

Traffic Signs Manual

Chapter 8

Traffic Safety Measures and Signs for Road Works and Temporary Situations

Part 2: Operations

Department for Transport/Highways Agency

Department for Regional Development (Northern Ireland)

Transport Scotland

Welsh Assembly Government

Traffic Signs Manual 2009

Contents of Chapters 1-8

[**CHAPTER 1 Introduction**](#)

[**CHAPTER 2 Informatory Signs ***](#)

[**CHAPTER 3 Regulatory Signs**](#)

[**CHAPTER 4 Warning Signs**](#)

[**CHAPTER 5 Road Markings**](#)

[**CHAPTER 6 Illumination of Traffic Signs ***](#)

[**CHAPTER 7 The Design of Traffic Signs**](#)

[**CHAPTER 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations**](#)

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Chapter 8

CONTENTS

O1	INTRODUCTION	7
O1.1	Background	7
O1.2	Structure and scope of the document	7
O1.3	Legal status	8
O1.4	Concepts and objectives	8
O1.5	Primary definitions	9
O1.6	Standard works and relaxations	9
O2	GENERAL	11
O2.1	Health and safety	11
O2.2	Risk assessment	12
O2.3	Planning considerations	12
O2.4	Formulation of method statement	14
O2.5	Site information	16
O3	OPERATIONAL ISSUES	18
O3.1	General	18
O3.2	Safety clearances	18
O3.3	Safe taper positions	24
O3.4	Delineation of works	24
O3.5	Crossing the carriageway on foot	24
O3.6	Installation of static traffic management	25
O3.7	Maintaining static traffic management	27
O3.8	Removal of static traffic management	28
O3.9	Working in the hours of darkness	29
O3.10	Adverse weather conditions	29
O3.11	Works access points	30
O3.12	Loading and unloading of materials	31
O3.13	Pedestrians	31
O3.14	Cyclists	32
O3.15	Works off the carriageway	33
O3.16	Surface condition	33

O3.17	Surface dressing	35
O3.18	Storage of materials	35
O3.19	Parked vehicles	36
O3.20	Matrix signals	37
O3.21	Portable traffic signals	38
O3.22	"STOP/GO"	41
O3.23	"STOP-WORKS" sign	42
O3.24	Priority traffic	43
O3.25	Railway level crossings	43
O3.26	Aircraft taxiways	46
O3.27	Works near tramways	46
O3.28	Scaffolding	46
O3.29	Builders' skips	47
O4	SIGNING AND ROAD MARKING ISSUES	48
O4.1	Principles	48
O4.2	Accuracy	49
O4.3	Sign condition	50
O4.4	Stability of signs	50
O4.5	Mounting and siting of signs	50
O4.6	Lighting of signs	52
O4.7	Warning lights (road danger lamps)	52
O4.8	Temporary lighting	54
O4.9	Signs authorisation	54
O4.10	Delineators	54
O4.11	Use of barriers	56
O4.12	Road markings and studs	58
O5	GENERAL VEHICLE ISSUES	61
O5.1	General	61
O5.2	Conspicuity	61
O5.3	Roof-mounted beacons	62
O5.4	Impact protection	62
O5.5	Temporary traffic management vehicle specifications	63
O5.6	Convoy working vehicles	65
O5.7	Mobile lane closure vehicles	65
O5.8	Mobile carriageway closure vehicles	65
O5.9	Use of vehicles at road works	66
O6	WORKFORCE ISSUES	68
O6.1	General	68
O6.2	Training	68
O6.3	Personal protective equipment (PPE)	69
O6.4	Fitness for task	70
O6.5	Working hours	70
O7	INCIDENT MANAGEMENT	71
O7.1	Emergencies	71
O7.2	Emergency traffic management	72
O7.3	Free vehicle recovery facilities	84
O7.4	Other vehicle recovery provision	85
O7.5	Use of CCTV	87
O7.6	Reporting of incidents	87
O7.7	Incident management system	87

O8	SINGLE VEHICLE WORKS AND INSPECTION STOPS	88
O8.1	Single vehicle works	88
O8.2	Works undertaken at or near normal road speed	96
O8.3	Inspection stops	96
O8.4	Road (highway) maintenance inspections/operations	98
O9	CONVOY WORKING	100
O9.1	General	100
O9.2	Legal issues	101
O9.3	Vehicles	101
O9.4	Number of vehicles	102
O9.5	Traffic control	103
O9.6	Speed limits	103
O9.7	Radio communication	104
O9.8	Side roads within the site	104
O9.9	Queue management	105
O9.10	Emergency vehicles	105
O9.11	The convoying method	106
O10	MOBILE LANE CLOSURE TECHNIQUE	110
O10.1	General	110
O10.2	Planning	111
O10.3	Training and personnel issues	111
O10.4	Traffic parameters	112
O10.5	Matrix signals	113
O10.6	Vehicles	114
O10.7	Signs	115
O10.8	Light arrow system for block vehicles	116
O10.9	Flashing amber lanterns	117
O10.10	Illumination of signs at night	118
O10.11	Vehicle checks	118
O10.12	Communications	118
O10.13	Establishing a closure	118
O10.14	During a closure	121
O10.15	Working through junctions without a hard shoulder	122
O10.16	Working through junctions with a hard shoulder	123
O10.17	Removing a closure	124
O10.18	Operations at night	124
O10.19	Plans and principles for mobile lane closures	124
O11	MOBILE CARRIAGeway CLOSURE TECHNIQUE	138
O11.1	Background	138
O11.2	Definitions	138
O11.3	The principle of the technique	139
O11.4	Planning issues	141
O11.5	Closing access junctions	143
O11.6	Roads without a hard shoulder	147
O11.7	Signing	148
O11.8	Vehicles	152
O11.9	Communications	153
O11.10	Training	154
O11.11	Operational issues prior to the operation	154
O11.12	Establishing the closure	154
O11.13	Speed of the closure	156
O11.14	The working window	157

O11.15	Removing the closure	157
O11.16	The role of the monitor vehicle	159
O11.17	Breach of the closure/passage of emergency vehicles	159
O11.18	Junctions	159
O11.19	Dealing with a lane drop/lane gain	160
O11.20	The role of the control office	160
O11.21	Communication failure	160
O11.22	Other works/weather conditions	160
O11.23	Use of the technique to set up traffic management	161
A1 APPENDIX – TABLES		162
Table A1.1	Location and number of approach signs	163
Table A1.2	Sizes of signs	165
Table A1.3	Recommended spacing and sizes of traffic cones	173
Table A1.4	Key to areas and symbols shown in plans	175
Table A1.5	Details A to K used in plans (minimum sizes given)	176
A2 APPENDIX – GLOSSARY		186
A3 APPENDIX – REFERENCES		192
A3.1	British Standards: British Standards Institution	192
A3.2	Legislation	192
A3.3	Department for Transport: The Stationery Office Ltd	193
A3.4	Design Manual for Roads and Bridges (DMRB): The Stationery Office Ltd.	194
A3.5	HSE documents	194
A3.6	Other documents	195
A4 APPENDIX – MISCELLANEOUS		197
APPENDIX 4.1	– Specification for builders' skips	197
APPENDIX 4.2	– Specification for an automatic braking system	198
APPENDIX 4.3	– Assessment of condition of traffic signs	200
A5 APPENDIX – LIST OF PLANS		207
INDEX		208

O1 INTRODUCTION

O1.1 BACKGROUND

O1.1.1 In the operation and maintenance of highway networks, it is necessary from time to time to put in place temporary traffic management measures to facilitate safe road works, temporary closures or incident management, whilst keeping the traffic flowing as freely as possible. With high traffic flows on many roads, it is particularly important to plan all works activities and temporary closures to optimise safety, road space and work efficiency, whilst minimising road user congestion, delay and inconvenience.

O1.1.2 Road works on or near a carriageway, cycleway or footway might impair the safety and free movement of vehicles, cyclists and pedestrians (particularly those with mobility and visual impairments). All reasonable steps should be taken to ensure that the effects of the works are reduced to a minimum. This Chapter sets out the effects of road works or temporary closures on all kinds of road user and recommends steps that should be taken to minimise these effects. It also emphasises the importance of following the recommended measures.

O1.1.3 The Health and Safety at Work, etc. Act 1974 and the Health and Safety at Work (NI) Order 1978 require all clients, employers and employees to establish and maintain safe systems of work. Highway authorities, statutory undertakers and contractors shall give due attention to the detailed traffic management arrangements at road works sites and incident locations in order to ensure the safety of the public and of their own employees at these obstructions. It is essential for the safety of all concerned that uniform and consistent procedures should be adopted. Chapter 8 is intended to provide a standard of good practice for the signing and marking of obstructions as well as for the temporary traffic control necessitated by such obstructions of the highway. The standard described is a minimum, which should always be achieved. At difficult sites, i.e. sites where the on-site risk assessment has shown that the level of risk is above normal, further signs and other equipment will be necessary.

O1.1.4 Under the Construction (Design and Management) Regulations 2007 (CDM) and the Construction (Design and Management) Regulations (NI) 2007, clients, co-ordinators, designers and contractors have legal duties to plan, co-ordinate and manage health and safety throughout all stages of the project. CDM goes hand in hand with the Management of Health and Safety at Work Regulations 1999 (MHSW) and the Management of Health and Safety at Works Regulations (NI) 2000. Good management of the work is essential to prevent accidents and ill health.

O1.1.5 Further reasonable adjustments may also need to be made to works in order to comply with the Disability Discrimination Act 2005. Further guidance on meeting the requirements of the Act can be found in the revised Code of Practice on Section 3 of the Disability Discrimination Act.

O1.2 STRUCTURE AND SCOPE OF THE DOCUMENT

O1.2.1 Chapter 8 (2009) comprises two documents:

- **Part 1: Design** provides guidance for those responsible for the design of temporary traffic management arrangements which should be implemented to facilitate maintenance activities or in response to temporary situations. It contains advice relating to traffic safety measures, and the identity and location of the traffic signs needed to guide road users, including pedestrians, safely past obstructions in temporary situations. It is structured to facilitate and reflect the design process for temporary traffic management, from the initial broad brief to details of signing provision. It raises the principal issues that need to be considered in temporary traffic management design and provides advice about their resolution. The document deals with the design of temporary traffic management arrangements on single carriageway roads and dual carriageway roads separately. The design guidance is illustrated by the inclusion of sample plans.

- This document, [Part 2: Operations](#), provides guidance for those responsible for planning, managing, and participating in operations to implement, maintain and remove temporary traffic management arrangements. It contains advice relating to good working practice spanning all aspects of temporary traffic management operations from broad management issues to issues involving the activities of individual operatives. The guidance is illustrated by the inclusion of sample plans relating to the operational guidance of particular temporary traffic management techniques.

O1.2.2 Working drawings for the design of the signs shown in the plans and other prescribed signs are available for download free of charge on the Department for Transport website: www.dft.gov.uk.

O1.3 [LEGAL STATUS](#)

O1.3.1 The Traffic Signs Manual is applicable in England, Northern Ireland, Scotland and Wales. This Chapter sets out a code of practice to enable the legal requirements to be met in a wide variety of circumstances, although it has no statutory force, except in Northern Ireland where an authorised officer for the Department may deem it to have such force. (In Northern Ireland, Article 31 (or equivalent) is the legal status that deems Chapter 8 to be a legal document for certain roads only and only for the signs and devices used.) All authorities, bodies and organisations responsible for all types of roads to which the public have access are strongly recommended to make compliance with the requirements of Chapter 8 a condition of contract in the case of works carried out on their behalf. These roads include toll roads, tunnels and bridges, industrial parks, retail parks, leisure parks, academic, hospital, dock, railway, Ministry of Defence, heritage, park, and similar estate roads etc.

O1.3.2 It should be noted that many of the basic principles contained in this document are also covered in the Safety at Street Works and Road Works – A Code of Practice, which has legal backing under Sections 65 and 124 of the New Roads and Street Works Act 1991 and Article 25 of the Street Works (NI) Order 1995.

O1.3.3 Section 174 of the Highways Act 1980 and Section 60 of the Roads (Scotland) Act 1984 and Article 31 of the Road Traffic Regulation (NI) Order 1997 make it clear that the proper guarding, lighting and signing of the works are the responsibility of the person carrying them out.

O1.3.4 Traffic signs and other apparatus for the control of traffic must conform to the Traffic Signs Regulations and General Directions (TSRGD) in force at the time of the works. Any requirement for goods or materials to comply with a specified standard shall be satisfied by compliance with the requirements for mutual recognition contained in clauses 104 and 105 of the Manual of Contract Documents for Highway Works (Volume 1 Specification for Highway Works).

O1.3.5 The contents of this document may be considered as representing what is reasonably practicable for the enforcement of the Health and Safety at Work etc. Act 1974, the Health and Safety at Work (NI) Order 1978, and associated regulations.

O1.3.6 Compliance with the requirements of this Chapter may assist local traffic authorities to comply with their network management duties under Section 16 of the Traffic Management Act 2004.

O1.4 [CONCEPTS AND OBJECTIVES](#)

O1.4.1 Safe and efficient traffic management is founded upon the following simple principles:

- provision of clear and early warning of obstructions in the highway;
- optimisation of road space and the provision of an adequate safety zone and working space at works locations;

- clear directions relating to decisions/actions required from road users;
- minimisation of potential conflict between road users, and between road users and road workers and their operations;
- credibility of traffic signs and temporary requirements; and
- speed limits and restrictions appropriate for the temporary highway geometry and safety features.

O1.4.2 Compliance with the guidance provided in this document should assist those involved with the installation, maintenance and removal of temporary traffic management arrangements to develop and implement a safe and effective system of working at all times.

O1.4.3 This document makes recommendations based on good practice for the guidance of temporary traffic management operators. It is intended to guide the operator through the operational process and through the considerations that are necessary to produce safe and effective temporary traffic management arrangements. It is not a prescriptive specification and it is recognised that the guidance given may not be applicable to all situations.

O1.5 PRIMARY DEFINITIONS

O1.5.1 In this document the word “**must**” is used to indicate a legal requirement which must be complied with. The word “**shall**” indicates an essential (or mandatory) requirement of compliance with this document, and “**should**” indicates a course of action that is strongly recommended by the Department, see [Glossary \(Appendix 2\)](#). The word “**may**” is used to indicate an option, which requires consideration depending on the circumstances.

O1.5.2 In this document the terms “**traffic**” and “**road users**” shall be taken to include both motorised and non-motorised users such as pedestrians, cyclists and horse riders.

O1.5.3 In this document “**road works**” are defined as any works or temporary restrictions which cause partial or total obstruction of any road or highway, whether on the verge, hard shoulder, footway, cycleway, bridleway or carriageway. Examples may include highway improvement schemes, excavations, structural or maintenance works of any kind, street works or any other work executed on or near the highway together with the necessary working space, safety zones, space required for the storage of any materials, the construction of any temporary structures and the operation of any constructional plant required for the execution of such work, including associated surveys and inspections.

O1.6 STANDARD WORKS AND RELAXATIONS

O1.6.1 Temporary traffic management schemes referred to in this Chapter are either “**standard**” schemes, “**relaxation**” schemes or else emergency traffic management.

O1.6.2 “**Standard**” schemes are appropriate for works carried out in all weather, visibility and traffic conditions.

O1.6.3 “**Relaxation**” schemes are appropriate for certain types of works (as indicated within this Chapter) for short-term situations with good visibility and low traffic flows. In this document “short-term situations” are situations that are expected to last less than 24 hours, “good visibility” means visibility extending to the full length of the stopping sight distance, and “low traffic flows” means flows less than the reduced available carriageway capacity when the works are in place. “**Stopping sight distance**” is the distance required for a

vehicle to come to a stop, taking into account the time taken to perceive, react, brake and stop safely – for full details see Table 3 of TD 9 “Highway Link Design” (DMRB 6.1.1). Individual plans state, where appropriate, what relaxations may be applied. Plans for single carriageway roads can be found in [Part 1: Design, Section D5](#) and plans for dual carriageway roads in [Part 1: Design, Section D6](#).

O1.6.4 If relaxation schemes are located on roads with a permanent speed limit of 40 mph or more and are in place during the hours of darkness, then warning lights must be added in accordance with the requirements given for the appropriate standard works. Additional signs may also be required to suit site-specific circumstances. On roads with a lower permanent speed limit the use of warning lights should be considered, depending on the standard of street lighting.

O1.6.5 The relaxations contained within this document are intended to retain fundamental signing principles whilst reducing the number of temporary traffic signs, road markings and delineators. The general principle is that signing for relaxation schemes is a subset of signing for standard schemes, such that should conditions at the site deteriorate then additional signing can be added to bring the signing up to the level of the equivalent standard scheme. Alternatively, if appropriate, the site should be cleared. Due to the requirement for supplementary signing should conditions deteriorate, and the short-term nature of the works, relaxations should only be applied at works which are manned continuously.

O1.6.6 Emergency traffic management should only be deployed for short-term incident management.

O2 GENERAL

O2.1 HEALTH AND SAFETY

O2.1.1 The complexity of traffic management arrangements varies from scheme to scheme, but the primary objective is always to maximise the safety of the workforce and the travelling public.

O2.1.2 The live carriageway of any road is a dangerous working environment in which to work. In particular, during the periods when traffic management arrangements are being set up, changed, maintained or removed, operatives may need to work on the live carriageway without the protection afforded by the fully installed layouts. It is therefore essential that temporary traffic management operations are designed, planned and implemented in accordance with a safe system of work.

O2.1.3 Specific guidance relating to the health and safety aspects of the setting up, maintenance and removal of traffic management arrangements is given in "Guidance for Safer Temporary Traffic Management" published on behalf of the Highways Agency, the County Surveyors' Society (CSS) and the Health and Safety Executive (HSE); see [References \(Appendix 3\)](#).

O2.1.4 Where works are in progress on a highway, or on any road to which the public have access, the Health and Safety at Work, etc. Act 1974 (or Health and Safety at Work Order (NI) Order 1978) requires those responsible for the works to establish and maintain, so far as is reasonably practicable, safe systems of work, including:

- the provision and maintenance of plant and systems of work that are safe and without risks to health;
- arrangements for ensuring the safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
- the provision of such information, instruction, training and supervision as is necessary to ensure the health and safety at work of their employees;
- the maintenance of any place of work under the employer's control in a condition that is safe and without risks to health including the provision and maintenance of means of access to and egress from it that are safe and without such risks; and
- the provision and maintenance of a working environment that is safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

O2.1.5 Where works are in progress on a highway, the person, persons or organisation responsible for the works is under an obligation to any persons using the highway, i.e. vehicle users, cyclists, pedestrians and other users (e.g. horse riders), to take such steps as are reasonably practicable to protect them from personal injury and their property from damage. Therefore sufficient warning signs, barriers and other measures needed to highlight any danger should be placed at or near the site of the works to the extent necessary to discharge that obligation. These measures must be removed when no longer required. The Highway Authority has the ultimate responsibility for the administration of all work that affects its roads.

O2.1.6 The Construction (Design and Management) Regulations 2007 and the Construction (Design and Management) Regulations (NI) 2007 place duties on clients, designers, co-ordinators and contractors to manage the risks which are under their control. The term "designer" within these regulations has a broad definition. Further guidance on the application of these regulations can be found in "Managing Health and Safety in Construction, Construction Design and Management Regulations 2007, Approved Code of Practice" HSE Legal Series publication L144. See [References \(Appendix 3\)](#).

O2.1.7 The Manual Handling Operations Regulations, as amended in 2002, apply to a wide range of manual handling activities including, e.g. lifting and lowering of traffic management equipment. Further guidance on the application of these regulations can be found in "Manual Handling, Manual Handling Operations Regulations 1992, Guidance on the Regulations" HSE publication L23 and "Manual Handling solutions you can handle" HSE publication HSG115. See [References \(Appendix 3\)](#).

O2.1.8 Working on live roads carries a potentially high risk. Road users may not expect to encounter standing or slow-moving works vehicles, or people at work, in the carriageway. In addition, the personnel involved may have little protection from oncoming traffic. Hence the work shall be managed properly to ensure that the risks are as low as is reasonably practicable.

O2.1.9 High-speed trunk roads, particularly motorways, and class A roads have a lower accident rate in normal use than minor roads. However, they can present a greater risk when obstructed by road works unless the boundary of the works is effectively delineated and precautions are taken to ensure that the travelling public is adequately warned of the presence of any obstruction.

O2.1.10 Although the potential consequences of an accident on heavily-trafficked high-speed roads are more severe, the risks involved in working on lower category routes shall not be ignored. Commonly such roads will not meet current sight distance or other design standards and in many cases the available carriageway width will be limited.

O2.1.11 As temporary traffic management on high-speed roads is a hazardous activity, the selection of the actual method of work shall be made by a competent person and shall reflect the risks and site-specific circumstances of the planned work.

O2.2 RISK ASSESSMENT

O2.2.1 The Management of Health and Safety at Work Regulations 1999 require that a suitable and sufficient risk assessment, specific to the task being performed, must be carried out to provide input to the method statement as it is being drafted. Consideration must be given to ways of firstly eliminating, or if this is not possible, then minimising the risk to operatives and the public. Information on formulating a risk assessment is given in the HSE free publication "Five steps to risk assessment".

O2.3 PLANNING CONSIDERATIONS

O2.3.1 The planning of temporary traffic management operations shall:

- seek to eliminate potential conflicts

but, where it is not possible to eliminate the risk, shall:

- seek to reduce and control potential conflicts.

O2.3.2 When planning road works schemes, the following issues, which are intended to eliminate or reduce and control the risk from temporary traffic management operations, should be noted.

- Road works schemes inevitably involve a compromise between getting the work done as quickly as possible and keeping the traffic flowing freely and safely. It is therefore important to plan the activities (including the placing and removal of traffic management arrangements) to optimise work efficiency and safety and to minimise traffic and road user congestion, delay and inconvenience. Meetings or consultations with other interested parties, e.g. the police, should therefore normally precede the start of works. In addition it needs to be appreciated that traffic

regulation orders cannot be made on demand. Highway authorities will need certain minimum times for processing. Speed control and temporary speed limits are dealt with in [Part 1: Design, Section D3.7](#).

- Direct risks to the safety of the workforce from passing traffic should be eliminated if possible by changes in working method (e.g. closures) or otherwise controlled by the use of temporary vehicle restraint barriers. Temporary speed limits should not be imposed at road works sites solely for the direct purpose of protecting the workforce. The presence of vulnerable work operations on foot should always be minimised.
- When a length of road is closed, the opportunity should be taken to carry out as much other maintenance as is practicable on that length of road.
- An objective of traffic management shall be to satisfy safely the expected traffic demand on the affected road or roads while work is in progress. Whenever possible, any work involving a reduction in the number of traffic lanes, particularly on heavily-trafficked commuter routes, should be avoided at peak periods, e.g. between the hours of 07.30 and 09.30 and between 16.30 and 18.30. The National Street Gazetteer (NSG) provides details of all the traffic-sensitive situations on the network. Details of the NSG may be found on the following website: www.nsg.org.uk. Local circumstances may permit or require variation of these times. If demand exceeds available capacity, queues will develop and road users could be put at risk. This should be avoided if possible. See [Part 1: Design, Section D3.4](#).
- Provided that there is adequate storage space, plant and machinery should be kept on site for the duration of the works in order to avoid unnecessary movements into and out of the site. Where practicable, materials should be transported to the site in bulk and partial loads combined into full loads for the same reason. Refer to [Section O3.18](#) for guidance on the storage of materials, and [Section O4.11](#) for advice on the use of barriers to protect plant and materials.
- There shall always be liaison with the Highway Authority concerned to avoid concurrent works in close proximity. See [Part 1: Design, Section D3.5](#) for details on the maximum recommended distance between sites on different types of road.
- The needs of pedestrians, particularly those who are disabled, should be considered when planning road work schemes. Guidance is given in [Part 1: Design, Section D3.32](#).

O2.3.3 Measures for enforcement of temporary speed limits should be agreed with the police at the planning stage. These could include speed cameras, use of fixed and/or mobile VMS or increased police patrols. Speed control and temporary speed limits are dealt with in [Part 1: Design, Section D3.7](#). Guidance is also included in a Highways Agency document entitled "Ensuring Road Works Speed Limit Compliance and Safety: Guide to Best Practice".

O2.3.4 Sufficient resources should be made available, where practicable, to keep sites occupied and operating during normal working hours since long stretches of coning with no sign of activity annoy road users and bring legitimate coning into disrepute, e.g. breaks such as those for meals should be staggered. Where workers may be out of sight of road users, e.g. when working underneath a bridge, an information sign to diagram 7004, varied to omit the warning triangle and distance plate, should be erected. Further guidance on driver information signs is given in [Part 1: Design, Section D4.11](#).

O2.3.5 Traffic flows at all sites should be monitored regularly so that, if problems develop, the regional control centre, police or traffic officers can be asked to take appropriate action. On motorways this might include activating the VMS. Care needs to be taken to ensure that any signals activated correctly describe the lanes open and the lanes closed for traffic.

O2.3.6 The forward visibility available to drivers passing through a road works site may unavoidably be restricted because of temporary structures provided as part of the works, e.g. scaffolding around a bridge support. It is essential to ensure that any such unavoidable reduction of visibility is kept to a minimum at all times. Existing visibility through the site and at side road junctions should not be impaired under any circumstances by the placing of temporary huts or other movable objects. A temporary reduction in the speed limit throughout the works may be appropriate where forward visibility is reduced by unavoidable works. See [Part 1: Design, Section D3.7](#).

O2.3.7 Consideration should be given, at the planning stage, to the method to be used for escorting or diverting wide loads. On designated Abnormal Indivisible Load (AIL) routes, consideration should be given to providing early notification to known AIL operators of the timing and limitations which will apply during the works, to enable operators to plan their load movements. Guidance on the escorting of abnormal loads is provided in the Highways Agency "Code of Practice: Self-Escorting of Abnormal Loads and Abnormal Vehicles". See [References \(Appendix 3\)](#).

O2.3.8 Following the installation and operation of a significant section of static temporary traffic management or the significant alteration of an existing layout where established traffic patterns are being amended, consideration should be given to carrying out an interim Stage 3 Safety Audit, (see HD 19 "Road Safety Audit" (DMRB 5.2.2)).

O2.4 FORMULATION OF METHOD STATEMENT

O2.4.1 A project-specific detailed method statement should be prepared for the implementation, maintenance and removal of the detailed traffic management arrangements.

O2.4.2 Generic method statements should only be used as a base document for production of the project-specific method statement. They should always be reviewed and adapted to address the particular circumstances of the site and the specific activity proposed.

O2.4.3 The method statement should be prepared by the organisation responsible for undertaking the works activities. Its formulation should take into account the available resources, including the skill, knowledge and experience of the various elements of the workforce. For each activity, the method statement should identify the resource implication, both human and equipment.

O2.4.4 Where the method statement sets out activities which interact with those of other organisations, detailed liaison shall take place to facilitate co-operation and ensure a cohesive operation. Such liaison is likely to include the police, the Highway Authority and the organisation responsible for construction of the works.

O2.4.5 To ensure sufficient scope in the production of the method statement, consideration will need to be given to points raised throughout this document. In particular the following issues should be addressed.

- Working period – the amount of work which can be carried out in one working period should be considered.
- Work during the hours of darkness – traffic flows and other factors dictate that some traffic management activities are conducted during the hours of darkness. Such operations require additional pre-planning, resources and procedures to those needed for daytime activities. Refer also to [Section O3.9](#).
- Positioning of vehicles – if parking the vehicle in a live traffic lane is unavoidable, a risk assessment shall be carried out and, for works on dual carriageway roads, consideration should be given to utilising an Impact Protection Vehicle (see paragraph [O5.5.5](#)), or a vehicle-mounted road works sign to diagram 610 or 7403. See also [Section O8.1](#) which gives guidance on single vehicle works.

- Crossing the carriageway on foot – this is a hazardous activity. It should be planned so that the location provides adequate sight lines and a place of safety at both sides of the carriageway. On no account should the crossing of more than four continuous lanes be considered. For further guidance refer to “Crossing high-speed roads on foot during temporary traffic management works” HSE Construction Information Sheet No. 53. See [Section O3.5](#).
- Pre-placement – placing temporary traffic management equipment out in advance ready for erection, or delayed removal, may often be the safest, most efficient method for implementing temporary traffic management arrangements. In such cases, this should only take place as part of the ongoing temporary traffic management operations and equipment should be left in position for the minimum time practicable before erection or removal.
- Any temporary arrangements for pedestrians (including the provision of ramps) should be installed prior to the closure or diversion of footways. Meanwhile the placing of signs on or adjacent to footways should not prejudice passage by pedestrians. See also [Section O3.13](#).
- Carriageway closure during installation and removal – consideration should be given at an early stage to the use of an approved closure technique to provide a safe working environment. This may be achieved either by use of police, traffic officers or any technique approved by the relevant Highway Authority, such as the Mobile Carriageway Closure technique described in [Section O11](#).
- Storage of equipment – this should allow easy access and availability.
- Erection of signs – the sequence of erection should ensure that the first sign erected provides protection for the erection of the remaining signs. Consideration shall also be given to the associated manual handling implications; refer to paragraph [O2.1.7](#). It is crucial to ensure that at all stages of temporary traffic management implementation and removal, the signs displayed do not conflict with the prevailing situation in such a manner as to create a hazard. When mobile lane closure operations are used to deploy static signs on the central reservation, it is imperative to avoid any possible conflict between the static and mobile signs. Such conflict may sometimes be avoided by locating the mobile lane closure operation on the other carriageway.
- Construction of tapers – the detailed sequence in which this work is to be carried out should be clearly indicated.
- Placement of longitudinal cones – method of placement should be clearly indicated, either pre-placement or directly placed from a vehicle.
- Maintenance regime – consideration should be given to access, and to the availability of a place of safety whilst carrying out maintenance tasks. Arrangements for remedial action and the replacement of damaged equipment should be considered.
- Contingency planning – the method statement shall cover contingency plans for foreseeable problems, e.g. the effect of the onset of inclement weather on the use of temporary markings and the time window available for completing the works, including the possibility of extending the works over more nights than planned or removing them prematurely.
- When a mandatory temporary speed limit is being imposed at the works site, the detailed enforcement regime to be put in place should be clearly indicated.

O2.4.6 There are particular hazards associated with short-term temporary traffic management needed as part of the implementation of the main temporary traffic management. The design and implementation of such schemes therefore requires particular care.

O2.4.7 At all sites where works are being carried out above public roads, vehicles and pedestrians shall be protected adequately from falling objects by nets, platforms or other devices. Before any reduction in working height is effected, the Highway Authority shall be consulted so that hauliers and bus operators can be advised of the changed circumstances. The Highway Authority may require a licence and an indemnity for devices etc. placed over the highway.

O2.5 SITE INFORMATION

O2.5.1 There is a considerable stock of existing information about the site that may help to ensure the safety of those involved with the works. This shall be gathered by those responsible for the works, and where appropriate, shared with those responsible for the traffic management operation. This could include:

- the design brief – see [Part 1: Design, Section D2.3](#);
- health and safety plan/risk assessment;
- information on traffic flows and patterns, peak periods etc.;
- the presence of underground and/or overhead services. See HSE documents HSG47 “Avoiding Danger from Underground Services” and HSE GS 6 “Avoidance of danger from overhead electric power lines”;
- the presence of rail crossings and other rail signalling equipment which, for example, may affect the location of portable signals;
- local weather conditions, e.g. susceptibility to fog or local flooding; and
- safe refuges for vehicles used in association with the temporary traffic management.

O2.5.2 The organisation undertaking the temporary traffic management operations shall always be provided with information, by the designer, relating to highway features and traffic levels for the area for which the operations are proposed. For example:

- carriageway layout, lane widths and levels;
- narrow central reservations;
- narrow or weak hard shoulders;
- VMS signs and/or matrix signals;
- safe taper positions;
- absence of hard shoulder;
- specific locations without provision for stationary traffic management vehicles off carriageway;
- permanent mounting facilities for temporary signs; and
- traffic data.

O2.5.3 Electronic light-emitting roadside variable message signs (VMS): The use of these, if present, to warn of mobile lane closure operations, and the establishment and removal operations associated with static temporary traffic management arrangements should be considered. Where queue detection systems (e.g. MIDAS) are installed within the area of the works, consideration should be given to disabling the system for the duration of the traffic management operations concerned. Reference should be made to the codes of practice: "The Joint ACPO and HA Policy and Procedures for the Use of Variable Message Signs (VMS) by the Police and Regional Control Centres" (Highways Agency/ACPO, 2005) and "The Joint ACPO and HA Policy and Procedures for the Police Use of Matrix Signals" (Highways Agency/ACPO, 2002), or equivalent documents. The codes of practice referred to are those related to roads in England. For details of the appropriate rules that apply in Scotland, Wales and Northern Ireland refer to the appropriate regional government.

O3 OPERATIONAL ISSUES

O3.1 GENERAL

O3.1.1 At some sites, during the first few days of operation, low traffic capacity may be experienced until drivers become accustomed to the situation. It is important not to make inappropriate changes which may increase the risk to the workforce and road users during this period.

O3.1.2 The extent of all excavations and temporary obstructions should be kept to a minimum and the aim at all times should be to complete the works as quickly and safely as practicable.

O3.1.3 On motorways and dual carriageway roads subject to the national speed limit, operatives shall not make their way into and out of any traffic management arrangement using their own personal vehicles unless the vehicle is fully compliant with the appropriate requirements of [Section O5](#).

O3.1.4 The number of vehicles entering and leaving a site should be kept to a minimum at all times. Only essential works vehicles complying with the requirements of [Section O5](#) should be allowed within the site. Provision for the parking of operatives' personal vehicles should be made off site whenever possible.

O3.2 SAFETY CLEARANCES

O3.2.1 For all roads with a permanent speed limit of 50 mph or more, the lateral clearance between the edge of the working space and that part of the carriageway being used by traffic should be not less than 1.2 m.

O3.2.2 On single carriageways if the nature of the road is such that a lateral safety clearance of 1.2 m cannot be achieved, then the lateral safety clearance should be as wide as practicable with an absolute minimum of 0.5 m.

Where the lateral safety clearance is less than 1.2 m then a temporary mandatory speed limit of 40 or 30 mph will need to be put in place, using physical safety measures, in association with enforcement of the speed limit where appropriate, to ensure that traffic passing through the site does not exceed the temporary speed limit. These safety measures may include chicanes, temporary speed ramps, traffic control etc. Solely relying on a temporary mandatory speed limit as a safety measure is not deemed sufficient.

O3.2.3 On roads other than motorways, if there is insufficient space to provide the minimum lateral safety clearance of 0.5 m, there are a number of available options.

- If practicable, the road can be closed and traffic diverted along a suitable diversion route (see [Part 1: Design, Section D3.15](#)).
- If diversion of traffic would be impracticable, traffic speeds must be reduced to below 10 mph and an agreed safe method of working imposed on the site; this must be agreed with the Highway Authority.
- For short lengths of shuttle working, i.e. 50 m or less, on single carriageways, chicanes can be used. At least one chicane is required in each direction of the minimum size to allow a large vehicle to pass through slowly, and traffic must first be brought to a halt by positive traffic control and then released in small batches by careful use of "STOP/GO" signs or manually controlled portable traffic signals. See also [Part 1: Design, Section D5.12](#).
- On single carriageway roads with low traffic flows an extended all-red period with portable traffic signals or "STOP/GO" boards may be used. See [Part 1: Design, Section D5.13](#). For a definition of "low traffic flows", see [Glossary \(Appendix 2\)](#).

- For longer site lengths a convoy working system should be used, see [Section O9](#) and [Part 1: Design, Section D7, Convoy Working](#).

O3.2.4 For roads with a permanent speed limit of 40 mph or less the lateral clearance should be not less than 0.5 m.

O3.2.5 The dimensions given above are the normal minimum lateral clearances required. Where it is reasonably practicable to provide additional clearance this should be done. In reaching a decision on what additional space, if any, may be provided, due regard should be paid to any possible consequences for the safety of road users and also to possible additional costs, including extra delay to road users. The latter will arise if there is insufficient capacity in the road space left available to traffic.

O3.2.6 The provision of adequate lateral (sideways), longitudinal (longways) and vertical safety clearances between moving traffic and the works is an important element of temporary traffic management design and is dealt with in detail in [Part 1: Design, Section D3.2](#).

O3.2.7 Lateral and longitudinal clearances are measured at ground level, but apply above ground up to the headroom dimensions given in paragraph [O3.2.19](#). The lateral clearance is measured horizontally between the edge of the working space and the edge of the carriageway in use by vehicles. It should be noted that the areas within the coned tapers should be regarded as parts of the safety zone as shown in [Figure 3.1](#).

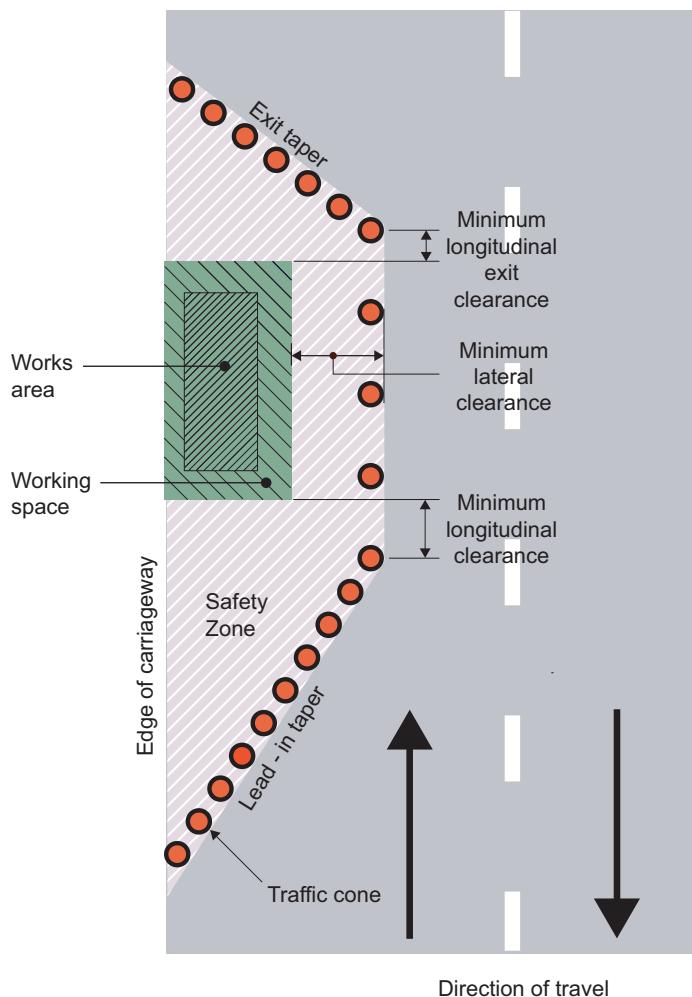


Figure 3.1 Safety zones – typical site layout

NOTE: The safety zone extends to the outside edge of the cones or the traffic edge of any road markings or studs that are present separating the live traffic lanes from the work area.

O3.2.8 The area created by the safety clearances around the works constitutes the safety zone, into which persons, equipment, transport and plant should not enter in the normal course of work. The following important issues relate to safety zones and should be taken into account during the operation of a works site.

- Materials shall not be deposited or stored in the safety zone.
- Moving parts of plant or machinery shall not be allowed to encroach into the safety zone.
- The safety zone may be entered as necessary to place, replace, remove, clean and otherwise maintain the traffic cones and cylinders, warning lights, signs, temporary barriers and fences etc. which are part of the signing and guarding of the works site. Such encroachments, however, shall be kept to an absolute minimum.
- Adequate working space should be provided around the works to allow for the movement of persons, equipment and vehicles. The working space may vary during the period of the works and need not be a constant width around the works. The safety zone should not be used as a working space.
- The lateral and longitudinal safety zone clearances and the working space around the works area are necessary whenever personnel are present and/or there is an obstruction or hazard which remains outside working hours, e.g. a hole, skip or materials in the works which may cause a potential hazard to the travelling public.
- When a site is unoccupied it may be possible to reduce the size of the overall site and, therefore the obstruction, by removing the working space which is not required and reducing the safety zone if circumstances allow. The exception to this is when pedestrians are diverted into the carriageway.
- The safety zone will be required at all times between the outer pedestrian barrier and the coning.
- Operators of “STOP/GO” signs to diagrams 7023 and 7024 shall not stand in the safety zone; see [Section O3.2.2](#).
- Delineated safety zones are not required at mobile works provided work is not being carried out on foot. If work is being carried out on foot a delineated safety zone should be provided whenever practicable, or a suitable audible warning system (e.g. horn on closest block vehicle) provided to alert operatives if they are about to enter the safety zone; see also paragraphs [O10.19.8](#) to [O10.19.13](#).

O3.2.9 The outer boundary of the safety zone should always be marked by traffic cones, with the addition of warning lights during poor weather conditions and/or darkness (see [Table A1.3 \(Appendix 1\)](#) for the spacing of the lights) or an approved temporary vehicle safety barrier (TVSB). Where the permanent speed limit is greater than 40 mph the inner boundary should always be marked. The purpose of the inner marking is to indicate the extent of the safety zone, to attract workers’ attention when they are in danger of stepping out of it, and to prevent workers inadvertently entering the safety zone, as this is outside the working space.

O3.2.10 When the boundary of the working space and the outer boundary of the safety zone are both marked with cones, the inner row of cones may be longitudinally offset to the outer row, effectively halving the spacing between them and giving the appearance of a more substantial boundary.

O3.2.11 The inner boundary should be marked with a lightweight barrier wherever practicable. The purpose of the inner marking is to indicate the extent of the safety zone; see paragraph [O3.2.9](#). Suitably supported traffic tape, of an appropriate breaking strength so that it would break before causing serious personal injury,

but which is strong enough to withstand strong winds and the buffetting from passing vehicles, could suffice for this marking. The tape should break in tension cleanly without excessive stretching or elongation. See also paragraph O4.11.14.

O3.2.12 Any lightweight barrier used should be installed at a constant height above the carriageway surface, be of conspicuous colour and be maintained in clean condition to ensure its visibility at all times. The boundaries of the safety zone or limit of the working space of the site should be sufficiently visible that workers do not stray into adjacent live traffic lanes. Supports should not be driven into the road surface, i.e. road pins are not permitted, but should be stable and able to withstand wind buffeting from passing vehicles.

O3.2.13 Lightweight barrier systems used to delineate the inner edge of the safety zone should not be deployed in long interconnected lengths. Short adjacent lengths, no more than 50m, should be used to minimise the hazards posed to workers if a section is struck by an errant vehicle and dragged into the works or highway.

O3.2.14 For short-duration progressive works being carried out throughout the length of a closure, e.g. central reservation maintenance, a safety zone may be established by placing only traffic cones to delineate the inner boundary.

O3.2.15 At works lasting less than one hour it may not be practicable to provide the type of inner delineation described above, but in such cases an attempt should be made to indicate the extent of the safety zone to help ensure it is not entered unwittingly. Where operatives are working on foot, this might be achieved by placing traffic cones or a light movable barrier or fence along the inner edge of the safety zone only at the point where work is in progress.

O3.2.16 For works within the central reservation, safety zones (or safety lanes) should be provided on both sides of the works area. In certain circumstances (e.g. the absence of an intact vehicle safety restraint barrier system) this may involve closure of the off side lanes on both primary and secondary carriageways.

O3.2.17 On motorways and dual carriageway roads a minimum clearance of 0.45m should be provided between the carriageway in use and the nearest part of any temporary sign (excluding cones, cylinders, road markings and studs) or its supporting structure. If necessary, the signs placed on hard shoulders and central reservations may be angled within the limits shown in Figure 3.2 in order to achieve the minimum clearance. If this does not achieve sufficient clearance, the next smaller size of sign should be used and if necessary angled similarly to provide the specified clearance. Reflectorised signs are sensitive to changes in orientation. The contractor should ensure that the signs and material properties are suitable for the required orientation. In particular, signs manufactured from microprismatic materials should always be mounted vertically, not leaning backwards on A-frames.

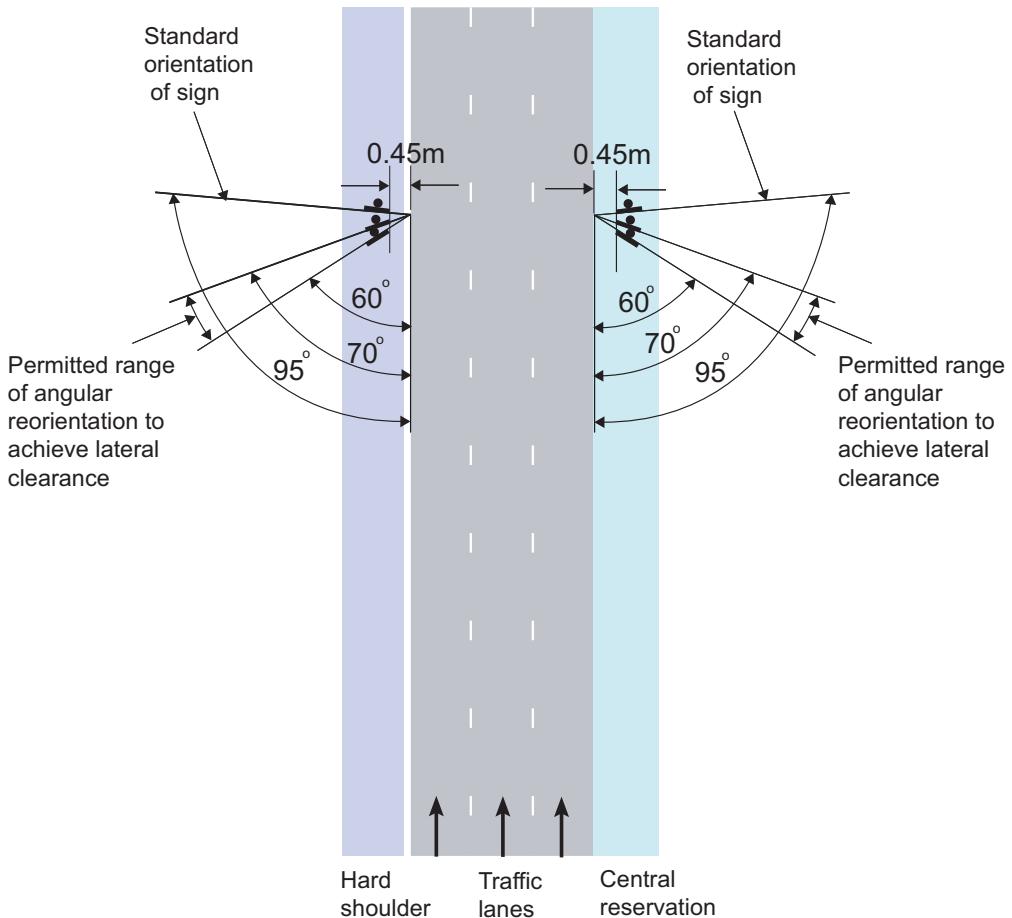


Figure 3.2 Orientation of temporary traffic signs to achieve a safety clearance

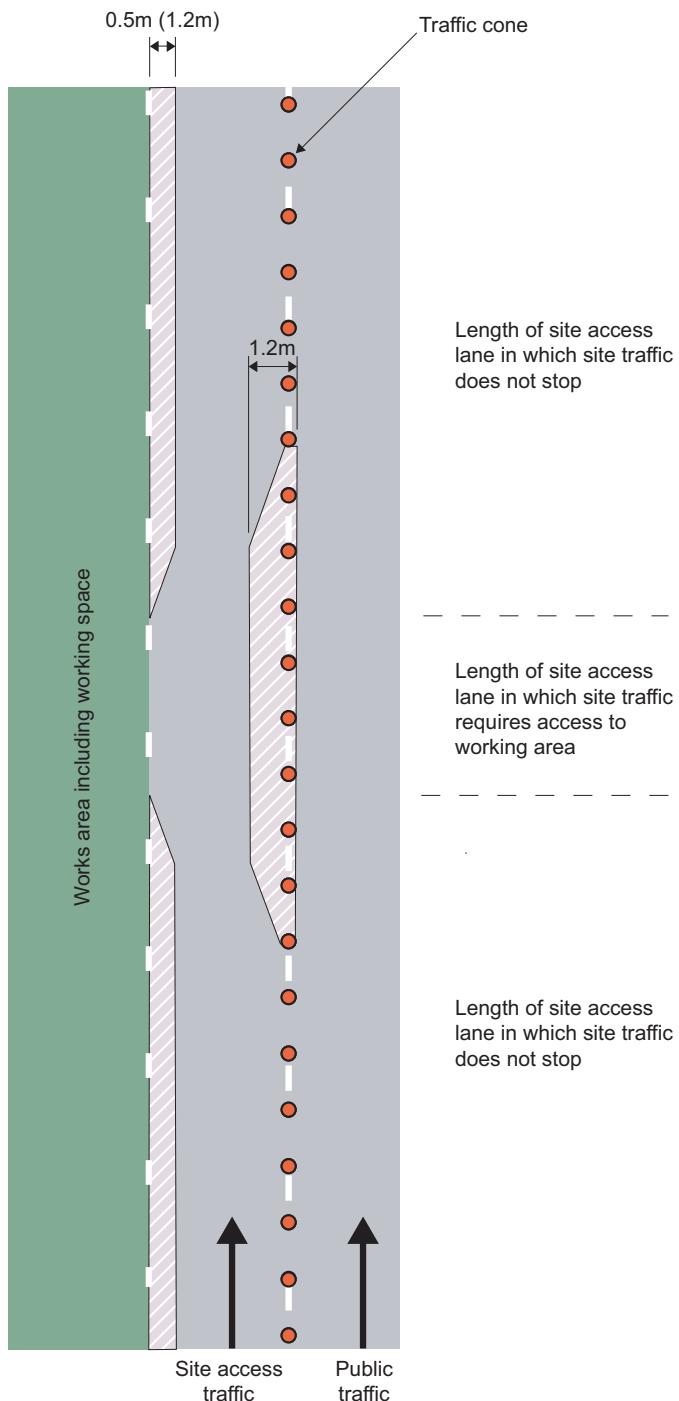
O3.2.18 When provision is made for vehicles to travel outside the normal limits of the carriageway or hard shoulder (e.g. if a part of the verge is hardened for a short-distance in order to accommodate the necessary traffic lanes on that part of the highway), there should be a clearance of at least 0.6 m between the edge of the trafficked lane and the nearest part of any permanent traffic sign. Additional safety barriers may be necessary.

O3.2.19 The minimum headroom to be provided at temporary structures (e.g. scaffolds, falsework, temporary accesses, etc.) should always be as follows:

- where the temporary structure is free-standing, the minimum headroom should be as for sign/signal gantries, i.e. 5.41 m;
- where the temporary structure is attached to or associated with a permanent structure, the minimum headroom for the temporary structure should be the same as for the permanent structure – if the permanent structure has a clearance greater than that given above, the minimum headroom for the temporary structure should be 5.41 m unless it is a high-load route; and
- where the road has a high-load clearance requirement greater than 5.41 m, the headroom appropriate to the high-load route plus 0.15 m should be provided.

O3.2.20 The headroom should always be increased as necessary to allow for vertical curvature, cross fall and the longitudinal grade of the road and take account of the deflection of the temporary structure under dead and live loads. If the required headroom is not obtainable over the full width, the part of the carriageway beneath the temporary structure should always be closed. The Highway Authority may use its powers to divert traffic when the required headroom is not available.

O3.2.21 On motorways and dual carriageway roads the provision of a site access lane as shown in [Figure 3.3](#) may be required on major reconstruction works. The lane shall be kept free from plant and materials, but may be used temporarily by broken-down vehicles in order to keep the running lanes clear. The safety zone should be located between the live highway and the access lane if the site access traffic is required to stop, or between the access lane and the works if site access traffic is unlikely to stop. The safety zone should be not less than 1.2 m wide, except that, where it is located between the access lane and the works, it may be reduced to not less than 0.50 m if a temporary speed limit of 40 mph or less is applied to the access lane.



[Figure 3.3 Location of safety zones in relation to site access lane](#)

O3.2.22 Where the works impose a temporary height restriction (e.g. a safety platform or falsework underneath a bridge soffit) warning of the restriction must be given by means of the “headroom at hazard” sign to diagram 530, which should be attached to the structure, and by another “headroom at hazard” sign to diagram 530 with a “distance to hazard” plate to diagram 572 or 573 in advance of a suitable diversion point before the hazard; details of signing at bridges and other structures is given in Chapter 4, Section 7.

O3.3 SAFE TAPER POSITIONS

O3.3.1 Tapers are a fundamental element of traffic management plans and their position should have been considered as an integral part of the traffic management design. Safe taper positions are dealt with in [Part 1: Design, Section D3.6](#).

O3.4 DELINEATION OF WORKS

O3.4.1 Obstruction of part of a road may require drivers of vehicles to carry out unusual manoeuvres, so drivers shall be given clear indication of the path they should take. Temporary delineation in the form of traffic cones, cylinders and barriers, etc. should be used for this purpose, augmented where practicable by temporary carriageway markings or temporary reflecting road studs to indicate the edge of the route to be followed. Existing road markings may need to be removed or masked, unless traffic is to be confined to a single lane delineated by cones on each side.

O3.4.2 Measures are necessary to ensure the safety of workers on site and to warn pedestrians of the hazard. The use of signs, barriers and the presence of a conspicuous vehicle all serve to protect the workforce. High-visibility clothing should also be worn at all times; see [Section O6.3](#).

O3.4.3 At works on minor roads, guarding should comply with the requirements of [Part 1: Design, Section D3.10](#).

O3.4.4 Where a filter drain or other soft material is adjacent to the edge of a hard shoulder being used as a running lane, and there is no kerbed protection, it should be hardened whenever possible as part of preliminary works, see [Part 1: Design, Section D3.19](#). When this is not done, traffic cones should be placed on top of the filter drain/soft material with their bases touching the edge of the hard shoulder and spaced at approximately 18m intervals. The back edge of the hard shoulder running lane should be marked with a 100 mm wide white thermoplastic line as specified in [Part 1: Design, Section D3.19](#). An edge line and traffic cones should also be provided when there is a dished drainage channel adjacent to the edge of a trafficked lane.

O3.5 CROSSING THE CARRIAGEWAY ON FOOT

O3.5.1 Crossing the carriageway on foot is a hazardous activity and should be minimised whenever practicable. It should be carefully planned to ensure that the location chosen has adequate sight lines, in both directions if appropriate, and a place of safety at both sides of the carriageway.

O3.5.2 If it is essential to cross the carriageway, a gap in the traffic should be allowed which is long enough to allow walking across briskly keeping a look-out for oncoming vehicles. To reduce the risk of tripping and falling, the person crossing the carriageway should not run. They should be prepared to wait some time to do this in safety. On very heavily-trafficked roads it may be possible to cross the carriageway only during off-peak periods.

O3.5.3 Safe gaps in the traffic are only likely to occur in traffic flows of less than 40 vehicles per minute on three-lane carriageways. At least three seconds per lane, or a safe gap of 150m per lane, should be allowed when estimating crossing times.

O3.5.4 Crossing a high-speed dual carriageway on foot should only be done by suitably trained traffic management operatives. All other site personnel should be transported to the worksite by suitable vehicle once the full traffic management arrangements are in place.

O3.5.5 On high-speed roads there should be a presumption against crossing the carriageway on foot whilst working alone.

O3.5.6 Crossing of three or four-lane carriageways on foot should only be carried out after a location-specific risk assessment. Crossing of carriageways with more than four lanes should be avoided in accordance with current HSE guidance.

O3.5.7 Operatives should only cross dual carriageways by foot where the central reservation provides a safe place to conduct work and a safe system of work has been specifically identified.

O3.5.8 On motorways and dual carriageway roads subject to the national speed limit, individuals shall not make their own way into and out of the site across live traffic lanes.

O3.5.9 For further guidance, see the HSE publication entitled “Crossing high-speed roads on foot during temporary traffic management works” (Construction Information Sheet 53).

O3.6 INSTALLATION OF STATIC TRAFFIC MANAGEMENT

O3.6.1 The organisation responsible for the temporary traffic management operation should address the following points prior to commencing operations.

- The operatives should be broadly aware of the proposals in general, and fully conversant with their role in the operation in particular. Special site-specific hazards such as overhead cables (see also [Section O2.5](#)) should be brought to the attention of operatives. This may be achieved by holding a site safety induction meeting.
- Risks are influenced by the timing and speed of deployment. In ideal circumstances, traffic management should be implemented during periods of low traffic flow to minimise direct risk and duration of exposure to risk.
- The criterion for the commencement of traffic management operations should relate to traffic flow not clock time.
- Before commencement, weather forecasts should be consulted to confirm the likelihood of satisfactory visibility throughout the operation and to check on the viability of putting down temporary markings and adhesive studs.
- Assessment of the condition of equipment should be made during assembly for delivery to site. Only equipment that is in an acceptable condition should be deployed. Guidance on the assessment of the condition of traffic management equipment is given in [Appendix 4.3](#).
- Checks should be made to ensure that the resources available match the method statement.
- Assumptions made in drafting the method statement (refer to [Section O2.4](#)) should be confirmed and any changes to the road works environment noted. A traffic flow count may be necessary to ensure that traffic conditions are safe for operations to proceed.

- Operatives should work facing oncoming traffic as far as practicable and inside the safety of the traffic management delineators; any available footway or verge should be used when collecting or transporting equipment on foot; see also [Section O3.2](#).
- Care shall be taken when erecting signs etc. to ensure that they are secure, upright and positioned where they are not hidden from view by other temporary signs, any existing features or vegetation. The temporary signs should not interfere with the visibility of permanent signs, junctions etc.; see also [Section O4](#).
- Carrying of signs on foot across the live carriageway shall be done only when there is a suitable gap in the traffic; see [Section O3.5](#).
- The handling of large signs may be facilitated if the signs are hinged. The hingeing arrangement should not compromise the appearance of the sign.
- When coning from a moving vehicle (refer to [Section O5](#)), operatives should avoid unnecessary exposure of any part of their bodies e.g. by leaning out.
- The method of placing signs on dual carriageways with no hard shoulder or driveable verge should be the subject of a risk assessment and a method statement to avoid directing traffic into lanes temporarily occupied by the traffic management vehicles.

O3.6.2 When cones, warning lights and signs etc. are being set out, it is essential that all persons involved shall wear high-visibility garments; see [Section O6.3](#).

O3.6.3 On high-speed roads in particular, during the initial work of setting out advance warning signs and of establishing the taper of cones, a sign with the legend "WORKFORCE IN ROAD SLOW" to diagram 7001.3 should be positioned on the near side of the carriageway, in advance of the first crossing point. The variant "SETTING OUT ROADWORKS AHEAD" may also be used. The use of either of these signs should also be considered for works on other types of road. Alternatively, if VMS are available then these should be used to display the message "WORKFORCE IN ROAD SLOW", see paragraph [O7.2.32](#). Whenever possible, either of these signs should be enhanced by the addition of a high intensity flashing warning light, refer to paragraph [O4.7.15](#). The temporary sign or VMS message should be removed immediately following completion of the setting out work.

O3.6.4 Setting out should start with the "road works" sign to diagram 7001 at the recommended distance from the start of the taper. Signs and cones should then be set out in sequence, moving towards the site of the works. It may be necessary to involve the police or traffic officers when setting up initial traffic management signing on motorways and other high-speed roads.

O3.6.5 There are particular hazards associated with short-term temporary traffic management needed as part of the implementation of the main temporary traffic management. The implementation of such schemes therefore requires particular care. For example, for an overnight carriageway closure on a dual carriageway or motorway, see [Part 1: Design, Section D6.20](#), a rolling road block may be required to allow the remaining cones to be placed up the exit slip road to implement the closure (see paragraph [O7.2.68](#)).

O3.6.6 Consideration shall be given to the state of the traffic management at all times during the implementation of the temporary traffic management arrangements, e.g. when installation of the arrangement needs to take place over several nights, the detailed traffic management design should take account of and remove or control the risk associated with the intermediate arrangements.

O3.6.7 Whenever temporary traffic management operations involve regular repetition of layouts, e.g. use of overnight near side lane closures, the contractor should consider the safety advantages of changing legends or uncovering and recovering signs using remote control methods.

O3.6.8 Following the installation of, or changes to, temporary traffic management arrangements, an inspection shall be carried out by the person nominated to be responsible for traffic management at the site to ensure that all signs and delineators are correct or have been removed or covered, as appropriate. The responsible person shall be adequately trained and competent (see [Section O6.2](#)). For standard works on trunk roads, this person is normally the Traffic Safety and Control Officer (TSCO) or nominated deputy (see paragraph [O6.2.8](#)). For relaxation works on trunk roads and on other roads, the responsible person may be the:

- foreman responsible for activities in the working area;
- works supervisor;
- ganger;
- resident engineer; or
- highways inspector or superintendent.

This list of potentially responsible persons is not exhaustive. The Highway Authority has the ultimate responsibility for the administration of all work that affects its roads.

O3.6.9 The inspection shall include a drive through or visual inspection, as appropriate, to gain the drivers' perspective and ensure that signs are not obscured, legends are readable, and manoeuvres are safe. It is recommended that the inspection is formally recorded to provide evidence of the adequacy of the traffic management in the event of an incident.

O3.7 MAINTAINING STATIC TRAFFIC MANAGEMENT

O3.7.1 Signs, cones, temporary road markings and any existing road markings that form the traffic management layout shall be maintained for the duration of the temporary traffic management regime. Guidance on the assessment of the condition of traffic management equipment is given in [Appendix 4.3](#).

O3.7.2 The required intervals at which static traffic management is to be maintained will be specified in the design; see [Part 1: Design, Section D2.12](#). The temporary traffic management contractor should make the resources available to carry out the checks/maintenance and should carry out a risk assessment and produce a method statement for the maintenance operation.

O3.7.3 Contractors should be aware that the amount of work associated with maintenance of any particular layout may vary throughout the duration of a scheme due to variations in things like volume of traffic and weather. The contractor shall ensure that he provides sufficient resources at all times to maintain the layout in a safe condition.

O3.7.4 On high-speed roads, in particular, during the maintenance of traffic management the use of a sign with the legend "WORKFORCE IN ROAD SLOW" to diagram 7001.3 positioned on the near side of the carriageway, in advance of the first crossing point, or the use of VMS signs, should be considered; see also paragraph [O3.6.3](#).

O3.7.5 For a heavily-trafficked motorway site, maintenance at two-hourly intervals, twenty four hours a day, would be appropriate. This should include maintenance of cones, signs, barriers, temporary studs and markings, and at night also warning lights and any temporary area illumination provided during the hours of darkness. On large schemes, it may well take two hours for the maintenance crew to travel around the site, effectively making the maintenance a continuous operation.

O3.7.6 For other roads, appropriate intervals of inspection should be determined reflecting the vulnerability of the site. Two or three times a day would not be unreasonable for most circumstances. However, the frequency of inspection may need to be increased for sites where vandalism is found to be a problem.

O3.7.7 Sites which are unoccupied overnight or at the weekend still require the traffic management to be inspected and maintained. The frequency of the inspections should be commensurate with the level of risk should the temporary traffic management not function as required.

O3.7.8 Where works are in the vicinity of a school or a play area etc. there may be a need for increased maintenance.

O3.7.9 In the event of remedial work being needed, it should be undertaken in accordance with the method statement where applicable, and otherwise in accordance with the principles underlying the method statement; refer to [Section O2.4](#).

O3.7.10 All damaged and displaced signs, carriageway markings, cones, studs etc. shall be replaced as soon as it is safe and practicable to do so. In any case, signs and cones shall be replaced within 12 hours of damage or displacement being reported.

O3.7.11 Where a temporary speed limit is required, the signs must be in place at all times otherwise it is not possible to carry out speed enforcement – further guidance is contained in the HA guidance document entitled “Speed Limit Enforcement at Road Works: Guidance and Best Practice”.

O3.7.12 Inspection of speed limit, lane restriction and prohibition signs should be formally logged. Such logs may be used in enforcement cases to show that the signs complied with the Regulations.

O3.7.13 It is recommended that the checks and remedial actions should be formally recorded. This will provide evidence as to the adequacy of the traffic management in the event of an incident, and also allows recurrent problems to be identified.

O3.7.14 If there is a recurrent problem on a long-term layout, such as repeated damage to the temporary traffic management signs and devices being used, then the designer should be consulted to consider ways in which the layout may be improved. Where appropriate, the designer should consult with police and other parties.

O3.8 REMOVAL OF STATIC TRAFFIC MANAGEMENT

O3.8.1 The removal of temporary traffic management arrangements should be approached with the same level of planning as that adopted for its deployment.

O3.8.2 On high-speed roads, in particular, during the removal of traffic management the use of a sign with the legend “WORKFORCE IN ROAD SLOW” to diagram 7001.3 positioned on the near side of the carriageway, in advance of the first crossing point, or the use of VMS signs, should be considered. See also paragraph [O3.6.3](#).

O3.8.3 The temporary traffic management arrangement should not be removed until a check has confirmed that construction works on the carriageway and/or footway are complete, and that the carriageway and/or footway is unobstructed and safe for traffic and pedestrians. The removal also needs to be co-ordinated with other activities on the site, so for example a safety inspection and audit can be completed under the protection offered by traffic management.

O3.8.4 In general, the temporary traffic management should be removed in a linear operation, working from the “end of road works” sign towards the advance road works signs. To afford the site operatives the maximum potential protection, the “road works” sign to diagram 7001 should be the last to be removed or covered. Operatives should work facing oncoming traffic and within the works area as far as practicable. The advance warning signs should be removed or covered as soon as practicable so as not to mislead drivers.

O3.8.5 On completion of the works or following the removal of temporary traffic management arrangements, if earlier, an inspection shall be carried out to ensure that all signs and delineators remaining are correct or else have been removed or covered as appropriate. Inspection shall include a drive through or visual inspection, as appropriate, to ensure that all temporary traffic management and signs have been removed and any permanent road signs that were temporarily covered or removed have been uncovered or reinstated correctly.

O3.9 WORKING IN THE HOURS OF DARKNESS

O3.9.1 The following checks should be conducted during daylight hours prior to works to be conducted during the hours of darkness, as necessary:

- stopping points for vehicles should be pre-determined and positively identified;
- the proposed location for temporary signs, the start and end of tapers, and longitudinal coning should be positively identified;
- relevant verges and central reservations should be inspected for hazards, and to ensure that there is adequate width to place the temporary signs safely;
- consideration should be given to pre-placing signs in the central reservation or verge so that they then only need to be stood up at night;
- carriageway crossing points should be checked to ensure that there are adequate sight lines to see oncoming traffic; and
- the position of any overhead electric lines likely to impinge on the planned traffic management activity should be positively identified.

O3.9.2 Traffic flows and other factors dictate that some traffic management activities are conducted during the hours of darkness. Such operations require additional pre-planning, resources and procedures to those needed for daytime activities.

O3.9.3 Although the risk of encountering high traffic flows are reduced by working during the night, other factors such as poor driver behaviour, higher speeds, fatigue, difficulty in judging distances and limited vision will increase the risk of working during the night. Throughout the hours of darkness, coning and signing shall be supplemented by the addition of warning lights and high intensity flashing warning lights as appropriate. These high intensity lights may be used only as prescribed by regulation 54. See [Section O4.7](#).

O3.9.4 Further detailed guidance on working at night can be found in “Guidance for Safer Temporary Traffic Management”, (CSS/HA/HSE 2002); see [References \(Appendix 3\)](#).

O3.10 ADVERSE WEATHER CONDITIONS

O3.10.1 Traffic management operatives and contractors should be aware of the effects of adverse weather, such as decreased visibility in fog or heavy rain, increased stopping distances, and the reflective glare of sunlight on a wet road surface. It is essential that a risk assessment identifies clearly the hazards associated with adverse weather and that adequate controls are in place. Wherever possible, the traffic management operator should seek agreement with the client regarding the acceptable limits of adverse weather prior to work taking place.

O3.10.2 When visibility of the signs and the works is seriously affected by the onset of adverse weather conditions, it may be appropriate to improve the advance warning by the addition of high intensity flashing warning lights on the approach to the site. These flashing warning lights may only be used where allowed under regulation 54.

O3.10.3 If the conditions persist it may be advisable to cease work and to clear the site of all personnel in the interests of their safety. In exceptional cases, it may be better to clear the carriageway of all obstructions due to the works if this can be done safely. The initial decision in any of these eventualities is for those supervising the works and maintaining the traffic management, although the final decision is for the police and/or client and will depend on all the prevailing circumstances, including the nature of the works, the volume of traffic and the characteristics of the weather conditions.

O3.11 WORKS ACCESS POINTS

O3.11.1 Access to and exit from the works area require signing both for the purpose of directing works traffic and to alert other road users of the likelihood of works vehicles making unexpected manoeuvres. Care needs to be taken to ensure that these signs do not obstruct sight lines and neither obstruct the view of, nor are obstructed by other signs.

O3.11.2 For works vehicles to gain access to a site, cones and barriers may have to be removed. Unless these cones and barriers are replaced immediately, other vehicles may follow the works vehicles into the site and in built-up areas visually impaired pedestrians may stray on to the site.

O3.11.3 Traffic entering or leaving works accesses should behave in the same manner as traffic entering or leaving any side road. The introduction of a new access may require the provision of "side road ahead" signs to diagram 506.1 on the public road and the signs may carry an additional plate to diagram 7301, with the legend "WORKS ACCESS". Right turns into sites on single carriageway roads should be avoided unless traffic control is used. The responsibility rests with drivers of emerging vehicles to manoeuvre safely.

O3.11.4 Where construction traffic, especially heavy earth-moving equipment, regularly crosses an existing public road, the junction should be signed as for crossroads and a "HEAVY PLANT CROSSING" plate variant to diagram 511 should be provided below a "crossroads ahead" sign to diagram 504.1. The normal road works signing, including portable traffic signal control, will also be required on the public road. For more information on haul routes see [Part 1: Design, Section D3.23](#).

O3.11.5 Only prescribed or authorised signs may be used on public roads. Unauthorised signs, such as "Caution Lorries Turning", must not be used and would be considered an obstruction of the highway.

O3.11.6 The "NO WORKS TRAFFIC" sign variant to diagram 7301 may be displayed in order to prevent the use of selected routes by works traffic seeking to gain access to a nearby site.

O3.11.7 The "WORKS TRAFFIC" sign to diagrams 7303 to 7306 may be used to direct traffic to a works access. The contract number of the access may be added to this sign in order to identify a particular access but the sign will then need to be authorised by the appropriate Secretary of State.

O3.11.8 To improve the conspicuity of the access point to approaching works vehicles, close-spaced cones to Detail B may be used over a distance of approximately 20m before and after the access point.

O3.11.9 When works are in progress on motorways and other dual carriageway roads, works vehicles shall not cross from one carriageway to the other by means of the emergency crossings or the central reservation. Any existing emergency crossing points within the length of the road works should be closed. For routine maintenance, vehicles should reach the other carriageway by means of the nearest junction.

O3.11.10 The presence of slow-moving works vehicles in the right-hand lane is highly dangerous. Where it is necessary for works vehicles to enter the right-hand lane in connection with road works or to use the central reservation, the right-hand lane should be taken out of use in the appropriate manner.

O3.11.11 Entrances should be kept clear of plant and vehicles at all times to ensure that entering vehicles do not have to slow or stop partially in the entrance. Such accesses will function as side roads and shall be treated accordingly in relation to traffic safety needs. The volume of traffic entering and leaving these accesses will often be well in excess of traffic movements at many rural junctions and they should therefore be designed and signed so that drivers on the public road have adequate warning of their presence. A "WORKS TRAFFIC ONLY" sign variant to diagram 7301 should be provided at these accesses, which should have adequate sight lines. "Advance direction to the works" signs to diagram 7306 should normally be provided unless traffic speeds are low and the access is very clearly visible from a distance.

O3.12 LOADING AND UNLOADING OF MATERIALS

O3.12.1 As part of a road works scheme there may be a number of vehicles on the carriageway engaged in loading and unloading materials, but the number of occasions when such vehicles need to stand on the public road shall be kept to a minimum. These vehicles will interfere with traffic flow and create a hazard in just the same way as would any other standing vehicles. Wherever possible therefore they should not stop on any part of the carriageway in use. However, if this is not practicable they should stop within the limits of a properly signed and delineated area both for their own protection and that of the travelling public. An allowance for waiting space for works vehicles should be made when setting out road works barriers, cones etc.

O3.13 PEDESTRIANS

O3.13.1 Road works will often interfere with the free movement of pedestrians causing them to be diverted from their usual path and even on to the carriageway. Pedestrians shall never be forced into dangerous situations. They should be protected from the works and vehicular traffic by means of continuous barriers that clearly delineate and warn pedestrians of the works' presence; see also paragraph [O4.11.6](#).

O3.13.2 Traffic cones must not be used as a barrier system. Pedestrian barrier systems, when placed in the carriageway, must be separated from the adjacent traffic lane by either traffic cones or temporary vehicle safety barriers. It is not acceptable to separate pedestrians and vehicular traffic only with pedestrian barrier.

O3.13.3 Continuous barriers surrounding the entire site should be erected whenever the works are unattended; see [Part 1: Design, Section D3.10](#).

O3.13.4 Continuous barriers or fences on the footway or carriageway should be enhanced with the addition of warning lights by night.

O3.13.5 Footways should be of a suitable width for the volume of pedestrian traffic. Temporary pedestrian routes should be at least 1.5m wide wherever possible, and should be a minimum of 1.2m wide with an absolute minimum of 1.0m in exceptional circumstances. If sufficient width cannot be maintained on existing footways then alternative measures should be put in place. Options include placing a temporary footway in the carriageway, diverting the footway onto a verge or across the road, or escorting pedestrians through the works using signing and staff. The measure chosen should be based on a site specific risk assessment. Where the normal pedestrian route is severely interrupted, "direction of temporary pedestrian route" signs to diagram 7018 should be provided. It is important to note that the "keep left/right" sign to diagram 610 must not be used to direct pedestrians when footways are diverted. See also [Part 1: Design, Section D3.32](#).

O3.13.6 The special needs of people with visual and other mobility impairments and persons with prams or wheelchairs should be kept in mind. Protection for people with a visual impairment will generally require that road works sites should be guarded on those sides accessible to pedestrians. This is not necessarily restricted

to the footway side of the works. Provision may need to be made for people crossing the road. There must be a pedestrian barrier which may be readily detected by a visually impaired person using a stick; see [Section O4.11.6](#) and [Part 1: Design, Section D3.10](#).

O3.13.7 When temporary pedestrian ways need to be placed in the carriageway the signing and guarding should be put in place before the footway is blocked.

O3.13.8 The colour on the back of signs is prescribed in direction 41 but the sign frame/post may be any colour. Frames may therefore be painted a conspicuous colour, e.g. yellow, to delineate the edge of a sign.

O3.13.9 Where a temporary footway is provided, its surface shall be of an adequate standard. Well secured timber planking (free of projections), compact fine-grained material or tarmac are acceptable, but unbedded flagstones or loose hardcore are not. Ramps must be provided where temporary footways are diverted across a kerb and a temporary alternative facility shall be provided to replace any ramped access way which is broken up or obstructed.

O3.13.10 Ramps should have a slip resistant surface and should slope gently enough to enable wheelchair users and pushchairs to negotiate it without difficulty. The maximum gradient should be 1 in 20. When possible, the layout should include a platform at kerb level which would allow wheelchair users to turn through 90° before descending the ramp.

O3.13.11 Hazards on the footway such as open chambers, excavations etc. should be guarded adequately at all times. They should never be left unattended unless the covers are replaced, plated over or protected by barriers.

O3.13.12 When a cable is pulled from a drum or coil, care shall be taken to avoid direct injury to either workers or pedestrians and to avoid creating an obstruction on the footway over which pedestrians may trip, or an obstruction on the carriageway.

O3.13.13 Footways should always be kept clear of mud and other loose material.

O3.14 CYCLISTS

O3.14.1 Consideration must be given to the safety of cyclists in particular when narrow lane techniques are applied on all-purpose roads.

O3.14.2 Long lengths of narrow lanes can cause difficulties for cyclists and it may be preferable to have lanes that are too narrow for other vehicles to overtake than lanes where passing is possible but unsafe. Lane widths between 2.75m and 3.25m should be avoided. Detailed guidance on lane widths is given in [Part 1: Design, Section D3.3](#).

O3.14.3 In situations where motor vehicles are unable to pass cyclists safely, e.g. where the effective lane width is less than 3.5m, the use of temporary speed limits should be considered, backed by the appropriate enforcement methods, where feasible; see [Part 1 Design, Section D3.7](#).

O3.14.4 It should be borne in mind that cyclists are particularly vulnerable to rough surfaces (temporary or otherwise) and particularly gullies at the edge of the carriageway. Therefore, wearing courses should be kept as level as possible, especially at locations where cycling demand is known to exist. Guidance on surface condition is given in [Section O3.16](#).

O3.14.5 Care should be taken not to place cones, signs and other items in locations likely to cause hazards to cyclists.

O3.14.6 Where there is cycle provision, such as cycle lanes or tracks, efforts should be made to keep these open or to provide an acceptable alternative during the road works. They should not be blocked by signs, debris, plant etc.

O3.14.7 The settings on portable signals should give cyclists sufficient opportunity to pass safely through road works, particularly where oncoming motor vehicles cannot pass without conflict. See [Section O3.21](#) for guidance on the use of portable traffic signals.

O3.14.8 When cycle routes, and other facilities for the exclusive use of cyclists and pedestrians, are affected by the road works the changes should be clearly signed well in advance of the road works.

O3.14.9 Cyclists may be tempted to ride contra-flow to the traffic or use the footway in order to avoid potential hazards, lengthy diversions or other long delays. Hence, wherever possible, access for cyclists should be maintained in both directions throughout the period of road works, avoiding more hazardous diversions. Where possible, a segregated cycle lane or route away from the carriageway should be provided particularly on dual carriageways or multi-lane roads.

O3.14.10 Department for Transport Traffic Advisory leaflet 15/99 gives further guidance on catering for the needs of cyclists at road works.

O3.14.11 For road works on routes used by both cyclists and pedestrians, the guidance given in this section should be considered in conjunction with that given in [Section O3.13](#).

O3.15 WORKS OFF THE CARRIAGEWAY

O3.15.1 For works which are completely outside the carriageway, a risk assessment of their impact on adjacent traffic should be carried out. Consideration should be given to the number of works vehicle movements anticipated and the number of personnel working alongside the carriageway. Works which do not affect vehicular traffic in any way should not be signed with a "road works" sign to diagram 7001 or "keep left/right" signs to diagram 610. Works considered likely to have an effect upon traffic should be signed in accordance with the principles of [Part 1: Design](#). In certain circumstances, coning of the verge to delineate the works area may provide information for drivers that operations are underway off the carriageway and give reference points to the workforce of their works area.

O3.16 SURFACE CONDITION

O3.16.1 As part of a temporary traffic management layout, there will be occasions when areas of carriageway are brought into operation that would not normally be used. The adequacy of these temporary surfaces should be considered before use. In particular, the effect on traffic of the following should be borne in mind:

- cross falls on chevron areas;
- gullies and channels;
- drain covers in hard shoulders and in central reservations at crossovers;
- clearances if traffic runs on edge strengthening (e.g. safety barrier, emergency telephones); and
- surface condition, the need to sweep the surface and skidding resistance.

Similarly the effect on carriageways of carrying unexpected traffic loads needs to be considered (e.g. drain covers on the hard shoulder may need to be strengthened).

O3.16.2 Any person, persons or organisation responsible for the works shall ensure that the site of works or the highway (or any other road to which the public have access) is left in a condition which is not dangerous to road users.

O3.16.3 When road surfaces are removed or reshaped by planing operations before being resurfaced, the pattern of grooves left on the temporary surface and the presence of gratings and covers standing proud of the surface often create particular hazards to riders of motor cycles and bicycles.

O3.16.4 The "TEMPORARY ROAD SURFACE" sign variant to diagram 7010.1 should be used to warn drivers of an unfinished road surface, e.g. when road surfaces are removed or reshaped by planing operations before being resurfaced. Particular attention should be given to the programming and contractual arrangements for planing and resurfacing works so as to reduce to a minimum the periods that elapse between these operations. All reasonable steps should be taken to reduce hazards in the periods when the planed lengths are used as temporary running surfaces. A longitudinal step of more than 50 mm should always be marked by a line of cones. See [Part 1: Design, Section D3.18](#).

O3.16.5 The "uneven road" sign to diagram 556 may be used to warn of an uneven road in those cases where traffic is required to use a carriageway with more severe undulations than those for which the "TEMPORARY ROAD SURFACE" sign variant to diagram 7010.1 would be used; see Chapter 4.

O3.16.6 Sloping fillets formed of cold asphalt should be provided for every raised cover over which vehicles, wheelchairs, pushchairs or pedestrians may pass. They should be so sloped as to provide an easy path for vehicles, especially two-wheeled vehicles. If fillets are not provided, raised covers are a hazard both to vehicles and pedestrians. In such cases advance warning signs as described in paragraphs [O3.16.4](#) and [O3.16.5](#), and barriers around the obstruction together with a "keep left/right" sign to diagram 610 should be provided, augmented by warning lights during the hours of darkness.

O3.16.7 In no case should these precautions be accepted as an alternative to the restoration of the levels of the adjacent carriageway or footway surfaces at the earliest possible opportunity.

O3.16.8 The "RAMP AHEAD" sign variant to diagram 7010.1 warns of a sudden change of road level which the driver is approaching, and should be sited not less than 30m before the ramp. The sign should be used when the change in level exceeds 15 mm. The sign must always be used in conjunction with the "RAMP" sign to diagram 7013. The gradient and length of the ramp will be dictated by the speed at which vehicles are expected to traverse it. Wherever possible, the ramp should be constructed at right angles to the vehicle path.

O3.16.9 "RAMP AHEAD" and "RAMP" signs must also be used when cable crossing protectors which exceed 15 mm in height are placed in live traffic lanes. These protectors are typically to be found in use in conjunction with portable traffic signal cabling. See also [Section O3.21](#).

O3.16.10 The very nature of road works means that mud may be deposited on carriageways or footways and cause a hazard, but every precaution must be taken to prevent this happening. (It is an offence under the Highways Act to deposit mud or other debris onto the road surface.) Clay, chalk and similar materials become slippery when wet and therefore constitute additional dangers. All such deposits must be removed without delay. The installation and proper use of wheel washing equipment can virtually eliminate the problem. Similarly, water shall not be pumped or be allowed to flow on to the highway to an extent which may cause dangerous conditions (e.g. through the formation of ice in frosty weather). If necessary, special drainage facilities should be provided.

O3.16.11 The "slippery road" sign to diagram 557 may be required because of the deposit on the road of mud, clay, chalk or other excavated materials. Every effort must be made to reduce this hazard to a minimum by requiring regular road washing/brushing, but the sign should be erected whenever surfaces become slippery. The provision of this sign does not absolve contractors from their duty under the Highways Act 1980. A "distance over which hazard extends" plate to diagram 570 may be used with the sign (see also Chapter 4).

O3.16.12 Where hard shoulders are to be used as temporary running lanes carrying heavy traffic during maintenance works, they shall be structurally adequate to carry the traffic for the period of such use and have a surface with skidding resistance similar to that of the permanent running lanes; see [Part 1: Design, Section D3.18](#).

O3.16.13 The use of road plates may be appropriate to bridge excavations in order to open the carriageway to traffic for example during traffic sensitive periods and should be used following a site specific risk assessment. The plates must be rigidly secured to the road surface and must either be sunk into the surface or suitable bituminastic material used to provide a ramp to plate level. Where a ramp is used, appropriate ramp warning signs should be used; see paragraph [O3.16.8](#).

O3.17 SURFACE DRESSING

O3.17.1 The particular requirements for traffic management arrangement relating to surface dressing operations are included in the RSDA/CSS document "Code of Practice for Traffic Safety and Control of Surface Dressing Operations".

O3.17.2 The "loose chippings" sign to diagram 7009 is used during surface dressing operations to warn of the likelihood of loose chippings on the carriageway; see Chapter 4. This sign must be reflectorised if it is not directly lit. The sign must be retained in position until the danger from flying chippings has passed. It should be accompanied by an "advisory speed limit" plate to diagram 513.2 indicating an advised maximum speed of 10 or 20 mph during the period that the chippings are being embedded by the traffic. See [Part 1: Design, Sections D3.7 and D3.29](#). Consideration should also be given to the use of a non-prescribed supplementary plate reading "Skid risk". Details of how this plate should be used, and authorisation for its use, can be obtained from the Overseeing Organisation.

O3.17.3 Traffic, particularly from side roads, shall not be allowed to drive over unchipped binder. Where possible, drivers should be encouraged to use an alternative route.

O3.17.4 During heating and planing operations, adequate space shall be allowed to ensure that pedestrians and vehicles, especially those with inflammable loads, are not endangered.

O3.17.5 See [Part 1: Design, Section D3.29](#) for further guidance on surface dressing.

O3.18 STORAGE OF MATERIALS

O3.18.1 It should rarely be necessary to store road working materials etc. on the central reservation of a dual carriageway road. However, any such obstruction on the central reservation should be kept as far as possible from the edges of the carriageways and in such a position that sight lines are not obstructed and that there is no interference with the proper functioning of any safety fence. Any signs stored in the central reservation should be laid down with legs pointing away from traffic flow.

O3.18.2 Obstructions should be lit and marked with signs unless they have more than the required lateral clearance from the carriageway and/or safety fence. If signs and/or cones are required it should be remembered that traffic in the adjacent lane will require the maximum appropriate warnings and a coned taper should be provided; see [Table A1.1 \(Appendix 1\)](#).

O3.18.3 On most construction sites the delivery, storage and access to materials can cause concern. On road works sites with the inherent constraints on space, detailed consideration needs to be given to ensure that materials are delivered safely, stored without encroaching into safety zones and can be accessed without undue difficulty. Access to and exit from the site have been considered in [Section O3.11](#).

O3.18.4 Constraints on the timing of deliveries may need to be considered to ensure that materials can be safely delivered. Particular attention should also be given to the storage of materials that are hazardous to health.

O3.19 PARKED VEHICLES

O3.19.1 In some circumstances works off the carriageway, as well as on the carriageway, may require vehicles to be parked on the carriageway (see paragraph [O3.19.4](#)).

O3.19.2 The design aspects of works on minor roads are dealt with in [Part 1: Design, Section D5.3](#).

O3.19.3 For works on the carriageway where there are no parked vehicles in the vicinity of the works, and there is no works vehicle in attendance to afford protection, the following signs should be provided together with cones and pedestrian barriers as necessary:

- “road works” signs to diagram 7001;
- “keep left/right” signs to diagram 610;
- “road narrows” signs to diagram 517; and
- “lane closed” barriers to diagram 7105.

The presence of an occasional parked vehicle does not require different treatment.

O3.19.4 For works on the carriageway with a works vehicle in attendance:

- in the interests of safety, vehicles used at road works should be conspicuous, see [Section O5.2](#);
- where a vehicle meeting the above requirements is parked within the coned-off area, the “lane closed” barrier to diagram 7105 need not be used; and
- works vehicles and plant should not be parked in a position where they are likely to obstruct junctions, accesses or driveways.

Provided that all the following conditions are met:

- the permanent speed limit is 30 mph or less, and
- there is a total two-way traffic flow of less than 400 vehicles per hour, and
- less than 20 heavy goods vehicles and buses pass the works site per hour

then if a roof-mounted flashing amber beacon is continuously operating, and if the beacon is always clearly visible from a distance of at least 50 m on each approach, it will not be necessary to provide the “road works” signs to diagram 7001 or the “road narrows” sign to diagram 517 in advance of the works.

O3.19.5 The “road works” sign to diagram 7001 should normally be placed 45 m in advance of the works, but this distance may have to be greater if the visibility of the sign is impaired by features of the road. However, in urban areas the sign may need to be placed closer where there are numerous side roads so that the sign does not become disassociated from the works. [Sections D5.4 to D5.10 of Part 1: Design](#) provide details of different methods of traffic control.

O3.19.6 On minor roads where the parking of vehicles is usual and parked vehicles are likely to be present for the duration of the works, advance warning of works which are taking place in the space between the parked vehicles should normally be provided by a “road works” sign (7001) if it is practical to do so. Advance warning shall always be provided if the delineated area (including working space and safety zones) extends into the carriageway beyond the line of vehicles, a line of cones should be placed in the carriageway along the length of the works in line with the parked vehicles. The works should have a continuous barrier on the footpath side at all times to safeguard pedestrians (see [Section O3.13](#) and [Part 1: Design, Section D3.10](#)), and provision made for the installation of any necessary additional barriers and coning to safeguard the perimeter of the works when parked cars are moved.

O3.19.7 For works on the carriageway with parked vehicles:

- a line of cones should be placed on the traffic side at all times. To allow for the eventuality of the parked cars being moved, when the works are unattended there should be a continuous barrier on the footway side to safeguard pedestrians (see [Part 1: Design, Section D3.10](#)) and the guidance given in paragraphs [O3.19.3](#) and [O3.19.4](#) should be adopted. If the delineated area, which includes a safety zone, extends into the carriageway beyond the line of vehicles a “keep left/right” sign to diagram 610 will be required;
- if a works vehicle is present at this type of work it may occupy one of the parking spaces next to the site. For a visiting works vehicle the space can be kept clear by the provision of cones; and
- if the majority of the parked vehicles are removed so that the site of the works becomes exposed to traffic, it will then be necessary to revert to the arrangements described in paragraphs [O3.19.3](#) and [O3.19.4](#).

O3.20 MATRIX SIGNALS

O3.20.1 Permanent motorway matrix signals are generally located at intervals on the central reservation and at junctions. On some sections of motorway these signals are placed on gantries and used to display temporary restrictions, e.g. controlled motorways. Matrix signals form part of the national motorway communications network and are operated either by the police or the highway authority from regional control centres. Motorway telephones are also connected to the regional control centres.

O3.20.2 Permanent motorway matrix signals are intended for use in connection with incidents or specific circumstances, where other means of control are unlikely to be effective. Standard practice for road works is to use normal signing and coning with the use of signals being restricted to those situations where the normal methods cannot cope. Signals can be used to assist during the setting-up, alteration, or removal of temporary traffic management arrangements, when the signs can display a message such as “WORKFORCE IN ROAD” (see paragraph [O3.6.3](#)), but as soon as the normal static signs and cones have been installed and the workforce are clear of the remaining live carriageway, the message should be switched off. The precise arrangements to be adopted should be a matter for agreement between the Highway Authority, or the agent acting on its behalf, and the police.

O3.20.3 When traffic management is set up to close traffic lanes or divert traffic onto the hard shoulder at locations where there are matrix signals on overhead gantries or in the central reservation, there is a risk that the matrix signals could be set to give contradictory or confusing indications. In such cases the police or local traffic control centre should be notified and kept informed so that they can take account of the changed lane situation if the matrix signals need to be activated.

O3.20.4 If the traffic management is to be in operation for longer than 24 hours the Highway Authority, or the agent acting on its behalf, should be informed with a view to the possibility of disabling the signals in order to prevent the inadvertent display of erroneous messages. Where queue detection systems (e.g. MIDAS) are installed within the area of the works, consideration should be given to disabling the system for the duration of the traffic management operations concerned.

O3.20.5 Consideration should also be given to the use of portable VMS to support temporary traffic management arrangements. However before use, suitable legends and operational protocols shall be agreed with the Highway Authority. The signs themselves should have sign authorisation and type approval as appropriate and should meet the standard laid out in HA document TR2516, "Specification for discontinuous Variable Message Signs" or equivalent.

O3.21 PORTABLE TRAFFIC SIGNALS

O3.21.1 Useful advice on the operation of portable traffic signals is also given in the Department for Transport booklet "An introduction to the use of vehicle actuated portable traffic signals".

O3.21.2 Control shall be exercised in such a manner that no additional hazards are created and the traffic flows as smoothly as possible in the circumstances. Care should be taken to ensure that any lighting adjacent to portable traffic signals, e.g. sign lighting, floodlighting etc. does not affect visibility of the signal indications.

O3.21.3 Signals must be to diagram 3000.1 and capable of operating on vehicle actuated, fixed time and manual modes.

O3.21.4 The normal mode of operation with portable traffic signals is vehicle actuation and this should be used in all cases except where the Highway Authority directs otherwise in writing.

O3.21.5 Manual operation may also be used to deal with short-term problems, without reference to the Highway Authority, e.g. when a shuttle lane is temporarily blocked. During manual operation the signals shall be under the control of a competent operator at all times.

O3.21.6 The settings for signals should be supervised by competent persons to ensure that minimum delays are obtained. Contractors shall ensure that such persons are available throughout the period during which traffic control is necessary.

O3.21.7 On roads subject to appreciable tidal flow, the maximum green time should be altered to cater for morning, evening or off-peak traffic conditions.

O3.21.8 During the hours of darkness on unlit roads, the base of the signal support should be marked by a separate non-flashing warning light to allow for failure of a signal lamp.

O3.21.9 The signals should be moved with the work where it is of a type that moves progressively along a road.

O3.21.10 Alternate one-way working should not be used over distances greater than 300m. For greater distances the Highway Authority shall be consulted. See also [Part 1: Design, Section D5.10](#).

O3.21.11 Where the signals are positioned on the near side of the approaching traffic, the effectiveness of the detectors used with vehicle-actuated operation is maximised. Where the signals are connected by cable, the layout requires the cable to cross the running lane. To prevent damage and minimise the danger to road users, in particular cyclists, motorcyclists and horse riders, a cable crossing protector should be used. The best position for the cable crossing is halfway along the shuttle lane where there is less possibility of vehicles braking or accelerating as they pass over the cable. An alternative to the cable crossing protector for works of long duration is to place the cable in a slot cut into the road surface which should be reinstated.

O3.21.12 Cable crossing protectors shall be secured against movement and should not present a risk to road users passing over them, especially cyclists and motorcyclists. The Highway Authority should be satisfied that the cable crossing protector is safe and fit for use.

O3.21.13 "RAMP AHEAD" and "RAMP" signs must be used when cable crossing protectors are placed in live traffic lanes. Refer to paragraphs [O3.16.8](#) and [O3.16.9](#) for the principles of their use.

O3.21.14 The arrangement where the signals are positioned on or near the centre line of the road at both ends of the works has the advantage that, because there is no need for electricity cables to cross the running lane, the signals can if required be easily moved along the road as the work progresses. The arrangement also gives better visibility to oncoming traffic because the signal is less likely to be obscured by stationary vehicles. It has the disadvantage that with vehicle-actuated operation the effective range of the detectors is much reduced by interference from receding vehicles. This problem is aggravated by the significant gap which exists necessarily between the signal head and the "WHEN RED LIGHT SHOWS WAIT HERE" sign to diagram 7011 or "stop" line to diagram 1001 at one end of the works.

O3.21.15 "STOP/GO" boards to diagrams 7023 and 7024 must be available on all sites to control traffic in the event of portable traffic signal failure. The number of these boards available should be equivalent to the number of temporary signal heads in use. When not in use, the "STOP/GO" boards should be stored under or next to the signal controller to facilitate rapid location should the signals fail. The "STOP/GO" boards can only be deployed if sufficient trained operators are available. For details of the operation of "STOP/GO" boards see [Section O3.22](#).

O3.21.16 The "traffic signals ahead" sign to diagram 543 is used to warn drivers that they are approaching traffic signals. It may be accompanied by a "distance to hazard" plate to diagram 572.

O3.21.17 The "TRAFFIC UNDER SIGNAL CONTROL" sign to diagram 7021 must be erected with a "road works" sign to diagram 7001 on every side road leading to an uncontrolled junction within a length of road controlled by portable traffic signals or "STOP/GO" boards. This procedure shall be used only when traffic held at the signals is visible to the joining traffic.

O3.21.18 The "JOINING TRAFFIC NOT SIGNAL CONTROLLED" sign to diagram 7022 together with an "other danger ahead" sign to diagram 562 is required within a length of road controlled by portable traffic signals at each uncontrolled junction with a side road. On trunk roads the sign shall always be used if appropriate.

O3.21.19 When traffic signals are not operating (removed from use), for any significant period of time, the signal head should be bagged over. Alternatively, for periods of less than one week, signs to diagram 7019 may be erected to indicate that the signals are not in use. The signs should be fixed to the traffic signal posts, and may also be erected in advance. However they should never be used if portable signals are in use at the same location. Signs to diagram 7019 must be reflectorised if not directly illuminated by specially provided luminaires.

O3.21.20 A risk assessment should be carried out and contingency plan prepared in anticipation of signal failure at signalled intersections. The sign "Light signals not in use", diagram 7019, is prescribed for use where signals fail. White retroreflective borders on the backing boards of the signals, to enhance conspicuity, are also very useful if signals fail. However, if the absence of signal control is predictable and long term, signs to diagram 7019 may be necessary, whether or not the backing boards have a white retroreflective border. The risk assessment and contingency plan need to take into account predictability and the duration of the problem. For example, a power failure is neither predictable in occurrence nor duration. If a sign to diagram 7019 is used as part of a contingency plan, it could be confusing and potentially dangerous if the signs remain in place when the signals are working again. Switching off the traffic signals should be considered to avoid the risk of confusion and a potential dangerous situation until the signals are ready to be operated again. Maintenance of traffic signals is dealt with in [Part 1: Design, Section D3.25](#).

O3.21.21 Where personnel are working on signals in close proximity to traffic, other than in short-term situations, the traffic signal maintenance sign (prescribed variant of diagram 7010.1) should be provided in advance of the signals. This sign must be reflectorised if it is not directly illuminated.

O3.21.22 The “TRAFFIC CONTROL AHEAD” sign variant of diagram 7010.1 should not be used to warn of traffic control by traffic signals. It should be used only at road works to warn that there is manual control of traffic ahead by the use of “STOP/GO” signs to diagrams 7023 and 7024. See [Section O3.22](#).

O3.21.23 Traffic control arrangements should be reviewed to ensure delays are kept to a minimum and amended to suit the circumstances, adjusting the associated signs accordingly.

O3.21.24 If traffic signals that operate during the day are removed at night or over a weekend, the “traffic signals ahead” signs to diagram 543 must also be removed.

O3.21.25 The “WHEN RED LIGHT SHOWS WAIT HERE” sign to diagram 7011 is normally placed about 2 m in advance of portable traffic signals when use of a “stop” line to diagram 1001 is inappropriate or impracticable. The sign indicates the position at which the first vehicle should wait when the signals show red. As a variant of the sign to diagram 7011, the words “RED LIGHT” may be replaced by “STOP SIGN”. See also [Part 1: Design, Section D5.8](#). Careful positioning of the signals and of the sign is essential to ensure that vehicles from the opposite direction have sufficient room in which to clear the waiting vehicles and to return to their own side of the road, if necessary.

O3.21.26 If portable traffic signals are not operating, they should be removed or at least turned away so that it is clear that they are not in operation.

O3.21.27 At sites with high traffic flows and/or poor carriageway alignment, it may also be appropriate to keep sufficient “TRAFFIC CONTROL AHEAD”, “WHEN STOP SIGN SHOWS WAIT HERE” signs in reserve to enable “STOP/GO” traffic control, complying with [Section D5.8](#) of [Part 1: Design](#), to be implemented quickly in the event of failure of the traffic signals.

O3.21.28 Where a junction is normally controlled by “GIVE WAY” signs and the designer has decided that the level of traffic or visibility problems require the minor road or access to be controlled by signals, both the junction and the shuttle lane should be controlled by a multiphase portable signal controller and the “GIVE WAY” signs and lines should be temporarily masked or removed. Any cable crossing protectors used should be sited away from turning traffic and where braking and acceleration are unlikely to occur.

O3.21.29 Where the junction is normally controlled by permanent signals, the position of the proposed works will dictate the most appropriate course of action. A temporary change in the position of the stop line and/or one signal head may suffice. Should the vehicle detectors for the permanent signals be located within the area of the works or if traffic is diverted so that the vehicle detectors cannot register the passage of vehicles, the traffic signal controller should be switched to provide a permanent demand on that phase. If the works are to continue for more than a few days and delays are likely as a result of fixed time operation, alternative detection arrangements should be considered.

O3.21.30 Other situations may require the permanent signals to be switched off to allow traffic to be controlled by temporary signals (a reconfigured permanent signal controller and signals to diagram 3000), or by a multiphase portable signal set, or by one of the manual methods of traffic control. If any of the permanent signal heads cease to be relevant, they must be covered. A typical example would be a two-way road temporarily made one-way.

O3.21.31 Where the road works do not actually include a junction, but one is so close that difficulties may be encountered, multiphase control of the junction and shuttle lane may be inevitable, even though either the junction or shuttle lane taken in isolation would not require signal control. Local Transport Note 1/98, “The installation of traffic signals and associated equipment” states they should be to the same standard as permanent signals.

O3.21.32 Where a junction within a controlled area is of relatively minor importance it may not require to be separately signalled and the provision of warning signs may be appropriate (see paragraph O3.21.17). Vehicles emerging from uncontrolled side roads will normally join the rear of the traffic stream proceeding in the direction in which they wish to go. However, if emerging vehicles do not have a clear view of both ends of the works, there is a danger that they will set off in one direction only to be confronted with a traffic stream proceeding in the other. For this reason it is essential that clear visibility is available from the side road to both ends of the works if it is not to be signalled separately.

O3.22 “STOP/GO”

O3.22.1 “STOP/GO” signs to diagrams 7023 and 7024 are used for the control of traffic on single carriageway roads by an operative or operatives on site. They are combined to form a double-sided sign and used on a suitable stand or post. The design aspects for the use of these signs are given in Part 1: Design, Section D5.8. The signs can also be used in conjunction with single vehicle works; see Section O8.1.

O3.22.2 Before selecting “STOP/GO” signs as a method of traffic control, a risk assessment should be carried out to investigate the use of alternative safer methods of traffic control that remove the need for operators to stand in close proximity to a live traffic flow. On high-speed single carriageway roads the use of “STOP/GO” signs is not recommended at night.

O3.22.3 A system where a pair of “STOP/GO” signs is operated remotely by radio is available. Manually rotated “STOP/GO” signs should only be used if a risk assessment has determined that the use of remotely controlled signs is not appropriate. The reasons for not using remotely controlled signs should be documented in the method statement.

O3.22.4 If remotely controlled “STOP/GO” signs are used then the following conditions shall apply:

- the operator shall be positioned no more than 100 m from either sign board;
- the two sign boards shall be no more than 200 m apart;
- the operator shall have a completely unobstructed view of both sign boards and of oncoming traffic in both directions;
- vehicle flow through the road works site is no greater than 850 vehicles per hour;
- use of the remotely operated device shall be restricted to daylight hours; and
- the operator shall be fully conversant with the advice contained in this section concerning the normal manual control of “STOP/GO” signs, and have received comprehensive instruction in the use of both manual and automatic operation of these signs.

Where the site length exceeds the criteria set out above or the works take place during the hours of darkness, each remotely controlled sign board shall be controlled by a separate operative. The operatives shall be in contact with one another; see paragraph O3.22.8.

O3.22.5 If used, “STOP/GO” signs shall always be positioned to ensure both the maximum visibility of the sign and safety of the operator. It is important to note that manually rotated signs shall not be operated inside the safety zone. If this is not possible, then temporary traffic signals shall be used or the road should be closed temporarily to vehicular traffic.

O3.22.6 Appropriate measures shall be taken, in advance of the works, to reduce the speed of the traffic passing through the works.

O3.22.7 For very short lengths of alternate traffic movement, manually rotated signs at one end or in the middle will suffice, but if the distance exceeds about 20m, the control should be operated at both ends. If remotely-controlled signs are used, the distance of 20m may be exceeded if a risk assessment has shown that the presence of an operator is not necessary for drivers to obey the signs. However, the operator shall have a clear view of each approach to the control points.

O3.22.8 Where the obstruction continues round a bend or corner so that the operators posted at the ends cannot see each other, manually rotated signs should not be used. However if it is unavoidable for short-duration works or emergencies, then a third operator who can see the other two shall be placed at an intermediate point, or telephone or radio communication established between the two operators.

O3.22.9 When more than one operator is employed, the operator showing "STOP" will ask the operator showing "GO" to reverse their sign when the queue of traffic on the approach to the "STOP" sign has grown unacceptably long. The first operator will continue to display "STOP" until the traffic already in the shuttle length has passed through.

O3.22.10 Each sign should be so located that it is in full view of approaching drivers with adequate regard for the safety of operators, who should each wear a high-visibility garment; see [Section O6.3](#).

O3.22.11 During hours of darkness each sign face must be adequately illuminated by its own source of lighting; the use of reflectorised materials alone is not sufficient. Note that it is unlawful to use "STOP/GO" boards at night unless they are directly lit. As with fixed signs, illumination shall be uniform across the sign face and shall be steady. Partial illumination of sign faces is not permitted, nor is intermittent illumination.

O3.22.12 The "TRAFFIC CONTROL AHEAD" sign variant to diagram 7010.1 should be used to warn that traffic ahead is controlled by the use of "STOP/GO" signs which are manually operated. It is not to be used to warn of traffic control by traffic signals. See [Section O3.21](#).

O3.22.13 "STOP/GO" signs must not be used in conjunction with priority signs to diagrams 615 and 811.

O3.22.14 Where excessively windy conditions make a large sign difficult to handle the alternative smaller size may be used.

O3.22.15 Operators of these signs should be suitably trained; see [Section O6.2](#). Competence should be assessed, and training/instructions provided as necessary.

O3.23 "STOP-WORKS" SIGN

O3.23.1 The "STOP-WORKS" sign (7031) may be used only to stop traffic for a short period during works on or near a road. It should not be used as a substitute for other forms of control. The sign should be used only at sites where the risk is assessed as being low. It must not be used on a motorway (direction 13(3)).

O3.23.2 The sign must be double sided and mounted on a black/yellow banded pole (direction 41(5)), and must be held by the operator who should be wearing high-visibility clothing.

O3.23.3 During the hours of darkness each sign face must be adequately illuminated by its own source of lighting: the use of reflectorised materials alone is not sufficient.

O3.23.4 Two "STOP-WORKS" signs may be required in circumstances such as manoeuvring plant or works vehicles.

O3.23.5 The conditions for use of the "STOP-WORKS" sign (7031) are dealt with in [Part 1: Design, Section D5.9](#).

O3.24 PRIORITY TRAFFIC

O3.24.1 Priority signs may only be used on single carriageway roads and when certain conditions are met. See [Part 1: Design, Section D5.7](#).

O3.24.2 The “priority to vehicles from opposite direction” sign to diagram 615, which must be used with the plate “Give way to oncoming vehicles” to diagram 615.1, and “priority over vehicles from opposite direction” sign to diagram 811, which must be used with the plate “Priority over oncoming vehicles” to diagram 811.1, must always be used in conjunction with each other. The sign to diagram 811 must never be used upside down in an attempt to imply a reversal of the sign’s prescribed meaning.

O3.24.3 The “priority to vehicles from opposite direction” sign to diagram 615 is used at the beginning of the priority length. A plate to diagram 615.1 must also be used; “for” and a distance may be added (see working drawing P615.1). At the end of the priority length, the sign to diagram 615 is repeated with an “End” plate to diagram 645, which also acts as the conclusion of other prohibitions and restrictions. Where the length under control is less than 50 m, “End” plates are not necessary.

O3.24.4 According to the circumstances, the signs may be accompanied by the “keep left/right” sign to diagram 610 at the point where the obstruction occurs. It is usually preferable to give priority to vehicles which have an unobstructed lane past the works or to those vehicles which are climbing a steep gradient. However the decision shall depend on local conditions. The use of these signs is illustrated in [Part 1: Design, Section 5.7, Plan SC4](#). Reversing the priority from the permanent situation should be avoided if possible. If this is necessary, the sign variant “CHANGED PRIORITIES AHEAD” to diagram 7014 should be used in the direction which previously had priority, and the appropriate permanent priority signs should be covered.

O3.25 RAILWAY LEVEL CROSSINGS

O3.25.1 It is extremely dangerous to cause road traffic to stop on or move slowly over a level crossing. If works are to be carried out within the Precautionary Area, i.e. an area containing the whole or part of each street/road falling within 200 metres of the crossing when following a route leading from the crossing, special precautions must be taken to ensure the safe operation of the crossing. Design aspects of conducting works near or on level crossings are dealt with in [Part 1: Design, Section D5.17](#).

O3.25.2 Operators should ensure that traffic does not block back and stop on the crossing; care shall therefore be exercised in the traffic control arrangements.

TYPES OF RAILWAY LEVEL CROSSING

O3.25.3 There are three main types of railway level crossings.

- Automatic level crossings, with or without barriers, have road traffic signals which display a steady amber light for approximately 3 seconds followed by twin red flashing lights as a train approaches; in some cases, miniature red and green warning lights activated by trains are provided. Crossings may either have half-barriers which close the left half of the road or no barriers at all.
- Manually operated level crossings have gates or barriers which extend across the full width of the road. Some may have warning lights which are normally the same steady amber and twin red flashing lights as at automatic crossings, while at a few locations the normal three-aspect traffic signals are provided.
- Open level crossings have neither gates, barriers or any form of traffic signal.

O3.25.4 Details of the various types of level crossing protection are given in the Health and Safety Executive publication HSG 153/6 "Railway Safety Principles and Guidance. Part 2, Section E. Guidance on level crossings".

O3.25.5 At automatic crossings with or without barriers, the promoter of the works should arrange for the provision of a member of railway authority staff holding appropriate competencies to act as level crossing attendant. All train drivers will have been instructed to approach the crossing with caution and the attendant should ensure that the crossing is clear before any train passes over it. An attendant may only be omitted if this is specifically authorised in writing by the railway authority.

O3.25.6 If having commenced works there appears to be danger of traffic blocking back, the traffic control should be moved immediately to a point on the side of the crossing opposite the works (so that traffic can be stopped before reaching the crossing). The railway authority should then be telephoned from the crossing or the nearest point available.

O3.25.7 No cones, signs or signals should be placed on the crossing. The controlling operator of the "STOP/GO" signs should be the one positioned closest to the crossing.

O3.25.8 Whatever method of traffic control is used, the works or any associated equipment should not obscure permanent traffic signals, advance warning or information signs.

O3.25.9 Where telephones are provided, the works supervisor is to ensure that they are working correctly before starting work.

O3.25.10 Particular care should be taken if the works could cause visually or physically impaired pedestrians to move from their usual paths; see also [Section O3.13](#). Automatic crossings should be manned and train drivers cautioned to approach the crossing at reduced speed in accordance with paragraph [O3.25.5](#). This advice need not be given for mobile works such as sweeping or hedge trimming unless there is the possibility that the highway may be obstructed causing traffic to move slowly over the crossing. Operators should ensure that traffic does not stop on the crossing (see paragraph [O3.25.2](#)).

O3.25.11 At automatic level crossings, the control signs should be operated in the following manner:

- when the crossing is open to road traffic, the signs should be operated together to control traffic along the length of one-way working;
- when advised by the level crossing attendant, or if no attendant is present, as the amber lights in the road traffic signals at the crossing show, both signs should show "STOP" to traffic coming towards the crossing; the level crossing attendant will, where practicable, operate the crossing's own traffic signals (and at automatic half barrier crossings lower the barriers); and
- when the attendant advises, and all traffic signals are extinguished, normal alternate one-way working should be resumed; any vehicle held in the one-way section during passage of the train should be allowed to clear first.

O3.25.12 At manually-controlled level crossings where the barriers or gates and, where provided, associated road signals are controlled by a railway employee, either in an adjacent cabin or remotely located and controlling the crossing with the aid of closed circuit television, the control signs should be operated in the following manner:

- when the crossing is open to road traffic, the signs should be operated together to control traffic along the length of one-way working;
- the temporary manually operated "STOP/GO" signs on each side of the crossing must show "STOP" in both directions as soon as requested by the railway employee controlling the crossing, or as soon as the amber lights at the crossing first show;

- normal alternate one-way working should be resumed as the gates are opened or barriers lifted and, where provided, the road traffic signals extinguished; any vehicle held in the one-way section during passage of the train should be allowed to clear first; and
- when the obstruction is on the left-hand side of the road approaching the crossing the "STOP/GO" sign assembly on the exit side should be sited at least 25 m beyond the crossing; this is to ensure that the crossing signals are not obscured and also to allow sufficient space for vehicles to return to the left-hand side of the road beyond the crossing.

O3.25.13 At open level crossings, trains are required to approach at a slow speed. The approaches to open crossings on public roads are signed with "GIVE WAY" signs to diagram 602 and "open level crossing" plates to diagram 778. There is no telephone at open level crossings. If works have to be undertaken close to such a crossing "STOP/GO" signs are to be used. Care shall be taken to ensure that the "GIVE WAY" signs are not obscured by the works. The control signs should be operated in the following manner:

- when there are no trains approaching, the level crossing is open to road traffic; the "STOP/GO" signs should be operated together to control traffic along the length of one-way working;
- when the controlling operator sees a train approaching, he is to stop all road traffic ensuring that it is never stopped on the crossing;
- care shall be taken to ensure that no ambiguous instructions are given to road traffic as drivers are still obliged to obey the permanent "GIVE WAY" signs; and
- normal alternate one-way working may be resumed once the train has passed. Any vehicle held in the one-way section during passage of the train should be allowed to clear first.

LEVEL CROSSING LIGHT FAILURE

O3.25.14 At many level crossings, road traffic is controlled by permanent twin red flashing lights or traffic signals. Should these lights or signals fail, it is the usual practice for the railway authority to inform the police and appropriate procedures are taken to control road traffic.

O3.25.15 Contingency plans shall be prepared in advance for specific crossings. Any procedures so agreed shall be stopped immediately the crossing is working correctly again.

EMERGENCY WORKS

O3.25.16 If it is necessary to carry out emergency works, that is works which are required in order to put an end to, or prevent the occurrence of circumstances which are likely to cause danger to persons or property, the following actions are to be taken before works commence:

- at an automatic half barrier level crossing or at most automatic open crossings there are emergency telephones; these telephones shall be used to inform the railway employee monitoring the crossing;
- at manually operated or CCTV controlled level crossings the railway employee controlling the crossing is to be informed directly or by telephone as appropriate;
- in either event, works shall not proceed until the railway authority advises it is safe to do so.

O3.26 AIRCRAFT TAXIWAYS

O3.26.1 Highway authorities, statutory undertakers and contractors shall consult/notify the appropriate airport authority when planned or emergency works are being carried out in the vicinity of controlled aircraft taxiway crossings, at runway thresholds and manned or unmanned landside/airside vehicle access control posts. The traffic control arrangements for railway level crossings, set out in [Part 1: Design, Section D5.17](#), may be varied after consultation with the airport authority to suit airport operational requirements.

O3.27 WORKS NEAR TRAMWAYS

O3.27.1 Special safety precautions must be taken when works are to be carried out near a tramway. Detailed advice must be obtained by the works supervisor from the relevant track or transport authority prior to starting work and should be given to those carrying out the works.

O3.27.2 Tramcars are wider than the tracks on which they run. The path of a tramcar, which must be left unobstructed, is known as the 'swept path'. In some cases this is indicated by a line of yellow discs, a painted line or a raised kerb.

O3.27.3 It is essential that signing and guarding equipment, operatives, vehicles and pedestrians are kept out of the swept path. Where the works cause the footway to be diverted into the carriageway, the barrier between the pedestrians and the tramway must be kept at least 0.5m away from the edge of the swept path.

O3.27.4 Where the safety zone lateral clearance would intrude on the swept path, the transport authority should be consulted. The safety zone may be reduced to 300mm and the transport authority may impose a speed restriction on tramcars and/or provide a lookout.

O3.27.5 Tramway electrical cables consist of overhead lines and underground cables that may be placed outside the swept path. The works supervisor should liaise with the track or transport authority before working close to overhead lines. No equipment, plant, vehicles etc. should be brought within 2 m of the overhead lines. Underground cables should be dealt with using standard safe digging practices.

O3.27.6 Where a tramway runs on a reserved track but crosses the road at certain places, such crossings should be treated as railway level crossings. See [Section O3.25](#).

O3.28 SCAFFOLDING

O3.28.1 Where scaffolding or other type of temporary structure, such as a scaffold tower, is to be erected on or adjacent to a roadway or highway, a risk assessment should be conducted to consider whether impact protection should be provided, particularly if part of the scaffold is on the carriageway or edge of the footway (see [Section O4.11](#) for guidance on types of barriers). The site of the structure shall be suitably signed and guarded in accordance with the appropriate principles of the design document and the safety clearances described in [Section O3.2](#) should be adhered to at all times.

O3.28.2 Where scaffolding or other type of temporary structure is erected on or adjacent to a footway, or any other part of a roadway or highway, it is essential that its presence is made clear to visually impaired people as required by the Highways Act 1980 (Roads (Scotland) Act 1984) and Chapter 43 of the Disabled Persons Act 1981. Each tubular support should be provided with a white band, 150 mm in depth, the lower edge of the band being about 1.6m above ground level. Temporary close-boarded structures delineating a footway should be provided with a continuous white band of the same depth and at the same height above the ground level in the immediate vicinity. Scaffolding and temporary structures adjacent to a footway should be lit during the hours of darkness.

O3.28.3 A scaffolding licence or other appropriate licence will need to be obtained from the local Highway Authority (or roads authority in Scotland) and the structure should display an emergency contact telephone number.

O3.29 BUILDERS' SKIPS

O3.29.1 Roadside containers, also known as "builders' skips" should comply with the requirements of [Appendix 4.1](#). They may only be deposited on the highway for the temporary storage of builder's materials, rubbish etc., with the prior written approval of the local Highway Authority (or roads authority in Scotland).

O3.29.2 The Builders' Skips (Markings) Regulations 1984 require that any builder's skip which is deposited on the highway (unless it is placed entirely on a footway or verge) must be fitted with vertical red fluorescent and yellow reflective markings on each end. The design and fitting of these markings are prescribed in Schedules 1 and 2 of these Regulations.

O3.29.3 Where permission is given for skips to be placed on the footway and verges then provision should be made for pedestrians.

O3.29.4 During the hours of darkness the skip must be lit by means of warning lights at each corner. See [Section O4.7](#) on the use of warning lights. The skips may also be guarded by a line of cones at 1.2 m centres (Detail B) on the approach side set at 45° to the edge of the carriageway. During the hours of darkness, a warning light must be placed on each cone in accordance with [Section O4.7](#).

O4 SIGNING AND ROAD MARKING ISSUES

O4.1 PRINCIPLES

O4.1.1 Any appropriate prescribed sign may be used temporarily in connection with road works, accidents, temporary traffic regulations or control, during holiday seasons, and for other special occasions such as large public gatherings. Such signs must be of a prescribed size and type, and details of their use and siting distances can be found in Part 1: Design, Section D4.

O4.1.2 Most signs which when used permanently require an order or site approval by the Secretary of State, are subject to the same conditions when used temporarily by or on behalf of a Highway Authority.

O4.1.3 This requirement does not however apply to signs erected by the police in accordance with the powers granted by section 67 of the Road Traffic Regulation Act 1984, or by traffic officers in accordance with powers granted by the Traffic Management Act 2004, who may in an emergency display regulatory signs for a period not exceeding seven days.

O4.1.4 Section 36 of the Road Traffic Act 1988, which makes it an offence for a driver to disregard the indication given by a sign, applies to regulatory signs displayed by the police or by traffic officers that are backed by some form of statutory provision or else are specified in the Regulations as one to which section 36 of the Road Traffic Act 1988 applies. The police in Northern Ireland do not have these powers.

O4.1.5 Temporary signs are required for a limited period only and must be removed as soon as their message no longer applies, e.g. if an obstruction of the road is caused during the day by an item of plant which is removed overnight, any associated "road narrows" signs to diagram 516 or 517 must also be removed overnight. The site should also be left tidy.

O4.1.6 Outside working hours, consideration should be given to removing or covering temporary speed limit signs unless they are considered necessary to maintain safety within the site. A check should always be made to ensure that no conflicting signs remain in place at any time – see also paragraph O3.7.12.

O4.1.7 The messages given by temporary signs must be applicable to the situations in which they are used and sign faces must be kept clean and legible at all times. Any displaced, missing or damaged signs must be replaced as soon as practicable.

O4.1.8 Temporary signs must not be displayed at weekends or holiday times if their messages do not apply. If not removed immediately, such signs cause confusion and create a lack of respect for temporary signing.

O4.1.9 Signs should be placed where they will be clearly seen and cause minimum inconvenience to drivers, cyclists, pedestrians and other road users alike, and where there is minimum risk of their being hit or knocked over by traffic. Where there is a grass verge the signs should normally be placed there. If no verge is present, the placing of signs on the footway is permitted but in no circumstances shall the width of the footway be reduced to less than 1 m (see paragraph O3.13.5).

O4.1.10 For guidance relating to traffic signs mounted on and displayed by vehicles involved in temporary traffic management operations, refer to Sections O8.1, O9.3, O10.7 and O11.7 of this document. Regulation 14 of TSRGD identifies the position and type of signs that may be attached to or mounted on a road maintenance vehicle depending on the road's maximum speed limit. These signs should be removed or covered when the maintenance vehicle is not carrying out operations; this is particularly important when a vehicle is travelling to or from a works site.

O4.1.11 There will be no need for signs to warn vehicular traffic where works are carried out off the carriageway in the following situations:

- wholly within a verge not used by pedestrians and where a clearance of at least 0.50m (see Section O3.2) exists between the working area and the edge of the carriageway;

- on a footway (or verge used by pedestrians) where an unobstructed width of at least 1.0m can be maintained for pedestrians on the side of the works remote from the carriageway and a safety zone of 0.50 m can be maintained between the works and the carriageway; or
- on roads with a permanent speed limit of 30 mph or less, on a footway (or verge used by pedestrians) where an unobstructed width of at least 1.0m can be maintained for pedestrians on the carriageway side of the works. The 1.0m width for pedestrians would constitute the necessary safety zone for road workers.

O4.1.12 Where the conditions above cannot be met, pedestrians will need to occupy part of the carriageway and safety measures similar to those necessary for works in the carriageway should be adopted. See [Part 1: Design, Section D5.5, Plan SC1](#).

O4.1.13 The procurement of traffic signs will normally be carried out under contracts incorporating the Specification for Highway Works (Manual of Contract Documents for Highway Works Volume 1) or similar local Highway Authority or statutory undertaker's specification. In such cases products conforming to equivalent standards and specifications of other member states of the European Economic Area and tests undertaken in other member states will be acceptable in accordance with the terms of the 104 and 105 Series of clauses of that Specification. Any contract not containing these clauses must contain suitable clauses of mutual recognition having the same effect.

O4.1.14 Manufacturers of road works signs for use on trunk roads should comply with National Highway Sector Scheme (NHSS) Scheme 9A, for the manufacture of permanent and/or temporary road traffic signs.

04.2 ACCURACY

O4.2.1 All signing (including delineators, markings, traffic control equipment and warning light) should be consistent and in accordance with its intended legal and informative function, particularly when mobile traffic management techniques are used in conjunction with a static traffic management arrangement.

O4.2.2 Drivers will be confused and hazards may be created if the information on permanent signs or road markings ceases to be applicable or conflicts with temporary signing erected because of road works. This problem may be overcome by altering, covering or replacing signs or road markings to suit the circumstances, with the approval of the Highway Authority. Spraying with masking material should be done neatly. Small signs should be completely obliterated or removed. It is essential to ensure that at all times the signing represents the prevailing conditions accurately. Any covers used must be durable, opaque and secured. Temporary signs must not be allowed to obscure existing permanent signs which still apply.

O4.2.3 Where overhead gantries are in use and traffic lanes are closed or moved onto the hard shoulder, provision shall be made to ensure that the messages on the gantry signs are not in conflict with the traffic management arrangement e.g. by covering or masking the conflicting gantry signs. Consideration should also be given to the need for temporarily disabling any queue detection systems associated with matrix or VMS warning signing for the duration of the works.

O4.2.4 Where a pedestrian or cycle crossing will become unusable or where the studs and marking are to be substantially removed or obliterated, the crossing must be taken out of service. Any beacons must be covered, preferably with an opaque black or white bag. For signalised crossings, the signals must be switched off and a traffic sign "light signals not in use" to diagram 7019 must be displayed. Barriers should be placed across the pedestrian access to the crossing and a "CROSSING NOT IN USE" sign to diagram 7016 to warn pedestrians must be provided. See also [Section O3.13](#).

O4.2.5 It is important to remove any lengths of road markings which are in conflict with temporary traffic requirements, e.g. when vehicles would otherwise have to pass over raised rib lines at changeover and crossover positions or chevron markings at junctions, or when two or more parallel lanes of traffic are changing lanes.

However, raised rib and other lane markings may be left in situ where they match with the temporary lane markings. There should be no need to remove or cover the lane markings at a changeover position when only one lane is being switched.

O4.3 SIGN CONDITION

O4.3.1 All temporary traffic management equipment shall be clean and fit for its intended purpose on initial deployment and shall be regularly maintained in such condition until completion of the work (refer to [Section O3.7](#)). Temporary traffic signs/cones should be cleaned by personnel in a place of safety. See [Section O3.2](#) for safety clearance requirements.

O4.3.2 Guidance on assessing the condition and acceptability of temporary traffic management equipment can be found in [Appendix A4.3](#).

O4.3.3 When temporary sign face patches are fixed to permanent signing e.g. for temporary diversions, they shall be capable of being removed completely without damage to the sign face. Temporary patches shall be removed at the end of the works.

O4.3.4 It is inadequate and unacceptable to spray masking paint over the numerals on speed limit signs; if this method is used, the entire sign face including the red border must be completely obscured in order to prevent the numerals being visible in daylight or in silhouette against the retroreflective background at night.

O4.4 STABILITY OF SIGNS

O4.4.1 Suitable and sufficient measures should be taken to ensure that traffic signs, cones, cylinders etc. are sufficiently robust to prevent them from being displaced during any windy conditions likely to be encountered on site or by buffeting from passing vehicles. BS 8442 "Miscellaneous road traffic signs and devices – Requirements and test methods" offers three classes of resistance to wind loads. Any system used to mount signs or to fix signs to safety fences must be capable of resisting the specified wind load. For details of the requirements for traffic cones and traffic cylinders see [Part 1: Design, Section D4.9](#).

O4.4.2 Ballast used to stabilise traffic signs shall be in the form of fine, granular material contained in a sack so that, should the sack be hit, it would split and the contents be dispersed without causing further problems.

O4.4.3 Kerbstones, timber baulks, heavy weights, straw bales or other traffic management equipment shall not be used as ballast. Road pins shall not be used.

O4.4.4 Ballast should always be placed below car windscreens height to prevent serious injury in the event of a collision.

O4.5 MOUNTING AND SITING OF SIGNS

O4.5.1 The signs must not be obscured in any way. The signs may be mounted on portable frames; see BS 8442 "Miscellaneous road traffic signs and devices – Requirements and test methods". Note however that, regardless of the size of the sign, the lower edge of the sign should be no less than 300 mm from ground level. For the minimum clearance of temporary signs to carriageways in use on motorways and dual carriageways, and for the positioning of signs using microprismatic material, see [O3.2.17](#).

O4.5.2 Devices similar to traffic cones, e.g. police “no waiting” signs, are sometimes used as mounting structures for signs. These mounting structures are not then regarded as traffic cones and are not required to conform with the provisions of regulation 56. The sign face must be flat and not wrapped around the cone (see working drawing P636).

O4.5.3 Traffic cones complying with diagram 7101.1 can be used to support signs to diagram 7104 and 7105 in accordance with direction 41(6) and traffic tape or other lightweight barriers used in the demarcation of safety zones within the site.

O4.5.4 Road work signs should be located so that if a vehicle leaves the carriageway the consequences are minimised. The following procedures for signs may also be appropriate for temporary gantries and other temporary equipment; further guidance is given in TD 19 “Requirement for road restraint systems” (DMRB 2.2.8):

- the sign could be mounted behind a length of existing safety barrier;
- a new length of safety barrier could be provided around the sign;
- the sign could be mounted further away from the carriageway; and
- the sign could be mounted on a passively safe structure designed to minimise vehicle damage and injury to occupants.

O4.5.5 Guidance on the mounting of temporary traffic management signing on central barriers, especially concrete barriers, can be found on the HA website at www.highways.gov.uk.

O4.5.6 Road works signs should be sited to minimise danger to pedestrians by ensuring that they have sufficient width for safe passage at all times. See also [Section O3.13](#).

O4.5.7 Scaffold poles aligned with the carriageway shall not be used.

O4.5.8 Mounting posts shall not project above the top of the sign because of the additional hazard this poses in the event of a collision.

O4.5.9 The colour of the backs of signs is prescribed in direction 41 but the sign frame/post may be any single colour. Frames may therefore be painted a conspicuous colour, e.g. yellow, to delineate the edge of a sign for the benefit of pedestrians. It is recommended that signs on footways are accompanied by a traffic cone to ensure conspicuity if it is considered that the mounting fails to do so.

O4.5.10 Extracts from [Table A1.1 \(Appendix 1\)](#), in characters not exceeding 25 mm high, may be marked on the back of signs to assist operators to place them at the appropriate distance from the works.

O4.5.11 For details of safety clearances to be maintained see [Section O3.2](#).

O4.5.12 Cone bases, sign plates and frames should be marked to facilitate identification of ownership. It is unlawful (see regulation 56(4) and direction 42) to place such marks on the front face of a sign, and it is poor working practice to place them anywhere on the front of a frame which is visible to oncoming traffic during normal usage.

O4.6 LIGHTING OF SIGNS

O4.6.1 The visibility of signs during the hours of darkness is extremely important and the reflectivity should be at least equal to that of permanent signs. All parts of the sign face, except those parts coloured black, must be reflectorised.

O4.6.2 Most traffic signs used at road works must be reflectorised and/or directly illuminated as required by the Regulations (Schedule 17). The exceptions are signs to diagrams 7007.1, 7008, 7016, 7017, 7018, 7018.1 and 7404.

O4.6.3 All signs that are required to be reflectorised and used at works on motorways and dual carriageway roads shall be reflectorised by the application of Class RA2 retroreflective material as detailed in BS EN 12899-1:2007 "Fixed, vertical road traffic signs". Note that this is the same as Class 1 in BS873-6: 1983 which has been superseded by BS EN 12899-1:2007. Alternatively, a suitable microprismatic sheeting may be used. Signs for use in connection with works on other roads, where these are unlit, may be Class RA1 or Class RA2 material as detailed in BS EN 12899-1:2007. On lit roads, signs to Class RA2 or a suitable microprismatic material should always be used where the Regulations do not require them to be directly illuminated (see paragraph O4.6.5).

O4.6.4 Note that Class RA1 and Class RA2 refer to the photometric properties of the sign. The weathering resistance requirement for temporary signs is specified in BS 8442, which provides two classes, T2 which requires three years natural weathering as in BS EN 12899-1, and T1 which requires only two years.

O4.6.5 All road works signs used on a lit road which are required to be lit must be illuminated directly either when the street lighting is illuminated, or throughout the hours of darkness, unless the road is subject to a permanent speed limit of 40 mph or less; see regulation 18 and Schedule 17 to the Regulations. On roads with a speed limit over 40 mph it will not be sufficient to rely on street lighting for the illumination of signs. Whenever temporary road lighting is installed on such roads, signs must be directly lit in accordance with the Regulations.

O4.6.6 Special attention should be given to the orientation of the lighting units to ensure that drivers are not dazzled.

O4.6.7 Where lighting is required, the standard of illumination required for temporary traffic management signing shall be a minimum mean illuminance on the sign of 100 lux.

O4.6.8 All lamps should be kept clean and in good working order.

O4.6.9 Illumination of signs shall only be by lamps that are electrically powered.

O4.7 WARNING LIGHTS (ROAD DANGER LAMPS)

O4.7.1 The outer boundary of the works site, temporary fences, barriers etc. should always be marked by the addition of warning lights during the hours of darkness; refer to Part 1: Design, Section D3.12. The full width and length of the obstruction shall be clearly indicated by lights. It is important that the lights are placed correctly on top of the cones with the lens facing the oncoming traffic. On a dual carriageway, if distraction of drivers on the other carriageway is likely to be a problem then uni-directional warning lights, and not bi-directional or omni-directional, should be used.

O4.7.2 The spacing of lights on longitudinal coning and cone tapers is given in Table A1.3 (Appendix 1).

O4.7.3 Where barriers are used to delineate the works area, a warning light showing a steady light shall be placed at each corner of the obstruction and at 3m intervals along each side which is accessible to pedestrians.

O4.7.4 Care shall be taken to ensure that any lights are not misleading to rail, water or air traffic. In case of doubt the railway, harbour, port, river or airfield authority should be consulted.

O4.7.5 Lights using flammable substances, e.g. paraffin, should not be used.

O4.7.6 Warning lights must conform to the National Annex to BS EN 12352:2006. The external surface of the warning light body visible to road users shall be coloured lemon, colour reference no. 355, or golden yellow, colour reference no. 356 of BS 381C:1996, and the lights must also comply with the mounting height requirements of regulation 55(2) (in Northern Ireland, regulation 44(2)).

O4.7.7 Warning lights must show an amber light and may be placed at regular intervals along the line of an obstruction. However, when a vehicle restraint barrier is used, coloured reflectors should be placed at 18m intervals along the side of the barrier in lieu of warning lights. Such reflectors must conform to diagram 560 or 561 in terms of their dimensions as well as their colour (red on the near side, amber on the off side of a dual carriageway or on a one-way road). Rectangular reflectors must be at least 35 mm wide, with a minimum area of 45 square centimetres, and circular reflectors must be at least 75 mm in diameter. Reflectors shall be cleaned frequently in order to maintain their effectiveness.

O4.7.8 Under normal circumstances, lights should be installed on stands or cones, and not at road level. The height of the centre of the lens of each light shall not exceed 1500 mm above the road surface where the speed limit is 40 mph or less, or 1200 mm where the speed limit is more than 40 mph.

O4.7.9 If there is any possibility of the lights masking the retroreflective cone sleeves then the lights should be placed on separate stands or cones midway between traffic cones.

O4.7.10 Lights should be switched on in a place of safety before being put into position.

O4.7.11 Reflectorised cones and markers should be used as an addition to, and not instead of, lights. Lights showing a steady light may be used on any road with or without street lighting. Alternatively, where lights are used within 50 m of an illuminated street light on a road with a speed limit of 40 mph or less, lights flashing at 55-150 flashes per minute may be used. Flashing warning lights must not be used on an unlit road unless specifically authorised.

O4.7.12 During the hours of darkness, any barriers to diagram 7105 provided to delineate the edge of the works may be illuminated by a means of either internal or external lighting. If not illuminated then they must be reflectorised in accordance with regulation 19. They may be marked by warning lights showing an amber light. See paragraph O4.7.6 for details.

O4.7.13 Care should be taken to ensure that the intervals at which bulbs and batteries are changed, and the type of replacement used, are in accordance with the manufacturer's specification.

O4.7.14 High intensity flashing warning lights (with a peak intensity in excess of 100 candelas) showing an intermittent light are prescribed by the Regulations. They are used only to draw attention to the hazard existing at a particular site and they warn drivers to take special care. These flashing warning lights may be used only in combination with prescribed traffic signs and not as a means of delineating the works. These high intensity flashing lights are defined as warning light types WL5 and WL6 in the National Annex to BS EN 12352:2006 "Traffic control equipment. Warning and safety light devices".

O4.7.15 High intensity flashing warning lights of the uni-directional type may be used to supplement signs indicating road works, or the beginning of a temporary traffic diversion. They may also be used in association with police or weather condition signs to warn drivers to take special care. Excessive use of these lights on any one site will reduce their effectiveness and care should be taken to use them only to draw attention to signs indicating particularly hazardous situations. It should be noted that several unsynchronised flashing warning

lights situated close together produce a confusing appearance. High intensity flashing warning lights should not be used on barriers to diagram 7105 within tapers where sequentially flashing warning lights are used; see paragraph O4.7.17.

O4.7.16 High intensity flashing warning lights may be used to supplement signs to diagrams 606, 609, 610, 616, 633, 829.1, 829.2, 829.3, 829.4, 7101.1, 7102 or 7105. When the warning lights are placed by the police in accordance with regulation 54(1)(b), the light emitted by them must be blue. It should be amber in all other cases.

O4.7.17 Consideration shall be given to the use of backlit sequentially flashing warning lights to highlight taper coning in both daylight and darkness. Research has shown that use of these lights can help drivers to identify and make the necessary change of lane much earlier than with conventional lights, thereby reducing the risk of taper strikes. The use of these lights shall be restricted to lead-in and intermediate stepped tapers involving a lane drop, and shall not be used when a lane or lanes are narrowed, at a changeover, or a crossover. Where these lights are in use, high intensity flashing warning lights shall not be used on barriers to diagram 7105 within the taper.

O4.7.18 The backlit sequentially flashing warning lights have been authorised for use on the motorway and trunk road network. For use on other roads, the need for specific authorisation of these lights should be checked with the relevant Overseeing Organisation prior to their use.

O4.7.19 On motorways and dual carriageway trunk roads with a permanent speed limit of 50 mph or more, backlit sequentially flashing warning lights shall be used to highlight both lead-in and intermediate stepped tapers within the works.

O4.8 TEMPORARY LIGHTING

O4.8.1 Road works sites may be floodlit and in some cases temporary lighting may be installed to enable work to proceed after dark. Special attention should be given to the orientation of the lighting units to ensure that drivers are not dazzled. The quality of the illumination should be such that the work involved can be carried out to the appropriate standard. Safety fencing may be necessary if temporary lighting columns are erected.

O4.8.2 The temporary lighting of crossovers is dealt with in British Standard BS 5489-1:2003 and additional advice is given in Section 5 of TA 92 "Crossover and changeover design" (DMRB 8.4.6).

O4.9 SIGNS AUTHORISATION

O4.9.1 Certain traffic signs illustrated in the Regulations are specifically prescribed only for use at road works. Any other sign prescribed in the Regulations or authorised by the Secretary of State may also be used, provided that the appropriate criteria are met and that any necessary orders have been made.

O4.9.2 Only prescribed traffic signs, or traffic signs that have been authorised by the Secretary of State may be used. Practically every foreseeable road works situation can be dealt with by the use of official signs for which designs are readily available. If new signs are required the Overseeing Organisation must be consulted and authorisation obtained. In exceptional cases special signs which comply with regulation 53 can be used.

O4.10 DELINEATORS

O4.10.1 Cones and cylinders are used to delineate the traffic lane a driver should take past an obstruction, accident or road works. The portability of these devices is of particular advantage in emergencies or when they are used to delineate works which move progressively along a carriageway. Cones to diagram 7101.1, flat

traffic delineators to diagram 7102, and cylinders to diagram 7103 are prescribed traffic signs. Traffic cones and cylinders should conform to BS EN13422:2004 “Portable road traffic signs – Cones and cylinders” and must comply with regulation 56; see also [Part 1: Design, Section D4.9](#).

O4.10.2 Oil drums, barrels or other containers shall not be used to delineate road works.

O4.10.3 Cones should be placed close enough together to give an impression of continuity and an appearance of substance. The size of cone and the rate of taper to be used on different classes of road are specified in the [Table A1.3 \(Appendix 1\)](#), which also gives details of the cone spacing depending on their location in a layout and the type of works involved.

O4.10.4 For works of short length a minimum of two cones should be placed between the entry and exit tapers. In adverse weather conditions, especially fog, cone spacings may need to be reduced in order to continue to give drivers adequate guidance past the obstruction. On roads subject to the national speed limit, 9m spacing should always be the maximum in these conditions. Special arrangements for cones at builders' skips are described in [Section O3.29](#).

O4.10.5 Flat traffic delineators to diagram 7102 are blades which are fixed to heavy bases. They have the same elevation as conventional traffic cones and may be used as an alternative on dual carriageway roads. BS 8442 includes a specification for flat traffic delineators.

O4.10.6 The edge of carriageway road marking which is normally placed on the road surface 500 mm from the centre line of the cones may be placed on the edge of the base of a flat traffic delineator provided that:

- when placed on the road their bases touch and their traffic face edges provide a continuous smooth line (bases which have white lines incorporated on them, but are used in other circumstances, should be oriented so that the white line is at the back so that it is less visible to drivers of approaching vehicles);
- the white line comprises a white reflective strip 100 mm wide firmly adhered to the base;
- the edge of the base where the white line is to be attached comprises a sloping surface, which is at an angle to the road surface of no more than 60° and is of such dimensions either to accommodate the 100 mm wide white line fully, or, where the angle between the road surface and the sloping surface exceeds 30°, to accommodate at least 80 mm of the width of the white line, the excess (max 20 mm) being returned on to the top surface of the base; and
- the material from which the base is made allows proper adhesion of the white reflective strip.

O4.10.7 When flat traffic delineators are placed so that the retroreflective surfaces are at right angles to the approaching traffic they can offer benefits of improved visibility during hours of darkness over conventional traffic cones. Unlike conventional traffic cones, however, flat traffic delineators are only visible for limited traffic approach angles (the angle between the normal to the sign face and the direction of the approaching traffic). It is therefore recommended that the following conditions are met whenever they are placed at road works:

- flat traffic delineators should be used only where they may be placed with the white retroreflective surface facing the approaching traffic, so that the angle between the sign face and the direction of approaching traffic is as close to 90° as possible, but under no circumstances less than 50°;
- flat traffic delineators should not be used within 50m of “at grade” entry junctions on all-purpose dual carriageway trunk roads; and
- flat traffic delineators should be stored separately from ordinary traffic cones to prevent accidental use on single carriageway roads.

O4.10.8 When selecting the height of the flat traffic delineator to be used, refer to [Table A1.3 \(Appendix 1\)](#).

O4.10.9 Rotating reflector delineators are mechanisms which enable one or more amber reflectors, complying with diagram 560 or 561, to be shown intermittently during the dynamic mode and constantly in the static mode. They do not constitute warning lights to BS EN 12352:2006. When used, they must always be mounted on top of traffic cones to diagram 7101.1.

O4.10.10 Rotating reflector delineators shall not be used in lead-in tapers. Elsewhere, if rotating reflector delineators are used, they may be mounted on the top of existing traffic cones provided they do not mask any of the retroreflective material, obscure the cone or affect its stability. Where they are used on cones on the nearside of traffic, the spacing of the warning lights may be increased by up to 100% with rotating reflectors at the midpoint between consecutive warning lights. In other situations, the spacing of the warning lights may be increased by up to 50% with rotating reflectors placed at the third points or midpoint between consecutive warning lights.

O4.10.11 Timber baulks, and other similar non-approved proprietary systems, shall not be used as a means of delineation of works areas on high-speed roads because their ability to control a fast-moving vehicle on impact is totally unpredictable. Subject to local Highway Authority approval, their use on roads with a permanent speed limit of 30 mph with street lighting is likely to be acceptable provided that:

- they are securely fastened together and that each one is securely fastened to the ground; and
- they are painted in alternate red and white bands, each approximately 600 mm wide.

O4.11 USE OF BARRIERS

O4.11.1 Obstructions and excavations should be adequately guarded at all times for the protection of all persons who use the highway. There are four basic types of barrier:

- pedestrian barriers;
- traffic barriers for guiding vehicles and indicating that a traffic lane or part of a traffic lane is closed;
- lightweight barriers for delineating the inner edge of safety zones; and
- vehicle safety restraint barriers.

O4.11.2 Barriers, other than vehicle restraint barriers, adjacent to running traffic lanes should be guarded by a line of traffic cones, augmented by warning lights at night.

O4.11.3 Barriers should be stable under adverse weather conditions and be or appear to be substantial depending on the usage. They should not, however, cause excessive damage to a vehicle should they be struck. Mounds of soil are not acceptable as a barrier. Care should be taken to ensure that horizontal barriers do not project towards oncoming traffic. Wooden or tubular steel poles shall not be used as horizontal barriers as they constitute a serious hazard should a vehicle collide with them.

O4.11.4 In order to avoid a haphazard appearance, different kinds of barriers should not be mixed.

O4.11.5 Barriers should be marked so that they stand out conspicuously in contrast to the works behind them and are visible by day and night. See also [Section O4.7](#) and paragraphs [O4.11.12](#) and [O4.11.13](#).

PEDESTRIAN BARRIERS

O4.11.6 Requirements for maintaining pedestrian mobility are set out in [Section O3.13](#). Particular attention should be paid to the needs of people with an impairment and particularly those who have a visual impairment. A pedestrian barrier should be provided on those sides of an obstruction that restrict pedestrian flows or are accessible to pedestrians whether or not there is any reason to expect pedestrians who are blind or who have a visual impairment at that location.

O4.11.7 Pedestrian barriers and rails may be red and white as diagram 7105 with vertical posts coloured red. Base supports should not protrude more than 300 mm into the path of pedestrians and any vertical edge should be not more than 25 mm high. Temporary pedestrian routes should never be less than 1 m wide, and wherever possible should be at least 1.5 m wide (see paragraph [O3.13.5](#)).

O4.11.8 Pedestrian barriers should be of sufficiently solid construction to guide the blind and partially sighted. They should have a robust tapping rail fixed at a height of approximately 150 mm above ground level measured to the underside of the rail and a robust hand rail at a height of between 1.0 m and 1.2 m measured to the top of the rail. In both cases the rail should be at least 150 mm deep. The thickness and/or width will depend on the material and construction and will need to be such as to ensure sufficient strength.

O4.11.9 Alternatively, when the site is continuously manned and covers are to be temporarily removed from underground access chambers, manholes etc., pedestrians may be protected by barriers of sufficient size to enclose both the chamber opening and its cover. In this case the hand rail must be fixed at a minimum height of 0.95 m (Work at Height Regulations 2005). The barrier should be continuous between supports and fixed so that it cannot be accidentally dislodged.

O4.11.10 Pedestrian barriers alongside excavations should be the subject of a risk based assessment. Barriers alongside excavations greater than 300 mm in depth in high duty areas (>22 persons per minute, per linear metre width, for at least half of the working day) should be able to withstand crowd pressure and be at least 300 mm clear of the edge of the excavation. These barriers should comply with BS 7818 "Specification for pedestrian systems in metal". Lesser pedestrian trafficked footways may use other approved barrier systems that are rigid enough to guard pedestrians from traffic, excavations, plant and materials and withstand wind pressures.

O4.11.11 Where the footway is diverted into the carriageway it will be necessary to provide a safety zone between the outer pedestrian barrier and the live traffic. If the works themselves are adjacent to or in the carriageway a safety zone will need to be provided as described in [Section O3.2](#). The outer edge of the safety zone will be delineated by traffic cones or cylinders. The inner boundary of the safety zone may be delineated by a lightweight barrier, but see paragraph [O3.2.11](#).

TRAFFIC BARRIERS

O4.11.12 Traffic barriers for guiding vehicles past obstructions should be placed on the traffic side of the obstruction and should be red and white as shown in diagram 7105. The barrier should be placed between 0.8 m and 1.5 m above ground level. Where a driver is required to alter direction sharply, a sharp deviation of route sign to diagram 7104, pointing in the appropriate direction, should be erected as the barrier. See [Table A1.2 \(Appendix 1\)](#).

O4.11.13 Vertical posts to traffic barriers should be coloured red and must be supported at the base in such a way that no part of the structure projects more than 300 mm towards the carriageway beyond the face of the barrier. Horizontal boards should be striped in alternate vertical 250 mm wide red and white bands to diagram 7105 and must be reflectorised, or illuminated either internally or externally during the hours of darkness (refer to [Section O4.7](#)).

LIGHTWEIGHT BARRIERS

O4.11.14 Lightweight barriers may be used where there is no risk of pedestrians encountering the works or where there is a need to delineate the inner boundary of a safety zone (refer to paragraphs O3.2.11 to O3.2.13). All elements of lightweight barriers should be sufficiently stable to withstand wind buffeting from passing traffic and to prevent any part being blown into the live carriageway or presenting a hazard to traffic. Expanding barriers and barriers incorporating steel or plastic mesh and similar material are acceptable provided they are placed continuously. Specially adapted cord or tape systems may also be used, see paragraph O3.2.11. Lightweight barriers may be reflectorised.

VEHICLE SAFETY RESTRAINT BARRIERS

O4.11.15 In some cases it may be appropriate to provide a temporary vehicle safety barrier. It may be appropriate to provide traffic barriers in addition behind the safety barrier and outside its working width, or to mark the face of the safety barrier in accordance with diagram 7105 to aid conspicuity. The temporary safety barrier may take the form of a permanent type safety barrier erected temporarily or a purpose made temporary safety barrier made from concrete or steel, or other materials. Guidance on temporary and permanent safety barriers is given in TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

O4.11.16 Where a temporary vehicle restraint safety barrier is provided, the temporary road markings or studs used adjacent to the barrier should be to Detail E, F or H as specified in [Table A1.5 \(Appendix 1\)](#).

O4.12 ROAD MARKINGS AND STUDS

O4.12.1 Road markings are used at road works principally to delineate the carriageway edge or to divide the carriageway into traffic lanes. When, during the course of road works operations, the road remains in use and dangerous conditions are likely to occur through the absence of road markings, temporary markings shall be provided.

O4.12.2 Unless traffic is to be confined to a single lane delineated by cones on each side, it is important that existing road markings, reflecting road studs and raised rib lines are removed or appropriately masked when they might be hazardous or give misleading information to drivers.

O4.12.3 Markings should be renewed or relaid as soon as possible after resurfacing or on the completion of road works which may have interfered with them. Where it is not possible to restore them immediately in permanent materials, a temporary marking should be used, particularly at sites such as road junctions where the absence of the marking is likely to give rise to dangerous conditions.

O4.12.4 Where it is not possible to provide temporary road markings drivers should be informed of their absence by means of advance warning signs. On lengths of road where lane lines or centre of carriageway lines have been removed, the sign "NO ROAD MARKINGS FOR X MILES" to diagram 7012 should be used with the appropriate distance inserted. At junctions where all, or any part, of the "STOP" or "GIVE WAY" markings have been removed and temporary markings cannot be provided, the sign variant "NO STOP MARKINGS" or "NO GIVE WAY MARKINGS" to diagram 7012 should be placed at or near the junction preferably about 5-10m from the edge of the main road carriageway.

O4.12.5 It is important to remove any lengths of road markings which are in conflict with temporary traffic requirements, e.g. when vehicles would otherwise have to pass over raised rib lines at changeover and crossover positions or chevron markings at junctions, or when two or more parallel lanes of traffic are changing lanes. However, raised rib and other lane markings may be left in situ where they match with the temporary lane markings. There should be no need to remove or cover the lane markings at a changeover position when only one lane is being switched.

O4.12.6 Detailed guidance on operational issues related to the installation and removal of temporary road markings and studs is given in the document "Temporary Road Markings: Working Group Findings"; see References (Appendix 3).

O4.12.7 Where traffic crosses over the line of the hard shoulder, the red studs and the edge line should be removed on standard schemes. There is no requirement to remove the red studs throughout the length of hard shoulder running.

O4.12.8 Ideally there should be no difference in the surface characteristics between any parts of the carriageway.

O4.12.9 When narrow lanes are used as part of a traffic management layout, the reconfiguration of the carriageway may place the longitudinal joints or the original road stud bases within the new lanes and in some cases in line with the vehicle wheel tracks. Hence the inserts and reflectors of road studs shall always be removed. The road stud bases should also be removed if they are likely to present a hazard to motorists and the carriageway should be reinstated before introducing traffic to the narrow lane layout. If road stud bases are retained, drivers may take avoiding action and, in addition, the bases may be held to be unlawful as they are not fitted to prescribed road markings.

O4.12.10 To avoid driver confusion, before the carriageway is remarked to the new configuration, it is essential that original road markings which are not to be retained as part of the temporary lane markings are thoroughly removed.

O4.12.11 When temporary road markings are required which will be removed upon completion of the works, only removable marking or masking materials complying with BS 7962 for black masking materials or the appropriate European Standard for white markings shall be used.

O4.12.12 Prior to reverting to the normal carriageway configuration, any temporary road marking should be totally removed and any road markings or road studs that have been removed should be replaced.

O4.12.13 Other than black masking materials used to cover white markings, road markings must conform to the relevant European Standards, BS EN 1436, BS EN 1790 for preformed materials (e.g. tapes) and BS EN 1824 for road trials for materials from both standards. The physical properties of road marking materials are covered by BS EN 1871.

O4.12.14 Black masking materials, including temporary tape and thermoplastic, are not included in the European Standards, but are specified in British Standard BS 7962. Black paint, unless it has been certified as complying with BS 7962, shall not be used as it may not provide the necessary skid resistance and low-gloss finish. It is essential that wear of the masking material should not expose the original white material below it.

O4.12.15 The performance of road studs is specified in European Standard BS EN 1463 Parts 1 and 2. The Traffic Signs General Directions 2002 (direction 57) specify which performance classes in the European Standard must be met. It is unlawful to use a stud that is not certified to at least those minimum classes.

O4.12.16 Temporary reflecting road studs are intended to be removed without undue damage to the road surface and the adhesive should be of the correct quality to achieve this. The manufacturer's recommendations for installation and removal should be carefully observed.

O4.12.17 Temporary studs are not recommended for use for periods much longer than three months and they shall not be utilised for more than one application.

O4.12.18 Arrangements should be made to protect road studs during surface dressing operations.

O4.12.19 When additional thermoplastic or paint material is used for covering or reinstating existing road markings, care must be taken to ensure that the total thickness of the marking does not exceed 6 mm; see regulation 32.

05 GENERAL VEHICLE ISSUES

05.1 GENERAL

05.1.1 Production vehicles are rarely suited to site work in their standard form, so before purchasing a vehicle, consideration should be given to the model's suitability for modifications and its ability to carry the necessary equipment. The ease with which an operator can move from the off side seat to the near side door should also be considered.

05.1.2 The choice of vehicle type, engine size and gearbox should reflect the acceleration and manoeuvrability required of that vehicle during normal working conditions.

05.1.3 All vehicles and equipment shall be checked for correct operation before work commences. All checks should be documented and all faults reported prior to work commencing. If necessary, the vehicle or equipment should be taken out of service until faults are rectified. Basic vehicle checks should always include fuel, lights, oil, water, electrics and tyres.

05.1.4 All site vehicles should, where practicable, have all round visibility, for example, estate cars should be used in preference to vans. Where this is not practicable, additional mirrors should be fitted to eliminate blind spots.

05.2 CONSPICUITY

05.2.1 Any vehicle engaged in works on the highway not in an established works zone should be of a conspicuous colour.

05.2.2 Subject to the specific requirements of the following sections, any works vehicles that are used to protect the workforce or form part of the signing of the works should be of conspicuous colour and appropriate marking. This is particularly important for that part of the vehicle visible to drivers and prescribed as part of any sign mounted on the vehicle.

05.2.3 In addition, on high-speed roads, all vehicles stopping on the highway for works purposes or inspections shall be equipped with high visibility rear markings. High visibility rear markings should comprise either:

- a) signing to diagram 7403, or
- b) the alternative light arrow sign in accordance with [Section O10.8](#), or
- c) chevron markings comprising alternate strips of fluorescent orange-red retroreflective material and fluorescent yellow non-retroreflective material, of not less than 150 mm width each, inclined at 45-60° to the horizontal and pointing upwards, or
- d) a solid block of fluorescent orange-red retroreflective material.

The markings described in (c) and (d) above should cover as much of the rear-facing portion of the vehicle as possible without obscuring windows, vehicle lighting or registration plates.

Where the main body of the vehicle being used is not a recognised conspicuous colour (yellow or white) then the above markings should be supplemented by a high visibility fluorescent yellow retroreflective strip, of not less than 50 mm wide, along the side of vehicle as a minimum.

05.2.4 Red retroreflective tape shall also be applied to all rear facing edges of open doors, guardrails and equipment lockers.

O5.2.5 Where rear facing high visibility markings may be obscured by any device mounted on the vehicle (e.g. lorry-mounted crash cushion (LMCC) or cone laying adaptation), at any time that the vehicle is stopped on a high-speed road, additional markings complying with paragraph O5.2.3 (c) or (d) shall be applied to any face of the device which is displayed to the rear and other road users.

O5.2.6 Works vehicles should be kept clean to maintain conspicuity.

O5.2.7 Motor vehicles with a maximum gross weight exceeding 7.5 tonnes and trailers with a maximum gross weight exceeding 3.5 tonnes must be fitted with rear markings in accordance with the Lighting Regulations.

O5.2.8 Vehicles used for works purposes shall be identified by displaying to the rear the sign to diagram 7404 "HIGHWAY MAINTENANCE". The sign to diagram 7404 variant "MOTORWAY MAINTENANCE" may be used instead when working on motorways only.

O5.3 ROOF-MOUNTED BEACONS

O5.3.1 Without prejudice to the specific requirements of the following sections, any vehicle stopping on the highway for works purposes or inspections shall be equipped with either a roof-mounted flashing amber warning light bar (comprising at least two independent light sources) or two independent roof-mounted flashing amber warning beacons, visible through 360°.

O5.3.2 Roof-mounted flashing amber warning beacons must comply with the requirements of the Road Vehicle Lighting Regulations and should also comply with the United Nations Economic Commission for Europe (UNECE) Regulation 65 on Special Warning Lamps.

O5.3.3 If the main roof-mounted beacon is likely to be obscured from the rear by parts of the vehicle or any equipment carried on the vehicle, additional beacons should be fitted toward the rear of the vehicle where they will remain visible.

O5.3.4 The roof-mounted beacons shall be in use when entering, leaving or moving within the site, when travelling in traffic at less than the general traffic speed, and when stationary on the hard shoulder.

O5.3.5 When stationary within the confines of a fully installed traffic management arrangement, the roof-mounted beacons shall be switched off, unless they form part of the guarding of the works, e.g. works on minor roads, or are required for mobile works; see [Sections O10 and O11](#).

O5.3.6 Vehicles engaged on snow clearing, gritting operations or similar work shall display a flashing amber warning beacon at all times when operating.

O5.4 IMPACT PROTECTION

O5.4.1 Impact Protection Vehicles (IPV), Mobile Lane Closure (MLC) vehicles, and Mobile Carriageway Closure (MCC) vehicles shall be fitted with a lorry-mounted crash cushion (LMCC). The requirements for LMCCs are given in Departmental Standard TD 49 "Requirements for lorry-mounted crash cushions" (DMRB 8.4.7). As higher specification LMCCs become available their use should be adopted if appropriate.

O5.4.2 It should be noted that vehicles fitted with a LMCC currently contravene the Road Vehicles (Construction and Use) Regulations 1986, as amended, with regard to the permissible overhang (regulation 11) when the LMCC is in operational mode. To enable the vehicle to be operated legally, a special dispensation known as a Vehicle Special Order (VSO) must be obtained from the Department for Transport before the vehicle is put into service. Further details about applying for a VSO can be found on the DfT website (www.dft.gov.uk) under the heading "Vehicle special orders section 44 requirement".

O5.4.3 In addition to the overhang requirements of regulation 11, the vehicle must comply with all the other applicable requirements of the Construction and Use Regulations as well as those of the Road Vehicles Lighting Regulations 1989, also as amended.

O5.4.4 A device which automatically activates the block vehicle's brakes when any contact is made with the rear of a LMCC shall be fitted in order to minimise roll-forward and the risk of any secondary accident in the event of a collision. The device should conform to the specification provided in [Appendix 4.2](#), and once fitted to the vehicle will be subject to a notifiable alteration with the Vehicle and Operator Services Agency (VOSA). For notifiable alteration requirements in Northern Ireland, refer to the Department of the Environment – Driver and Vehicle Testing Agency.

O5.4.5 Seat belts with a minimum of three points of anchorage to the vehicle shall be fitted for all occupants of block vehicles (e.g. IPV, MLC and MCC vehicles), and they should be worn at all times whilst operations are being carried out.

O5.4.6 Head restraints shall be fitted and correctly adjusted (centre of restraint at eye level) for all the occupants of block vehicles and advance sign vehicles.

O5.4.7 It is recommended that a safety survey of the block vehicle cab be undertaken whenever additional fittings or protruding items, such as two-way radios, are fitted.

05.5 TEMPORARY TRAFFIC MANAGEMENT VEHICLE SPECIFICATIONS

O5.5.1 Vehicles used for the installation, maintenance and removal of static traffic management on high-speed roads shall comply with the following specifications in paragraphs [O5.5.2](#) to [O5.5.5](#). Compliance with these specifications is also recommended for use on all types of highway irrespective of speed limit.

05.5.2 Inspection/supervisor vehicles

- conspicuous colour (e.g. yellow or white – a non-reflective yellow colour, No. 355 (lemon) to Table 1 of BS 381C: 1996 “Specification for colours for identification, coding and special purposes” is recommended);
- 70 mm capital letter height “HIGHWAY MAINTENANCE” sign to diagram 7404 (externally mounted on rear of vehicle) (see also paragraph [O5.2.8](#));
- roof-mounted amber light bar (visible 360°) with a minimum of two independent light sources;
- “Class RA2” to BS EN 12899-1 or microprismatic reflective markings on the rear of the vehicle in accordance with paragraph [O5.2.3](#) (c) or (d); and
- company or client livery on side of vehicle.

05.5.3 Traffic management/maintenance vehicles (personnel/equipment carrier)

- conspicuous colour (e.g. yellow or white – a non-reflective yellow is recommended (see paragraph [O5.5.2](#)));
- 140 mm capital letter height “HIGHWAY MAINTENANCE” sign to diagram 7404 (externally on rear of vehicle) (see also paragraph [O5.2.8](#));
- “Class RA2” to BS EN 12899-1 or microprismatic reflective markings on the rear of the vehicle in accordance with paragraph [O5.2.3](#);

- all seats shall be fitted with head restraints and 3 point inertia reel belts;
- working lights;
- reversing beeper;
- front roof-mounted amber light bar (visible 360°) with a minimum of two independent light sources, and rear-mounted flashing amber beacons (visible 360°);
- company or client livery on side of vehicle;
- high visibility fluorescent yellow retroreflective strip along side of vehicle; and
- CCTV for rearward vision.

O5.5.4 Equipment installation/removal vehicles

- conspicuous colour (e.g. yellow or white – a non-reflective yellow is recommended (see paragraph O5.5.2));
- 140 mm capital letter height “HIGHWAY MAINTENANCE” sign to diagram 7404 (externally mounted on rear of vehicle) (see also paragraph O5.2.8);
- “Class RA2” to BS EN 12899-1 or microprismatic reflective markings on the rear of the vehicle in accordance with paragraph O5.2.3;
- all seats shall be fitted with head restraints and 3 point inertia reel belts;
- working lights;
- reversing beeper;
- front roof-mounted amber light bar (visible 360°) with two independent light sources, and rear-mounted flashing amber beacons (visible 360°);
- company/client livery on side of vehicle;
- high visibility fluorescent yellow retroreflective strip along side of vehicle;
- special adaptation to provide a low level working platform with a guard rail arrangement within the normal width of the vehicle (e.g. tail lift or well);
- driver/operative intercom system; and
- CCTV for rearward vision.

O5.5.5 Impact protection vehicles

- conspicuous colour (e.g. yellow or white – a non-reflective yellow is recommended (see paragraph O5.5.2));
- 10 tonne minimum on the road weight;

- lorry-mounted crash cushion (LMCC) – see [Section O5.4](#). For details of the latest specification for LMCCs see Departmental Standard TD 49 “Requirements for lorry-mounted crash cushions” (DMRB 8.4.7);
- automatic brake activation system in accordance with [Appendix 4.2](#); see also paragraph [O5.4.4](#);
- signing equipment in accordance with [Section O10.7](#);
- light arrow sign in accordance with [Section O10.8](#);
- reversing beeper;
- 140 mm capital letter height “HIGHWAY MAINTENANCE” sign to diagram 7404 (externally mounted on rear of vehicle) (see also paragraph [O5.2.8](#));
- “Class RA2” to BS EN 12899-1 or microprismatic reflective markings on the rear of the vehicle in accordance with paragraph [O5.2.3](#) (c) or (d) when LMCC is in the stowed position;
- front-mounted amber light bar with two independent light sources and rear-mounted flashing amber beacons visible when the cushion and the light arrow are in the stowed position;
- all seats shall be fitted with head restraints and seatbelts with a minimum of three points of anchorage to the vehicle; and
- CCTV for rearward vision.

NOTES:

1. A vehicle complying with this specification can also be used for the installation and removal of longitudinal coning as long as it is fitted with a special adaptation to provide a low-level working platform with a guard rail arrangement within the normal width of the vehicle i.e. a “coning well”.
2. The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway.

O5.6 CONVOY WORKING VEHICLES

- O5.6.1** For details of vehicles used in the Convoy Working technique ([Section O9](#)) see [Section O9.3](#).

O5.7 MOBILE LANE CLOSURE VEHICLES

- O5.7.1** For details of vehicles used in the Mobile Lane Closure technique ([Section O10](#)) see [Section O10.6](#).

O5.8 MOBILE CARRIAGEWAY CLOSURE VEHICLES

- O5.8.1** For details of vehicles used in the Mobile Carriageway Closure technique ([Section O11](#)), see [Section O11.8](#).

O5.9 USE OF VEHICLES AT ROAD WORKS

O5.9.1 In urban situations or where traffic speeds are low, for very short-duration stops (less than 15 minutes) the roof-mounted flashing amber beacons and vehicle markings may constitute sufficient warning to other road users of the obstruction caused by a works vehicle; see [Section 08](#) and [Part 1: Design, Section D3.31](#). However, when approach visibility is poor, traffic flows are heavy and/or traffic speeds are high, additional warning shall be given by the use of a tapered length of cones on the approach side (see [Table A1.3 \(Appendix 1\)](#) and advance road works signs).

O5.9.2 On all-purpose roads, where a works vehicle is parked in advance of the works with the intention of providing some physical protection, a minimum clearance of 2m should be provided when the speed limit is 30 mph or less. This clearance should be increased to 5m when the speed limit is 40 mph or more. The longitudinal clearance will then be measured from that part of the vehicle facing oncoming traffic. The permissible reduction in signing when a works vehicle is in attendance is described in [Section O3.19](#).

O5.9.3 Most traffic regulation orders dealing with waiting restrictions on minor roads make exemptions for vehicles belonging to statutory undertakers, local authorities and contractors while carrying out road works; consequently these may wait despite the presence of waiting restrictions. In these circumstances, where the presence of parked vehicles is abnormal and provided the road works are wholly within the footway, no advance signs are required. The minimum guarding required, in addition to the barriers protecting the works, is a roof-mounted flashing amber beacon. If the road works are in the carriageway extra precautions will be needed.

O5.9.4 During routine maintenance of street lighting equipment, overhead telecommunications and electricity works by undertakers, it is often necessary for a vehicle to stand on the carriageway. The vehicle will have a hoist system in order to raise operators and replacement equipment to, for example, lantern level. Nets should be provided around and under the bucket to catch any articles dropped by the operators.

USE OF VEHICLES TO INSTALL AND REMOVE TRAFFIC MANAGEMENT

O5.9.5 The presence of stationary or slow-moving vehicles in live traffic lanes on high-speed roads should be minimised. Where temporary traffic management operations involve the encroachment of stationary or slow-moving vehicles into live traffic lanes on a dual carriageway, each such vehicle should:

- be afforded impact protection;
- be fitted with a light arrow sign;
- be protected by advance signing – see also paragraph [O3.6.3](#); and
- take up a position in the centre of the lane to be blocked;

or otherwise the stationary or slow-moving vehicle should be protected by a vehicle complying with the above.

This does not apply to vehicles entering or leaving the works area, hard shoulder or verge.

O5.9.6 On high-speed dual carriageway roads without hard shoulders, operations should be planned to identify safe taper positions which facilitate the provision of advance signing without the need for stationary or slow-moving works vehicles to encroach into live lanes when pre-placing, erecting or removing traffic management equipment.

O5.9.7 In those locations where the procedure described in paragraph O5.9.6 is not practicable, either the works vehicle should be afforded impact protection and be fitted with a light arrow sign, or an approved closure employing either the police, traffic officers or the Mobile Carriageway Closure technique (see [Section O11](#)) should be used.

O5.9.8 For the purpose of activities involving vehicles, the area within the taper should be treated as a live lane.

O5.9.9 Vehicles which are located outside the works area and are engaged in the installation and removal of traffic management equipment adjacent to live lanes should face in the direction of the traffic at all times.

O5.9.10 Trailers shall not be used for temporary traffic management operations which involve reversing.

O6 WORKFORCE ISSUES

O6.1 GENERAL

O6.1.1 Workforce issues are dealt with in detail in the document "Guidance for Safer Temporary Traffic Management", (CSS/HA/HSE 2002); see [References \(Appendix 3\)](#). This document makes reference to other documents where further detailed guidance can be found.

O6.1.2 Authority to stop on a motorway for maintenance purposes is covered by the Motorway Regulations. Inspections and surveys are covered by the Regulations which state that any inspection, survey, investigation or census is to be carried out in accordance with any general or specific authority granted by the Secretary of State. All personnel who carry out this kind of work on motorways are required to carry a pass certifying that the bearer is required to carry out the inspections etc. by authority of the Secretary of State. This pass also serves to establish the bearer's credentials if required by the police.

O6.1.3 In order to counteract risk of complacency or loss of concentration, members of the workforce should be briefed by the appropriate team leader on the specific tasks, local risks and control measures to be enforced during the next work operation or period. Such briefings should take account of the experience of the workforce and be conducted at appropriate intervals commensurate with the location and the tasks involved.

O6.2 TRAINING

O6.2.1 Each operative engaged in the installation, removal and maintenance of traffic management equipment shall be competent in the particular activity in which they are involved and should have a full understanding of the signing requirements for the activity and the correct operation of the equipment they are using. Only adequately trained and competent operatives and foremen/supervisors should be engaged in temporary traffic management operations.

O6.2.2 In the case of undertaker street works, members of the workforce with particular roles shall hold a current Street Works Qualification. This may be as an Operative, Supervisor or both – in accordance with the New Roads and Street Works Act (NRSWA) 1991 and associated regulations.

O6.2.3 In the case of Highway Authority road works, members of the workforce should have successfully completed the appropriate nationally recognised training and have been successfully assessed for competency against national standards for temporary traffic management. Training includes appropriate driver instruction for use of impact protection vehicles within static traffic management operations and mobile lane closure operations. Specific requirements relating to training for the Mobile Lane Closure technique and the Mobile Carriageway Closure technique are contained in [Sections O10.3](#) and [O11.10](#) respectively.

O6.2.4 The National Highway Sector Schemes (NHSS) 12A, 12B, 12C and 12D provide details of one such nationally recognised training and competency assessment regime that may be considered appropriate for Highway Authority road works traffic management activities. Although NHSS 12D recognises the training, assessment and accreditation for street works (see New Roads and Street Works Act (NRSWA) 1991 and Traffic Management Act (TMA) 2004), it provides for training and competency assessment beyond that required by the 1991 Act including requirements for risk assessment and positive temporary traffic management for activities other than those covered by the Act.

O6.2.5 Other sector schemes such as NHSS13A also include requirements for temporary traffic management based on the training and competency assessment requirement contained in NHSS 12A to 12D. Details of all these sector schemes can be downloaded from the United Kingdom Accreditation Service, UKAS website, www.ukas.com.

O6.2.6 Operatives should undertake regular refresher training to ensure their knowledge and skills remain up to date. Sector schemes require operatives and supervisors to be reassessed every five years and to attend refresher training as part of that re-assessment process. The Street Works (Qualifications of Supervisors and Operatives) Regulations 1992 will provide the necessary details in regard to undertakers' street works.

O6.2.7 On the Highways Agency network in England, the organisations engaged in traffic management operations are required to comply fully with the requirements of the National Highway Sector Schemes. All operatives are required to carry the appropriate registration card at all times when working and the contractor shall be responsible for ensuring that all operatives (including any sub-contract personnel) meet these requirements.

O6.2.8 Where a Traffic Safety and Control Officer (TCSO) is required by the contract (see paragraph O7.7.2), they should possess a broad experience of the highways construction industry, combined with the ability to interpret the requirements set out in the contract documents. The requirements for TSCO competency are mandatory in England and Wales from 1 April 2009. They should have a detailed knowledge of the temporary traffic management industry and motorways and trunk roads. In England, Scotland and Wales they shall hold a Sector Scheme 12A Traffic Safety and Control Officer Registration card. Information on the criteria for this are included in Clause 117 of the Manual of Contract Documents for Highway Works (Volume 1 Specification for Highway Works).

O6.2.9 It is essential that the operative/supervisor in overall charge of any road works involving portable traffic signals on a public highway has a full understanding of the signing requirements and the correct operation of the signals and likely consequences if they are improperly set. Site personnel should therefore have attained the appropriate Street Works Qualification (in the case of undertaker street works) as set out in the Regulations or (in the case of Highway Authority road works) attend a suitable course on the use of portable traffic signal equipment and correct signing of works. Information on training and competency assessment is provided in National Highway Sector Scheme 12D.

O6.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

O6.3.1 Whenever possible exposure to hazards should be eliminated or otherwise minimised at source by careful selection of the method of working, plant and material being used, rather than by the issue of personal protective clothing and equipment (PPE) e.g. by minimising noise at source rather than providing hearing protection. The use of PPE shall not be considered as an alternative to efforts to eliminate or reduce risks. If hazards cannot be eliminated, items of PPE may assist in controlling the residual risk.

O6.3.2 The workforce and site supervisory staff must wear high visibility warning clothing at all times when on site. Clothing shall comply with BS EN 471 Table 1, Class 2 or 3 (Class 3 on motorways or other high-speed roads) and shall comply with the requirements of paragraph 4.2.3(b) of the Standard. The colour of the clothing shall normally be fluorescent yellow or fluorescent orange-red complying with Table 2 of the Standard. The retroreflective material shall be to Class 2 as defined in Table 5 of the Standard. In addition, on motorways and other high-speed roads, high visibility jackets or coveralls shall have full length sleeves meeting the requirement of paragraph 4.2.4 of BS EN 471. This requirement may be varied to three-quarter-length sleeves where a risk assessment shows full length sleeves would present increased risk due to the activity being undertaken. Staff should also wear high visibility trousers complying with Class 1 of BS EN 471 where the carrying of large items of equipment or other activities may at any time obscure the visibility of the high visibility jacket or vest.

O6.3.3 When appropriate, weatherproof clothing should be worn. Extra care should be taken when hoods are worn because they can restrict the field of vision. At no time should weatherproof clothing obscure high visibility clothing.

O6.3.4 High visibility warning clothing shall be clean and in a serviceable condition. Damaged or degraded PPE shall be replaced.

O6.4 FITNESS FOR TASK

O6.4.1 Traffic management operatives should be assessed to ensure that they:

- have full use of neck, trunk, arms and legs;
- have at least 6/12 distance vision when wearing glasses or contact lenses;
- have good hearing; and
- are suitable for this work, and that, by means of checks, safety is not compromised by them suffering from specific conditions, e.g. vertigo and balance disorders, psychotic illnesses, diabetes, cardiovascular and gastrointestinal conditions, sleeping disorders.

O6.4.2 Organisations undertaking temporary traffic management operations should adopt policies regarding the inappropriate use of medication, drugs and alcohol. They should consider adopting an alcohol policy which gives a maximum blood alcohol content of 30 mg/100 ml of blood.

O6.5 WORKING HOURS

O6.5.1 Fatigue reduces awareness and hence increases the potential for accidents to happen in the dangerous environment of road works. In the interests of employees' safety, employers shall not allow excessive hours to be worked under the Working Time Directive.

07 INCIDENT MANAGEMENT

07.1 EMERGENCIES

O7.1.1 Emergencies on the highways network are normally dealt with by either the police, other emergency services or traffic officers (if appropriate). If they do not last more than a few hours, as in the case of a vehicle breakdown or an accident on the carriageway, the police or traffic officers will erect the necessary temporary signs. However, if the effects of the emergency last for a longer duration (e.g. when a damaged length of road surface has to be replaced following a vehicle fire), the police or traffic officers will request that the Highway Authority or its maintaining agents take over and erect signs in accordance with the recommendations of [Part 1: Design](#). Should an emergency occur within a section of carriageway already subject to restrictions as a result of road works, the police may request the site personnel to erect or alter signing. It is recommended that the police consult with either the person responsible for the traffic management on the site or a person competent in temporary traffic management before issuing any instructions to change signing.

O7.1.2 The guidance in this section applies to all roads on the highway network.

O7.1.3 Where positive traffic control has to be used in an emergency, the site supervisor should inform the Highway Authority and the police at once and request assistance. Traffic control is discussed in [Part 1: Design, Section D5.4](#).

O7.1.4 If emergency diversions are likely to be a rare occurrence, the cost of permanent symbolic signing (see [Part 1: Design, Section D3.15](#)) along diversion routes may not be justified. Emergency diversion routes should be signed with "temporary diversion" signs to diagrams 2702 to 2707 unless the route is already marked by permanent symbolic signing in accordance with [Part 1: Design, Section D3.15](#). These signs must not be used on a motorway (see TSRGD direction 13(3)).

O7.1.5 The sign to diagram 562 supplemented by the "Accident" plate variant to diagram 563 may be used on motorways and other dual carriageway roads subject to the national speed limit, to give advance warning of an accident. See Chapter 4 for guidance on the use of diagrams 562 and 563. Various other signs will probably be used at the site of the accident, the treatment being similar to that adopted for road works, and will depend upon the severity and duration of the situation. In an emergency, it may not be possible to provide the full range of signs immediately, and the first signs to be erected may be those provided by the police or traffic officers. The aim should always be to give adequate advance warning.

O7.1.6 The prescribed signs "STOP POLICE", "POLICE SLOW" and "POLICE ACCIDENT" to diagrams 633, 829.1 and 829.2 are for use only by the police in an emergency. Additional authorised signs for use in an emergency, such as "INCIDENT SLOW", "INCIDENT USE HARD SHOULDER" and "REJOIN MAIN CARRIAGEWAY" are for use by traffic officers and those acting under their instructions. Each incident will require different treatment and this section does not attempt to set out the specific details of the manner in which these signs should be used. For working drawings of these signs refer to the Overseeing Organisation.

O7.1.7 In tidal flow systems, the tidal lane normally has sufficient lane width to carry mixed traffic in these circumstances, and may be used to redirect traffic to bypass the obstruction. At night, when traffic flows are low, the tidal lane may be closed to serve as a buffer lane between opposing flows and for maintenance and emergency access. Consideration could also be given to the closure of the tidal lane in off-peak periods if flows permit.

O7.1.8 For incident control, whilst it is not possible to predict the timing and precise location of incidents, highway operators should prepare generic plans and procedures to deal with any foreseeable scenarios which are liable to arise from incident situations. Generic plans should take account of previous incidents and works occurring on the network including emergency street works and road traffic accidents.

O7.1.9 Incident management plans and procedures should take account of all road users likely to be affected by both the incident and the management of that incident. In emergency situations it may not always be possible to account for the needs of vulnerable road users (including the physically and visually impaired), however consideration should be given to addressing their needs in the event that such a situation continues for an appreciable length of time.

O7.1.10 The Highway Authority shall ensure that sufficient resources are available, and that the relevant staff are trained and competent, to assist the emergency services when requested to provide ETM for its roads.

O7.2 EMERGENCY TRAFFIC MANAGEMENT

GENERAL

O7.2.1 In an emergency, temporary traffic management complying with the principles included in Part 1: Design may not always be possible. In such circumstances it may be necessary for those dealing with an incident to deploy emergency traffic management (ETM) using such limited traffic management resources as are available to them upon arrival at the incident. The requirements of the Safety at Street Works and Road Works – A Code of Practice should be complied with for incidents on roads which are the responsibility of the Highway Authority.

O7.2.2 Emergency traffic management shall only be deployed to:

- provide short-term protection to those dealing with or involved in the incident;
- prevent escalation of the incident;
- protect and give direction to other traffic approaching the scene;
- protect the scene of a crime until such time as the police take over; or
- help manage incident-related congestion.

O7.2.3 The primary aim of any ETM shall be to provide immediate basic guidance to road users and to create a sterile area for the protection of those involved with an incident. As with all traffic management, drivers should be given sufficient advance warning of an obstruction, so that they can adjust the speed and position of their vehicles on the road, in order to pass the obstruction in safety.

O7.2.4 Several highway authorities operate teams to provide a fast response to incidents. Various terms are used for these teams, including Incident Support Units (ISUs), which is the term used in this document, and Emergency Response Teams (ERTs). The teams, however, will have broadly the same function. The main functions of the teams are:

- to attend and help clear minor incidents when requested by police or traffic officer;
- supplement ETM when requested to do so by police or traffic officer;
- undertake highway maintenance safety patrols and safety inspections;
- assess asset damage and clear minor debris; and

- in the case of minor incidents, identify when a road is safe to be reopened. For more major incidents, this decision is likely to be taken by the police or a traffic officer. However, if repairs are required following the initial incident, the manager from the managing agent or Direct Labour Organisation (DLO) may make this decision in consultation with the appropriate control centre (if applicable).

O7.2.5 ETM will normally be provided by the first to arrive at the incident, e.g. police, traffic officer or ISU, using whatever resources are available to them at time of deployment. The situation where an ISU is first to arrive is dealt with in paragraph O7.2.8.

O7.2.6 ETM involving carriageway closure or stopping of traffic shall only be deployed under the control of the police or a traffic officer. ISUs may deploy such ETM only when acting under the instructions of either the police or a traffic officer acting within their powers as defined under Part 1 of the Traffic Management Act 2004.

O7.2.7 Contractors do not have any general authorisation or powers to stop or direct traffic. However, under section 65 of the Road Traffic Regulation Act 1984 (as amended by the New Roads and Street Works Act 1991) a Highway Authority can permit contractors employed by them to place ETM on any part of their network without a specific instruction. Contractors should confirm with the Highway Authority employing them, whether or not they are permitted to deploy ETM complying with this section.

O7.2.8 If an ISU discovers an incident where police or a traffic officer are not already in attendance, they should follow their own emergency traffic management procedures based on the amount of equipment they are carrying. ISU's ETM should always make full use of the equipment available to them and shall at no time be less than the basic ETM layout described in this section. If police or traffic officer assistance is required, e.g. to instigate a carriageway closure, they should immediately summon the appropriate assistance.

O7.2.9 Emergency traffic management shall be deployed only to deal with emergency situations, i.e. where the event/incident is unplanned. It shall not be used for planned short-duration highway maintenance works.

O7.2.10 Examples of typical circumstances when ETM may need to be deployed are:

- road traffic accidents;
- broken-down or abandoned vehicles: broken-down vehicles present a hazard not only through the presence of the vehicle itself, but also because other vehicles may need to attend to effect recovery, and hence require protection; and
- debris on the road: small manageable items should be removed as soon as it is safe and practicable to do so; unmanageable items may need to be protected in the same way as road works.

O7.2.11 Any ETM layout shall take account of all the road users likely to be affected by management of the incident, including pedestrians and cyclists.

O7.2.12 Any ETM layout deployed should be adequate and appropriate to the nature of the incident and the traffic management resources available throughout the duration of the incident. Consideration should always be given to the topographical and environmental conditions under which the ETM will be deployed, e.g. the extent of visibility at the time of the incident may require the use of warning lights to help guide traffic past the incident scene.

O7.2.13 ETM should be continually assessed to ensure it remains appropriate to the circumstances and duration of the incident and to decide if replacement temporary traffic management is required.

O7.2.14 In carrying out their dynamic risk assessments, those dealing with the incident should also consider the following factors (this list is not exhaustive):

- weather conditions – rain, fog, snow etc.;
- road geometry – incident on a corner or straight, at or near a junction, or on the crest of a hill; and
- traffic volumes – the volume of traffic and its speed.

TRAINING

O7.2.15 Staff deploying ETM shall be trained in the implementation of traffic management on a live carriageway (see [Section O6.2](#)) and any other procedures needed to deal with the incidents they are required to attend.

O7.2.16 Records should be kept of the training received by staff, and reviews undertaken to identify the need for new training and its suitability.

ROLE OF INCIDENT SUPPORT UNITS (ISU)

O7.2.17 Police and traffic officers carry limited traffic management equipment for deployment in an emergency situation. However they also have the option to call for traffic management support from ISUs at any time during the management of the incident.

O7.2.18 ISUs and/or dedicated traffic management vehicles may be called upon to provide additional traffic management support to the police and traffic officers when dealing with incidents.

O7.2.19 ETM which is deployed initially by the police or a traffic officer may be enhanced by an ISU before finally being replaced by fully compliant temporary traffic management.

DURATION OF INCIDENT

O7.2.20 The following timescales and levels of appropriate ETM resource are provided for guidance only and should be interpreted flexibly depending upon the nature of the incident and the availability of suitable traffic management resources.

O7.2.21 Short-term duration incidents – where an incident is likely to last less than 20 minutes following the deployment of ETM, no further action will normally be required.

O7.2.22 Medium-term duration incidents – where an incident is likely to last longer than 20 minutes, but less than 90 minutes, replacement of the ETM coning and signing should be arranged and carried out by ISU. In these circumstances, the ISU may deploy their equipment using the basic ETM layout as a minimum guide, but using their larger coning and signing. ISUs should deploy their equipment either upstream (with a longer taper) or adjacent to the initial ETM coning and signing. After they have finished laying out their own equipment, ISUs will then remove the ETM equipment to the back of the hard shoulder, or to the verge if there is no hard shoulder.

O7.2.23 Long-term duration incidents – where an incident is likely to last longer than 90 minutes, ETM should be replaced by temporary traffic management complying with [Part 1: Design](#), as soon as practicable following a dynamic risk assessment.

O7.2.24 Those dealing with an incident should not wait until these times have elapsed before calling for additional support.

O7.2.25 Where a carriageway closure is required, ISU support in the form of fully compliant temporary traffic management will be required and should be deployed as soon as possible. Refer also to paragraph [O7.2.6](#).

INITIAL RESPONSE

O7.2.26 The appropriate choice of ETM layout at the scene of an incident will depend upon factors such as the incident type, location, road geometry, time of day and available equipment.

O7.2.27 If safe to do so, initial action should be taken by those first at the scene to prevent further escalation of the incident and make the scene safe. If further equipment and resources are required to achieve this, these should be requested without delay.

O7.2.28 Upon arrival at an incident the following should be considered:

- is it necessary to implement ETM immediately in order to protect those at the incident or to prevent secondary incidents?
- can the incident be dealt with on foot? e.g. a small piece of debris in the carriageway that could be easily and safely removed to the back of the hard shoulder or verge. Refer to [Section O3.5](#) for further guidance;
- can the incident be moved to a place of safety (e.g. the hard shoulder) quickly without deploying ETM?
- could the incident be dealt with/protected by stopping in the live carriageway? Refer to paragraphs [O7.2.73](#) and [O7.2.74](#);
- is a rolling road block required? Refer to paragraph [O7.2.67](#);
- are additional traffic management resources available nearby?

O7.2.29 If the incident can be cleared quickly, the use of a stationary high-conspicuity vehicle to protect the scene may be appropriate. Refer also to paragraph [O7.2.74](#). Consideration should always be given to using an approved rolling road block technique, and/or setting out a lane or lane closures depending upon the location and circumstances of the incident.

O7.2.30 The need to respond rapidly to an incident (in terms of deploying ETM) will depend upon the circumstances of the incident. For example debris in the carriageway may be easily removed using gaps in the traffic or a rolling road block, whereas a major incident will require a full traffic management deployment.

O7.2.31 [Figure 7.1](#) summarises the basic considerations involved in the deployment of ETM.

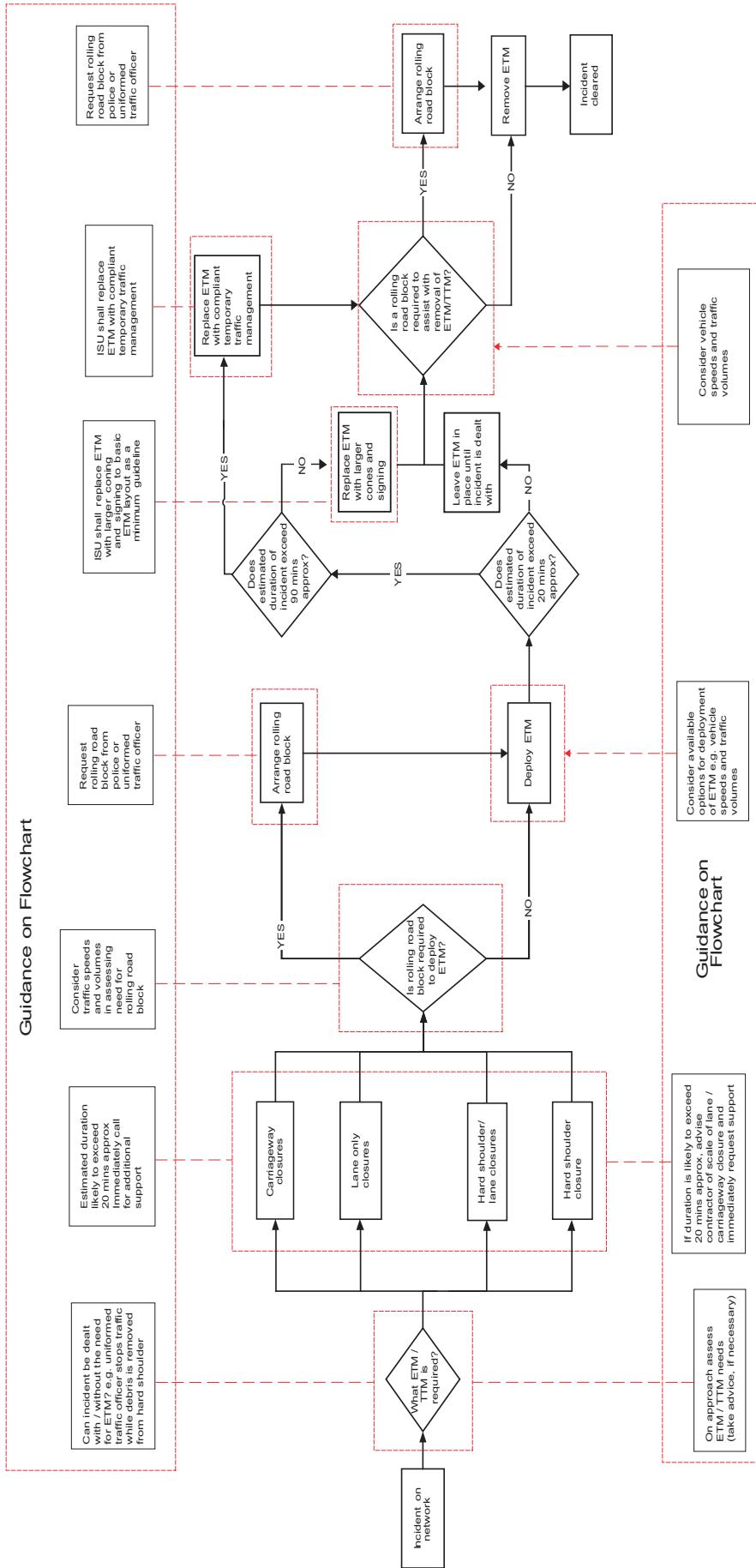


Figure 7.1 Deployment of emergency traffic management

VMS SIGNING

O7.2.32 The use of variable message signs, either permanent or temporary, should be considered as a means of warning motorists of transitory conditions ahead. Any messages displayed on these signs must comply with regulations 53(1) and 58, and Schedule 15 to the Regulations. On trunk roads in England, fixed VMS signing is controlled by either the police or the Highways Agency via their National Traffic Control Centre or Regional Control Centres and requests for any necessary warning messages should be addressed to them.

O7.2.33 Where enhanced or variable message signs (EMS/VMS), including central reservation matrix signals, are available on approach to an incident, these should be used to provide advance warning to motorists (especially where lanes are closed) and reduce the speed of approaching traffic. However, it should be noted that the use of signals to close lanes or reduce speeds does not guarantee the compliance of motorists.

O7.2.34 Signs displaying hard shoulder closures should not be used, however consideration should still be given to displaying a lower advisory maximum speed, or where appropriate a reduced temporary speed limit on approach to and past the incident, to minimise the risk and potential severity of secondary incidents.

O7.2.35 If there are no EMS/VMS in the immediate vicinity of the incident, consideration should be given to using the nearest available signs to give advance warning.

O7.2.36 Signs should be activated for the entire duration of the incident to provide advance warning.

DEPLOYMENT

O7.2.37 A dynamic risk assessment shall be undertaken to determine the appropriate course of action at the incident scene taking into account; traffic speeds, traffic volumes, lighting levels, weather, road geometry etc., as each will affect the requirement for ETM and the extent of any ETM to be deployed.

O7.2.38 The first vehicle to arrive at the scene of an incident shall normally stop approximately 50 m in advance (upstream) of the incident. On single carriageway roads if the distance of 50 m is impracticable it should stop at a safe distance based on either an initial site assessment that gives adequate protection to the site of the incident, or, if the emergency services are involved, as directed by the officer in charge. By parking upstream of the incident, the vehicle and lighting provides additional warning to approaching drivers of an incident and encourages them to pass the incident at an appropriate speed.

O7.2.39 If the vehicle is suitably equipped (refer to paragraph O7.2.40 below) then consideration may be given to using the vehicle to provide physical protection to those at the scene by creating a longitudinal safety zone. If an ISU discovers an incident where the police or traffic officers are not already in attendance, they should follow their own procedures for dealing with that incident.

O7.2.40 Where vehicles are required to stop in a live carriageway to protect the scene whilst they make an initial assessment of an incident, the vehicle shall be fitted with appropriate high-conspicuity livery and enhanced warning lighting, complying with the Road Vehicle Lighting Regulations, appropriate to the type of vehicle dealing with the incident. Note that alternate flashing rear facing red lights are not currently authorised for use on vehicles other than emergency service and traffic officers' vehicles. Refer also to paragraph O7.2.74.

O7.2.41 Unless the vehicle is already fitted with a suitable electronic light arrow, a "keep left/right" sign to diagram 610 shall be deployed immediately to the rear of the vehicle to give a clear indication to motorists that the vehicle is stationary. Once the incident is dealt with, the sign can be quickly removed and the vehicle move off. Alternatively, it may be that deployment of ETM is required, and this should be done in accordance with the following guidance.

O7.2.42 Under no circumstances should a vehicle be reversed in a live carriageway without the protection of the police, traffic officer or traffic management.

CONING AND SIGNING

O7.2.43 Traffic cones used within ETM shall comply with either diagram 7101.1 or 7102. The number of cones used is unlikely to comply with the requirements of [Part 1: Design](#), hence the size of cone used should always be the largest size of cone available at time of deployment. Under no circumstances shall the size of cone be less than 450 mm in height.

O7.2.44 Cone spacing shall not be greater than 12.5 m in the final ETM layout. Coning at 12.5 m centres shall be continued longitudinally past the incident if resources allow.

O7.2.45 ETM shall always be deployed across full lane widths only.

O7.2.46 If the incident is on a dual carriageway between two live lanes of traffic, coning shall always be from either the near side or off side of the carriageway as appropriate, in order to avoid the formation of an island.

O7.2.47 The lead-in taper on a dual carriageway road with a permanent speed limit of 40 mph or above shall be not less than 100 m in length per lane closed. Below 40 mph, the lead-in taper may be reduced to 50 m minimum. Longer taper lengths may be necessary if sight lines (horizontal and vertical) are restricted. See [Figure 7.2](#). Details of the lengths of tapers for single carriageways are given in [Table 5.3](#) in [Part 1: Design, Section D5.4](#), and depend on the permanent speed limit and the width of the hazard. The required taper length is between 13 m and 125 m.

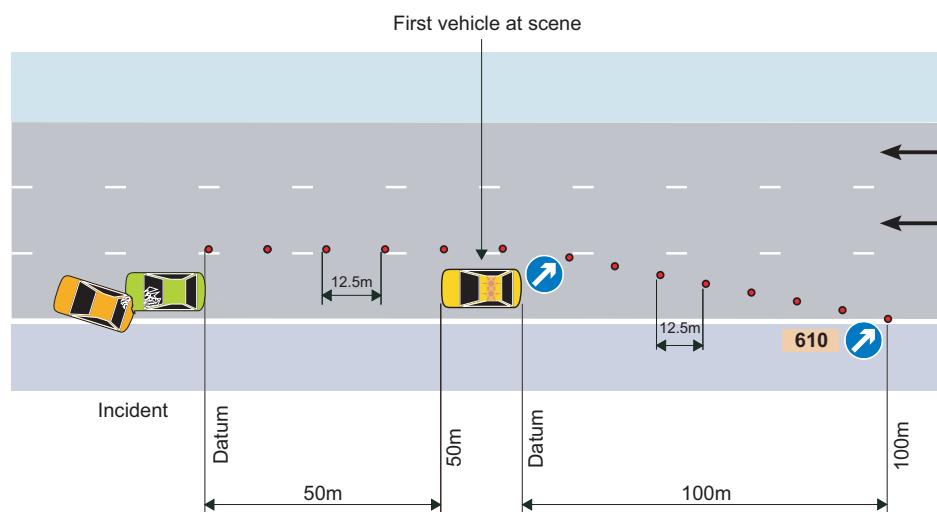


Figure 7.2 Minimum ETM coning and signing (40 mph and above)

NOTES:

1. For appropriate fend position see paragraphs [O7.2.76](#) to [O7.2.78](#).
2. For details of signing refer to paragraph [O7.2.55](#).

O7.2.48 If the duration of the closure is to be protracted, or its position dictates a longer taper, additional support shall be called upon to implement a more permanent closure complying with the guidance provided in [Part 1: Design](#).

7.2.49 The working space in advance of the incident shall be determined according to the nature of the incident being dealt with. Where emergency services or traffic officers need to utilise the area in advance of the incident, a working space shall be incorporated into the ETM layout (in addition to the 50 m already provided). Emergency services and/or recovery operators should always work under the protection of ETM within the working space provided.

O7.2.50 The presence of a high-conspicuity vehicle providing protection to the scene does not permit a reduction in the longitudinal clearance.

O7.2.51 The lateral clearance between the edge of the working space and that part of the carriageway being used by traffic should be not less than 1.2 m. If the extent of the working space around the incident is such that this lateral clearance is not achievable, then the closure of an additional lane may be required.

O7.2.52 Where fire service attendance is required at the scene, it should be noted that fire officers have to work from both sides of their vehicles to access equipment. Consideration should be given to closing off an additional lane to provide a safe working area. Where an ambulance is required at the scene it should be noted that the ambulance will usually park in front of the incident to permit quick removal of the injured.

O7.2.53 The safety zone includes the areas upstream and downstream of the working space, as well as the area between the working space and the passing traffic. Under normal circumstances, the safety zone should not be entered during the course of the incident, other than to maintain or remove the ETM.

O7.2.54 It is not necessary to provide an exit taper for ETM, unless resources allow and the provision of an exit taper will not impede emergency vehicles accessing and leaving the scene.

O7.2.55 The coning used with emergency traffic management shall be supplemented by use of "keep left/right" signs to diagram 610 where appropriate. Depending upon resources available a minimum of two "keep left/right" signs per lane shall normally be used within the lead-in taper. The first should normally be placed adjacent to the first traffic cone within the taper. The second may be placed either in the centre of the lane being closed or in line with the last cone of the taper. The position of signs within the taper may be varied within the lanes to make best use of the equipment available. Where resources permit, the number of signs may be increased to two signs per lane closed.

O7.2.56 The size of "keep left/right" signs used shall be as defined in [Table A1.2 \(Appendix 1\)](#) or otherwise the largest size available at time of deployment. Under no circumstances shall the size of "keep left/right" signs be less than 600 mm in diameter.

O7.2.57 Any signs used adjacent to traffic cones must be of suitable dimension and mounting height to be visible.

O7.2.58 When the incident is restricted to the hard shoulder, coning and signing layouts shall be in accordance with Detail A, [Table A1.5 \(Appendix 1\)](#).

O7.2.59 When traffic is directed to use the hard shoulder past an incident and appropriate signing using diagrams 7260 and 7261 is unavailable, a combination of "keep left/right" signs to diagram 610 and traffic cones shall be provided to Detail A, [Table A1.5 \(Appendix 1\)](#), to direct traffic to re-join the main carriageway. See also paragraph [O7.2.65](#) below.

O7.2.60 "No entry" signs to diagram 616 shall be used by, or on the instruction of, police or traffic officers at a junction or the top of a slip road to restrict access onto the carriageway for the duration of an incident. This sign can also be used to supplement a complete closure on a multi-lane carriageway.

O7.2.61 During conditions of reduced visibility (night, rain, snow, fog etc.), the lead-in taper shall be supplemented with amber warning lights complying with BS EN 12352:2006. Alternatively, sequentially-flashing warning lights or other sequential light emitting devices may be used where specific authorisation for their use exists (see paragraph [O4.7.17](#)). The use of unsynchronised flashing warning lights close together produces a confusing appearance and therefore shall not be used.

O7.2.62 High-intensity flashing warning lights may be used only in combination with prescribed traffic signs and not as a means of delineating an incident.

ADVANCE SIGNING

O7.2.63 The need for advance warning signs to be placed shall be dependent upon the nature and duration of the incident, the individual site conditions and the risk assessment undertaken at the scene. The availability of EMS/VMS for advance warning shall always be considered.

O7.2.64 Before deploying advance warning signs, consideration shall be given to the emergency services that may need to use the hard shoulder to access the incident.

O7.2.65 The amount of advance warning required will depend upon local traffic speed and road alignment approaching the incident. If advance signing is required on high-speed dual carriageway roads, it should be provided at 300, 600 and 900m in advance of the incident on the hard shoulder, verge and/or central reservation as appropriate. On high-speed single carriageway roads this may be reduced to two signs provided at 150 and 300m in advance of the incident and on all roads with a speed limit of 40mph these distances should be 50 and 100m. On roads with a speed limit of 30mph or less, a single sign placed 50m in advance of the incident may suffice.

O7.2.66 Advance warning of an incident may be provided by use of "INCIDENT SLOW" signing as a minimum (or police equivalent – refer to paragraph [O7.1.6](#)). Where appropriate this may be supplemented by use of "INCIDENT USE HARD SHOULDER", and "REJOIN MAIN CARRIAGEWAY" signing if available. Note that these signs require authorisation for use outside the Highways Agency network.

ROLLING ROAD BLOCKS

O7.2.67 Emergency rolling road blocks shall be provided only by police or traffic officers in suitably equipped vehicles. ISUs will not be directly involved in holding back traffic at any time. Rolling road blocks shall not be provided by ISUs unless complying with the Mobile Carriageway Closure technique (see [Section O11](#)).

O7.2.68 A rolling road block shall be considered for the following tasks:

- placing or removing traffic management signs/equipment in the central reservation;
- removal of debris on the carriageway;
- setting out or removing a lane or carriageway closure;
- recovery of a broken-down vehicle to the hard shoulder; and
- stray animals on the motorway.

REMOVAL OF ETM

O7.2.69 ETM shall be removed completely as soon as the incident has been fully dealt with. Where an incident is likely to take longer than 90 minutes to resolve, ETM should be replaced by traffic management meeting the full requirements of [Part 1: Design](#) as soon as practicable following a dynamic risk assessment.

O7.2.70 When replacing ETM, ISUs shall deploy their traffic management equipment immediately adjacent to the ETM taper as a minimum, or in accordance with their own incident traffic management procedures.

O7.2.71 When replacing ETM with a full temporary traffic management deployment it will normally envelop the ETM coning and signing. This will allow the ETM to be removed once the ISU's temporary traffic management is fully in place.

O7.2.72 ETM signing should be removed as quickly as possible after an ISU deploys compliant temporary traffic management. A mixture of signing should never be left as it may confuse motorists.

VEHICLE ISSUES

O7.2.73 Vehicles which are dealing with incidents on a regular basis shall be fitted with high-conspicuity retroreflective livery and lighting as appropriate to the nature of the vehicle. Guidance on appropriate livery and lighting can be obtained from the Highway Authority.

O7.2.74 Consideration should be given to the fitting of light arrow devices and/or impact protection devices to vehicles regularly involved in incident management. The light arrow should be used whenever the vehicle is providing protection and there are blocked lanes.

O7.2.75 The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway. At the scene of an incident, the light arrow sign may be used on the hard shoulder if the nearside lane is blocked, in order to provide additional warning to approaching drivers until such time as it is possible to place ETM in position in the live lane. The light arrow sign may continue to be used until the ETM closure is complete at which time it should move into the live lane.

O7.2.76 When a vehicle is required to stop on the carriageway to deal with an incident, consideration should be given to the appropriate orientation of parking within the ETM; see [Figure 7.3](#) below.

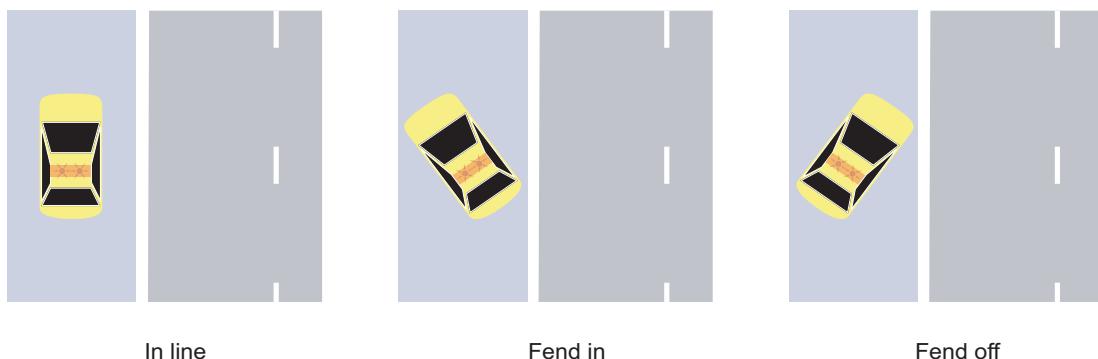


Figure 7.3 Positioning of vehicles

O7.2.77 The fend off position is generally considered the most advantageous vehicle orientation and should be used unless factors identified by a dynamic risk assessment indicate that it is inappropriate. These factors may include:

- there are narrow hard shoulders where using fend off will result in part of the vehicle obstructing a live carriageway lane – consider using “in line” instead; and
- there is significant road curvature to the left (e.g. on an intersection slip road) where using fend off will reduce the side visibility of the vehicle to approaching drivers – consider using “fend in” instead.

O7.2.78 The detailed advantages and disadvantages of the three vehicle orientation options are shown below.

VEHICLE PARKED IN “FEND OFF” POSITION

Advantages:

- fills the lane and therefore provides a line of defence;
- provides a forewarning that the vehicle is stationary;
- visually the vehicle gets larger as approaching vehicles draw nearer;

- when parked on the hard shoulder the vehicle appears as though it could be emerging from the hard shoulder and is more likely to arouse caution from an approaching motorist;
- provides the occupants with a better view of approaching traffic when looking to get out of the vehicle; and
- provides a better view of approaching traffic over the vehicle's bonnet and enables occupants to be better aware of approaching danger.

Disadvantages:

- rear lights and markings aimed towards the hard shoulder;
- when parked on the hard shoulder, approaching motorists may be inclined to react by slowing or changing lanes having wrongly assumed that the vehicle is emerging from the hard shoulder;
- driver is exposed to a direct impact from an errant vehicle;
- when on the hard shoulder, if struck, the vehicle is more likely to be projected into live lanes; and
- the errant vehicle may then breach the safety zone.

VEHICLE PARKED IN "FEND IN" POSITION

Advantages:

- fills the lane and therefore provides a line of defence;
- provides a forewarning that the vehicle is stationary;
- driver not exposed to direct impact on exiting vehicle; and
- when parked on the hard shoulder, if struck it will minimise the likelihood of the vehicle being projected into the live carriageway.

Disadvantages:

- rear lights and markings are aimed towards the central reservation;
- when "fend in" is used whilst parked on the hard shoulder, and a near side barrier or wall is present, if the vehicle is struck it is more likely to collide with the barrier and then continue to travel along the hard shoulder alongside the barrier. At high speeds this could result in the vehicle breaching the safety zone;
- visually the vehicle gets smaller as approaching vehicles draw nearer;
- with the vehicle in the "fend in" position it tends to obstruct the operative's view of approaching traffic when returning to the vehicle; and
- the presence of a near side ditch or embankment may cause the vehicle to turn over if struck.

VEHICLE PARKED "IN LINE"

Advantages:

- rear facing warning lights are most visible;

- rear vehicle markings most visible; and
- driver of vehicle is not exposed to direct impact on exiting vehicle.

Disadvantages:

- may appear to approaching drivers that the vehicle is moving;
- does not fill the lane, therefore offering only a limited line of defence; and
- if the vehicle is struck it will travel forward and may breach the safety zone.

Whatever position is adopted, in all cases the vehicle should be left with its front wheels steered straight ahead i.e. parallel to the vehicle, and in the case of a vehicle fitted with an automatic gearbox, with the gear selector in "park". The handbrake shall be set and if available, the four-wheel drive mode engaged. If it is necessary to leave the engine running, "run lock" should be used, if available.

SUMMARY CHECKLIST FOR ETM

O7.2.79 The first to arrive at the scene shall:

- stop before the incident with flashing roof-mounted beacons on. The distance before the incident on dual carriageways should be 50 m, and on single carriageway roads, should be a safe distance (see paragraph [O7.2.38](#));
- notify the emergency services or traffic officers if needed;
- protect the scene with a high-conspicuity vehicle or IPV (see paragraph [O5.5.5](#)) (if available);
- place a "keep left/right" sign behind the vehicle (or activate the light arrow if available);
- arrange for EMS/VMS to be activated if the incident cannot be cleared quickly;
- deploy a 100 m minimum (50 m on 30 mph roads) cone taper per lane;
- deploy additional diagram 610 "keep left/right" signs along taper;
- deploy advance warning signs if appropriate; and
- in reduced visibility, deploy warning lights along taper.

O7.2.80 The ISU shall:

- replace ETM with TTM, if the incident is likely to last longer than 90 minutes;
- deal with the incident;
- clear the carriageway;
- remove the ETM; and
- reopen carriageway.

O7.3 FREE VEHICLE RECOVERY FACILITIES

O7.3.1 It is essential to have a well defined operational procedure in the event of an incident. When works are likely to cause congestion, accidents and breakdowns can result in stationary traffic which may create a hazardous situation. It may therefore be appropriate to have recovery vehicles permanently on site or available on immediate call out. The design aspects of vehicle recovery provision are dealt with in [Part 1: Design, Sections D3.35 and D3.36](#).

O7.3.2 Where hard standings are constructed to accommodate recovery vehicles, these should be removed or fenced off upon completion of the works to prevent their use as general stopping points by the public.

O7.3.3 Having located a broken-down vehicle, the level of recovery service deployed should be appropriate to the work, the risk and/or scale of congestion likely to develop.

O7.3.4 Any breakdown/recovery operator entering the coned-off area to assist a broken-down vehicle will need to have due regard for their actions and how these affect other people in accordance with the Health and Safety at Work etc. Act 1974, the Health and Safety at Work (NI) Order 1978. See also [Section O2.1](#).

O7.3.5 The Specification for Highway Works (see MCHW Volume 1 Clause 120 and Volume 2 Appendix 1/20) provides a generic specification for basic types of recovery vehicles, equipment and inspection requirements.

O7.3.6 The use of an Impact Protection Vehicle (IPV) (see paragraph [O5.5.5](#)) should be considered to protect the scene of the recovery where vehicle speeds passing the broken-down vehicle are generally in excess of 30mph. This applies to the incident site and also to the setting-down point.

O7.3.7 Once the broken-down vehicle and its occupants have been recovered, the recovery operator should convey them to the pre-agreed safe setting-down location as quickly and safely as possible, in order to return to standby ready for the next incident.

O7.3.8 The choice of setting-down locations should take account of the following.

- Safety – recovered motorists should be protected as far as reasonably practicable from the possibility of involvement in accidents with other traffic. Hence, if possible, the setting-down point should not be located on a high-speed road or alternatively physical barriers should be provided to give some protection from traffic.
- Security – it is important to consider and minimise as far as practicable any danger to recovered occupants from criminal threat or activity. In remote setting-down locations, it may be necessary to provide staff or CCTV and lighting to safeguard them.
- Facilities – at all setting-down locations there should be telephone facilities to enable recovered motorists to make arrangements for further assistance. However, in circumstances where dedicated telephone facilities are not available the recovery service provided should include making telephone contact on behalf of the recovered motorist.
- In addition to the above requirement the following items are deemed desirable but not essential:
 - toilet facilities;
 - drinking water facilities; and
 - shelter with heat, light and seating.

Advice on suitable setting-down locations can be found in [Part 1: Design, Section D3.35](#).

O7.3.9 The key to an effective recovery system on site is good communication between the relevant parties. The ISU should provide an effective two-way communication system, taking into account any local communication black spots or low signal areas. Secondary “back-up” communication systems should also be provided to ensure continued service.

O7.3.10 A dedicated landline should be provided between the recovery base station/CCTV monitoring station, the appropriate regional control centre, and the police for use in emergencies.

O7.3.11 The recovery operator shall have in place appropriate insurance covering damage to broken-down vehicles while being recovered to a place of safety as well as third party liability insurance.

O7.3.12 Vehicle recovery operatives should hold appropriate certificates of competence for the tasks they are performing. In addition, vehicle recovery operatives shall hold a current driving licence free of endorsements other than for speeding.

O7.3.13 All recovery operators working within Highways Agency construction sites are required to be accredited to the National Highway Sector Scheme for Vehicle Recovery at Highway Construction Sites. Details of the scheme can be found on the United Kingdom Accreditation Service (UKAS) web-site, www.ukas.com.

O7.3.14 The company employing vehicle recovery operatives shall ensure that each individual is vetted in respect of a police record. This may be audited under the Sector Scheme.

O7.3.15 The Specification for Highway Works (see Manual of Contract Documents for Highway Works (MCHW) Volume 1) provides a sample of the leaflet which should be handed out to drivers/riders of recovered vehicles. The leaflets should include telephone numbers from which motorists can obtain further assistance.

EMERGENCY ROUTE

O7.3.16 In the event of an accident blocking the running lanes, the police may require the site access lane to be used by general traffic. Site personnel shall take particular care during such periods. For a full contra-flow where the primary carriageway is closed and all traffic is transferred to the secondary carriageway, it is essential that a continuous, well-defined emergency route is available on the primary carriageway at all times. This does not have to be part of the normal site access route.

O7.3.17 A tidal layout with its bounded single lane is particularly vulnerable in the event of an incident. However, in an emergency the tidal lane could be closed and cleared either to assist access by the services to the incident, or for operation in the reverse direction should an incident cause a blockage on an opposing lane; see [Part 1: Design, Section D6.28](#).

O7.3.18 Where continuous lengths of temporary vehicle restraint barrier are deployed in narrow lane running, the police may request openings at regular intervals to gain access to or egress from the open carriageway. Such openings require special consideration and enhancement at the downstream end of the opening to deter public traffic from impacting the next section of guarded section at the leading edge.

07.4 OTHER VEHICLE RECOVERY PROVISION

O7.4.1 Where recovery vehicles are not permanently on site or available on immediate callout, consideration should be given to the possibility that vehicles may still break down at a works site and require attendance by a road recovery operator. Breakdowns can result in stationary traffic which may create a hazardous situation.

O7.4.2 Motorists in difficulty may choose to access a coned-off area. However, signs advising drivers to use a coned-off area in the event of an emergency must not be used (see [Part 1: Design, Section D6.10](#)).

O7.4.3 A vehicle that has broken-down and is not located within the coned-off area will be a hazard, create congestion and should be treated as an emergency situation. If the repair activity or the recovery/removal procedure is likely to obstruct traffic flows or in any way be considered dangerous, then the road recovery operator shall inform the police or traffic officer service, as appropriate, and their assistance requested.

O7.4.4 Whilst a broken-down vehicle that is located within the coned-off area should be treated as an emergency situation, at all times the recovery operator must firstly consider their own safety and then the safety of the occupants of the casualty vehicle. The operator should carry out a risk assessment to ascertain how the incident should be dealt with. If the operator considers that the location and/or the nature of the incident make it too dangerous to attempt either a repair or removal without assistance, then they should inform their road recovery operator. The police or traffic officer service, as appropriate, should then be requested to attend to help protect the scene.

O7.4.5 If the exact location of the casualty vehicle is not known, the operator may need to drive through the area of road works in order to establish the most appropriate place to enter the coned-off area. Access to the works area is only to be gained using the approved signed access points if these are present. At no time should an operator create an opening by moving traffic cones or other traffic management devices. Particular care must be taken in areas where the traffic cones are roped together to create a safety zone.

O7.4.6 Prior to entering the works area the operator should check that any vehicles behind are at a safe distance and approximately 100 metres prior to the access point check that it is clear for entry and gradually slow down to an appropriate speed. If the entry to the access point or start of the road works is blocked, the operator should not attempt to enter the works and must continue on the main carriageway. Under no circumstances must the operator stop in a running lane.

O7.4.7 The speed limit within a works area should be complied with and seatbelts must be worn at all times. The operator should exercise extreme caution when driving within a works area since there may be maintenance vehicles, plant and site operatives moving around as well as excavations or obstructions present.

O7.4.8 Where works personnel are present on site, the operator should contact the works manager and inform them of their intentions. The guidance and/or assistance of works personnel should be requested in both accessing the casualty vehicle and subsequently leaving the works area.

O7.4.9 Wherever possible operators should only access and work on casualty vehicles from the side furthest from the live traffic. Walking or working in between the casualty vehicle and running lanes should be avoided wherever possible.

O7.4.10 In cases where the operator is required to reposition their vehicle in order to carry out the removal of the casualty vehicle, then this manoeuvre must be carried out with extreme caution. If works personnel are present then they should be asked to provide assistance if required.

O7.4.11 Operators should be aware of any overhead cables that may be present within an area or road works and comply with any overhead safety signage instructions.

O7.4.12 Operators should only exit an area of road works using the approved signed exit points if these are present. At no time should an exit be created by moving any traffic cones or other traffic management devices. When leaving a works area, an operator should only rejoin the main carriageway when their vehicle has reached a speed to enable them to do so in a safe manner.

O7.4.13 In those cases where the casualty vehicle has been repaired, the operator should advise the driver of the casualty vehicle of the correct procedure for rejoining the main carriageway.

O7.4.14 It is recommended that operators carry out their duties in accordance with the requirements of PAS 43:2008, available from the British Standards Institution, and the publication entitled "Best Practice Guidelines for dealing with Breakdowns/Removals on Motorways and High Speed Dual Carriageways", which has been produced by SURVIVE. Copies of this document can be obtained from the SURVIVE website www.survivegroup.org.

07.5 USE OF CCTV

07.5.1 If provided, CCTV should be monitored continuously. To be effective the camera locations need to be carefully selected to ensure comprehensive coverage both through the site and on the approaches. The control centre should be in the site compound if possible, and serve as the main communications link to recovery, contractor's and resident engineer's staff and the emergency services. Multiple means of communications, such as site radios, land-line telephones and mobile telephones should be provided to ensure a continuous communication facility. The operatives should be well trained and appreciate the key role that they play in ensuring the smooth operation of the layout.

07.5.2 CCTV facilities can be particularly useful in providing accurate reports to the regional traffic control centre, police, motoring organisations and local radio stations on any traffic problems during peak periods.

07.6 REPORTING OF INCIDENTS

07.6.1 The effective analysis of incidents and accurate assembly of information is essential if long term monitoring is to be meaningful. Incident reports leading on to appropriate levels of investigation are the basis for all further analysis. The Highway Authority should be consulted for the appropriate procedure for reporting incidents.

07.6.2 The police must be informed of all road accidents which involve an injury occurring on that section of highway open to public use and, on behalf of HM Coroner, of any deaths occurring on site.

07.6.3 Under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), basic reports, using form F2508, are required by the HSE for certain categories of accident and incident. These are not required for accidents unless they are caused as a result of the works.

07.7 INCIDENT MANAGEMENT SYSTEM

07.7.1 The statutory requirement to record and report incidents under RIDDOR 1995 and section 25 of the Road Traffic Act 1972 needs to be augmented by the creation of a management tool for the project which records all site incidents, including particularly those which are traffic management related.

07.7.2 This incident management system needs to incorporate a feature which will identify unexpected levels or categories of incidents, and this will facilitate early action to ameliorate any unsafe features in the project. In England, for works on the trunk road network, the appointment of a dedicated Traffic Safety and Control Officer (TSCO) under the terms of the contract provides a first line of reporting to assist in this procedure. The appropriate Highway Authority should be consulted for works on other roads.

07.7.3 The incident management system should include:

- a formal reporting system;
- providing review meetings;
- establishing the person who has responsibility for record keeping;
- an operational structure; and
- outline contingency plans.

07.7.4 Further issues concerning incident management are considered in Appendix C of "Guidance for Safer Temporary Traffic Management" (CSS/HA/HSE 2002); see [References \(Appendix 3\)](#).

O8 SINGLE VEHICLE WORKS AND INSPECTION STOPS

O8.1 SINGLE VEHICLE WORKS

O8.1.1 Single vehicle works are those works which involve a vehicle either standing for a short-duration or operating at low speed in the carriageway, normally on an urban or low speed road where a Mobile Lane Closure in accordance with [Section O10](#) is inappropriate. The works vehicle used shall display a "keep left/right" sign to diagram 610 conspicuously on the rear or front of the vehicle as appropriate to show approaching drivers which side to pass, in accordance with regulation 15. The use of signs attached to the works vehicle must comply with regulation 14.

O8.1.2 Vehicle-mounted "keep left/right" signs to diagram 610 shall be covered when the vehicle is travelling to and from the site. At no time must they be pointed directly up or down.

O8.1.3 Single vehicle works should not be carried out on dual carriageway roads where the national speed limit applies, except for works such as gritting, salting and damping down of dust, which are undertaken at a controlled speed nearing that of normal road speed; see paragraph [O8.2.1](#).

O8.1.4 Single vehicle works should normally only be carried out on the near side lane of a carriageway, see also paragraph [O8.1.19](#).

O8.1.5 On roads where the speed limit is 40 mph or more, if practical and appropriate, and subject to risk assessment, consideration should be given to fitting a lorry-mounted crash cushion (LMCC) to the working vehicle and/or any escort vehicle that may be employed. It should be noted that LMCCs may be inappropriate on roads with poor alignment, and less than 5.5 m wide, as they may create an additional hazard to road users.

O8.1.6 On roads where the speed limit is 40 mph or more, the working vehicle shall carry a sign to diagram 7403 on the rear. If an escort vehicle carrying a sign to diagram 7403 is provided, the sign on the works vehicle can be to either diagram 610 or 7403 but on single carriageway roads the use of the sign to diagram 610 on the works vehicle is the preferred option as this will help retain forward visibility past the works vehicle. The size of the sign to diagram 610 to be used is given in [Table A1.2](#) of [Appendix 1](#).

O8.1.7 The standard light arrow sign (see [Section O10.8](#)) may be used to replace the sign to diagram 7403 on either vehicle. Note that the light arrow element of this sign shall not be used on two-way single carriageway roads.

O8.1.8 An authorised small light arrow sign may be used on works vehicles as a substitute for a sign to diagram 610 and for the sign to diagram 7403. Details of which signs are authorised for use in this manner, and the limitations on their use as a substitute for the sign to diagram 7403, should be confirmed with the Overseeing Organisation. Where the traffic authority has carried out a risk assessment and determined that using the small light arrow sign on a road subject to a maximum speed limit above 40 mph will not compromise safety, they may apply for special authorisation to do so.

O8.1.9 Work carried out using single vehicles standing or operating in the carriageway should be carried out only during periods of low risk.

O8.1.10 Advance warning to traffic in each direction should be given by a "road works" sign to diagram 7001, a supplementary plate variant to diagram 7001.1 and a "road narrows" sign variant to diagram 517 with a "single file traffic" supplementary plate to diagram 518 ([Plan SVW1](#)). The distance between the signs should be sufficient to enable moving work to progress before the signs are moved and should not exceed 1 mile. Subject to a risk assessment, the supplementary plate to diagram 570 "For 1 mile" in [Plan SVW1](#) may be replaced by a supplementary plate to diagram 7001.1 showing the type of mobile operation taking place and optionally "for" and a distance in the manner shown in working drawing P7001.1 may be included. The distance shown on plates 570 or 7001.1 may be varied. Repeater signs to diagram 7001 may be required if the road alignment is poor.

O8.1.11 Plan SVW1 is the basic layout and may be used if, following a risk assessment, it is not considered necessary to use traffic control by means of manually operated "STOP/GO" boards.

O8.1.12 Plan SVW2 shows an example of a traffic management plan for single vehicle works on single carriageways using traffic control. Such arrangements should be used when forward visibility is limited to less than 150 metres or site circumstances require traffic control.

O8.1.13 When traffic control is used, the "road works" sign (7001) with supplementary plate "Mobile road works" (7001.1) should be repeated at approximately 400m intervals. Additional signs may be required to suit the carriageway alignment and at junctions.

O8.1.14 When traffic control is used, the "STOP/GO" board operatives shall be equipped with two-way radios.

O8.1.15 The systems illustrated in Plans SVW1 and SVW2 are only to be operated on two-lane single carriageways, and when the two-way flow past the site is less than 1300 vehicles per hour. The system shown in Plan SVW2 is only to be operated in daylight.

O8.1.16 Where the road alignment is good and congestion is unlikely to occur and on single carriageway roads where adequate remaining width for two-way traffic is available (see Part 1: Design, Section D3.2), advance warning signs may be unnecessary provided the vehicle is adequately marked; see Section O5.2.

O8.1.17 When working in the vicinity of junctions or roundabouts where approaching vehicles are not able to see the rear-mounted signing, or rear illumination is ineffective due to the angle of approach, the works and/or signing vehicles should have their flashing amber warning beacons switched on and approach signing to the junction placed as appropriate.

O8.1.18 When it is necessary to work across junctions, a static "road works" sign to diagram 7001 should be displayed to traffic on the side road. Signs will not be required at minor junctions and accesses providing there is good visibility for drivers emerging from the junction.

O8.1.19 Where mobile works are carried out in the nearside or offside lane of an urban dual carriageway where the permanent speed limit is 40mph or less, it may be impracticable to locate the advance vehicle mounted signs (see also O8.1.1) and the requirements of Section O10 may be inappropriate. In this case, advance warning should be given by "road works" signs to diagram 7001, with a supplementary plate variant to diagram 7001.1 "Mobile road works" and "lane restriction" signs to diagram 7202. The principles of the system are given in paragraph O8.1.22 and are illustrated in Plan SVW3. The system shown in this plan is only to be operated when the traffic flow is less than that given in Table 10.1 (see Section O10.4).

SINGLE VEHICLE WORKS ON SINGLE CARRIAGEWAY ROADS, BASIC LAYOUT

O8.1.20 The principles are illustrated in [Plan SVW1](#).

Two advance signs are required:

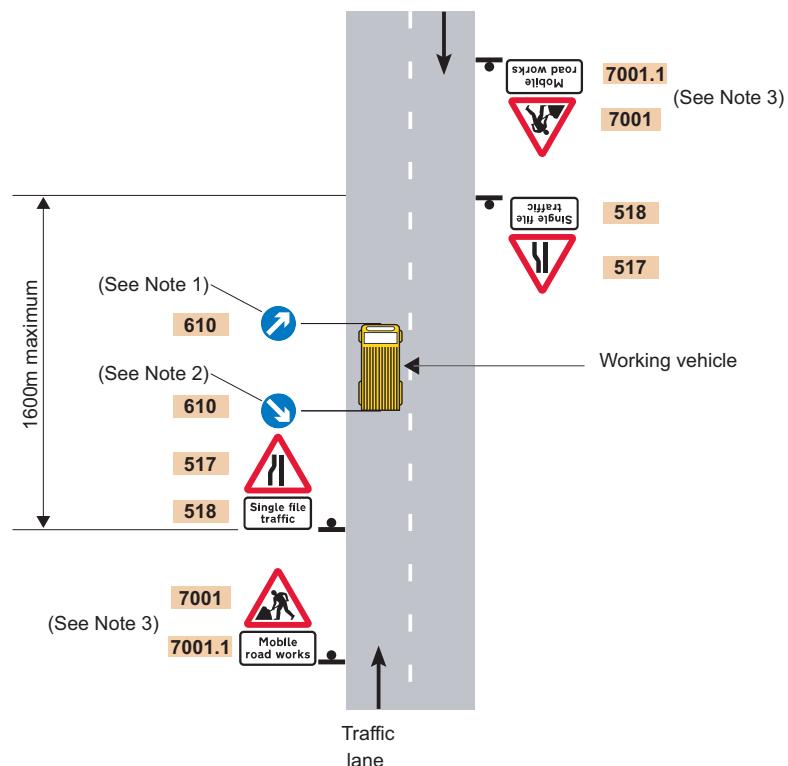
- a “road works” sign (7001) with a “distance over which hazard extends” supplementary plate (570) on near side only in both directions. A supplementary plate to diagram 7001.1, showing the type of mobile operation taking place (see [Table 4.1](#) in [Part 1: Design](#)), “for” and a distance, may be used in place of the plate to diagram 570; and
- a “road narrows” sign (517) with supplementary plate “Single file traffic” (518) on near side only in both directions.

Additional signs may be required to suit the carriageway alignment and at junctions.

Working vehicle signing:

- a “keep right” sign (610) to the rear of the working vehicle attached in accordance with regulation 14(1) or a sign to diagram 7403 (see paragraph [O8.1.6](#)); and
- optionally, “keep left” sign (610) to the front of the working vehicle attached in accordance with regulation 14(1).

Plan SVW1: Single vehicle works on a single carriageway road, basic layout



NOTES:

1. Use of a sign to diagram 610 on the front of the working vehicle is optional. It may only be used on roads with a maximum speed limit of 30 mph or less (see regulation 14).
2. The sign to diagram 610 on the back of the working vehicle may only be used on roads with a maximum speed limit of 30 mph or less (see regulation 14 and paragraph [O8.1.6](#)).
3. This sign is to be repeated at approximately 400m intervals. Additional signs may be required to suit the carriageway alignment and at junctions. The supplementary plate to sign diagram 7001 (diagram 7001.1) may also show a distance.
4. An authorised vehicle mounted small light arrow sign may be used in place of signs to diagram 610 and 7403 (see paragraph [O8.1.8](#)).
5. On roads with a speed limit of 40 mph or more, consideration should be given to fitting a LMCC and/or a sign to diagram 7403 on the working vehicle. If neither are provided an escort vehicle shall be employed. See paragraphs [O8.1.5](#) and [O8.1.6](#).
6. Additional signs may be required to suit the carriageway alignment and at junctions.
7. Keys to the plan are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

SINGLE VEHICLE WORKS ON SINGLE CARRIAGEWAY ROADS – “STOP/GO”

O8.1.21 The principles are illustrated in [Plan SVW2](#).

Four advance signs are required:

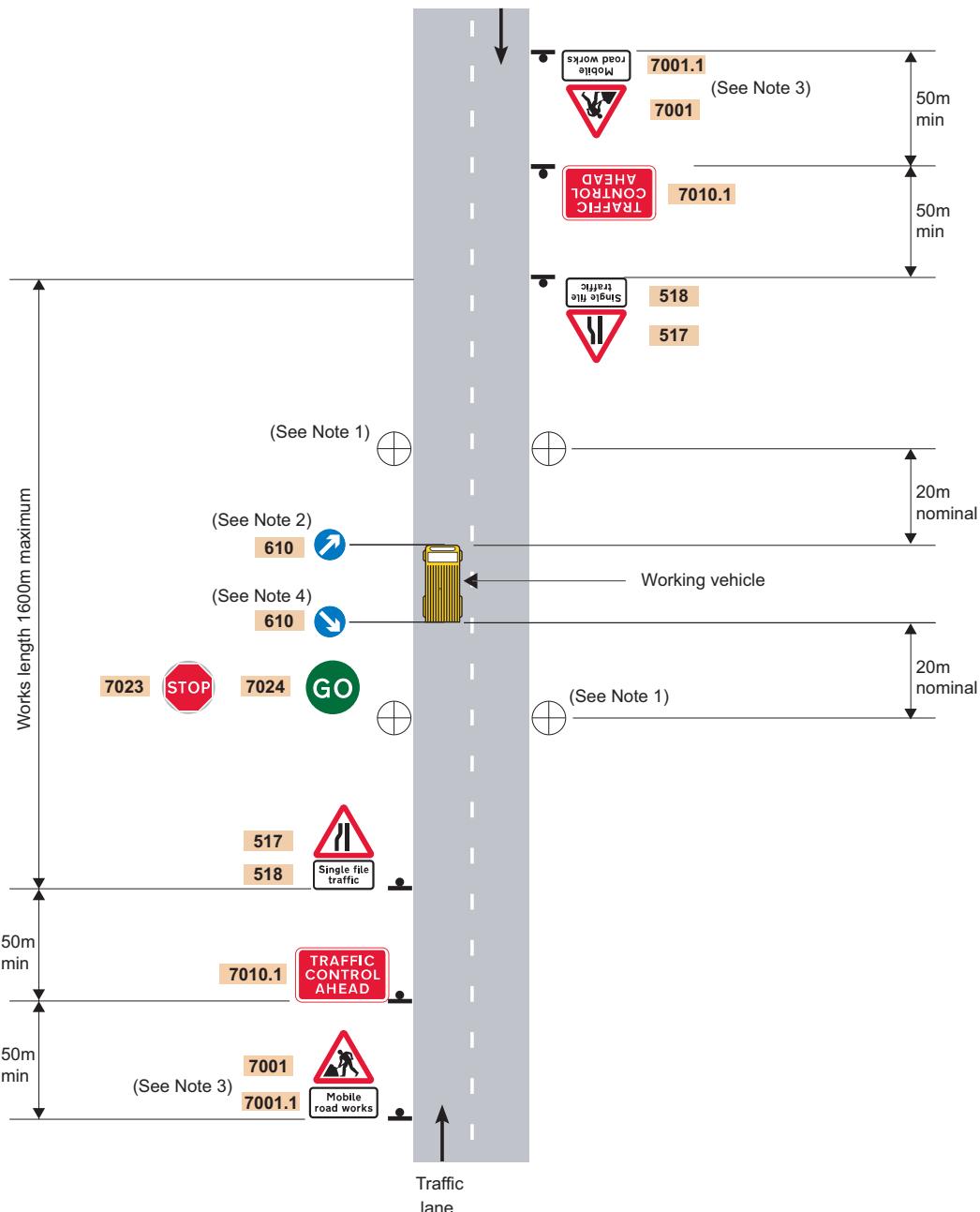
- a “road works” sign (7001) with supplementary plate “Mobile road works” (7001.1) on the near side only in both directions;
- a “TRAFFIC CONTROL AHEAD” sign (7010.1) on near side only in both directions;
- a “road narrows” sign (517) with supplementary plate “Single file traffic” (518) on near side only in both directions; and
- a “STOP/GO” board (7023 7024) nominally 20 m in advance of the working vehicle.

The “road works” sign (7001) with supplementary plate “Mobile road works” (7001.1) should be repeated at approximately 400 m intervals. Additional signs may be required to suit the carriageway alignment and at junctions. The supplementary plate (diagram 7001.1) may also show a distance.

Working vehicle signing:

- a “keep right” sign (610) to the rear of the working vehicle attached in accordance with regulation 14(1) or a sign to diagram 7403 (see paragraph [O8.1.6](#)). An authorised vehicle mounted small light arrow sign may be used in place of signs to diagram 610 and 7403 (see paragraph [O8.1.8](#)); and
- optionally, a “keep left” sign (610) to the front of the working vehicle attached in accordance with regulation 14(1).

Plan SVW2: Single vehicle works on a single carriageway road – “STOP/GO”



NOTES:

1. Alternative “STOP/GO” operative location dependant upon carriageway alignment and visibility.
2. Use of the sign to diagram 610 on the front of the working vehicle is optional. It may only be used on roads with a maximum speed limit of 30 mph or less (see regulation 14).
3. This sign is to be repeated at approximately 400m intervals. Additional signs may be required to suit the carriageway alignment and at junctions. The supplementary plate to sign diagram 7001 (diagram 7001.1) may also show a distance.
4. The sign to diagram 610 may only be used on roads with a maximum speed limit of 30 mph or less (see regulation 14 and paragraph O8.1.6).
5. An authorised vehicle mounted small light arrow sign may be used in place of signs to diagram 610 and 7403 (see paragraph O8.1.8).
6. On roads with a speed limit of 40 mph or more, subject to a risk assessment, consideration should be given to fitting a LMCC and/or a sign to diagram 7403 on the working vehicle. If neither are provided an escort vehicle shall be employed. See paragraphs O8.1.5 and O8.1.6.
7. Keys to the plan are given in Tables A1.4 and A1.5 of Appendix 1.

SINGLE VEHICLE WORKS ON DUAL CARRIAGEWAY ROADS, PERMANENT SPEED LIMIT 40 MPH OR LESS

O8.1.22 The principles are illustrated in [Plan SVW3](#).

- a pair of “road works” signs (7001) with supplementary plate “Mobile road works” (7001.1) should be repeated at approximately 400 m intervals, additional signs may be required to suit the carriageway alignment and at junctions; and
- a pair of lane closed ahead signs (7202), additional signs may be required to suit the carriageway alignment and at junctions.

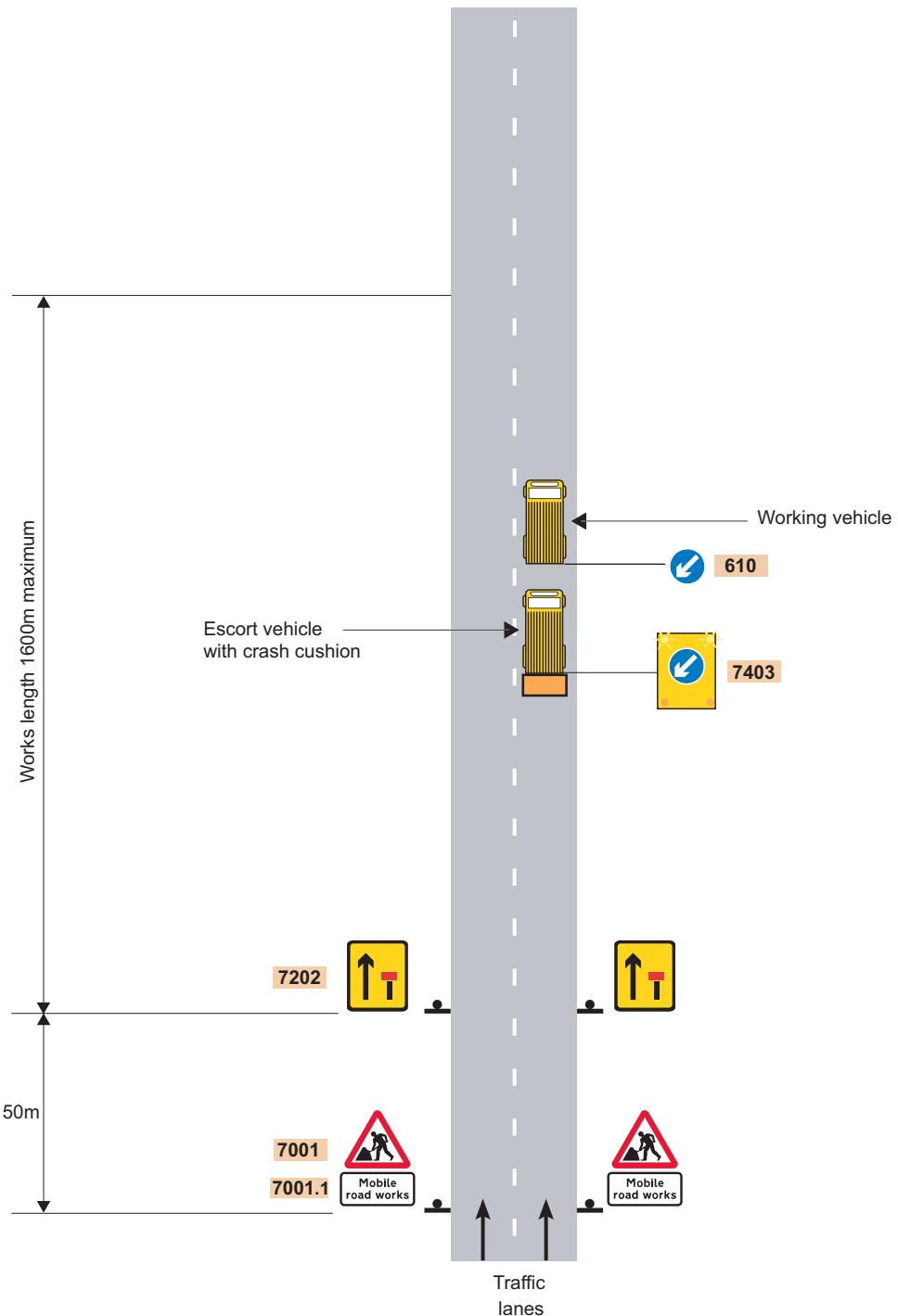
Impact protection vehicle signing:

- a “keep left” sign (7403) to the rear of the escort vehicle attached in accordance with regulation 14(1).

Working vehicle signing:

- a “keep left” sign (610) to the rear of the working vehicle attached in accordance with regulation 14(1) or a sign to diagram 7403 (see paragraph [O8.1.6](#)); an authorised vehicle mounted small light arrow sign may be used in place of signs to diagram 610 and 7403 (see paragraph [O8.1.8](#)).

Plan SVW3: Single vehicle works on a dual carriageway road, permanent speed limit 40 mph or less



NOTES:

1. The system shown in this plan is only to be operated when the traffic flow is less than that given in [Table 10.1](#) (see [Section O10.4](#)).
2. An authorised vehicle mounted small light arrow sign may be used in place of signs to diagram 610 and 7403 (see paragraph [O8.1.8](#)).
3. The pairs of signs to diagram 7001 and 7001.1 to be repeated at approximately 400 m intervals. Additional signs may be required to suit the carriageway alignment and at junctions. The supplementary plate to sign diagram 7001 (diagram 7001.1) may also show a distance.
4. Keys to the plan are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

O8.2 WORKS UNDERTAKEN AT OR NEAR NORMAL ROAD SPEED

O8.2.1 Works such as gritting, salting, damping down of dust, and other works undertaken at a controlled speed nearing that of normal road speed, should not normally require special precautions other than those appropriate to the specialist vehicle concerned, but with damping down of dust, care should be taken to avoid times of high risk or inconvenience to traffic. Exceptionally, where the scale of these operations is unusual, a "road works" sign to diagram 7001, with appropriate supplementary plate "Gritting" or "Salting" variants to diagram 7001.1 should be used to give advance warning.

O8.3 INSPECTION STOPS

O8.3.1 This section deals with short-duration stops, i.e. those lasting less than 15 minutes.

O8.3.2 There is always an element of danger in activities undertaken on an operational road. There is a duty under the Health and Safety at Work, etc. Act 1974 and Health and Safety at Work (NI) Order 1978 on every employer and every operative to take particular care to ensure the safety of themselves and those affected by their actions. Some ways of meeting this requirement are:

- carry out a risk assessment; see [Section O2.2](#);
- plan to do the inspection in periods of light traffic flow;
- ensure that all staff are adequately trained, informed and supervised;
- plan the inspection before going on to the road and try to keep to the plan;
- do not embark on any activity if visibility is poor or during adverse weather conditions, except in an emergency. Whenever visibility is significantly reduced, the inspection should not proceed unless there are at least two persons present at the site, one of whom should act as a lookout to warn others of approaching traffic;
- remain alert at all times and whenever possible facing oncoming traffic; and
- complete the inspection as quickly as possible.

O8.3.3 Whenever possible, short-duration inspections of structures or particular features of roads should be conducted well away from the traffic lanes, e.g. making use of verges or overbridges. Inevitably sometimes it will be unavoidable for people to be on the hard shoulder or on traffic lanes and any such carriageway inspections or measurements lasting 15 minutes or less should be carried out in accordance with the guidance in this section. If they are being carried out on a high-speed dual carriageway and are likely to last longer than 15 minutes but less than 90 minutes then reference should be made to the document "Guidance for works on the hard shoulder and road side verges on high speed dual carriageways" which is available on the following website: www.standardsforhighways.co.uk. This document is not valid in Northern Ireland and guidance for inspection stops in Northern Ireland lasting less than 90 minutes is given in [Part 1: Design, Appendix A4](#). In all other cases if they are likely to last longer than 90 minutes, inspection stops should be carried out as either mobile works or, if appropriate, as static works, with appropriate signing in each case.

O8.3.4 On some roads, particularly urban or rural roads, the geometry of the road and adjacent features such as junctions, changes in speed limit or high traffic flows mean that particular care is needed when carrying out inspection stops. In these cases, in particular, a site specific risk assessment should be carried out prior to the inspection.

O8.3.5 Authority to stop on a motorway for maintenance purposes is covered by the Motorway Regulations. Inspections and surveys are covered by the Regulations which state that any inspection, survey, investigation or census is to be carried out in accordance with any general or specific authority granted by the Secretary of State. All personnel who carry out this kind of work on motorways are required to carry a pass certifying that the bearer is required to carry out the inspections etc. by authority of the Secretary of State. This pass also serves to establish the bearer's credentials if required by the police.

O8.3.6 Any proposal to carry out an inspection on a highway, particularly a motorway, should be notified to the Highway Authority's agent for maintenance and to the police in accordance with arrangements previously established.

O8.3.7 For all classes and speeds of road, any vehicle stopping on a highway for inspection or works purposes should be of a conspicuous colour and marking (refer to [Section O5.2](#)). It should be identifiable to traffic police (obviating the need for them to stop) by a sign "HIGHWAY MAINTENANCE" to diagram 7404 on or in the vehicle and facing the rear, and by any other vehicle identification scheme required by the Overseeing Organisation. The "HIGHWAY MAINTENANCE" sign should also be used on all-purpose roads. Vehicles should always carry a roof-mounted flashing amber beacon complying with paragraph [O5.3.1](#).

O8.3.8 When arriving at the site the following procedures for stopping on the highway should be observed:

- manoeuvre to the left-hand traffic lane and switch on roof-mounted flashing amber beacon before starting to slow down. For the general use of roof-mounted beacons refer to paragraphs [O5.3.4](#) and [O5.3.5](#);
- on motorways stop on the hard shoulder as far to the left as possible, approximately 50m in advance of the site;
- on all-purpose roads stop in any convenient lay-by, field gate entrance or side road; if stopping on a grass verge, leave sufficient space for use by pedestrians; if there is no alternative to stopping on the carriageway, park the vehicle as close to the edge as possible;
- consider adopting the "fend" position (see paragraph [O7.2.78](#));
- if the vehicle is to remain parked on the hard shoulder of a motorway or in the carriageway of an all-purpose road, the flashing beacon should remain on for the duration of the stop unless within the confines of a fully installed traffic management layout;
- ensure that there is a minimum safety clearance between live traffic and all personnel and vehicles; see [Part 1: Design, Section D3.2](#);
- put on a high-visibility garment (see [Section O6.3](#)) before leaving the vehicle; and
- leave the vehicle by a door on the side away from the traffic if possible, otherwise look out for approaching traffic before opening the door and alighting.

O8.3.9 While on the road the following points should be observed:

- do not run – to reduce the risk of tripping and falling;
- take particular care in climbing up and down side slopes – to avoid slipping, falling or rolling on to the carriageway; and

- if it is essential to cross the carriageway, wait for a gap in the traffic which is long enough to allow walking across briskly keeping a look out for oncoming vehicles. Be prepared to wait some time to do this in safety. On very heavily-trafficked roads it may be possible to cross the carriageway only during off-peak periods. See [Section O3.5](#) and the HSE publication entitled “Crossing high-speed roads on foot during temporary traffic management works” (Construction Information Sheet 53). See [References \(Appendix 3\)](#).

O8.3.10 On completion of the work, the following should be observed:

- take special care when rejoining the traffic stream;
- ensure that the appropriate direction indicator is switched on before moving off;
- on a motorway, build up speed on the hard shoulder to match the speed of traffic in the left-hand lane before rejoining it. NB watch out for debris which can accumulate on a hard shoulder and may hinder its use; and
- the flashing amber beacon should remain in operation until the main flow of traffic has been rejoined.

O8.3.11 The “Surveying” plate variant to diagram 7001.1 is used for the protection of survey teams working on or very near the carriageway where the carriageway is not obstructed.

O8.3.12 On a heavily-trafficked road or where equipment is located on the carriageway, it will be necessary to close a lane using the principles set out in [Part 1: Design, Sections D5](#) and [D6](#) for single and dual carriageway roads respectively, so that the team may work in safety. Alternatively, it may be necessary to close one carriageway completely. This should be done by means of the appropriate layout of signs, including the “road works” sign to diagram 7001, delineators and barriers.

O8.4 ROAD (HIGHWAY) MAINTENANCE INSPECTIONS/OPERATIONS

O8.4.1 This section refers to slow moving continuous operations such as highway maintenance inspections, road testing and white lining operations; see also [Section O8.1](#) and [Part 1: Design, Section D3.30](#).

O8.4.2 The requirements are:

- the work should be carried out at off-peak times;
- operatives should wait for a sufficient gap in the traffic prior to marking any defects on the carriageway. [Section O3.5](#) deals with crossing the carriageway and specifically paragraph [O3.5.3](#) refers to safe gaps in the traffic;
- operatives should face oncoming traffic or use a lookout while marking defects; and
- where gaps in the traffic are insufficient, operatives should not attempt to mark the defect but instead should estimate the dimensions of the repair.

Work on three-lane single carriageway roads should be carried out from the nearside lane. If driving at speeds less than 30 mph or on lanes other than the nearside lane, mobile or static lane closure techniques are required.

O8.4.3 In order to determine the appropriate method of working, single and dual carriageway roads are split into categories depending on the daily vehicle flow per carriageway. The road categories are:

- Category 1: >80,000 vehicles/day
- Category 2: 20,000 to 80,000 vehicles/day
- Category 3: less than 20,000 vehicles/day

O8.4.4 For each road category the choice of vehicle used should be determined based on a site specific risk assessment. [Section O5](#) deals with vehicle issues and the specification of temporary traffic management vehicles is given in [Section O5.5](#).

O8.4.5 For Category 1 and 2 roads, the following method should be followed by the operative:

- drive at a minimum of 30 mph on the nearside lane of the carriageway; and
- pull up on the hard shoulder or at a safe location to record or assess defects.

On a dual carriageway with a hard shoulder, the inspection should be undertaken from the hard shoulder if this is practicable and safe to do so.

O8.4.6 For Category 3 roads, the following method should be followed by the operative:

- when travelling slowly, allow traffic to pass at a suitable safe location;
- use a roof-mounted beacon during the inspection and hazard warning lights when stationary;
- place a diagram 7404 "HIGHWAY MAINTENANCE" sign to the rear of the vehicle during the inspection; and
- park at a safe location and walk back to mark the defect, facing oncoming traffic.

O8.4.7 Walk and inspect method:

- for Category 1 & 2 roads use a static lane closure (see [Part 1: Design, Sections D5 and D6](#)), or, on dual carriageway roads only, a Mobile Lane Closure (see [Section O10, Plan MLC4](#)) or the Mobile Carriageway Closure technique (see [Section O11.1](#));
- for Category 3 roads, carry out the work from a footway or verge off the road or face oncoming traffic, otherwise a static closure is to be used; see [Part 1: Design, Sections D5 and D6](#).

O9 CONVOY WORKING

O9.1 GENERAL

O9.1.1 Where the highway width is so restricted as to prohibit the provision of the appropriate lateral clearance detailed in [Section O3.2](#), and diversion of traffic would be impracticable, traffic speeds should be reduced to not more than 10 mph and an agreed safe method of working imposed on the site. Convoy working provides such a method.

O9.1.2 The design aspects are dealt with in [Part 1: Design](#), [Section D7](#) and the operational details, including the method of operation, are described in this section.

O9.1.3 This method of working should preclude the use of workers in the safety zone wherever possible. Incursions into the safety zone increase the risk to workers and passing traffic on the highway.

O9.1.4 Convoy working can be used on:

- single carriageways where traffic travels either in a single direction, or in alternating opposite directions;
- individual carriageways of two-lane all-purpose dual carriageway roads, where traffic travels in one direction only and works have reduced the traffic to single file; and
- carriageways during surface dressing operations when it is considered necessary to ensure compliance with speed limits which have been implemented to protect newly-laid surface dressing.

O9.1.5 Convoy working can be used for both day and night working.

O9.1.6 Convoy working shall not be used on motorways.

O9.1.7 Convoy working has been used successfully on single carriageways with two-way peak hour flows of 900 – 1000 vehicles/hour and on dual carriageways, where the one-way hourly traffic flow has typically not exceeded 600 vehicles/hour during the period of convoy working.

O9.1.8 On single carriageways it has been found that, at flow levels approaching the value quoted in paragraph [O9.1.7](#) above, it may be necessary to restrict peak-time working or make provision to withdraw the convoy periodically to disperse queues. In this event the work activity should also be suspended until the passing speed of traffic can again be reduced to 10 mph or less.

O9.1.9 Those responsible for the design or implementation of a convoy working system should ensure that the proposed arrangements will prevent any traffic from exceeding 10 mph whilst passing the working space.

O9.1.10 Signs to diagram 7003.1 giving advance notice of the commencement of the works shall be displayed at least seven days before work begins. If convoy working is to take place at night on a dual carriageway road, the “Night-time works Expect delays” sign to diagram 7002.1 should be placed two miles upstream of the works. This should be left in place during the day.

O9.1.11 A limited number of works, such as gully cleaning, cats eyes replacement or cone maintenance may be carried out in the running lane between convoys under the protection of red-red signals or “STOP/STOP” boards. The traffic signals or manually operated “STOP/GO” boards at both ends of the works should be turned to “STOP” during this process.

O9.1.12 Where works are allowed to encroach into the running lane, the traffic control supervisor should check by radio with the works supervisor that the running lane is clear before releasing the convoy. Similarly, the works supervisor should not allow works to recommence until the traffic control supervisor has confirmed

that the running lane is clear of convoyed vehicles. Measures need to be included to ensure a fail-safe system to cover for eventualities such as inadequate radio reception, bad weather conditions and lack of clarity in the instructions between the traffic control supervisor and the works supervisor.

O9.1.13 The need for relief drivers should be considered, bearing in mind the nature of the work and the need for a high standard of awareness and concentration. Experience has shown that a change of driver every hour is desirable, especially when using a single convoy vehicle.

O9.1.14 It is essential that the public are made aware of the reasons for carrying out the convoy method, namely site safety, and the benefits to be gained from its use such as avoidance of diversionary routes, and minimising queue jumping. Wherever possible, the opportunity should be taken to use local newspapers, local radio and TV to inform the public of the method of working, and the benefits it has for the workforce and the travelling public.

O9.2 LEGAL ISSUES

O9.2.1 Provided that a mandatory speed limit has been lawfully imposed and the traffic signals or manually operated "STOP/GO" boards are lawfully placed and operated, no other statutory authority for operating convoy working is required, since the driver of the convoy escort vehicle is merely exercising his legal right to proceed along the restricted length of road at a speed at or near the maximum permitted. Since there is no primary legislation which enables drivers of convoy escort vehicles to do anything which an ordinary driver cannot do, it is essential that a temporary mandatory speed limit is imposed as described in [Section O9.6](#) in order to prevent these drivers from being accused of driving without due consideration for other road users or of causing an obstruction of the highway when travelling at a low speed.

O9.2.2 Convoy escort vehicle drivers should be instructed that they are not empowered to carry out manoeuvres other than those which any other driver could do. They should observe speed limits and comply with traffic signals or manually operated "STOP/GO" boards as other drivers are required to do. A convoy escort vehicle driver who breaks any traffic laws or drives in an unsafe manner could be prosecuted.

O9.2.3 The convoy vehicle must conform with the Road Vehicles (Construction and Use) Regulations 1986, and the Road Vehicle Lighting Regulations 1989, and must be fit to travel on the public highway in all respects, including having a vehicle excise licence and insurance.

O9.3 VEHICLES

O9.3.1 This section deals with issues that specifically relate to convoy escort vehicles. General issues relating to vehicles used at work sites are dealt with in [Section O5](#).

O9.3.2 Each vehicle driver should be in radio contact with the traffic signal (or manually operated "STOP/GO" board) operator, the traffic control supervisor and the works supervisor at all times.

O9.3.3 Convoy vehicles should have good all-round visibility and wing mirrors fitted on both sides. A tight turning circle can be particularly useful on single carriageways.

O9.3.4 Only four-wheel vehicles with drivers should be used. The vehicles should be capable of being driven at 10mph or less through the length of the works for the duration of the contract, i.e. should be capable of travelling at low speeds without overheating. Diesel-engined vehicles have proved to be less prone to overheating than those with petrol engines. However, overheating problems in the latter can be overcome by fitting additional fans. The vehicle should be equipped with a speedometer capable of indicating 10 mph.

O9.3.5 The type of vehicle used should be appropriate to the nature of the convoy operation. For instance, small hatchbacks, quad bikes and mini-tractors have been used successfully on shorter single carriageway works whilst medium-sized pickup vans are considered more appropriate on dual carriageways where works are generally longer and intimidation by HGVs is more likely.

O9.3.6 Convoy vehicles should be yellow, white or some other conspicuous colour. Vehicles should be kept clean to maintain their conspicuity.

O9.3.7 Convoy vehicles should be fitted with roof-mounted flashing amber beacons in accordance with [Section O5.3.1](#).

O9.3.8 Convoy vehicles shall display a "CONVOY VEHICLE NO OVERTAKING" sign to diagram 7029, on the rear of each vehicle. Neither the beacons nor the sign should obscure one another. On dual carriageway roads, the "NO OVERTAKING" part of the sign legend may be omitted where the convoy vehicle is unable to turn round, say within half a mile of the end of the works. However, in this case, static mandatory "no overtaking" signs to diagram 632 should be used where this is considered to be a problem, but only where an order prohibiting overtaking is in force.

O9.4 NUMBER OF VEHICLES

O9.4.1 The number of vehicles required will depend on the traffic flow, the characteristics of the site and the method of employment of the convoy working system. Three-vehicle and single-vehicle systems have both been used with considerable success on single carriageways.

O9.4.2 The three-vehicle system is particularly suited to higher traffic flow sites or sites where the convoy vehicle has to turn at a location which is remote from the works, increasing the cycle time of the system and hence the delays to traffic.

O9.4.3 When traffic flows are low, a single-vehicle system may be satisfactory. Traffic control in the single-vehicle system should be provided by manually operated "STOP/GO" boards.

O9.4.4 On dual carriageway roads, the system does not operate on a shuttle basis. A typical method of convoy working on dual carriageways is described in [Section O9.11](#). The ease with which vehicles can turn and get back to the start of the works therefore influences the number of vehicles required. The empirical formula below may be used to give an indication of the likely requirement on dual carriageway working.

$$\text{No. of convoy vehicles for dual carriageway} = \frac{X + 1}{Y}$$

Where, X = estimated cycle of convoy vehicle, in minutes (i.e. time to travel through the works + return time).

Y = time, in minutes, for maximum acceptable queue to develop

$$= \frac{\text{maximum queue}}{\text{vehicles arriving per minute}}$$

O9.4.5 Maximum queue is site dependent but is generally of the order of 30 vehicles.

O9.4.6 During long-term work, at least one standby convoy vehicle should be provided in case of breakdown to any of the operating vehicles and for use when they are being refuelled. If at any time insufficient vehicles are available to operate the system as planned, convoy operations should be suspended and a full safety zone put in place or the work activity temporarily suspended.

O9.5 TRAFFIC CONTROL

O9.5.1 Signals should be operated manually during operation of convoy working with provision to switch to vehicle-actuation during periods when no work is taking place. Manually operated "STOP/GO" boards can be beneficial on single-vehicle convoy working since they are more sensitive to traffic demand and allow more control of "red light" jumping which can be more prevalent with convoy working. However, it is unlawful to use "STOP/GO" boards during hours of darkness unless they are directly lit. See also [Sections O3.21](#) and [O3.22](#).

O9.5.2 Where possible the period between convoys in the same direction should not be more than five minutes. Shorter periods would be preferable but are not always practicable. The optimum length of convoy and cycle time for the site layout and traffic flows should be calculated as far as is possible before operations commence. Transportation of chippings etc. should be planned to work in behind or between convoy flows.

O9.5.3 As soon as a convoy has passed the signals (or manually operated "STOP/GO" board), the vehicle that is to lead the next convoy should take up position to prevent any traffic entering the restricted lane. This is not possible when only one convoy vehicle is in use. In this case, traffic control should be by means of individually manned "STOP/GO" boards so that operatives are present to encourage drivers to obey the signs and travel in convoy. Should a gap occur for any reason in the traffic passing the signal (or manually operated "STOP/GO" board) then the operator should immediately signal "STOP". This is to prevent a "late" vehicle rushing through the convoy lane to catch the tail of the convoy.

O9.5.4 At the end of the works, the position at which the convoy vehicle pulls over and waves traffic on should be such that the last vehicle in the convoy has passed the works. This will avoid the tail of the convoy speeding up whilst still passing the work area.

O9.6 SPEED LIMITS

O9.6.1 It is important that the arrangements for imposition of mandatory limits are discussed and agreed with the police and Highway Authority.

O9.6.2 The issues relating to the correct application of temporary mandatory speed limits (including signing) are dealt with in [Part 1: Design, Section D3.7](#).

O9.6.3 A Highway Authority may issue an Order or Notice under section 14 of the Road Traffic Regulation Act 1984. Others may seek an Order under section 84 of the Act.

O9.6.4 The signing required is shown in [Plans CW1](#) and [CW2](#) in [Part 1: Design, Section D7.6](#). Repeater speed limit signs should be placed throughout the works site at 200m intervals on alternate sides of the road.

O9.6.5 A temporary mandatory 10mph limit should be imposed throughout the length of the works which are subject to convoy working. This should extend a short distance beyond the works so that the tail of the convoy is held to 10mph or less until it has passed the works. Generally an extension of the coned section will be necessary to prevent overtaking of the convoy vehicle.

O9.6.6 Appropriate speed limit signs must also be displayed to traffic entering from a slip road or side road within the section where the speed limit is imposed.

O9.6.7 On high-speed roads, both single and dual, a temporary mandatory limit of 20mph below the permanent limit prevailing on the road should be imposed in advance of the temporary 10mph limit. The speed limit signs should be positioned far enough away from the works to permit traffic to reduce its speed comfortably to the required level, but not so far as to prematurely constrain drivers to artificially low speeds for long distances in advance of them.

O9.6.8 Whenever convoy working is withdrawn, the reduced speed limit signs must be covered or removed until such time as convoy working resumes. Outside working hours temporary speed limit signs shall be covered or removed unless they are considered necessary to maintain safety within the site. A check should always be made to ensure that no conflicting signs remain in place at any time.

O9.6.9 Where safety concerns exist, consideration should be given to the need for a second temporary speed restriction (e.g. 40mph) for use when the convoy works have been withdrawn temporarily.

O9.7 RADIO COMMUNICATION

O9.7.1 There should be radio communications between the operators of the signals (or "STOP/GO" boards), operatives in the convoy vehicles, traffic control supervisor, and the works supervisor at all times. The role of traffic control supervisor may be combined with one of these other roles in appropriate circumstances. The main purposes of using radio communication are:

- to inform the signal (or "STOP/GO" board) operator of the time to effect a change;
- to tell the driver of the leading convoy vehicle when the end of the convoy has cleared the end of the 10mph speed limit zone, allowing the speed to be increased; and
- to inform the works supervisor to suspend the work and re-establish the safety zone as necessary.

O9.7.2 All operatives should be fully conversant with the radio communication system and should be carefully briefed about their role and the agreed method of radio control.

O9.7.3 It has been shown that there are benefits to be gained by using precise predetermined radio instructions for the changing of the traffic control, dealing with emergency vehicles and other key steps in the operation of the convoy system.

O9.7.4 Operatives should take special care when operating radios that they maintain concentration on the driving task. Experience has shown that it can be beneficial to use an additional person in each vehicle to act as radio operator. This person also allows for frequent driver changes which aid concentration and alertness. Where an additional person is not provided, the radio should be capable of hands-free operation.

O9.8 SIDE ROADS WITHIN THE SITE

O9.8.1 The works should be arranged to avoid junctions occurring within them. Where this is not reasonably practicable, the following procedures should be adopted.

O9.8.2 In all cases, except when there are high flows on the minor road, control of side road traffic should be provided by manually operated "STOP/GO" boards. (These boards must not be used during hours of darkness unless they are directly lit). The "TRAFFIC CONTROL AHEAD" sign to diagram 7010.1 should be erected on the minor road after a "road works" sign to diagram 7001. This procedure should be used only when traffic held at the works is visible to the joining traffic. The signs should be supplemented with convoy signs to diagrams 7025 and 7028 placed 100m and 50m respectively in advance of the junction. The "WAIT HERE" sign to diagram 7027 (using the "STOP SIGN" version of the legend) should also be placed at the junction stop or give way.

O9.8.3 The traffic control supervisor should advise the "STOP/GO" board operator at the side road by radio that the convoy is proceeding through the works. As the tail of the convoy passes his position the operator should signal the waiting side road traffic to join the convoy. The operator should ensure that vehicles joining from the side road do not travel in a different direction to the convoy. When the last vehicle in the side road queue has joined the convoy he should turn the sign to "STOP".

O9.8.4 On single carriageway roads, vehicles joining from the side road should be directed to join the tail of a convoy travelling in the direction in which they wish to turn. If the traffic flow on the side road is likely to be high enough that difficulties may be encountered with this procedure, then the advice given in paragraph O9.8.5 below should be followed.

O9.8.5 For a minor road with high flows, if a suitable diversion exists for the minor road traffic, a road closure should be implemented to close it in the vicinity of the junction. If there is no diversionary route, if possible the works should be located so that the junction falls beyond the section of road subject to convoy working and signal control should be provided for the minor road flow. In the case where this is not possible, it may be necessary to consider the use of a convoy vehicle for the side road traffic to avoid unescorted traffic travelling through the works. See also paragraph O9.8.3 above.

O9.8.6 Arrangements at all locations which involve side roads within a work site should minimise the possibility of a gap being created between the end of the convoy and the traffic joining it from the side road.

O9.9 QUEUE MANAGEMENT

O9.9.1 A system of monitoring queue lengths should be implemented so that any excessive build-up of traffic can be identified at an early enough stage to enable action to be taken to avoid long delays. If unacceptably large queues of traffic occur, it may be necessary, where practicable, to suspend convoy working in order to clear the delay.

O9.9.2 If convoy working is suspended, the 10 mph signing should be replaced with 30 or 40 mph signing and the works will need to be suspended or modified so that the appropriate safety zone can be implemented. A 30 mph restriction would be applicable if this is the permanent limit prevailing on the road. A 40 mph limit would apply where the permanent limit exceeds 30 mph. Once the queue has cleared, then normal 10 mph convoy operations may be recommenced. It should be borne in mind that, depending on the nature of the works, it may take longer to implement these measures on some schemes than on others.

O9.9.3 On sites where it is not possible to establish a safety zone, plant and operatives shall be stood down and moved to the back of the working space until convoy working has been re-established.

O9.9.4 The works supervisor should confirm to the traffic control supervisor that the running lane is clear before unrestricted traffic is allowed past the works.

O9.10 EMERGENCY VEHICLES

O9.10.1 Contingency measures should be pre-planned to allow the free passage of emergency vehicles through the convoy lane. This should include discussion with the local emergency services, where possible, during contract preparation. One method is for a single radio call to instigate the suspension of work and the implementation of an all-red (or all-stop) stage, thereby clearing the running lane and enabling emergency vehicles to overtake the waiting queue on the off side, "jump" the signals (or manually operated "STOP/GO" board) and proceed unobstructed through the works.

O9.10.2 Before the emergency vehicle enters the site, the traffic control supervisor should ensure that any convoy travelling in the opposite direction to it has cleared the works or has been halted at a location where the emergency vehicle can pass. He should also obtain confirmation from the works supervisor that the running lane is clear and that plant and operatives have been stood down.

O9.11 THE CONVOYING METHOD

O9.11.1 The basic principles of convoy working are the same for all works situations. On single carriageway roads, the choice between single and three-vehicle working will depend on the traffic flow and the characteristics of the site. The single-vehicle method will be more appropriate when flows are low and there are convenient locations for turning round at each end of the works.

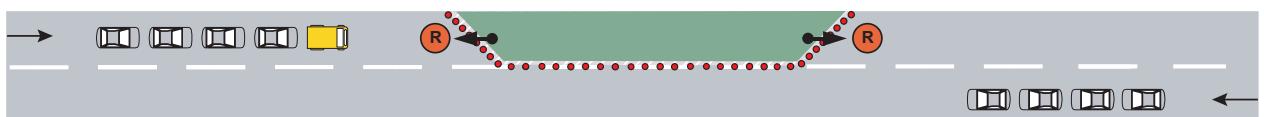
O9.11.2 The way in which these principles are applied is dependent on the number of convoy vehicles used, the ease with which these vehicles can be turned round after they have led traffic through the site, and whether the convoy system is being operated on a unidirectional or a shuttle basis. The main methods of working have been set out in the paragraphs which follow. The drawings are diagrammatic and are not to scale. R indicates "red" or "stop", and G means "green" or "go". Yellow/grey vehicles are convoy vehicles.

SLIP ROAD MERGES

O9.11.3 Experience has shown that the convoy system can be used successfully at slip road merges. In such cases, the following procedure is substituted for Step 3 of "Dual carriageway – multiple-vehicle working sequence" below. When the end of the queue passes the signal head, the traffic control supervisor switches the main carriageway signals to red. Another convoy vehicle takes up position on the main carriageway to prevent unrestricted vehicles from travelling through the site and at the same time, the traffic control supervisor changes slip road traffic signals to green, enabling the slip road traffic to join the end of the previous convoy. When the slip road queue has passed, the slip road signals are switched to red and the convoy vehicle which has been blocking the main carriageway moves forward to a position to prevent all unrestrained vehicles from the main carriageway and slip road from travelling through the site.

O9.11.4 If it is not considered appropriate to operate convoy working on the main carriageway on dual carriageway roads, an alternative method of working is to divert all traffic from the main carriageway at the interchange (see [Part 1: Design, Section D6.20](#)). Traffic rejoins the main carriageway via the entry slip road and convoy traffic management on the slip road is used to control the traffic past the works on the main carriageway. Queuing traffic on the slip road should not be permitted to extend onto the interchange and cause congestion.

SINGLE CARRIAGEWAY – SINGLE-VEHICLE WORKING

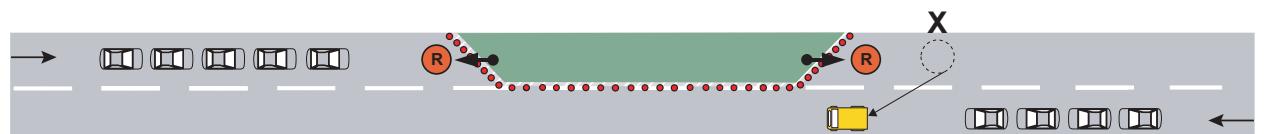


- With both signs on "STOP", the convoy vehicle moves into place at the head of the queue in front of the "...WAIT HERE FOR CONVOY VEHICLE" sign (diagram 7027).



- The sign is changed to "GO" and the convoy vehicle sets off, leading the traffic past the works at a speed of 10 mph or less.

The sign is changed to "STOP" when the last vehicle in the queue has entered the working area. At busy periods this may have to be restricted to a specific number of vehicles.

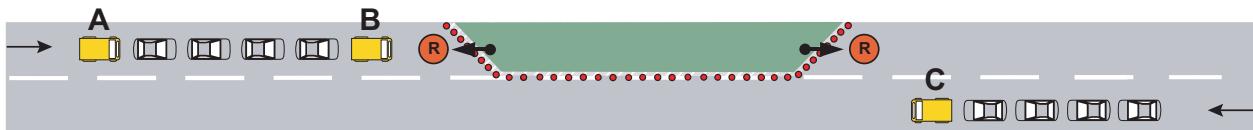


- At the end of the works the convoy vehicle pulls over, waves traffic on, then waits until the last vehicle has cleared the works before turning round to proceed in the return direction as Step 1.

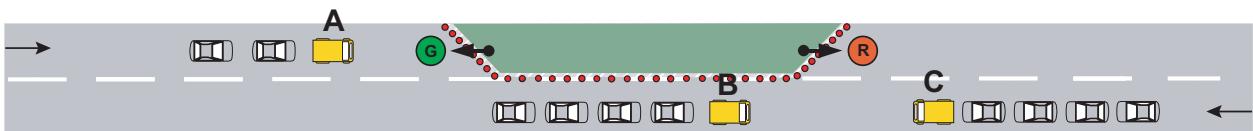
The position of the pull-off X should be such that the last vehicle in the convoy has passed the works area before the convoy vehicle pulls off. This can be achieved by extending the coning past the end of the works.

The convoy vehicle at position X should not obscure the "STOP" sign for the opposing vehicles.

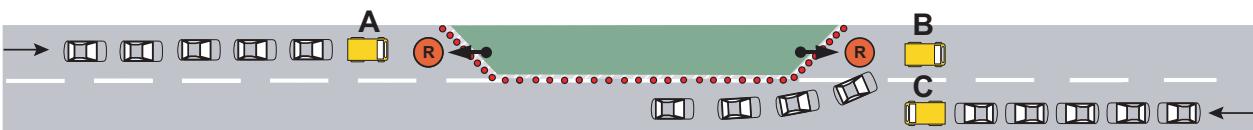
SINGLE CARRIAGeway – THREE-VEHICLE WORKING



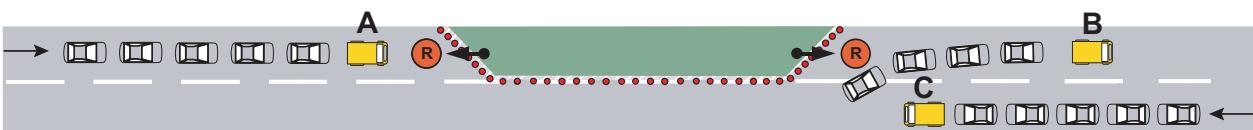
1. Initially the signs at both ends are on "STOP". The convoy escort vehicles are labelled A, B and C.



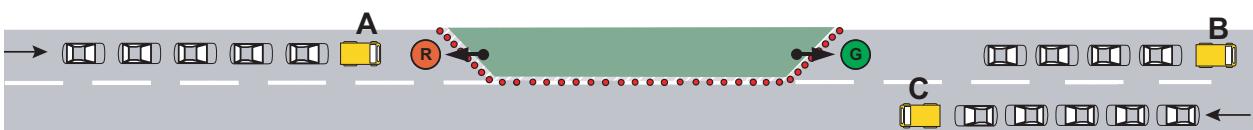
2. The sign in front of B is switched to "GO" and B then sets off leading traffic past the works at a speed of 10 mph.



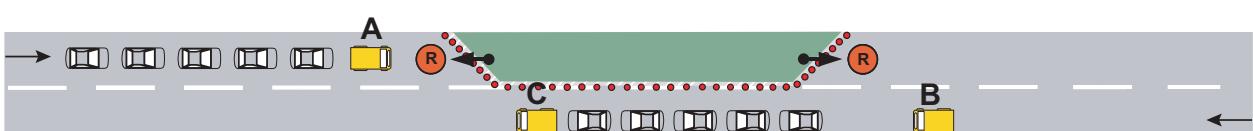
3. Driver A radios the sign operator to switch to "all-stop" as he approaches the sign and stops in front of it to prevent following vehicles passing the sign on "STOP".



4. Vehicle B continues to lead the following traffic at not more than 10 mph until well clear of the works, thus ensuring that vehicles at the back of the convoy are still travelling at 10 mph.



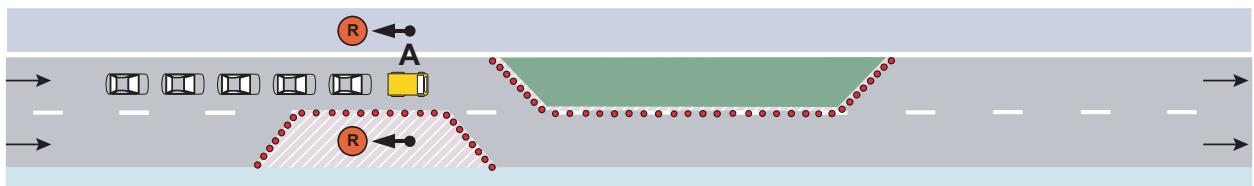
5. Driver C radios the sign operator when the last vehicle of the convoy has cleared the works to change his sign to "GO". Driver B turns around and joins the queue.



6. Driver C sets off leading traffic past the works at a speed of 10 mph. Driver B radios the sign operator to switch to "all-stop" as he/she approaches the sign. Depending on the length of the queue, convoy vehicle B may need to enter the queue part way along its length to limit the length of the convoy past the works.

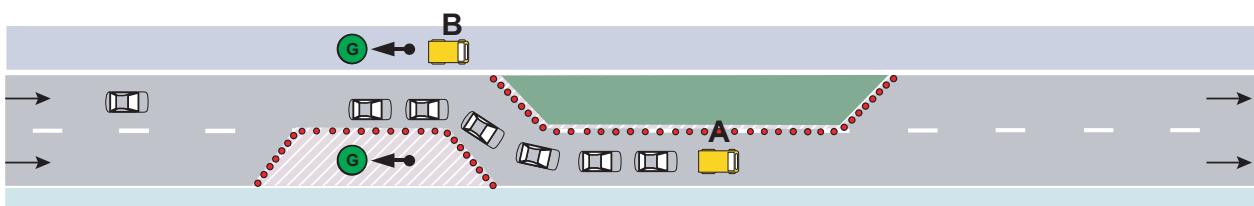
This process is then repeated from Step 2 above, but from the opposite direction and so on.

DUAL CARRIAGeway – MULTIPLE-VEHICLE WORKING

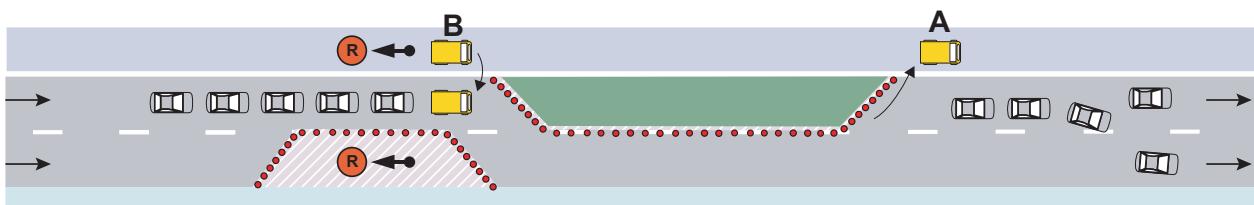


1. The convoy escort vehicles are labelled A and B.

With the signs on "STOP", the convoy vehicle A moves into place at the head of the queue in front of the "...WAIT HERE FOR CONVOY VEHICLE" sign (diagram 7027).



2. The signs are changed to "GO" after a queue of 20–30 vehicles has formed, or not more than five minutes after the first vehicle has arrived, and the convoy vehicle A sets off leading the traffic through the works at a speed of 10 mph or less.



3. The signs are turned to "STOP" when the last vehicle in the queue has entered the works area. Convoy vehicle B moves into place and the sequence is repeated from Step 1.

Convoy vehicles return to the start by turning at nearby interchanges, by using site accesses, slip roads or the lane closure.

Use of the running lane for this purpose is not recommended as it will increase the cycle time of the system and may adversely affect its capacity and safety.

O10 MOBILE LANE CLOSURE TECHNIQUE

O10.1 GENERAL

O10.1.1 The Mobile Lane Closure (MLC) technique for use on dual carriageway trunk roads uses essentially the same signs, although fewer, as those employed for a static closure.

O10.1.2 The intervals between the signs are changed to concentrate the warning information presented to passing drivers by ensuring that they may see, at any instant, at least two consecutive signs. To improve the signs' conspicuity, and also to compensate for their reduced number, the prescribed design incorporates a yellow sign display board and high-intensity flashing amber lanterns are mounted at each corner.

O10.1.3 All MLC operations on motorways and other dual carriageway roads should comply with the following guidance and fully take into account the advice relating to the design of the technique given in [Part 1: Design, Section D6.26](#). Operational aspects are dealt with in this section and are illustrated in [Plans MLC1 to MLC7](#) below. Note that single vehicle works are dealt with in [Section O8](#).

O10.1.4 Working through junctions using the technique requires particular care. For this reason, and because of restricted sight lines, its use on roads of an urban nature or with a speed limit of 40 mph or less will probably be limited and would require a detailed risk assessment. In these situations, the use of single vehicle works may be more appropriate. See [Section O8](#).

O10.1.5 The MLC technique should be carried out in good visibility, during periods of low risk when traffic flows are low and congestion is unlikely to occur. The maximum allowable traffic flows when the MLC technique may be operated are given in [Table 10.1](#) in [Section O10.4](#).

O10.1.6 MLC working on dual carriageway roads without a hard shoulder requires additional planning. Advance signing requirements and placement positions should be carefully planned, allowing for any particular circumstances which dictate the need for additional signs. See [Plan MLC1](#) in [Section O10.19](#).

O10.1.7 Use of the MLC technique on four to six-lane dual carriageway roads requires special care and the use of additional advance sign vehicles as appropriate to the prevailing operational conditions is recommended. Work on five and six-lane dual carriageway roads in particular should only be undertaken by the most experienced MLC teams. The MLC technique should not be used on five or six-lane dual carriageway roads unless matrix and/or VMS signals are employed (see [Section O10.5](#)) in conjunction with a light arrow sign. See [Section O10.8](#).

O10.1.8 This technique should only be carried out where there is adequate stopping sight distance as specified in Departmental Standard TD 9 "Highway link design" (DMRB 6.1.1). For most dual carriageway roads, the desirable minimum visibility requirement is a stopping sight distance of 295 metres.

O10.1.9 Conditions which reduce visibility such as spray from wet roads, rain, fog etc., increase the risk of accidents. The technique should not be operated when drivers approaching the works are heading towards a sun low on the horizon. MLCs should therefore not be used if visibility has been reduced to below an acceptable level.

O10.1.10 When working in the vicinity of junctions or roundabouts where approaching vehicles are not able to see the rear-mounted signing, or rear illumination as required in paragraph [O10.1.2](#) is ineffective due to the angle of approach, the works and/or signing vehicles should have their flashing amber warning beacons switched on and approach signing to the junction placed as appropriate.

O10.1.11 All equipment should be checked to be in full working order prior to starting MLC operations.

O10.2 PLANNING

O10.2.1 Those responsible for planning the works should ensure that appropriate risk assessments are undertaken. Where the MLC technique is found to be suitable, the system of work should be carefully planned. The various operations for which the technique is to be used should be planned to follow in sequence as far as practicable to eliminate unnecessary lane closures.

O10.2.2 Due account should be taken of any other works taking place in the vicinity of MLC operations. Road space should be booked in advance with the Highway Authority to ensure that no conflict is likely to arise.

O10.2.3 Slow-moving MLCs are at greater risk and should be used with more caution. Some operations which involve repeated movement along the road with periodic stops may also be carried out using this technique. The decision whether to use the technique should be based on the result of a risk assessment.

O10.2.4 At the planning stage, when deciding on the maximum time it is acceptable for the MLC to remain stationary or moving very slowly, a risk assessment should be carried out to confirm that the proposed method of working minimises the risk compared with alternative ways of carrying out the same work. It is anticipated that the maximum time that a MLC vehicle should be planned to remain stationary is 15 minutes.

O10.2.5 The assessment should include, but may not be limited to, an evaluation of the degree of risk, time of exposure to risk, and ways of minimising risk such as the use of the higher visibility light arrow (see paragraph O10.7.5), matrix signals, and VMS. In Northern Ireland the assessment should include an analysis of the operation to determine the measures needed to eliminate or control the sources of harm.

O10.2.6 If the MLC vehicle is still in place when the planned stop time has elapsed, a dynamic risk assessment should be carried out immediately in order to determine the next course of action. If this risk assessment results in a decision to continue with the MLC operation, an absolute maximum additional 15 minutes should be allowed.

O10.2.7 When MLC operations are used to deploy static signs on the central reservation, consideration should be given to avoiding any possible conflict between the static and mobile signs. Such conflict may sometimes be avoided by locating the mobile lane closure operation on the other carriageway.

O10.3 TRAINING AND PERSONNEL ISSUES

O10.3.1 The general training and competency requirements of those involved in both mobile and static works are dealt with in [Section O6.2](#). This section deals specifically with MLC related issues.

O10.3.2 All MLC personnel shall be competent and have received relevant training in MLC techniques.

O10.3.3 On the Highways Agency network, the organisations engaged in MLC operations are required to comply with the requirements of National Highways Sector Scheme (NHSS) 12C documents. Scheme 12C is listed in Appendix A of the Specification for Highway Works (SHW). The employer shall ensure that all operatives including any sub-contract personnel meet the requirements of NHSS 12C, in particular, he shall check at the start of each contract and at regular intervals thereafter that MLC operatives are appropriately qualified and hold valid relevant registration cards (see paragraph O10.3.4 below). The results of these checks shall be recorded.

O10.3.4 Operatives who have lost or damaged their registration cards should apply immediately to the relevant registration body for a replacement card. Where a card is damaged or unavailable for any reason, the operative should provide, when requested, a means of identification and appropriate evidence to demonstrate that he is a competent MLC operative, enabling employers to check with the relevant registration body. The employer shall carry out this check and record the result.

O10.3.5 Any external works sub-contractor should be competent and should attend a briefing to familiarise themselves with the operation of the MLC technique.

O10.3.6 Operatives should be assessed to ensure that they are fit and have no physical impediments which would prevent them from safely carrying out their MLC operational duties, and if appropriate, their suitability for working at night; see also [Section O6](#).

O10.3.7 A relief driver may be employed in the leading (working) vehicle to give directions during complicated manoeuvres. The relief driver should be fully qualified and trained and be capable of replacing any other mobile sign vehicle driver in the convoy should it become necessary.

O10.3.8 All those working on the road must wear high visibility clothing (see [Section O6.3](#)) and comply with all of the safety measures identified in the risk assessment; see [Section O2.2](#).

O10.4 TRAFFIC PARAMETERS

O10.4.1 The use of MLC techniques on dual carriageway roads is restricted by certain traffic volume parameters; see [Table 10.1](#) below.

O10.4.2 When working past slip roads the maximum flow on the slip road should not exceed 500 vehicles per hour without police or traffic officer assistance with traffic control.

O10.4.3 [Table 10.1](#) gives absolute maximum flows for MLC operations which relate to level and well-aligned sites with hard shoulders. These figures may need to be reduced for sites on roads with steeper than normal gradients, difficult horizontal alignments (in particular, left-hand bends) or roads lacking an adequate hard shoulder.

O10.4.4 Traffic volume parameters in [Table 10.1](#) are given in terms of vehicles without regard to traffic composition. Typically, traffic on these major roads will include 15-20% of heavy goods vehicles. Any markedly higher or lower proportion of heavy goods vehicles will affect the capacity of the layout and the tabulated figures should be amended accordingly. e.g. if the heavy goods vehicle content is 30% the vehicle flow levels should be reduced by 10%.

O10.4.5 Providing adequate care is taken, it is considered that, in general, the flow figures in [Table 10.1](#) apply equally to day and night-time mobile works.

O10.4.6 The flow limit figures given in [Table 10.1](#) have been derived on the basis that they are within the traffic capacity of the lanes remaining open and therefore at these flows queues are unlikely to form. The table does not specifically consider separate limits for establishing and removing a mobile lane closure. Consideration of how and when a closure can be set out and removed should form part of the overall planning of the work when deciding on a safe method of working. The specific decision on whether or not to move MLC vehicles into/out of position will depend on the appearance of acceptable gaps in the traffic flow.

Table 10.1 MLC operations: Absolute maximum allowable traffic flow

Type of closure	Maximum allowable traffic flow	
	Veh/hr	Veh/3 mins
Dual two-lane carriageway Lane 1 Lane 2	1200	60
	1200	60
Dual three-lane carriageway Lane 1 Lane 3 Lane 1 + 2 Lane 2 + 3	2400	120
	2700	135
	1200	60
	1200	60
Dual four-lane carriageway Lane 1 Lane 4 Lane 1 + 2 Lane 3 + 4	3600	180
	3900	195
	2400	120
	2700	135

NOTES:

- Figures are based on an HGV content of 15-20%. Where the HGV content varies from this, the above figures may need to be adjusted; see paragraph [O10.4.4](#).
- When working past slip roads the maximum flow on the slip road should not exceed 500 vehicles per hour (25 veh/3 minutes) without assistance with traffic control.
- When two lanes are closed, central reservation matrix signals, Variable Message Signs (VMS) ([Section O10.5](#)) and the light arrow sign (paragraph [O10.7.5](#)) should be used.
- For work on dual four-lane carriageways, three advance sign vehicles are the absolute minimum required. The MLC technique should not be used on such carriageways unless matrix and/or VMS signals are employed, preferably in conjunction with a light arrow sign; see paragraph [O10.7.5](#).

O10.5 MATRIX SIGNALS

O10.5.1 Where roads are suitably equipped, the use of matrix signals and VMS is recommended for MLCs which encroach on live running lanes. This is often facilitated through agreement between the contractor and the local police for a particular site. However, it would be preferable for the appropriate Overseeing Organisation to establish area-wide agreements with the police, and where applicable, regional control centres and traffic officers.

O10.5.2 These arrangements will need to include advance notice requirements. They should also include an agreed method for police or regional control centre to contact the MLC supervisor while the closure is in operation, because in the event of an accident or incident, the signals/signs may have to be altered.

O10.5.3 In establishing these arrangements, reference will need to be made to the codes of practice, "The Joint ACPO and HA Policy and Procedures for the use of Variable Message Signs (VMS) by the Police and Regional Control Centres" (Highways Agency/ACPO, 2005) and "The Joint ACPO and HA Policy and Procedures for the Police use of Matrix Signals" (Highways Agency/ACPO, 2002). The codes of practice referred to are those related to roads in England. For details of the appropriate rules that apply in Scotland, Wales and Northern Ireland refer to the appropriate regional government.

O10.5.4 If the proposed operations involve the use of matrix/VMS signs, pass through areas where the carriageway or junction layout is not straightforward, or will require other police or traffic officer assistance, then contact should be made with the relevant police force or regional control centre at an early stage.

O10.5.5 The first step in establishing a closure is to contact the local Highway Authority or police control centre as appropriate giving them advance notice of the works and letting them know which signals/signs are going to be needed. The control room will need to know which lanes are going to be closed in order to display the correct messages.

O10.5.6 On site, the MLC supervisor should take up a position on the hard shoulder/verge where he or she can see the first of the signals/signs and confirm with the control room that they are operating correctly. Guidance on the position of the MLC supervisor is given in paragraph [O10.13.4](#). Unless agreed otherwise, all on-site contact with the control room should be made using emergency roadside telephones.

O10.5.7 Work can commence when the signals/signs are seen to be operating correctly.

O10.5.8 As soon as the closure is removed, the police or regional control centre should be advised of the fact so that the signals/signs can be switched off. It is essential that they are advised promptly in order to maintain credibility of the matrix signals/VMS.

O10.6 VEHICLES

O10.6.1 General works vehicle issues are dealt with in [Section 05](#). This section relates specifically to MLC vehicles.

O10.6.2 The block vehicles used to form the closure in live traffic lanes should be as specified for an Impact Protection Vehicle in paragraph [O5.5.5](#) except that signing shall be in accordance with the relevant parts of [Section O10.7](#) below.

O10.6.3 All vehicles and trailers should be fitted with a roof-mounted amber warning light bar (comprising at least two independent light sources) or two independent roof-mounted flashing amber warning beacons, visible through 360° whether the sign display board is displayed or in the transport position. It is important that the rotating beacons are visible to oncoming drivers when the signs are being erected or folded. Subject to the requirements of paragraph [O10.1.10](#), rotating beacons on block vehicles that are visible to the rear should not be used when the light arrow sign or four rear-mounted amber lanterns are in operation. Beacons shall comply with [Section O5.3](#).

O10.6.4 Block vehicles ideally should be loaded to have an on-the-road weight of between 10 and 15 tonnes. The block vehicle should not have an on-the-road weight of less than 10 tonnes. The choice of block vehicles should reflect the acceleration and manoeuvrability required of them by the method of working.

O10.6.5 In view of the very low speeds at which some of these operations are undertaken, it may be advantageous to select vehicles with an appropriate low ratio drive.

O10.6.6 To minimise the risk of vehicles cutting in between the working vehicle and the block vehicle, a sign to diagram 7403 should be fitted to the rear of the working vehicle or be trailer-mounted and towed by the working vehicle. If these two options are not practicable, then the working vehicle should carry a "keep left/right" sign to diagram 610 with a diameter of 1500 mm.

O10.6.7 The number of working vehicles may be varied according to the nature of the work being undertaken. Unless it is not practicable to do so, a sign to diagram 7403 should be fitted to the rear of each working vehicle or be trailer-mounted and towed by the working vehicle. See paragraph [O10.7.5](#).

O10.6.8 Personnel may experience difficulty reading marker posts at night so the fitting of an adjustable spotlight is advised. Before leaving the depot all lighting equipment should be checked.

O10.6.9 When working vehicles or personnel are operating on the hard shoulder a block vehicle with a LMCC is required. The working vehicles should carry a “keep right” sign to diagram 610, which should be 1500 mm diameter unless this is not practicable in which case the largest possible sign should be used. The block vehicle on the hard shoulder should carry a sign to diagram 7403 or the recommended alternative light arrow sign. See [Section O10.8](#) below. The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway. If the works vehicle carrying the sign to diagram 7403 (or the higher visibility alternative) is substantial (e.g. a gully emptier or sweeper) and is fitted with a LMCC, the block vehicle may be dispensed with.

O10.6.10 Regulation 14 gives details of the signs that may be attached to vehicles. The light arrow sign is not listed in regulation 14 and so needs separate signs authorisation and type approval from the appropriate Secretary of State.

O10.7 SIGNS

O10.7.1 Signs on the carriageway should always be vehicle or trailer-mounted and attended at all times. Signs on the verge may be vehicle or trailer-mounted or static and need not be attended.

O10.7.2 All traffic signs used in connection with this technique must comply with the relevant requirements of the Traffic Signs Regulations and General Directions 2002 (TSRGD), the Lighting Regulations and BS EN 12899-1:2007 “Fixed, vertical road traffic signs” and BS 8408:2005 “Road traffic signs. Testing and performance of microprismatic retroreflective sheeting materials. Specification”.

O10.7.3 The sign prescribed for use with the advance sign vehicles is diagram 7402 using 300 mm wide arrows; see working drawing P7202 for design details. Working drawings for the design of the signs shown in the plans and other prescribed signs are available for download free of charge from the Department for Transport website: www.dft.gov.uk/roads/signs.

O10.7.4 The MLC signs to diagrams 7402 and 7403 must be reflectorised in their entirety, including the yellow background in which the flashing amber lamps are installed. The material, when rated in accordance with BS 8408 “Testing and Performance of microprismatic retroreflective sheeting – Specification” shall have a performance index of not less than 3.0 for a V1 vehicle (passenger car), using angularity A1, luminance index B and a sign location correction factor of 1.0. It shall achieve this performance index rating for each of the distance ranges D1, D2 and D3. It is not necessary to provide sign lighting luminaires when signs are reflectorised in accordance with this specification (except in Northern Ireland). Care and maintenance of the sheeting material should be in accordance with the manufacturer’s guidelines. See also [Section O4.3](#).

O10.7.5 The sign to diagram 7403 may be used with the block vehicle, but a higher visibility light arrow alternative sign is recommended. This sign incorporates a flashing light arrow to supplement the message given by the “keep left/right” sign to diagram 610. The design and operation of the sign must have type approval and special signs authorisation. A description of this sign is given in [Section O10.8](#). The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway.

O10.7.6 On the light arrow sign and the sign to diagram 7403, the arrow on the “keep left/right” sign to diagram 610 must be capable of indicating either “keep left” or “keep right”. To avoid displaying an incorrect instruction during set up and removal of the MLC, the rotation of the arrow, or covering of the sign, should be carried out remotely from the driver’s cab, with a means for the driver to verify the arrow direction or state of the sign.

O10.7.7 Adequate means should be provided to support the sign display boards, bearing in mind the possible operating speeds. The lower edge of every sign display board when mounted on a vehicle should be at least 0.75 m above the road surface. When fitting a sign display board to a vehicle, the vehicle's rear lights, reflectors and number plate must not be obscured.

O10.7.8 Signs shall be removed from the view of following drivers when not in use. If a blind is used it should be opaque and preferably yellow, and should fully reveal or fully cover the sign. When visible to other road users, the "keep left/right" sign must not be rotated to a vertical position.

O10.7.9 Flap type variable message signs should be constructed to facilitate opening/closing by a person standing in a safe position. They should be fitted with a means of securing them in both the open and closed positions. The construction and colouring of these signs should be such that the appearance of the sign is not compromised regardless of whether the flaps are up or down. Particular attention should be given to the flap hinge detail in this respect.

O10.7.10 On lane closure signs, each arrow symbol should be capable of being flapped to show a red bar symbol as an alternative to the arrow. Each flap should be fitted with a means of securing it in either of these positions. The red bars must be at the correct height otherwise the legibility of the lane closed symbol is affected, especially at night, making it difficult to distinguish between open and closed lanes. The correct configuration for the flaps is detailed on working drawing P7402.

O10.7.11 Signs should not be manually changed when the sign vehicle is standing on a live traffic lane.

O10.8 LIGHT ARROW SYSTEM FOR BLOCK VEHICLES

O10.8.1 The colours of the system shown in [Figure 10.1](#) are as follows:

- upper sign display board: non-reflective grey;
- lower sign display board: retroreflective yellow in the same material as for MLC sign diagram 7403 (see paragraph [O10.7.4](#)); and
- lamps: amber.

The sign to diagram 610 on the lower panel should be reflectorised in accordance with the relevant special signs authorisation. The lower sign panel should be reflectorised using the same material as that specified for signs to diagram 7403; see paragraph [O10.7.4](#).

O10.8.2 Light arrow systems where the lower sign display board is non-reflective yellow and which have been used on trunk all-purpose roads and motorways before 1 April 2009 may continue to be used on such roads until 31st March 2011. Such light arrow systems may be used on other roads if the relevant traffic authority has obtained written authorisation from the Secretary of State for Transport in England or the equivalent national authority in Scotland, Wales or Northern Ireland.

O10.8.3 The lamp layout shown is indicative; for details of the precise number and layout of lamps refer to the relevant special signs authorisation. The halogen light-emitting arrow lamps under the current signs authorisation are required to pulse at a rate of 30 to 50 flashes per minute, with the on-period twice the length of the off-period, and when the light-emitting arrow lamps are operating the two synchronised xenon flashing lanterns shall only flash during the off-period of the light-emitting arrow lamps.

O10.8.4 Subject to special signs authorisation, four flashing amber lanterns complying with [Section O10.9](#) may be fitted to the lower panel of the light arrow system for block vehicles and may be used in place of a diagram 7403 sign when the upper light arrow panel is lowered. The lanterns shall only be operated when the upper light arrow panel is lowered and is not visible to approaching drivers.

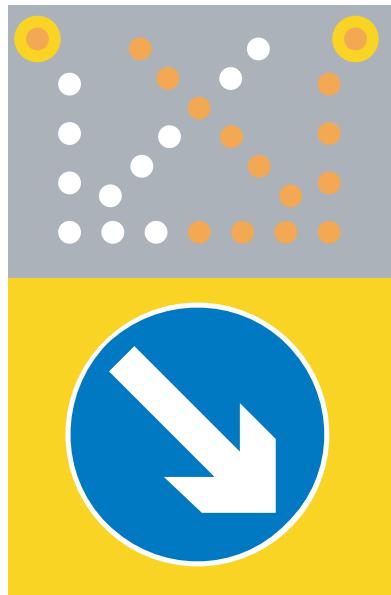


Figure 10.1 Light arrow system for block vehicles

O10.9 FLASHING AMBER LANTERNS

O10.9.1 Rear-mounted flashing amber lanterns must comply with the Road Vehicles Lighting Regulations 1989 (RVLR), with a lens diameter of $300\text{ mm} \pm 10\text{ mm}$. Each lamp must show an intermittent amber light at a rate of flashing of not less than 60 nor more than 90 flashes per minute, and in such a manner that the lights of one horizontal pair are always shown when the lights of the other horizontal pair are not shown. The optimum flash rate has been found to be 65 (± 5) flashes per minute.

O10.9.2 The light intensity of the lanterns on the principal axis should be measured when the lamps are continuously energised and shall be as follows:

- daylight – 2000 candelas (minimum); and
- night-time (during lighting up time) – 400 to 800 candelas.

O10.9.3 The light intensity during hours of darkness should not exceed the maximum value of 800 candelas since this may cause glare and make the sign difficult to read. Day and night intensities should be measured with amber lenses in place and with the measuring device 7 m from the lanterns. Amber lenses should preferably be to C yellow 1 in Table 4 of BS EN 12352: 2006 or otherwise signal yellow (Class A) as specified in BS 1376.

O10.9.4 The angle of half intensity shall be between 2.25° and 2.5° .

O10.9.5 Adjustment of the light intensity of the lanterns for night-time operations should be carried out by an automatic light-sensitive multistage light dimming device.

O10.10 ILLUMINATION OF SIGNS AT NIGHT

O10.10.1 Unless the MLC sign display panel is fully reflectorised in accordance with paragraph O10.7.4, it shall be externally illuminated by means of one or more sign lighting luminaires. It shall not be illuminated from the bottom alone nor from one side alone. The luminaires shall not obscure the sign display panel.

O10.10.2 The illumination should be distributed evenly over the entire sign face and the luminaires used and the illumination of the sign display panel shall comply in all respects with BS EN 12899-1 and the illuminance should be at least 40 lux.

O10.10.3 If the lighting would be visible to opposing traffic then signs should be fitted with light screens to avoid dazzling drivers approaching drivers or those on the opposite carriageway, as required by item 2 of the table in regulation 27 of the Road Vehicles Lighting Regulations 1989.

O10.10.4 In order to avoid any problem with specular reflection, the sign should be fixed to the vehicle or trailer so that the top of the sign is tipped towards the front of the vehicle or trailer by approximately 5° in relation to the road surface on which the vehicle is standing.

O10.11 VEHICLE CHECKS

O10.11.1 All equipment should be checked to be in full working order prior to starting MLC operations, in particular, that the flash rate of the lanterns is in accordance with the values given in paragraph O10.9.1 above, the lenses on the lanterns are orientated correctly, there is consistent brightness between lamps and that they are not too bright or too dim, and that the light sensor functions correctly.

O10.12 COMMUNICATIONS

O10.12.1 The supervisor will need to communicate with individual members of the team during the course of the operation. In view of the distances involved, a reliable two-way radio communication system should be provided between all vehicles, including any contractor's vehicles. A radio channel for dedicated use during MLC operations should be used, where possible. A plan should be prepared to deal with a loss of communication with the supervisor.

O10.12.2 At least one member of the team, usually the supervisor, should carry a mobile phone for contacting the emergency services but this method of communication needs to be agreed beforehand with the police, and, if appropriate, with traffic officers.

O10.13 ESTABLISHING A CLOSURE

O10.13.1 MLCs are put into effect by driving a vehicle or convoy of vehicles in a particular sequence, displaying signs at the rear. The vehicle drivers should operate as a team, with a supervisor in charge of all operations, including the activities of contractors who may be carrying out works from their own vehicles with their own drivers; see paragraph O10.3.5. A deputy supervisor should also be appointed.

O10.13.2 Normally the supervisor will require the team of drivers to report to the depot for final briefing and vehicle/sign/lighting equipment checks. All drivers, whether employed by the Highway Authority or by a contractor, should attend this briefing.

O10.13.3 Drivers should then take their vehicles to a prearranged rendezvous where they will be instructed to space their vehicles out, on the hard shoulder if possible, at the requisite distance apart, each one moving as necessary to a prearranged marker post position.

O10.13.4 The supervisor will normally be based in the block vehicle, or the leading block vehicle if more than one is used, but can be based in the advance warning vehicle nearest the block vehicle if it is decided that this is preferable.

O10.13.5 At this stage, all signs are covered or flapped shut, with the exception of block vehicles which should have LMCCs lowered in the operating position and the diagram 610 signs showing "keep right".

O10.13.6 The supervisor should arrange for a three-minute check count of traffic to be made, while the warning vehicles are being moved to their initial positions along the hard shoulder, to ensure that the flow accords with the value that has been determined as appropriate having carried out a safety assessment; see [Section O10.4](#). [Figure 10.2](#) is a standard record sheet which may be used to record traffic flows. This form may be copied for operational use.

O10.13.7 To avoid error, the count should begin at whole minutes. If in doubt, a further check count should be made after ten minutes have elapsed. The closure procedure should only continue when the supervisor is quite sure that the traffic flow is within limits, and is not close to the limit and rising.

O10.13.8 If the result of the count is satisfactory, the local Highway Authority or police control centre, as appropriate, should be contacted to check that no incidents have been reported on the stretch of carriageway where the mobile works are to be undertaken and to set matrix signals/VMS if appropriate; see [Section O10.5](#).

O10.13.9 The signs should now be uncovered showing the correct lane closure indications. As the vehicles are positioned on the left, the diagram 610 arrows should all be indicating "keep right". (For off side closures, arrows on the block and working vehicles will later need to rotate to indicate "keep left" as they take up their closure positions.)

O10.13.10 The supervisor should check by radio that the driver of each vehicle is in position and that the appropriate signs are displayed with the flashing beacons switched on. The lanterns are not to be lit yet. When it is confirmed that all is in order, the team should be instructed to start the operation.

O10.13.11 The warning vehicle lanterns should now be switched on. The block and working vehicles should move at normal speed into the lanes to be closed some distance away, approach with the traffic flow, switch on their lanterns, and slow down into the working position.

O10.13.12 Alternatively, the working vehicle may wait until the closure has been established by the block vehicle and then take up position. In this case, the supervisor should inform the driver of the working vehicle when the closure is in place. The working vehicle can then get into position in front of the mobile train with the driver using his own judgement as to the timing of any manoeuvre. For a right lane closure, the supervisor should assist the driver of the working vehicle during this operation.

O10.13.13 Another option for establishing the closure is for the vehicles to move from the hard shoulder directly across into their appropriate position on the carriageway as soon as practicable.

O10.13.14 When establishing and removing an off side lane closure, the direction of the diagram 610 sign and/or flashing light arrow on the vehicle should be changed remotely from the driver's cab to direct oncoming traffic accurately and avoid giving an incorrect message.

TRAFFIC COUNT FORM FOR MOBILE LANE CLOSURES

DATE:	CLOSURE OPERATIVES:
LOCATION:	SUPERVISOR:
OPERATION:	BLOCK VEHICLES:
CONTRACTOR:	200 YARDS VEHICLE:
CLIENT SUPERVISOR:	500 YARDS VEHICLE:
WEATHER:	800 YARDS VEHICLE:
TIME CLOSURE ON:	OTHER (STATE):
	TIME CLOSURE OFF:

Traffic flow limits applicable during the Mobile Lane Closure operation.

Traffic flow level above which the closure cannot be put into effect.	Maximum allowable traffic flow level (see Table 10.1)

TRAFFIC COUNT

Figure 10.2 Traffic count form for MLC operations

NOTE: This form may be photocopied for operational use.

O10.14 DURING A CLOSURE

O10.14.1 It is the supervisor's responsibility to warn other members of the team by radio of hazards on the road or hard shoulder, such as debris, but in particular of stationary vehicles. When such a hazard is encountered, it is each driver's responsibility to negotiate the hazard and come back to station as safely and quickly as possible, keeping the supervisor informed of his progress.

O10.14.2 It is the supervisor's responsibility to decide what course of action to take, if any, in respect of any incident which may affect the safety of the Highway Authority or contractor's personnel/vehicles, or public traffic on the road.

O10.14.3 When working in the vicinity of junctions or roundabouts, drivers of vehicles approaching from the side may not be able to see the rear-mounted signing or lanterns on the main route. In these circumstances, the works and/or signing vehicles should have their warning beacons switched on and appropriate signing should be provided on the side roads.

O10.14.4 Station keeping by hard shoulder sign display vehicles relative to the working vehicles may be a problem. One method found to be effective is for the driver of the leading warning vehicle to broadcast each marker post number as it is passed, and the vehicle's approximate speed every kilometre. The problem of station keeping increases as the speed increases.

O10.14.5 Where there is no hard shoulder or the hard shoulder is of restricted width (see paragraph O10.19.4 below), the vehicle or trailer-mounted advance signs should be located on the verge where practicable. Consideration should be given to installing hard standings on the verge to locate these vehicles. Advice on the installation of such hard standings is included in TD 69 "The location and layout of lay-bys" (DMRB 6.3.3). Except when moving position, these vehicles should not encroach into the near side lane. Where verges are restricted, the use of lay-bys or field gate entrances may be considered. In ideal circumstances, drivers approaching a mobile closure should be able to see, at any instant, at least two consecutive signs. Where there is no hard shoulder ([Plan MLC1](#)), the warning vehicles should therefore be positioned so that:

- block vehicle B and vehicle C should be clearly visible from warning vehicle D;
- vehicles C and D should be clearly visible from warning vehicle E; and
- the distance between warning vehicle E and block vehicle B should be less than one kilometre.

O10.14.6 If, in extreme circumstances, suitable stopping points are not available for all three advance warning vehicles then Vehicle D may be omitted. This decision should be based on a site specific risk assessment. Vehicle D should always be used unless there are very sound reasons not to do so.

O10.14.7 If it is not possible to find sufficient stopping points, then the use of static traffic management will be necessary.

O10.14.8 The supervisor should co-ordinate the activities involved in recharging the tanks of working vehicles, e.g. during white lining and weed spraying, and should therefore be aware of the distances that can be travelled on each charge of material.

O10.14.9 Strict control of ancillary vehicles is essential especially when working in the right or centre lane, e.g. the tanker waiting to refill a white-lining machine should wait nearby on a lightly-trafficked road until required; then the driver can be called by radio to bring the vehicle on to the works section. Like all works vehicles, the tanker should be conspicuous and be fitted with flashing amber warning beacons to the same standard as the works vehicle. See [Section O10.9](#).

O10.14.10 If the working vehicle has to stop for more than a few seconds the driver should inform the supervisor, who will stop the remainder of the convoy until informed by the driver of the working vehicle that it is mobile again.

O10.14.11 Where there is a hard shoulder with a discontinuity of up to 400 m, the working vehicles and block vehicles should proceed together and advise the rest of the mobile train of their position. When the leading warning vehicle reaches the discontinuity, all warning vehicles should stop. The leading warning vehicle should proceed on its own to regain the hard shoulder after the discontinuity, when the rearmost block vehicle is about 100 m past its far end. If the train is slow-moving, this distance will need to be increased to ensure the leading warning vehicle does not catch the train up and reduce the actual distance between itself and the block vehicle to less than the 200 yards figure indicated on its distance plate. The following warning vehicles should then negotiate the discontinuity in turn in a similar manner, although maintaining station with the leading warning vehicle while negotiating the discontinuity is temporarily less important. Work on reduced width sections exceeding 400 m should be carried out by means of a lane closure using static signs and cones.

O10.14.12 On particular stretches of dual carriageway, it may be necessary to reduce the distance between advance warning vehicles to ensure that the next vehicle in the convoy can be seen by road users before they have passed the preceding one. Drivers should be instructed to make this temporary adjustment as necessary.

O10.14.13 The supervisor should arrange for periodic traffic counts to be made – normally a three-minute count every 15 minutes to ensure that the flow remains less than the value determined as appropriate during the planning of the work. The figures in [Table 10.1](#) in [Section 10.4](#) are absolute maxima and appropriate flow values may well be lower depending on the particular features of the site.

O10.14.14 The closure should not be taken off simply on the grounds of traffic flow levels until either of the following occurs:

- two successive counts give results above the appropriate value; or
- the counts show a rising trend with the last one above the appropriate value.

O10.14.15 If for any reason the supervisor considers that the situation is dangerous, he should abort the operation.

O10.15 WORKING THROUGH JUNCTIONS WITHOUT A HARD SHOULDER

O10.15.1 As the MLC approaches a junction the supervisor should instruct team members by radio on the procedure to be adopted. This will depend on the nature of the works being undertaken, the nature of the junction, and the volume of traffic on both the subject road and the joining road. When the MLC is operating on the near side lanes of the main carriageway, consideration shall be given to temporarily closing the slip road whilst the convoy passes it. This may be achieved with the assistance of either the police or a traffic officer if available.

O10.15.2 Alternatively, if the slip road is not closed, static road works ahead sign to diagram 7001 displaying a "Mobile road works" plate to diagram 7001.1, or a mobile sign to diagram 7402 displaying an "Ahead" plate, should be displayed to joining traffic just prior to the arrival of the convoy, and removed after it has passed. See [Part 1: Design, Section D6.26](#).

O10.15.3 The driver of each vehicle should exercise special care when negotiating the junction.

O10.16 WORKING THROUGH JUNCTIONS WITH A HARD SHOULDER

O10.16.1 As the MLC approaches a junction or a motorway service area, the supervisor should instruct the team members by radio the procedure to be undertaken. This will depend on the nature of the works being undertaken, the nature of the junction, and the volume of traffic on both the subject road and the joining road. The slip road may be closed by the police or a traffic officer; or the arrangement described in paragraph O10.16.2 below should be used.

O10.16.2 If the police or a traffic officer are not being used to close the slip road, a static "road works" sign to diagram 7001 displaying a "Mobile road works" plate to diagram 7001.1, or mobile sign to diagram 7402 displaying an "Ahead" plate, should be displayed on the entry slip road just before it is reached by the leading working vehicle. See Plan MLC7. As the last sign-bearing vehicle clears the entry slip road, the supervisor should ask for this sign on the slip road to be removed. As appropriate, the sign should be moved forward ready for display at the next junction or motorway service area to be negotiated by the closure train.

O10.16.3 On reaching an exit slip road the working vehicles and lane closure vehicles should be prepared to stop if necessary, to give way to traffic leaving the main carriageway. They should then continue in their normal line and at the prearranged speed. As the sign-bearing vehicles on the hard shoulder reach the exit slip road they should follow the same procedure. Each warning vehicle driver waiting to cross a slip road should notify drivers behind him that he has stopped (to prevent bunching). When he has successfully crossed the slip road he should notify following warning vehicle drivers so that they can recover lost ground. Each vehicle should then continue along the hard shoulder of the main carriageway and regain station as quickly as possible.

O10.16.4 On reaching an entry slip road each sign-bearing vehicle should stop in turn at the end of the hard shoulder at the extremity of the nose of the junction. The vehicle should be driven across the slip road on to the hard shoulder as and when a suitable gap in the traffic occurs and regain station as quickly as possible. Again, drivers waiting to cross, or crossing, a slip road should advise following drivers of their status. The driver of each vehicle should exercise special care when executing the manoeuvres.

O10.16.5 When work is to be carried out on the main carriageway and then on an exit slip road, as the working vehicle reaches the start of the slip road, the mobile train should stop and the closure is removed. The distance plate on each of the advance sign vehicles should then be changed to a plate "On slip road" and, if the number of lanes on the slip road is different from that on the main carriageway, the lane closure signs should be changed. The working vehicle should then work along the slip road escorted by a block vehicle showing a "keep left/right" sign to diagram 610. The remaining mobile signs should maintain station on the hard shoulder of the main carriageway. When the working vehicle reaches the end of the slip road, the closure should be removed.

O10.16.6 When it is necessary to work on an entry slip road and then on the main carriageway, a static "road works" sign to diagram 7001 displaying a "Mobile road works" plate to diagram 7001.1, or mobile sign to diagram 7402 displaying an "Ahead" plate, should be displayed at the start of the slip road. The working vehicle, escorted by a block vehicle showing a "keep left/right" sign to diagram 610, should work along the slip road while the remaining mobile signs are sited on the hard shoulder of the main carriageway prior to the junction with their beacons switched off. As the working and escort vehicles reach the main carriageway, the beacons on the waiting vehicles should be switched on and they should move off and take up station in the normal way. If the slip road exceeds 400m in length, additional mobile signs to diagram 7402 are required. If the number of lanes on the slip road is different from that on the main carriageway, the lane closure signs should be changed when appropriate. The drivers of the hard shoulder sign vehicles should exercise special care when crossing the entry slip road.

O10.17 REMOVING A CLOSURE

O10.17.1 When a closure is to be removed, either because work is complete or the traffic flows are getting too high (see [Section O10.4](#)), the supervisor should instruct the drivers of the working vehicles and the block vehicles to move off the carriageway, on to the hard shoulder if one is available, while the rest of the team maintains station. For a right lane closure this may involve accelerating in the lane occupied and then manoeuvring to the left as gaps in the traffic occur.

O10.17.2 Once the lane closure vehicles are off the carriageway, the supervisor should instruct that the vehicles should stop and the signs be covered. Any static signs should be recovered. Drivers can then be instructed to leave the site. From this stage in the procedure drivers should proceed independently and at a normal pace.

O10.17.3 Where there is no hard shoulder, as soon as the work has been completed and the block/works vehicles have moved off, the signs on the advance warning vehicles should be covered at their last stationary position clear of live traffic.

O10.17.4 If the mobile train is required to move further along the road to commence work elsewhere, the supervisor should direct the drivers accordingly. On roads with a hard shoulder, where traffic flows are light and there is a short distance between works sites (e.g. 2-3 km), the train can be kept together with the closure operational and travelling at 20-25 km/h (12-15 mph) to the next site. Otherwise, the closure should be removed and the signs covered. The drivers should then be instructed to take their vehicles to the next site independently.

O10.18 OPERATIONS AT NIGHT

O10.18.1 As with daytime use, the technique should be employed only in conditions of good visibility; see paragraph [O10.1.9](#). It may be used on both lit and unlit carriageways. Care should be taken when operating this technique near dusk or dawn.

O10.18.2 Using the MLC technique at night on roads with no proper hard shoulder can present particular difficulties in safely siting and relocating the advance warning sign vehicles off carriageway. The technique should be used in these circumstances only by very experienced practitioners. The guidance in this document for daytime use on roads with no hard shoulders should be supplemented by a specific risk analysis. A detailed analysis for each case is required. This will need to be preceded by a site inspection carried out by a competent responsible person having relevant MLC experience to determine exactly where sign vehicles can pull off safely without getting bogged down and the findings included in the site specific quality plan and instructions.

O10.18.3 Personnel may experience difficulty reading marker posts at night so the fitting of an adjustable spotlight is advised. Before leaving the depot all lighting equipment should be checked.

O10.18.4 A relief driver may travel in the working vehicle to give directions during complicated manoeuvres and to replace any other driver in the train, if required. This is especially important at night as the additional stress can bring on premature fatigue. See paragraph [O10.3.7](#).

O10.19 PLANS AND PRINCIPLES FOR MOBILE LANE CLOSURES

O10.19.1 The plans and principles for the operation of the MLC technique are given in [Plans MLC1 to MLC7](#). They relate to the free-flowing conditions found on motorways and other dual carriageway roads with grade-separated junctions. The separation distance between block/working vehicles is a compromise between the need to keep the gap small to discourage other vehicles from breaching the closure and allowing sufficient room to avoid the block vehicle being pushed forward into the working vehicle should it be struck from behind. The block vehicle shown in the plans has the same specification as an Impact Protection Vehicle; see paragraph [O5.5.5](#).

O10.19.2 Should the technique be used on a road with at-grade junctions (e.g. signals, roundabouts etc.) then gaps between vehicles may need to be reduced in the proximity of these junctions. At this type of location, the speed of the traffic reduces, approaching that of the MLC, and there is therefore an increased risk of vehicles invading the closure, either from a side road or by cutting in. This is exacerbated if the larger gaps normally used when traffic is passing at higher speeds are maintained.

O10.19.3 Where the closure of two lanes is being carried out, if the works allow a choice of closing lanes 1 and 2 or lanes 2 and 3 then the latter option should be chosen since it does not require slower-moving traffic to change lanes.

O10.19.4 Where hard shoulders are less than 3.3 m wide, the supervisor should decide whether or not safety may be prejudiced by operating or working on a narrow hard shoulder. If safety is being prejudiced then the operation should not proceed.

O10.19.5 The block vehicle should maintain station with the working vehicle in front of it, at all times. When there is a particular risk of other vehicles getting between the MLC vehicles, the distance given as 50-100 m in the plans should be kept as close to 50 m as possible. To minimise the risk of the block vehicle being shunted into the works area this distance should never be less than 50 m in normal operation.

O10.19.6 Where there are three lanes and the working vehicle is operating in the centre lane, [Plan MLC3](#), three block vehicles should be used. These are shown as B1, B2 and B3 on the plan. This arrangement minimises any possible risk of errant vehicles passing between the block vehicles and by extending the length of the taper allows smoother merging of approaching traffic.

O10.19.7 When the near side and centre lane are closed then depending on the location of the workforce within the closure, consideration should be given to providing an additional block vehicle on the hard shoulder alongside vehicle B3.

WORKING ON FOOT

O10.19.8 Work on foot on the carriageway may be undertaken in association with this technique. [Plan MLC4](#) illustrates the principles involved. In the example depicted, the working area is shown as extending forwards and into part of the middle lane. In this situation, the working area should be protected by vehicles front and rear, and the rear vehicle should itself be protected by a block vehicle as shown. A lateral clearance or safety zone of not less than 1.2 m should be provided between the working space and the carriageway remaining open to traffic.

O10.19.9 Where appropriate, steps should be taken to ensure that the workforce does not stray into the safety zone, e.g. when a team member is acting as a lookout.

O10.19.10 When work is being carried out on foot, depending on the type of works being undertaken, additional block vehicles may be needed to protect the working area from errant vehicles. Where an additional block vehicle is positioned within the area protected by the main block vehicles, e.g. alongside vehicle B1, its flashing lanterns should be switched off.

O10.19.11 The arrangement may be adapted for other situations, e.g. work on lanes 2 and 3 may be carried out using a mirror image of the plan.

O10.19.12 When working alongside a central reservation which is wide enough for an errant vehicle to pass between the central reservation safety barrier and the block vehicles, the block vehicles should be positioned to prevent this happening.

O10.19.13 When work is undertaken on foot on a hard shoulder a lateral clearance or safety zone of not less than 1.2 m should be provided between the working space and the carriageway open to traffic; see [Section O3.2](#).

Plan MLC1: Mobile Lane Closure on a dual carriageway road without a hard shoulder

Three vehicle or trailer-mounted signs are required on the near side, off the carriageway, up to one kilometre from the initial block vehicle that is positioned in the carriageway:

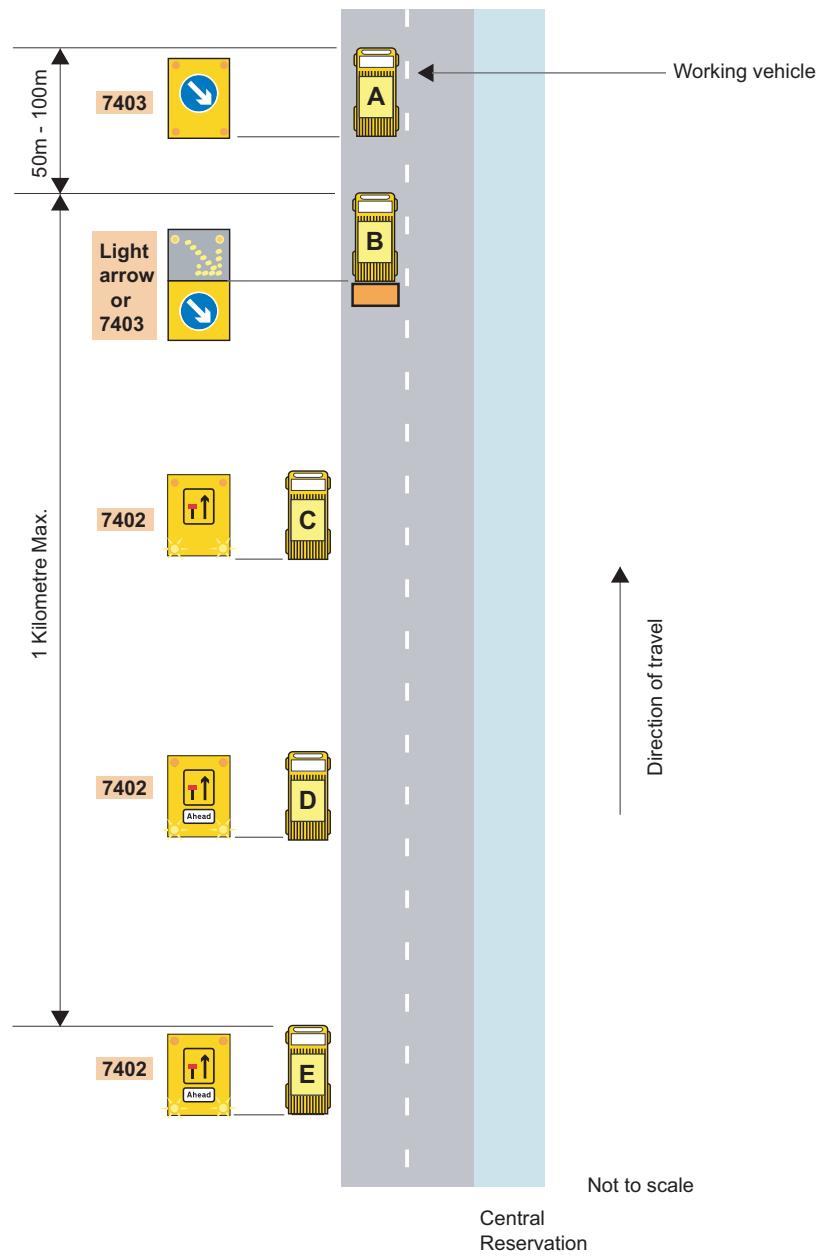
- initial two (or more) signs to diagram 7402 showing supplementary plate "Ahead";
- final advance sign to diagram 7402 with no supplementary plate; and
- one block vehicle B carrying a light arrow sign (or sign to diagram 7403) 50 m – 100 m in advance of the working vehicle A carrying sign to diagram 7403.

Vehicles C, D and E should preferably be evenly spaced with a spacing no closer than 200 m or greater than 350 m. These vehicles will move from their current positions to the next available hard standing as the work progresses whilst maintaining an overall distance of no more than one kilometre from vehicle B. Advance sign vehicles should be positioned so that approaching drivers are able to see, at any instant, at least two consecutive signs; see paragraph [O10.14.5](#).

If, in extreme circumstances, suitable stopping points are not available for all three advance warning vehicles then Vehicle D may be omitted. This decision should be based on a site specific risk assessment. Vehicle D should always be used unless there are very sound reasons not to do so.

For a closure of the middle lane on a three lane dual carriageway road without a hard shoulder, the advance signs should be as [Plan MLC1](#) and the position of the block vehicles and working vehicle should be as [Plan MLC3](#) or [MLC5](#).

Plan MLC1: Mobile Lane Closure on a dual carriageway road without a hard shoulder

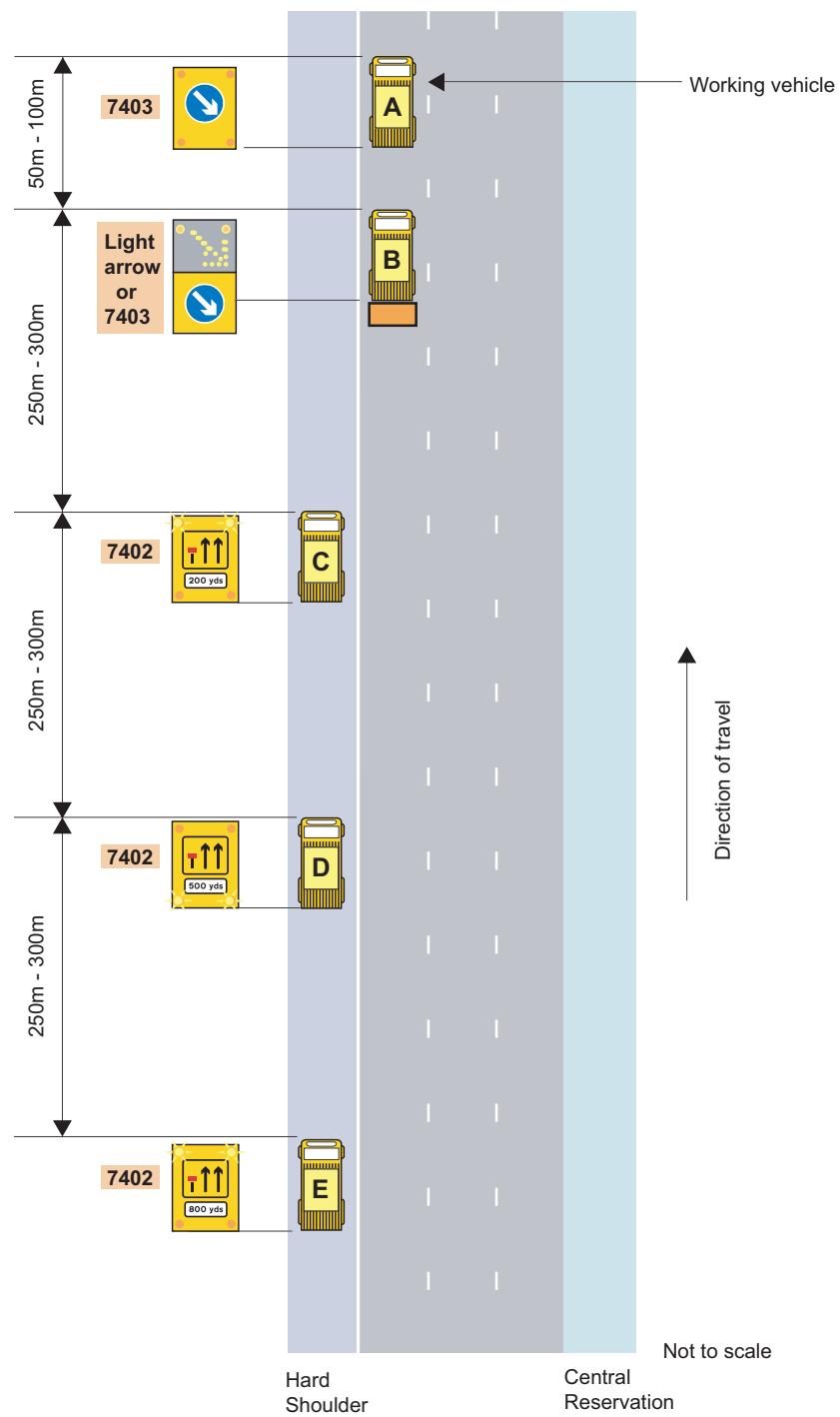


Plan MLC2: Mobile Lane Closure on a dual carriageway road with a hard shoulder

Three vehicle or trailer-mounted signs are required on the hard shoulder in advance of the initial block vehicle that is positioned on the carriageway:

- three vehicle or trailer-mounted signs to diagram 7402 showing supplementary plate "800 yds", "500 yds" and "200 yds" spaced at intervals of 250m to 300m starting 200m to 250m in advance of the initial block vehicle B; and
- one block vehicle B carrying a light arrow sign (or sign to diagram 7403) 50 m – 100 m in advance of the working vehicle A carrying sign to diagram 7403.

Plan MLC2: Mobile Lane Closure on a dual carriageway road with a hard shoulder



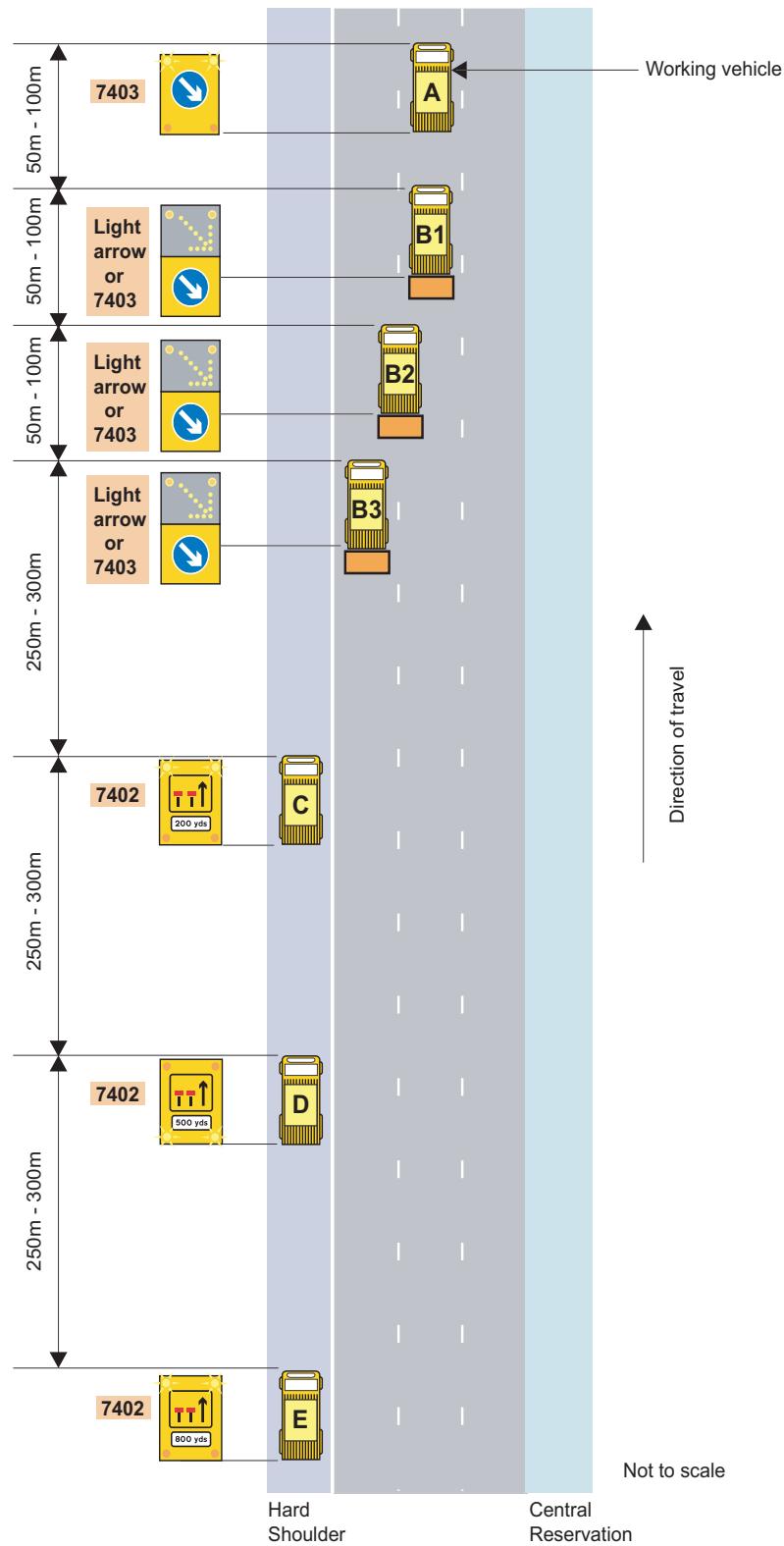
Plan MLC3: Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with a hard shoulder, working vehicle only

Three vehicle or trailer-mounted signs are required on the hard shoulder and three block vehicles are positioned on the carriageway:

- three vehicle or trailer-mounted signs to diagram 7402 showing supplementary plate "800 yds", "500 yds" and "200 yds" spaced at intervals of 250m to 300m starting 200m to 250m in advance of the initial block vehicle B3;
- one block vehicle B3 carrying a light arrow sign (or sign to diagram 7403) in lane 1, 50m – 100m in advance of the next block vehicle;
- one block vehicle B2 carrying a light arrow sign (or sign to diagram 7403) straddling lane line between lanes 1 and 2, 50m – 100m in advance of block vehicle B3; and
- one block vehicle B1 carrying a light arrow sign (or sign to diagram 7403) in lane 2, 50m – 100m in advance of the working vehicle A carrying sign to diagram 7403. See [Plan MLC4](#) for the position of lane 2 block vehicles where works are being carried out on foot.

NOTE: Where two-lane closures are to be carried out, if the works allow a choice of closing lanes 1 and 2 or 2 and 3 then the latter option should be chosen since it does not require slower moving traffic to change lanes; see [Plan MLC5](#).

Plan MLC3: Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with a hard shoulder, working vehicle only



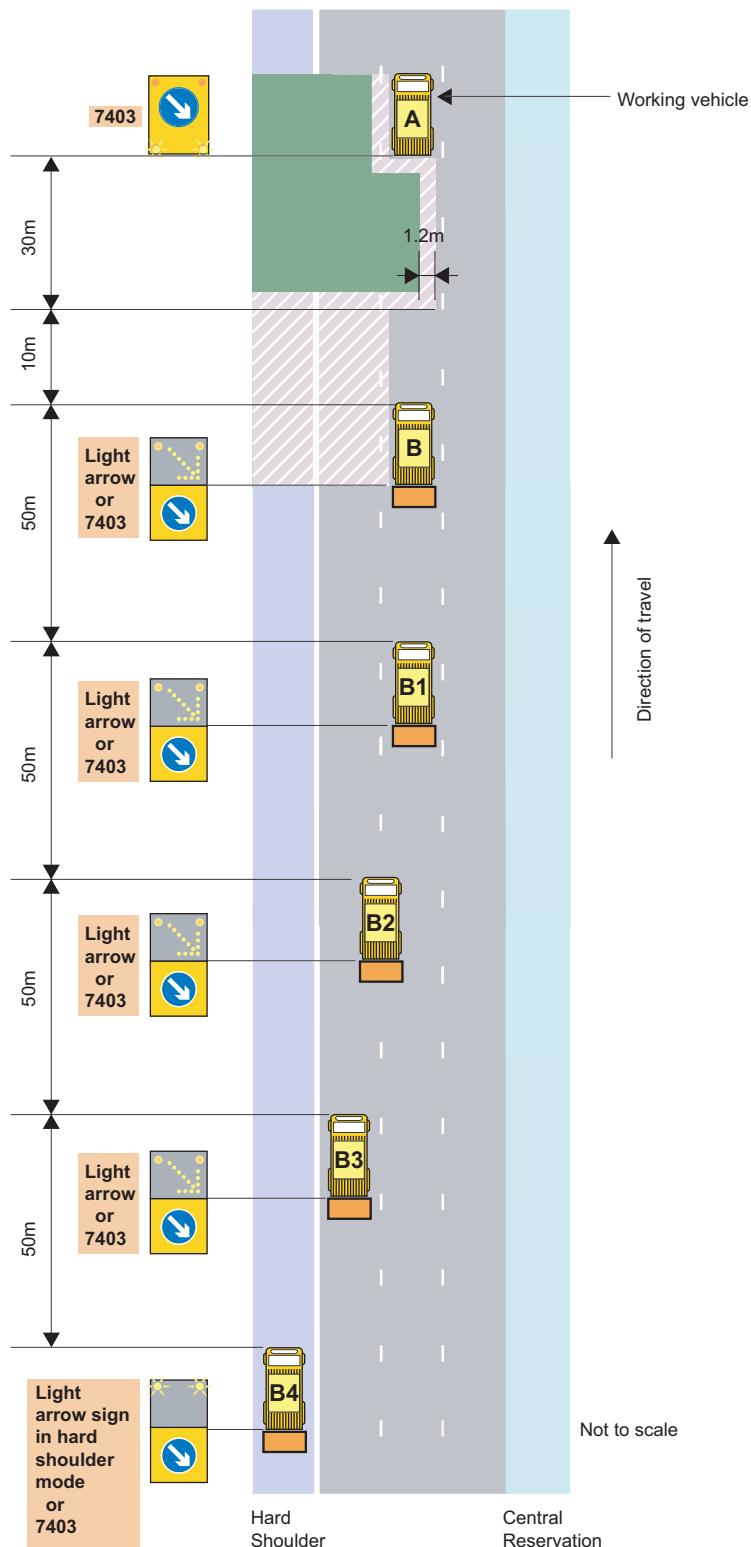
Plan MLC4: Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with and without a hard shoulder, working on foot

The requirements are:

- three vehicle or trailer-mounted signs to diagram 7402 showing supplementary plate "800 yds", "500 yds" and "200 yds" spaced at intervals of 250m to 300m (not shown on plan) starting 200m to 250m in advance of the initial block vehicle B4;
- one block vehicle B4 carrying a light arrow sign (or sign to diagram 7403) positioned on hard shoulder, when this is present, 50m in advance of block vehicle B3; the light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway;
- one block vehicle B3 carrying a light arrow sign (or sign to diagram 7403) in lane 1, 50m in advance of block vehicle B2;
- one block vehicle B2 carrying a light arrow sign (or sign to diagram 7403) between lanes 1 and 2, 50m in advance of block vehicle B1;
- one block vehicle B1 carrying a light arrow sign (or sign to diagram 7403) in lane 2, 50m in advance of the initial block vehicle B;
- consideration should be given to using an additional block vehicle (with lanterns switched off), depending on the nature of the works, alongside either block vehicle B1 or B in lane 1 to protect the working area;
- one block vehicle B carrying a light arrow sign (or sign to diagram 7403) in lane 2 adjacent to the upstream limit of the safety zone;
- working vehicle A carrying a sign to diagram 7403 is positioned in front of block vehicle B; the distance between the front of block vehicle B and the rear of the working vehicle A should be 40m; the position of vehicles A and B may be swapped over if required;
- the downstream limit of the working space is adjacent to the front of the working vehicle A;
- a 1.2m safety zone should be maintained between the edge of the working space and the adjacent live traffic lane; and
- a 10m safety zone should be maintained in front of block vehicle B.

The arrangement may be adapted for other situations, e.g. work on lanes 2 and 3 may be carried out using a mirror image of Plan MLC4. When working alongside a central reservation which is wide enough for an errant vehicle to pass between the central reservation safety barrier and the block vehicles, the block vehicles should be positioned to prevent this happening.

Plan MLC4: Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with and without a hard shoulder, working on foot



For clarity, the three vehicle or trailer-mounted advance signs have been omitted.

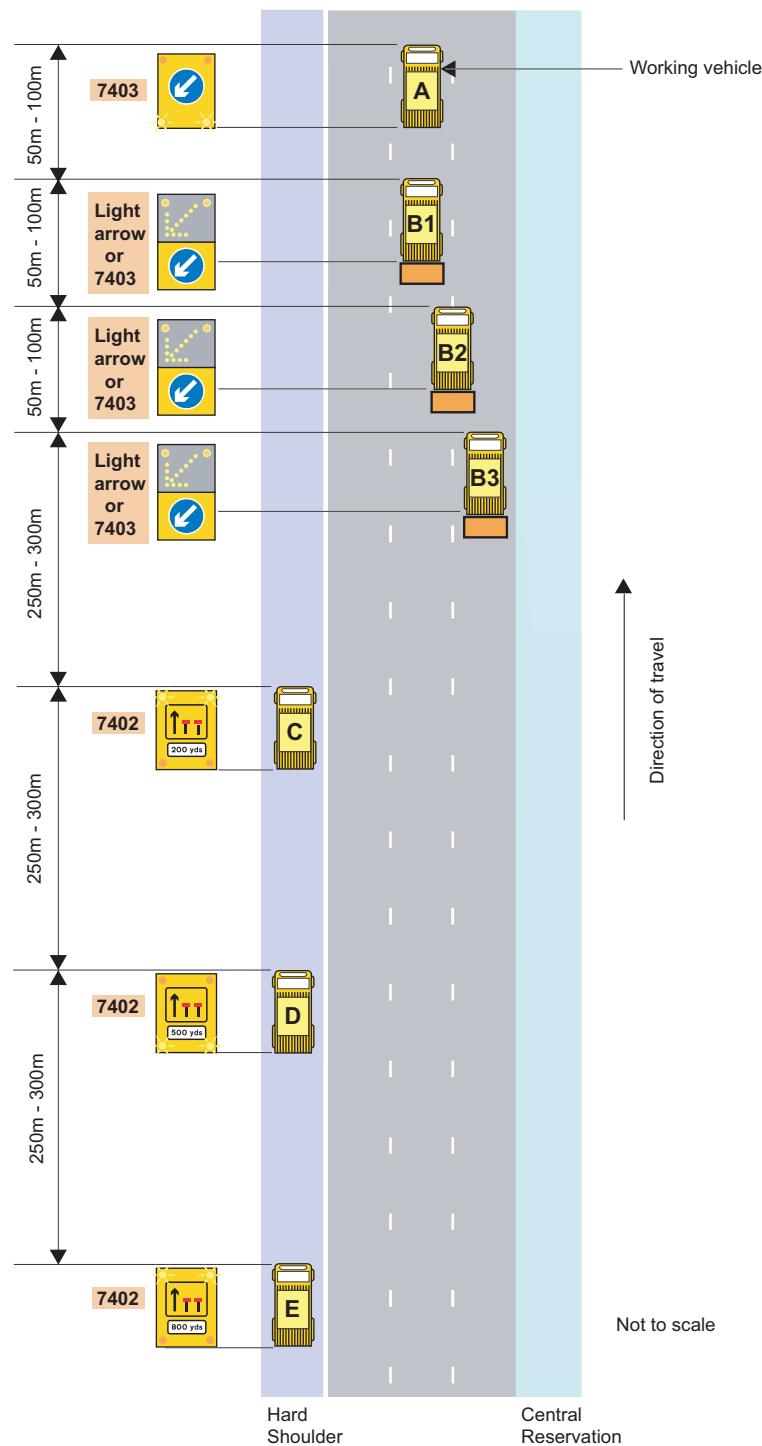
NOTE: The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway.

Plan MLC5: Mobile Lane Closure of two off side traffic lanes (lanes 2 and 3 on a three-lane carriageway) with and without a hard shoulder

Three vehicle or trailer-mounted signs are required on the hard shoulder and three block vehicles are positioned on the carriageway:

- three vehicle or trailer-mounted signs to diagram 7402 showing supplementary plate "800 yds", "500 yds" and "200 yds" positioned at intervals of 250 m to 300 m in advance of the initial block vehicle B3;
- one block vehicle B3 carrying a light arrow sign (or sign to diagram 7403) in lane 3, 50 m – 100 m in advance of next block vehicle B2;
- one block vehicle B2 carrying a light arrow sign (or sign to diagram 7403) straddling the lane line between lanes 2 and 3, 50 m – 100 m in advance of block vehicle B1; and
- one block vehicle B1 carrying a light arrow sign (or sign to diagram 7403) in lane 2, 50 m – 100 m behind the working vehicle A carrying sign to diagram 7403, see [Plan MLC4](#) for the position of the lane 2 block vehicles where works are being carried out on foot.

Plan MLC5: Mobile Lane Closure of two off side traffic lanes (lanes 2 and 3 on a three-lane carriageway) with and without a hard shoulder

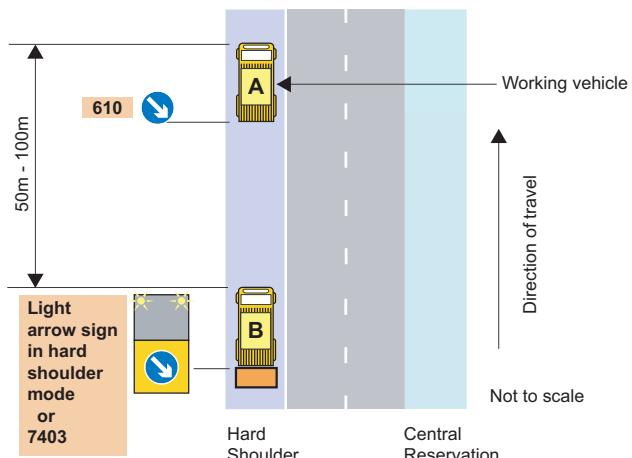


Plan MLC6: Mobile Lane Closure, working vehicle on a hard shoulder

The requirements are:

- one block vehicle B carrying a light arrow sign (or sign to diagram 7403) on the hard shoulder;
- working vehicle A carrying a “keep left/right” sign to diagram 610 is positioned in advance of block vehicle (B);
- the block vehicle B may be dispensed with if:
 - the works vehicle A carries a light arrow sign (or a sign to diagram 7403); and
 - is fitted with a LMCC and meets the requirements of a block vehicle and is substantial e.g. a sweeper weighing in excess of 10 tonnes.

NOTE: The light arrow sign shall not display any form of arrow when on a two-way single carriageway road and, other than at the scene of an incident, the light arrow sign shall not display any form of arrow when on a hard shoulder of a dual carriageway.



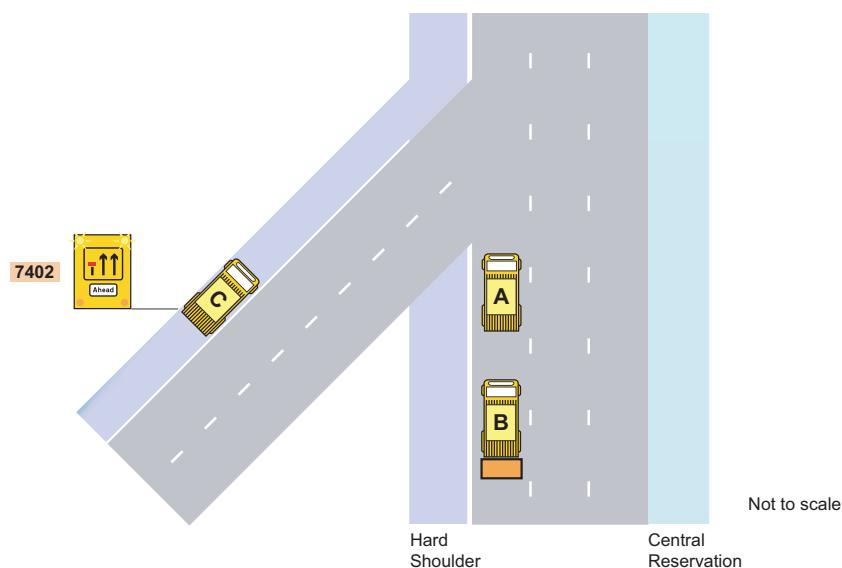
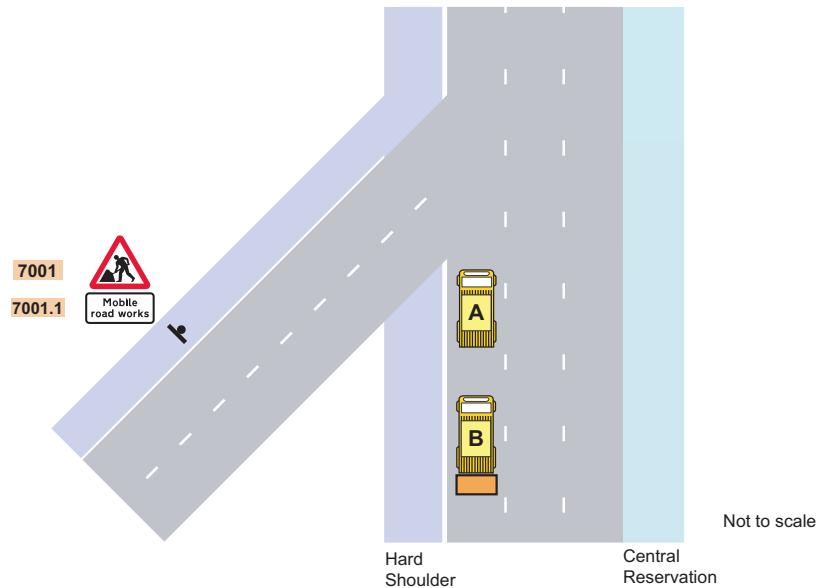
Plan MLC7: Mobile Lane Closure, working through junctions – slip road signing options

Either:

- a static “road works” sign to diagram 7001 in combination with a “Mobile road works” plate to diagram 7001.1; or
- a mobile sign to diagram 7402 displaying an “Ahead” plate

should be displayed on the slip road just prior to the arrival of the convoy, and removed after all the advance signing vehicles have passed the slip road.

Alternatively, consideration should be given to the need for either partial or complete closure of the slip road using either static signing or police/traffic officer assistance to improve safety and flow of traffic during the MLC operation.



For clarity, the three vehicle or trailer-mounted advance signs have been omitted from these plans.

O11 MOBILE CARRIAGEWAY CLOSURE TECHNIQUE

O11.1 BACKGROUND

O11.1.1 On high-speed dual carriageway roads, some maintenance tasks can only be conducted safely on the carriageway when the road is clear of passing traffic. The movement of a short length of coning and signing to change the configuration of a temporary traffic management layout during major road works which takes less than 5 minutes is a prime example.

O11.1.2 Consideration should be given in the early stages of planning to the use of an approved Mobile Carriageway Closure technique to support the safe installation, maintenance and removal of temporary traffic management operations; see [Section O11.23](#).

O11.1.3 The technique may be used for temporary traffic management operations that have been planned, e.g. the installation of temporary traffic management layouts, contra-flow switch-overs, and tidal flow changeovers. It is not intended to be used to protect the scene of an incident in an emergency situation (unless the resources needed are already on site).

O11.2 DEFINITIONS

O11.2.1 The following terms are used throughout this section.

Advance warning vehicle:	A vehicle which is positioned on the hard shoulder or verge as appropriate, which is equipped with a queue warning sign or tows it on a trailer.
Assembly point:	A point off the main carriageway, where the closure vehicles will assemble prior to the commencement of the closure operation.
Access point:	A point giving access to the carriageway, e.g. a junction entry slip road or the access from a service area.
Closure control vehicle:	The closure vehicle driven by the person responsible for the manoeuvres of the closure vehicles.
Control office:	The office responsible for monitoring traffic and the setting of matrix and also VMS signs. This may be either the Police Control Office (PCO) or Regional Control Centre (RCC) as appropriate.
Mobile carriageway closure:	The temporary closure of a carriageway created by a number of closure vehicles, travelling at low speed in line abreast across the carriageway.
Closure vehicle:	A vehicle, equipped with impact protection and closure vehicle signing, which when aligned with other such vehicles forms a mobile carriageway closure.
Closure start point:	The point on the carriageway where the closure vehicles start manoeuvring across the carriageway to travel line abreast, prior to slowing down.
Hard shoulder vehicle:	The vehicle that travels on the hard shoulder (if necessary), aligned with the closure vehicles, to complete the mobile carriageway closure.
Monitor vehicle:	The vehicle that travels ahead of the closure to monitor and mark the boundary of the traffic-free zone in front of the closure. Its driver also identifies and reports to the supervisor any stationary vehicles within the traffic-free zone.

Supervisor:	The person, usually situated in the closure control vehicle, who is responsible on site for the co-ordination of the entire closure operation.
Traffic-free zone:	The section of carriageway ahead of the closure that is clear of traffic.
Working area:	The area of a carriageway in which works activities take place.
Working window:	The time during which the working area is free from non-works traffic.

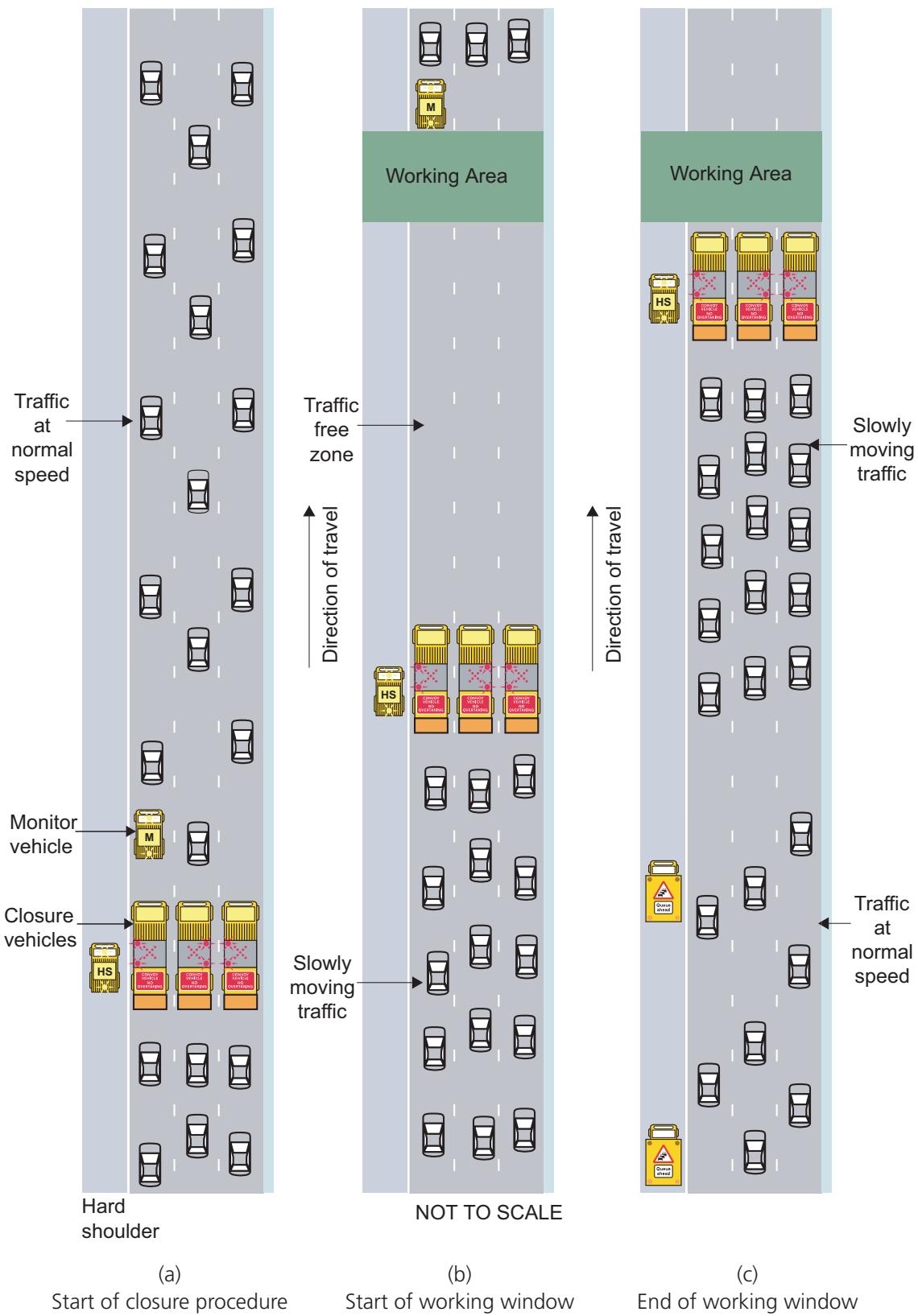
O11.3 THE PRINCIPLE OF THE TECHNIQUE

O11.3.1 A mobile carriageway closure is created by a number of specially-signed vehicles, usually one per lane, that manoeuvre within normal free flow traffic conditions to align laterally across the carriageway, ([Plan MCC1a](#)). Their speed is then gradually reduced to a predetermined speed, thereby slowing the traffic behind them. This will create a traffic-free zone between the closure vehicles and the traffic in front of them. It is the speed differential between traffic moving away in front of the closure and the closure itself that creates the working window.

O11.3.2 When the last of this downstream traffic has passed the proposed working area, ([Plan MCC1b](#)), work on the carriageway can commence in a traffic-free environment.

O11.3.3 The convoy closure vehicles move towards the working area travelling at an agreed reduced speed (from 20 mph to 30 mph) and when they reach the working area, ([Plan MCC1c](#)), work on the carriageway must have ceased and the carriageway must have been cleared for the passage of traffic. When the closure vehicles have passed the working area, they resume normal speed and move to the left-hand lane of the carriageway to allow traffic to pass. The operation is then complete.

Plan MCC1: Principles of the Mobile Carriageway Closure technique



NOTE: HS – In Northern Ireland, the hard shoulder vehicle specification is to be the same as for the lane closure vehicles.

011.4 PLANNING ISSUES

O11.4.1 The design process starts with the establishment of the location of the works area and the duration of the working window needed to complete the particular task. This working window should comprise the time required to complete the task plus a safety cushion of two minutes. In general, the working window, including the safety cushion, should not exceed seven minutes.

Table 11.1 Closure start point

Duration of working window required (minutes)	Closure start point – upstream of the works zone (km)*	
	Closure speed	
	20 mph	30 mph
3	4.7	8.0
4	5.6	10.1
5	6.5	12.1
6	7.4	14.1
7	8.3	16.1

* Includes an allowance of 2 km for the closure vehicles to move from the near side lane into position across the carriageway.

O11.4.2 Table 11.1 shows the distance upstream of the working area that the closure must start in order to provide the required working window, for closure speeds of 20 mph and 30 mph. This distance allows two kilometres for the closure vehicles to get in position across the carriageway and reduce their speed to the planned closure speed. The distances shown assume that the slowest vehicles in the traffic in front of the closure are travelling at a minimum speed of 50 mph.

O11.4.3 The presence of any entry slip roads or lane gain/drops on the length of carriageway between the works area and closure start point given by Table 11.1 should then be identified.

O11.4.4 It will be necessary to provide advance signing to warn road users of the presence of the slow-moving traffic ahead. Consequently the design process will need to assess the likely queues arising from the operations.

O11.4.5 Tables 11.2 and 11.3 provide estimates of queue length for different working windows and flow rates for a closure speed of 20 mph and 30 mph. In general, the mobile carriageway closure operation should not be used for traffic flows exceeding 1200 veh/hr for each lane left open through the works area. The risk to queuing traffic can be reduced by scheduling the closure operation in moderate traffic flow conditions when exceptionally high approach speeds are less likely.

Table 11.2 Queue length when closure reaches works – closure speed: 20 mph

Demand flow (veh/hr for each lane open through the works)	Queue length (km)				
	Working window (minutes)				
	3	4	5	6	7
50	0.1	0.1	0.1	0.1	0.1
100	0.1	0.2	0.2	0.2	0.3
200	0.3	0.3	0.4	0.5	0.6
300	0.4	0.5	0.6	0.8	0.9
600	0.8	1.0	1.3	1.6	1.8
900	1.2	1.6	2.1	2.5	2.9
1200	1.7	2.3	2.9	3.5	4.1

Table 11.3 Queue length when closure reaches works – closure speed: 30 mph

Demand flow (veh/hr for each lane open through the works)	Queue length (km)				
	Working window (minutes)				
	3	4	5	6	7
50	0.1	0.1	0.2	0.2	0.2
100	0.2	0.2	0.3	0.4	0.4
200	0.4	0.5	0.6	0.7	0.9
300	0.6	0.8	0.9	1.1	1.3
600	1.2	1.6	2.0	2.4	2.7
900	1.8	2.5	3.1	3.7	4.3
1200	2.6	3.5	4.3	5.2	6.1

O11.4.6 Tables 11.2 and 11.3 show that, at this range of traffic flows, the queue is unlikely to extend beyond the point where the closure started. The tables enable the appropriate signing regime to be devised, using both permanent and temporary signs, to warn approaching traffic of the back of the queue.

O11.4.7 Using a closure speed of 20 mph has the advantages that the closure start point is nearer the work site and also the length of the traffic queue is less than when a speed of 30 mph is used. However, the use of the lower speed does require vehicles approaching the rear of the queue to decelerate more sharply.

O11.4.8 Once the start point of the closure operation has been established, the location of the following should be identified:

- the assembly point, off the main carriageway, where the closure vehicles will assemble prior to the commencement of the closure operation; and
- the access point where the closure vehicles will enter the carriageway.

O11.4.9 At this stage, the number of vehicles necessary for the operation should also be determined. This is:

- usually one closure vehicle per lane plus a hard shoulder vehicle for the hard shoulder, where present;
- monitor vehicle;
- two advance warning vehicles; and
- if necessary, the signing equipment and/or vehicles necessary to close temporarily any access points.

011.5 CLOSING ACCESS JUNCTIONS

O11.5.1 Traffic access points in the path of the closure vehicles shall be securely closed for a brief period during the operation to prevent entry of traffic into the traffic-free zone ahead of the convoy. A Traffic Order will not be required for the slip road closure. The slip road is closed just before it is passed by the monitor vehicle and is reopened when the closure vehicles have passed it. See [Section O11.18](#).

O11.5.2 The three options for closing the access slip road are shown in [Plans MCC2, MCC3](#) and [MCC4](#). The decision on which option to use at a particular site will depend on a number of factors including:

- the anticipated traffic flow on the slip road;
- the length of the slip road;
- the topography and sight lines at the junction (e.g. if the sight lines are poor then closing the slip road at its entry may be preferable); and
- the length, quality and signing of the diversion route should the slip road be closed.

O11.5.3 The usual option for closing the slip road, which is shown in [Plan MCC2](#), will be a closure at its downstream end using a works vehicle (see paragraph [O11.8.5](#)) that is brought to a halt by a manually operated "STOP" sign to diagram 7023. There are two options for the type of works vehicle used:

- a vehicle fitted with impact protection; on a relatively short slip road linking a high-speed local road carrying high traffic flows to the motorway, it is likely that a risk assessment would show that a vehicle fitted with impact protection (see paragraph [O11.8.5](#)) would be most appropriate; or
- a vehicle not fitted with impact protection; on a slip road that is relatively long and that has good visibility and carries relatively little traffic, a vehicle with the same features as the one used to close the hard shoulder (see paragraph [O11.8.4](#)) is likely to be more appropriate.

O11.5.4 The option given in [Plan MCC3](#), which involves personnel placing and removing coning and signing across a traffic lane, will only be appropriate when the traffic flows on the slip road are very low and a risk assessment has shown that this is the most appropriate option.

MOBILE CARRIAGEWAY CLOSURE TECHNIQUE

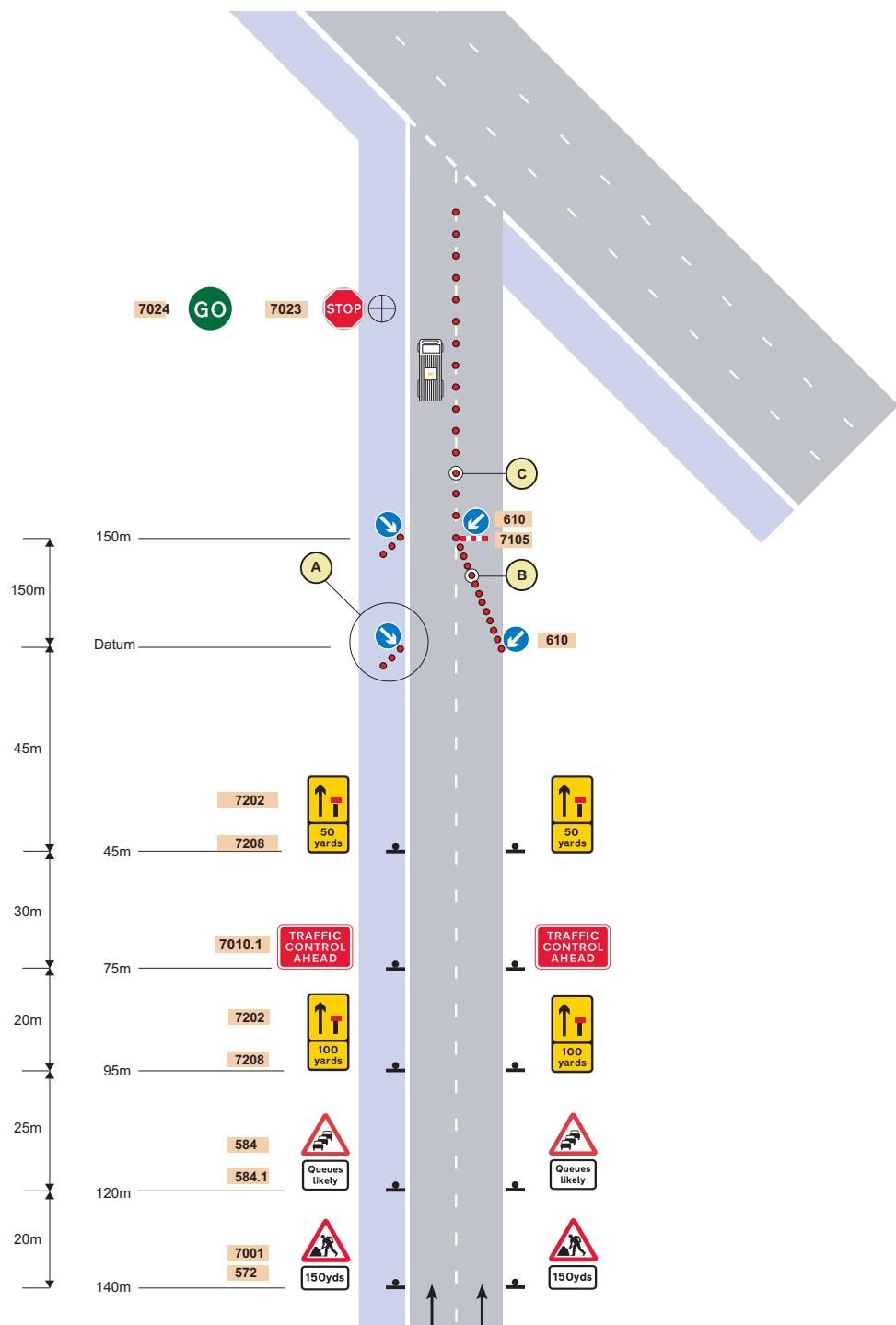
O11.5.5 When one of the options where the slip road is closed at its downstream end is used for a closure during the hours of darkness, it is important that the area in the vicinity of the actual closure is well illuminated. On unlit slip roads this will mean the use of temporary lighting.

O11.5.6 At junctions where the movement of traffic is controlled by traffic signals, it may be appropriate to use the signal controller to manually set the signals to all-red on the arms approaching the particular slip road that is to be closed temporarily. If this all-red period is likely to be prolonged, say, in excess of four minutes, then additional warning signs advising of this should be considered.

O11.5.7 If the slip road is to be closed at its downstream end, i.e. the end nearer the main carriageway ([Plans MCC2](#) and [MCC3](#)), if it is possible that the traffic flow on the slip road may cause vehicles to back up and cause congestion at the junction then additional signing will be required on the approach roads to the junction.

O11.5.8 When the slip road is closed at its entry ([Plan MCC4](#)), a suitable diversion route should be signed. One option, if appropriate, will be to direct traffic up the opposing carriageway to join the affected carriageway at the previous junction.

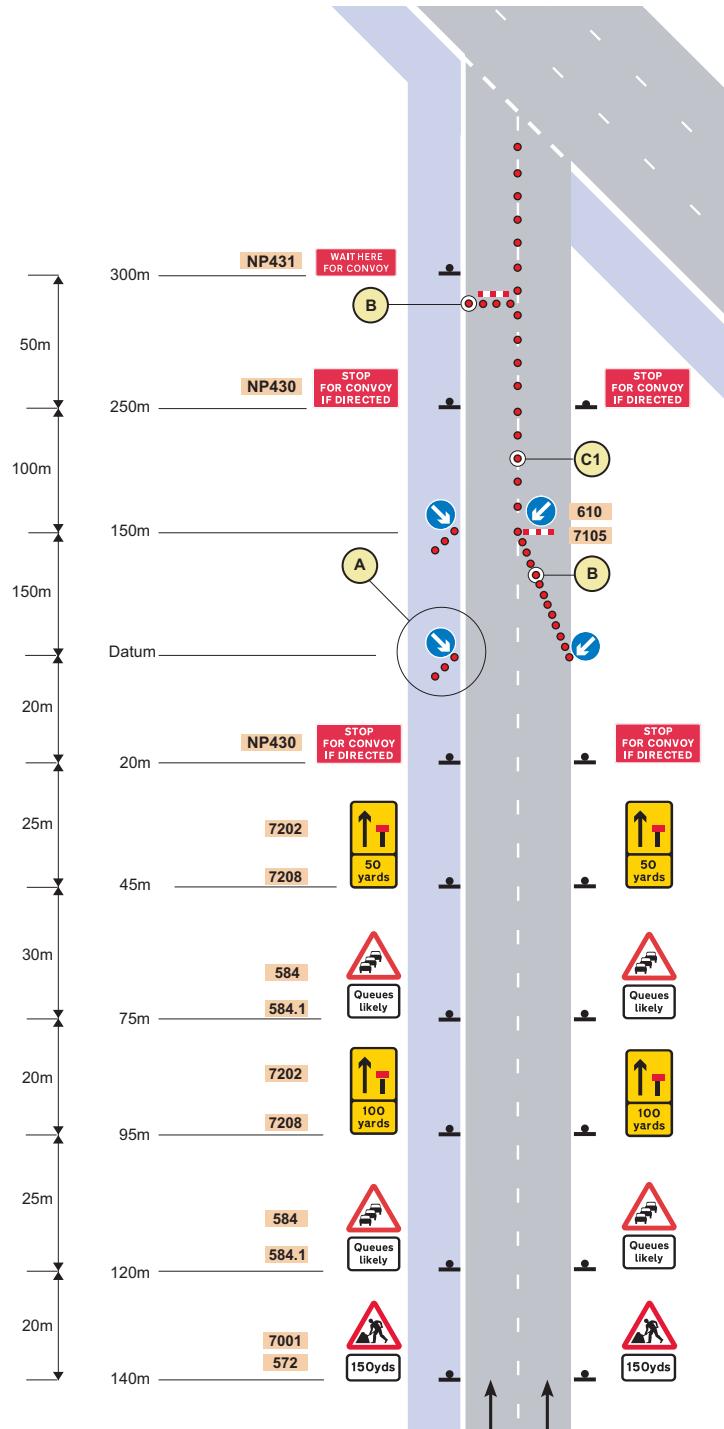
Plan MCC2: Mobile Carriageway Closure, closure of the downstream end of the access slip road using a works vehicle



NOTES:

1. The specification for the works vehicle that closes the slip road is given in paragraph O11.8.5 below.
2. If queuing vehicles may cause congestion at the entry to the slip road, additional warning signs will be required on the approach roads to the junction; see [Section O11.5](#).
3. In the hours of darkness, the area in the vicinity of the manually operated "STOP/GO" sign should be well illuminated, if necessary by means of temporary lighting. The "STOP/GO" boards must themselves be illuminated if used at night.
4. Remotely operated signs may be considered to minimise the period that the slip road signs are displayed.
5. Keys to the plan are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

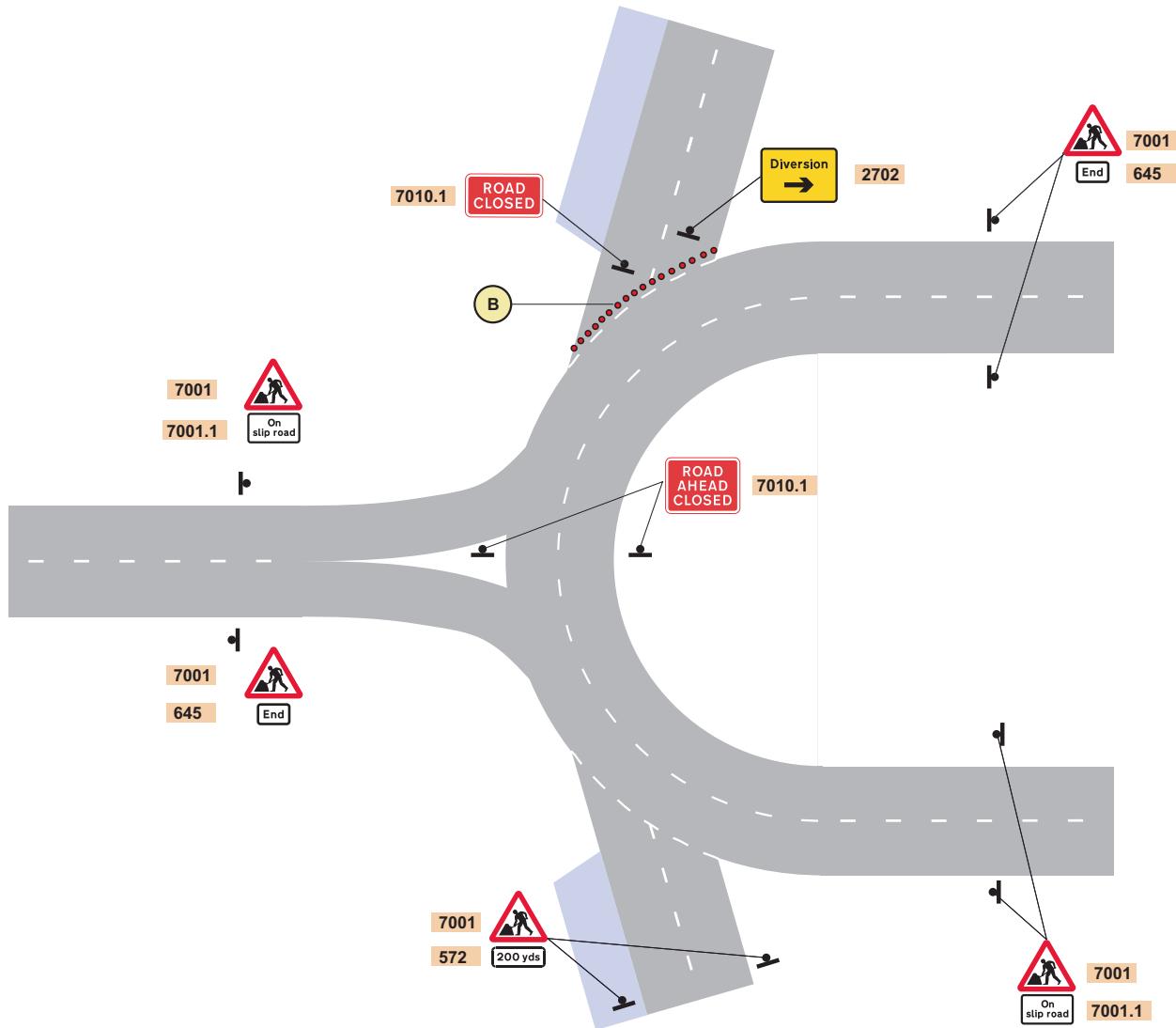
Plan MCC3: Mobile Carriageway Closure, closure of the downstream end of the access slip road not using a works vehicle



NOTES:

- When it is to be closed temporarily, cones are placed across the slip road and a "lane closed" barrier to diagram 7105 is placed behind the cones.
- If queuing vehicles may cause congestion at the entry to the slip road, additional warning signs will be required on the approach roads to the junction; see [Section O11.5](#).
- In the hours of darkness, the area in the vicinity of the "STOP FOR CONVOY IF DIRECTED" and "WAIT HERE FOR CONVOY" signs should be well illuminated, if necessary, by means of temporary lighting.
- Remotely operated signs may be considered to minimise the period that the slip road signs are displayed.
- Keys to the plan are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan MCC4: Mobile Carriageway Closure, closure of the upstream end of the access slip road – example of traffic management



NOTES:

1. Sign 7010.1 should be located so that drivers can see that it is the slip road ahead and not the roundabout that is closed.
2. Keys to the plan are given in [Tables A1.4 and A1.5 of Appendix 1](#).

011.6 ROADS WITHOUT A HARD SHOULDER

011.6.1 This section primarily gives guidance for use of the Mobile Carriageway Closure technique on carriageways with a hard shoulder. However, it is also appropriate to use the technique on roads when a hard shoulder is not present. In this case, the guidance will differ in the following ways.

- Advance warning vehicles. If it is not possible to locate vehicle-mounted queue warning signs off the carriageway at convenient locations, appropriate static queue warning signing should be used. Prior to the operation, the “traffic queues likely on road ahead” sign to diagram 584 with plate “Queues likely” to diagram 584.1 should be placed at 500 m intervals alternately on the near side and off side of the carriageway from the point where it is planned to first establish the closure up to the start of the works area.

- The monitor vehicle should remain in a safe location off the carriageway while the traffic counts are being taken prior to the closure.
- The use of a hard shoulder vehicle referred to in this document will obviously not be appropriate.

O11.7 SIGNING

VEHICLE-MOUNTED CARRIAGEWAY CLOSURE SIGNS

O11.7.1 Closure vehicles in live traffic lanes should be capable of displaying both a red cross with red lanterns flashing in the same format as diagram 6031.1 and an amber light arrow in accordance with the upper portion of the sign described in [Section O10.8](#). The basic design of the whole sign is shown in [Figure 11.1](#). This arrangement is not prescribed; only signs which have the appropriate sign authorisation and type approval may be used.

O11.7.2 In accordance with TSRGD regulation 37, the four corner red lamps must flash in alternate vertical pairs. The red cross must be illuminated by a steady light.

O11.7.3 There are two ways in which the red cross may be formed:

- individual lamps (diameter 200 mm); or
- as part of a VMS panel.

The lamp layout shown is indicative, for details of the precise number and layout of lamps refer to the relevant special signs authorisation.

O11.7.4 Whichever option is used, the form of the red cross on all the closure vehicles should be the same.

O11.7.5 The lower panel shows a sign with the legend “CONVOY VEHICLE NO OVERTAKING”, to diagram 7029. See [Figure 11.1](#). A more flexible alternative to this sign on the lower panel is a VMS sign which, in this application, should display the same “CONVOY VEHICLE NO OVERTAKING” legend. The lower panel should be reflectorised using the same material as the sign to diagram 7403 (see paragraph [O10.7.4](#)).

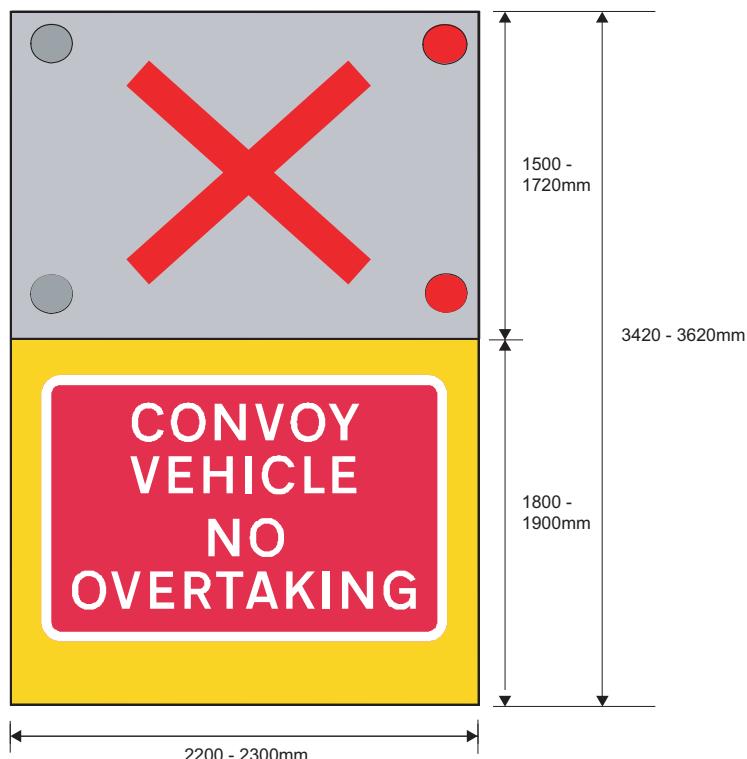


Figure 11.1 Closure vehicle sign

NOTES:

1. This sign requires authorisation by the Secretary of State.
2. The red cross on the upper panel may be composed of (a) individual lamps or (b) take the form of a VMS sign.
3. The red cross shall show a steady light and the four corner red lamps shall flash in alternate vertical pairs.
4. A means of obscuring the sign remotely from the driver's cab should be fitted to cover and uncover the lower sign to diagram 7029.
5. The sign to diagram 7029 must be reflectorised in accordance with the relevant special signs authorisation.
6. The lower panel should be reflectorised using the same material as the sign to diagram 7403 (see paragraph O10.7.4).

SLIP ROAD CLOSURE/SIGNING

O11.7.6 Comprehensive advance signing is essential to facilitate the temporary closure of entry slip roads. Depending upon the geometry of the slip road and the volume of traffic using it, the slip road can be closed at its downstream end, ([Plans MCC2 and MCC3](#)) or at its entry ([Plan MCC4](#)). See also [Section O11.5](#).

O11.7.7 When a works vehicle is used to bring the slip road traffic to a halt, a manually operated "STOP" sign to diagram 7023, 900 mm in diameter should be used. The manner in which this sign is used is described in [Section O11.18](#).

O11.7.8 If, following a risk assessment, the decision is made to use a works vehicle fitted with a lorry-mounted crash cushion, the sign used on this vehicle is shown in [Figure 11.2](#) below.

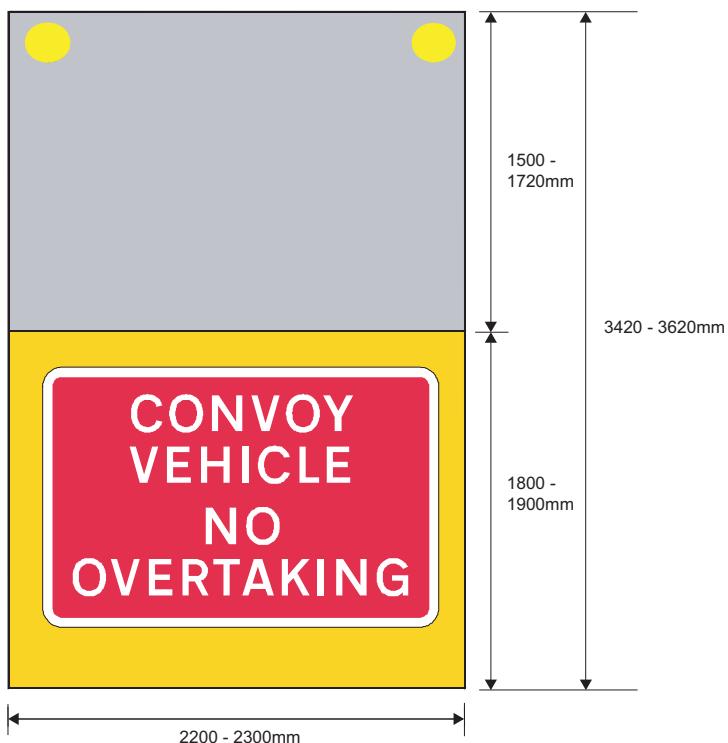


Figure 11.2 Sign used with a slip road closure vehicle when it is fitted with a lorry-mounted crash cushion

NOTES:

1. This sign requires authorisation by the Secretary of State.
2. The upper panel of the sign is the light arrow sign (see [Section O10.8](#)) with the two top flashing amber strobe lamps only illuminated.
3. A means of obscuring the sign remotely from the driver's cab should be fitted to cover and uncover the lower sign to diagram 7029.
4. The sign to diagram 7029 must be reflectorised in accordance with the relevant special signs authorisation.
5. The lower panel should be reflectorised using the same material as the sign to diagram 7403 (see paragraph [O10.7.4](#)).

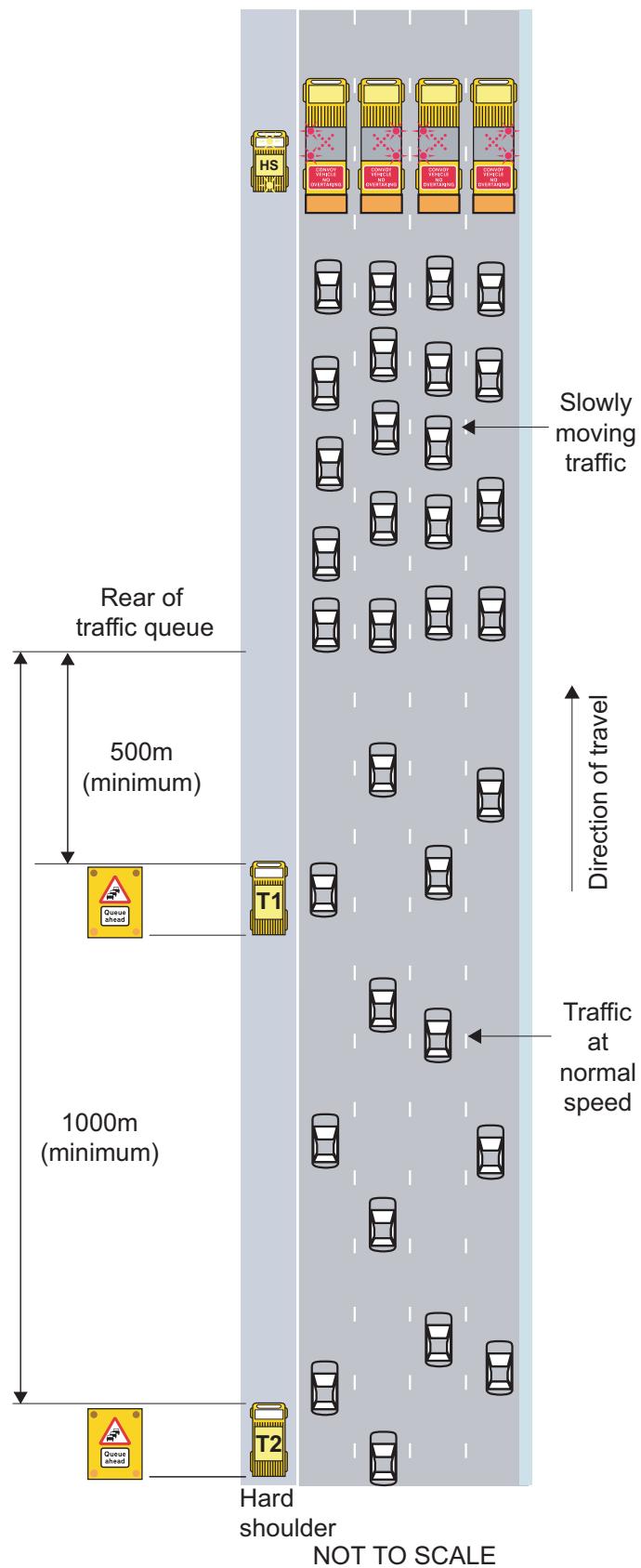
WARNING OF QUEUING TRAFFIC

O11.7.9 Comprehensive signing is required to inform road users to the rear of the convoy that there is slow-moving traffic ahead. Where it is available, full use of existing permanent variable message signs (VMS) and matrix signals in the central reservation is necessary. The location of such signs should be determined at an early stage of the planning of the closure and arrangements made with the appropriate control office for full use to be made of this signing. See [Section O11.20](#).

O11.7.10 Gantry-mounted signals to diagram 6021 and post-mounted signals to diagram 6022 on the central reservation should show "50 mph". VMS signs that are capable of displaying a legend should show "QUEUE SLOW DOWN".

O11.7.11 Upstream traffic should be warned by these signals of the presence of a traffic queue by at least two VMS signs. If permanent signs/signals are not available to provide this level of warning, at least two vehicle-mounted signs warning of queues ahead should be positioned on the hard shoulder or verge as appropriate. These signs are not prescribed for use on vehicles and require authorisation by the Overseeing Organisation. See [Plan MCC5](#) and [Figure 11.3](#).

Plan MCC5: Mobile Carriageway Closure, vehicle-mounted queue warning signing



NOTE: HS – In Northern Ireland, the hard shoulder vehicle specification is to be the same as for the lane closure vehicles.

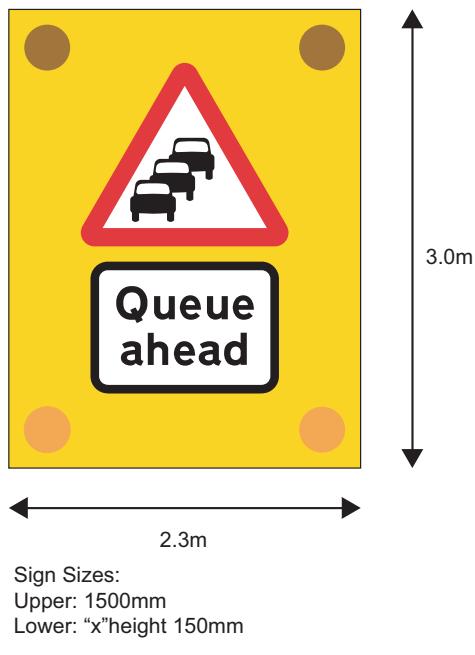


Figure 11.3 Vehicle-mounted queue warning sign

NOTES:

1. This sign requires authorisation by the Secretary of State.
2. The sign shall be made from the same material as the sign to diagram 7402; see paragraph O10.7.4.
3. A sign 2.5 m x 2.5 m may also be used.

O11.8 VEHICLES

O11.8.1 General works vehicle issues are dealt with in [Section O5](#). This section specifically details those vehicles used in the Mobile Carriageway Closure technique.

CLOSURE VEHICLES

O11.8.2 The vehicles used to form the closure in live traffic lanes should be as specified for an Impact Protection Vehicle in paragraph [O5.5.5](#) except that signing shall be in accordance with the relevant parts of [Section O11.7](#).

MONITOR VEHICLE

O11.8.3 This vehicle should have the following features:

- a conspicuous colour (yellow is recommended);
- a roof-mounted amber light bar complying with [Section O5.3](#); and
- a sign to diagram 7404 "HIGHWAY MAINTENANCE" (x-height: 50 mm, character height: 70 mm); see also paragraph [O5.2.8](#).

HARD SHOULDER VEHICLE

O11.8.4 This vehicle should have the following features:

- a 3 tonne minimum on-the-road weight;
- a van-type vehicle with full height rear retroreflective chevron markings (a pickup-type vehicle will not be suitable). Note: If the vehicle is not signed with these conspicuous markings then a vehicle to the same specification as the closure vehicle should be used; see paragraph [O10.7.1](#);
- a conspicuous colour (yellow is recommended);
- a roof-mounted amber light bar with a minimum of two independent light sources, towards the rear of the vehicle complying with [Section O5.3](#); and
- a sign to diagram 7404 "HIGHWAY MAINTENANCE" (x-height: 100 mm, character height: 140mm); see also paragraph [O5.2.8](#).

In Northern Ireland, the hard shoulder vehicle specification is to be the same as for the lane closure vehicles; see paragraph [O11.8.2](#).

SLIP ROAD CLOSURE VEHICLE

O11.8.5 There are two options for the type of works vehicle that is used to temporarily close a slip road. The choice of which option is used will depend on the nature of the slip road and will be the result of a risk assessment; see paragraph [O11.5.3](#). The options are:

- Option A: The vehicle should have the same features as the hard shoulder vehicle; see paragraph [O11.8.4](#).
- Option B: The vehicle shall have the same features as an Impact Protection Vehicle (as specified in paragraph [O5.5.5](#)) except that signing shall be in accordance with [Figure 11.2](#).

ADVANCE WARNING VEHICLE

O11.8.6 This vehicle should have the following features:

- a conspicuous colour (yellow is recommended);
- a roof-mounted amber light bar with a minimum of two independent light sources, towards the front of the vehicle complying with [Section O5.3](#); and
- a sign to diagram 7404 "HIGHWAY MAINTENANCE" (x-height: 50 mm, character height: 70 mm); see also paragraph [O5.2.8](#).

O11.9 COMMUNICATIONS

O11.9.1 Good communications are vital for the efficient and safe operation of the Mobile Carriageway Closure technique. A dedicated radio channel and clear communication will be necessary between:

- all the vehicles forming the convoy;

- the monitor vehicle;
- the vehicles and personnel forming the closure at each access slip road; and
- the foreman responsible for activities in the working area.

O11.9.2 The proposed radio equipment should be checked throughout the stretch of carriageway along which the mobile carriageway closure operation is planned. If there are any areas where reception is inadequate due to the topography of the site, then this problem should be rectified, e.g. by upgrading the radio equipment, before the operation is carried out.

O11.9.3 The supervisor, who is located in the closure control vehicle, should have a clear communication link with the appropriate control offices. The key personnel should also carry mobile phones to be used in the event of a communications failure. The procedure for dealing with a communications failure is dealt with in [Section O11.21](#).

O11.10 TRAINING

O11.10.1 All those involved in the operation of the Mobile Carriageway Closure technique must be certificated under the appropriate Traffic Management Sector Scheme. For further information on training see [Section O6.2](#).

O11.10.2 On motorways and trunk roads in England, all the drivers shall have the appropriate Sector Scheme 12C training. The driver in control of the operation, the supervisor, should be qualified as a Sector Scheme 12C Supervisor.

O11.11 OPERATIONAL ISSUES PRIOR TO THE OPERATION

O11.11.1 The contractor carrying out the operation should inform the police and the Highway Authority well in advance of the nature and location of the intended operation.

O11.11.2 Prior to the commencement of the closure, the supervisor should confirm with the personnel at the following locations that they are ready for the closure to commence:

- control offices;
- the working area;
- advance warning vehicles; and
- downstream access points, if applicable.

O11.12 ESTABLISHING THE CLOSURE

O11.12.1 The closure vehicles, advance warning vehicles and monitor vehicle should assemble in a safe place off the dual carriageway for final vehicle and sign checks and for the drivers to be briefed. The vehicles should then be driven to a pre-arranged access point to the carriageway upstream of the point chosen as the closure start point.

O11.12.2 The advance warning vehicles and monitor vehicle should then proceed to the pre-agreed marker post locations. The monitor vehicle should be located within sight of a matrix or VMS signal so that their operation can be confirmed, and the advance warning vehicles should be positioned 500m and 1000m upstream of where it is planned to establish the closure.

O11.12.3 The supervisor should instruct the personnel in the monitor vehicle to conduct a flow count; the operation should not take place if the flow traffic exceeds 1200 vehicles per hour per lane left open (60 vehicles in 3 minutes per lane left open) at the work site, the limit for using the technique referred to in [Section O11.4](#).

O11.12.4 At this time, the supervisor should advise the control office in order that the VMS signs/signals show the appropriate symbols for the operation and should check that there are no incidents on the highway that will conflict with the planned operation.

O11.12.5 Before the run commences, the personnel in the monitor vehicle should confirm that the matrix signals have been activated.

O11.12.6 When the supervisor is satisfied that the operation can proceed, he/she should radio to the closure vehicles to this effect. The LMCC on the closure vehicles should now be lowered if this has not already been done. The closure vehicles and the hard shoulder vehicle should then join the traffic stream in the near side lane behind one another ([Plan MCC6, Phase 1](#)).

O11.12.7 When the vehicles pass the advance warning vehicles on the hard shoulder, the flashing amber lanterns on the signs on the warning vehicles should be switched on.

O11.12.8 When the closure vehicles are ready to establish the closure ([Plan MCC6, Phase 2](#)), the supervisor should direct that the blind on each closure vehicle should be raised to uncover the "CONVOY VEHICLE NO OVERTAKING" sign, and the red cross and flashing red warning lights should be switched on.

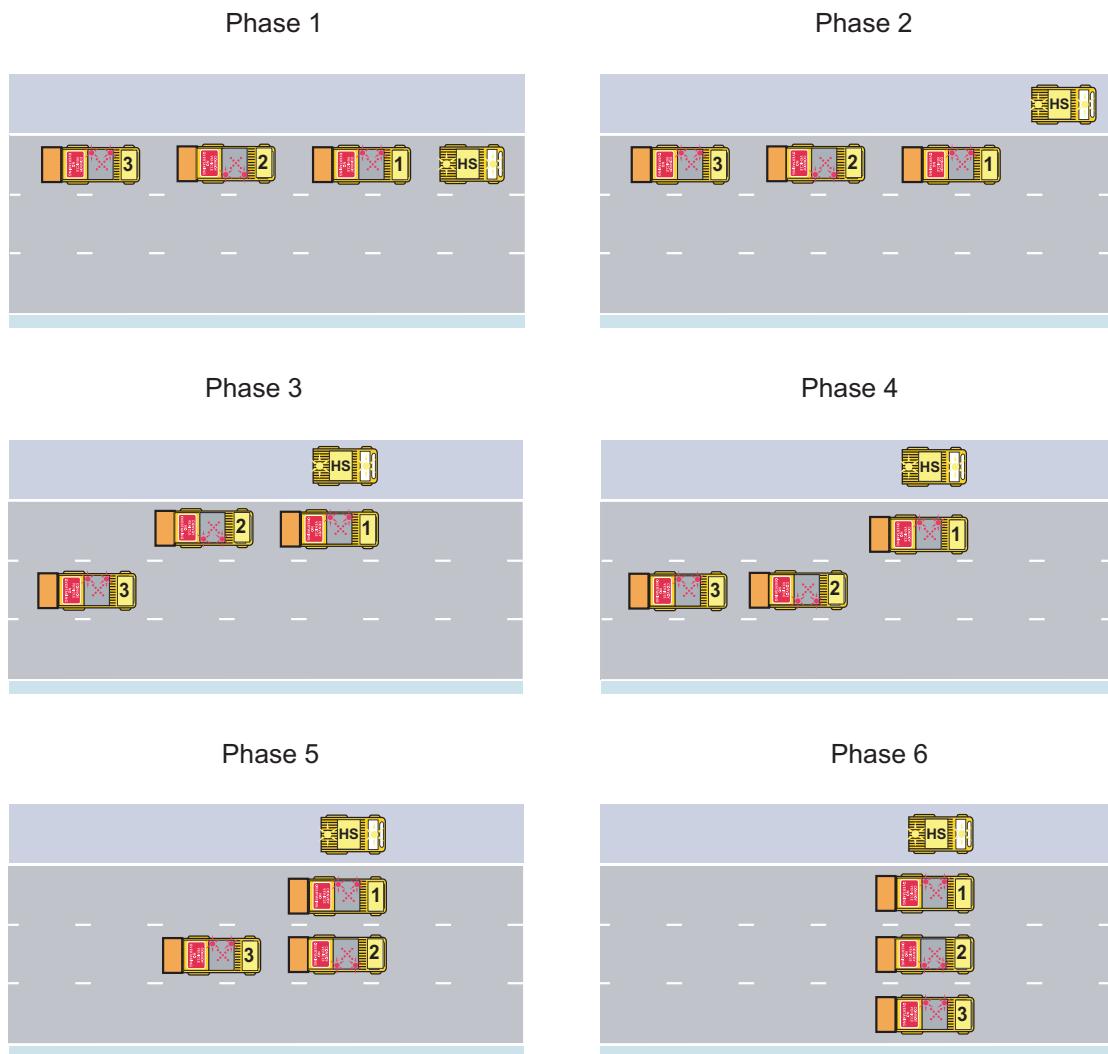
O11.12.9 When directed by the supervisor, the closure vehicles should move into the appropriate lane to become line abreast, and the hard shoulder vehicle should move to the hard shoulder. The sequence is shown in [Plan MCC6, Phases 3 to 6](#).

O11.12.10 The closure control vehicle should then signal for the closure vehicles to slow down progressively to the agreed closure speed of either 20 or 30 mph.

O11.12.11 The monitor vehicle should be positioned in front of the closure vehicles and should keep station with the rear of the traffic moving away in front of the closure.

O11.12.12 The advance warning vehicle T1 (see [Plan MCC5](#)) should keep station 500m to the rear of the queue that forms, and vehicle T2 should maintain a position 500m behind vehicle T1.

Plan MCC6: Sequence for establishing the Mobile Carriageway Closure



Not to scale

NOTE: HS – In Northern Ireland, the hard shoulder vehicle specification is to be the same as for the lane closure vehicles.

O11.13 SPEED OF THE CLOSURE

O11.13.1 The monitor vehicle at the rear of the group of vehicles moving away in front of the closure should monitor the speed of these vehicles. The supervisor should be informed if the speed of this group falls below 50 mph since the duration of the working window relies on the speed differential between the closure and this group of vehicles. In such circumstances, the supervisor should consider reducing the speed of the closure (but not to less than 20 mph), in order to achieve the designed closure window. See also reference to the creation of an emergency situation in paragraph O11.14.2 below.

O11.13.2 The monitor vehicle will be travelling behind the last of the traffic in front of the closure and when it has passed the proposed working area (Plan MCC1b), the driver should inform the supervisor of his position and the supervisor will inform the foreman responsible for activities in the working area, and work on the carriageway can commence in a traffic-free environment.

O11.14 THE WORKING WINDOW

O11.14.1 The closure vehicles move towards the working area travelling at either 20 mph or 30 mph. When they reach the working area ([Plan MCC1c](#)), work on the carriageway must have ceased and the carriageway have been cleared for the passage of traffic.

O11.14.2 In the case when the highway within the works area remains obstructed outside the closure window, an emergency situation has been created and it may be necessary to stop the convoy. Emergency situations must be reported to the police and the Highway Authority immediately.

O11.14.3 If the closure vehicles have to stop, the length of the queue behind them may increase rapidly. The advance warning vehicles should stop and maintain their position and available matrix and VMS signs should be set to give the necessary warning to traffic approaching the end of the queue.

O11.15 REMOVING THE CLOSURE

O11.15.1 If there are no lane closures, removal shall be the reverse of the procedure detailed in [Section O11.12](#) used to establish the closure except that each closure vehicle will accelerate to normal road speed in turn and merge in front of the adjacent closure vehicle, i.e. the lane 3 vehicle will merge in front of the lane 2 vehicle.

O11.15.2 When there is an off side lane reduction at the start of the works area, the following procedure should be adopted to remove the closure:

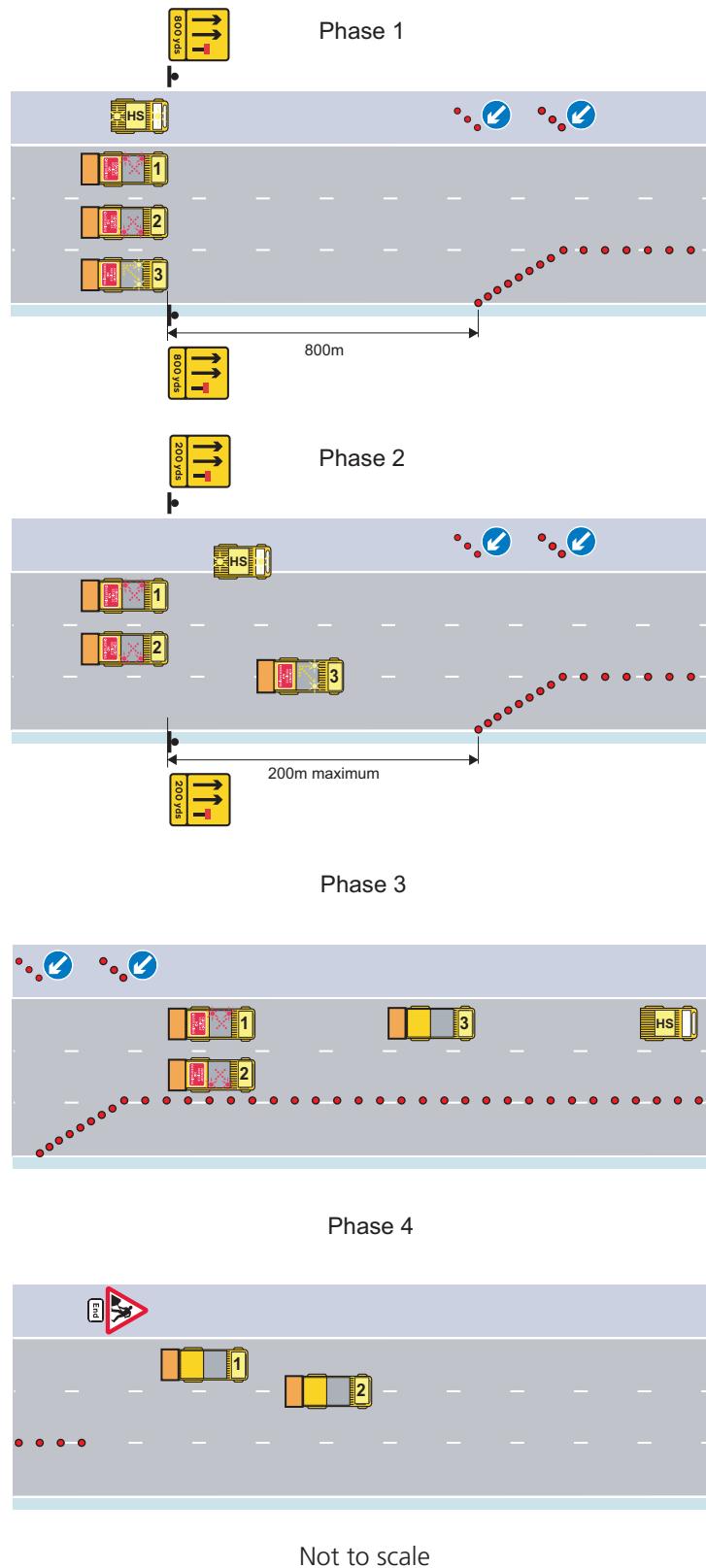
- 800 m from the start of the cone taper, the closure vehicle in the lane to be closed should switch from the red cross sign to the flashing “keep left” light arrow sign ([Plan MCC7, Phase 1](#));
- at 200 m from the start of the cone taper, this vehicle (Vehicle 3 in [Plan MCC7](#)) accelerates then merges in front of the closure vehicle to its left (Vehicle 2) so that the vehicles behind have a clear view of the lane closure ahead and can react accordingly ([Plan MCC7, Phase 2](#)); if possible, an impact protection vehicle displaying a “keep left” light arrow sign should be positioned within the works area to reinforce the presence of the lane closure; and
- the hard shoulder vehicle rejoins the main carriageway in front of Vehicle 1 approximately 200 m before hard shoulder signing commences.

Note that for a near side closure, this operation is reversed with Vehicle 1 merging etc.

O11.15.3 The closure vehicles increase their speed up to the limit applicable at the works site and travel through the works area maintaining the closure ([Plan MCC7, Phase 3](#)).

O11.15.4 When the closure vehicles have passed the working area, they resume normal speed and move to the left-hand lane of the carriageway to allow traffic to pass ([Plan MCC7, Phase 4](#)). The operation is then complete and the closure vehicles may return to their rendezvous point.

Plan MCC7: Sequence for removing the Mobile Carriageway Closure



Not to scale

NOTE: HS – In Northern Ireland, the hard shoulder vehicle specification is to be the same as for the lane closure vehicles.

O11.16 THE ROLE OF THE MONITOR VEHICLE

O11.16.1 The main tasks of the driver of the monitor vehicle are to:

- check for stationary vehicles on the hard shoulder in the path of the convoy. When the driver of the monitor vehicle encounters a stationary vehicle on the hard shoulder he or she should inform the supervisor at the head of the convoy; the foreman responsible for activities in the working area should be informed by the supervisor of the presence of any vehicle in the traffic-free zone;
- tell the supervisor, when he/she is passing the one mile advance sign for a junction or service area where the access point needs to be closed temporarily; the supervisor then instructs that the access slip road be closed, and then seeks confirmation that this has been done; see [Section O11.18](#) below.

O11.17 BREACH OF THE CLOSURE/PASSAGE OF EMERGENCY VEHICLES

O11.17.1 If the closure is breached by, for example, a motorcycle squeezing between the closure vehicles, or by an emergency vehicle, the supervisor should notify the foreman responsible for activities in the working area. A procedure should be in place for giving this warning, e.g. by using a klaxon with a pre-planned signal.

O11.17.2 Emergency vehicles should be allowed to pass the closure and this will normally be done via the hard shoulder, if one is available.

O11.18 JUNCTIONS

O11.18.1 Correct timing of the closure of access points is important to avoid unnecessary queuing, e.g. on the slip road. The slip road should be reduced initially to a single lane using coning and signing. See paragraphs [O11.7.6](#) to [O11.7.8](#). As the monitor vehicle on the main carriageway passes the one mile advance sign for a junction or service area, the monitor vehicle driver should inform the supervisor who will instruct that the slip road be closed.

O11.18.2 Closing a slip road using a works vehicle: The works vehicle that will close the slip road should be located in the immediate vicinity of the slip road. When the request to close the slip road is made by the supervisor, the slip road closure vehicle should join the slip road and should gradually reduce speed as it approaches the section of the slip road that has been reduced to one lane. An operative should display a "STOP" sign to diagram 7023 and the slip road closure vehicle should come to a stop at this sign. When the signal is given to reopen the slip road (see paragraph [O11.18.5](#)), the "STOP" sign should be changed to "GO" to diagram 7024 and the slip road closure vehicle will move forward and pull off the carriageway to allow following traffic to pass, reopening the slip road.

O11.18.3 Closing a slip road using coning and signing: When the request to close the slip road is made by the supervisor, when it is safe to do so, operatives should place the cones and a "lane closed" barrier to diagram 7105 across the traffic lane that has remained open; see [Plan MCC3](#). Note that this option of closing the slip road using signing alone should be carried out only where a risk assessment has shown that the traffic flow will be low enough that there will be sufficient gaps in the traffic for the signing to be placed safely without undue delay. When the signal is given to reopen the slip road, the cones and sign should be removed.

O11.18.4 As the monitor vehicle passes the slip road, the driver should check that it has been securely closed and should communicate this information to the supervisor. If the slip road has not been closed, the closure operation will need to be aborted.

O11.18.5 When the closure vehicles have passed the slip road, it should be reopened and the waiting traffic allowed to merge with that in the queue behind the convoy.

O11.19 DEALING WITH A LANE DROP/LANE GAIN

O11.19.1 At a lane drop, the closure vehicle in the lane to be dropped merges in front of the one in the adjoining lane in such a way that the risk of errant drivers breaching the closure is minimised.

O11.19.2 In the case of a lane gain on the near side, an additional closure vehicle will travel in front of the closure vehicle travelling in the near side lane and at the lane gain should move alongside the closure vehicles in the additional lane to prevent errant vehicles breaching the closure. A similar procedure should be adopted for an off side lane gain.

O11.20 THE ROLE OF THE CONTROL OFFICE

O11.20.1 The control office staff should be informed of the programmed closure at an early stage so that they may consider how best to use the available matrix and/or VMS signing. They should be told the planned procedure, its location and, in particular, the anticipated length of any queue that may form so that the appropriate VMS and matrix signs may be set; see paragraphs O11.7.9 to O11.7.11.

O11.20.2 In addition to the advance notification required by paragraph O11.20.1 above, the supervisor shall notify the local emergency service control rooms immediately prior to the closure starting and again immediately after it is complete. If notified, emergency services will try to avoid the area as far as possible for the duration of the closure operation. If emergency services are deployed on an emergency call within the locality of the closure, their control office will advise them to pass the closure on the hard shoulder in accordance with paragraph O11.17.2 above.

O11.20.3 The means of communication between the supervisor and the control office, together with procedures for dealing with emergency situations that may arise, should also be established early in the planning process for the closure.

O11.20.4 There may be cases when the extent of the operation, in particular the possible length of the traffic queue, spans more than one control office's area of responsibility. Should this arise, the communication links and procedures between the control offices and the vehicles involved in the operation should be established at an early stage of the planning process.

O11.20.5 The procedures used by control offices for dealing with operations such as the Mobile Carriageway Closure technique should be in accordance with a framework of national guidance and the advice given in this section is intended to supplement this guidance.

O11.21 COMMUNICATION FAILURE

O11.21.1 In the unlikely event of a total communication failure during the mobile carriageway closure operation, the closure should not be aborted since this might compromise the safety of those working in the traffic-free zone. Instead, the closure vehicles should continue until the work site is reached. If the highway remains obstructed, the convoy should be stopped in accordance with paragraph O11.14.2.

O11.22 OTHER WORKS/WEATHER CONDITIONS

O11.22.1 The presence of other planned works, both on the main route and on any diversion routes that might be affected by queuing traffic, should also be investigated and taken into account.

O11.22.2 The forecast weather conditions during the operation should also be checked in advance since this technique should not be used in inappropriate weather conditions which might lead to poor visibility or slippery conditions.

O11.23 USE OF THE TECHNIQUE TO SET UP TRAFFIC MANAGEMENT

O11.23.1 On dual carriageways, the Mobile Carriageway Technique may be used to set up traffic management in the approach zone (see [Part 1: Design, Section D6.15](#)) and lane change zone (see [Part 1: Design, Section D6.16](#)) of a lane closure. The principle is the same as given in [Section O11.3](#) and [Plan MCC1](#) with the working area being the coning taper to be set up. The approach signs are set up in the traffic-free zone between the passing of the monitor vehicle and before the arrival of the closure vehicles.

O11.23.2 The procedure is as described in the previous sections except that, at the locations of the approach signs, works vehicles are either stationed on the hard shoulder in advance of the monitor vehicle or travel with the monitor vehicle and stop off at the sign locations. As soon as the monitor vehicle passes the traffic management personnel, the off side signs can set up in a traffic-free environment.

O11.23.3 The works vehicle setting up the 2 mile advance sign will have sufficient time to travel to the 1 mile advance sign and set this up as well in the working window. Two further works vehicles are required for setting up the signs within the lane change zone. Sufficient personnel and works vehicles should be provided to set up the taper.

O11.23.4 The actual number of vehicles and personnel will depend on site circumstances and the experience of the personnel. Careful pre-planning is necessary to determine the resources required.

A1 APPENDIX – TABLES

This appendix contains the following tables:

- [Table A1.1](#) Location and number of approach signs
- [Table A1.2](#) Sizes of signs
- [Table A1.3](#) Recommended spacing and sizes of traffic cones
- [Table A1.4](#) Key to areas and symbols shown in plans
- [Table A1.5](#) Details A to K used in plans (minimum sizes given)

Table A1.1 Location and number of approach signs

Type of road (permanent speed limit)	Minimum siting distance of first sign in advance of the works metres and miles	Minimum clear visibility distance to first sign metres	Minimum size of warning or regulatory sign (Note 1) mm	Distance from end of works to "End of road works" signs metres
Single carriageway road (30 mph or less)	20m – 45m	60	600	10 – 30
Single carriageway road (40 mph)	45m – 110m	60	750	30 – 45
Single carriageway road (50 mph or more)	275m – 450m	75 at 50 mph 90 at 60 mph	900	30 – 45
Dual carriageway road (40 mph or less)	300m	60	750	45
Dual carriageway road (50 mph)	Standard: 800m (1 mile where congestion is likely) Relaxation: 800m	75	1200	90
Dual carriageway road (60 mph)	Standard: 1 mile (2 miles where congestion is likely) Relaxation: 1 mile	90	1500	90
Dual carriageway road (national speed limit)	Standard: 2 miles (3 miles where congestion is likely) Relaxation: 1 mile	120	1500	90
Dual carriageway road (national speed limit) hard shoulder only closure	800 m	120	1500	90

NOTES:

1. Recommended sizes of all repeater warning or regulatory signs beyond the start of the entry taper in relation to the initial sign are as follows:

Initial sign (mm)	600	750	900	1200	1500
Repeater sign (mm)	450	600	750	900	900

Chapter 3 provides further advice on size and spacing of speed limit signs, but the size and spacing of speed limit signs specified in this Chapter may be more onerous.

2. The minimum number of warning signs in advance of a road works is dependent on the particular temporary traffic management requirement. Generally for single carriageways there will be a minimum of two signs, but four or more signs may be required for more complex traffic arrangements. Similarly for dual carriageways there will be generally a minimum of two signs in pairs, but seven or more may be required for complex traffic management arrangements.
3. On roads with a permanent speed limit of 40 mph or less, for relaxation situations no advance signing is required in certain circumstances for off carriageway works (see [Part 1: Design](#), paragraphs [D3.20.2](#) and [D3.20.3](#)).
4. On dual carriageway roads with a permanent speed limit of 40 mph or less, the “end of road works” sign (7001 with 645 plate) need only be placed on the near side of the carriageway. However, where traffic is diverted around an off side lane closure island it is recommended that one is also placed in the central reservation.
5. All signs up to the start of the taper should be of the size shown.
6. The siting distance of the first sign is given in metres or miles. However, to comply with the Regulations the distances on supplementary plates must be shown in imperial dimensions. Tables and plans show the placing of road works signs in equivalent metric dimensions; this utilises part of the permitted 10% tolerance on the placing of signs ([paragraph D4.4.8](#)), e.g. signs showing 400 yards being placed at 400 m.

Table A1.2 Sizes of signs

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
504.1	Triangle	600	750	900	750	1200	1500
506.1	Triangle	600	750	900	750	1200	1500
511	x-height	62.5	75	100	75	125/150*	200
516	Triangle	600	750	900	750	1200	1500
517	Triangle	600	750	900	750	1200	1500
518	x-height	62.5	75	100	75	125/150*	N/A
521	Triangle	600	750	900	750	1200	1500
522	Triangle	600	750	900	750	1200	N/A
530	Triangle	600	750	900	750	1200	1500
543	Triangle	600	750	900	750	1200	1500
543.1	x-height	62.5	75	100	75	125	150
554	Triangle	600	750	900	750	1200	N/A
554.1	Triangle	600	750	900	750	1200	1500
556	Triangle	600	750	900	750	1200	1500
557	Triangle	600	750	900	750	1200	1500
560	Circle	75-150	75-150	75-150	75-150	75-150	75-150
561	Rectangle	240 max					
562	Triangle	600	750	900	750	1200	1500

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
563	x-height	62.5	75	100	75	125/150*	200
570	x-height	62.5	75	100	75	125/150*	200
572	x-height	62.5	75	100	75	125/150*	200
573	x-height	62.5	75	100	75	125/150*	200
601.1	Octagon	750	750	900	750	1200	1200
602	Triangle	600	750	900	750	1200	1500
606	Circle	600	750	900	750	1200	1500
609	Circle	600	750	900	750	1200	1200
610 ^(a)	Circle	600	750	900	750	1200	1500
611	Circle	600	750	900	750	1200	1200
612	Circle	600	750	900	750	1200	1200
613	Circle	600	750	900	750	1200	1200
614	Circle	600	750	900	750	1200	1200
615	Circle	600	750	900	N/A	N/A	N/A
615.1	x-height	62.5	75	100	N/A	N/A	N/A
616	Circle	750	750	900	750	1200	1200
622.1 A	Circle	600	750	900	750	1200	1500

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
626.2A	Circle & x-height	450 60	600 80	900 100	600 80	900 100/120*	900 120
627.1	x-height	37.5	50	62.5	50	62.5/75*	75
632	Circle	600	750	900	N/A	N/A	N/A
645	x-height	62.5	75	100	75	125/150*	200
811	Rectangle	800	1000	1200	—	—	—
811.1	x-height	50	62.5	100	—	—	—
829.1	Rectangle	375	375	600	375	600	600
829.2	Rectangle	375	375	600	375	600	600
830	Rectangle – single size 750						
830.1	Rectangle – single size 750						
831	Rectangle – single size 750						
832	Rectangle – single size 750						
1001 to 1066	See Chapter 5						
2702	Rectangle – single size 750						
2703	x-height	60	75	100	75	100/150*	200

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
2704	x-height	60	75	100	75	100/150*	200
2705	x-height	60	75	100	75	100/150*	200
2706	x-height	60	75	100	75	100/150*	200
2707	x-height	60	75	100	75	100/150*	200
7001	Triangle	600	750	900	750	1200	1500
7001.1	x-height	62.5	75	100	75	125	150
7001.2	x-height	62.5	75	100	75	125/150*	200
7001.3	x-height 1 x-height 2	100 140	100 140	125 180	100 140	125/150* 180/200*	150 210
7002A	x-height	75	75	100	75	100/150*	200
7002B	x-height	75	75	100	75	100/150*	200
7002.1	x-height	75	75	100	75	100/150*	200
7003.1	x-height	100	100	125	100	125/150*	200
7004	x-height	100	100	125	100	125/150*	200
7005	x-height	100	100	125	100	125/150*	200
7006	x-height	100	100	125	100	125/150*	200
7006.1	x-height	150	150	200	150	200/250*	200/250
7007.1	x-height	100	100	125	100	125/150*	200

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
7008	Max x-height	200/50/200	200/50/200	200/50/200	200/50/200	200/50/200	200/50/200
7009	Triangle	600	750	900	750	1200	1500
7010.1	x-height	60	75	100	75	100/150*	200
7011	Rectangle – single size 750						
7012	x-height	60	75	100	75	100/150*	200
7013	Rectangle – single size 450						
7014	x-height	60	75	100	75	100/150*	200
7015	x-height	100	100	125	100	125/150*	200
7016	Rectangle – single size 375						
7017	Rectangle – single size 450						
7018	Rectangle – single size 450						
7019	Rectangle	700	875	875	875	1050	1050
7021	Rectangle – single size 750						
7022	Rectangle – single size 750						
7023	Circle	600	900	900	N/A	N/A	N/A
7024	Circle	600	900	900	N/A	N/A	N/A
7101.1	See Table A1.3 (Appendix 1)						

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
7102	See Table A1.3 (Appendix 1)						
7103	See Table A1.3 (Appendix 1)						
7104	Rectangle	200	200	400	200	800	800
7105	Rectangle	150	150	300	150	300	300
7202	Rectangle				1125	1350	1575 ^(b)
7203	Rectangle – single size	1350					
7203.1	Rectangle – single size	1350					
7204	Rectangle – single size	1350					
7205	Rectangle – single size	1350					
7206	Rectangle	900	1125	1350			
7208	Four sizes of x-height	100, 125, 150 and 175 depending on size of plate					
7209	Single size x-height	150					
7210 to 7255	See Chapter 7						
7260	Single size x-height	150					
7261	Single size x-height	150					
7262	Single size x-height	150					
7263	Single size x-height	150					

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
7264	Single size x-height 150						
7270	Single size x-height 165						
7271	Single size x-height 165						
7272	Single size x-height 165						
7274	Single size x-height 165						
7275	Single size x-height 100, numeral character height 400						
7280 to 7288	See Chapter 7						
7291	x-height –	150	150	150	150	150	200
7292	x-height –	150	150	150	150	150	200
7293	x-height –	150	150	150	150	150	200
7294	x-height: Numeral ht	– 250	62.5 400	100 250	62.5 250	75/100* 300/400*	125 500
7301	Rectangle – single size 750						
7302	Rectangle – single size 750						
7303	Rectangle – single size 1050						
7304	x-height	75	75	100	75	100/150*	200
7305	x-height	75	75	100	75	100/150*	200

Table A1.2 Sizes of signs (continued)

TSRGD diagram no.	Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40 mph)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
7306	x-height	100	100	125	100	125/150*	200
7307	x-height	100	100	125	100	125/150*	200

* The larger x-height should be used on dual-carriageways with a permanent speed limit of 60 mph.

(a) – Diagram 610 – if this sign is vehicle mounted it should be 1500 mm in diameter unless this is not practicable in which case the largest sign possible should be used.

(b) – Diagram 7202 – For works for which relaxations apply, the size of signs to diagram 7202 on the left-hand side of the carriageway should be as given above but the signs on the central reservation may be reduced to 1350 mm. The x-height on the supplementary plate to diagram 7208 should be reduced proportionally.

Table A1.3 Recommended spacing and sizes of traffic cones

Road Type	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)		Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)		Dual carriageway road (national speed limit)
		Relaxation	Relaxation		Relaxation	Relaxation	
Rate of taper (see Note 3)	1 in 13	1 in 20	1 in 25	1 in 25	1 in 40	1 in 55	1 in 40
Taper length (m) for hazard of standard carriageway width between 3.6 m and 4 m	50	80	100	100	150	200	150
Minimum number of cones	8	28	68	35	101	135	51
Taper	Minimum cone size (mm)	450	450	750	450	750	1000
See Note 8 for spacing of cones in 45° tapers	Maximum cone spacing (m)	3	3	1.5	3	3	(see Note 5) (see Note 5)
Maximum warning light spacing (m)	9	9	9	9	9	9	3
Longitudinal	Minimum cone size (mm)	450	450	750	450	750	750 (see Note 5) (see Note 5)
	Maximum cone spacing (m)	9	(see Note 1)	9	(see Note 1)	9	9 (see Note 1)
	Maximum warning light spacing (m)	9	(see Note 2)	18	18	18	18

NOTES.

1. For longitudinal coning for work sites of over 180m in length for which relaxations apply, the 9m traffic cone spacing may be increased to 18m. This applies only to cones placed in straight lengths parallel to the line of traffic.
 2. For longitudinal coning for work sites of over 180m in length for which relaxations apply, the 9m warning light spacing may be increased to 18m. This applies only to cones placed in straight lengths parallel to the line of traffic.
 3. Taper length equals rate of taper multiplied by the width of hazard (generally rounded up to the next whole 10 m length). Where appropriate the next larger size of cone should be used in the entry tapers.
 4. The number of cones in a taper equals the taper length divided by the spacing rounded up to the next whole number plus 1.
 5. On motorways and all-purpose dual carriageway roads with hard shoulders for which the national speed limit applies, 1m cones will be required for both standard works and works for which relaxations apply, for both entry/lead tapers and the facing wall even if 750 mm cones are used elsewhere. Where traffic cones are to be installed by machine or there could be confusion, especially at night, between the 1m and 750 mm cones it is recommended that all cones should be 1m cones. In Northern Ireland, on all motorways and dual carriageway roads with hard shoulders, only 1m cones should be used.
 6. During the hours of darkness a warning light showing an amber light should be placed at regular spacing as indicated in [Table A1.3](#). Warning lights should be spaced at 9m intervals on tapers. Flashing lights may be used only where there is a system of street lighting on a road having a speed limit of 40 mph or less.
 7. Warning lights may be mounted on the top of existing traffic cones provided they do not mask any of the retroreflective material, obscure the cone or affect its stability. Where there is any doubt the lights should be mounted on additional cones placed at regular spacing in the line of existing cones, in accordance with the above table.
 8. On single carriageways where traffic control is used and guide islands are not provided, the taper should be at an angle of 45° to the approaching traffic and cones should then be at 1.2m spacing with a warning light on each cone.
 9. Exit tapers should be at 45° except where guide islands are provided. Entry and exit tapers for guide islands should be determined from the entry rates of taper given in the above table.
 10. Rotating reflector delineators, see [Part 1: Design, Section D3.13](#), may be used in conjunction with traffic cones delineating the outer edge of a safety zone where this runs parallel with the traffic lane. They must not be used in tapers.
 11. If rotating reflector delineators are used, they may be mounted on the top of existing traffic cones provided they do not mask any of the retroreflective material, obscure the cone or affect its stability. Where they are used on cones on the near side of traffic, the spacing of the warning lights may be increased by up to 100% with rotating reflectors at the midpoint between consecutive warning lights. In other situations, the maximum longitudinal spacing of the warning lights shown in [Table A1.3](#) (9m and 18m) may be increased by up to 50% (13.5m and 27m respectively), with rotating reflectors placed at the third points or midpoint between consecutive warning lights.
 12. The spacing and size of traffic cones used with Emergency Traffic Management (ETM) is dealt with in paragraphs [O7.2.43](#) to [O7.2.47](#) inclusive.
-

Table A1.4 Key to areas and symbols shown in plans

Footway



Traffic lane



Hard shoulder



Central reservation



Safety zone



Works area



Traffic signal



“STOP/GO” sign



Police officer or traffic officer

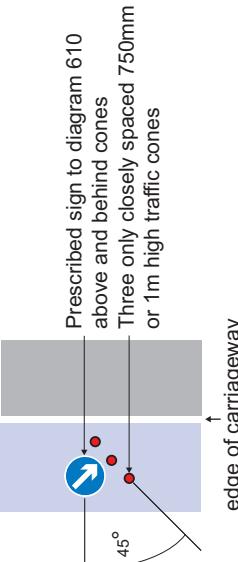


Sign

7001

TSRGD diagram number

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail A	 <p>Prescribed sign to diagram 610 above and behind cones Three only closely spaced 750mm or 1m high traffic cones</p> <p>edge of carriageway</p> <p>45°</p>		<p>—</p>	<p>—</p>	<p>Cones 750 mm</p> <p>Cones 750 mm</p>

NOTES:

- 1) During darkness, a single warning light to BS EN 12352:2006 should be provided.
- 2) Traffic cones should conform to diagram 7101.1 and to BS EN 13422.

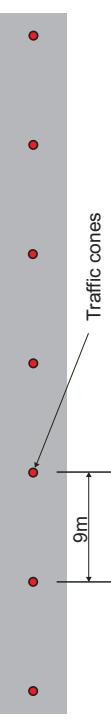
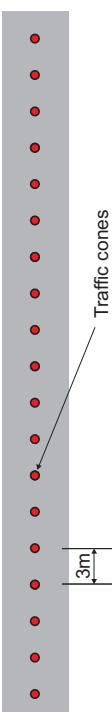
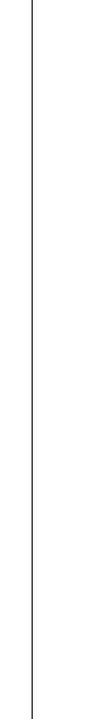
Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail B					
Traffic cones (45° tapers have 1.2m spacing, no relaxations) 	Cones 450 mm Cone spacing 1.5m	Cones 750 mm Cone spacing 1.5m	Cones 450 mm Cone spacing 1.5m	Cones 750 mm Cone spacing 1.5m	Cone spacing 1.5m Relaxation 3 m

NOTES:

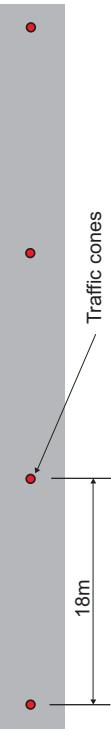
- 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).
- 2) 45° tapers have 1.2m cone spacing, no relaxations.
- 3) On motorways and all-purpose dual carriageway roads with hard shoulders on which the national speed limit applies, 1 m cones will be required for both standard works and works for which relaxations may be applied, for both lead tapers and the facing wall of a lane change.

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail C					
Method C1:					

NOTES:
 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).
 2) For relaxation to Detail C1 see [Table A1.3 \(Appendix 1\)](#).

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail D			 <p>Traffic cones 18m</p>	Cones 450 mm 750 mm	Cones 450 mm 750 mm 750 mm 750 mm

NOTES:

- 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).
- 2) Detail D only applies to relaxation cases, see [Table A1.3 \(Appendix 1\)](#).

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail E					
Method E1: Using road markings and traffic cones or temporary vehicle safety barrier					
Prescribed road marking to diagram 1012.1 (retroreflective) in material complying with BS EN 1790					
Running lane					
Traffic cones or temporary vehicle safety barrier					
Method E2: Using studs and traffic cones or temporary vehicle safety barrier					
Temporary road studs*					
Traffic cones or temporary vehicle safety barrier					

* With fluorescent saturn yellow (yellow/green) bodies and uni-directional reflectors coloured amber when on the right and red on the left. Studs must conform to direction 57.

NOTES:

- 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).
- 2) On motorways and all-purpose dual carriageway roads with hard shoulders on which the national speed limit applies, 1 m cones will be required for both standard works and works for which relaxations may be applied, for both lead tapers and the facing wall of a lane change.

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail F					

Method F1: Using road markings and traffic cones or temporary vehicle safety barrier

Prescribed road marking to Diagram 1012.1 (retroreflective) in material complying with BS EN 1790

Running lane

9m

Traffic cones or temporary vehicle safety barrier

100mm

500mm

Method F2: Using studs and traffic cones or temporary vehicle safety barrier

Running lane

9m

Temporary road studs as per method E2

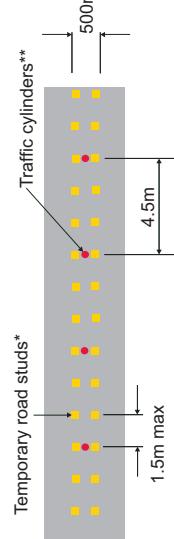
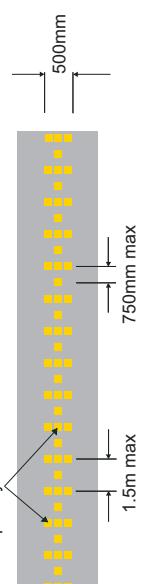
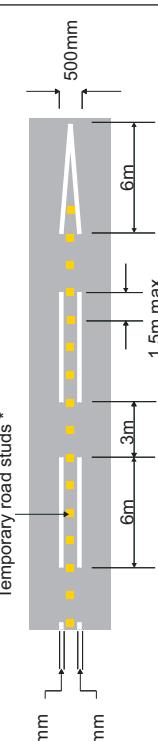
500mm

Traffic cones or temporary vehicle safety barrier

NOTES:

- 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail G					
Method G1: Using studs and traffic cylinders					
Temporary road studs*					
Traffic cylinders**					
					
Method G2: Using studs					
Temporary road studs*					
					
Method G3: Using road markings and studs					
Temporary road studs*					
					

* With fluorescent saturn yellow (yellow/green) bodies and uni-directional red reflectors.

** Traffic cylinders must conform to diagram 7103 and BS EN 13422.

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail H					

Detail H

Traffic cylinders or temporary vehicle safety barrier

1.2m to 1.4m**

Temporary road studs*

9m

1.5m max

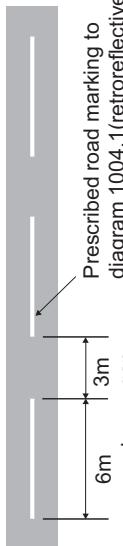
Detail	Description	Size
A	Single carriageway road (permanent speed limit of 40 mph or less)	9m high, 1.5m wide
B	Single carriageway road (permanent speed limit of 50 mph or more)	9m high, 1.5m wide
C	Dual carriageway road (permanent speed limit of 40 mph or less)	9m high, 1.5m wide
D	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	9m high, 1.5m wide
E	Dual carriageway road (national speed limit)	9m high, 1.5m wide

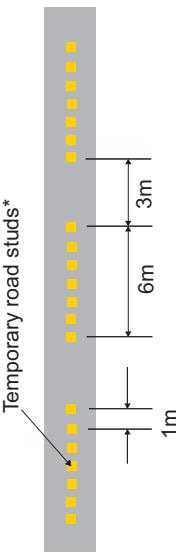
* With fluorescent saturn yellow (yellow/green) bodies and uni-directional amber reflectors.
See also Detail G 1.

** This dimension may be reduced to a minimum of 0.7 m on two-lane dual carriageway roads only except when a temporary vehicle safety barrier is used.

Note: For narrow lane contra-flow buffer zones cylinder case, see Detail K below.

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail J					
Method J1: Using white lines	 Prescribed road marking to diagram 1004.1 (retro-reflective) in materials complying with BS EN 1790	Line 100 mm	Line 100 mm	Line 100 mm	Line 100 mm

Method J2: Using studs**

* With fluorescent saturn yellow (yellow/green) bodies and uni-directional white reflectors.

** Not to be used for situations where continual over-running by traffic is expected.
(For roads with a permanent speed limit of 40 mph or less then the marking is to diagram 1004, i.e. 4 m mark, 2 m gap)

Table A1.5 Details A to K used in plans (minimum sizes given)

Details A to K used in plans (minimum sizes given)					
	Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph or 60 mph)	Dual carriageway road (national speed limit)
Detail K					

Detail K

The diagram illustrates Detail K, which consists of a series of yellow traffic cylinders arranged in a grid pattern. The total width of the cylinder arrangement is 6m max. The height of each cylinder is 1.5m max. A red dot is positioned at the center of the grid. A bracket indicates a minimum distance of 0.9m between the outer edge of the cylinders and the red dot. Labels include 'Traffic cylinders' pointing to the grid, 'Temporary road studs*' pointing to the red dot, and '1.5m max' indicating the height of the cylinders.

* With fluorescent saturn yellow (yellow/green) bodies and reflectors which are:

- bi-directional when delineating a tidal lane; and
- uni-directional in all other cases

A2 APPENDIX – GLOSSARY

A2.1 “Access road” means a road which in rural areas serves a small settlement and provides access to individual properties and land; it is often only single lane width and unsuitable for HGVs. In urban areas an access road is often a residential loop road or a cul de sac.

A2.2 “All-red period” means the time during which the signals display a red signal to all traffic streams simultaneously. It allows one stream of traffic to clear the controlled area before the opposing stream is signalled to proceed.

A2.3 “Authorised traffic sign” means a non-prescribed sign authorised by the Secretary of State in accordance with Sections 64 and 65 of the Road Traffic Regulation Act 1984. In Northern Ireland an “authorised traffic sign” means a sign authorised by the Department under Article 28 of the Road Traffic Regulation (NI) Order 1997.

A2.4 “Beacon” means a roof-mounted flashing amber beacon.

A2.5 “Buffer lane” means an existing traffic lane kept unoccupied to provide a temporary separation between lanes carrying opposing flows of traffic.

A2.6 “Buffer zone” means a longitudinal strip of carriageway which provides a temporary physical separation between lanes carrying opposing flows of traffic.

A2.7 “Builders’ Skips (Markings) Regulations” means the Builders’ Skips (Markings) Regulations 1984 (SI 1984 No 1933) or the Roads (Control of Builders Skips) Regulations (NI) 1981 (SR1981 No 22) or the Builders’ Skips (Markings) (Scotland) Regulations 1986 (SI 1986 No 642).

A2.8 “Carriageway” means that part of the road or highway constructed for use by vehicular traffic.

A2.9 “Changeover” means a change of lanes introduced to divert traffic within the same carriageway, including the hard shoulder.

A2.10 “Chapter X” means the appropriately numbered chapter of the Traffic Signs Manual.

A2.11 “Client” means the organisation or individual for whom the road works are being carried out.

A2.12 “Competent person” means a person who has sufficient training and experience or knowledge and other qualities to enable him or her to undertake the task referred to.

A2.13 “Cone” means a delineator to diagram 7101.1 of TSRGD.

A2.14 “Controlled area” means the length of road between the stop lines to diagram 1001 or “WHEN RED LIGHT SHOWS WAIT HERE” signs to diagram 7011 or diagram 7011.1, where priority is indicated by traffic signals.

A2.15 “Crossover” means where one or more lanes on a dual carriageway are diverted onto the opposing carriageway.

A2.16 “Department” means the Department for Transport in England; in Northern Ireland, the Department for Regional Development (Northern Ireland); in Scotland, Transport Scotland; and in Wales, Transport Wales, Welsh Assembly Government.

A2.17 “Diagram number” means the appropriately numbered diagram in a Schedule to the Regulations.

A2.18 “District distributor road” means an “A”, “B” or “C” class road linking identifiable communities with each other which provides for major traffic movements within a town or district.

A2.19 The term “direction XX” means the appropriately numbered direction in the General Directions. (The N.I instrument does not include directions.)

A2.20 “Dual carriageway road” means a road which comprises a central reservation or two separate carriageways for travel in opposing directions. This term includes motorways. An “all-purpose dual carriageway road” means a dual carriageway road which is not a motorway.

A2.21 “Emergency Traffic Management (ETM)” means short-term traffic management required to protect both those involved in an incident and any other road users affected by that incident during the period before fully compliant traffic management can be installed.

A2.22 “Emergency works” means works which are required in order to put an end to, or prevent the occurrence of circumstances which are likely to cause danger to persons or property.

A2.23 “Facing wall” means a set of cones that directly faces the flow of traffic and guides the traffic along the required path.

A2.24 “Fixed-time operation” means control of traffic by signals in which the change of signal indications from one traffic stream to another is automatic at times predetermined by the settings of the signal controller.

A2.25 “Flat traffic delineator” means a device complying with the relevant requirements of regulation 56 (in Northern Ireland, regulation 45). A specification for flat traffic delineators is given in BS8442.

A2.26 “Full contra-flow” means a road works traffic management scheme where all traffic on both carriageways travels past the works area on the secondary carriageway.

A2.27 “General Directions” means the Traffic Signs Regulations and General Directions 2002 (SI 2002 No. 3113) and subsequent Amendment Regulations and Amendment General Directions. (The N.I instrument does not include directions). In Wales “the Directions” also include the Traffic Signs (Welsh and English Language Provisions) Regulations and General Directions 1985 (SI 1985 No 713).

A2.28 “Good visibility” means visibility extending to the full length of the stopping sight distance. For site stopping distances see TD 9 “Highway Link Design” (DMRB 6.1.1), Table 3.

A2.29 “Guide island” means a temporary island usually of one lane width used to control or marshal traffic, e.g. on the approach to the controlled area.

A2.30 “High-speed road” means a single or dual carriageway road which is subject to a permanent speed limit of 50 mph or more.

A2.31 “Highway” means the area between the boundary fences including verges, shoulders, medians, footways, cycle tracks and carriageways.

A2.32 “Highway Authority” is defined by the New Roads and Street Works Act 1991 as having the meaning given in Highways Act 1980 or in Scotland the meaning of “roads authority” as given in the Roads (Scotland) Act 1984.

A2.33 “Heavy goods vehicle” (HGV) is defined as one with a maximum gross laden weight in excess of 7.5 tonnes.

A2.34 “Hours of darkness” means the time between half an hour after sunset and half an hour before sunrise.

A2.35 “Incident” means an unplanned obstruction in the highway which is likely to place road users at risk. It includes, but is not limited to, road traffic accidents, broken-down or abandoned vehicles, or debris in the carriageway.

A2.36 “Intergreen period” means the period between the ending of a green signal being shown to one traffic stream and the start of the green signal being shown to the other traffic stream. It is the length of the all-red period plus the amber and red/amber periods.

A2.37 “Intervisibility” means the distance at the works site over which drivers have uninterrupted vision of approaching traffic in normal weather conditions.

A2.38 “Junction” means the intersection of one road by another on each of which the public has a vehicular right of way. The term does not include a private driveway or works entrances and exits.

A2.39 “Lighting Regulations” means the Road Vehicles Lighting Regulations 1989 (SI 1989 No 1796) as amended by the Road Vehicles Lighting (Amendment) Regulations 1994 (SI 1994 No. 2280), and the Road Traffic Regulation (NI) Order 1997.

A2.40 “Local distributor road” means a road that serves communities of up to 1,000 dwellings or an industrial development. In rural areas these roads link the larger villages and HGV generators to the Primary Distributor Network. In built up areas these roads have 30 mph speed limits and very high levels of pedestrian activity with some crossing facilities including zebra crossings. On street parking is generally unrestricted except for safety reasons.

A2.41 “Low traffic flows” means flows less than the reduced available carriageway capacity when the works are in place. Generally low traffic flow is where the traffic flow is not more than 1200 vehicles per hour per traffic lane left open where the HGV content is less than 10%, or 1000 vehicles per hour per traffic lane left open where the HGV content is between 10% and 30%, or 900 vehicles per hour per lane left open where the HGV content is greater than 30%.

A2.42 “Manual control” means control of traffic by traffic signals in which the change from one signal indication to another or to the all-red period is initiated by an operator, or by the use of “STOP/GO” boards to diagrams 7023/7024.

A2.43 “Manually operated” means manual or remote control by an operative or operatives on site in view of traffic conditions.

A2.44 “Manually rotated” means a sign rotated by an operative who holds the sign.

A2.45 “Maximum green period” means the traffic controller setting which in the vehicle-actuated mode is the maximum period for which a traffic stream will continue to run after receiving a call from another traffic stream.

A2.46 “MIDAS” (Motorway Incident Detection and Automatic Signalling) means a system used on some Highways Agency roads which monitors traffic and displays warnings to drivers about queues ahead.

A2.47 “Motorway Regulations” means the Motorway Traffic (England and Wales) Regulations 1982 (SI 1982 No 1163) (as amended) or the Motorway Traffic (Scotland) Regulations 1964 (SI 1964 No 1002) as amended by the Motorway Traffic Amendment (Scotland) Regulations 1968 (SI 1968 No 960) or the Motorway Traffic Regulations (NI) 1984 (SR1984 No. 160) and subsequent amendment regulations.

A2.48 “Multiphase control” means control of a junction by traffic signals with or without a shuttle lane, but with more than two separate traffic streams.

A2.49 “National speed limit” in the context of this document means 70 mph for dual carriageway roads and 60 mph for single carriageway roads.

A2.50 “Order” means any order made under an Act of Parliament, regulation, byelaw or notice for the regulation of traffic.

A2.51 “Overseeing Organisation”, in the context of this document, means the body responsible for authorising non-prescribed signs for the road.

A2.52 “Partial contra-flow” means a road works traffic management scheme where primary traffic flows past the works site on both the primary and secondary carriageways.

A2.53 “Pedestrian Crossings Regulations” means the Zebra, Pelican and Puffin Pedestrian Crossings Regulations 1997 (SI 1997 No. 2400), or the Zebra, Pelican and Puffin Pedestrian Crossings Regulations (NI) 2006.

A2.54 “Portable traffic signals” (portable light signals) means traffic signals, as prescribed by regulation 35 (regulation 32 in Northern Ireland) normally mounted on a tripod, which are intended for positive control of traffic in shuttle lanes for relatively short periods of time.

A2.55 “Precautionary Area” means an area specified as such in the Special Designation file added to either the National Street Gazetteer or Scottish Street Works Register.

A2.56 “Prescribed traffic sign” means a sign as defined in the Road Traffic Regulation Act 1984 section 64, prescribed in the Regulations, identified by reference to a diagram number as shown therein. In Wales bilingual prescribed sign diagram numbers are prefixed by WAG. In Northern Ireland a “prescribed traffic sign” means a sign prescribed by regulations made under Article 28 of the Road Traffic Regulation (NI) Order 1997.

A2.57 “Primary carriageway” means the carriageway on which the road works are being carried out.

A2.58 “Primary distributor road” means an “A” or “B” class road providing traffic movements into and out of a town and linking major residential and commercial districts.

A2.59 “Priority control” means a shuttle lane where one stream of traffic has priority over the other stream indicated by traffic signs.

A2.60 “Public Transport Co-ordinator” means the person holding this post generally in a local authority.

A2.61 “Raised rib” means the alternative edge of carriageway road marking incorporating an audible and tactile warning in the form of a raised rib, diagram 1012.2 used on motorways and diagram 1012.3 used on roads that are not motorways and which have hard strips or hard shoulders.

A2.62 “The Regulations” means the Traffic Signs Regulations and General Directions 2002 (SI 2002 No. 3113) and subsequent Amendment Regulations and Amendment General Directions. In Northern Ireland, “the Regulations” means the Traffic Signs Regulations (NI) 1997 (SR1997 No 386) and subsequent amendment regulations. In Wales “the Regulations” also include the Traffic Signs (Welsh and English Language Provisions) Regulations and General Directions 1985 (SI 1985 No 713).

A2.63 The term “regulation XX” means the appropriately numbered regulation in the Regulations.

A2.64 A “regulation 53 sign” means a temporary sign complying with the requirements of regulation 53 (in Northern Ireland, regulation 42). Direction 38(1) requires that signs of the kind referred to in the regulation be removed with 6 months (2 years in the case of a sign of the kind referred to in regulation 53(1)(d)), unless the Secretary of State has authorised some longer period.

A2.65 “Restricted road” means a road subject to a maximum speed limit other than the national maximum speed limit.

A2.66 “Remotely controlled” means the change of a sign by an operative remotely by radio or wired connection.

A2.67 “Safety zone” means that area between the working space and the traffic lanes occupied by vehicles which is necessary to protect the workers.

A2.68 “Secondary carriageway” means the opposite carriageway to the one on which the road works are being carried out.

A2.69 The “Secretary of State” means the Secretary of State for Transport, the Department for Regional Development (Northern Ireland), Transport Scotland or the Welsh Assembly Government as appropriate.

A2.70 “Short-term situations” means situations that are expected to last less than 24 hours.

A2.71 “Shuttle lane” means the area of carriageway where, owing to a temporary restriction, traffic has to flow first in one direction then in the other in a controlled manner.

A2.72 “Single carriageway road” means a road that has one carriageway for travel in two directions or one direction in the case of a one-way road.

A2.73 “Site approval” means formal written approval, given by the Highway Authority in accordance with direction 53, for a site which includes a junction to be signal controlled.

A2.74 “Site length” means the distance between the ends of the controlled area.

A2.75 “Statutory undertaker” means the person by whom the relevant statutory right is exercisable or the licensee under the relevant street works licence. For a full definition see section 48(4) (or in Scotland section 107(4)) of the New Roads and Street Works Act 1991.

A2.76 “Stopping sight distance” is the distance required for a vehicle to come to a stop, taking into account the time taken to perceive, react, brake and stop safely. For full details see Table 3 of TD 9 “Highway Link Design” (DMRB 6.1.1).

A2.77 “Street works” means works such as placing, inspecting, maintaining, adjusting, repairing, altering or renewing apparatus, changing the position of apparatus or removing it, executed in a street in pursuance of a statutory right or a street works licence. For a full definition see section 48(3) (or in Scotland section 107(3)) of the New Roads and Street Works Act 1991.

A2.78 “Taper” means a single straight row of cones that directly closes or opens a traffic lane. An entry taper is the first taper encountered and lead tapers are subsequent tapers facing the flow of traffic.

A2.79 A “terminal” sign means a sign placed in accordance with direction 8 or 10.

A2.80 “Traffic authority” is defined by the New Roads and Street Works Act 1991 as having the meaning given in Road Traffic Regulation Act 1984.

A2.81 “Traffic cone” or “traffic cylinder” means a device complying with the relevant requirements of regulation 56 (in Northern Ireland, regulation 45) and manufactured in accordance with BS EN 13422: 2004 “Portable road traffic signs – cones and cylinders”.

A2.82 “Traffic officer” should be interpreted as referring to traffic officers as defined by the Traffic Management Act 2004. Traffic officers must be in uniform in order to exercise their powers.

A2.83 “Traffic sign” refers to all traffic signs, road markings, and delineators either prescribed in the Traffic Signs Regulations and General Directions 2002 (SI 2002 No. 3113), the Traffic Signs Regulations (NI) 1997 (SR 1997 No 386) and subsequent amendment regulations, or authorised by the Secretary of State in accordance with Sections 64 and 65 of the Road Traffic Regulation Act 1984.

A2.84 “Transition section” means the transition from a single carriageway road to a dual carriageway road and vice versa.

A2.85 “Tunnel” means an enclosed road tunnel of 150 m or more in length. For a full definition see BD 78 “Design of road tunnels” (DMRB 2.2.9).

A2.86 “Type approval” means approval in accordance with direction 56.

A2.87 “Unrestricted road” means a road subject to the national maximum speed limit, that is, 70 mph for dual carriageway roads and 60 mph for single carriageway roads.

A2.88 “Vehicle-actuated mode” means that the duration of the red and green signals and the time of the cycle vary in relation to the traffic flow into and through the controlled area.

A2.89 “Warning light” means a lit lamp that conforms to the National Annex to BS EN 12352:2006 at all times during its use.

A2.90 “Working space” means that space around the works area needed for workers and equipment.

A2.91 “Works area” means that area occupied by the works themselves.

A2.92 “Works vehicle” means any vehicle which is officially involved in the road works and entitled to be there.

A2.93 “Yellow” when describing the colour of a traffic sign means the colour of the retroreflective material described as “yellow” in BS 8408:2005 and BS EN 12899-1:2007.

A3 APPENDIX – REFERENCES

A3.1 BRITISH STANDARDS: BRITISH STANDARDS INSTITUTION

BS 381C: 1996 "Specification for colours for identification, coding and special purposes".

BS 873-6: 1983 "Road traffic signs and internally illuminated bollards. Specification for retroreflective and non-retroreflective signs". (*Superseded by BS EN 12899-1:2007*)

BS EN 1317-3: 2000 "Road restraint systems. Performance classes, impact test acceptance criteria and test methods for crash cushions".

BS 1376: 1974 "Specification for colours of light signals".

BS 5489-1:2003 "Code of practice for the design of road lighting. Lighting of roads and public amenity areas".

BS 7818:1995 "Specification for pedestrian restraint systems in metal".

BS 7962:2000 "Black materials for masking existing road markings. Specification".

BS 8408: 2005 "Road traffic signs. Testing and performance of microprismatic retroreflective sheeting materials. Specification".

BS 8442 "Miscellaneous road traffic signs and devices – Requirements and test methods".

BS EN 471:2003 "High-visibility warning clothing for professional use. Test methods and requirements".

BS EN 12352:2006 "Traffic control equipment. Warning and safety light devices".

BS EN 12767:2007 "Passive safety of support structures for road equipment. Requirements, classification and test methods".

BS EN 12899-1:2007 "Fixed, vertical road traffic signs".

BS EN 13422:2004 "Vertical road signs. Portable deformable warning devices and delineators. Portable road traffic signs. Cones and cylinders".

BS EN ISO 9002: 1994. "Quality systems. Model for quality assurance in production, installation and servicing".

BS EN ISO 9001:2000 "Quality Management Systems, Requirements".

PAS 43:2008 "Safe working of vehicle breakdown, recovery and removal operations. Management system specification".

A3.2 LEGISLATION

Unless indicated otherwise, these documents are available from the Stationery Office and from www.opsi.gov.uk

The Builders' Skips (Markings) Regulations 1984 (SI 1984 No. 1933)

The Construction (Design and Management) Regulations 2007 (SI 2007 No. 320), or in Northern Ireland, the Construction (Design and Management) Regulations (NI) 2007 (SR 2007 No. 291)

Disabled Persons Act 1981

Disability Discrimination Act 2005

Health and Safety at Work etc. Act 1974, or in Northern Ireland, the Health and Safety at Work (NI) Order 1978

The Health and Safety (Safety, Signs and Signals) Regulations 1996 (SI 1996, No 341)

Highways Act 1980

The Management of Health and Safety at Work Regulations 1999 (SI 1999 No. 3242), or in Northern Ireland, the Management of Health and Safety at Works Regulations (NI) 2000 (SR 2000 No. 388)

The Manual Handling Operations Regulations 1992 (SI 1992 No. 2793)

The Motor Vehicles (Construction and Use) Regulations (Northern Ireland) 1999 (SR 1999 No. 454)

New Roads and Street Works Act 1991

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (SI 1995 No. 3163) (www.rridr.gov.uk)

Road Traffic Regulation Act 1984, or in Northern Ireland, the Road Traffic Regulation (NI) Order 1997 (SR 1997 No. 410)

Roads (Scotland) Act 1984

Street Works (NI) Order

The Road Vehicles (Construction and Use) Regulations 1986 (SI 1986 No. 1078)

The Road Vehicle Lighting Regulations 1989 (SI 1989 No. 1796)

The Street Works (Qualifications of Supervisors and Operatives) Regulations 1992. (SI 1992 No 1687)

Traffic Management Act 2004

The Traffic Signs Regulations and General Directions 2002 (SI 2002 No. 3113)

The Traffic Signs Regulations (Northern Ireland) 1997 (SR 1997 No. 386)

Work at Height Regulations 2005 (SI 2005 No. 735)

The Workplace (Health Safety and Welfare) Regulations 1992 (S.I. 1992, No 3004)

Working Time Directive (93/104/EC) 1993 (www.dti.gov.uk)

A3.3 DEPARTMENT FOR TRANSPORT: THE STATIONERY OFFICE LTD

Department for Transport (2008). "An Introduction to the Use of Vehicle Actuated Portable Traffic Signals"

Department for Transport (2002). "Safety at Street Works and Road Works – A Code of Practice"

Department for Transport Working Drawings. These can be obtained directly from the Department for Transport's website at: www.dft.gov.uk

Department for Transport Code of Practice, "Co-ordination of Street Works and Works for Road Purposes and Related Matters". This can be obtained directly from the Department for Transport's website at: www.dft.gov.uk

Department for Transport Local Transport Note 1/98, "The Installation of Traffic Signals and Associated Equipment". This can be obtained directly from the Department for Transport's website at: www.dft.gov.uk

Department for Transport Traffic Advisory Leaflet 15/99, "Cyclists at road works". This can be obtained directly from the Department for Transport's website at: www.dft.gov.uk

A3.4 DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB): THE STATIONERY OFFICE LTD.

BD 78 "Design of road tunnels" (DMRB 2.2.9)

HD 19 "Road Safety Audit" (DMRB 5.2.2)

TA 11 "Traffic surveys by roadside interview" (DMRB 5.1.4)

TA 92 "Crossover and changeover design" (DMRB 8.4.6)

TD 9 "Highway link design" (DMRB 6.1.1)

TD 19 "Requirement for road restraint systems" (DMRB 2.2.8)

TD 22 "Layout of grade separated junctions" (DMRB 6.2.1)

TD 27 "Cross-sections and headrooms" (DMRB 6.1.2)

TD 49 "Requirements for lorry-mounted crash cushions" (DMRB 8.4.7)

TD 69 "The location and layout of lay-bys" (DMRB 6.3.3)

A3.5 HSE DOCUMENTS

Available from the HSE website (www.hse.gov.uk) and HSE Books www.hsebooks.co.uk or PO BOX 1999 Sudbury, Suffolk, CO10 2WA.

"Avoiding Danger from Underground Services" HSE Guidance publication HSG47.

"Avoidance of danger from overhead electric power lines" HSE Guidance Note GS6.

"Crossing high-speed roads on foot during temporary traffic-management works" (Construction Information Sheet No. 53).

"Five steps to risk assessment" HSE Guidance publication INDG163.

"Manual Handling, Manual Handling Operations Regulations 1992, Guidance on the Regulations" HSE Legal Series publication L23.

“Manual Handling solutions you can handle” HSE Guidance publication HSG115.

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A4 APPENDIX – MISCELLANEOUS

APPENDIX 4.1 – SPECIFICATION FOR BUILDERS’ SKIPS

Highways Act 1980 – Section 139

Road Traffic Regulation (NI) Order 1997

Roads (Scotland) Act 1984: Sections 85 and 86

A4.1.1 Bulk containers for use on the highway for the disposal of building materials, rubbish or other things shall comply with the appropriate Motor Vehicles (Construction and Use) Regulations when carried on a vehicle.

A4.1.2 The container shall not exceed 5 m in length by 2 m in width.

A4.1.3 The use of bulk containers on the highway shall be in accordance with this Chapter.

A4.1.4 The ends of containers shall be marked as follows:

- the ends of skips shall be painted yellow; and
- markings in accordance with the Builders Skips (Markings) Regulations 1984 (SI 1984 No. 1933) (or the Statutory Rules Roads (Control of Builders Skips) Regulations (Northern Ireland) 1979) or the (Builders Skips (Markings) (Scotland) Regulations 1986 (SI 1986 No. 642)) and with Specification BS AU 152 shall be provided adjacent to the outer edge of each end of the container.

A4.1.5 Provision shall be made for at least four lamps (one at each corner) to be fixed securely to the container or suspended from the corners.

A4.1.6 The container shall be clearly and permanently marked with the owner’s name and with his telephone number or address.

APPENDIX 4.2 – SPECIFICATION FOR AN AUTOMATIC BRAKING SYSTEM

SCOPE

A4.2.1 This is a generic specification for systems intended to apply the brakes of a heavy goods motor vehicle (HGV) in the event of a collision from the rear.

A4.2.2 This specification only applies when the said system is fitted to a vehicle being employed for the purpose of acting as an Impact Protection Vehicle (IPV) or block vehicle for a Mobile Lane Closure.

A4.2.3 The fitment of all such devices requires a “Notifiable Alteration” to be recorded with the Vehicle and Operator Services Agency.

A4.2.4 All such systems first fitted on or after the 1st June 2003 shall meet the requirements contained herein.

PURPOSE

A4.2.5 The purpose of this specification is to ensure that automatic impact braking systems meet certain minimum performance standards and have no deleterious effect on the operation of the standard service, secondary and parking brake systems. It is not intended to be a comprehensive design specification. Manufacturers shall design their system and its components within the constraints contained in this specification.

OPERATIONAL REQUIREMENTS

A4.2.6 The impact braking system shall be energised by a driver-operated control but it shall only be capable of functioning when the control is in the on position and the crash cushion has been lowered.

A4.2.7 If the driver-operated control is in the on position, the impact braking system shall be automatically enabled when the crash cushion is lowered. Conversely, raising the crash cushion shall automatically disable the impact braking system.

A4.2.8 The system shall incorporate one of the two following facilities:

- a diagnostic self-test function capable of detecting system defects and warning the driver; or
- a manual test facility allowing an operator to check for the correct function of the system. This test should be sufficiently simple to be incorporated into routine daily maintenance schedules.

A4.2.9 If a collision is detected the brakes shall be applied to all wheels of the vehicle.

A4.2.10 If the system has been activated, it shall continue to apply the vehicle brakes until such time as it is reset by switching it off at a control specifically designed and marked for the purpose. It shall not be possible to reset the impact braking system unless the parking brake has been applied.

DESIGN AND INSTALLATION REQUIREMENTS

A4.2.11 The system shall be designed and installed in such a way that it has no effect on the normal operation of the service, secondary and parking brake systems.

A4.2.12 The system shall be designed and installed in such a way that any malfunction within it has no influence whatsoever on the operation of any aspect of the standard vehicle braking systems. The only result would be the illumination of a warning light in the vehicle cab.

A4.2.13 The design and installation of the impact braking system shall not have any influence on the effects of a fault within the standard vehicle braking systems.

A4.2.14 The impact braking system shall never take an air supply from the input side of the four-circuit protection valve.

A4.2.15 If the impact braking system takes an air supply from the service brake system then it shall be isolated from the service brake by means of a dual circuit protection valve.

A4.2.16 Electrical or magnetic fields shall not adversely affect the operation of the impact braking system. It also shall not emit electrical or magnetic fields that could adversely affect other vehicle systems. This should be demonstrated in accordance with Directive 95/54/EC (Official Journal of the European Communities, No. L 266, 8 November 1995) or Directive 2004/104/EC (Official Journal of the European Communities, No. L 337, 14 October 2004).

A4.2.17 The impact braking system shall be insensitive to power line transient signals. This should be tested in accordance with ISO 7637.

A4.2.18 The impact brake system shall be equipped with a control to enable the system to be released and reset manually after an accident. This control should be clearly marked and positioned in an easily accessible place. It shall not be possible to reset the impact braking system unless the parking brake has been applied.

A4.2.19 The impact braking system shall be fitted or modified only by qualified personnel approved by the manufacturer of the system.

COMPONENT LEVEL REQUIREMENTS

A4.2.20 All wiring and components should conform to the requirements of BS EN 60068 with regard to protection from environmental factors such as vibration and humidity.

A4.2.21 All components and subsystems shall be insensitive to temperature within the range -20°C to $+50^{\circ}\text{C}$. This is of particular importance to the impact sensor if it is of the rubber air-filled tube type.

A4.2.22 The system shall be insensitive to accelerations of less than $\pm 1\text{ g}$ horizontally and $\pm 4\text{ g}$ vertically.

A4.2.23 The impact sensor will be exposed to a harsh working environment. It shall be extremely rugged, durable and resistant to physical damage.

A4.2.24 The mechanical integrity of components, wiring and piping in the impact braking system shall be at least as good as that of the standard vehicle braking system. Pipes should be resistant to rupture and both pipes and wiring should be routed carefully to avoid fretting.

A4.2.25 Components should either be designed for the life of the system or should have a service or replacement interval marked on them or published as part of a comprehensive aftercare manual.

APPENDIX 4.3 – ASSESSMENT OF CONDITION OF TRAFFIC SIGNS

INTRODUCTION

A4.3.1 It is important that all items of equipment used for temporary traffic management fulfil their intended legal and informative function throughout the period they are in position. This applies to all signs, delineators, markings, traffic signal equipment and warning lights. For instance, with age the retroreflective properties of signs degrade and the sign face colours will fade. Even in normal use, temporary traffic management signs and delineators are subject to forms of damage not experienced by permanent signs. This damage occurs during storage, delivery, installation and removal, causing deterioration in appearance and effectiveness.

A4.3.2 However, it is not practicable to specify new signs and delineators for each project. Therefore guidance is needed to facilitate the assessment of the condition of temporary traffic management equipment. To help to achieve this objective, illustrations of sample signs of different quality are included in paragraph [A4.3.27](#).

A4.3.3 Signs with defects which affect recognition and legibility are unacceptable. Temporary traffic management equipment which appears acceptable in daylight in good weather conditions may at other times, e.g. in the dark in heavy rain, not be adequate and so present a potential safety hazard. This should be considered when assessing the condition of the equipment.

A4.3.4 Assessment of the condition of equipment should be made at several stages: prior to storage, during assembly for delivery to site, and at regular intervals throughout deployment (see [Section O3.7](#)). A record of the assessment made and any corresponding action taken should be made and should be available for inspection when required. In many works contracts, this inspection and assessment is mandatory when the equipment is erected and while it is deployed.

CONDITION CLASSIFICATION

A4.3.5 The condition of each item of temporary traffic management equipment should be classified as follows:

- “acceptable”
- “marginal”
- “unacceptable”

A4.3.6 “[Acceptable](#)” – equipment which falls within this classification is appropriate for initial deployment and continued deployment on the highway. At the time of the initial set up all equipment shall be in the “acceptable” category.

A4.3.7 “[Marginal](#)” – equipment which falls within this classification is reaching the lower end of acceptability and should not be delivered to site. During a project, following an assessment of condition any equipment classified as “marginal”,

- should be replaced within 24 hours if it is not repeated
- if the item is repeated, it may remain in place until:
 - it is assessed as unacceptable; or
 - marginal items exceed 20 percent of the group (e.g. a set of repeater signs); or

- marginal items exceed 1 in 5 consecutive items of equipment (e.g. traffic cones).

A4.3.8 “Unacceptable” – devices in this category shall not be delivered to the site. When found in use, they should be replaced immediately.

CONDITION ASSESSMENT

A4.3.9 Illustrations and associated descriptions are provided in paragraph A4.3.27 to assist assessment of condition of signs and delineators.

A4.3.10 Temporary traffic management equipment inevitably becomes dirty during use and consequently becomes less conspicuous and legible, particularly at night and in adverse weather conditions. Therefore regular cleaning is essential. All items of temporary traffic management equipment should be cleaned prior to assessment of their condition and regularly cleaned throughout their time on site.

SIGNS AND DELINEATORS

A4.3.11 Signs and delineators should be assessed in relation to the following properties:

- structural integrity;
- sign face condition;
- sign face colour; and
- level of retroreflectivity.

A4.3.12 A sign or delineator assessed as failing in any one of the above categories should be classified as “unacceptable”.

A4.3.13 A sign or delineator assessed as “marginal” in any one of the above categories, but passing in the others should be classified as “marginal”.

A4.3.14 A sign or delineator assessed as “marginal” in two or more categories should be classified as “unacceptable”.

A4.3.15 Signs of a suitable size with defects which affect recognition and legibility should be classed as “unacceptable”.

A4.3.16 Signs which are not mounted at the specified height should be classed as “unacceptable”.

A4.3.17 The practice of mounting signs on unnecessarily long posts which project above the top of the sign is hazardous and “unacceptable”.

A4.3.18 Any sign or delineator which does not conform in every detail with the requirements in the Traffic Signs Regulations and General Directions is “unacceptable” regardless of its condition.

A4.3.19 Structural integrity: Sign plates should be checked to ensure that they are adequately fixed to their frames. Where a frame, including an A-frame, is broken or deformed so that the sign cannot be adequately secured or the sign plate is not at the appropriate angle to the road surface, it should be classified as “unacceptable”.

A4.3.20 Sign face condition: Legibility can be affected by scratches and other damage to the sign face. This can be best assessed at the appropriate viewing distance. The severity, extent and location of such damage shall be taken into account when deciding whether a sign should be classified as “unacceptable”. For example a relatively small area of damage could render a letter illegible and seriously compromise drivers’ ability to comprehend a sign. See paragraph A4.3.27 for illustrated examples.

A4.3.21 Sign face colour: If colour fading is noticeable it should be visually compared with a square of new/perfect material. For regulatory signs such as speed limit signs, any significant colour fading may compromise regulatory enforcement, and is therefore unacceptable. For information signs, legibility and vivid colour contrasts should be the main criteria.

A4.3.22 Level of retroreflectivity: Delineators should be highly conspicuous and all signs, symbols and letters should be clearly visible during darkness. The retroreflective properties of signs and delineators can be assessed, whilst they are suitably illuminated, by visual comparison with a new/perfect sample of retroreflective material. Alternatively, the retroreflectivity properties of signs and delineators can be assessed using a field retroreflectometer and readings can be directly compared with the relevant Standard. However, the use of a retroreflectometer should normally only be required in special situations or where the results of other methods are disputed.

A4.3.23 Retroreflectivity can be significantly reduced by dew formation on the sign face, and assessments should not take place in such circumstances.

WARNING LIGHTS

A4.3.24 All lamps shall be in good working order and in good condition.

TRAFFIC SIGNAL EQUIPMENT

A4.3.25 Faulty equipment shall not be placed on a public highway. All traffic signal equipment should be inspected and tested before delivery to the site. Useful advice is contained in “An introduction to the use of vehicle actuated portable traffic lights” (Department for Transport, 2008).

TEMPORARY ROAD MARKINGS

A4.3.26 All temporary road markings such as studs, paint and tape shall be installed in accordance with the manufacturer’s instructions, and their performance regularly monitored throughout the project.

A4.3.27 SIGN CONDITION ASSESSMENT GUIDE

This paragraph contains colour illustrations and associated descriptions to assist assessment of signs and delineators.

SIGNS WITH SYMBOLS



"Acceptable"

Symbols are clearly legible despite some abrasions on the sign face. The colours are vivid.



"Marginal"

There are numerous abrasions on the sign face, but there are no large areas missing or covered by residue. Despite some colour fading the sign face remains vivid.



"Unacceptable"

A high proportion of the sign face is damaged. The obvious colour fading no longer matches the standard colour.

SIGNS WITH LEGENDS



"Acceptable"

There are some abrasions on the surface but very little loss of lettering.



"Marginal"

Of the many surface abrasions throughout the sign face, many are within the individual letters of the message. Although some colour fading is evident, the legend contrasts clearly with the background colour.



"Unacceptable"

The colour clearly fails to match the standard colour. The sign face suffers from widespread abrasions.

SIGNS WITH SYMBOLS AND LEGENDS

**"Acceptable"**

There are some abrasions on the sign face but no loss of legibility. The colours are vivid. The relative height and size of the portions showing the lanes open and closed, and the characters on the distance plate, are in accordance with the Regulations.

**"Marginal"**

There are numerous small abrasions on the sign face, but it is free from large areas of residue or damage. The colours remain vivid although some fading is evident. The relative height and size of the portions showing the lanes open and closed, and the characters on the distance plate, are in accordance with the Regulations.

**"Unacceptable"**

In the left-hand example, the relative height and size of the portions showing the lanes open and closed is not in accordance with the Regulations. In the example on the right, a high proportion of the sign face is damaged. There is obvious colour fading.

ROAD WORKS DELINEATORS



"Acceptable"

The surface is free of punctures and abrasions, asphalt splatter, cement slurry or other material. The retroreflective band has only minor tears or scratches.



"Marginal"

The surface has some asphalt splattering or cement slurry, some abrasions and discoloration. The retroreflective band has tears and scratches, but is free of large areas of residue or missing material.



"Unacceptable"

Large areas of missing or stained retroreflective material, punctures and large areas of staining or asphalt splatter make the cone unacceptable.

Note that a situation where more than one traffic cylinder, or two adjacent cones, are missing or substantially out of alignment, should be regarded as "unacceptable".

A5 APPENDIX – LIST OF PLANS

Plan number	Plan title	Section
Plan SVW1	Single vehicle works on a single carriageway road, basic layout	O8.1
Plan SVW2	Single vehicle works on a single carriageway road – “STOP/GO”	O8.1
Plan SVW3	Single vehicle works on a dual carriageway road, permanent speed limit 40 mph or less	O8.1
Plan MLC1	Mobile Lane Closure on a dual carriageway road without a hard shoulder	O10.19
Plan MLC2	Mobile Lane Closure on a dual carriageway road with a hard shoulder	O10.19
Plan MLC3	Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with a hard shoulder, working vehicle only	O10.19
Plan MLC4	Mobile Lane Closure of two near side traffic lanes (lanes 1 and 2) with and without a hard shoulder, working on foot	O10.19
Plan MLC5	Mobile Lane Closure of two off side traffic lanes (lanes 2 and 3 on a three-lane carriageway) with and without a hard shoulder	O10.19
Plan MLC6	Mobile Lane Closure, working vehicle on a hard shoulder	O10.19
Plan MLC7	Mobile Lane Closure, working through junctions – slip road signing options	O10.19
Plan MCC1	Principles of the Mobile Carriageway Closure technique	O11.3
Plan MCC2	Mobile Carriageway Closure, closure of the downstream end of the access slip road using a works vehicle	O11.5
Plan MCC3	Mobile Carriageway Closure, closure of the downstream end of the access slip road not using a works vehicle	O11.5
Plan MCC4	Mobile Carriageway Closure, closure of the upstream end of the access slip road – example of traffic management	O11.5
Plan MCC5	Mobile Carriageway Closure, vehicle-mounted queue warning signing	O11.7
Plan MCC6	Sequence for establishing the Mobile Carriageway Closure	O11.12
Plan MCC7	Sequence for removing the Mobile Carriageway Closure	O11.15

INDEX

This index relates to both volumes of Chapter 8. References starting with D relate to Part 1: Design and those starting with O relate to Part 2: Operations.

Access for works vehicles	D3.21.4, D3.22.1, D6.22, O3.11, O3.22.2
Access lane	D3.2.15
"Accident" plate	D4.8.8, O7.1.5
Advance	
direction	D3.15.17
signing	D3.6.6, D3.42, D4.12, D5.5.3, O3.19.6, O7.2.63
taper of cones	D3.8.2, D3.9.2, D3.26.4
warning of motorway road works	D4.5.1, D4.12
warning signs	D3.2.19, D4.5, D6.29.7–11
"ADVERSE CAMBER" sign	D4.8.31
Adverse weather conditions	O3.10
Advisory	
maximum speed	O7.2.34
speed limit plate	D3.18.7, O3.17.2
speed limit sign	D3.7.5
speed limits	D3.7.5
Aircraft taxiways	O3.26
Airport authority	O3.26.1
All-purpose	
dual carriageway roads	D3.3.7
roads	D3.3.7, D5.5.3, D5.7.7
All-red period	O11.5.6
extended	D5.13
Alterations	
to existing road markings	D4.6, O4.2.5, O4.12.5, O4.12.10
to existing signs	D4.6.1, O4.3.4
Alternate one-way working	O3.21.10
Amber roof-mounted warning beacon	O3.19.4, O5.3, O8.1.17, O8.3.8, O8.3.10
Ancillary vehicles	O10.14.9
Approach	
and lane closure signing	D4.13
sign location and number	A1.1
Approach visibility	D3.23.2
Approach zone	D6.14.1, D6.15, D6.29.1
Attendant at level crossing	O3.25.5, O3.25.11
Automatic braking system	O5.4.4
Backing board – traffic signals	O3.21.20
Ballast for signs	O4.4.2–4
Barriers	
alongside excavations	O4.11.10
lightweight	D3.10.9, O3.2.10–12, O4.11.14

pedestrian safety fencing	D3.10.4–6, O4.11.6–11, O3.13.1–3, O3.19.6–7
traffic use of vehicle restraint vertical posts	O8.37 D3.10.7–8, O4.11.12–13 D3.10, O4.11 D3.7.8, D3.10.10–11, O4.11.15 D3.9.7
Beacons roof-mounted	O3.19.4, O5.3, O8.1.17, O8.3.8, O8.3.10
Bend in the road	D3.6.6
"Blasting" plate	D4.8.2–3, D4.8.9
Block vehicle	O10.6.4
Blocking back of traffic	D5.17.5
Bridge	
clearances	D3.2.12
heights	D3.16.4
safety zone	D3.2.12, D3.7.7
British Standards	A3.1
Broken-down vehicle	D4.10.37, D6.2.11, O7.2.10, O7.3
Buffer lane	D6.4.2, D6.4.14, D6.17, D6.18, D6.19
Buffer zone	D6.4.2, D6.4.14, D6.4.16, D6.17, D6.18, D6.19
Builders' skips see Skips, builders'	
Bus stops	D3.15.10
Cable crossing protector	D3.18.4, D5.14.7, O3.21.11–13, O3.21.28
Cables, overhead or flexible interconnecting	D4.8.9
Capacity, lane	D3.4
Carriageway	
closure	D6.20
closure mobile	D6.27
edge condition	D3.19
edge marking	D3.11.8, D3.19.2, D4.6.6, O3.4.4, O4.10.6
works – no parked vehicles	O3.19.3, O3.19.6–7
works – with works vehicle	O3.19.4
CCTV, use of	D3.35.13, D3.37, D6.2.11, O7.5
"Census" plate	D3.26.9, D3.26.18, D4.8.9
"CENSUS POINT" sign	D3.26.10, D3.26.18
"CENSUS STOP if directed" sign	D3.26.10, D3.26.18
Central reservation	D3.2.13, D3.2.16–17
"CHANGED PRIORITIES AHEAD" sign	O3.24.4
Changeovers	D4.6.5–6, D6.3.8, D6.6, D6.17, D6.19
CHART	D6.24.7
Clean signs	O4.1.7, O4.3.1
Clearance	
on bridges	D3.2.12

lateral	D3.2.1, O3.2
longitudinal	D3.2.1, O3.2
from parked vehicle	O3.19.6–7
from traffic signs	D3.2.11, O3.2.16
vertical	D3.2.23–24, O3.2.18–19, O3.2.21
Close-boarded structures	O3.28.3
Closure	
of a carriageway	D6.13.8, D6.20
establishment	O10.13, O11.12
of a lane	D4.8.13, D4.10, D4.13.10–16
removal	O10.17, O11.15
of a road	D3.15
of a slip road	D6.21
Clothing	O3.4.2
Code of practice	D6.24.7, O1.3.1
Communication system	O3.22.3, O8.1.14, O9.1.12, O9.7, O9.8.3, O10.12, O11.9
Compliance	D1.3.1, O1.4.2
Concepts and objectives	D1.4, O1.4
Condition of traffic signs, assessment of	OA4.2
Cones	
construction	D4.9.1
and cylinders	D4.9
recommended spacing and sizes	A1.3
spacing	D3.9.2–5, D3.29.3, D5.4.5, O4.10.3–4, O7.2.44, A1.3
taper in advance of works	D3.8.2, D3.9.2, D3.26.4
white lines	O4.10.6
Congestion	D1.1.1, D2.10.2, O2.3.2
Consent of Highway Authority see Highway Authority	
Conspicuous vehicles	O8.3.7
Conspicuousness of works vehicle	O5.2, O7.2.40, O7.2.73, O8.3.7
Construction traffic	O3.11.4
Contingency plans/planning	D7.11.1, O2.4.5, O3.25.15
Contra-flow	
lane diversion signs	D4.10
operation	D6.4
Convoy working	
the convoying method	D7, O9
emergency vehicles	O9.11
general	D7.11, O9.10
legal issues	D7.1, O9.1
number of vehicles	D7.4, O9.2
queue management	D7.2.1, O9.1.7, O9.4
radio communication	O9.9
side roads within the site	O9.1.2, O9.7, O9.8.3
speed limits	D7.8.6, D7.9, O9.8
traffic control	D7.1.3, D7.5.3, D7.8, O9.6
vehicles	D7.7, O9.5
Courtesy message	D7.5.1, O5.6, O9.2.3, O9.3
	D6.19.3

Covers	
drain	D3.18.1, O3.16.1, O3.16.3, O3.16.6, O4.11.9
on existing signs	D3.7.21, D3.7.24, D4.6.1, O4.2.2
Crash cushions	D3.35.14, O5.4.1–2, O5.4.4, O8.1.5, O10.6.9
Criteria for traffic control	D5.4.2
Crossroads ahead sign	D3.23.5
“CROSSING NOT IN USE” sign	D3.32.9, D4.6.2, O4.2.4
Crossing the carriageway on foot	O3.5, O8.3.9
Crossovers	D6.5, D6.17, D6.19, D6.29.14–18
Cyclists	D1.5.2, D3.3.7, D3.15.6, D3.32.13–20, O3.14
Cylinders	D4.9, O4.10
Damaged signs	OA4.2
Debris	O7.2.10, O7.2.28, O7.2.30
Definitions, primary	D1.5, O1.5
“Delays possible” plate	D4.12.3, D4.12.6
Delineation	
temporary	D2.1.8, D6.3.7
of works	D3.14, O3.4
Delineators rotating	O4.10
reflector	D3.13, O4.10.9–10
use of	D3.9
Demarcation of haul route	D3.23.8
Depressible road studs	D3.18.2, O4.12
Design	
brief	D2.3
criteria	D3
Design Manual for Roads and Bridges (DMRB)	A3.4
Details A to K used in plans	A1.5
Dimensions of signs	D4.4, A1.2
Direction of temporary pedestrian route sign	D3.32.8
Direction signs	D3.15.17
Disabled people	D3.10.4, O3.13.6, O3.25.10, O4.11.6, O7.1.9
Discontinuity of hard shoulder	D6.10.3
Displaced signs	O3.7.10, O4.1.7
Distance	
between sites	D3.5.2–3, D3.7.9
to “end of works” sign	D3.7.15
plate	D4.8.5–6, D6.10.8
Distance to restriction panel	D4.10.15
“Ditching” plate	D4.8.2

Diversion	D3.15, D4.2.8, O7.1.4
from motorways	D3.15.12
route	D3.15.3
"Diversion ENDS" sign	D3.15.17
Diversions/road closures	D3.15
Diverted traffic	D3.15.3, D3.15.17
Documentation	D2.15
Double white lines	D4.6.4
Dual carriageway roads	D3.3.4, D3.42.4, D6
use of one carriageway	D3.42.10, D6.4
Duration of restriction panel	D4.12.2–6
"Dust cloud" plate	D4.8.9
Edge of carriageway marking	D3.11.8, D3.19.2, D4.6.6, O3.4.4, O4.10.6
Electrical illumination	D3.7.23, O3.22.11, O3.23.3, O4.6, O10.10
Emergencies	O7.1
Emergency	
access	D3.34
through the works	D6.7
crossings	O3.11.9
route	O7.3.16
services	D2.6
telephone sign	D4.10.35
traffic management	D3.33
on high-speed roads	O7.2
vehicles	D2.6
End of road works	D4.14, D5.5.3, D5.10.16, D6.19.3
End-of-works zone	D6.14.1, D6.19, D6.29.21–24
England, applicability	D1.3.1, D2.6.2, D4.2.4, D4.15.8, D6.23.9, O1.3.1, O2.5.3, O6.2.7–8, O7.2.32, O7.7.2, O10.5.3, O10.8.2, O11.10.2
Entries for works vehicles	O3.11.11
Entry slip road, effect on contra-flow	D3.17.3
Entry taper see Taper	
Equipment installation/removal vehicles	O5.5.4
Excavation barriers	O4.11.10
"Except empty vehicles" panel	D4.8.30
Existing signs	D4.6
Existing markings	D4.6, O4.2.5, O4.12.5, O4.12.10
Exit slip road	D6.10.9, A1.4–5
closure	D6.21
Exit taper	D5.4.3, D5.5.3, D5.6.4, D5.7.7, D5.8.12, D5.10.16
Expanding barriers	O4.11.14

Extended all-red period	D3.2.8, D5.10.4, D5.13
"Fallen tree" plate	D4.8.9
Falling objects	D3.16.3, O2.4.7
Fatigue	O3.9.3, O6.5.1, O10.18.4
Fend positions	O7.2.77–78, O8.3.8
Fitness for task	O6.4
Fixed time operation	D5.15.1, O3.21.3, O3.21.29
Flap type signs	D3.15.21, O10.7.9, O10.7.10
Flashing amber lanterns	O10.9
Flat traffic delineators, specification of	O4.10.5–8
"Flood" sign	D4.8.20
Floodlighting	O4.8.1
Fog – warning of	D4.8.21
Footway	
obstructions	O3.13.11–12
temporary	O3.13.5, O3.13.9–10
works	D3.2.19, D3.20.2
Forward visibility	O2.3.6
Frames	O4.5.1
Free recovery service	D3.35
"Frost damage" plate	D4.8.9
Future road works	D4.12.1–4
Gantry signing	D6.13.3–6, O4.2.3
"GET IN LANE" panel	D4.10.14, D6.16, D6.17
"Give and take" traffic control	D5.4.3, D5.5.2, D5.6
Give way	
junction works	O3.25.13, O4.12.4
marking, temporary	D5.14.7
signs	D3.15.13
	D3.17
Glossary	A2
"GO" sign see "STOP/GO"	
Gradients	D2.1.10, D4.4.4, O10.4.3
"Grass cutting" plate	D4.8.2
Green setting optimum	O3.21.7
Gritting	D6.25.2, O8.2.1
"Gritting" plate	D4.8.2, D6.25.2, O8.2.1
Guide islands	D5.11, D6.9
Gully emptying	D4.8.2

Hard shoulder	
discontinuity	D6.10.3
limited width	D6.2.4
remedial works	D6.2.6
sign usage	D4.8.2
skidding resistance	D6.2.5
structural adequacy	D6.2.5, O3.16.12
as temporary running lane	D6.2, O3.4.4
use	D6.2
working	D6.10
Haul route	
approach	D3.23.1
crossing	D3.23
demarcation	D3.23.8
modes of crossing control	D3.23.2, D3.23.6
road marking	D3.23.7
sequence of signing	D3.23.9
site approval	D3.23.2
site signing	D3.23.5
traffic signals	D3.23.1–3
Hazards	D4.8.4–5
Headroom	D3.2.23–24, D3.16, O3.2.19–20, O3.2.22
Health and safety	D2.14, O2.1
Health and Safety at Work, etc Act	D2.14, O1.1.3
Heavy goods vehicles	
restrictions	D6.12
"HEAVY PLANT CROSSING" plate	D3.23.2, D3.23.5, D5.10.15, O3.11.4
"Hedge cutting" plate	D4.8.2
Height restriction	D3.16, D4.10.25–26, O3.2.19–20, O3.2.22
High intensity flashing warning lights	D3.12.1, D5.5.3, D5.7.7, D6.14.5, O3.9.3, O4.7.14–16, O7.2.62
police	O4.7.16
High intensity Xenon lamps	O10.8.3
High visibility garments	O3.4.2, O3.22.10, O3.23.2, O6.3.2, O6.3.4
Highway Authority	
adjoining	D2.4 D2.5
Horizontal alignments	D6.5.4, O10.4.3
Horizontal boards/barriers	O4.11.3, O4.11.13
HSE documents	A3.5
"Ice" plate	D4.8.21
Illumination of signs at survey sites	D3.7.23, O3.22.11, O3.23.3, O4.6, O10.10 D3.26.8
Impact protection vehicle	D3.35.30, O5.4, O5.5.5, O7.3.6, O11.5.3
Incident management system	O7 O7.7
"INCIDENT SLOW" sign	O7.1.6

"INCIDENT USE HARD SHOULDER" sign	O7.1.6
Incident Support Units (ISUs)	O7.2.5, O7.2.17, O7.2.39
Information board	D4.15.1–5
Information on existing signs	D4.6
Information signs	D4.2.9, D4.11
Inner boundary safety zone	D3.2.2, D3.10.6, D3.10.9, O3.2.9, O3.2.11, O3.2.14, O4.11.11, O4.11.14
Inspection of signs on a motorway site stops	O3.6.8, A4.3.4 D3.28.5 O10.18.2 D3.31, O8.3
Inspection/supervisor vehicles	O5.5.2
Installation of static traffic management	O3.6
Interference with pedestrian movement	O3.13.1
Island sites	D6.11
"JOINING TRAFFIC NOT SIGNAL CONTROLLED" sign	D5.10.12, D5.15.7, O3.21.18
Junction within road works	D3.17, D4.8.6, D5.14, D6.18.3, O3.21.28–29, O3.21.31–32
Junctions	D5.14, O11.18
Keep left/right sign	D4.8.16
Key to areas and symbols shown in plans	A1.4
Lane capacity diversion on one carriageway sign restriction panels widths	D3.4 D6.4.12 D4.10.16–36, D4.13.8 D3.3
Lane closed barrier	D4.8.13
Lane-change zone	D6.31.1, D6.16, D6.29.2–3
Lanterns, flashing amber	O10.9
Lateral clearance additional specified	D3.2.1, D3.2.4, D3.2.6–11, O3.2.1–7 D3.2.10 D3.2.6–11
Lead-in zone	D5.4.6, D6.14.1, D6.17, D6.29.4–6
Legal requirements status	D1.3.1 D1.3, O1.3
Legislation	A3.2
Length of site	D3.5.1
Length of works	D3.5
Level crossings	D5.17, O3.25

automatic	D5.17.2, O3.25.3
specification for an	O3.25.11
types	D5.17.2, O3.25.3
works procedures	D5.17.6–7
Liaison in planning	D3.35.6–11
Light arrow sign	O5.9.7, O7.2.74, O10.1.7, O10.6.9, O10.7.6, O10.19
Light arrow sign – small	O8.1
Light batteries and bulbs	O4.7.13
Lighting	
maintenance plate	D4.8.2
of signs	D3.7.23, O3.22.11, O3.23.3, O4.6, O10.10
Regulations	O10.10.3
“Line painting” plate	D3.30.5, D4.8.2
Loading and unloading of materials	O3.12
Location and number of approach signs	A1.1
Longitudinal	
clearance	D3.2.1, D3.2.4, D3.2.20–22, O3.2.7
road marking	D3.30.1, D3.30.2
Loose chippings	D3.18.7, D3.29.3, O3.17.2
Maintaining static traffic management	O3.7
Maintenance	
Inspections/operations	O8.4
of diversion route	D3.15.11
signs	O5.2.8
of signs	O4.1.14
works planning	D2
Major-minor junctions	
close by	D5.14
permanent signals	D5.15.1, O3.21.29
traffic signals	D5.15
Mandatory speed limits	D3.7.6, D3.7.25–26
Manual control	
of signals	O3.21.5
Manual level crossings	D5.17.2, O3.25.3
Manual “STOP/GO” control see “STOP/GO”	
Manufacture of signs	O4.9.2
Marking	
edge of carriageway	D3.11.8, D3.19.2, D4.6.6, O3.4.4
stop line	O4.12.4
temporary give way	D3.15.13
temporary hazard	D3.7.9
Material storage	D3.24, O2.3.2, O3.18
Matrix signals	D3.7.5, D3.7.29, D6.26.4, O2.5.3, O3.20, O7.2.33, O10.1.7, O10.5, O10.13.8, O11.7.9, O11.12.5, O11.20.1

Merge in turn signing	D6.23
Method statement, formulation of	O2.4
Mini-roundabout works	D5.16.6
Minimum clear visibility to first sign	D4.4.7
Minor road	
characteristics	D5.3.2
general requirements	D5.1
junction works	D5.14.5–6
works	D3.3.3, D5.3
Misleading lights	O4.7.4, O4.7.15
Mobile Carriageway Closure	
technique	D2.1.13, D6.27, O11
background	O11.1
breach of the closure/ passage of emergency vehicles	O11.17
closing access junctions	O11.5
communication failure	O11.21
communications	O11.9
dealing with a lane drop/lane gain	O11.19
establishing the closure	O11.12
junctions	O11.18
operational issues prior to the operation	O11.11
other works/weather conditions	O11.22
planning issues	O11.4
the principle of the technique	O11.3
removing the closure	O11.15
roads without a hard shoulder	O11.6
the role of the control office	O11.20
the role of the monitor vehicle	O11.16
signing	O11.7
speed of the closure	O11.13
training	O11.10
vehicles	O11.8
the working window	O11.14
vehicles	O5.4, O5.8, O11.8
Mobile Lane Closure	
technique	D6.24.4–5, D6.26, O10
communications	O10.12
during a closure	O10.14
establishing a closure	O10.13
flashing amber lanterns	O10.9
general	O10.1
illumination of signs at night	O10.10
light arrow system for block vehicles	O10.8
matrix signals	O10.5
operations at night	O10.18
planning	O10.2
plans and principles for Mobile Lane Closures	O10.19
removing a closure	O10.17
signs	O10.7
station keeping	O10.14.4
traffic parameters	O10.4
training and personnel issues	O10.3
vehicle checks	O10.11
vehicles	O10.6
working on foot	O10.19.8
working through junctions with a hard shoulder	O10.16

working through junctions without a hard shoulder vehicles	O10.15 O5.4, O5.7, O10.6
"Mobile road works" plate	D4.8.2, O8.1.13, O10.15.2, O10.16.2
Mobile traffic management	D6.24
Monitoring traffic flows	O2.3.5
Motorway	
Regulations	O6.1.2
signals	O3.20
Mounting and siting of signs	O4.5
Movement of signals	O3.21.9
Mud nuisance	O.3.16.10
Narrow lanes	D3.4.2, D3.18.2, D6.3, D6.18.3, O4.12.9
use of	D3.5.4, D6.3
"NARROW LANES" panel	D4.10.14–15, D6.16, D6.17, D6.18
No entry sign	D3.42.4, D5.14.6, O7.2.60
"NO HARD SHOULDER FOR XYDS" sign	D4.8.11, D6.10.6
No left turn sign	D4.8.17
No overtaking	
restrictions	D4.6.4
sign	D3.29.3, D4.8.19
No right turn sign	D4.8.17
"NO ROAD MARKINGS FOR X MILES" sign	O4.12.4
"NO WORKS TRAFFIC" sign	O3.11.6
Non-motorised road users	D1.5.2, D3.32, O1.5.2
Northern Ireland, applicability	D1.3.1, D2.6.2, D3.31.1, D4.1.4, D4.2.4, D5.17.4, D6.10.1, D6.26.4, DA4, O1.3.1, O2.5.3, O4.1.4, O4.7.6, O5.4.4, O8.3.3, O10.2.5, O10.5.3, O10.7.4, O10.8.2, O11.8.4
Objectives	D1.4, O1.4
Obscuration of permanent signals	D5.15.2
Obstructions on footway	O3.13.11–12
Oil drums	O4.10.2
Oncoming traffic has priority sign	O3.24.3
One-way street for two-way traffic, use of	D6.4.9
One-way working	O3.21.10
Optimum green settings	O3.21.7
Options for traffic control	D5.4.3
Other danger ahead sign	D3.26.9, D4.8.8, D5.10.12, D5.15.8, O3.21.18
Overhead cable repairs plate	D4.8.9

Overhead works	D3.16, D4.8.2, O5.9.4
"OVERHEIGHT VEHICLE DIVERT" sign	D3.16.5
Overload of controlled area	D5.1.6
Panels	
advisory maximum speed	D3.7.5
destinations	D3.17.5
distance to restriction	D4.10.15
duration of restriction	D4.12.2–6
"GET IN LANE"	D4.10.14, D6.16, D6.17
lane restrictions	D4.10.16–36
"NARROW LANES"	D4.10.14–15, D6.16, D6.17, D6.18
"REJOIN MAIN CARRIAGEWAY"	D4.10.14, D6.2.14, D6.19
"STAY IN LANE"	D4.10.14, D6.16, D6.17, D6.29.9–10
"USE HARD SHOULDER"	D4.10.14, D6.2.14, D6.16, D6.17, D6.18
Paraffin lamps	O4.7.5
Parked vehicles	O3.19, O7.2.78–9
"Part time signals" plate	D3.23.6
Peak period avoidance	D2.1.5
Pedestrian	
barriers	D3.10.4–6, O3.13.1–3, O3.19.6–7, O4.11.6–11
crossing	D4.6.2, O4.2.4
movement	O3.13.1
routes	D3.32.3–12, O3.4.2, O3.13, O4.1.11–12
Pedestrians	D1.5.2, O2.1.5, O3.13
"PEDESTRIANS LOOK LEFT/RIGHT" sign	D3.32.7, D6.4.9
Permission for builders' skip see Skips, builders'	
Personal protective equipment (PPE)	O6.3
Planning	
a closure	D2
considerations	O2.3
permission for builders' skip	O3.29.1
road works	D2
Plans – list	DA5, OA5
Plates	
"Accident"	D4.8.8, O7.1.5
advisory speed limit	D3.18.7, O3.17.2
"At level crossing"	D4.8.2
"Blasting"	D4.8.2–3, D4.8.9
"Census"	D3.26.9, D3.26.18, D4.8.9
"Delays possible"	D4.13.5–6, D4.14.5
distance	D4.8.5–6, D6.10.8
"Ditching"	D4.8.2
"Dust cloud"	D4.8.9
"Except empty vehicles"	D4.8.30
"Fallen tree"	D4.8.9
"Frost damage"	D4.8.9
"Grass cutting"	D4.8.2
"Gritting"	D4.8.2, D6.25.2, O8.2.1
"Gully emptying"	D4.8.2
"Hedge cutting"	D4.8.2
"Lighting maintenance"	D4.8.2

"Line painting"	D3.30.5, D4.8.2
"Mobile road works"	D4.8.2, O8.1.13, O10.15.2, O10.16.2
"On hard shoulder"	D4.8.2
"On slip road"	D4.8.2
"Overhead cable repairs"	D4.8.9
"Overhead works"	D4.8.2
"Part time signals"	D3.23.6
"Queues likely"	D4.8.23
"Road sweeping"	D4.8.2
"Road liable to flooding"	D4.8.9
"Runners in road"	D4.8.9
"Salting"	D4.8.2, D6.25.2, O8.2.1
"Sign erection"	D4.8.2
"Sign maintenance"	D4.8.2
"Single file traffic"	D3.26.15, D3.26.18, D4.8.26, D5.7.7, D5.8.12, D5.10.16, O8.1.10
sizes	A1.2
"Smoke"	D4.8.9
"Snow ploughing"	D4.8.2
supplementary	D4.8.2, D4.8.9
"Surveying"	D3.26.11, D4.8.2, O8.3.11
"Tree cutting"	D4.8.2
"Walkers in road"	D4.8.9
"Weed spraying"	D4.8.2
Poles as horizontal barriers	O4.11.3
Police	
high intensity warning lights	O4.7.16
signs	D4.15.6–11, O4.1.3–4
supervision	O7.2.6
temporary signs	D3.15.13
"POLICE ACCIDENT" sign	O7.1.6
"POLICE SLOW" sign	O7.1.6
Poor visibility	D3.8
Portable frames	O4.5.1
Portable traffic signals	D4.7.3, D5.4.3, D5.17.7, O3.21
Possible delays	D4.12.1–3, D4.12.6, D4.13.5–6, D4.14.5
Post-design review	D2.13
Prams	D5.5.3, O3.13.6
Prescribed signs used temporarily	O4.1.1
Primary definitions	D1.5, O1.5
Priority	
control	D5.7.1–6
over vehicles from opposite direction	O3.24.2
signs	D4.7.2, D5.4.3, D5.7
to vehicles from opposite direction	O3.24.3
traffic	O3.24
Programming	D2.9
Prohibition signs	D4.8.4
Public service vehicles, diversion	D3.15.10

Public transport	
co-ordinator	D2.1.5, D3.3.6
notification	D2.1.5, D3.3.6
Publicity	D3.40
“Queues likely” plate	D4.8.23, D7.5.6–7, O11.6.1
Radio	O3.22.3, O8.1.14, O9.1.12, O9.7, O9.8.3, O9.12, O10.12, O11.9
Railway authority	D5.17.5, O3.25.5–6, O3.25.14, O3.25.16
Railway crossing attendant	O3.25.5, O3.25.11
Railway level crossings see Level crossings	
“RAMP” sign	D3.18.5, D5.10.10, O3.16.9, O3.21.13
“RAMP AHEAD” sign	D3.18.4, D4.8.31, O3.16.8, O3.21.13
Rear markings	O5.2.3–5
Recharging tanks	O10.14.8
Recovery vehicles	D3.35, D4.10.37–8, O7.3
Recovery service – free	D3.35, O7.3
Reduced road width	D5.1.3
Reduction	
of vehicle speed	D3.7.8, D3.7.26–28, O2.3.2, O2.3.6
in visibility distance	D3.8, O2.3.6
Redundant signal heads	D4.6.1, O3.21.30
Redundant signs	D4.6.1
Reflectorisation	O4.6.2
Reflectorised hazard marker sign	D4.8.27
“REJOIN MAIN CARRIAGEWAY” panel	D4.10.14, D6.2.14, D6.19
Relaxation works	D1.6, O1.6
Relief driver	O9.1.3
Removable road marking materials	O4.12.11
Removal	
of closure	O10.17, O11.15
road studs	D6.3.6, O4.12.2, O4.12.7, O4.12.9, O4.12.16
of static traffic management	O3.8
Repair of traffic signals see Traffic signals, maintenance	
Repeater	
sign sizes	D4.4.4–5
speed limit signs	D3.7.18
Reporting of incidents	O7.6
Responsibilities	D2.2
Restricted	
headroom/working overhead	D3.16
width	D4.10.23–24

Restriction of heavy goods vehicles	D6.12
Retroreflective material	O4.6.2
Risk assessment	D3.20.1, O2.2, O3.21.20, O3.22.2, O3.28.1
Road	
closure	D3.15, D6.20
condition surveys	D3.28
diversions see Diversion; Diversions/road closures	
lighting maintenance	D4.8.2
markings	D3.30, O4.12
existing	D4.6, O4.2.5
haul route	D3.23.7
temporary	D3.11, O4.12.11–12
studs, temporary reflecting	
see Temporary reflecting road studs	
sweeping plate	D4.8.2
Road works	
end	D4.14, D5.10.16, D6.10.8
location	D4.8.7, D4.12.5
use of vehicles	D5.2, O3.19.4, O5.9
“ROAD AHEAD CLOSED” sign	D3.15.15, D4.8.20, D4.8.31
“ROAD CLOSED” sign	D3.15.14–15, D4.8.20, D4.8.31
“Road liable to flooding” plate	D4.8.9
Road narrows sign	D4.8.24
Road plates	D3.44
Roadside containers	O3.29.1
Roadside interview surveys	D3.26
Roles and responsibilities	D2.2
Rolling road blocks	O7.2.29–30, O7.2.67–68
Roof-mounted beacon	O3.19.4, O5.3, O8.1.17, O8.3.8, O8.3.10
Rotating reflector delineators	D3.13, O4.10.9–10
Roundabout	
circulatory works	D5.16.3
entry works	D5.16.1–2
exit works	D5.16.5
obstructing works	D5.16.4
Routes	
for diversion	D3.15.23
for pedestrians	O3.13
for site vehicles	D3.22
Routine Maintenance Management Systems	D6.24.7
Running lane width	D3.3
Safe	
systems of work	D2.1.3, D2.1.6, O1.4.2, O2.1.2, O3.5.7
taper positions	D3.6, O3.3
Safety	
Camera signs	D4.15.6–11

clearances	D3.2, O3.2
fencing	D6.5.1, O4.8.1
of works personnel	O3.4.2, O8.3.8
zone	D3.2.2, D3.2.17, D3.2.20, O3.2.7–9, O3.2.16, O3.2.21, O7.2.53
on bridges	D3.2.12, D3.7.7
Salting	D6.25.2, O8.2.1
"Salting" plate	D4.8.2, D6.25.2, O8.2.1
Scaffolding	D3.43, O3.28
Scope of document	D1.2, O1.2
Scotland, applicability	D1.3.1, D2.1.5, D2.4.2, D2.6.2, D2.9.1, D3.2.20, D3.43.2–3, D4.2.4, D5.17.4, D6.23.10, O1.3.1, O1.3.3, O2.5.3, O3.28.2–3, O3.29.1, O6.2.8, O10.5.3, O10.8.2
Sequentially flashing warning lights	D3.12.2, D6.8.6–8, D6.16.2, O4.7.17–19, O7.2.61
Setting out signs	O3.6.1–4, O4.1.9
Settings for signals	O3.14.7, O3.21.6
Sharp deviation of route	D3.10.7, D3.15.18, D4.8.12, D6.5.3, O4.11.12
Short-duration works	D1.6.3, D2.1.12, O3.2.14, O3.22.8, O8.3.1
Shuttle working	D5.6
Side roads within the site	D3.7.21–22, D7.9
Sign condition	O4.3, OA4.2
Sign maintenance plate	D4.8.2
Signal	
all-red settings	D5.17.6, O9.10.1, O11.5.6
control	D4.8.28, D5.10
controlled junctions	D5.15
heads redundant	D4.6.1, O3.21.30
manual operation	O3.21.5
maximum green settings	O3.21.7
"priority changed" sign	D5.10.14
timing changed	D5.10.14
Signals	
movement with works	O3.21.9
portable	D4.7.3, D5.4.3, D5.17.7, O3.21
switched off	D4.6.2, D5.15.2, O3.21.30, O4.2.4
settings	O3.14.7, O3.21.6
Signing	
considerations	D4.2
and guarding unnecessary	D3.20, O4.1.11
and marking	O4
accuracy	O4.2
principles	O4.1
principles	D4
Signs	
authorisation	D4.2.3, O4.9
backs of	O3.13.8, O4.5.9–10
ballast	O4.4.2
cleanliness	O4.1.7, O4.3.1

condition	O4.3, OA4.2
damaged	OA4.2
displaced	O3.7.10, O4.1.7
illumination see Illumination of signs	
illumination at survey sites	D3.26.8
inspection	O3.6.8
junction in road works see Junction within road works	
for lane restrictions, closures and contra-flow works	D4.10
legibility	O4.1.7
maintenance	O4.1.14
manufacture	O4.9.2
mobile	D6.24, O4.2.1
mounting structures	O4.5
police	D4.15.6–11, O4.1.3–4
procurement	O4.1.13
redundant	D4.6.1
setting out	O3.6.1–4, O4.1.9
siting	O4.5.4–6
sizes	D4.4, A1.2
stability	O4.4
temporary	O4.1.5–8
traffic survey	D3.26.4, D3.26.19
Single carriageway road	D5
"Single file traffic" plate	D3.26.15, D3.26.18, D4.8.26, D5.6.4, D5.7.7, D5.8.12, D5.10.16, O8.1.10
Single lane width minimum	D3.3.1, D4.2.6
Single vehicle works	D6.25, O8.1
Site	
access	D3.21
access lane	D3.2.15, D6.7.1, O3.2.21
approval of haul route crossing	D3.23.2
information	D2.8, O2.5
length – maximum	D3.5
personnel	O6
supervisor	O7.1.3
Siting distance of first sign	D4.4.8
Size	
of repeater signs	D4.4.4–5
of signs	D4.4, A1.2
and siting of signs	D4.4
of supplementary plates	D4.8.2
Skips, builders'	O3.29
(Markings) Regulations	O3.29.2
permission for	O3.29.1
specification for	O3.29.4, OA4.1
Slip road	
closure	D6.21
entry	D3.17.3, O11.7.6–8, O11.18.1, A1.4–5
exit	D6.10.9, D6.20.4, D6.20.8, O10.16.3
merges	O9.11.3
Slippery road sign	D3.18.8, D4.8.22, O3.16.11
"SLOW CENSUS POINT" sign	D3.26.10, D3.26.18
"SLOW WET TAR" sign	D4.8.31

Small light arrow sign	O8.1
"Smoke" plate	D4.8.9
"Snow ploughing" plate	D4.8.2
Soil mounds	O4.11.3
"Sorry for any delay" sign	D4.14.5
Spacing of cones see Cones, spacing	
Speed	
check area/cameras	D4.15.6–11
control/temporary speed limits	D3.7, D4.14.3–4, O4.1.6
limit	D3.7.5
Regulations	D3.7.19
signs	D3.7.20, D4.1.5, D4.14.4, D4.15.8–9, D6.10.8, D6.16.3, D7.5.3, D7.8.5, O4.1.6, O4.3.4, O9.6.4, O9.6.8
Spraying white lines	D3.30.4–5
Stability of signs	O4.4
Standard works	D1.6, O1.6
Static traffic management	D6.14, O3.6–8
Statutory undertakers	D2.7, O1.1.3, O3.26.1, O5.9.3, O6.2.6
"STAY IN LANE" sign	D3.26.17
"STAY IN LANE" panel	D4.10.14, D6.16, D6.17, D6.29.9–10
Stepped taper	D6.8.5, D6.16.2
"STOP/GO"	D5.8
"STOP/GO" sign	D4.7.1
"STOP-WORKS" sign	D5.4.3, D5.9, O3.23
Stop	
authority to	O6.1.2
line marking	O4.12.4
"STOP AT CENSUS POINT" sign	D3.26.10, D4.8.29
"STOP POLICE" sign	O7.1.6
Storage of materials	D3.24, O2.3.2, O3.18
Street lighting maintenance	D4.8.2
Structure and scope of the Chapter	D1.2, O1.2
Studs	D3.18.2, O4.12
temporary reflecting road	D3.11, O4.12.15–17
Supervisor vehicles	O5.5.2
Supervision by police	O7.2.6
Surface	
condition	D3.18, D6.2.6, O3.16
dressing	D3.29.1–2, O3.17
Surfacing	D3.29, O9.1.4

Surveillance/use of CCTV	D3.35.13, D3.37, D6.2.11, O7.5
Survey see Traffic survey	
“Surveying” plate	D3.26.11, D4.8.2, O8.3.11
“Road sweeping” plate	D4.8.2
Symbolic diversion sign	D3.15.20–22, D3.15.24, O4.3.3.
Systems of work – safe	D2.1.3, D2.1.6, O1.4.2, O2.1.2, O3.5.7
Tank recharging	O10.14.8
Taper	
of cones	D3.8.2, D3.9.2, D3.26.4, O3.3.1
exit	D5.4.5, D6.8, O7.2.54
lead-in	D3.6, D5.4.6, D5.5.3, D5.7.7, D5.8.12, D5.10.16, D6.8, O3.2, O7.2.47–48
stepped/direct	D6.8.5, D6.16.2
Telephone	O7.5.1
emergency	D3.19.1, D3.35.4, D4.10.36, D6.2.4, O3.20.1, O3.25.9, O10.5.6
facilities	D3.35.25, O7.3.8
at level crossings	O3.25.9, O3.25.16
Temporary	
footway	O3.13.5, O3.13.9–10
give way markings	D3.15.13
height restriction	D4.10.25–26, O3.2.19
lighting	D3.41.8, O4.8
police signs	D3.15.13
reflecting road studs	D2.1.8, D3.11, D3.14.1, O3.4.1, O4.12.15–17
removable road marking materials	O4.12.11
road markings	D3.11, O4.12.11–12
safety fencing as barrier	D3.2.2
signs	D3.7.18, D3.7.21, O4.1.5–8
speed limits	D3.7
traffic control	D4.7
traffic management vehicle specifications	D4.7, O5.5
traffic management design	D2.1
traffic regulation orders	D3.39, D4.3
traffic signals	D3.41.5, D3.41.10, D4.7.3, D5.4.3, D5.6.3, D5.8.3, D5.15.5, D5.17.7, O3.21, O3.22.5
waiting restrictions	D3.15.13, O5.9.3
“TEMPORARY ROAD SURFACE” sign	D3.18.3, D4.8.31, O3.16.4
Three-minute check count	O10.14.13
Tidal flow	D6.28–29, O7.1.7, O7.3.17
Timber baulks	D3.14.3, O4.10.11
Traffic	
cones see Cones	
count	D6.1.3, O10.13.6, O10.14.13, O11.6.1
cylinders see Cylinders	
disruption	D2.10
diverted	D3.15.3, D3.15.7
flows	
convoy working	D7.2
monitoring	O2.3.5
management	
design	D2.1, D2.2.2, D2.12

management/maintenance vehicles officer	O5.5, O5.9 D2.6.2, D3.35.6, O7
Traffic control	
at aircraft taxiway crossings	O3.26
"Give and take"	D5.6
minor roads	D5.4
options	D5.4.3
priority signs	D5.7
"STOP/GO"	D5.8
at railway level crossings	D5.17.6–7
traffic signal	D5.10
"TRAFFIC CONTROL AHEAD" sign	D3.29.3, D4.8.31, D5.8.12, D5.9.6, O3.21.22, O3.21.27, O3.22.12, O8.1.21, O9.8.2
"TRAFFIC SIGN MAINTENANCE" sign	D4.8.31
Traffic signals	
control	D5.10
equipment at haul route	D3.23.3
on haul route	D3.23
junctions	D5.14
maintenance	D3.25, D5.10.13, O3.21.21
portable	D4.7.3, D5.4.3, D5.17.7, O3.21
Traffic signals ahead sign	D3.23.5, D5.10.11, D5.10.16, O3.21.16
"TRAFFIC SIGNAL MAINTENANCE" sign	D4.8.31, D5.15.10
"TRAFFIC UNDER SIGNAL CONTROL" sign	D4.8.2, D5.15.7, D5.15.9, O3.21.17
Traffic surveys	
sign spacing	D3.26 D3.26.4, D3.26.19
Training	O6.2, O7.2.15, O10.3, O11.9
Transition sections	D3.42
"Tree cutting" plate	D4.8.2
Tunnels	D3.41
Turn left/right sign	D4.8.14
Turn left/right ahead sign	D4.8.15
Two-way operation installation	D6.4.1
Two-way traffic	D3.3.2, D5.4.3, D5.5
Two-way traffic sign	D3.42.10, D4.8.25
Uneven road sign	D3.18.6, O3.16.5
"USE HARD SHOULDER" panel	D4.10.14, D6.2.14, D6.16, D6.17, D6.18
Utility identification sign	D4.15.5
Variable message signs (VMS)	D3.37.3, D3.38, D4.12.6, O2.5.3, O3.6.3, O3.7.4, O3.20.5, O7.2.32–36, O10.1.8, O10.5.1, O10.5.8, O11.20.1
Vehicle	
checks	D3.27, O10.11
issues	O5, O7.2.73
beacons	O5.3

conspicuity	O5.2, O7.2.40, O7.2.73, O8.3.7
general	O5.1
impact protection	O5.4
recovery	D3.35, D4.10.37–38, D6.2.11, O7.3
at road works, use of	D5.2, O3.19.4, O5.9
weight and condition checks	D3.27
Vehicle-mounted signs	D3.30.4, O4.1.10, O11.7.1–5
Verge works	D3.2.19, D3.20.2–3
Vertical clearance	D3.2.23–24, O3.2.19–20, O3.2.22
Visibility	
distance	D1.6.3, D3.8, D5.7.1, O1.6.3, O2.3.6
to first sign	D4.4.7
Visually impaired people	D3.10.4, O3.11.2, O3.13.6, O3.25.10, O3.28.2, O4.11.6, O4.11.8, O7.1.9
Waiting restrictions	D3.15.13, D3.39.4, O5.9.3
Wales, applicability	D1.3.1, D2.6.2, D4.2.4, D5.17.4, D6.23.10, O1.3.1, O2.5.3, O6.2.8, O10.5.3, O10.8.2
Warning lights	D3.2.2, D3.12, D6.8.5–6, O4.7
high intensity flashing	O3.9.3, O4.7.14–16, O7.2.62
“WEAK BRIDGE” sign	D4.8.30
Weather see Adverse weather conditions	
“Weed spraying” plate	D4.8.2
Weight restriction sign	D4.8.30, D4.10.22, D6.12.2
Wheel washing equipment	O3.16.10
Wheelchairs	D5.5.3, O3.16.6, O3.13.6
“WHEN QUEUING USE BOTH LANES” sign	D6.23.7–8
“WHEN RED LIGHT SHOWS WAIT HERE” sign	D5.10.16, O3.21.14, O3.21.25
“WHEN STOP SIGN SHOWS WAIT HERE” sign	O3.21.25, O3.21.27
White lines	D3.14.1, D3.30.5, D4.6, D4.8.19, O4.2.5, O4.12.5, O4.12.10
on cones	O4.10.6
Wide loads	D3.10.11, D4.10.31–36, O2.3.7
White-lining	D3.30.4–5, O10.14.8–9
Wider carriageways on motorways	D6.13
Width of running lane	D3.3
“WORKFORCE IN ROAD – SLOW” sign	D4.8.10, O3.6.3, O3.7.4, O3.8.2, O3.20.2
Workforce issues	O6
training	O6.2
Working hours	D2.4.1, O6.5
Working in the hours of darkness	O3.9
Working space	D3.2, O3.2

Works

access	D3.21, D6.22, O3.11
off the carriageway not requiring guarding and/or signs	D3.20
carried out from a vehicle	D5.2
close to level crossing	D5.17, O3.25
delineation	D3.14, O3.4
exit	D3.21, D6.22
personnel	O6
protection by works vehicle	O5.9.2
undertaken at or near normal road speed	O8.2
vehicle in attendance	O3.19.4
vehicles	O5
zone	D6.18, D6.29.19
"WORKS ACCESS" sign	D3.21.2
"WORKS ACCESS ONLY 100yds" sign	D6.10.9, D6.22.3-5
"WORKS EXIT" sign	D3.21.2, D6.22.3-6
"WORK IN CENTRE OF ROAD" sign	D4.8.31
"WORKS TRAFFIC" sign	D3.21.3, O3.11.7
"WORKS TRAFFIC MERGING 100yds" sign	D6.22.3-6
"WORKS TRAFFIC ONLY" sign	D3.21.4, D6.22.3-5, O3.11.11
Xenon discharge lamps	O10.8.3