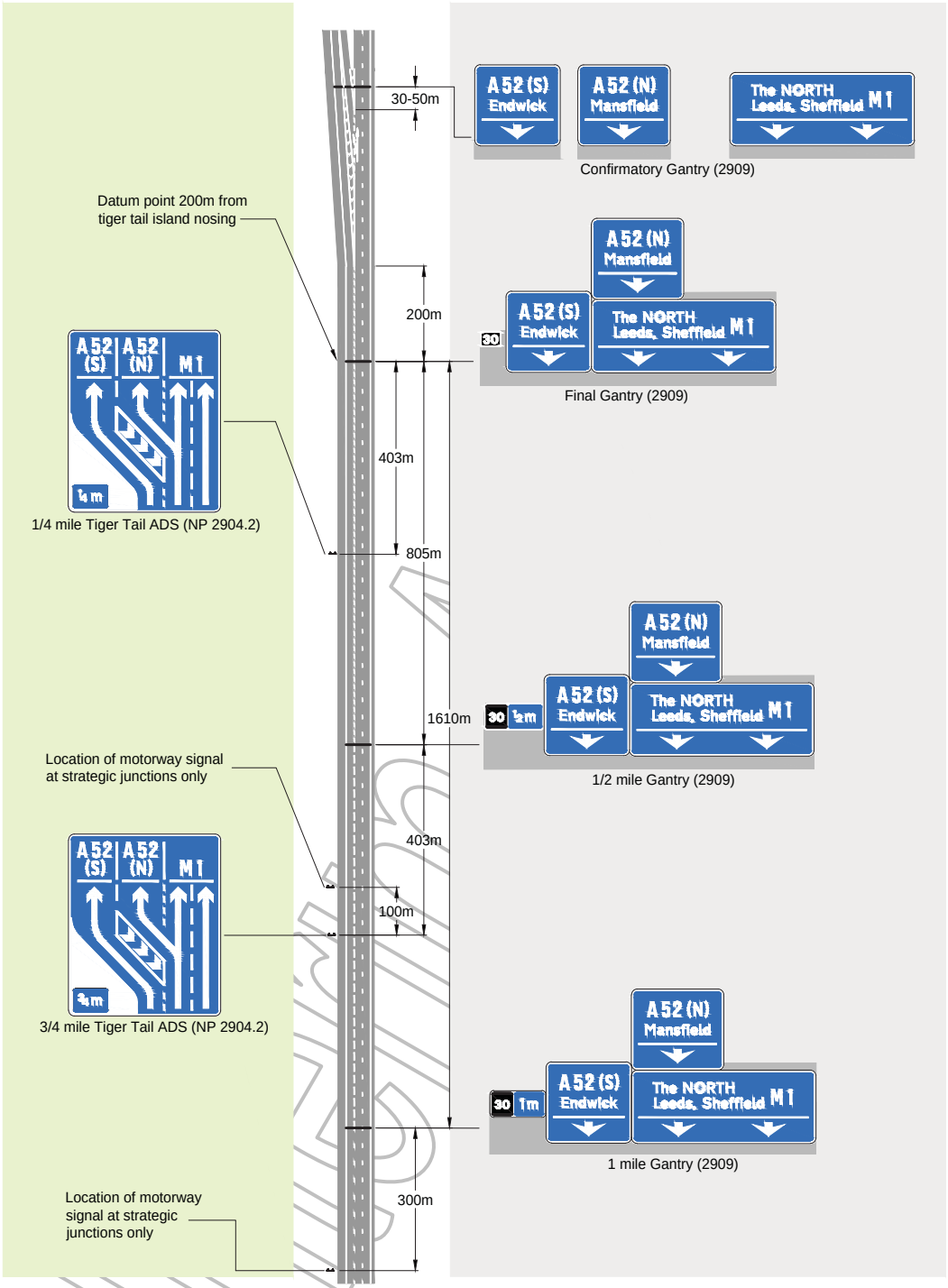
TIGER TAIL GHOST ISLAND WITH LANE DROP AND TAPER DIVERGE

FIGURE 4.2

Tiger Tail Ghost Island with Lane Drop and Taper Diverge (Different Lane Destinations on Slip Road) (Figure 4.3)

4.12 In Figure 4.3, all of the signs shown are lane specific, because the layout has a lane drop. The lanes of the slip road are dedicated to particular traffic directions downstream of the lane drop and taper diverge. As a result, traffic leaving the motorway for A52(S) is required to enter Lane 1 of the slip road directly from the lane drop, and A52(N) traffic is required to enter Lane 2 of the slip road, using the taper diverge. An upper tier lane specific sign is shown at each location to indicate that A52(N) traffic is required to share Lane 1 of the main carriageway with through traffic, and leave at the taper diverge, whilst A52(S) traffic is shown on a lane specific sign, dedicated to the lane drop. This layout differs from Figure 4.2 in that there is no lane sharing for different downstream directions on the slip road.

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

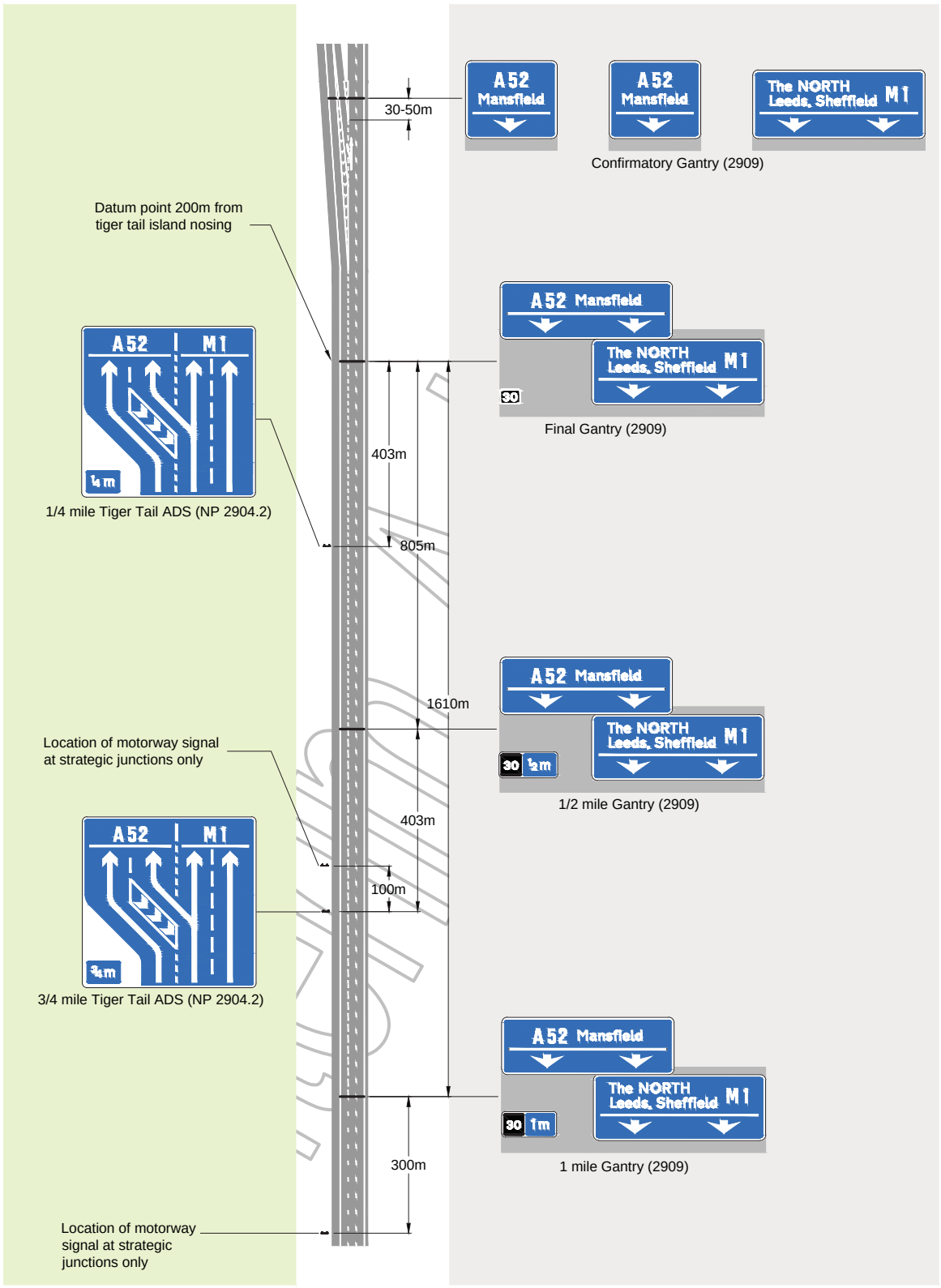
TIGER TAIL GHOST ISLAND WITH LANE DROP AND TAPER DIVERGE (DIFFERENT LANE DESTINATIONS ON SLIP ROAD)

FIGURE 4.3

Standard Tiger Tail Ghost Island with Lane Drop and Taper Diverge (Figure 4.4)

4.13 This layout incorporates a lane drop, so lane specific signs should be used throughout. In Figure 4.4, the slip road arrangement does not include lane dedication downstream of the diverge and as a result, A52 traffic can use either the lane drop or the taper diverge to enter the slip road. In this example, an upper tier sign has been used to indicate that A52 traffic can user either the lane drop or Lane 1 of the main carriageway to enter the slip road. In this example, a more balanced sign layout is achieved by showing the lane drop element on the upper tier of the signs.

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows
to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

STANDARD TIGER TAIL GHOST ISLAND
WITH LANE DROP AND TAPER DIVERGE

FIGURE 4.4

5. COMPLEX MOTORWAY JUNCTIONS

Introduction

5.1 In this part of the document, signing guidance is provided for a number of complex motorway junction layouts, including junctions which are spaced closely, require counter-intuitive manoeuvres, involve a motorway leading directly to an all-purpose primary route, and forks within motorway interchanges:

Taper Diverge Closely Followed by a Lane Drop on a Motorway (Figure 5.1)

5.2 This layout is equally applicable to an all-purpose road, with the appropriate colour signs being used.

5.3 In this layout the taper diverge is closely followed by a lane drop layout. There is insufficient distance to provide standard signs to the second exit. In these situations, it is recommended that each diverge is marked with a separate junction number, suffix or reference (for example, Junctions 4 and 5 in Figure 5.1). This will enable clearer signing.

5.4 Gantry mounted ADS to diagram 2908.1, showing destinations for both junctions must be provided in advance of the taper diverge. ADS to a variant of diagram 2909, showing destinations for the second junction only, must be provided in advance of the lane drop junction. The lane drop junction has lane specific signs.

5.5 ADS locations shall be measured from the EDP. There are two datum points for this layout. For the taper diverge (J4), the EDP is located at the start of the taper diverge; for the lane drop junction (J5), the EDP is located 200m in advance of the tip of the nose markings for the lane drop.

5.6 Gantry signs should be located:

- 1 mile from the diverge EDP
- 1/2 mile from the diverge EDP
- At the diverge datum point (final ADS)
- 30-50m after the start of the diverge nose markings – this gantry provides the confirmatory sign for the diverge at junction 4 and, in this case, the ⅓ mile ADS for the lane drop at junction 5
- At the lane-drop EDP (final ADS)
- 30-50m after the start of the lane drop nose markings.

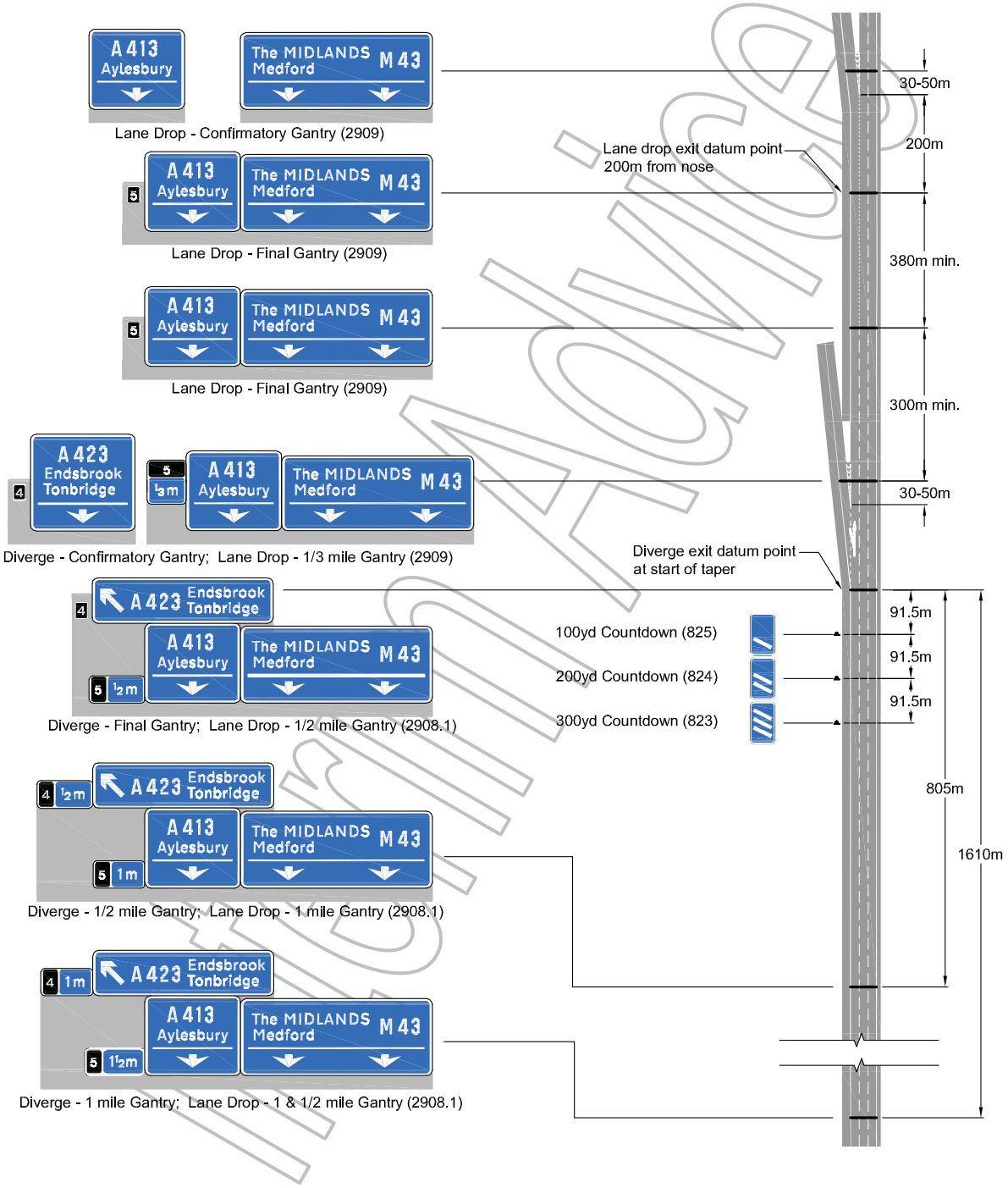
5.7 There is some flexibility on the positioning of gantry signs (see paragraphs 2.9 to 2.12).

5.8 The gantry mounted signs to variants of diagrams 2908.1 and 2909 may have a horizontal line and arrows within the white sign border. These signs will need to be authorised (see paragraph 1.12). Refer to paragraph 2.27 and Figure 2.2 for alternative methods of displaying gantry arrows.

5.9 If the distance between the confirmatory gantry at the diverge and the final gantry for the lane drop exceeds 580m, a 1/4 mile gantry should be included a minimum of 380m in advance of the final lane-drop gantry. This is shown on Figure 5.1. The 1/4 mile sign will need to be Authorised (see paragraph 1.12).

5.10 Verge mounted countdown marker signs to diagrams 823 to 825 shall be provided on the approach to the taper diverge, but shall NOT be provided on the approach to the lane drop exit (**TD 22/06 (DMRB 6.2.1)** [Ref 3] paragraph 5.38).

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



In this layout there is insufficient distance to provide standard signing.
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908. See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

CLOSELY SPACED JUNCTIONS
TAPER DIVERGE CLOSELY
FOLLOWED BYA LANE DROP
ON A MOTORWAY

FIGURE 5.1

Lane Drop Closely Followed by a Taper Diverge on a Motorway (Figures 5.2 and 5.3)

5.11 These layouts are also applicable to all-purpose roads, with the appropriate coloured signs being used. Figure 5.2 shows a layout for a 4-lane motorway; Figure 5.3 for a 3-lane motorway.

5.12 In Figures 5.2 and 5.3, lane drop exits are followed closely by taper diverges. With this layout there is insufficient distance to provide standard signs to the second exit. In these situations, it is recommended that each diverge is marked with a separate junction number, suffix or reference (for example, Junctions 30 and 31 in Figure 5.3). This will enable clearer signing.

5.13 Gantry mounted ADS to a variant of diagram 2909 showing destinations for both junctions should be provided in advance of the lane drop exit. Gantry mounted ADS to a variant of diagram 2908 showing destinations for the second junction only should be provided in advance of the taper diverge exit (illustrated in Figures 5.2 and 5.3).

5.14 ADS locations are always measured from the EDP. There are two datum points for this layout. For the lane drop junctions, the EDPs are located 200m in advance of the tip of the nose markings for the lane drops; for the taper diverges, the EDPs are located at the start of the taper diverge.

5.15 Gantry signs should be located as follows:

- 1 mile from the lane drop EDP
- 1/2 mile from the lane drop EDP
- At the lane drop EDP (final ADS)
- 30-50m after the start of the lane drop nose markings – this gantry provides the confirmatory sign for the lane drop at junction 3 (Figure 5.2) and the first diverge of junction 30 (Figure 5.3), and the ⅓ mile ADS for the diverge at junction 4 (Figure 5.2) and 1/2 mile ADS for the A52 diverge at junction 31 (Figure 5.3)
- At the diverge EDP (final ADS)
- 30-50m after the start of the diverge nose markings.

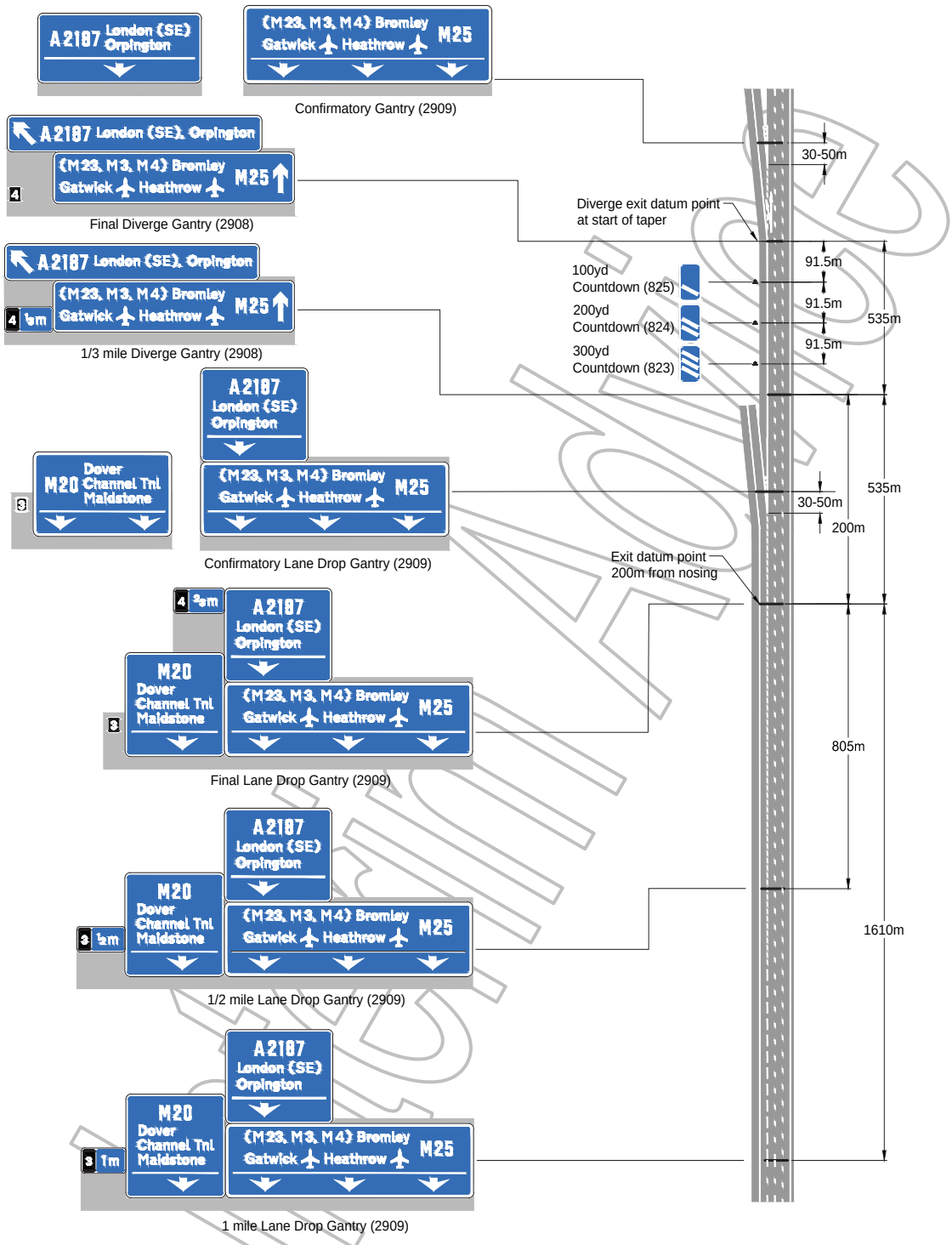
5.16 There is some flexibility on the positioning of gantry signs (see paragraphs 2.9 to 2.12).

5.17 The gantry mounted signs to a variant of diagram 2909 may have a horizontal line and arrows within the white sign border. These signs will need to be authorised (see paragraph 1.12). Refer to paragraph 2.27 and Figure 2.2 for alternative methods of displaying gantry arrows. Owing to the complexity, and volume of destinations required in the layouts in Figure 5.3, the upper tier signs shown in this example could benefit from deletion of the arrows (with Overseeing Organisation approval) described in paragraph 2.29 and Figure 2.3

5.18 If the distance between the confirmatory gantry at the lane drop and the final gantry for the diverge exceeds 580m, a 1/4 or 1/3 mile gantry should be included a minimum of 380m in advance of the final diverge gantry. These signs are shown in Figures 5.2 and 5.3. The 1/4 mile sign will need Authorisation (see paragraph 1.12).

5.19 Verge mounted countdown marker signs to diagrams 823 to 825 shall be provided on the approach to the taper diverge, but shall NOT be provided on the approach to the lane drop exit (**TD 22/06 (DMRB 6.2.1)** paragraph 5.38 [Ref 3]).

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED

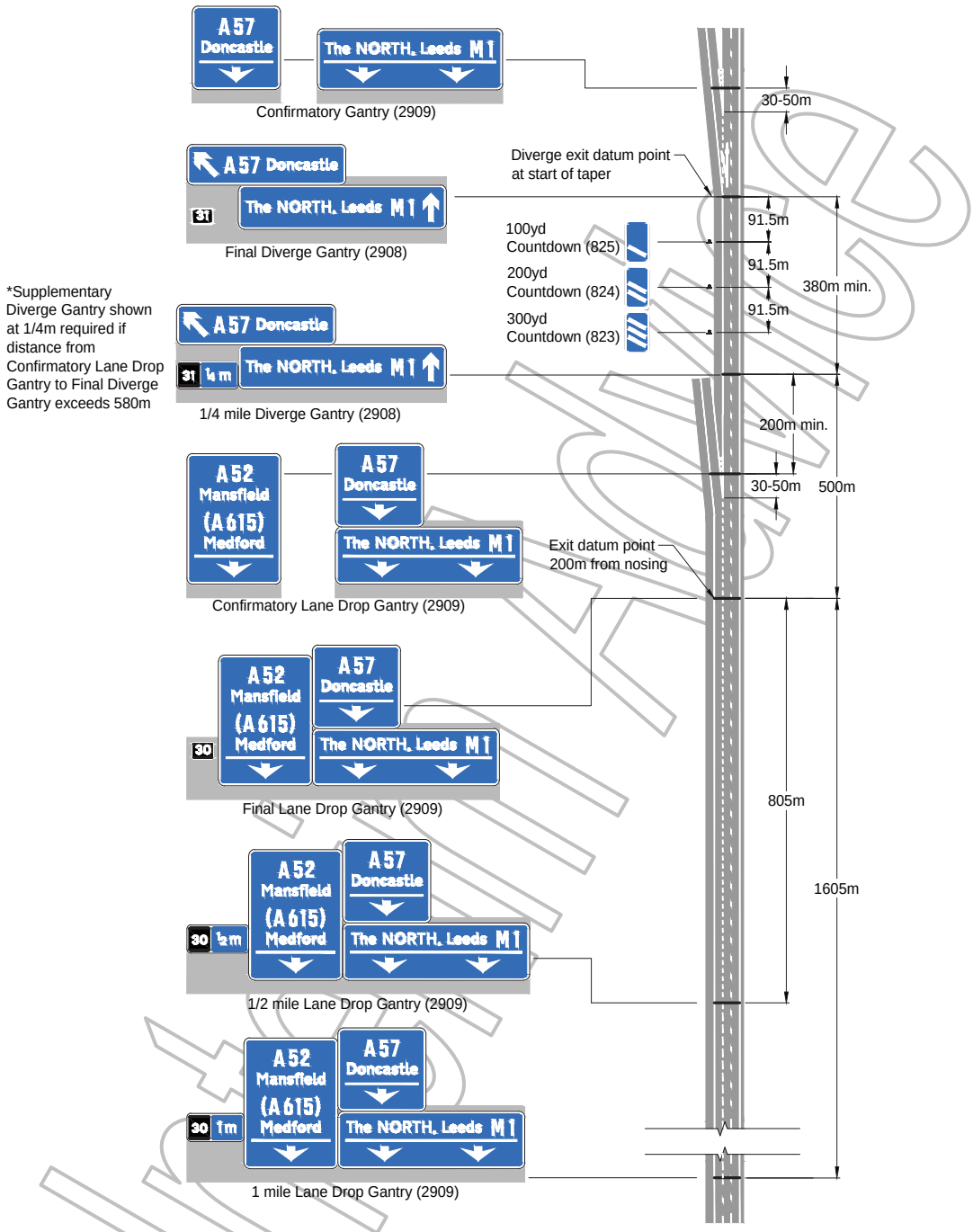


All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details. See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908. See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

CLOSELY SPACED JUNCTIONS
LANE DROP CLOSELY FOLLOWED BY
A TAPER DIVERGE ON A MOTORWAY
(4 LANE MOTORWAY)

FIGURE 5.2

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

CLOSELY SPACED JUNCTIONS
LANE DROP CLOSELY FOLLOWED BY A DIVERGE ON A MOTORWAY
(3 LANE MOTORWAY)

FIGURE 5.3

Taper Diverge Closely Followed by a Taper Diverge on a Motorway (Figure 5.4)

5.20 This layout is equally applicable to an all-purpose road, with the appropriate coloured signs being used. The layout includes the complexities of signing different motorway routes leading to different parts of a city from closely spaced motorway junctions.

5.21 In this layout the taper diverge is closely followed by a second taper diverge, and there is insufficient distance to provide standard signs to the second exit.

5.22 The layout is further complicated by each diverge accessing the same route (M62), but in different directions, and different geographic areas of Manchester being accessed by leaving M6, or continuing to a junction further along the route. The first issue introduces the potential for motorists to follow the route number but in the wrong direction for their destination. The destinations have been set out on the signs carefully, to ensure that both directions of M62 are highlighted.

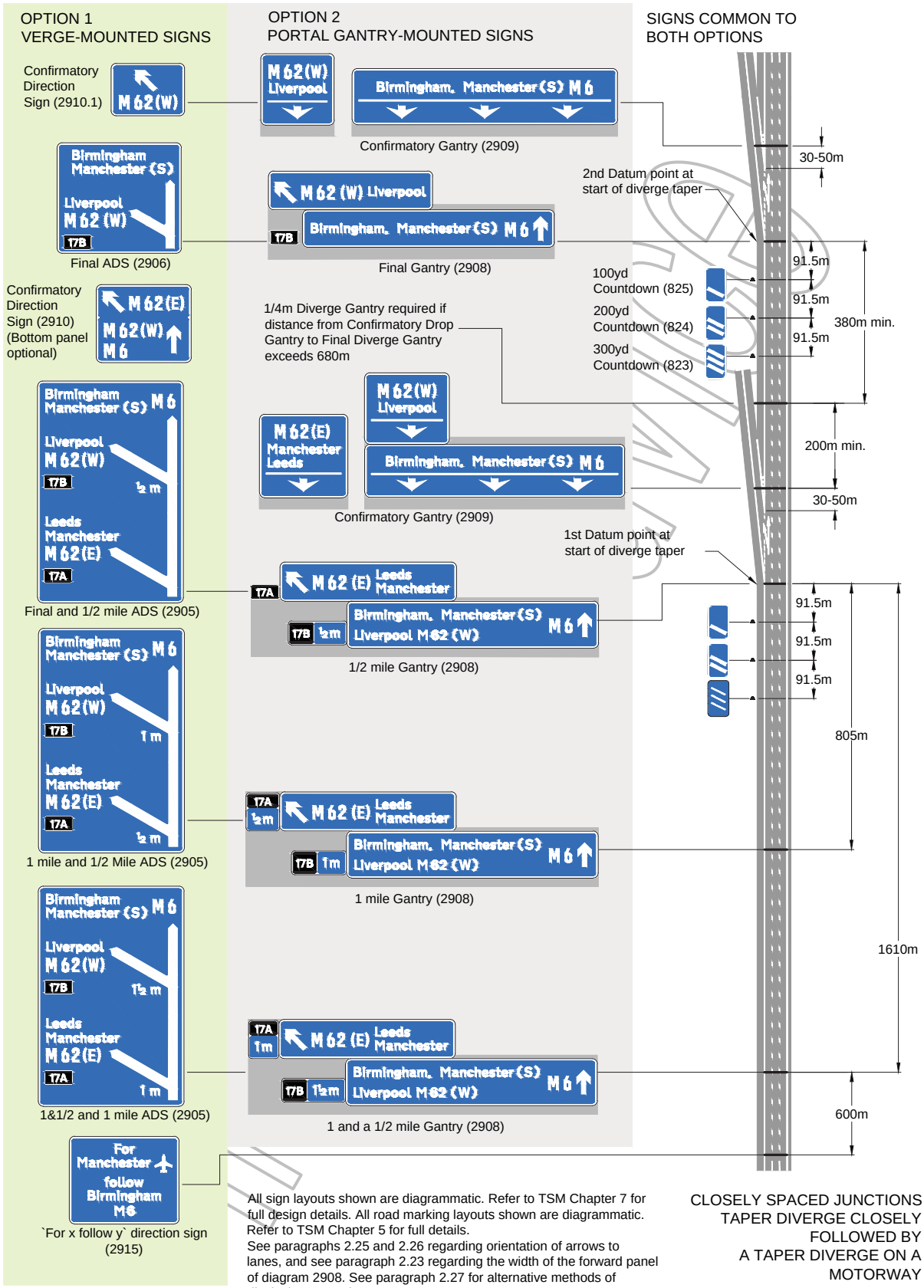
5.23 Gantry mounted ADS to diagram 2908 are provided in advance of the first taper diverge. The confirmatory gantry to the first taper diverge functions also as an ADS for the second taper diverge, using a variant of diagram 2909 to direct traffic wishing to exit at the second taper diverge into Lane 1.

5.24 ADS locations are measured from the EDP; however there are two EDPs for this layout. The first ADS should be positioned relative to the start of the first taper diverge, and the second ADS is located at the start of the taper to the second exit.

5.25 For the first diverge, gantries should be located at the standard distances of 1 mile and 1/2 mile in advance of the EDP and at the EDP itself. These are followed by the confirmatory gantry 30-50 metres after the start of the diverge nose markings – this gantry also provides an ADS for the second diverge by marshalling into Lane 1 traffic that should be signed to the next exit. The verge mounted signs to diagram 2905 include forward destinations on the 1/2 mile and 1 mile ADS, because of the need to show Manchester (S) as a forward destination, whilst Manchester is also an egress destination.

5.26 There is some flexibility on the positioning of signs, see paragraphs 2.9 to 2.12.

5.27 The gantry mounted signs to a variant of diagram 2909 may have a horizontal line and arrows within the white sign border. These signs will need to be Authorised (see paragraph 1.12). Refer to paragraph 2.27 and Figure 2.2 for alternative methods of displaying gantry arrows. The 1/4 mile diverge gantry, if required, will need Authorisation (see paragraph 1.12). Verge mounted countdown marker signs to diagrams 823 to 825 shall be provided on the approach to each taper diverge.



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908. See paragraph 2.27 for alternative methods of displaying gantry lane arrows.
Forward destinations may be shown on the 1 mile and 1/2 mile verge mounted AD signs (see paragraph 3.5).

CLOSELY SPACED JUNCTIONS
TAPER DIVERGE CLOSELY
FOLLOWED BY
A TAPER DIVERGE ON A
MOTORWAY

FIGURE 5.4

Tiger Tail Lane Drop with Counter Intuitive Layout (Three Lane Motorway) (Figure 5.5)

5.28 An example of a counter-intuitive layout is one where the manoeuvre required is not understood readily by motorists approaching the junction. These may be found at existing junctions. In the example shown in Figure 5.5, the counter-intuitive layout requires traffic on the main carriageway of the motorway to leave at the next junction, whilst the all-purpose route traffic on the main carriageway continues ahead.

5.29 Careful consideration should be given to the design. Additional signs should be provided prior to the first ADS, to highlight the fact that the layout is counter-intuitive. Design of the traffic signs needs to be assessed as part of the highway design process. Counter-intuitive layouts should be avoided wherever possible.

5.30 To supplement the standard sign layout two additional verge mounted ADS should be provided. This will alert motorists to the situation prior to them reaching the 1 mile ADS, beyond which they may be required to follow specific lanes to the EDP. Without additional signs to pre-alert motorists to the counter-intuitive layout, lane discipline may be poor.

5.31 There are a number of possible positions for these signs depending on the precise situation encountered at the site. One possibility is to provide two signs:

- 2 miles from the EDP - verge sign to diagram 2915 with the legend “For (Route number) leave at next junction”. Comprehension of this sign may be poor dependent on site circumstances

- 1½ miles from the EDP – verge or gantry ADS as appropriate, similar in design to the 1 mile ADS but showing route numbers only.

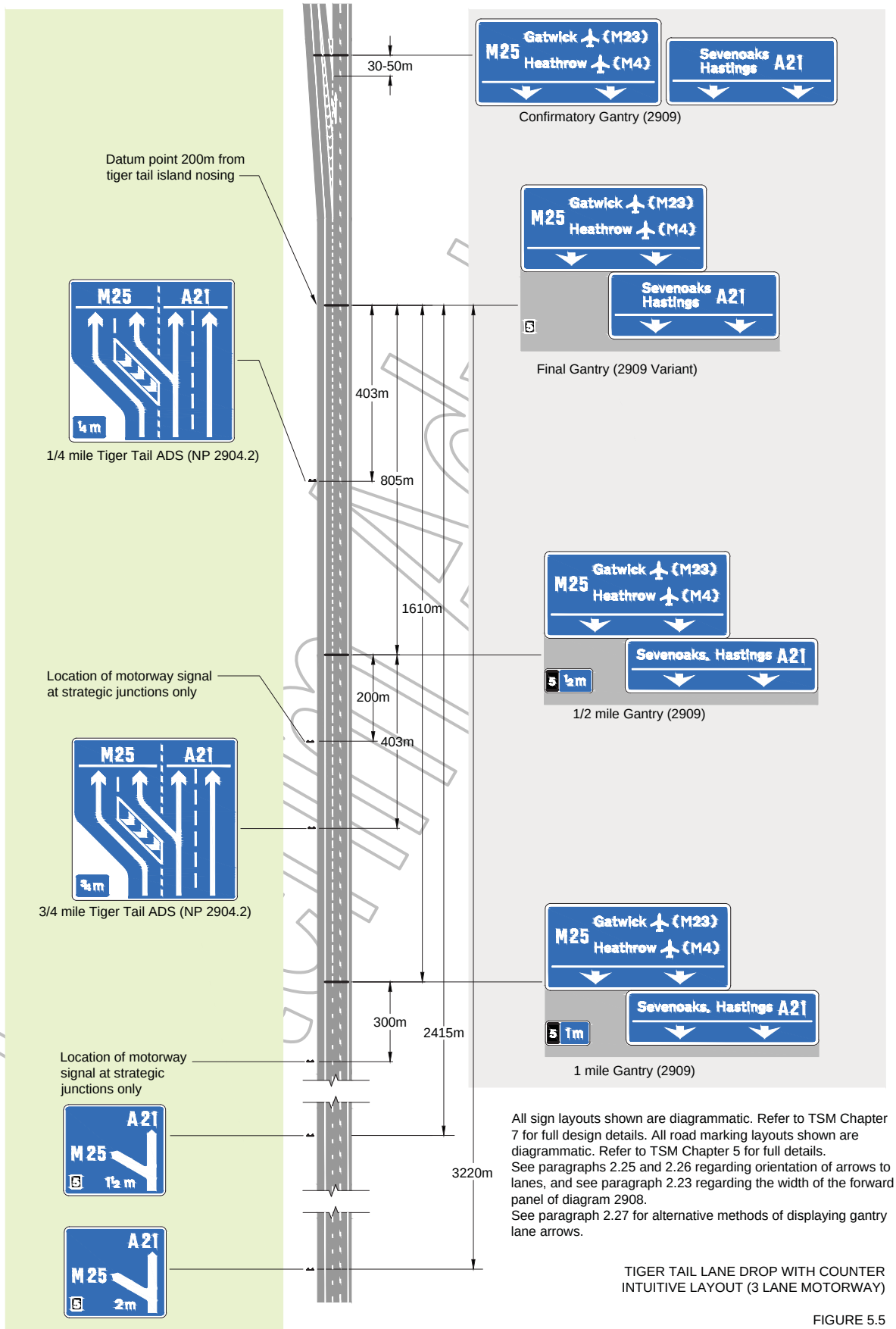
5.32 Alternatively where the choice of routes is clear-cut the option shown in Figure 5.5 is preferred and two signs to diagram 2906 are provided as follows:

- 2 miles from the EDP – verge or gantry ADS as appropriate, similar in design to the 1 mile ADS but showing route numbers only

- 1½ miles from the EDP – verge or gantry ADS as appropriate, similar in design to the 1 mile ADS but showing route numbers only.

5.33 Further advice on distance tolerances of sign positions is given in paragraphs 2.9 to 2.12. Signing proposals prepared for counter intuitive layouts should be discussed with the Overseeing Organisation at an early stage.

BOTH VERGE AND GANTRY-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
See paragraphs 2.25 and 2.26 regarding orientation of arrows to lanes, and see paragraph 2.23 regarding the width of the forward panel of diagram 2908.
See paragraph 2.27 for alternative methods of displaying gantry lane arrows.

TIGER TAIL LANE DROP WITH COUNTER INTUITIVE LAYOUT (3 LANE MOTORWAY)

FIGURE 5.5

Motorway Leading Directly to a Primary Route (Figure 5.6)

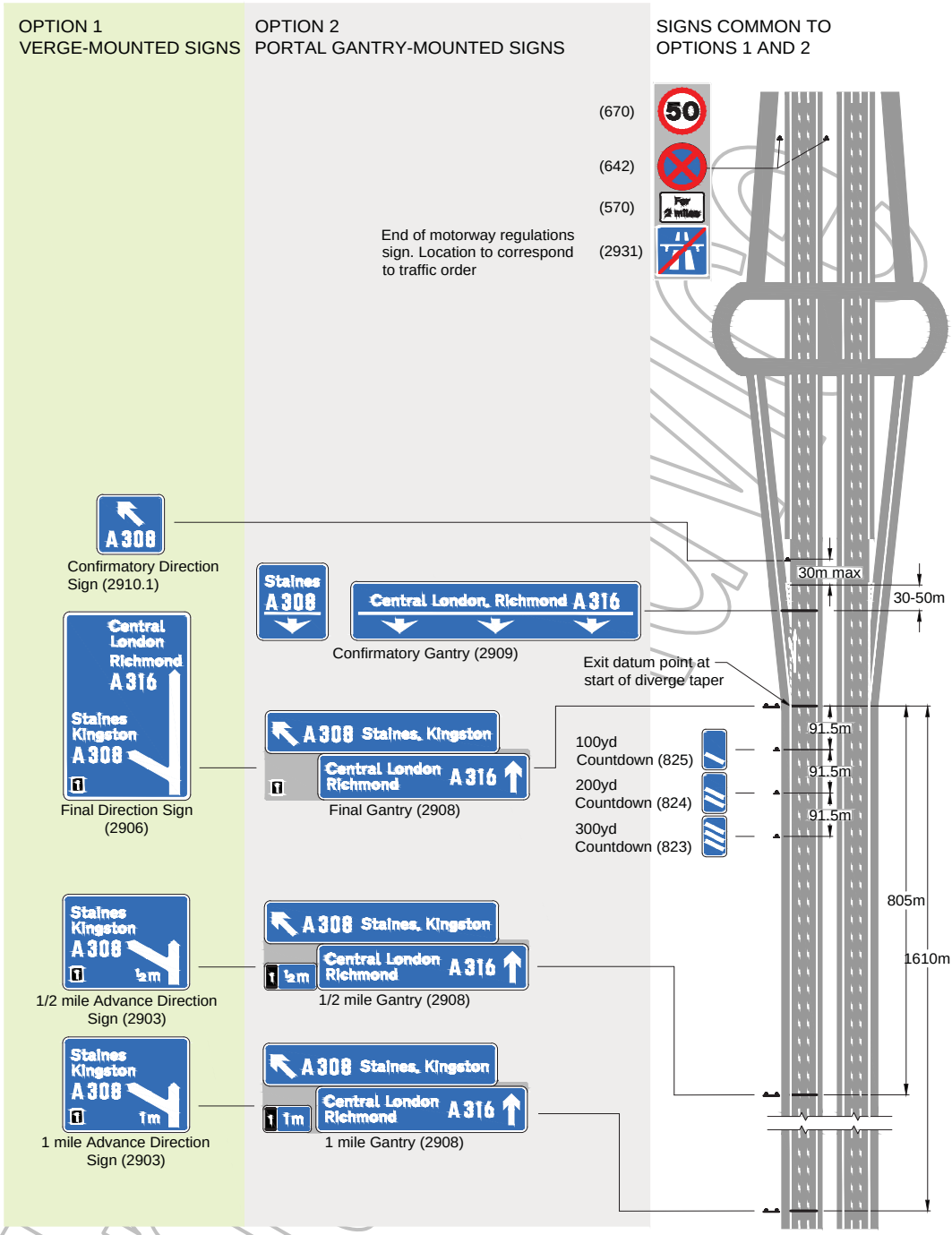
5.34 A motorway can lead directly to a primary route on the mainline. The Motorway Regulations cease to apply and the signing type changes from motorway signing to primary route signing. This can occur at any type of motorway junction. The signing layout for the ADS, diversion route signs, supplementary signs and countdown marker signs will depend on the approach layout of the junction. Refer to previous Figures in **IAN 144/15** for guidance on the different types of junction layout. The example in Figure 5.6 is for a taper diverge layout, also shown in Figure 3.4.

5.35 In this layout either verge or gantry mounted ADS should be provided as shown in Options 1 and 2 in Figure 5.6. Gantry mounted signs shall be used where the location meets the criteria in **TD 18/85 (DMRB 9.1.2)** [Ref 17]. Where gantries are provided, the 1/2 mile ADS and the final ADS must be gantry mounted while the 1 mile ADS would also be gantry mounted normally. It is not acceptable to use a gantry mounted ADS followed by a verge mounted ADS although the confirmatory sign can be verge mounted if no signal gantry is provided.

5.36 The Motorway Regulations cease to apply downstream of the junction. Signs located upstream of this point shall be of the blue background motorway type as defined in **TSRGD** Schedule 7 Part X [Ref 6]. Signing downstream following the end of the Motorway Regulations should be of the green (or white) background type dependent on the status of route. Green or white panels on the blue background motorway signs in advance of the change of status of the route should not be used.

5.37 The point at which the Motorway Regulations cease to apply usually occurs immediately prior to the start of the on-slip. This point is defined in the Special Road Order for the scheme. At, or as close as possible to this location, a pair of signs to diagram 2931 must be provided, one on the central reservation and one on the nearside verge. If there is insufficient space on the central reservation, an 'End of Motorway' sign to diagram 2930 should be provided either 1/2 mile or 1 mile in advance of the end of the Regulation. Advance signs to diagram 2930 may also be used if the character of the road ahead changes significantly or the designer feels that visibility of the signs may be obstructed.

5.38 The 'End of Motorway' signs located where the Motorway Regulations end, and the clearway and speed limit signs for the all-purpose route may be co-located on the same sign assembly. The example in Figure 5.6 shows the stacking order for these signs.



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.
Forward destinations may be shown on the 1 mile and 1/2 mile verge mounted AD signs.

MOTORWAY LEADING DIRECTLY TO A PRIMARY ROUTE

FIGURE 5.6

Diverges Within Motorway Interchanges - Single Lane Fork (Figure 5.7)

5.39 A single lane fork usually occurs within an interchange link, where a single lane tapers out and diverges into two single lane links. A standard junction layout is shown in Figure 4/6 **TD 22/06 (DMRB 6.2.1)** [Ref 3].

5.40 Verge mounted advanced direction signs to a variant of diagram 2913.2 as shown in Figure 5.7, with an arrow angle of 22 ½ °, should be provided in advance of the fork and at the EDP. These signs will need to be Authorised.

5.41 ADS locations are measured always from the EDP. This is located 75m in advance of the tip of the nose markings, at the start of the diverge taper, in this layout. The ADS shall be located as follows:

- A minimum distance of 200m from the junction EDP, depending on the layout of the interchange and the distance from the previous junction
- At the EDP (final ADS).

5.42 There is some flexibility on the positioning of signs. ADS distances may be varied (see paragraphs 2.9 to 2.12). If it is necessary to relocate the final direction sign, the minimum distance of 200m between the first ADS and final ADS must be maintained. It will therefore be necessary to relocate the first ADS accordingly. The final direction sign must not be located more than 100m in advance of the EDP.

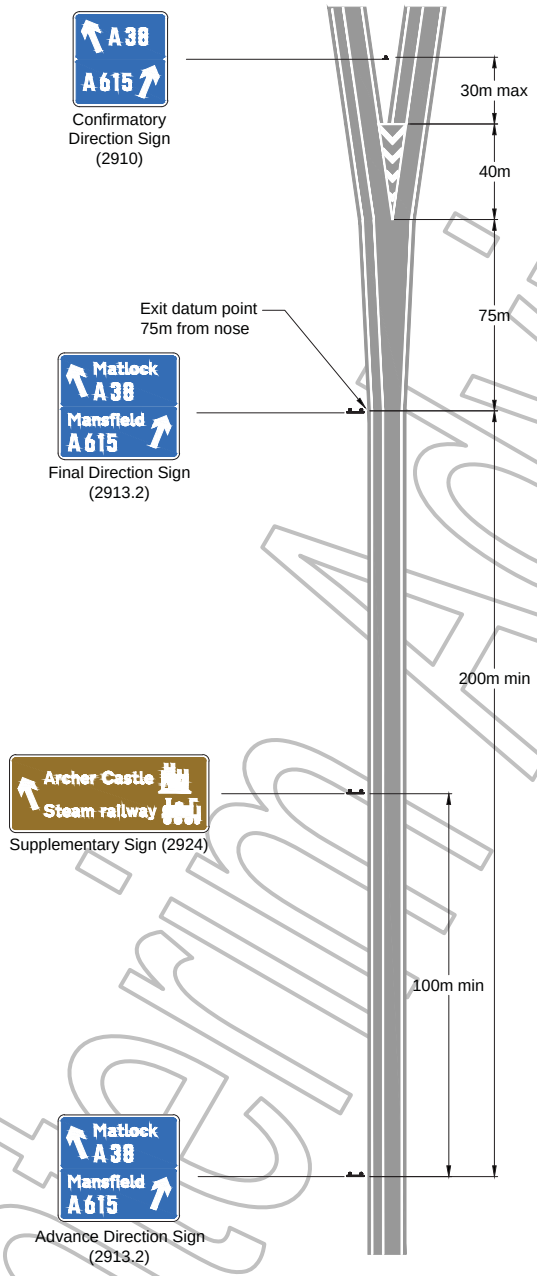
5.43 Where diversion route signs have been included upstream of the first ADS, the appropriate diversion symbol shall be included on the sign faces on this layout.

5.44 Where space is constrained, supplementary signs are not recommended. However, each site must be assessed on its own merit and one supplementary sign may be provided downstream of the first ADS, centrally positioned between the first ADS and final direction sign, ensuring siting distances comply with Figure 3.6a / Figure 3.6b. If supplementary signs are required but cannot be accommodated between the first ADS and final ADS, a “for x follow y” sign to diagram 2915 should be sited at a suitable location upstream of the first ADS.

5.45 Countdown marker signs (diagrams 823 to 825) shall NOT be provided with this type of layout (**TD 22/06 (DMRB 6.2.1)** paragraph 5.38 [Ref 3]).

5.46 A verge mounted confirmatory direction sign to diagram 2910 or 2910.1 should be positioned at a point no greater than 30m beyond the physical nose.

ONLY VERGE-MOUNTED SIGNS TO BE PROVIDED



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

SINGLE LANE FORK WITHIN A MOTORWAY INTERCHANGE

FIGURE 5.7

Diverges Within Motorway Interchanges - Two Lane Fork (Figure 5.8)

5.47 Two lane forks usually occur within an interchange link, where two lanes of traffic taper out and fork into two separate two-lane carriageways. A standard junction layout is shown in Figure 4/6 - **TD 22/06 (DMRB 6.2.1)** [Ref 3].

5.48 Either verge or gantry mounted advanced direction signs (ADS) should be provided as shown in Figure 5.8. Gantry mounted signs should be used where the location meets the criteria in **TD 18/85 (DMRB 9.1.2)** [Ref 17].

5.49 ADS locations are always measured from the EDP, which is located 90m in advance of the tip of the nose markings in this layout. The direction signs should be located as follows:

- At least 400m from the EDP, depending on the layout of the interchange and the distance from the previous junction
- At the EDP (final ADS).

5.50 There is some flexibility on the positioning of signs. ADS distances may be varied (see paragraphs 2.9 to 2.12). If it is necessary to relocate the final direction sign, the minimum distance of 400m between the first ADS and final direction sign must be maintained. It will therefore be necessary to relocate the first ADS accordingly. The final ADS must not be located more than 100m in advance of the EDP.

5.51 The verge mounted sign to a variant of diagram 2904.1 should have a solid line around the chevron to mirror the nose carriageway markings, and the gantry mounted signs to a variant of diagram 2909 may have a horizontal line and arrows within the white sign border. These signs will need to be Authorised.

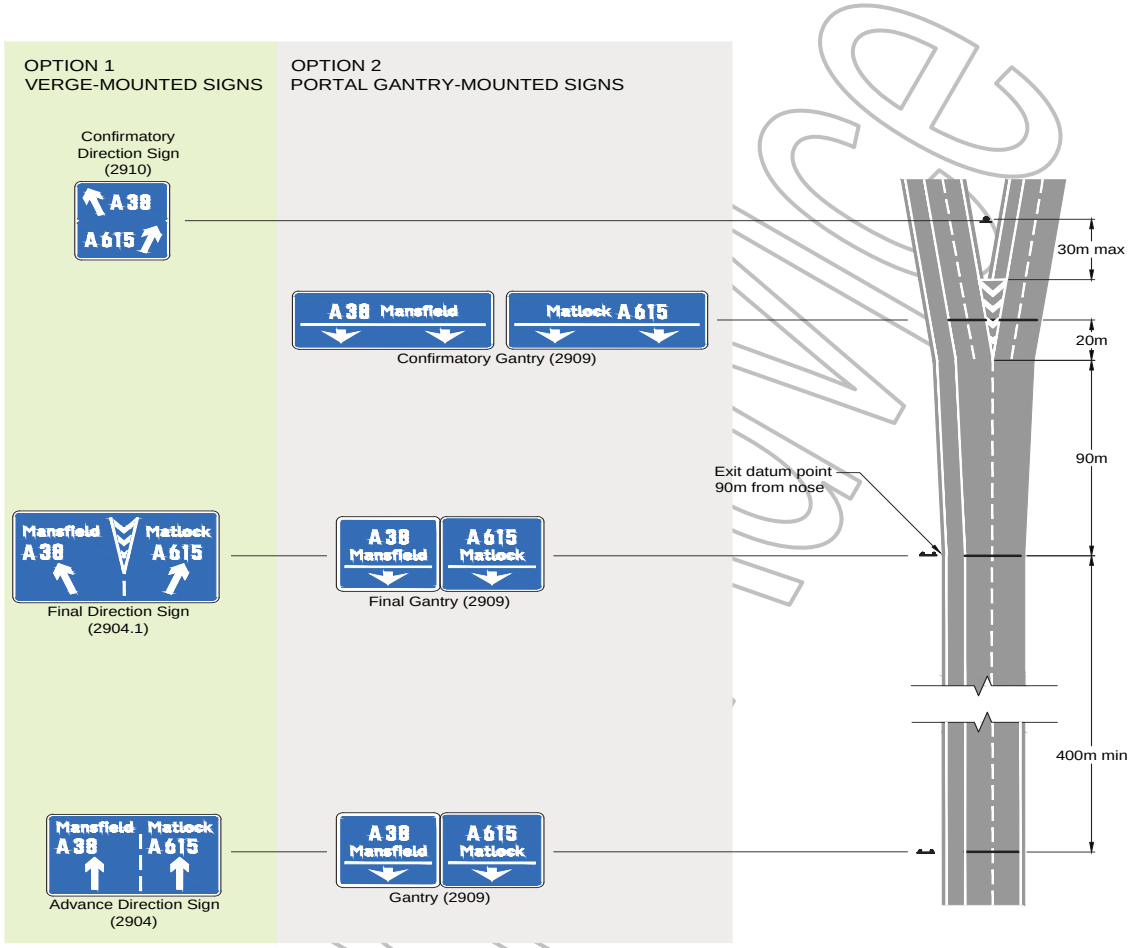
5.52 Where diversion route signs have been included upstream of the first ADS, the appropriate diversion symbol should be included on the sign faces on this layout.

5.53 Where space is constrained, supplementary signs are not recommended. However, each site must be assessed on its own merit and one supplementary sign may be provided downstream of the first ADS, centrally positioned between the first ADS and final direction sign. If supplementary signs are required but cannot be accommodated between the first ADS and final direction sign, a continuity sign to diagram 2915 (‘For X follow Y’) should be sited at a suitable location upstream of the first ADS.

5.54 Countdown marker signs (diagrams 823 to 825) shall NOT be provided with this type of layout. (**TD 22/06 (DMRB 6.2.1)** paragraph 5.38 [Ref 3]).

5.55 Where verge mounted signs are used on the approach to the junction, a confirmatory direction sign to diagram 2910 or 2910.1 should be positioned at a point no greater than 30m beyond the nose markings.

5.56 Where gantry mounted signs are used on the approach to the junction, a confirmatory direction sign to a variant of diagram 2909 should be provided at a point 20m after the start of the nose markings, with a horizontal line and arrows within the white sign border. This sign will need to be authorised.



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts ashown sre diagrammatic. Refer to TSM Chapter 5 for full details.

TWO LANE FORK WITHIN A
MOTORWAY INTERCHANGE

FIGURE 5.8

6. ALL-PURPOSE ROADS WITH MOTORWAY INTERFACES

Taper Diverge on an All-Purpose Road with a Motorway Ahead (Figure 6.1)

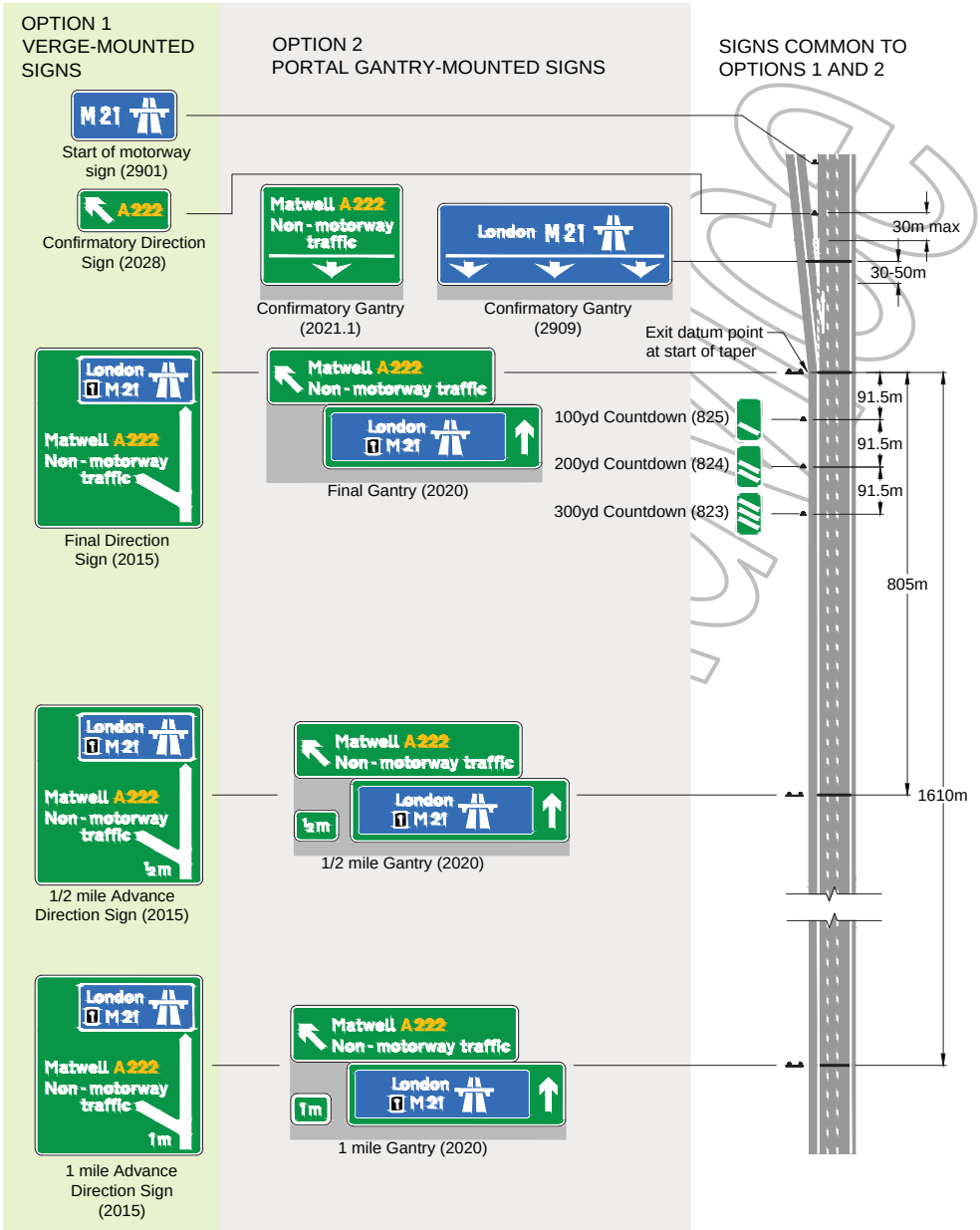
6.1 An all-purpose road can lead directly to a motorway with the all-purpose road leaving the mainline at a taper diverge layout.

6.2 Either verge or gantry mounted ADS should be provided as shown in Options 1 and 2 of Figure 6.1. Gantry mounted signs shall be used where the location meets the required criteria. (See **TD 18/85 (DMRB 9.1.2)** [Ref 17] for advice on when gantries should be provided)

6.3 All ADS should include blue motorway panels, incorporating the motorway symbol, on a green background for the ahead direction. The confirmatory gantry at the start of the motorway route ahead should have a blue background.

6.4 The destination 'Non-motorway traffic' should be added to all directional signs showing non-motorway routes at the junction. Where including this destination would overload the sign, separate verge mounted signs should be provided with the 'Non-motorway traffic' destination.

6.5 A 'start of motorway' sign to diagram 2901 sign must be provided at the earliest opportunity after the commencement of Motorway Regulations. This sign denotes the start of the area covered by Motorway Regulations and must be provided in addition to the motorway symbol and blue background sign on the confirmatory gantry or final ADS (**TSRGD** [Ref 6]).



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

TAPER DIVERGE ON AN ALL-PURPOSE ROAD WITH A MOTORWAY AHEAD

FIGURE 6.1

Lane Drop on an All-Purpose Road with a Motorway Ahead (Figure 6.2)

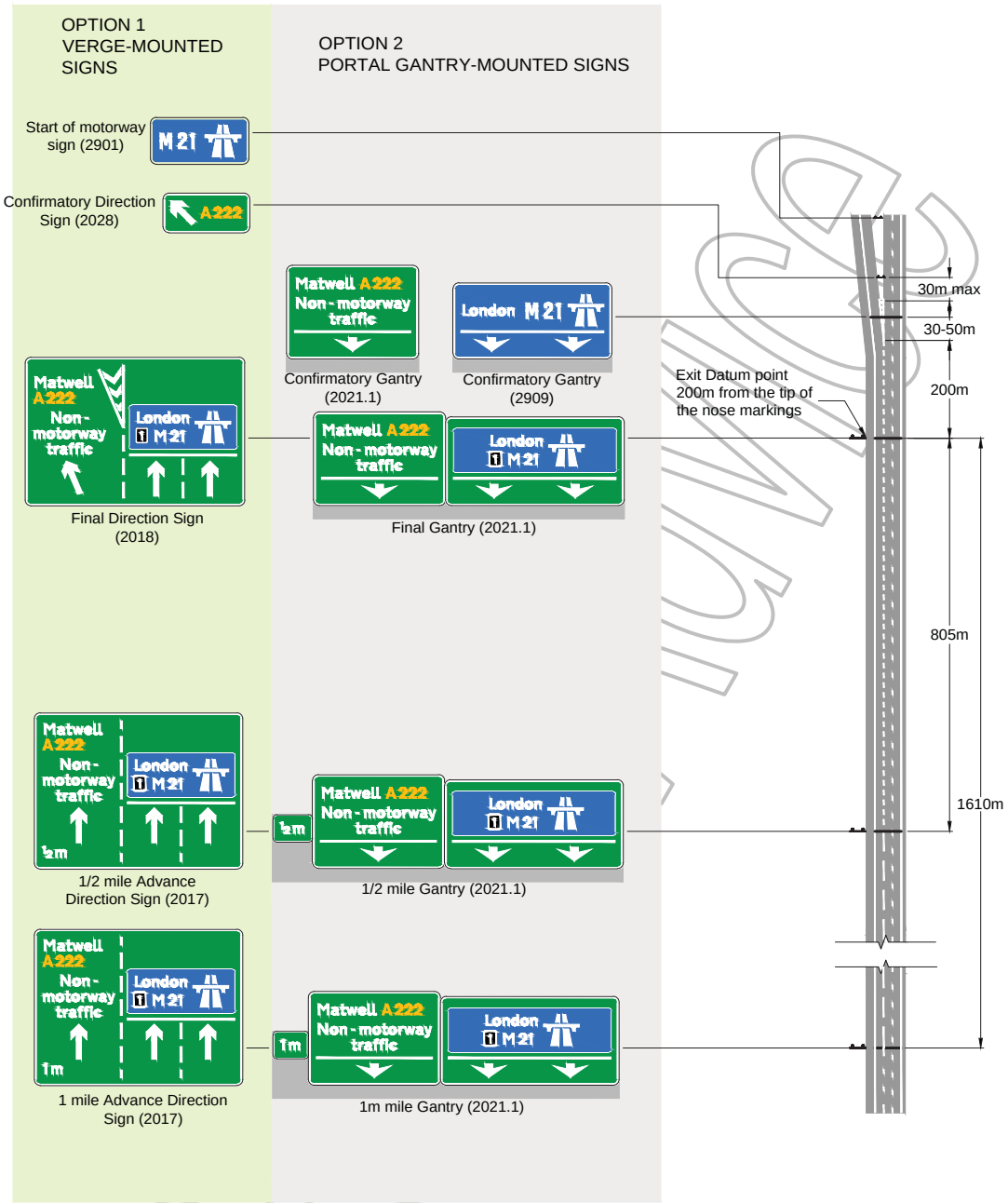
6.6 An all-purpose road can lead directly to a motorway with the all-purpose road leaving the mainline at a lane drop layout. The through lanes are divided from the diverging lanes with markings to diagram 1010 between the nose and the 1/2 mile gantry, and diagram 1004.1 (1004) between the 1/2 mile and 1 mile gantry.

6.7 Either verge or gantry mounted ADS should be provided as shown in Options 1 and 2 in Figure 6.2. Gantry mounted signs shall be used where the location meets the required criteria (See **TD 18/85 (DMRB 9.1.2)** [Ref 17] for advice on when gantries should be provided).

6.8 All verge mounted ADS to diagrams 2017 and 2018 should include blue motorway panels, incorporating the motorway symbol, on a green background for the ahead direction. All gantry mounted signs to a variant of diagram 2021.1should have the motorway destination incorporating motorway symbol on a blue panel on a green background, with a horizontal line and arrows within the white sign border. The gantry mounted confirmatory direction sign leading directly to the motorway (diagram 2909 variant), shown in Figure 6.2, is not prescribed for use in combination with signs to diagram 2021.1 and requires Authorisation in accordance with paragraph 1.12. The variant of diagram 2909 with arrows within the sign face will be authorised on Highways England roads if the signs otherwise meet the design requirements in **TSM Chapter 7** [Ref 2]. Check with the overseeing organisation that location specific or national authorisations are in place before specifying.

6.9 The destination ‘Non-motorway traffic’ should be added to all directional signs showing non-motorway routes at the junction. Where including this destination would overload the sign, separate verge mounted signs should be provided with the ‘Non-motorway traffic’ destination.

6.10 A ‘start of motorway’ sign to diagram 2901 sign must be provided at the earliest opportunity after the commencement of Motorway Regulations. This sign denotes the start of the area covered by Motorway Regulations and must be provided in addition to the motorway symbol and blue background sign on the confirmatory gantry or final ADS (**TSRGD** [Ref 6]).



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

LANE DROP ON AN ALL-PURPOSE ROAD WITH A MOTORWAY AHEAD

FIGURE 6.2

All-Purpose Road Junction with a Motorway on the Slip Road

Introduction

6.11 A motorway can commence on the slip road of an all-purpose road at a diverge junction.

6.12 Either verge or gantry mounted ADS should be provided as shown in options 1 (verge mounted) and 2 (gantry mounted). Gantry mounted signs shall be used where the location meets the required criteria. (See **TD 18/85 (DMRB 9.1.2)** [Ref 17] for advice on when gantries should be provided).

6.13 There is some flexibility on the positioning of signs. ADS distances may be varied (see paragraphs 2.9 to 2.12).

6.14 The destination 'Non-Motorway Traffic' should be added to all directional signs showing non motorway routes at the junction. Where including this destination would overload the sign, separate verge mounted signs should be provided with the 'non motorway traffic' destination.

6.15 A 'start of motorway' sign to diagram 2901 sign must be provided at the earliest opportunity after the commencement of Motorway Regulations. This sign denotes the start of the area covered by Motorway Regulations and must be provided in addition to the motorway symbol and blue background sign on the confirmatory gantry or final ADS (**TSRGD** [Ref 3]).

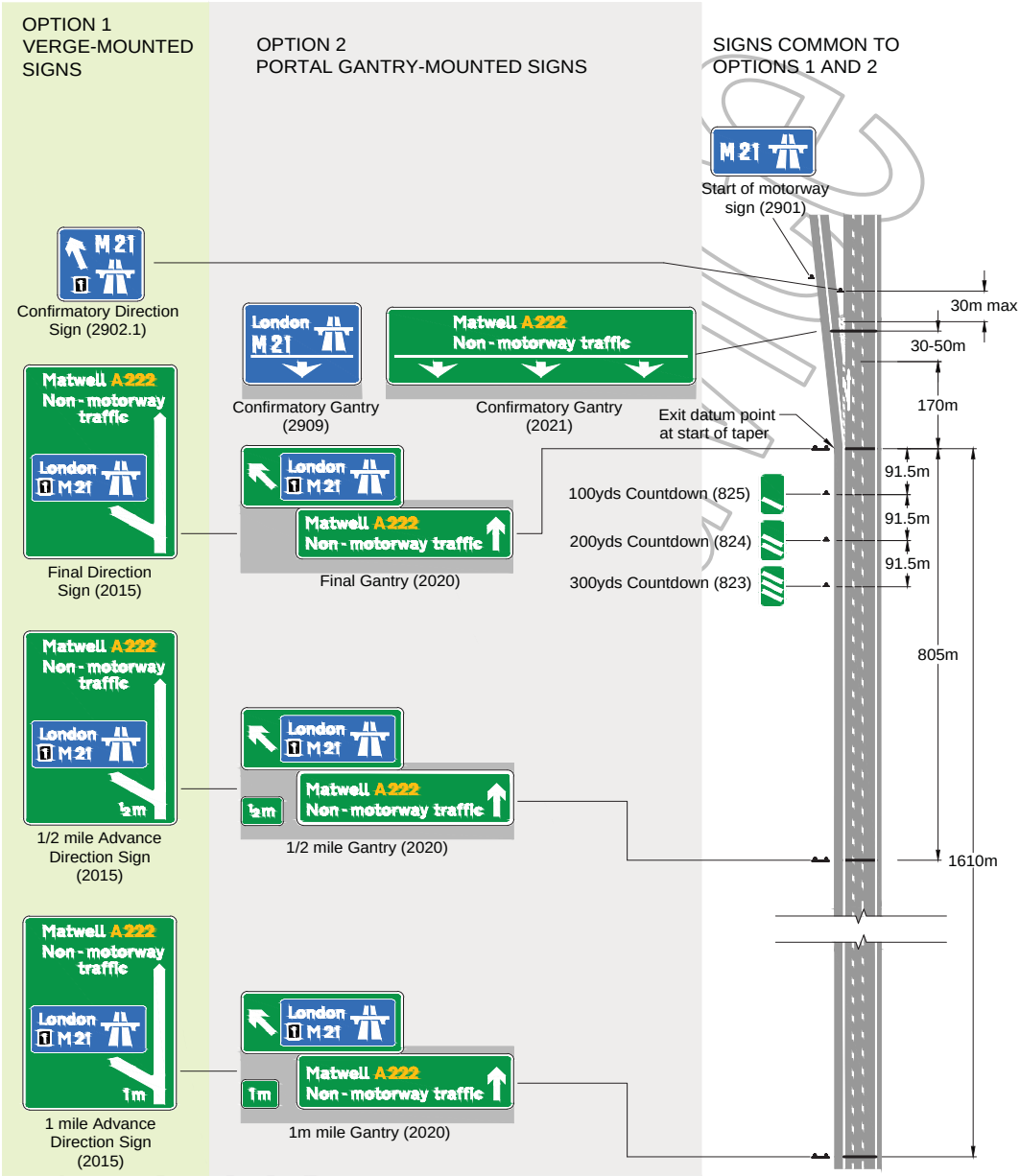
Taper Diverge on an All-Purpose Road with a Motorway on the Slip Road (Figure 6.3)

6.16 All ADS should include blue motorway panels incorporating the motorway symbol on a green background for the diverging traffic. The confirmatory gantry at the start of the motorway route ahead should have a blue background.

6.17 Gantry mounted signs to a variant of diagram 2020 and 2021 should have the motorway destination incorporating motorway symbol on a blue panel on a green background, with a horizontal line and arrows within the white sign border. The gantry mounted confirmatory direction sign leading directly to the motorway (diagram 2909 variant), shown in Figure 6.3, is not prescribed for use in combination with signs to diagram 2021 and requires Authorisation in accordance with paragraph 1.12. The variant of diagram 2909 with arrows within the sign face will be authorised on Highways England roads if the signs otherwise meet the design requirements in **TSM Chapter 7** [Ref 2].

6.18 Verge mounted countdown marker signs to diagrams 823 to 825 shall be provided on the approach to the taper diverge (**TD 22/06 (DMRB 6.2.1)** [Ref 3] paragraph 5.38).

6.19 Where gantry mounted signs are used on the approach to the junction, a confirmatory direction sign to a variant of diagram 2021 should be provided with a horizontal line and arrows within the white sign border.



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic.Refer to TSM Chapter 5 for full details.

TAPER DIVERGE ON AN ALL-PURPOSE ROAD
WITH A MOTORWAY ON THE SLIP ROAD

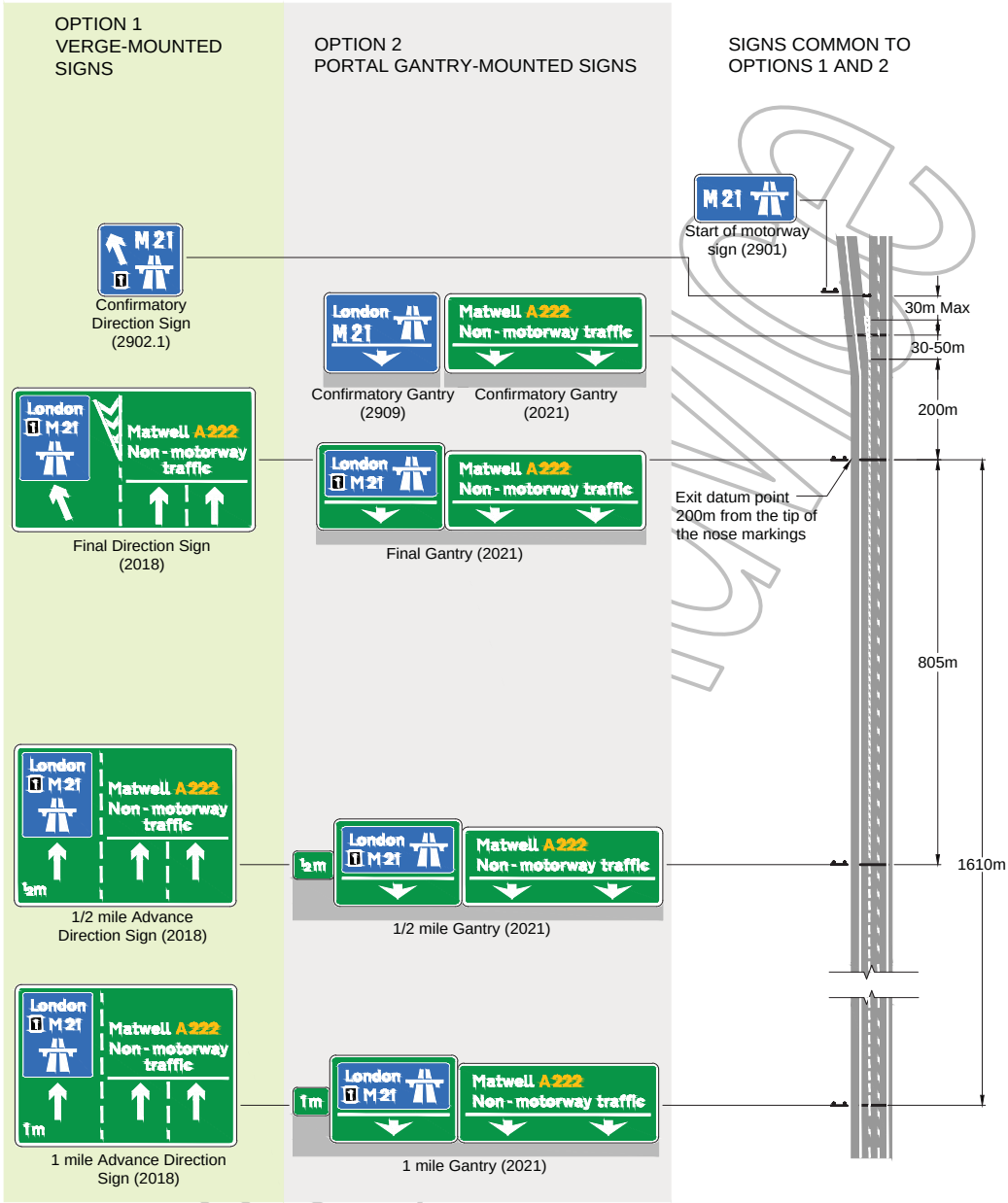
FIGURE 6.3

Lane Drop on an All-Purpose Road with a Motorway on the Lane Drop (Figure 6.4)

6.20 All verge mounted ADS to diagram 2018 should include blue motorway panels, incorporating the motorway symbol, within the green background sign for the lane drop direction. All gantry mounted signs to a variant of diagram 2021 have the motorway destination on a blue panel incorporating the motorway symbol, on a green background, with a horizontal line and arrows within the white sign border. The gantry mounted confirmatory direction sign leading directly to the motorway (diagram 2909 variant), shown in Figure 6.4, is not prescribed for use in combination with signs to diagram 2021 and requires authorisation in accordance with paragraph 1.12. The variant of diagram 2909 with arrows within the sign face will be authorised on Highways England roads if the signs otherwise meet the design requirements in **TSM Chapter 7** [Ref 2].

6.21 Countdown marker signs (diagrams 825 to 825) shall NOT be provided at lane drop layouts (**TD 22/06 (DMRB 6.2.1)** [Ref 3] paragraph 5.38).

6.22 Where gantry mounted signs are used on the approach to a junction, a confirmatory direction sign to a variant of diagram 2021 should be provided at a point 30-50m after the start of nose markings, with a horizontal line and arrows within the white sign border.



All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details. All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

LANE DROP ON AN ALL-PURPOSE ROAD
WITH A MOTORWAY ON THE LANE DROP

FIGURE 6.4

7. MERGES WITH LANE GAIN

Introduction

7.1 The guidance in this section of **IAN 144/15** deals with lane gain layouts at grade separated junction merges and is cross-referenced to the corresponding layouts in **TD 22/06 (DMRB 6.2.1)** [Ref 3]. This guidance replaces all elements of **TA 58/92 (DMRB 8.2.1)** [Ref 23] relating to permanent signing of lane gains.

7.2 The situation where lanes are gained is not as straightforward as a standard merge. Additional signs should be provided at these locations to ensure that drivers understand the road layout, to prepare them for the traffic movements they are likely to encounter and manoeuvres they will have to make.

7.3 The signs required are illustrated in the **TSRGD** [Ref 6], at diagrams 868 and 868.1 for primary routes and 873, 874, 875 and 876 for motorways. The advice in this section covers both motorways and primary routes. For simplification all examples given (Figures 7.1 to 7.3) are for primary routes.

7.4 This document does not cover the justification of the construction of a lane gain/ lane drop provision. For guidance on such matters reference should be made to **TD 22/06 (DMRB 6.2.1)** [Ref 3].

7.5 Siting distances in this guidance should be regarded as applicable in ideal situations. They may need to be varied to suit particular circumstances, for example, to accommodate the location of other signs.

7.6 **TSM Chapter 5** [Ref 7] paragraphs 10.8 to 10.12 gives information on road marking layouts for lane gains.

Single Lane Merge with Lane Gain (Figure 7.1) based on TD 22/06 (DMRB 6.2.1) Figure 2/4-3E [Ref 3].

7.7 When a lane is gained at a junction there are two major objectives in providing signs:

- To ensure that joining traffic proceeds ahead in the additional lane without impeding the flow of traffic on the main carriageway
- To alert drivers on the main carriageway that fast moving traffic may appear suddenly on their left-hand side in a parallel and additional traffic lane.

7.8 Signs to diagram 868 (showing the number of lanes to be gained) should be placed on the main carriageway and sited on the left hand side to indicate to through traffic the number of lanes added to the through carriageway on the left hand side. These signs should be sited 50 metres and 295-355 metres in advance of the back of the merge nose.

7.9 Signs to diagram 868.1 (showing the number of lanes to be gained), should be placed on the joining carriageway to indicate to joining traffic the number of lanes available for that traffic when it reaches the main carriageway. Signs showing a single lane gain should be sited on the left hand side only but signs showing two or more lanes gained should be sited on each side of the joining carriageway. These signs should be sited 50 metres and 160-230 metres in advance of the back of the merge nose.

7.10 To reinforce the lane gain message conveyed by the signs, all road markings to diagram 1005.1 on the slip road and main carriageway should be replaced by markings to diagram 1004.1 (1004 where the speed limit is 40 mph or less) for a distance commencing at least 200 metres upstream of the merge nose tip and continuing for at least 200 metres beyond the tip.

7.11 Straight ahead arrows to diagram 1038 should be placed on the joining (additional) lane (s) and on the original left lane of the main carriageway just beyond the merge nose tip.

7.12 The layout of signs should be provided as shown in Figure 7.1.

7.13 **TSM Chapter 5** [Ref 7], Figure 10-3 gives details of the road markings required for a double lane gain.

7.14 Where a two lane entry slip road joins the main carriageway but there is only one additional main carriageway lane available, there are three methods available to allow traffic to merge into the additional lane. Refer to methods A, B and C below.

A) Preliminary Merge in Advance of the Merge with the Main Carriageway (Figure 7.2) (based on **TD 22/06 (DMRB 6.2.1),** Figure 2/4.3 E and Figure 2/4.2 D [Ref 3])**.**

7.15 In this case, signs to diagram 872.1 should be provided, with background colour appropriate to the status of the road on which they are placed, to indicate to joining traffic that one slip lane is discontinued. These signs should be sited at each side of the joining carriageway and located in accordance with **TSM Chapter 4** [Ref 20], paragraphs 4.6, 4.7 and 4.8. (This would be at 270 metres and 135 metres in advance of the start of the taper for an 85%ile speed of 51 – 60 mph) Road markings should be in accordance with **TSM Chapter 5** [Ref 7], paragraph 10.10 (i) and as illustrated in Figure 10-4.

7.16 In addition a single sign to diagram 868.1 should be located on the nearside 50 metres upstream of the tip of the nose, and signs to diagram 868 should be located on the main carriageway 50 metres and 295-355 metres in advance of the back of the merge nose to indicate to through traffic that one lane will be added.

7.17 To reinforce the message conveyed by the signs, all road markings to diagram 1005.1 on the main carriageway should be replaced by markings to diagram 1004.1 from at least 200 metres upstream of the merge nose tip, and continued for at least 200 metres downstream of the merge nose tip or to the termination of the merge taper, whichever is the greater.

7.18 Straight ahead arrows to diagram 1038 should be placed on the joining (additional) lane, the original left lane of the main carriageway adjacent to the merge nose tip, and immediately beyond the termination of the furthermost merge taper to indicate straight ahead movement.

B) Lane Gain created by Left Lane of Slip Road – Right Lane of Slip Road Merges with Main Carriageway (Figure 7.3) (based on **TD 22/06 (DMRB 6.2.1)**, Figure 2/4.4 F – Option 1 – PREFERRED [Ref 3])

7.19 This is an alternative to the arrangement described in A (above), where the right lane of the slip road merges with the through carriageway, and the left lane of the slip road forms the lane gain on the main carriageway (Figure 7.3, based on **TD 22/06 (DMRB 6.2.1)** [Ref 3], Figure 2/4.4 F, Option 1).

7.20 Signs to diagram 874 should be used to indicate to joining traffic that the left hand slip lane is continuous and the right hand slip lane concedes priority to the main carriageway. Signs to diagram 874 should be sited on both sides of the joining carriageway 160 - 233 metres in advance of the back of the merge nose. A sign to diagram 868.1 should be sited on the left hand side of the position of the merge nose tip. Road markings should be in accordance with **TSM Chapter 5** [Ref 7], paragraph 10.10 (ii) and as illustrated in Figure 10-5.

7.21 Signs to diagram 873 should be sited on the left hand side of the main carriageway 50 metres and 295-355 metres in advance of the back of the merge nose.

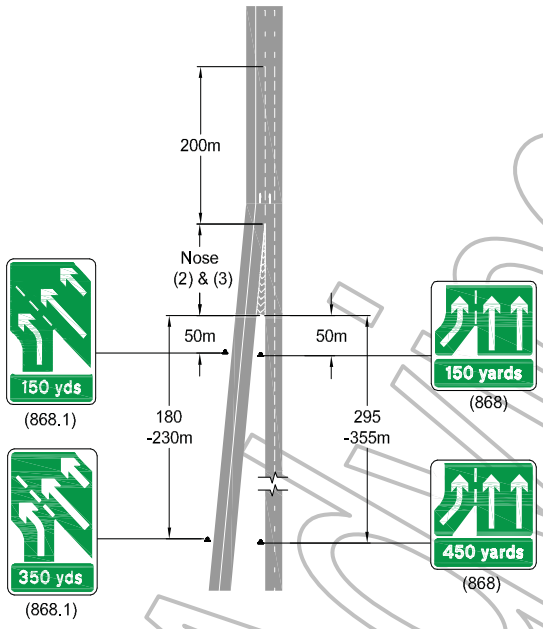
7.22 To reinforce the message conveyed by the signs, all road markings to diagram 1005.1 should be replaced by markings to diagram 1004.1. These markings should commence at the first sign to diagram 874 on the slip road at least 200 metres prior to the merge nose tip on the main carriageway. The markings should be continued for at least 50m beyond the termination of the merge taper (for the left hand slip lane).

7.23 Straight ahead arrows to diagram 1038 should be placed on the joining (additional) lane, the original left lane of the main carriageway adjacent to the merge nose tip, and immediately beyond the termination of the furthermost merge taper to indicate straight ahead movement.

C) Right Lane of Slip Road forms Lane Gain with Main Carriageway – Left Lane of Slip Road Merges Downstream of Lane Gain (TD 22/06 (DMRB 6.2.1), Figure 2/4.4 F – Option 2 – ALTERNATIVE [Ref 3])

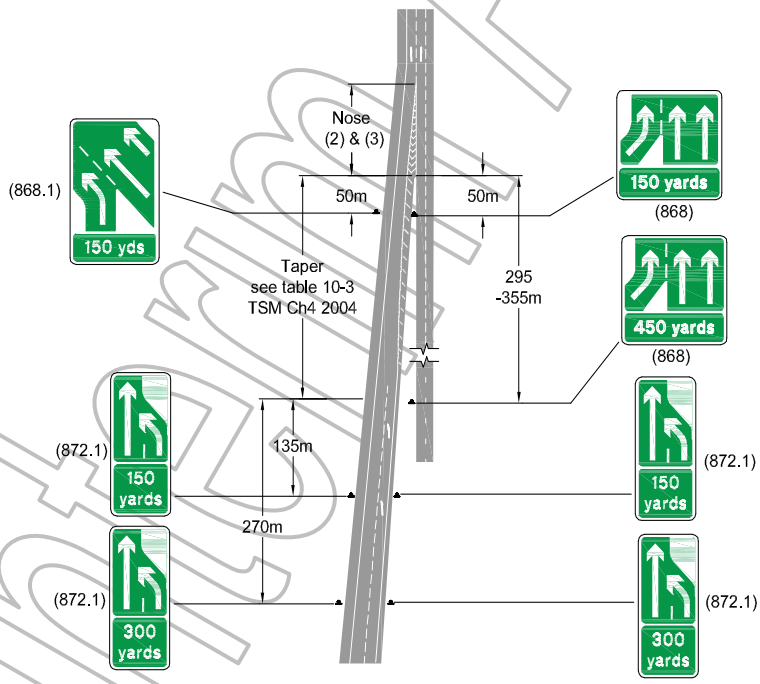
7.24 In this option, which uses signs to diagram 875 instead of 873/874, it is not easy for slower slip road traffic to merge from the auxiliary lane into the faster lanes; it is also difficult to sign. Reference should be made to the Overseeing Authority before this layout is used.

ONLY VERGE-MOUNTED SIGNS TO BE PROVIDED



SINGLE LANE MERGE WITH LANE GAIN

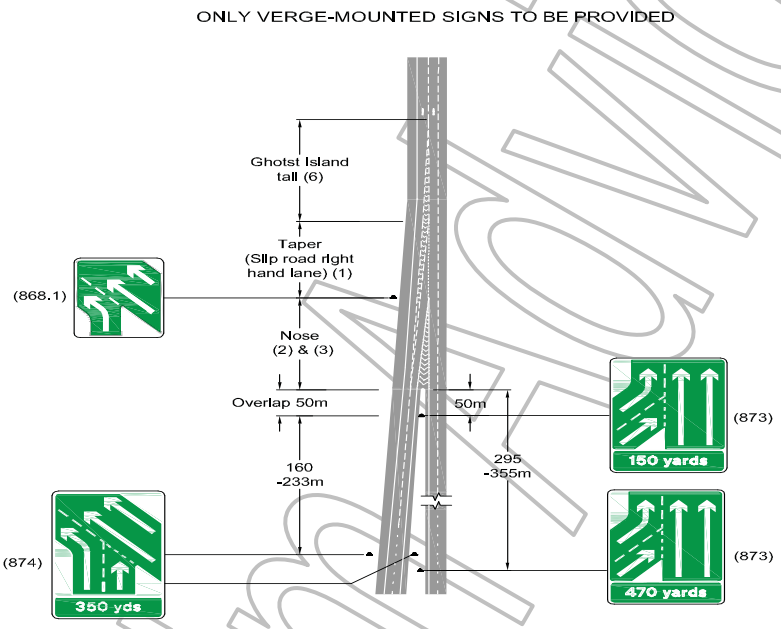
FIGURE 7.1



Background colour of sign layouts change dependent on status of route.
This example is based on a primary route.
Signs are indicative only and show an example of yardage - this will need to be varied for specific siting distance used within available range.
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

MERGE WITH SINGLE LANE GAIN

FIGURE 7.2



Background colour of sign layouts change dependent on status of route.
This example is based on a primary route.
Signs are indicative only and show an example of yardage - this will need to be varied for specific siting distance used within available range.
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

LANE GAIN WITH GHOST ISLAND MERGE

FIGURE 7.3

Parallel Merge with an Extended Auxiliary Lane (Figure 7.4)

7.25 Auxiliary lanes at merges are additional lanes provided at the side of the main carriageway between the nose and the entry taper at a junction. These are designed to increase capacity by providing increased merge opportunity and additional space for weaving. Clear signing should be provided to ensure motorists make correct use of the lanes provided. The layout is shown in **TD 22/06 (DMRB 6.2.1)** Figure 4.4 [Ref 3].

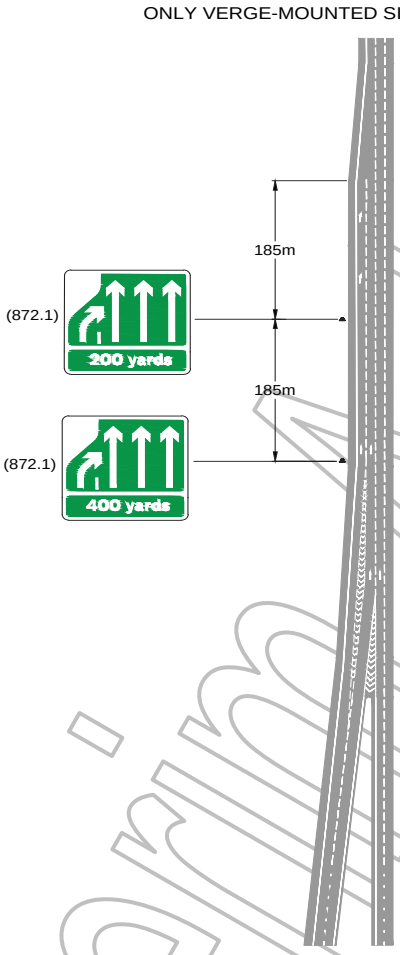
7.26 For extended auxiliary lanes in merges, of length greater than that given in column (4) of Table 4/3 in **TD 22/06 (DMRB 6.2.1)** [Ref 3], a sign to diagram 872.1 (reversed in a mirror image) with a diagram 876 distance plate '200 yds', should be placed 185 metres from the upstream end of the merge taper of the auxiliary lane. It is recommended that an additional diagram 872.1 be provided where the auxiliary lane is longer than 400m.. An example of this layout is shown in Figure 7.4.

7.27 The signing on each of the approaches to the merge of the main carriageway with the slip road should be considered carefully. Signs on the slip road and main carriageway

approaches to diagram 508.1 or 509.1, where appropriate in the circumstances described in **TSM Chapter 4** [Ref 20] paragraph 2.10, should be provided.

7.28 The carriageway markings used for an auxiliary lane layout are described in **TSM Chapter 5** [Ref 7] paragraph 10.9 – for extended auxiliary lanes, the layout of road markings in the section with the extended auxiliary lane should comprise diagram 1004.1 (1004) markings for each traffic lane. The marking between the extended auxiliary lane and Lane 1 of the main carriageway should be terminated adjacent to the upstream end of the merge taper of the auxiliary lane – no lane marking is provided between Lane 1 of the main carriageway and the auxiliary lane through the merge taper. The markings to diagram 1004.1 (1004) separating the lanes of the main carriageway should be continued for at least 50m beyond the downstream end of the merge taper of the auxiliary lane.

7.29 Right hand arrows to diagram 1014 are placed within the auxiliary lane in accordance with Table 4.6 of **TSM Chapter 5** [Ref 7], at distances ranged from the upstream end of the taper of the auxiliary lane.



Background colour of sign layouts change dependent on status of route.
This example is based on a primary route.
Signs are indicative only and show an example of yardage - this will need to be varied for specific siting distance used within available range.
All sign layouts shown are diagrammatic. Refer to TSM Chapter 7 for full design details.
All road marking layouts shown are diagrammatic. Refer to TSM Chapter 5 for full details.

PARALLEL MERGE WITH EXTENDED AUXILIARY LANE

FIGURE 7.4

8. CONTACTS

If you have any questions regarding the use or content of this document, please contact:-

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9. REFERENCES

1. **IAN 161/15** – Smart Motorways All Lanes Running - 2015
2. **The Traffic Signs Manual (TSM), Chapter 7**, The Design of Traffic Signs - 2013.
3. **TD 22/06 (DMRB 6.2.1)** - Layout of Grade Separated Junctions – 2006.
4. **Local Transport Note 1/94** - The Design and Use of Directional Informatory Signs - 1994.
5. **IAN 145/15** – Directional Signs on Motorways and All-Purpose Trunk Roads – At Grade and Compact Grade Separated Junctions - 2015.
6. **The Traffic Signs Regulations and General Directions 2002 (TSRGD)** and subsequent amendments - 2002 – 2012.
7. **The Traffic Signs Manual (TSM), Chapter 5**, Road Markings - 2003.
8. **IAN 111/09** - Smart Motorways Implementation Guidance Hard shoulder running - 2009.
9. **TD 46/05** (**DMRB 9.1.1)** - Motorway Signalling - 2005.
10. **Manual of Contract Documents for Highway Works (MCHW) Volume 3** Highway Construction Details (HCD).
11. **TA 74/05** (**DMRB 9.4.3)** – Motorway Signalling Welsh Addendum Applicable for Use in Wales (Annex A – England and Northern Ireland only) - 2005.
12. **TD 40/94 (DMRB 6.2.5)** - Layout of Compact Grade Separated Junctions - 1994.
13. **The Traffic Signs Manual (TSM), Chapter 1**, Introduction - 1982.
14. **IAN 149/11** – Existing Motorway Minimum Requirements - 2011.
15. **IAN 112/08** - Managed Motorway Implementation Guidance - Through Junction Hard Shoulder Running – 2008.
16. **The Traffic Signs Manual (TSM), Chapter 8** - Roadworks and temporary situations - 2009.
17. **TD 18/85** (**DMRB 9.1.2)** - Criteria for the Use of Gantries for Traffic Signs and Matrix Traffic Signals on Trunk Roads and Trunk Road Motorways - 1985.
18. **TD 52/04** (**DMRB 8.2.4)** - Traffic Signs to Tourist Attractions in England: Tourist Signing – Trunk Roads - 2004.
19. **TD 69/07** (**DMRB 6.3.3)** – The Location and Layout of Lay-Bys and Rest Areas - 2007.
20. **The Traffic Signs Manual (TSM), Chapter 4,** Warning Signs - 2013.
21. **TD 16/07** (**DMRB 6.2.3)** - Geometric Design of Roundabouts – 2007.
22. **TD 50/04** (**DMRB 6.2.3)** - The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts - 2004.
23. **TA 58/92** (**DMRB 8.2.1)** - Traffic Signs and Road Markings for Lane Gains and Lane Drops on All-Purpose Dual Carriageways and Motorway Trunk Roads – 1992.
24. **Department for Transport Working Drawings for Traffic Signs -** www.dft.gov.uk/pgr/roads/tss/workingdrawings *
25. **Road Traffic Regulation Act 1984.**

* please note that internet links to documents may be subject to change – however, these documents can be found generally by entering the Department for Transport web site and searching on the term ‘traffic signs’.