

Traffic Signs Manual

Chapter 8

Traffic Safety Measures and Signs for Road Works and Temporary Situations

Part 1: Design

Department for Transport/Highways Agency

Department for Regional Development (Northern Ireland)

Transport Scotland

Welsh Assembly Government

Traffic Signs Manual 2009

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CHAPTER 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations

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Chapter 8

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D1 INTRODUCTION

D1.1 BACKGROUND

D1.1.1 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.

D1.1.2 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.

D1.1.3 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 must 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.

D1.1.4 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 Work Regulations (NI) 2000. Good management of the work is essential to prevent accidents and ill health.

D1.1.5 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.

D1.2 STRUCTURE AND SCOPE OF THE DOCUMENT

D1.2.1 Chapter 8 (2009) comprises two documents:

- This document, **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.

- 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.

D1.2.2 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.

D1.3 LEGAL STATUS

D1.3.1 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.

D1.3.2 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.

D1.3.3 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.

D1.3.4 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).

D1.3.5 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.

D1.3.6 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.

D1.4 CONCEPTS AND OBJECTIVES

D1.4.1 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.

D1.4.2 Underlying the design of temporary traffic management arrangements should be the aim to produce a safety performance no worse than the rate for non-works conditions, whilst minimising delays for traffic passing the works or incident. The provisions within this Chapter are intended to achieve this aim. Health and Safety legislation imposes a duty upon designers to ensure that their temporary traffic management arrangements can be implemented, modified, maintained, and removed safely.

D1.4.3 In general this document sets out design provisions for temporary traffic management arrangements which are appropriate in all weather, visibility and traffic conditions. However it also indicates how these provisions may be relaxed in response to short-term situations with good visibility and low traffic flows, see **Section D1.6**. The relaxations contained within this document are intended to retain the fundamental signing principles whilst reducing the intensity of temporary traffic signs, road markings, and delineators.

D1.4.4 This document makes recommendations based on good practice for the guidance of temporary traffic management designers. It is intended to guide the designer through the design process and through the considerations that are necessary to produce safe and effective temporary traffic management arrangements. It is not a prescriptive specification or a collection of model temporary traffic management layouts. It is recognised that the guidance given cannot cover all situations and it is for the designer to adopt, adapt or develop the required traffic management to suit the actual conditions.

D1.5 PRIMARY DEFINITIONS

D1.5.1 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.

D1.5.2 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.

D1.5.3 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.

D1.6 STANDARD WORKS AND RELAXATIONS

D1.6.1 Temporary traffic management schemes referred to in this Chapter are either “**standard**” schemes, “**relaxation**” schemes or else emergency traffic management.

D1.6.2 “**Standard**” schemes are appropriate for works carried out in all weather, visibility and traffic conditions.

D1.6.3 “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 [Section D5](#) and plans for dual carriageway roads in [Section D6](#).

D1.6.4 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.

D1.6.5 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.

D1.6.6 Emergency traffic management should only be deployed for short-term incident management.

D2 PLANNING THE WORKS

D2.1 GENERAL PRINCIPLES OF TEMPORARY TRAFFIC MANAGEMENT DESIGN

D2.1.1 This section deals with the general principles of temporary traffic management design and its application to the planning of road works schemes. 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.

The secondary objective is:

- to keep traffic flowing as freely as possible.

Clients, project designers and traffic management designers need to be conscious of these objectives during all stages of the design process and particularly when considering the traffic management requirements of the design brief.

D2.1.2 It is vital that risk assessments are carried out at all stages of the development of the project, bearing in mind the potential hazards to the workforce and the public.

D2.1.3 The final traffic management design will see the implementation of the project risk assessment process translated into a safe system of work for both operatives and road users.

D2.1.4 There are a number of tasks which need to be undertaken in the course of the planning, design and implementation of temporary traffic management arrangements. Traditionally these tasks have often been associated with certain roles carrying particular job titles. It is recognised that there is increasing variation in the arrangements and forms of contracts relating to highway works and that reference to traditional roles may not always be appropriate. When tasks are allocated, it is essential that the person or organisation responsible for each task is identified, and that satisfactory completion of each task is recorded.

D2.1.5 During the planning stage of road works schemes the following points should be noted.

- Safety is the prime consideration.
- Attention must be paid to the needs of pedestrians. This applies especially in the vicinity of bus stops, shops, post offices, leisure facilities and day centres, where larger numbers of people with physical/mental impairments may be expected.
- Maintenance works should be undertaken in the minimum time, taking up the minimum of road space, but without compromising safety. Where practicable, additional resources or time-reducing techniques should be considered.
- There must always be liaison with the Highway Authority concerned to avoid concurrent works in close proximity.
- When a length of road is closed the opportunity should be taken to carry out any other maintenance required on that length of road.
- Holiday periods, if higher than normal flows are expected, special events and festivals should be avoided as far as possible. When the traffic is predominantly recreational, for example, at weekends and during bank holidays, the effect on lane capacity may be to reduce it by up to 30%. If demand exceeds available capacity, queues will develop and road users could be put at risk. If flows are expected to be lower than normal during holiday periods then consideration should be given to carrying out the works at this time.

- Public transport operators may be affected by the proposals and should be informed, together with the public transport co-ordinator of the local council, of any temporary traffic management schemes on public transport routes. It should be remembered that alterations to routes and stopping arrangements for local bus services can be a particular problem for people with mobility impairments in accessing public transport.
- Where appropriate, there should be liaison with the police and other emergency services and also with any adjacent local highway authorities or transport operators who have significant fleet operations in or through the works affected area.

The requirements of the Traffic Management Act 2004 (not applicable in Scotland) and the New Roads and Street Works Act 1991 must also be taken into account.

D2.1.6 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.

D2.1.7 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.

D2.1.8 Obstruction of part of a road may require drivers of vehicles to carry out unusual manoeuvres, so drivers must be given a 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.

D2.1.9 The detailed principles for guiding and controlling traffic past the more usual types of road works in safety are set out in this document. These should be followed as far as they are applicable to any particular site. The application of these principles and the signs and other equipment used to implement them are set out in plans within the document for typical types of road and types of work.

D2.1.10 The plans illustrate the minimum signing requirements in each case. The individual features of each site's layout and location must be carefully considered and additional signs should always be used if there is any doubt about the safety of any particular site. Examples of the situations where particular consideration will be needed are works situated close to schools, workshops for the visually impaired, old people's homes, works' entrances and junctions. Additional signs may also be required where sight lines are restricted by sharp bends, humps or steep gradients. However, too many signs can also be a problem for drivers due to sign overload and distraction, so care should be taken to add only signs that are considered necessary.

D2.1.11 In the interests of road safety and driver comprehension of traffic management schemes at major road works, it is essential that all schemes should adhere as closely as possible to the principles illustrated in the plans provided in this document. If this is achieved, drivers will always encounter the same signing and layout in similar situations. Local variations make it more difficult for drivers from another area to understand what is required of them and hence lead to possible confusion, hesitation and the risk of accidents. Where there is no plan available to suit a particular situation, as many of the standard features as possible should be incorporated into the proposed layout; any special signs should follow the principles established in the existing prescribed and authorised signs for road works. All unique or special layouts for trunk roads require authorisation by the appropriate Department.

D2.1.12 There will be some short-duration works which may be carried out either as static traffic management or by mobile traffic management techniques (Mobile Lane Closure or single vehicle works).

D2.1.13 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 schemes.

D2.2 ROLES AND RESPONSIBILITIES

D2.2.1 Roles and responsibilities of the client, co-ordinator, designer, principal and other contractors are detailed in the Construction (Design and Management) Regulations (CDM) 2007 and the Construction (Design and Management) Regulations (NI) 2007. The traffic management designer, together with the project designer, has a duty to prepare a traffic management design solution which is safe for the road user and the workforce, with all pertinent factors being assessed and risks eliminated, or where this is not possible, minimised and controlled.

D2.2.2 The client, co-ordinator and project designer have an obligation to supply the traffic management designer with all available relevant information and collected data – the “design brief”. The traffic management designer may need to liaise with the relevant sources to confirm information and data that is critical to the traffic management solution. The early involvement of the contractor should be considered to ensure that the design is safe, achievable and maintainable.

D2.3 DESIGN BRIEF

D2.3.1 The traffic management design brief is generally prepared by the project designer, and should identify the proposed works and programme, and provide an outline of the traffic management proposals and phases.

D2.3.2 For small scale road repairs, such as those carried out by local authorities, a formal design brief may not be required. However, safety and risk assessment issues must be addressed.

D2.3.3 A risk assessment will need to be carried out and the relevant health and safety issues addressed, refer to [Section D2.14](#).

D2.3.4 During the planning of the works there will need to be consultation with all relevant authorities and interested parties. The following sections cover a number of areas where consultation will be required.

D2.4 HIGHWAY AUTHORITY

D2.4.1 The Highway Authority may impose specific requirements and be aware of constraints that will have a bearing on the management of the site and may influence the traffic management design. These may include the following:

- minimum carriageway/ lane availability requirements;
- capacity and congestion issues;
- working hours and constraints;
- production of traffic regulation orders ([Section D3.39](#));
- road closures and diversion routes requirements ([Section D3.15](#));
- co-ordination arrangements with other planned road works and street works ([Section D2.7](#));

- emergency services access requirements ([Section D2.6](#));
- legal agreements and land restraint requirements, including public access to frontages etc.;
- incident management arrangements and provisions for vehicle recovery ([Sections D3.33](#) to [D3.36](#));
- winter maintenance arrangements;
- publicity requirements (e.g. press and advance signing) ([Section D3.40](#));
- abnormal loads movement requirements; and
- vulnerable road users and special needs groups' requirements.

D2.4.2 Under the Traffic Management Act 2004 (not applicable in Scotland, however the Transport (Scotland) Act 2005 may apply) road works may require a permit under the appropriate permit scheme.

D2.5 ADJOINING HIGHWAY AUTHORITIES

D2.5.1 Where the works have an impact on an adjoining Highway Authority's network, the client or their agents should obtain their agreement on access, signing, diversion routes, adjacent concurrent works etc.

D2.5.2 On roads which are not public highways but to which the public have access, if there is a hazard, e.g. road works, then the Health and Safety (Safety Signs and Signals Regulations) 1996 require that the signs used shall conform to the signs in TSRGD.

D2.6 EMERGENCY SERVICES

D2.6.1 Police, fire and ambulance services should, if appropriate, be consulted in relation to the timing and layout of the works and the emergency routes through the works, see [Section D6.7](#). In certain circumstances, there may be other organisations that will need to be consulted in the planning of the works, such as the coastguard, lifeboat crews and mountain rescue teams. Discussions may also be appropriate with the principal breakdown organisations on permitted access.

D2.6.2 Where appropriate the client should liaise with the police with regard to implementation of traffic management and enforcement issues. For certain trunk roads in England, advice will also be sought from the English Regional Control Centres, responsible for traffic officers. In Northern Ireland, this will be the Roads Service Traffic Control Centre, Traffic Scotland in Scotland, and in Wales, the National Assembly of Wales Traffic Control Centres. Other points that may influence the traffic management design that may need to be considered:

- enforcement of traffic regulation orders ([Section D3.39](#)) and use of speed cameras ([Section D3.7](#));
- arrangements for routeing emergency vehicles ([Section D6.7](#));
- incident management procedures ([Section D3.33](#)); and
- speed enforcement measures.

D2.7 STATUTORY UNDERTAKERS

D2.7.1 Under the New Roads and Streetworks Act 1991, there is a duty on road authorities and statutory undertakers to co-ordinate their works. This will include programming of temporary traffic management and arrangements for the statutory undertaker's contractors.

D2.7.2 Emergencies dealt with by the public utilities will normally be signed by them, sometimes in conjunction with the police or traffic officers (if appropriate), where the emergency lasts for only a few hours. Where emergency and remedial work is expected to be of longer duration, the Highway Authority or its maintaining agents should be consulted as soon as possible in order to agree to the erection of appropriate signs.

D2.8 SITE INFORMATION

D2.8.1 Any special features that may impact on the operational safety of the works will need to be taken into account during the design.

D2.8.2 There is likely to be a considerable stock of existing information about the site and this should be gathered and passed to those responsible for the detailed traffic management design (the "design brief" – see [Section D2.3](#)) and the traffic management operation, see [Part 2: Operations, Section O2.5](#). Site information could include:

- information on traffic flows and patterns, peak periods etc.;
- information on pedestrian usage and usage by other vulnerable road users;
- availability of alternative routes for diverted traffic;
- details of any traffic sensitive streets and sites of specific engineering difficulty;
- details of any railway or tram restrictions;
- location and nature of permanent signs and road markings;
- information about existing safety barriers;
- accident records;
- the presence of underground and/or overhead services (see HSE Guidance Notes HSG47 and GS6);
- the presence of rail crossings and other rail signalling equipment which, for example, may affect the location of temporary signals;
- local weather conditions, e.g. susceptibility to local flooding, fog etc.;
- safe refuge for vehicles used in association with the temporary traffic management; and
- needs of local residents and businesses.

D2.8.3 The topics listed above are discussed in more detail in [Section D3](#).

D2.9 PROGRAMMING

D2.9.1 The detailed programme is usually developed during the planning of the construction works. However, the designer should consider the need for a realistic programme when establishing contract length, considering constraints and closedowns. The requirements of the Traffic Management Act 2004 (not applicable in Scotland) must also be taken into account.

D2.10 TRAFFIC DISRUPTION

D2.10.1 A key objective of the temporary traffic management arrangements is to minimise traffic delays and disruption while maintaining a safe site and the safety of the public.

D2.10.2 Road works schemes 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, and safety and efficiency, to minimise traffic and road user congestion, delay and inconvenience.

D2.10.3 Maintenance works should be undertaken in the minimum time taking up the minimum of road space, but without compromising safety. Where practicable, additional resources or time-reducing techniques should be employed.

D2.11 BASIC CONSIDERATIONS

D2.11.1 Space at road works sites is often at a premium and consideration should be given to ensuring that the works and traffic management scheme can be carried out in a safe manner and minimising the disruption to traffic. In particular, the project designer and traffic management designer should consider:

- number and width of temporary traffic lanes, including use of hard shoulder ([Section D3.3](#));
- safety zones and the necessary working space ([Section D3.2](#));
- adequacy of work-space for the proposed work operations and for storage of materials and equipment, including consideration of the selection of suitable plant and machinery to do the work planned ([Section D3.2](#) and [Section D3.24](#));
- arrangements for access to and exit from the site. ([Section D3.21](#));
- option of using static or mobile traffic management ([Section D6.24](#) and [Part 2: Operations, Section O10](#));
- option of using convoy working where lateral safety clearance is restricted (not applicable for use on motorways) ([Section D7](#));
- option of using contra-flow traffic management technique on dual carriageways ([Section D6.4](#));
- lane restrictions and use of temporary speed limits ([Section D3.7](#)); and
- spacing of temporary road works signs and installation of signals and barriers. ([Section D4.4](#) and [Part 2: Operations, Section O4](#)).

D2.12 DETAILED TRAFFIC MANAGEMENT DESIGN

D2.12.1 For large scale works, the scheme traffic management design is led by the traffic management designer, who will produce the detailed traffic management layouts including scale plans of the traffic management scheme and possible alternatives which have been evaluated and assessed.

D2.12.2 The objective of the detailed traffic management layout is to demonstrate a practical solution to facilitate safe passage of traffic, including pedestrians, past the works and ensure that the safety of the workforce is not compromised. This requires an objective overview in detail of all the factors previously considered (e.g. design brief, consultation, and site constraints) to ensure production of a composite solution. In addition to familiarity with the appropriate standards and advice notes, knowledge of the site and the ability to visualise the traffic flow through the works are most important.

D2.12.3 The traffic management designer carries responsibility for the health and safety implications of the detailed traffic management design and must always consider the implications of erection, modification and removal of the traffic management arrangements, including temporary vehicle safety barriers if utilised. As part of the design, the traffic management designer should advise on the minimum standard of maintenance and inspection required to maintain the safety and integrity of the design (see Part 2: Operations, Section O3.7).

D2.12.4 This document provides guidance about minimum signing requirements for temporary traffic management. The signing must always convey accurately to road users, including pedestrians, exactly what is happening and what is expected of them. The demarcation of safety zones needs to be clear.

D2.12.5 For smaller scale works, a schedule of restraints plus an indicative design should be supplied to the contractor who will then produce the detailed traffic management design.

D2.13 POST-DESIGN REVIEW

D2.13.1 Upon completion of the detailed traffic management design, the proposals, as a whole, should be reviewed by the project designer and a formal risk assessment undertaken. At this stage the programme for the works should be finalised and the traffic management requirements confirmed.

D2.13.2 For complex schemes, and schemes which result in a change of layout that may raise safety concerns, the post-design review should include an independent road safety audit.

D2.13.3 The post-design review also provides the opportunity to check that the traffic restrictions required by the detailed temporary traffic management design are appropriately covered by traffic regulation orders and that any special sign authorisations and equipment type approvals are in place.

D2.13.4 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)).

D2.14 HEALTH AND SAFETY ISSUES

D2.14.1 Where works are in progress on a highway or other road to which the public have access, the Health and Safety at Work etc. Act 1974 (or Health and Safety at Work (NI) Order 1978) requires those responsible for the works to establish and maintain safe systems of work. The Management of Health and Safety at Work Regulations 1999 (MHSW) and the Management of Health and Safety at Work Regulations (NI) 2000 require risk assessments and the principles of prevention be applied to protective measures to control risks identified by the risk assessments. Those responsible for the works are also required to protect the property of those lawfully using the highway from damage. Therefore warnings, barriers and other measures should be placed at or near

the site of the works to such an extent as is needed to discharge these obligations. These measures must be removed when no longer required. The Highway Authority has the ultimate responsibility for the administration of work that affects its roads.

D2.14.2 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.

D2.14.3 Additional 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).

D2.15 DOCUMENTATION

D2.15.1 The temporary traffic management design should be set out in clear documentation including drawings and specifications, if appropriate, which are scheme specific. The documentation should not include any standard drawings, or details, which are not applicable to the scheme.

D3 DESIGN CRITERIA

D3.1 GENERAL

D3.1.1 This section gives advice on general design issues. However, not all the following guidance applies to all situations, but these criteria should be followed as appropriate.

D3.2 SAFETY CLEARANCES

D3.2.1 The following advice concerns the minimum lateral (sideways), vertical and longitudinal (longways) clearances that should be provided between moving traffic and the works for different types of roads. The establishment of well defined minimum width safety zones, into which workers and plant should not enter in the normal course of work and in which materials should not be deposited, is an essential prerequisite to ensuring safety during road works. An example of a safety zone is shown in [Figure 3.1](#). For safety clearances between opposing flows of traffic on a dual carriageway see [Section D6.4](#).

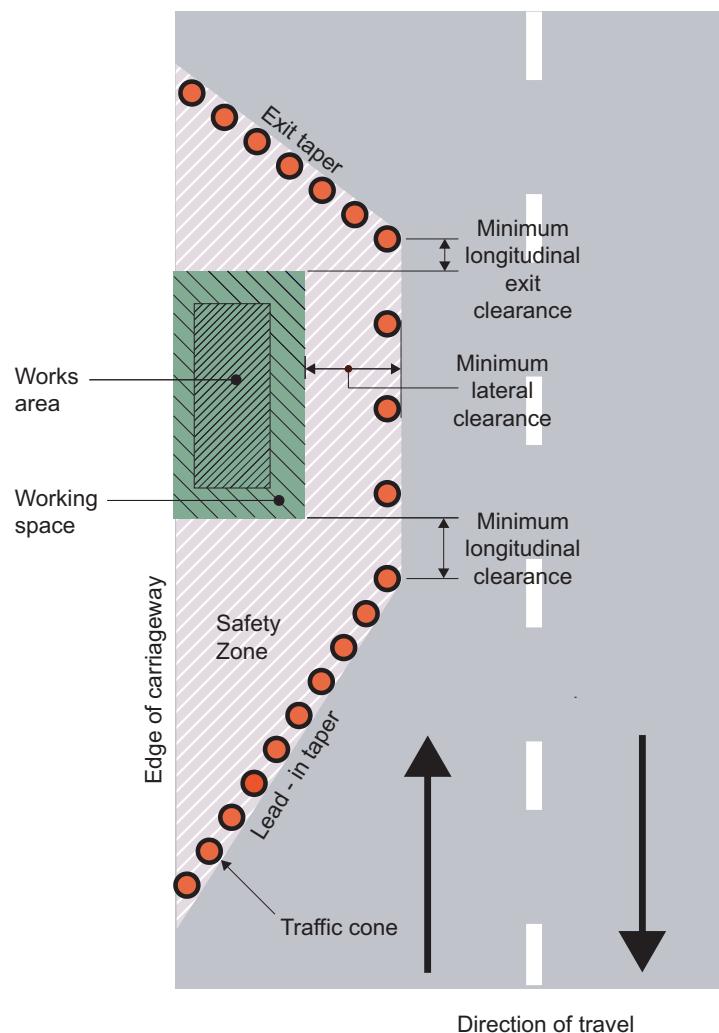


Figure 3.1 Safety zones – typical site layout

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.

D3.2.2 The outer boundary of the safety zone should always be marked by traffic cones, with the addition of warning lights during darkness, except where marked by a temporary vehicle restraint safety barrier (see [Section D3.10](#)). 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 and to attract workers' attention when they are in danger of stepping out of it. Suitably supported traffic tape could suffice for this marking; see Part 2: Operations, paragraphs O3.2.11 to O3.2.13. Supports should not be driven into the road surface, but should be stable and able to withstand wind buffeting from passing vehicles. The use of temporary safety barriers is dealt with in [Section D3.10](#).

D3.2.3 Adequate working space should be provided around the works to allow for temporary works, stores, the movement of persons, moving parts of plant or machinery such as jibs or booms, equipment and transport. The working space may vary during the period of the works and need not be a constant width around the works. However, the boundaries of the site should be sufficiently visible that workers do not stray into the safety zone or the adjacent live traffic lanes.

D3.2.4 Lateral and longitudinal clearances are measured at ground level, but apply above ground up to the headroom dimensions given in paragraph [D3.2.23](#). 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 boundaries, including tapers, should be regarded as parts of the safety zone as shown in [Figure 3.1](#).

D3.2.5 Designers should bear in mind that excavations or structures very close to the carriageway will tend to cause drivers to shy away from the edge and thus to encroach on another traffic lane. In these circumstances the designer should, where possible, provide additional lateral safety clearance, and ensure the near side traffic lane width is maximised taking all carriageway restraints into account.

D3.2.6 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.

D3.2.7 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.

D3.2.8 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 [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 [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 [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 D7, Convoy Working](#).

D3.2.9 For roads with a permanent speed of 40 mph or less the lateral clearance should be not less than 0.5 m.

D3.2.10 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.

D3.2.11 On motorways and dual carriageway roads a minimum clearance of 0.45 m should be provided between the carriageway and any temporary road works sign. For recommended sign sizes and x-heights refer to [Table A1.2 \(Appendix 1\)](#). Refer to [Part 2: Operations](#), paragraph [O3.2.17](#) for permitted signs reorientation and use of reduced x-heights where minimum clearance is difficult to achieve. Reflectorised signs are sensitive to changes in orientation. The designer 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. See also paragraph [D3.2.18](#).

D3.2.12 On certain major bridges and other structures and in some tunnels, the overall width of highway may be limited, making it difficult to maintain an adequate capacity for traffic if the full 1.2 m wide safety zone is provided. In such cases, the safety zone may be reduced in width to not less than 0.5 m provided that:

- full advantage has first been taken of the scope to reduce the lane width in accordance with the advice given in [Section D3.3](#); and
- a temporary mandatory 40 mph speed limit is imposed with enforcement when work is in progress.

Where this exceptional provision is invoked the inner edge of the safety zone should always be marked by a continuous barrier or fence.

D3.2.13 For narrow lanes on motorways, and other dual carriageways, it may be permissible to reduce the setback to the central reservation safety barrier (depending on its form) thus releasing an additional width of paving for use as part of the temporary running surface. For certain central reservation barriers, a mandatory speed limit of 50 mph or less on both carriageways may permit a reduction in setback on both carriageways. Setback criteria are set out in TD 27 "Cross-sections and headrooms" (DMRB 6.1.2) and criteria relating to safety barriers are given in TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

D3.2.14 Any extension of the paving carried out to permit reduction of the setback should be strong enough to carry the expected traffic load and could be carried out as part of the preliminary works. Safety clearances between traffic and the works must be provided in accordance with paragraphs [D3.2.6](#) to [D3.2.9](#).

D3.2.15 On motorways and dual carriageway roads the provision of a site access lane as shown in [Figure 3.2](#) may be required on major reconstruction works. The lane must 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 carriageway 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 0.5 m if a temporary speed limit of 40 mph or less is applied to the access lane.

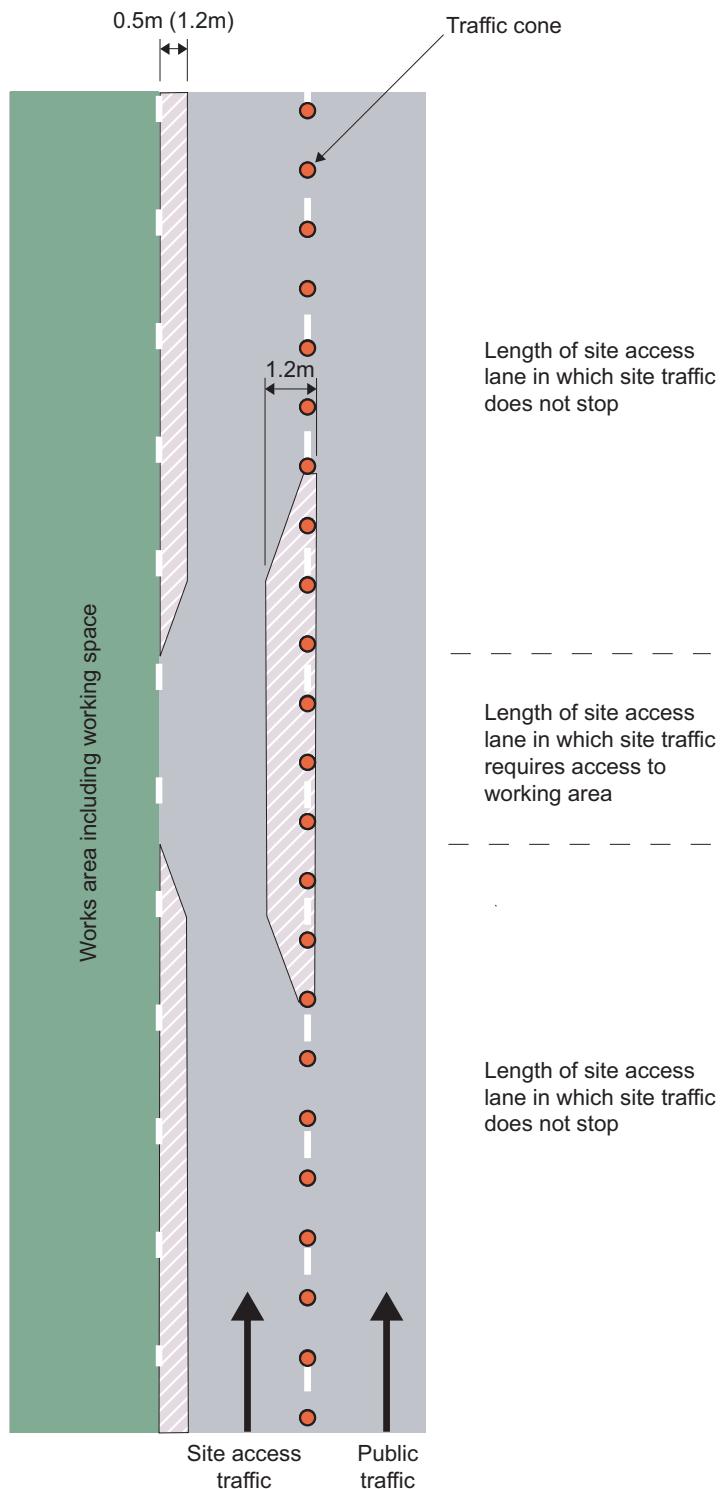


Figure 3.2 Location of safety zones in relation to site access lane

D3.2.16 When works are being carried out on the central reservation of a dual carriageway, consideration should be given to establishing a safety lane, in addition to those lanes required to carry out the work, and implementing hard shoulder running if feasible. Use of the hard shoulder as a running lane is dealt with in Section D6.2.

D3.2.17 For works within the central reservation, safety zones (or safety lanes) should be provided on both sides of the barrier. This will normally involve closing the off side lane of the secondary carriageway. Where the central reservation is sufficiently wide to enable the works to be undertaken safely, a risk assessment may conclude that a lane closure on the secondary carriageway will not be necessary.

D3.2.18 When designing traffic management schemes in which provision is made for vehicles to travel outside the normal limits of the carriageway and/or hard shoulder (for example, 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; see [Section D3.10](#).

D3.2.19 Works which are carried out on footways and highway verges, which when guarded allow the lateral clearances to the edge of the carriageway given in paragraphs [D3.2.6](#) to [D3.2.9](#), or which do not force pedestrians into dangerous situations by encroaching on the carriageway, will not require signing on the carriageway. Such works should be adequately protected by continuous barriers separating them from works traffic and vehicular traffic and, if there is any danger to pedestrians, should also be provided with warning lights at night. Working space may be required on the carriageway side of such works, in which case it may be necessary to encroach upon the carriageway. In this event the full provision of signs, cones, barriers and warning lights will be required. Where works vehicles are required to stop on the carriageway advance warning signs should be provided.

D3.2.20 The longitudinal safety zone is an open or unoccupied space between the end of the lead-in taper and the working space and provides a margin of safety for both the traffic and the workers. It is illustrated in [Figure 3.1](#). It is important that the longitudinal safety zone is free of equipment, workers, materials and parked vehicles. The minimum longitudinal clearance should be based on the road's permanent speed limit and not on any temporary reduced speed limit. In Scotland, this requirement may be varied to the temporary speed limit with the agreement of Transport Scotland.

D3.2.21 In urban areas subject to a 30 mph permanent speed limit, the minimum longitudinal clearance is the same length as the lateral clearance, 0.5m. The longitudinal clearance between the working space and the lead-in taper must be increased for higher permanent speed limits and the minimum values applicable are shown in [Table 3.1](#) below.

D3.2.22 The minimum longitudinal exit clearance for the placement of any temporary traffic signs/signals and access to and from the exit taper for traffic management operatives to carry out any necessary maintenance of the traffic management arrangement is also given in [Table 3.1](#). The longitudinal clearance should be as great as is practicable, but in no case be less than 0.5 m regardless of speed limit.

Table 3.1 Minimum and desirable longitudinal clearances

Permanent speed limit (mph)	Minimum longitudinal clearance (m)	Desirable longitudinal clearance (m)	Minimum longitudinal exit clearance (m)	Desirable longitudinal exit clearance (m)
30 or less	0.5	10	0.5	9
40	15.0	30	3.0	9
50	30.0	50	3.0	9
60	60.0	100	9.0	9
70	100.0	200	9.0	9

D3.2.23 The minimum headroom to be provided at temporary structures (for example, 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 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. Designers should consider the potential risk to the temporary structure posed by an errant vehicle and the possible need to provide a temporary safety barrier. Guidance on these aspects is given in TD 19 “Requirement for road restraint systems” (DMRB 2.2.8); 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.

D3.2.24 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.

D3.3 LANE WIDTHS

D3.3.1 On all roads, in order to provide the required lateral clearance, the running lane width may be reduced according to the expected type of usage. Where heavy vehicles, including public service vehicles, caravans etc. are expected, the lane width may be reduced to 3.25 m (desirable minimum) or 3.0 m (absolute minimum). Where two lanes are required for HGVs the near side lane should be 3.25 m (absolute minimum).

D3.3.2 On single carriageway roads, two-way operation of traffic should be maintained. This normally requires an unobstructed width of carriageway of 5.5 m, but see paragraph **D3.3.6** for considerations relating to bus routes, and paragraph **D3.3.7** for considerations relating to cyclists. If the width of unobstructed carriageway is less than 5.5 m, the through passage should be further restricted using cones to ensure that the traffic lane is not greater than 3.7 m and alternate one-way traffic (shuttle working) introduced using one of the methods of traffic control described in **Sections D5.6 to D5.8** and **D5.10**. The minimum width lane at which shuttle working may be maintained is 3.0 m, but, car-only traffic can be maintained with a minimum of 2.5 m. However, where the traffic is expected to consist only of cars and other light vehicles the lane width may be reduced to 2.75 m (desirable minimum) or 2.5 m (absolute minimum). Guidance on the maximum length of works and flow criteria can be found in **Sections D5.6 to D5.8** and **D5.10**. Whenever this situation arises, advance warning of the narrow lanes should be given using signs to diagram 516 or 517.

D3.3.3 For works on minor roads (see **Section D5.3**) where traffic speeds are restricted to 30 mph or less, the width of a single lane may be reduced to an absolute minimum of 2.5 m, for cars and light vehicles. Adequate warning of narrow lanes must be given, for example, by using a sign to diagram 516 and 517; see **Section D5**.

D3.3.4 Works on dual carriageway roads may require some traffic lanes to be reduced in width to less than 3.0 m. Whenever this situation arises, advance warning of the narrow lanes should be given. In these circumstances it will be necessary to re-mark the carriageway; see **Section D6.3**.

D3.3.5 When works are to be undertaken which will restrict the width of a road on which overtaking is normally permissible, it may be advisable to consider the imposition of a “no overtaking” restriction for the duration of the works. However, it is usually possible by means of temporary barriers, fences, cones or

cylinders to prevent overtaking at those places where it would be dangerous, while permitting it elsewhere. The appropriate signs to be used are the "road narrows" signs to diagram 516 or 517 with a "Single file traffic" plate to diagram 518, which is generally used only when a lane has been lost. Chapter 4, Section 4 includes general advice on the use of these signs. In no circumstances should a "no overtaking" sign to diagram 632 be used in the absence of a traffic order.

D3.3.6 Works in narrow roads may leave insufficient width for public service vehicles to pass. Bus operators and the public transport co-ordinator should be advised of a proposal where:

- the width of any road which forms part of a bus route is to be reduced to less than 3.0m; or
- for two-way working on a bus route, the width is to be reduced to less than 6.75m; or
- any bus stop may become unusable during the course of the works.

D3.3.7 On all-purpose single and dual carriageway roads, the designer should consider the adequacy of lane width provisions for vehicles to overtake cyclists safely. Department for Transport Traffic Advisory Leaflet 15/99 advises that cyclists need a width of at least 1.25 m to travel safely, thus requiring a minimum lane width of 3.25 m to allow a typical car to safely overtake a cyclist. Where there are HGVs and buses, additional lane width will be required, refer to the Traffic Advisory Leaflet 15/99 for further guidance. See also paragraphs D3.32.13 to D3.32.15.

D3.4 LANE CAPACITY

D3.4.1 The capacity of a road is defined as the maximum vehicle throughput at a site when there is a queue present upstream. **Table 3.2** below gives the likely maximum values for the capacity of normal width traffic lanes in terms of vehicles per lane per hour for different percentages of heavy goods vehicles.

D3.4.2 The capacity of narrow lanes should be taken to be 10 to 15 percent less than the figures given in **Table 3.2**.

D3.4.3 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 during this period.

Table 3.2 Capacity value of traffic lanes

Road Type	Capacity values (veh/lane/hr)					
	Percentage HGVs					
	5%	10%	15%	20%	25%	30%
1 lane rural	1330	1270	1220	1170	1120	1080
2+ lanes rural AP dual carriageway	1710	1640	1570	1500	1440	1380
2, 3, 4 lanes motorway urban or rural	1900	1820	1740	1670	1600	1540
1, 2 lanes urban road	1330	1270	1220	1170	1120	1080
1 lane suburban road	1330	1270	1220	1170	1120	1080
2 lanes suburban dual carriageway	1710	1640	1570	1500	1440	1380

D3.5 LENGTH OF WORKS

D3.5.1 The maximum length of a site on a trunk road is 4 km and the minimum distance between sites is as given in [Table 3.3](#) below except where otherwise agreed by the Highway Authority. These requirements may be varied on other roads, with the approval of the Highway Authority. The length of a site is taken as the distance between end of lead taper and the start of the exit taper.

Table 3.3 Distance between sites

Type of road	Distance between sites*	
	Standard works (km)	Works with relaxations (km)
Single carriageway road with a permanent speed limit of 30 mph or less	2	1
Single carriageway road with a permanent speed limit of 40 mph	5	2
Single carriageway road with a permanent speed limit of 50 mph or more	10	5
Dual carriageway road with a permanent speed limit of 40 mph or less	5	2
Dual carriageway road with a permanent speed limit of 50 mph or more	10	5

*see paragraph D3.5.3

NOTE: These requirements relate to trunk and principal roads and may be varied on other roads, with the approval of the Highway Authority.

D3.5.2 The distance between sites should be measured from the road works end sign to diagrams 7001 and 645, or the road works end signing (7001, 645 and 671) on a yellow background (see paragraph [D4.14.4](#)), of the first site to the start of the coning at the second site.

D3.5.3 The distance between sites is given in [Table 3.3](#) above and the standard works column should be used where either of the sites is a standard works and the relaxation column where both relate to works with relaxations. In all cases, the given distances between sites may be halved if the traffic demand is not expected to exceed the capacity of the lanes left open to traffic at the second site.

D3.5.4 When narrow lanes are used, drivers require a raised level of concentration and this should be taken into consideration when determining the maximum length of the scheme.

D3.6 SAFE TAPER POSITIONS

D3.6.1 Tapers are a fundamental element of traffic management layouts. Their position will be influenced by the location of the works in relation to road features, for example, slip roads, and the need to provide a longitudinal safety zone. However, the prime consideration should be that they are situated where sight lines are good (in both the vertical and horizontal planes). Additional lengths of lane closure may be required for this to be achieved. A taper closing an off side lane should only be positioned at a location where each successive cone is clearly visible to the left of the preceding cone. Similarly for a taper closing a near side lane, each successive cone should be clearly visible to the right of the preceding cone.

D3.6.2 The locations of safe taper positions should be identified on all networks and the details recorded. These details should be held by those responsible for maintaining the highway, or their agents, and they shall make them available to those responsible for design and operation of temporary traffic management.

D3.6.3 The location of tapers should be decided following a risk assessment but, in general, on dual carriageway roads tapers should not be installed adjacent to entry or exit slip roads.

D3.6.4 It is essential, before detailing tapers as part of the traffic management design, that a full appreciation of the site is obtained; a site visit is the only way to be sure that the theoretical layout can be achieved in practice. Consideration of safety issues involved in placing, erecting and removing advance warning signs and cones in the taper and the provision of safe pulling off points for traffic management vehicles may also be factors in deciding the taper position.

D3.6.5 In addition, on roads without hard shoulders, the traffic management should be designed so that safe taper positions are identified 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.

D3.6.6 Where road works are situated near a bend in the road, and especially a left-hand bend, it is essential that adequate advance warning is given to approaching drivers because of the reduced visibility. An indication should be given of the path that must be followed to avoid any obstruction in the carriageway.

D3.7 SPEED CONTROL/TEMPORARY SPEED LIMITS

GENERAL

D3.7.1 Works should be designed to minimise the risks to road users and the workforce. Having done so, implementation of a temporary mandatory speed limit should be considered, especially where the workforce is required to operate on the carriageway, or other vulnerable area.

D3.7.2 There may often be pressure for temporary speed limits, but it is important that their limitations as a protection to persons working on the site should be realised. Traffic speeds will inevitably be reduced where busy roads are severely obstructed, so a speed restriction may not be necessary. On dual carriageway roads, where works requiring protection are taking place within the central reservation or on the other carriageway, any protection necessary on the unobstructed carriageway should be given by means of coning rather than a speed limit.

D3.7.3 To help ensure compliance, the designer should involve enforcement agencies early in the design of a road works scheme to ensure agreement on enforcement issues and the siting of cameras and signs. The locations of cameras, either at a fixed point or for average speed measurements, should be designed to reduce the likelihood of drivers making sharp braking manoeuvres. It is, therefore, recommended that cameras are not located between the initial terminal speed limit signing and the first repeater sign, see [Table 3.4, Note 1](#). The design programme for such works should make provision for the time necessary to obtain temporary traffic regulation orders.

D3.7.4 In the event of an emergency, when road users or road workers are at risk and there is insufficient time to obtain temporary traffic regulation orders under normal procurement procedures, consideration should be given to obtaining a traffic order under emergency notice procedures (section 14(2) of the Road Traffic Regulation Act 1984).

D3.7.5 Where it is impracticable to obtain a mandatory speed limit, consideration should be given to the application of an advisory speed using the bottom panel to diagram 7275 or the free-standing sign to diagram 7294. VMS or matrix signals may also be used to show the maximum speed advised. The method for assessing the appropriate speed is the same for advisory speeds as for mandatory speed limits.

D3.7.6 For roads other than motorways where the highway width is so restricted as to prohibit the provision of the appropriate lateral safety clearance, one option is to reduce traffic speeds to less than 10 mph and an agreed safe method of working imposed on the site; see [Section D7, Convoy Working](#). This may be achieved by

the imposition of a temporary mandatory 10 mph speed limit. For both single and all-purpose dual carriageway high-speed roads, a temporary maximum speed limit of at least 20 mph lower than the permanent limit should be imposed in advance of the 10 mph limit.

D3.7.7 Where on bridges, other structures and in tunnels, the overall width of highway is limited, making it difficult to maintain an adequate traffic capacity with the full lateral clearance, a reduced safety clearance may be considered in conjunction with the enforcement of a reduced mandatory maximum speed limit of 40 mph or less; see paragraph D3.2.12.

D3.7.8 Direct risks to the safety of the workforce should be countered by the presence of vehicle restraint barriers or changes in working methods that eliminate the risks. 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 be minimised. When direct measures to ameliorate identified risks to workers are not likely to be fully effective at the permanent speed limit, or represent an increased risk to road users, the imposition of a temporary speed reduction should be considered.

D3.7.9 Under normal circumstances, temporary speed limits should only be imposed at road works in response to temporary hazards arising from the temporary traffic management arrangements. However, when road works involve a number of discrete works areas which are within 800 m of each other, it may be appropriate to continue the temporary speed limit between sites irrespective of the presence of temporary traffic management arrangements between sites.

D3.7.10 Where changes to the work being undertaken remove or alter the need for temporary traffic management, the extent of any temporary speed limit should be adjusted to match the new temporary arrangements. A temporary speed restriction shall not be left in force once works are completed (or where works are left in a part complete state for any significant length of time) unless its immediate removal would pose additional risk to road users. It is not acceptable to maintain traffic management to justify the retention of a temporary speed limit or to maintain a temporary mandatory speed limit where there is no overall risk benefit in so doing.

D3.7.11 Where works are suspended or part suspended during holiday periods, temporary speed limits should also be removed unless any remaining temporary traffic management required to protect part complete works also presents a risk to road users. In situations where lane closures are reduced to hard shoulder closures, it would be expected that temporary speed limits would be removed or set at a higher level.

D3.7.12 Where it is anticipated that regular imposing/removing of speed restrictions will be necessary, consideration should be given to using remotely operated signs for safety reasons.

D3.7.13 Traffic regulation orders should be written in a form that will allow temporary speeds limits to be changed to reflect alterations in temporary traffic management over the length of the works. If the temporary speed limit is required for purposes other than in support of temporary traffic management arrangements it is essential to ensure that the temporary speed limit order is still applicable or another order is promoted to address the particular reason (e.g. solely safety related) for the speed limit remaining.

D3.7.14 Temporary speed limits should generally be imposed 50 m in advance of the first sign at road works indicating a restriction or lane closure, On a two-lane single carriageway road this is likely to be the "road narrows ahead" sign to diagram 517 and on a dual carriageway road a lane closure sign to diagram 7202. This ensures that speed restrictions apply to the sector of the temporary traffic management arrangement in which vehicle manoeuvres or lane changing tends to occur.

D3.7.15 Speed restrictions should extend to a point, 90 m for dual carriageway roads and 45 m for one-way single carriageway roads, beyond the last cone of the temporary traffic management arrangement. However, on two-way single carriageway roads, to ensure that the speed limit is enforceable, the signs indicating the end of the speed restriction must be located back to back with those in the other direction that indicate the start

of speed restriction. The Regulations require signs to diagram 7001 with an "End" plate to diagram 645 to indicate the end of a temporary mandatory speed limit although a combined end of works and the permanent speed limit sign may be used; see [Section 4.14](#).

D3.7.16 The designer should consider where to site the signs to ensure clear visibility (see [Section D4.4](#)). The resulting location of the signs may alter the distance from the works given above, but must be accurately referred to in the traffic regulation order.

D3.7.17 In general, a temporary speed limit should not be introduced where the length of restriction would be less than 800 m on dual carriageway roads and 400 m on single carriageway roads, measured between the initial speed limit sign and the sign indicating the end of all restrictions.

D3.7.18 At sites where the length of road affected is 800 m or longer, repeater signs at regular intervals along the length of the works are required to remind drivers of the maximum speed and ensure better compliance. See [Table 3.4, NOTES](#) for details of the spacing of these repeater signs.

Table 3.4 Signs for the temporary speed limit

Type of road	Size of terminal signs	Size of repeater signs
Dual carriageway road (national speed limit)	1500 mm	900 mm
Dual carriageway road with a permanent speed limit of 50 mph or 60 mph	1200 mm	750 mm
Single carriageway road with a permanent speed limit of 50 mph or more)	900 mm	600 mm
Other roads with a permanent speed limit of 40 mph	750 mm	600 mm
Other roads with a permanent speed limit of 30 mph or less	600 mm	450 mm

NOTES:

1. The recommended maximum spacing of repeater signs for temporary speed limits is as follows:
 - for temporary speed limits of 50 mph or more: consecutive repeater signs on the same side of the carriageway not more than 700 m apart, with a maximum of 450 m between consecutive signs on alternate sides of the carriageway;
 - for temporary speed limits of 40 mph: consecutive repeater signs on the same side of the carriageway not more than 500 m apart, with a maximum of 350 m between consecutive signs on alternate sides of the carriageway; and
 - for temporary speed limits of 30 mph or less: consecutive repeater signs on the same side of the carriageway not more than 400 m apart, with a maximum of 250 m between consecutive signs on alternate sides of the carriageway. On lit roads subject to a temporary limit of 30 mph, repeater signs must not be used.
2. Further advice on spacing and size of signs for use on non-trunk roads, including side roads, can be found in Chapter 3.
3. The size of signs on a side road should be one size larger than that recommended in Chapter 3 for the permanent signs.
4. Except where required for signing of enforcement cameras, see paragraph [D4.15.10](#), or where required to avoid sign obscuration, the spacing between repeater signs on the same side of the carriageway should not normally be reduced from that specified in Note 1. Placing repeater signs in pairs on both sides of the carriageway is discouraged due to the increased exposure to workers in maintaining this arrangement.
5. If the police or other enforcement body request additional signs or reduced repeater spacing, the designer should confirm with the body that a risk assessment has been carried out of the effect of the requested signs on road worker safety.

D3.7.19 The police can only enforce speed limits where the speed limit signs are correctly placed and conform to the requirements of the Regulations. The extent of any temporary mandatory speed limit should be checked against the temporary order to ensure the limits of the restriction do not exceed those permitted by the order.

D3.7.20 Temporary speed limit signs at road works on high-speed roads and other roads should comply with **Table 3.4** above. The initial speed limit signing must be placed on both sides of the carriageway, for both dual and single carriageway roads. If the termination signing includes signs to diagram 670 or 671, then it must also be placed on both sides of the carriageway, for both dual and single carriageway roads. The use of the sign to diagram 7290 is no longer recommended.

D3.7.21 Where side roads join the road works, and are subject to a different speed limit from that imposed through the works, temporary speed limit signs must be provided for traffic entering the works site. Any existing speed limit signs for traffic leaving the side road must be fully covered with opaque material or removed. Where the limit through the works is:

- lower than the limit on the side road; a temporary speed limit sign must be placed on each side of the carriageway of the side road, not more than 20m from the junction and plainly visible to traffic about to enter the works;
- higher than the limit on the side road; temporary speed limit signs need not be provided on each side of the carriageway of the side road for traffic entering the works, provided that there is a repeater sign in the works not more than 100m from the junction for traffic travelling in each direction. If the repeaters are more than 100m from the junction, a terminal sign showing the temporary limit must be placed on each side of the carriageway of the side road, not more than 20m from the junction.

Similar principles apply at signalled and unsignalled junctions, at crossroads and at all roundabouts.

D3.7.22 If the permanent speed limit on the side road is the same as the permanent limit on the road on which works are being carried out, there will be no existing speed limit signs at the junction. In order to indicate to traffic turning off the road with the temporary limit the end of that limit, a sign to diagram 7001 in combination with an "End" plate to diagram 645 or a speed limit sign to diagram 670 indicating the limit in force on the side road must be placed on the near side of the side road not more than 20m from the junction. If the limit is the national limit, a sign to diagram 671 must be used instead of diagram 670.

D3.7.23 All terminal signs must be directly lit (not merely reflectorised) throughout the hours of darkness if they are placed on a trunk or principal road within 50m of a street lamp. All signs, including repeaters, not required to be directly lit must be reflectorised.

D3.7.24 If during the course of the works, any existing speed limit signs require covering, they must be fully covered with opaque material or otherwise removed. 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.

HIGH-SPEED ROADS

D3.7.25 The application of temporary mandatory speed limits should be considered for all planned works on high-speed roads, i.e. roads with a permanent speed limit of 50 mph or more. Temporary mandatory speed limits are established for each site and made by means of a temporary traffic regulation order; see [Section D3.39](#). Better compliance can be obtained with these than with advisory speed limits because they are more readily understood by drivers and they are enforceable.

D3.7.26 [Table 3.5](#) shows recommendations for the appropriate speed reduction to limit the risks associated with specific traffic management features on high-speed roads. Usually these features are not concurrent, but in such situations the designer would need to weigh the assessed risks to determine whether it is appropriate to apply a greater speed reduction.

Table 3.5 Speed limit reduction table for high-speed roads

Temporary traffic management feature		Speed reduction
Restricted visibility ⁽¹⁾	restricted driver forward visibility	20 mph
Loss of hard shoulder	used as running lane	20 mph
	closure of hard shoulder refuge	zero
Loss of vehicle restraint barrier ⁽²⁾	without protection	20 mph
	with protection	zero
Lane restrictions ⁽³⁾ giving rise to lane changing	other than light traffic flow ⁽⁴⁾	20 mph
	light traffic flow ⁽⁴⁾	zero
Lane merge	other than light traffic flow ⁽⁴⁾	20 mph
	light traffic flow ⁽⁴⁾	zero
Narrow lane width ⁽⁵⁾	HGV lanes less than 3.3 m and other traffic lanes subject to width restrictions less than 3.0 m	20 mph
Contra-flow traffic management	with or without narrow lanes	20 mph
Crossovers and changeovers	determined by design speed	see TA 92 "Crossover and changeover design" (DMRB 8.4.6)

NOTES:

1. For example, where a works structure or road works feature is likely to obstruct a driver's forward visibility and the sight line distance is likely to be reduced below the desirable minimum.
2. The speed reduction where there is loss of vehicle restraint barrier should be related to the risk. Reference should be made to TD 19 "Requirement for road restraint systems" (DMRB 2.2.8) and the risk assessment tool. Where a vehicle restraint barrier is removed from the central reservation as part of the temporary works and a temporary barrier, or an Impact Protection Vehicle (see [Part 2: Operations, Section O5](#)) equivalent, is not installed, or is installed but does not provide an equivalent containment level, it should be classed as without protection.
3. Where lane restrictions apply, e.g. lane closure, weight, width or height restrictions.
4. Refer to the [Glossary \(Appendix 2\)](#) for the definition of light traffic flow.
5. Lanes less than 3.3 m wide that are required to carry HGVs, including public service vehicles, or lanes less than 3.0 m wide which are subject to vehicle width restrictions, are to be considered as narrow lanes.

D3.7.27 On high-speed roads the greatest required speed reduction applicable from [Table 3.5](#) above should be used throughout the site; also refer to paragraph [D3.7.26](#) above. One exception to this is where the crossover speed limit is lower than at other areas. Another exception is the prevention of over-long lengths of over-restrictive speed restrictions, i.e. where the length of road works is required to exceed 4 km and the speed limit to be imposed on the initial length of road (1 km or greater) is lower than that required for the remaining majority length of road works.

D3.7.28 Speed reduction should be considered on a case-by-case basis and should involve a site-specific risk assessment. Generally for motorways and dual carriageway roads normally subject to the national speed limit, a temporary maximum speed limit should not be less than 40 mph and for other high-speed roads not less than 30 mph. Temporary mandatory speed limits are not required for relaxation works.

D3.7.29 Applying speed restrictions for factors not listed in [Table 3.5](#), and where drivers are unlikely to identify a potential hazard, is likely to reduce the level of compliance. General safety concerns, such as queuing traffic and inoperable matrix signals, are not normally sufficient to justify speed limits unless there are relevant substandard or non-standard features e.g. insufficient stopping sight distance or active lane control. Where there is sufficient justification for imposing a speed limit in these situations, signs to diagram 7004 should be used to inform drivers of the nature of the hazard, see paragraph [D4.13.11](#).

D3.8 REDUCTION IN VISIBILITY DISTANCE

D3.8.1 Where road works are situated near a bend in the road, and especially a left-hand bend, it is essential that adequate advance warning is given to approaching drivers because of the reduced visibility. An indication should be given of the path that must be followed to avoid any obstruction in the carriageway. These remarks apply to all works, including those of a temporary nature, for example, those for which the supplementary plates mentioned in paragraph [D4.8.2](#) below would be appropriate.

D3.8.2 A tapered line of cones must start far enough in advance of the obstruction to enable drivers to negotiate both the bend and the obstruction in safety. The tapered line of cones must be located in advance of the bend so that it is clearly visible on the approach side. These precautions will also help to safeguard those persons working on the road.

D3.8.3 Where it is considered that positive traffic control is necessary, the requirements set out in [Sections D5.8 to D5.10](#) should be observed.

D3.8.4 Sight lines need to be considered from both the traditional highway design perspective where the road users' needs are considered, and also from the operatives' point of view (e.g. the design of works access/exit). The project designer should ensure that layouts consider the sight line requirements from both points of view and endeavour to ensure that provision of forward visibility and signing does not compromise the operatives' safety.

D3.9 USE OF DELINEATORS

D3.9.1 Traffic 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.

D3.9.2 Traffic 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 [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.

D3.9.3 In adverse weather conditions, especially fog, traffic cone spacings may need to be reduced in order to continue to give drivers adequate guidance past the obstruction. 9m spacing should always be the maximum in these conditions.

D3.9.4 For works on motorways and all-purpose dual carriageway roads with hard shoulders, where there are long straight runs and there is good visibility, the 9m longitudinal spacing of traffic cones may be relaxed to 18m. In this case the spacing of the warning lights should also be 18m, see [Table A1.3 \(Appendix 1\)](#).

D3.9.5 For works of short length a minimum of two traffic cones should be placed between the entry and exit tapers.

D3.9.6 Special arrangements for traffic cones at builders' skips are described in [Part 2: Operations, Section O3.29](#).

D3.9.7 Traffic cylinders can be fixed into the bases of existing depressible road studs or into purpose-made bases. They are used to separate opposing flows of traffic where one carriageway of a dual carriageway road is required to carry two-way traffic or to separate two lanes which are to become segregated or to be rejoined.

D3.10 USE OF SAFETY BARRIERS

D3.10.1 Obstructions and excavations should be adequately guarded at all times. Barriers may be used to protect all persons from roadside hazards, obstructions/excavations and/or for the protection of the workforce from an errant vehicle.

D3.10.2 Barriers should be visible by day and night. 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. Barriers may also constitute a traffic sign; see paragraph [D3.10.7](#) below.

D3.10.3 There are four basic types of safety barrier that may be used:

- 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 restraint safety barriers.

PEDESTRIAN BARRIERS

D3.10.4 Requirements for maintaining pedestrian mobility are set out in [Section D3.32](#). Particular attention should be paid to the needs of people with mobility and visual impairments. A pedestrian barrier should be provided on those sides of an obstruction that restrict pedestrian flow or are accessible to pedestrians.

D3.10.5 Pedestrian barriers alongside excavations should be the subject of a risk based assessment. Barriers alongside excavations greater than 300mm 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 300mm 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.

D3.10.6 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. Where works are adjacent to or in the carriageway, a safety zone will need to be provided as described in [Section D3.2](#). 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.

TRAFFIC BARRIERS

D3.10.7 Traffic barriers for guiding vehicles past obstructions should be placed on the traffic side of the obstruction and should be red and white to diagram 7105, or where a driver is required to alter direction sharply to diagram 7104 and must be reflectorised (or illuminated internally or externally during the hours of darkness). Examples of the use of both types of barrier are shown in the plans in [Section D5](#) and [D6](#).

D3.10.8 In some cases, it may be appropriate to provide a temporary vehicle safety restraint barrier acting as a traffic barrier. It may be appropriate to provide traffic barriers in addition or to mark the vehicle safety restraint barrier in accordance with diagram 7105.

LIGHTWEIGHT BARRIERS

D3.10.9 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.

VEHICLE RESTRAINT SAFETY BARRIERS

D3.10.10 Temporary vehicle restraint safety barriers compliant with BS EN 1317 may take the form of permanent type vehicle restraint safety barriers erected temporarily or purpose made temporary safety barriers. For further guidance on the use of vehicle restraint safety barriers refer to TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

D3.10.11 Where it is evident at the design stage that a temporary vehicle restraint safety barrier will be necessary to protect road users and/or the workforce, its use should be specified as part of the design. The type and length that is needed will need to be based on the requirements and guidance given in TD 19. Other factors that should be considered are the time taken and means of installation, maintenance and removal of the safety barrier, implications arising from its use on works accesses and exits, the emergency services, wide loads, the duration of the works and the provision of a vehicle recovery service. Designers also need to take into account speed limits and the degree of deflection of the safety barrier which may occur in the event of an impact. In determining whether to include temporary safety barriers, the project designer shall undertake a risk assessment of the situation, considering the above factors, the cost benefit of the proposed use and any special arrangements which may be necessary to facilitate safe installation and removal.

D3.10.12 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 \(Appendix 1\)](#).

D3.11 TEMPORARY ROAD MARKINGS AND STUDS

D3.11.1 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 should be provided. Refer to [Part 2: Operations, Section O4.12](#) for details relating to advice on the standards for temporary road marking materials and on the use of the "NO ROAD MARKINGS" advance warning signs to diagram 7012.

D3.11.2 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 appropriately masked or removed when they might give misleading information to drivers or be hazardous in themselves.

D3.11.3 Drivers shall be given a 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.

D3.11.4 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 these minimum classes.

D3.11.5 Temporary studs are not recommended for use for periods much longer than three months and they must not be utilised for more than one application.

D3.11.6 The following factors in particular should be considered by the designer when designing a temporary traffic management system which incorporates temporary road markings:

- time of year the work will be executed and thus the likely weather and climatic conditions throughout the duration of the works;
- the nature of the existing and proposed road surface – locations of road surfaces which may require special treatment both for the application of temporary markings and the removal of existing ones should be identified; and
- suitable methods for removal or covering of existing road markings – some methods can be time consuming and the possibility of an advance works phase prior to contract commencement may need to be considered.

D3.11.7 At sites with temporary layouts consideration should be given to the use of temporary road studs in place of road markings, where road studs are an alternative option, (e.g. Detail J, see [Table A1.5 \(Appendix 1\)](#)), to facilitate the installation of the layout in poor weather.

D3.11.8 The edge of a carriageway without raised kerbs should be indicated by a 100 mm-wide continuous reflectorised white line to diagram 1012.1 with its near side edge placed approximately 200 mm from the actual edge of the carriageway. Where flush kerbs are provided, the edge line should be superimposed on the kerb.

D3.12 WARNING LIGHTS (ROAD DANGER LAMPS)

D3.12.1 Warning lights must conform to the National Annex to BS EN 12352:2006. In addition, the external surface of the light body visible to road users shall be coloured lemon, colour reference no. 335, or golden yellow, colour reference no. 356 of BS 381C:1996. The lights should be placed at regular intervals along the line of an obstruction. The spacing of warning lights on tapers is specified in [Table A1.3 \(Appendix 1\)](#), also refer to [Part 2: Operations, Section O4.7](#). High intensity warning lights (beacons) are defined as warning light types WL5 and WL6 in the National Annex to BS EN 12352:2006.

D3.12.2 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 lights shall not be used on barriers to diagram 7105

within the taper. The lights have been authorised for use on the motorway and trunk road network. However, 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.

D3.12.3 Further guidance on the use of warning lights is given in [Part 2: Operations, Section O4.7](#).

D3.13 ROTATING REFLECTOR DELINEATORS

D3.13.1 Rotating reflector delineators are mechanisms complying with regulation 56(6) which enable one or more amber reflectors, complying with diagram 560 or 561, to be displayed intermittently whilst rotating and constantly whilst static. They do not constitute warning lights to BS EN 12352:2006. They must always be mounted on top of traffic cones to diagram 7101.1. Rotating reflector delineators may be used only 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 lead-in tapers.

D3.14 DELINEATION

D3.14.1 It is essential that at all times all persons who use the highway should clearly see the lateral limits of the works and traffic lanes that they are required to use, from all directions of approach. This should be achieved by the use of some or all of the following: traffic cones, traffic cylinders, temporary white lines, temporary reflecting road studs, temporary barriers, and additionally warning lights must be used during the hours of darkness and in poor visibility; see [Section D3.12](#).

D3.14.2 The boundaries of all road works must be clearly delineated to indicate the limits of the carriageway and to protect the works and personnel. This should be done by means of traffic cones, cylinders and barriers, and prescribed signs in accordance with the Regulations. Warning lights must be used after dark and should be used at times of poor visibility. The aim should be to guide approaching vehicles gradually into a lane past the works. The devices used may be supplemented by temporary edge of carriageway markings. The overall appearance should be such that drivers can readily judge the limits of the lane.

D3.14.3 Timber baulks, and non-approved proprietary barrier type systems, should 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. Their use on roads with a permanent speed limit of 30 mph with street lighting should be checked with the Highway Authority and is likely to be acceptable provided that:

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

D3.15 DIVERSIONS/ROAD CLOSURES

D3.15.1 The designer should discuss road closure options for any planned works with the police and the appropriate highway authorities early in the planning stage. For trunk roads the presumption is to maintain the existing route, see paragraph [D3.15.12](#). However, where there is an agreed diversion route, or it is likely that a suitable diversion route can be found and agreed, the designer should include the diversion option in his risk assessment considerations.

D3.15.2 Road diversions may be necessary in order to close a road or because of continuing congestion, and the need for temporary orders under Section 14 of the Road Traffic Regulation Act 1984 must be borne in mind. Sometimes such a diversion may be necessary only for traffic proceeding in one direction.

D3.15.3 Any diversion introduces new traffic movements, so that confusion and hazards may result. Diversions should therefore be planned with the Highway Authority taking account of the suitability of the diversionary route for the expected traffic flows, comprehensive directional signing (see Figure 3.3), priority at junctions, the presence of railway level crossings and low bridges and the effect of diverted traffic on the environment.

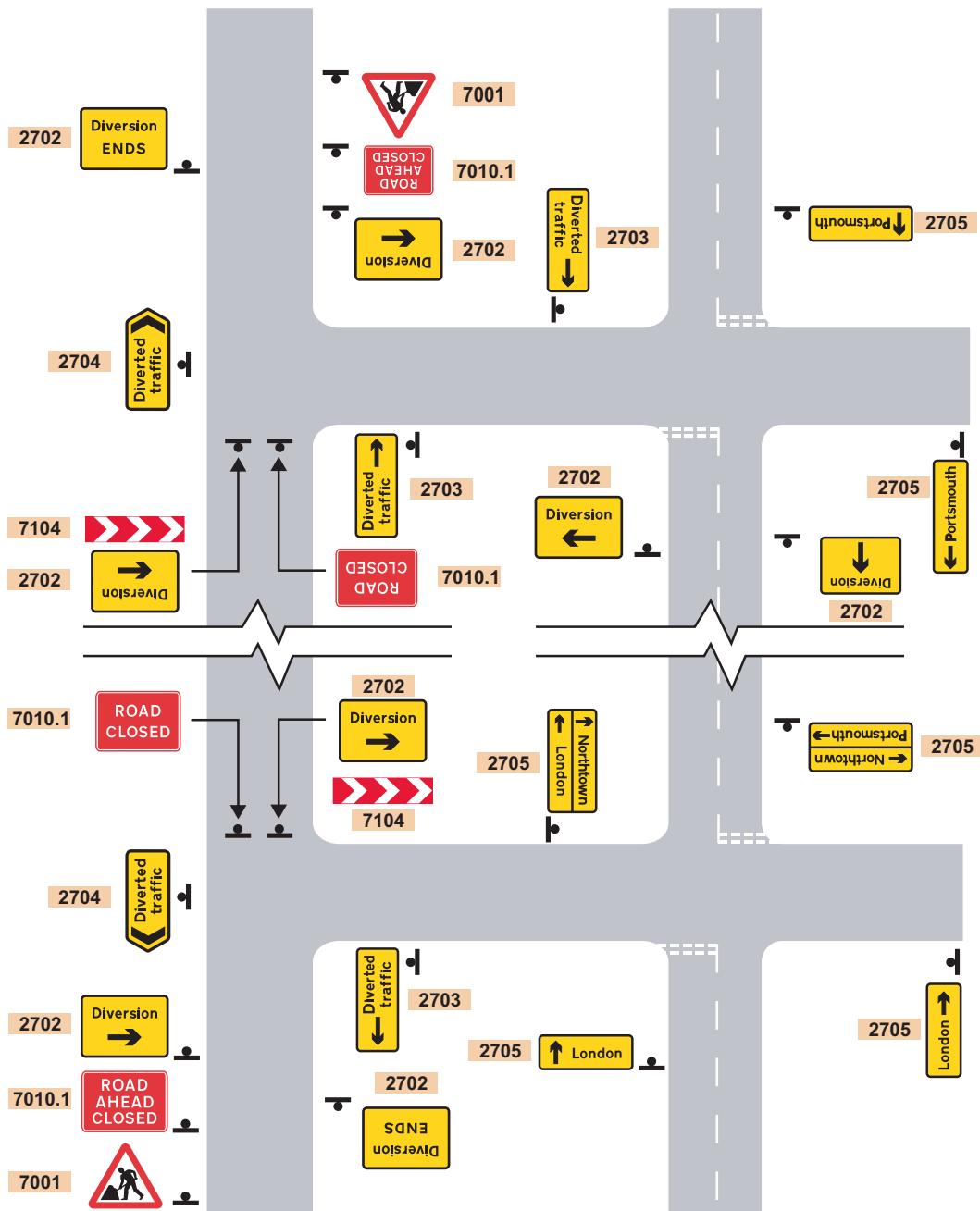


Figure 3.3 Layout of signs for road works on single carriageway roads with diversions

NOTES:

1. Signs and cones should be of the sizes shown in Tables A1.2 and A1.3 (Appendix 1).
 2. Chevrons and diversion signs should be provided at the positions shown.

D3.15.4 The “Diverted traffic” sign to diagram 2704 is used to indicate the direction of the temporary diversion route, usually at crossroads and T-junctions, and the “Diverted traffic” sign to diagram 2703 is used in advance of a junction to indicate the direction the diverted traffic should take at the junction ahead.

D3.15.5 The sign to diagram 2716 that indicates a junction ahead leading to a temporary diversion route may be used on both local and trunk roads (see also paragraph D3.15.23). Permitted variants of the sign allow a route number, road name or place name to be used. Flexibility is also permitted in the description of the route to be followed and also whether or not a diversion symbol is used (see also paragraph D3.15.21).

D3.15.6 When designing diversion routes at work sites, the designer should consider the needs of cyclists, who are unlikely to accept lengthy detours or long delays and are likely to ignore the diversion signs and/or use the footway. Guidance on catering for the needs of cyclists and other non motorised users at work sites is given in [Section D3.32](#).

D3.15.7 Where a side road is closed and traffic cannot turn into it, traffic should be diverted by travelling ahead. In these cases, the “no right turn” or “no left turn” sign to diagram 612 or 613 (in conjunction with the necessary order) should be used. [Section D5.14](#) deals with works at or near junctions on single carriageway roads.

D3.15.8 The need to construct temporary diversions may arise where the works interfere with existing public or private roads or other routes over which there is a public or private right of way for any traffic.

D3.15.9 Should the works cause continuing congestion unacceptable to the Highway Authority, steps should be taken by the authority to re-route traffic, commencing if need be some distance away from the works.

D3.15.10 The Highway Authority should ensure that the diversion route is correctly signed throughout its length using appropriate direction signs to diagrams 2702 to 2707 and variants (but see paragraph D3.15.20). It should be noted that in re-routing traffic, and signing a diversion, the needs of all types of vehicles, including public service vehicles, should be kept in mind. Where a bus stop is temporarily removed or relocated, the position of the nearest alternative bus stops should be indicated at the stop affected.

D3.15.11 Where it is necessary to construct temporary diversions they should be maintained in a satisfactory condition throughout the period of the diversion. However these provisions do not apply to any temporary works which contractors may construct for their sole use in the execution of the works; see also [Section D3.22](#).

D3.15.12 Diversions from motorways to all-purpose roads should be put into effect only when absolutely necessary, in order to avoid lengthy delays and only after consultation with the police and Highway Authority. The accident rate on all-purpose roads is higher than that for works-affected motorways, so it will normally be safer to keep traffic on the motorway. For short-term works however, closure of a carriageway overnight may be appropriate, for such cases see [Section D6.20](#).

D3.15.13 Some road works may cause an increase in traffic on otherwise lightly-trafficked roads. The Highway Authority should keep the roads in the vicinity of the works under observation and ensure that appropriate signs are provided. For example, “give way” markings to diagram 1003 may have to be supplemented by the triangular road marking to diagram 1023 and a “GIVE WAY” sign to diagram 602 because of increased traffic. The possible need to impose temporary waiting restrictions on the diversionary route should be borne in mind. Police temporary signs can be used without the need for an order, if the restrictions are to be imposed for less than seven days. The railway authorities must be notified if road traffic over a railway level crossing is increased.

D3.15.14 The “ROAD CLOSED” sign variant to diagram 7010.1 is used to indicate that the road, beyond the point at which it is placed, is closed to traffic. The shortest route of adequate width and available height should be signed with the “Diversion” sign to diagram 2702. Chapter 8 signing might still be needed within the closed section of a highway or road as there are likely to be exemptions to the closure order, e.g. emergency services, frontage requiring vehicular access, pedestrians.

D3.15.15 The “ROAD AHEAD CLOSED” sign variant to diagram 7010.1 is used at the entrance to a road which, because of road works some distance along it, cannot be used by through traffic. Similar consideration must be given to the need for additional signs for diverting traffic as, for example, when the “ROAD CLOSED” sign variant to diagram 7010.1 is used.

D3.15.16 Advance warning of a diversion is given by the “Diversion” sign to diagram 2702. Distances up to but not exceeding 400 yards may be shown on the sign, to the nearest 10 yards, in place of the arrow.

D3.15.17 The “Diversion” sign to diagram 2702 is used in conjunction with “ROAD CLOSED” and “ROAD AHEAD CLOSED” signs variants to diagram 7010.1 to direct drivers to a diversionary route, where it is the only one possible. At subsequent changes of direction along the diversionary route “Diverted traffic” signs to diagram 2703 or 2704 should be used if all traffic must continue to follow the diversion. At junctions where named destinations need to be indicated, advance direction or direction signs to diagram 2705, 2706 or 2707 should be erected. The signs to diagrams 2703, 2705 and 2706 are always used in advance of the junction, the signs to diagrams 2704 and 2707 are always used at the junction. It is most important that a diversionary route is clearly and consistently signed throughout its length and that the end of the diversion is shown by the “Diversion ENDS” sign variant to diagram 2702. The purpose of the sign is to mark the end of the diversion, and to indicate to drivers that the special temporary signs terminate at this point and that permanent signs should be followed from this point onwards. See [Figure 3.3](#).

D3.15.18 The various diversion signs have black legends on yellow backgrounds. This is to distinguish them from permanent directional signs and to attract the driver’s attention in the unusual surroundings of the diversionary route. The “Diversion” sign to diagram 2702 is not used to indicate a change of direction within the works themselves; the sharp deviation of route sign to diagram 7104 is used in these circumstances.

D3.15.19 Signs to diagrams 612, 613 and 616 may be required to prohibit entry to a particular road from one or all directions. These signs may be used only to indicate the effect of an order.

D3.15.20 To avoid unnecessary repetition of diversion direction signs on extended diversions from, and to, motorways and all-purpose roads, symbolic diversion signing may be used. Drivers diverted from a closed section of motorway or other road are advised to follow the specified symbol along the diversion route until the intended route is rejoined. Symbolic signing should be used only when non-symbolic diversion signing is not practicable.

D3.15.21 The designs of the symbols to be used for symbolic diversion route signing are prescribed in Schedule 13 Part VII of the Regulations. A sign to diagram 2716 is placed at the start of the diversion. If a pre-established diversion route is used then the flap-type signs which can be opened to display the message in an emergency can be used, otherwise the signs used will be of the standard type. It may be possible in some cases to show this information on a variable message sign. All equipment used in connection with variable message signs requires type approval under the terms of direction 56.

D3.15.22 Wherever possible, symbolic signing along the diversion routes should be incorporated into existing directional signing, following the design rules set out in Chapter 7 (paragraph 11.4). When it is necessary to use additional separate signs, diagram 2703 and its prescribed variants (see the working drawing P2703) should be used. When temporary patches are used, they shall be capable of removal without damaging the sign face and they shall be removed at the end of the works. All diversion routes shall be agreed in advance with the Highway Authority and the police.

D3.15.23 Where the diversion route is fairly short and straightforward it will often be possible for the signs to diagram 2716 at the start of the diversion to give route numbers rather than a symbol for the diversion route (for example, “M6 North closed Alternative route via A123 and B456”). Continuity of signing along the route is essential and “Diverted traffic” signs to diagram 2703 or 2704 will be required at junctions along the route, where the legend can be varied to read “M6 diverted traffic” in accordance with the working drawings P2703 and 2704.

D3.15.24 If emergency diversions are likely to be a rare occurrence, the cost of permanent symbolic signing along diversion routes may not be justified. In this case, temporary diversion signs to diagrams 2702 to 2707 will have to be placed along the route if it is too complex for the route number techniques described above to be used.

D3.16 RESTRICTED HEADROOM/WORKING OVERHEAD

D3.16.1 Where the works temporarily impose a lower height restriction (for example, 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.

D3.16.2 Where the works temporarily impose a lower height restriction at a structure that is already signed by virtue of the permanent headroom being below 16'-6" (5.03 m), since drivers might not notice the reduced dimensions on the standard signing, consideration should also be given to providing an additional sign as shown. While works are in progress, the sign would be deemed to be prescribed under regulation 53(1)(e)(i).



D3.16.3 At all sites where works are being carried out above public roads, vehicles and pedestrians must be protected adequately from falling objects by nets, platforms or other devices. Before any reduction in working height is effected, the Highway Authority must 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.

D3.16.4 Bridge heights must be checked each time the road is resurfaced or reconstructed and signs erected or altered as necessary. Detailed guidance can be found in Chapter 4 (paragraphs 7.7 to 7.9).

D3.16.5 Where the work involves a reduction in height clearance at a structure an "OVERHEIGHT VEHICLE DIVERT" sign, which is prescribed in the Regulations in Schedule 15, Part II, may be erected before the preceding junction. Amber lamps flash when this sign is activated by an overheight vehicle detector. The sign otherwise shows a blank face.

D3.17 JUNCTION WITHIN ROAD WORKS

D3.17.1 Signs to diagram 7220 and 7240 may be used to show destinations at junctions within road works on motorways and non-motorways respectively. Lower panels described in [Section D4.10](#) may be added.

D3.17.2 Signs to diagrams 7250 to 7254 are used to show the lane configuration at junction entries and exits. Countdown distances may be shown on a lower panel in accordance with diagram 7256.

D3.17.3 Consideration should be given to closing any entry slip roads that occur within road works on dual carriageway roads (see [Section D6.21](#)), particularly for overnight relaxation works. If this is not practicable, the traffic management at the junction should be designed as closely as possible to the original junction layout.

D3.17.4 Where taper lengths or rearward visibility at temporary merges on entry slip roads are below those set out in TD 22 “Layout of grade separated junctions” (DMRB 6.2.1) for the prevailing traffic speed, consideration should be given to providing “GIVE WAY” signs to diagram 602. The associated markings to diagrams 1003 and 1023 should be used where practicable, though their use with signs to diagram 602 is not mandatory in temporary situations (see direction 17(2)). When deciding whether “GIVE WAY” signs are to be used, it should be borne in mind that there are possible hazards associated with the use of the signs in these situations. Drivers on the main carriageway will have little room for manoeuvre and allowing vehicles that have been stationary to move off onto a high-speed carriageway is potentially hazardous.

D3.17.5 Where a junction is within the works area and segregation of traffic by destination is required, the advance signs and those indicating a bifurcation of routes to different destinations should be designed in accordance with diagrams 7212, 7220, 7230 and 7233 and with the design guidance in Chapter 7 (Section 13).

D3.18 SURFACE CONDITION

D3.18.1 As part of a temporary traffic management layout, there will be occasions when areas of carriageway that are not normally used are brought into operation. The adequacy of these temporary surfaces should be considered, in particular, bearing in mind the needs of motorcyclists and cyclists. In addition, the effect on traffic of the following should be taken into account:

- 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 telephone); 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).

D3.18.2 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. Road stud bases, as well as the inserts and their reflectors, should be removed and the carriageway reinstated before introducing traffic to the narrow lane layout. If stud bases are retained, drivers may take avoiding action and, in addition, the bases may be held to be unlawful because they are not fitted to statutorily prescribed road markings.

D3.18.3 The “TEMPORARY ROAD SURFACE” sign variant to diagram 7010.1 is used to warn drivers of an unfinished road surface, for example, 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.

D3.18.4 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 30 m before the ramp. It must always be used in conjunction with the “RAMP” sign to diagram 7013. These signs should also be specified when cable crossing

protectors are in use at traffic signal sites (see paragraph D5.10.9) and when locally fabricated or prefabricated "humps" are used to protect pipes, cables etc. that are run across the road. Such "humps" should not be of such a design that they are a hazard to road users, in particular cyclists and motorcyclists.

D3.18.5 The "RAMP" sign to diagram 7013 is used at the change in level. 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.

D3.18.6 The "uneven road ahead" 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 also Chapter 4 (paragraph 12.1).

D3.18.7 The "loose chippings on road ahead" sign to diagram 7009 is used during surface dressing operations to warn of the likelihood of loose chippings on the carriageway. It must be retained in position until the danger from flying chippings has passed. This sign must be reflectorised; see Chapter 4 (paragraph 1.37). It should be accompanied by a maximum speed advised plate to diagram 513.2 indicating an advisory maximum speed of 10 or 20 mph during the period that the chippings are being embedded by the traffic; see [Sections D3.7](#) and [D3.29](#).

D3.18.8 The "slippery road ahead" sign to diagram 557 may be required because of the deposit on the road of mud, clay, chalk or other excavated materials (see paragraph D4.8.22). Every effort must be made to reduce this hazard to a minimum by requiring regular road washing or 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 (paragraph 12.3).

D3.19 CARRIAGEWAY EDGE CONDITION

D3.19.1 The carriageway edge condition should be considered when traffic is run on the hard shoulder. Allowance should be made for the presence of kerbing, since this will have the effect of reducing the running lane width as passing traffic shies away. Fixtures, such as emergency telephones may also be closer to the edge of the hard shoulder than desirable when it is being used as a running lane. Drainage facilities on the verge can also give rise to problems if the filter medium is loose, or if there is a dished drainage channel adjacent to the edge of a trafficked lane.

D3.19.2 The edge of the carriageway without raised kerbs should be indicated by a 100 mm-wide continuous reflectorised white line to diagram 1012.1 placed approximately 200 mm from the actual edge of the carriageway. Where flush kerbs are provided, the edge line should be superimposed on the kerb.

D3.19.3 Edge protection and/or temporary widening may be needed as a temporary measure where lane widths are narrow, or where turning vehicles may cause over-run problems. If required, the designer should;

- locate services and discuss the need to protect them with the utilities or services provider;
- design construction to withstand loading; and
- review environmental concerns and reinstatement requirements.

D3.20 WORKS OFF THE CARRIAGEWAY NOT REQUIRING GUARDING AND/OR SIGNS

D3.20.1 A risk assessment of the impact of off-carriageway operations should be carried out where works vehicles cannot fully pull off the carriageway. Where the risk assessment identifies that advance signing should be provided, the working space should be extended into the carriageway to include adequate space for works vehicles, and signing and coning should be provided as indicated in [Sections D5](#) and [D6](#).

D3.20.2 Generally, there will be no need for signs to warn vehicular traffic on a single carriageway where works are carried out off the carriageway on minor roads in the following situations; see paragraph [D3.2.19](#) and [Section D5.3](#):

- wholly within a verge not used by pedestrians and where a clearance of at least 0.5m exists between the working space and the edge of the carriageway; see [Section D3.2](#);
- 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 0.5m can be maintained between the works and the carriageway; or
- on roads with a permanent speed limit of 30mph 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.

D3.20.3 No signing or guarding will be required in the carriageway for vehicular traffic when work is being carried out off the carriageway on all-purpose carriageway roads in daylight on or above a footway, verge, central reservation or traffic island in the following circumstances:

- on all-purpose single carriageway roads, on dual carriageway roads where the speed limit is 40mph or less and on dual carriageway roads subject to the national speed limit, providing they are no longer than 5km in length and lie between successive lengths of single carriageway road;
- when the work comprises inspections, minor repairs, lamp changing or the cleaning of signal heads, and can be done within the limits of the existing refuges;
- when working on fixed apparatus which is closer to the edge of the carriageway than specified below, provided the person carrying out the work, the tools and equipment being used and any ladder are not closer to the edge of the carriageway than the apparatus being worked upon; and
- in any other situation, provided the horizontal clearance distances from the edge of the carriageway to the person carrying out the work, the tools and equipment being used and any ladder, are not less than 0.5m on roads with speed limits up to and including 40mph and 1.2m minimum where the speed limit exceeds 40mph.

D3.21 WORKS ACCESS AND EXIT

D3.21.1 Where possible, access to and exit from the works area should be considered at the design stage and the following should be considered:

- conflict with other movements;
- location;

- width;
- sight lines;
- signing;
- swept path;
- slowing down/acceleration space;
- separation of slowing down/acceleration space from works area; and
- cleanliness/mud on road.

D3.21.2 The introduction of a new access or exit 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" or diagram 7302 with the legend "WORKS EXIT". Right turns into sites on single carriageway roads should be avoided unless traffic control is used.

D3.21.3 The "WORKS TRAFFIC" signs to diagrams 7303, 7304 and 7305 may be used to direct traffic to a works access. The signs to diagram 7303 and 7304 may be used prior to a road junction to advise works traffic of the direction to be taken at the junction to the works site access, and the sign to diagram 7305 is used at a junction or at the works access. The contract number of the access may be added to these signs in order to identify a particular access but the signs will then need to be authorised. Works traffic signing, for example to diagram 7304, should not be used at locations distant from the site. Where the works traffic is not likely to make unexpected manoeuvres, directional signing should be to diagram 2705 or 2707. For temporary directional signs for motorways, the Overseeing Organisation should be contacted for guidance.

D3.21.4 Road works will often necessitate the construction of new accesses to the public road for contractors' vehicles and plant, for example, earth-moving equipment. Some accesses will be on both sides of the road, forming crossroads. Accesses and exits for works vehicles should be located and designed with care to ensure that vehicles can enter and leave the site in safety. 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 must 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. On a motorway or dual carriageway road on which the national speed limit applies, advance direction signs to the works to diagram 7306 should be provided.

D3.22 ROUTES FOR SITE VEHICLES

D3.22.1 Routes for vehicles to the site and through the works can create significant problems. Access is required for works vehicles and plant, delivery vehicles and site staff's vehicles. How these vehicles access the site can have a significant impact on the adjoining network. On high-speed roads it is a fundamental element of the design process to plan this. In particular, the following should be considered:

- any points arising from the consultation process;
 - determination of permitted/prohibited routes and sign design;
 - provision of adequate signing;
-

- imposition of site speed limits;
- access to works from adjoining network;
- conflict with local land-use patterns and timing of works;
- the need to eliminate as far as possible mud and debris left on road surfaces;
- consultation with adjoining highway authorities;
- possible need for heavy/light vehicles to follow different routes/arrangements from those for heavy/wide/high loads; and
- impact on local businesses.

D3.23 HAUL ROUTES

D3.23.1 It may be necessary to provide traffic signal control when contractors' vehicles, site equipment or materials need to be moved across a public highway between sites or within a site. The haul route traffic should approach the public highway in a defined line and on a level gradient. Priority should be given to the public highway, not to the haul route.

D3.23.2 The need for traffic signal control should be considered at the design stage of a contract. The Highway Authority should be contacted for advice and for arranging site approval when a contract is let. It may be advisable to relocate the proposed crossing if approach visibility is reduced by a bend or other obstruction. If the crossing is not signal-controlled, the variant of diagram 511 "HEAVY PLANT CROSSING" should be placed in advance of the crossing place (see paragraph D3.23.5).

D3.23.3 All equipment used to control traffic signs or signals must be of a type that has been approved for haul route use. This is generally referred to as "type approved". The Overseeing Organisation administers type approval and can advise the approval status of equipment if it is in doubt.

D3.23.4 The general standard of layout and installation practice must be that associated with normal junction signals.

D3.23.5 The "road works" sign to diagram 7001, the "crossroads ahead" sign to diagram 504.1 and the "traffic signals ahead" sign to diagram 543 are required on the public highway approaches to a haul route crossing. The "crossroads ahead" sign to diagram 504.1 is used in conjunction with a supplementary plate "HEAVY PLANT CROSSING" to diagram 511. Additional signs as appropriate may be required.

D3.23.6 A plate to diagram 543.1 with the legend "Part time signals" should be fixed to each signal pole and also beneath the "traffic signals ahead" sign to diagram 543 in each case.

D3.23.7 Where a stop line to diagram 1001 is provided and carriageway markings do not exist, lane and/or centre line road markings are required for a distance of at least 50 m in advance of the stop line. Road markings are not required where a stop board to diagram 7011 is used in place of the stop line to diagram 1001.

D3.23.8 If required, posts or markers coloured yellow may be implanted to demarcate the corners of the haul route crossing and to make the site corners more conspicuous, and hence more readily identifiable by drivers.

D3.23.9 The recommended sequence of signing for each approach is shown in Figure 3.4.

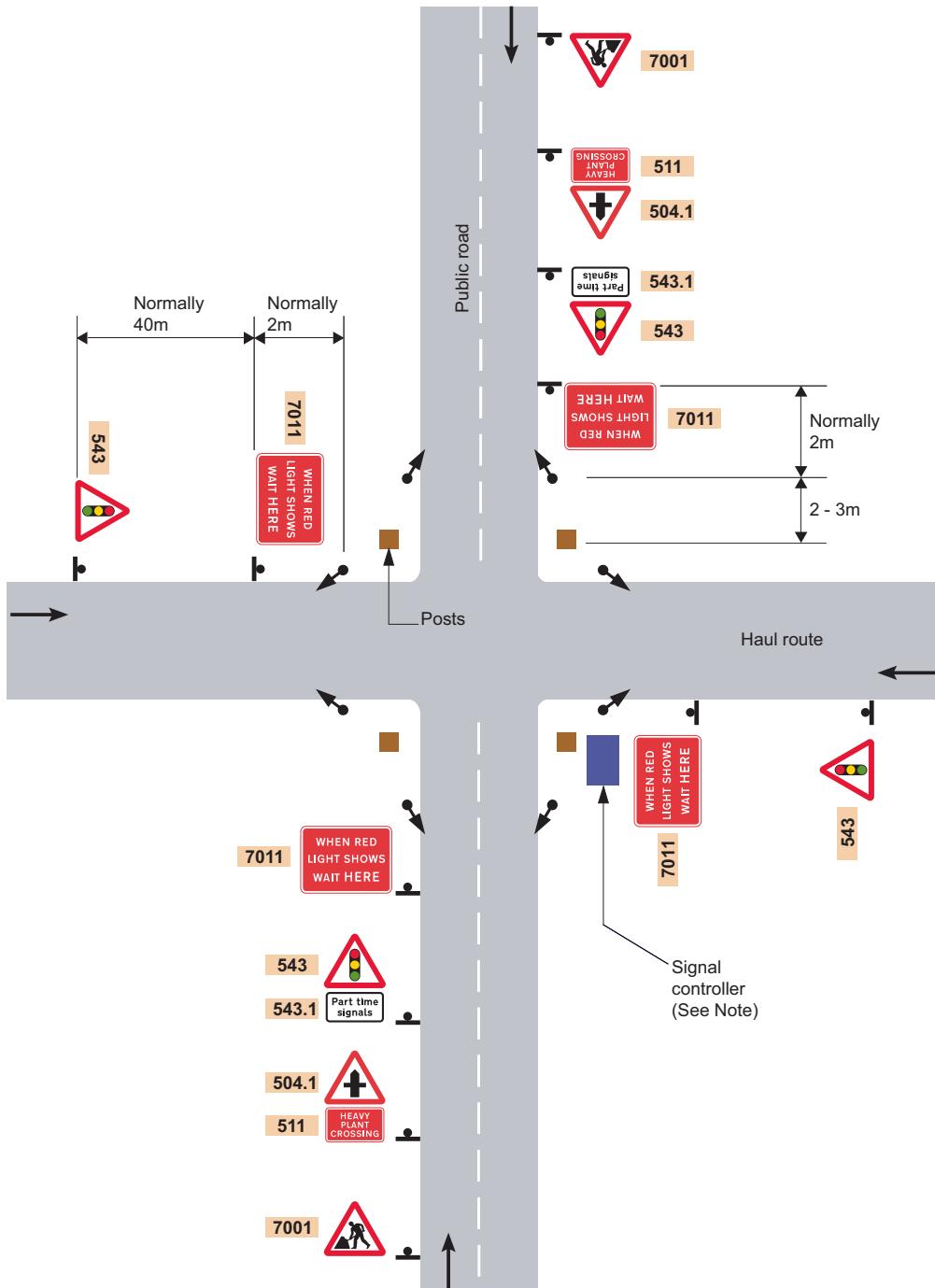


Figure 3.4 Haul route crossing

NOTE: The controller should be sited to provide clear visibility of the site when under manual control.

D3.24 MATERIAL STORAGE

D3.24.1 On most construction sites, delivery, storage and access to materials can cause concern, and the issue of material storage and deliveries should form part of the works plan and risk assessment. On road works sites with the inherent constraints on space, detailed consideration is needed at the design stage 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 dealt with in [Section D3.21](#).

D3.24.2 Constraints on the timing of deliveries may need to be considered at the design stage to ensure that materials can be safely delivered. Particular attention will also need to be given to the storage of materials that are hazardous to health through Control of Substances Hazardous to Health Regulations 1999 (COSHH) assessments.

D3.25 TRAFFIC SIGNAL MAINTENANCE

D3.25.1 The maintenance of traffic signals and street furniture at a junction on a single carriageway road should be carried out in good visibility and ideally in daylight. At traffic signal sites where the work is likely to be prolonged, the traffic authority may need to consider the installation of portable or temporary signals.

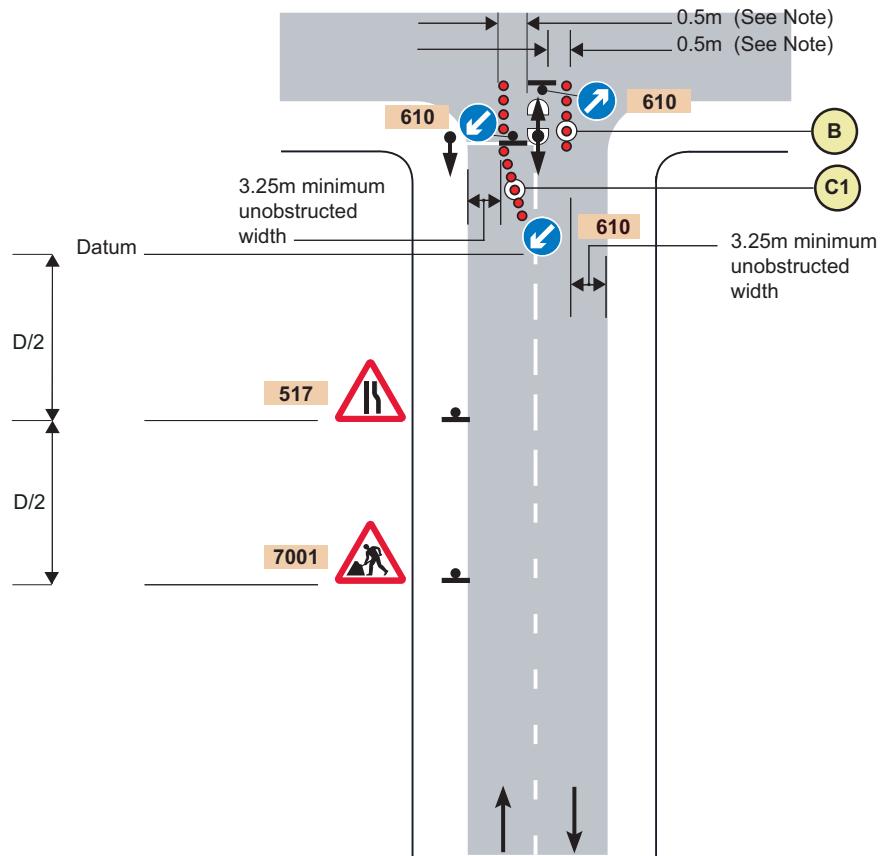
D3.25.2 When maintenance work is being carried out on traffic signals, a "TRAFFIC SIGNAL MAINTENANCE" sign variant to diagram 7010.1 should be displayed. This sign must be reflectorised if it is not directly illuminated. The needs of pedestrians and other non-motorised roads users must be considered when traffic signals are removed from use, see [Section D3.32](#) and [Part 2: Operations, Sections O3.13 and O3.14](#).

D3.25.3 Typical layouts and signing for work at a signal island and a kerbside signal at a junction are given in [Plans SM1 to SM3](#). The principles shown on these plans are also applicable for the maintenance of street furniture.

D3.25.4 For signal crossing sites along a single carriageway road the approach coning and signing principles given in [Plans SM1 to SM3](#) should apply.

D3.25.5 The principles for works in the centre of a single carriageway road are illustrated in [Plan SC2](#) in [Section D5.5](#).

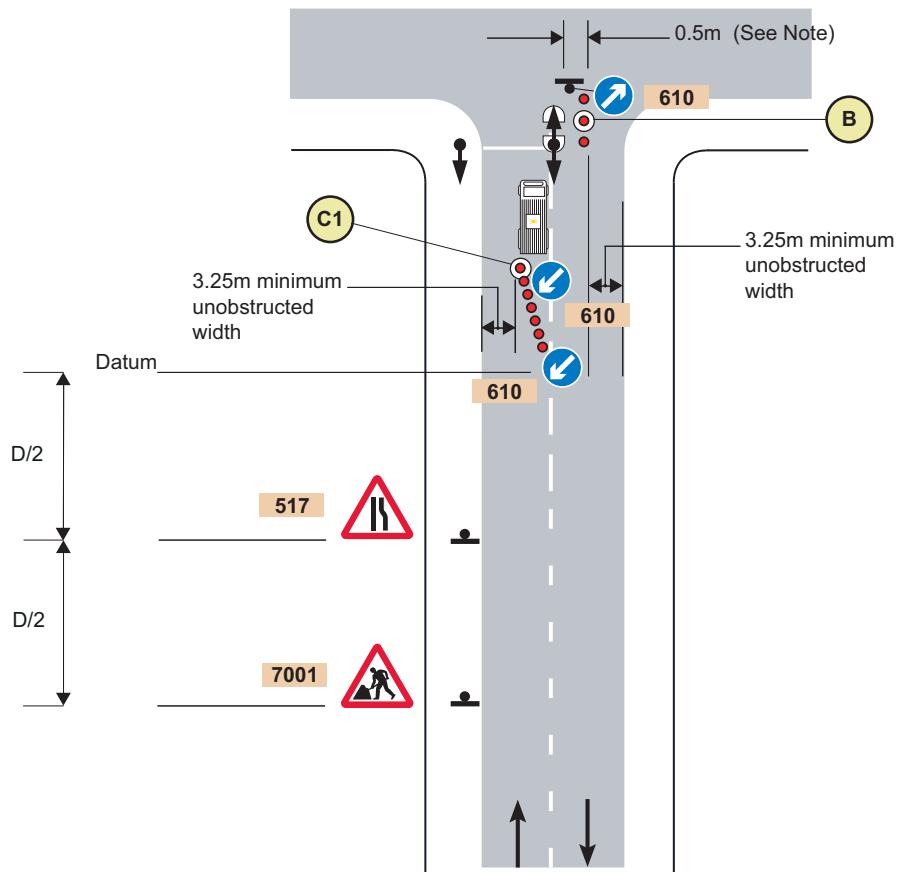
Plan SM1: Junction on a single carriageway road with a permanent speed limit of 30 mph or less, work on a signal island



NOTES:

1. The minimum lateral clearance is increased from 0.5 m to 1.2 m if the speed restriction on the crossing road is 50 mph or more.
2. Detail B – the size of cones is dependent on the speed limit on the crossing road.
3. Appropriate advance warning signs should be placed on the cross arms of the junction.

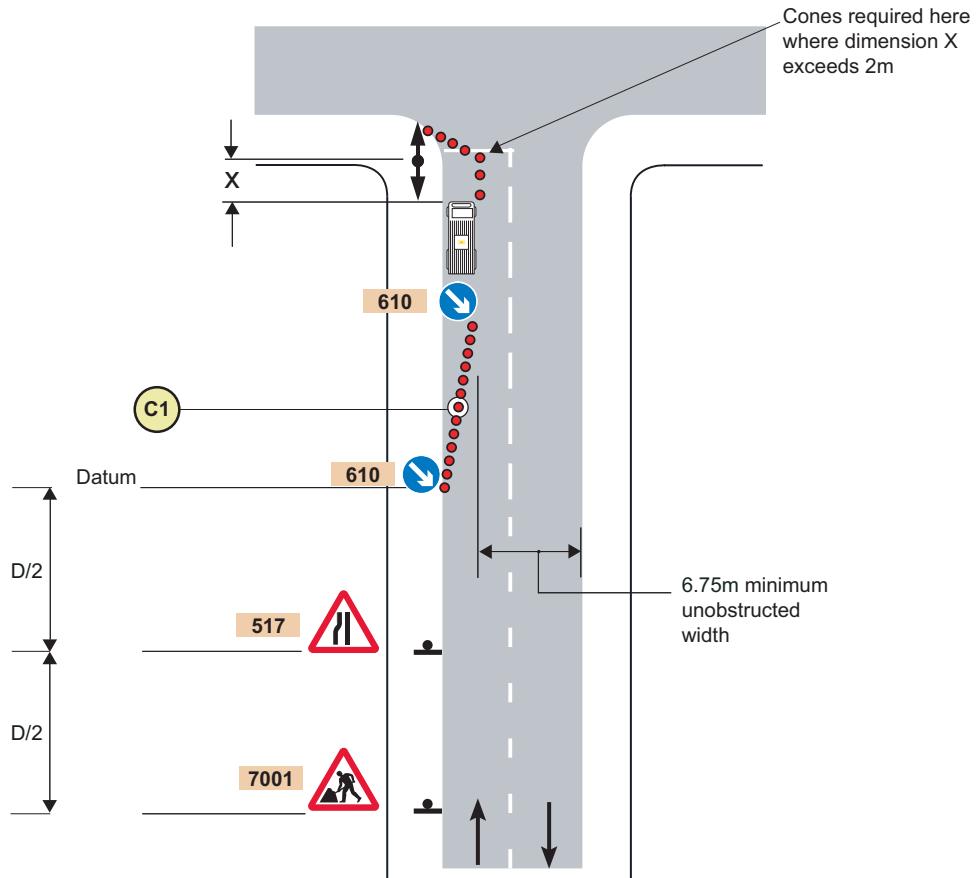
Plan SM2: Junction on a single carriageway road with a permanent speed limit of 30 mph or less, work on a signal island with a conspicuous vehicle with beacon



NOTES:

1. Minimum lateral clearance increased from 0.5 m to 1.2 m if speed restriction on the crossing road is 50 mph or more.
2. Detail B – the size of cones is dependent on the speed limit on the crossing road.
3. Appropriate advance warning signs should be placed on the cross arms of the junction.

Plan SM3: Junction on a single carriageway road with a permanent speed limit of 30 mph or less, work at a kerbside with a conspicuous vehicle with beacon



NOTE: Appropriate advance warning signs should be placed on the cross arms of the junction.

D3.26 TRAFFIC SURVEYS

D3.26.1 Guidance on the conduct of traffic surveys is given in TA 11 "Traffic surveys by roadside interview" (DMRB 5.1.4) and that document should be read in conjunction with this section.

D3.26.2 Generally, it is not possible for the traffic management layouts at survey sites to conform fully with the road works traffic management plans shown in [Sections D5](#) and [D6](#). This is because of the nature of the survey work and the limited road space available at selected sites. The survey plans provided are based on previous survey traffic management arrangements where a police officer was in attendance.

D3.26.3 Typical layouts and signing for interview sites are given in [Plans SV1](#) to [SV3](#). The plans indicate principles and minimum requirements. Some local discretion in their application may be necessary for optimum safety and operational efficiency, depending on the traffic flow, speeds, type of road and information required on the nature of the survey. Surveys may need to be carried out in conditions where it is not possible or appropriate for traffic to be funnelled into a single lane of slow-moving traffic, or stationary traffic at signals, and TA 11 provides guidance on alternative survey layouts. All survey sites present an obstruction on the highway and it is essential that they are subject to a site specific risk assessment.

D3.26.4 Where the space available for a survey site is limited, [Table 3.6](#) identifies the spacing of signs and minimum length of lead tapers for single and dual carriageway roads.

Table 3.6 Survey sites – spacing of signs and taper length

Permanent speed limit (mph)	Siting distance apart of signs (m)	Length of lead taper (m)	Minimum clear visibility of sign to diagram 562 (m)
30 or less	20	45	60
40	30	70	60
50	80	95	75
60	90	115	90
70	110	140	105

D3.26.5 Additional signs should be used, as appropriate, in consultation with the police, particularly on roads for which the national speed limit applies. Supplementary distance plates should be used if appropriate; see paragraph D4.8.2. Cones should be 750 mm high and placed 9 m apart or closer as required.

D3.26.6 All the signs used at interview sites must conform to the Regulations or be specifically authorised. Authorisations and approvals, where required, need to be procured through the Highway Authority.

D3.26.7 The aim on all roads is to reduce the speed of vehicles approaching an interview station to about 20 mph in the vicinity of the sampling line by appropriate signing and cones. The implementation of a temporary mandatory speed limit is recommended; see [Section D3.7](#).

D3.26.8 Sign illumination at interview sites must be in accordance with the Regulations. Warning lights to BS EN 12352:2006 should be used to indicate the limits of the obstruction and the path vehicles should take. The lights should be sited on cones as indicated in [Table A1.3 \(Appendix 1\)](#).

D3.26.9 The “other danger ahead” sign to diagram 562 and “Census” plate to diagram 563 warn of a traffic census or survey at which roadside interviews are being conducted.

D3.26.10 The “STOP AT CENSUS POINT” sign to diagram 830, “SLOW CENSUS POINT” sign to diagram 831, “CENSUS POINT” sign to diagram 832 and “CENSUS STOP if directed” sign to diagram 830.1 can be used only at the approaches to a site where a driver may be stopped for interview in connection with a traffic survey approved by the Secretary of State and, where appropriate, also by the Highway Authority and the police. Only a police officer or a traffic officer may legally stop or direct traffic at a survey site.

D3.26.11 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.

D3.26.12 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 [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.

D3.26.13 The spacing of approach signs is specified in [Table A1.1 \(Appendix 1\)](#).

D3.26.14 For surveys at lay-by sites (see, for example, [Plans SV1a](#) and [SV2a](#)) an additional guide island is required to separate the vehicles to be surveyed from the through vehicles.

D3.26.15 For surveys on single carriageway roads with a permanent speed limit of 40 mph ([Plan SV2](#)), an additional “road narrows” sign to diagram 517 with sub-plate “Single file traffic” to diagram 518 is required.

D3.26.16 On dual carriageway roads the reduction of traffic speed may present difficulty. In such cases it is essential that:

- signing is adequate and sufficient advance warning of the site is given.
- vehicles are constrained to a single lane prior to the sampling line to reduce traffic speed to about 20 mph.

D3.26.17 Plan SV3 indicates the layout for interview sites at signal-controlled junctions. The “road narrows” sign is not used, but additional “STAY IN LANE” signs to diagram 830.3 are required on the arm of the signals on which the traffic survey is being carried out. On the other arms of the signals, a “hazard” sign to diagram 562 with supplementary plate “Census” to diagram 563 is required. These sites should be used only in built-up areas where approach speeds are low.

THE PRINCIPLES FOR TRAFFIC MANAGEMENT AT A SURVEY SITE

D3.26.18 The principles for traffic management at survey sites differ from those in layouts in [Sections D5](#) and [D6](#), see paragraph [D3.26.2](#). The principles are:

- the length of the survey area is given by the formula:
 $(4 + 8 \times \text{the number of interviewers})(\text{m})$,
except when the survey site is at a traffic signal controlled junction. In this case the length is given by the formula:
 $(4 + 4 \times \text{the number of interviewers})(\text{m})$;
- coning to Detail C1 is used to mark a guide island through the survey site;
- “keep left/right” signs (610) are used on the off side behind the coning of the guide island to indicate the route traffic should take past the guide island; and to indicate the line of the traffic; and
- a police officer or a traffic officer is required to be in attendance as only a duly authorised officer may legally stop or direct traffic at survey sites.

The following signing is required in the primary direction on the near side upstream of the sampling point:

- a “hazard” sign (562) with supplementary plate “Census” (563);
- at least one “road narrows” sign (517) with supplementary plate “Single file traffic” (518);
- a “SLOW CENSUS POINT” sign (831);
- a “CENSUS STOP if directed” sign (830.1); and
- a “CENSUS POINT” sign (832) located at the far end of the census point;

and in the secondary direction on the near side upstream of the first cone of the survey area:

- a “hazard” sign (562) with supplementary plate “Census” (563); and
- at least one “road narrows” sign (517) with supplementary plate “Single file traffic” (518).

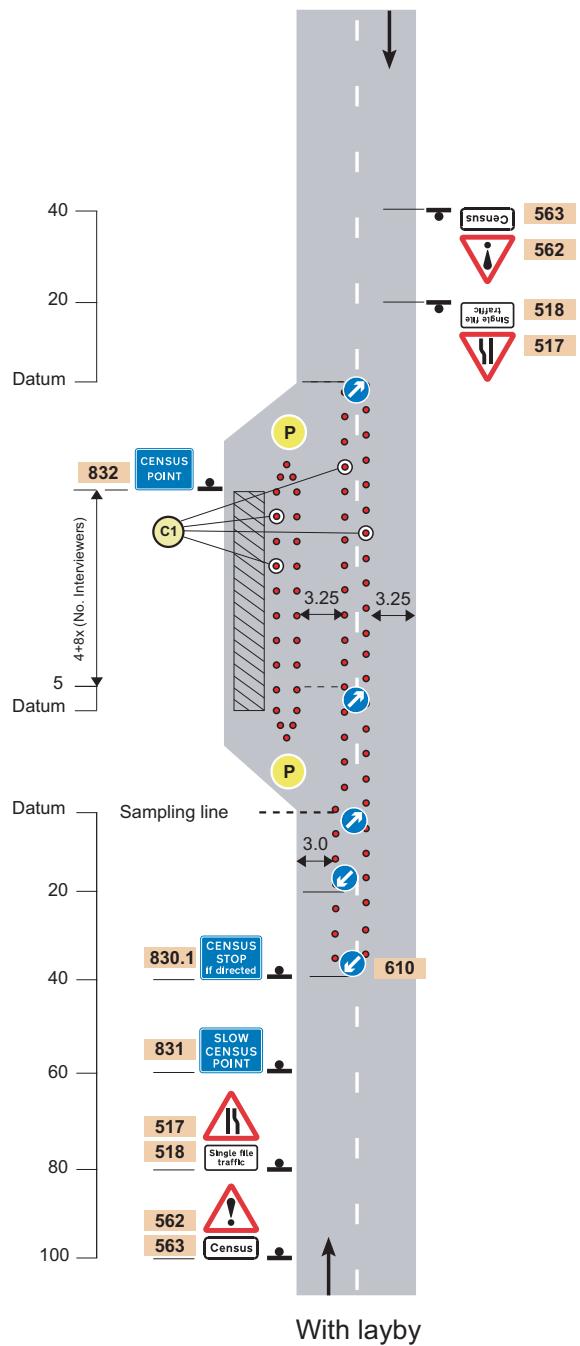
D3.26.19 List of plans:

Plan SV1 Traffic survey on a single carriageway road with a permanent speed limit of 30 mph or less (less than 10m wide)

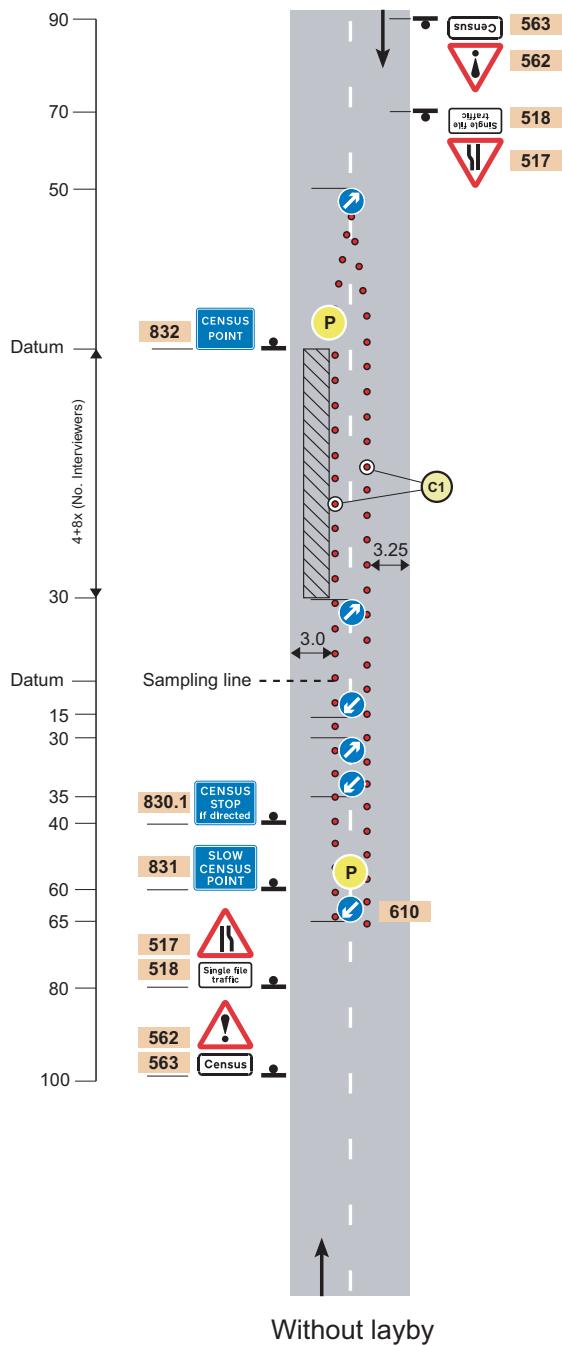
Plan SV2 Traffic survey on a single carriageway road with a permanent speed limit of 40 mph (less than 10m wide)

Plan SV3 Traffic survey on a traffic signal controlled junction with a permanent speed limit of 30 mph or less

Plan SV1: Traffic survey on a single carriageway road with a permanent speed limit of 30 mph or less (less than 10 m wide)

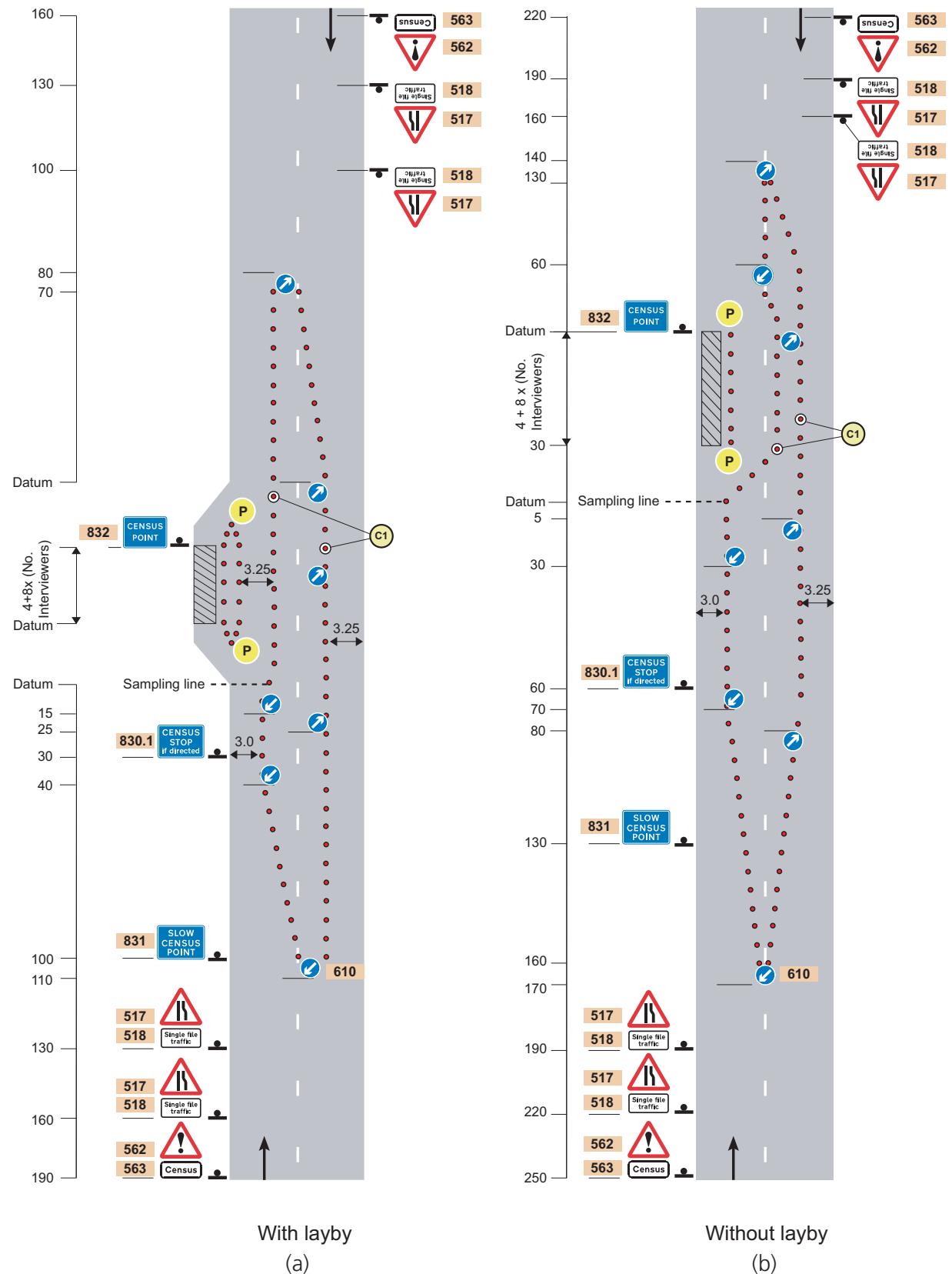


(a)

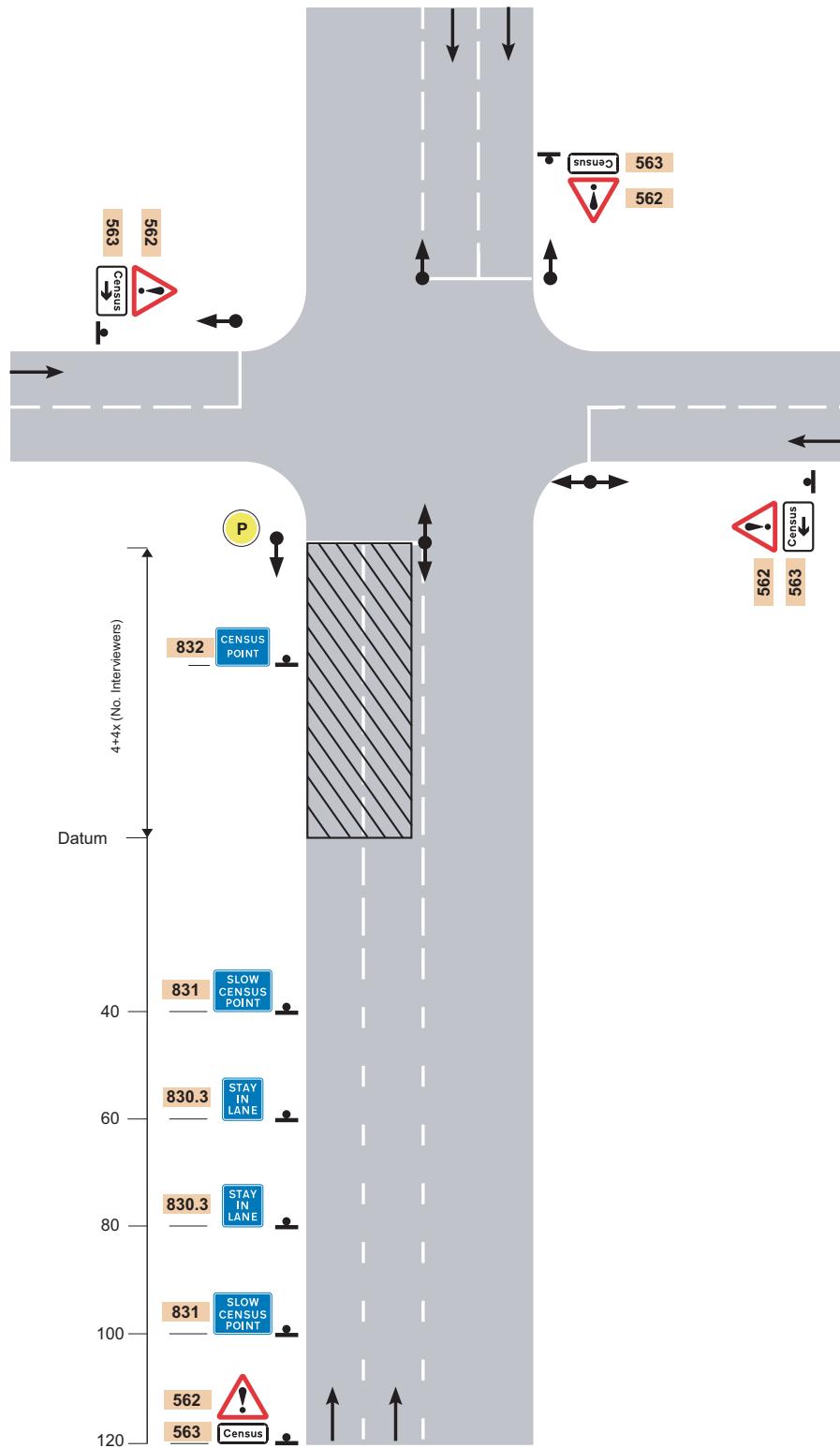


(b)

Plan SV2: Traffic survey on a single carriageway road with a permanent speed limit of 40 mph (less than 10m wide)



Plan SV3: Traffic survey on a traffic signal controlled junction with a permanent speed limit of 30 mph or less



D3.27 VEHICLE WEIGHT AND CONDITION CHECKS

D3.27.1 The principles for the traffic management arrangements at sites where checks are carried out on the condition of all vehicles and the weight of goods vehicles are generally the same as those given for traffic surveys; see [Section D3.26](#).

D3.27.2 Signs used when vehicle checks are being conducted are variants of diagrams 830 and 830.1, "VEHICLE EXCISE LICENCE CHECK" sign to diagram 831.2, "CHECK POINT AHEAD" sign to diagram 832.1A, "VEHICLE CONDITION INSPECTION" sign to diagram 832.2A and "GOODS VEHICLES STOP if directed" sign to diagram 830.2. Other signs to diagrams 832.3 to 832.10A are also used to give goods traffic directions to a check point.

D3.27.3 Refer to the Vehicle and Operator Services Agency (VOSA) for details of the traffic management arrangements at vehicle check sites and for the procedures used to stop vehicles.

D3.28 ROAD CONDITION SURVEYS

D3.28.1 Road condition surveys, such as skidding resistance, deflection testing, surface texture and profile measurements are generally executed on all types of road, both with and without hard shoulders, by means of short-duration lane closures. Vehicle-mounted signs are used involving one or more vehicles travelling at slow speed. In short-duration lane closures the vehicles may move continuously or proceed slowly along the road with frequent stops.

D3.28.2 Mobile works should be carried out only during periods of low risk and during low traffic flows when congestion is unlikely to occur. The works will be carried out using either the Mobile Lane Closure technique or as single vehicle works.

D3.28.3 The Mobile Lane Closure technique may be used only on dual carriageway roads and is restricted by certain traffic volume parameters; see [Section D6.26](#).

D3.28.4 Single vehicle works, see [Section D6.25](#), may be used on single carriageway roads and involve the use of a works vehicle displaying a "keep left/right" sign to diagram 610 at the rear; refer to regulation 14 of TSRGD 2002 for signs permitted to be mounted on vehicles (see [Part 2: Operations, Section O8.3](#)).

D3.28.5 Any proposal to carry out an inspection on a motorway shall be notified to the Highway Authority or their maintaining agent for maintenance and to the police.

D3.29 SURFACING

D3.29.1 The particular requirements for traffic management arrangement relating to surface dressing operations are included in the document "RSDA / CSS Code of practice for signing at surface dressing sites".

D3.29.2 Advance warning of surface dressing, heating and hot or cold planing should always be given by use of "road works" signs to diagram 7001. A typical signing arrangement for surface dressing works is shown on Plan SC5 in [Section D5.8](#). Advisory speeds of 10 mph are recommended for any roads dressed for less than one hour and of 20 mph until the road is opened to "self-regulated" traffic; see paragraph [D3.18.7](#).

D3.29.3 The "loose chippings" sign to diagram 7009 should be placed at 400 m intervals on newly surface-dressed roads. For the use of "no overtaking" signs to diagram 632, see paragraph [D4.8.19](#) and Chapter 3. Traffic cones should be placed 9 m apart on the centre line of single carriageway roads wider than 7.3 m. On urban streets and minor rural roads, the "road works" sign to diagram 7001, "TRAFFIC CONTROL AHEAD" variant to diagram 7010.1 and "loose chippings" sign to diagram 7009 with advisory speed plate to diagram

513.2 indicating a maximum speed of 20 mph, should be placed at the start of the work and then at regular intervals of between between 50 m and 100 m spacings. All signs must be reflectorised if not directly illuminated during the hours of darkness. [Section D3.7](#) deals with speed control and temporary speed limits.

D3.30 ROAD MARKINGS

D3.30.1 Road markings can be divided into two general types: those applied by machine and those applied by hand. For longitudinal work, long sections of markings on wide and undisrupted carriageways are often applied by a mechanised (e.g. vehicle mounted) machine. In areas where carriageways are narrow, disrupted, subject to parked cars or with many variations, markings are generally applied manually by a pedestrian operated applicator or hand screed.

D3.30.2 For longitudinal work, provided there is adequate width for the passage of traffic and it is not required to keep newly laid lines or studs clear of traffic, advance warning signs and the warning indications on vehicles may be sufficient. Otherwise, further measures may be required ranging from the coning off and the use of "keep left/right" signs to diagram 610, up to full lane closure, with or without traffic control.

D3.30.3 For markings applied by a pedestrian operated applicator or hand screed, such as the provision of medium/short length centre line etc., the traffic management provisions set out in [D3.30.2](#) may still be sufficient. However, for static marking operations, such as priority junction markings, arrows etc. the designer shall have responsibility for ensuring that appropriate traffic management is defined. Necessary consideration should be given to whether such works require a carriageway closure, positive traffic control or other measures as appropriate.

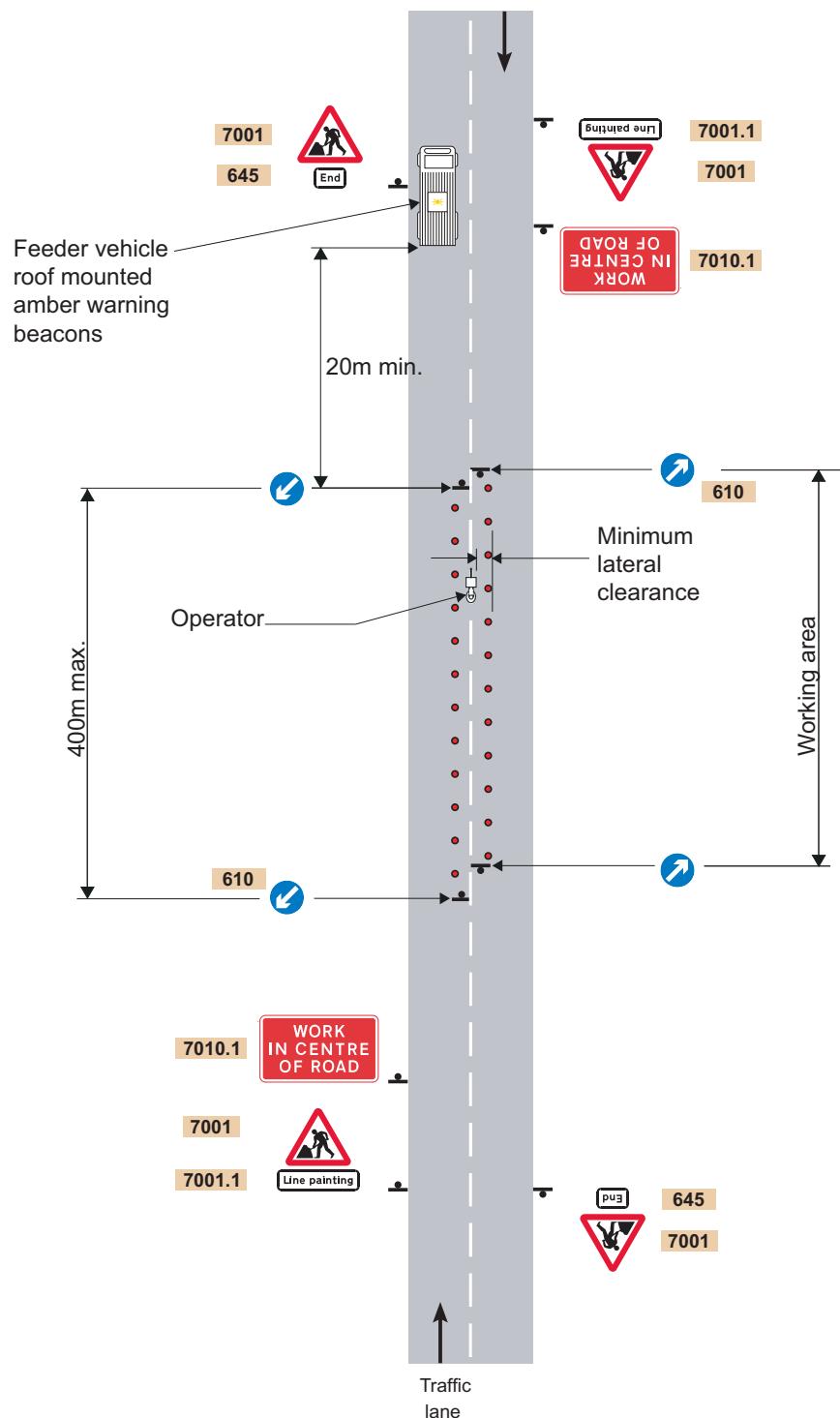
D3.30.4 Carriageway marking and road stud works pose different problems to those of the more usual type of road works. Whilst only a small width of carriageway along the division between traffic lanes is worked on; the personnel, vehicles and plant engaged in the works are continually on the move along the carriageway. Traffic may not be seriously interrupted, but circumstances may require the partial closure of a lane or lanes for this operation; see [Plan RM1](#).

D3.30.5 Where road marking material is applied to the carriageway using a mechanised (e.g. vehicle mounted) road marking machine, a different approach to the issue of signing is required. The road marking machine travels at approximately 5 mph (8 km/h) and therefore the use of static road signs alone is not practical. To overcome this, it is necessary to provide signs mounted on the rear of the working vehicle and/or other vehicles which travel in convoy with the marking machine. On dual carriageway roads, one option is to use the Mobile Lane Closure technique (see [Section D6.26](#)). Other measures to provide the necessary safety to the road marking operatives may, at the designer's discretion, include road closures for short periods.

D3.30.6 It is important to acknowledge that different road marking operations require different approaches to traffic management. Examples of commonly used traffic management layouts used in road marking operations are shown in [Plan RM1](#) and [Plans SC2 and SC3](#), and in [Part 2: Operations, Plans SVW1 and SVW2](#).

D3.30.7 Operational aspects of road marking operations are dealt with in [Part 2: Operations, Section O8.4](#).

Plan RM1: Single carriageway road line painting



NOTES:

1. Signs and cones should be of the sizes and at the locations shown in [Tables A1.1, A1.2 and A1.3 \(Appendix 1\)](#).
2. For minimum lateral clearances between live traffic and all personnel, equipment and vehicles see [Section D3.2](#).
3. See regulation 14 for details of road works signs that may be attached to works vehicles.

D3.31 INSPECTION STOPS

D3.31.1 Whenever possible, inspections of structures or particular features of roads should be conducted well away from the traffic lanes, for example making use of verges or overbridges. Inevitably sometimes it will be unavoidable for people to be on the hard shoulder or on traffic lanes. For short-duration stops (up to 15 minutes) and medium duration stops (15 to 90 minutes), guidance on the traffic management required is given in the document "Guidance for works on the hard shoulder and road side verges on high speed dual carriageways". This is Highways Agency document IAN115/08 and it is available on the following website: www.standardsforhighways.co.uk. This document is not valid in Northern Ireland and guidance for short and medium duration inspection stops in Northern Ireland is given in [Appendix A4](#).

D3.31.2 Any carriageway inspections or measurements which may last longer than 90 minutes should be carried out as static works, with the corresponding signing. For guidance on the operational issues relating to short-duration inspection stops, see [Part 2: Operations, Section O8.3](#).

D3.31.3 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.

D3.32 NON-MOTORISED ROAD USERS

D3.32.1 Where pedestrians, cyclists, equestrians and other vulnerable road users are affected by road works, the designer should give detailed consideration to minimising the impact on them and ensuring suitable alternatives exist. This consideration should include the following:

- review length and advance signing of diversion routes;
- safety implications of temporary surfaces, obstructions, ramps, diversions etc.;
- impact on frontagers;
- standard of surface/gradients/lighting;
- adequacy of lane widths for cyclists past the works and/or on the diversion route (see Traffic Advisory Leaflet 15/99);
- adequacy of crossing facilities for pedestrians;
- the needs of children, particularly if schools or play areas etc. are nearby;
- the impact on bus stop locations and access to bus stops;
- closing off of unsafe access across works; and
- arrangements for those with restricted mobility and other special needs.

D3.32.2 When designing works, the process of deploying and removing signs, barriers etc. should be such that they should only be deployed just before work starts and be removed as soon as it is finished. Signs, barriers etc. should not be stored on the street so they cause an obstruction.

PEDESTRIANS

D3.32.3 Pedestrians must not be forced into dangerous situations and should be protected from the works and vehicular traffic by means of continuous barriers which clearly delineate the works and warn pedestrians of their presence. Continuous barriers surrounding the site must be erected where the works are unattended; see [Section D3.10](#). Obstructions on the footway should be well guarded by continuous barriers or fences, with the addition of warning lights at night. Pedestrian routes diverted on to the carriageway should be clearly defined by continuous barriers or fences.

D3.32.4 When a pedestrian route is diverted into the carriageway, ramps to allow wheelchair and scooter users to move between the footway and carriageway must be provided. Ramps should have a slip resistant surface and should slope gently enough to enable users to negotiate it without difficulty. When possible, the layout should include a platform at kerb level which would allow wheelchair and scooter users to turn through 90° before descending the ramp.

D3.32.5 Where necessary, ramps or raised footways or boards should be provided which are fit for purpose. For more information, see "Safety at Street Works and Road Works – A Code of Practice", see [References](#) ([Appendix 3](#)).

D3.32.6 Temporary pedestrian ways should never be less than 1 m wide, and wherever possible should be at least 1.5 m wide. Where the normal pedestrian route is severely interrupted, "route for pedestrians" signs to diagram 7018 should be provided.

D3.32.7 The designer should consider if barriers should be used to restrict crossing points and if additional signing is necessary to warn pedestrians of changed traffic movements. The "PEDESTRIANS LOOK LEFT/RIGHT" sign to diagram 7017 is used at road works to warn pedestrians of one-way traffic. A double-faced sign with "LEFT" on one side and "RIGHT" on the other, facing across the road, should be provided at each edge of the carriageway. This sign may also be varied to read "BOTH WAYS".

D3.32.8 The "route for pedestrians" sign to diagram 7018 is used where the normal pedestrian route is diverted and the alignment of the new route is not obvious. Signs to diagrams 606 and 610 must not be used to direct pedestrians.

D3.32.9 The "CROSSING NOT IN USE" sign to diagram 7016 should be attached to each post of any type of pedestrian crossing facility which is temporarily taken out of use; see paragraph [D4.6.2](#). In this case, the need for alternative crossing facilities should be considered.

D3.32.10 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 D3.2](#).

D3.32.11 Where the conditions for working off the carriageway (see [Section D3.20](#)) 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, for example, [Plan SC1](#).

D3.32.12 The need for signing and guarding for pedestrians should be assessed where a contra-flow is to be introduced on an all-purpose dual carriageway road, particularly in an urban area.

CYCLISTS

D3.32.13 Consideration must be given to the safety of cyclists, in particular when narrow lane techniques are applied on all-purpose roads.

D3.32.14 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. Widths of between 2.75 m and 3.25 m for near side lanes should be avoided. Guidance on lane widths is given in [Section D3.3](#).

D3.32.15 In situations where motor vehicles are unable to pass cyclists safely, for example, where the effective lane width is less than 3.5 m, the use of temporary speed limits should be considered, backed by the appropriate enforcement methods, where feasible (see [Section 3.7](#)).

D3.32.16 Cyclists are particularly vulnerable to rough surfaces, temporary or otherwise, and particularly gullies at the edge of the carriageway. The designer should ensure that provisions are made to keep wearing courses level and in good condition. Guidance on surface condition is given in [Section D3.18](#).

D3.32.17 Wherever possible, access should be maintained for cyclists 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.

D3.32.18 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.

D3.32.19 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.

D3.32.20 It is particularly important in the case of partial contra-flow schemes to ensure that the single lane, situated on the primary carriageway, is of adequate width to allow wider vehicles to pass cyclists.

D3.33 EMERGENCY TRAFFIC MANAGEMENT

D3.33.1 In an emergency, the provision of temporary traffic management complying with the principles included in this document 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 operational aspects of ETM are dealt with in [Part 2: Operations, Sections O7.1 to O7.4](#).

D3.34 EMERGENCY ACCESS

D3.34.1 Consideration should be given to emergency access to all parts of the works area and highway which are subject to temporary traffic management, should a carriageway be blocked and queuing occurs. Provision of an emergency access lane is dealt with in [Section D6.7](#).

D3.35 FREE VEHICLE RECOVERY FACILITIES

D3.35.1 When works are likely to cause congestion, accidents or 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. It is essential to have an efficient recovery service and a well defined operational procedure in the event of an incident.

D3.35.2 On dual carriageway roads where the hard shoulder is utilised as a running lane so there is no refuge for the broken-down vehicle, the provision of a recovery vehicle service is recommended. Recovery vehicles, if provided, should be located on the approach to the affected length of hard shoulder so that the broken-down vehicle may be removed as quickly as possible. These recovery vehicles should be available throughout the period of hard shoulder usage.

D3.35.3 Issues which need to be considered include the number and siting of the recovery vehicles, communication systems, the siting of drop-off points, facilities provided (toilets, lighting etc.), in particular for vulnerable vehicle occupants, and also the system for identifying vehicles in need of recovery (CCTV/patrols). In addition, a regime to ensure compliance with contractual requirements should be specified. The police role and communication details, particularly with regard to procedures for dealing with abandoned vehicles should be agreed with the police and the appropriate traffic control centre at an early stage of the design process.

D3.35.4 The provision of a free recovery service should be considered whenever works are likely to involve the following:

- reduction in the number of lanes available;
- narrow lane widths;
- sections of motorway without hard shoulders;
- hard shoulder running;
- known congestion sites; and
- decommissioning of emergency telephones over a significant length of carriageway.

D3.35.5 When a free recovery service is implemented at a works site, "Free recovery Await rescue" signs to diagram 7291 should be placed at intervals throughout the site. The variant "Free recovery End" should be used at the end of the section of carriageway served by the free recovery service. Further information on these signs is given in paragraphs D4.10.37 and D4.10.38.

LIAISON AND PLANNING ISSUES

D3.35.6 Early planning and consideration of the options available is essential to ensure the right level of service is provided and the cost minimised. The police and, where appropriate, traffic officers, should be involved at an early stage of planning to offer advice on the need for and specification of recovery services appropriate to the particular stretch of the network affected.

D3.35.7 The designer should note that local police forces currently have their own contracted recovery operators and may be able to provide advice and guidance on the performance and capabilities of local operators.

D3.35.8 If not already involved with the contract, the highway maintaining agent should be consulted for advice on the proposed locations of recovery stations and setting down points. These should also be checked to ensure they do not conflict with proposed works.

D3.35.9 Where it is proposed to construct, or to site, temporary facilities for recovery operators outside the highway boundary, the local authority will need to be consulted over planning consent issues, waste arrangements and statutory charges.

D3.35.10 Siting of recovery operations on the local road network, i.e. off the trunk road, should be discussed with the local Highway Authority and written agreement of proposals obtained.

D3.35.11 The procedure for dealing with abandoned vehicles should be agreed at an early stage of the design process.

MONITORING THE SITE

D3.35.12 In order to achieve rapid removal of broken-down vehicles, it is essential that an efficient system is set up to monitor the affected network for broken-down vehicles throughout the duration of the works. This can be achieved using one of the following.

D3.35.13 Closed Circuit Television (CCTV) – such systems are relatively expensive to install and maintain but are reliable and allow 24 hour monitoring and recording of the affected network. CCTV systems can be linked either directly to the recovery contractor's office or else to a dedicated monitoring station provided by the main contractor. Monitoring stations should be manned for the duration of any restrictions imposed by the works and should be provided with appropriate communication systems; see also [Section D3.37](#).

D3.35.14 Dedicated roving patrols – these patrols offer a cheaper alternative in terms of set-up costs. They require additional recovery or contractor's staff to drive through the works area looking for broken-down vehicles. Once found, the patrol reports the location to the recovery base. Unless the dedicated roving patrol vehicles are fitted with an approved lorry-mounted crash cushion (LMCC), they should not be used to protect broken-down vehicles. The specification for LMCCs can be found in TD 49 "Requirements for lorry-mounted crash cushions" (DMRB 8.4.7). On larger sites the use of dedicated roving patrols can slow the recovery operation when compared with CCTV and hence this system is not recommended for road works where congestion is currently or likely to become a major problem.

D3.35.15 Watchman – providing a watchman is the cheapest of the three systems and relies upon contractor's staff within the site area acting as lookouts for broken-down vehicles. This system can be very effective within small sites but has limited value on larger sites. Watchmen can be useful when used in conjunction with dedicated roving patrols.

LEVEL OF SERVICE

D3.35.16 The level of recovery service employed should be appropriate to the risk of accident and/or the scale of congestion likely to develop.

D3.35.17 Dedicated/on site recovery equipment – this is a costly option as the recovery vehicles and staff are based on site permanently for the duration of the works or restrictions. Response times will be dependent upon the size of site and number of bases but are usually quicker than any other arrangement.

D3.35.18 Minutemen/local arrangements – this system is reliant upon there being locally based recovery services available. The contractor shall make arrangements with a local service provider for a priority call-out system. The required service level including response times and minimum equipment levels should be specified by the designer.

LOCATION OF DEDICATED RECOVERY SERVICES

D3.35.19 The designer should ascertain that there are suitable locations for a recovery base station in consultation with emergency services and adjacent highway authorities. However, the final choice should normally be left to the contractor unless there are particular safety implications that could limit the number of suitable locations.

D3.35.20 When choosing the location of the base, designers and contractors should give consideration to the safety of both the recovery operator and the road user. Recovery vehicles should not be required to carry out dangerous manoeuvres on the network in order to enter or exit their base. If located adjacent to the carriageway they should be suitably protected from accidents involving errant vehicles or debris. The use

of cones, permanent barriers, temporary proprietary vehicle restraint barriers etc. should be considered as appropriate. Where appropriate, base stations may be protected by location behind bridge abutments/piers provided visibility for access and exit is not compromised.

D3.35.21 The likelihood of congestion and/or accidents will influence the level of response time required and this should be considered early in the pre-contract planning process.

D3.35.22 The designer and contractor should carry out a risk assessment of the proposals before implementation. The client should be satisfied that this risk assessment is adequate before giving agreement to any location.

D3.35.23 When choosing the location of the base, the designer and contractor should consider use of the following.

- Motorway service areas – if these are convenient for the works, they offer an ideal and safe location. Local permission from the operators must be obtained.
- Local garages located off network – these are not appropriate where congestion is likely to block slip roads or local roads preventing rapid access. Response times will be dependent on distance away from site.
- Hard shoulder and slip roads – sufficient width should be provided to ensure ease of access and exit. Temporary widening of the back of hard shoulder may be required if insufficient width exists. Adequate protection is essential. Consideration must be given to arrangements for recovery vehicles to turn around before returning to base.
- Access roads – where access roads are provided for emergency access or gritting purposes, these can offer a useful location for the recovery base provided there is sufficient width to allow their intended use to continue unhindered.
- Lay-bys – on or off the network.
- Verge hard standings – where there is sufficient highway land, a temporary hard standing behind the hard shoulder or verge may be constructed to accommodate the base station. After completion of the road works, temporary hard standings should be removed to prevent their use as general stopping points. In locations where the provision of a hard standing would involve substantial construction costs, consideration should be given to more cost effective alternatives.
- Abnormal load lay-bys – if conveniently located near to the works, these can offer a low cost option. Prior to use, the police must be consulted regarding likely abnormal load movements during the works period. Protection should be provided as appropriate and signing used to deter illegal parking, for example, with a sign to diagram 660 varied to “Large or slow vehicles only”.
- Emergency refuges – these should be avoided if possible unless the works prevent their use by road users.
- Service provider’s depots and compounds – local maintenance depots and winter maintenance compounds can be used subject to there being sufficient space and easy access to the network. The designer should seek the client’s permission for use at a very early stage of planning, as there will be issues of safety and security to overcome.
- Surplus land – land located within junctions or owned by the Highway Authority can be used subject to the use not interfering with sight lines, and safe access and exit being possible.

SETTING-DOWN LOCATIONS

D3.35.24 The designer and contractor should give consideration to the following when deciding upon a setting-down location.

- 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 mitigate 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.

D3.35.25 The following are typical locations that are currently used as setting-down locations for recovered vehicles and occupants.

- Motorway service areas – the facilities for recovered vehicles and passengers listed above already exist at a service area. Setting down recovered vehicles and passengers at a service area should be considered whenever it is near a road works site. The service area operator should be consulted at the planning stage to ensure that there are no insurmountable problems.
- Local services or garages – checks should be made to ensure facilities are 24 hour and the local police should be consulted to ensure there are no security issues.
- Contractors' compound – contractors' compounds may be considered as setting- down locations where they are situated close to the road works site, and there is sufficient land for parking and other facilities. For safety and security, it will generally be necessary to fence off the recovery setting-down area from plant, materials and from any potential health and safety hazards in the compound.
- Winter maintenance compounds – as for contractors' compounds. Operational times may not coincide with the site times causing problems of access/security.
- Temporary lay-by – where there is sufficient highway land, a temporary lay-by behind the hard shoulder may be constructed to accommodate recovered vehicles and passengers. However the construction of the temporary lay-bys may be made impracticable by topographical and land ownership factors. After completion of the road works, temporary lay-bys should be removed

to prevent their use as general stopping points. In locations where the provision of a temporary lay-by would involve substantial construction costs, consideration should be given to more cost-effective setting-down locations.

- Off-route lay-bys – where the road works are near a suitable junction, a lay-by on an adjoining road may provide a good location for setting down recovered vehicles and occupants.

D3.35.26 The list given in paragraph D3.35.25 above is not exhaustive, and circumstances may arise where a combination of these locations on a day/night basis may best serve the interests of road users. In addition, local knowledge may be employed to identify unique locations which fulfil the requirements for setting down recovered vehicles and occupants. The police are often able to advise on this.

VEHICLES AND EQUIPMENT

D3.35.27 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.

D3.35.28 The designer should note that the list of equipment represents only guidance and so should consult with one of the recognised recovery industry associations for advice and guidance on the latest equipment and capabilities of vehicles. Alternative equipment specifications should be agreed with the Highway Authority.

D3.35.29 The key to an effective recovery system on site is good communication between the relevant parties. The contractor 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.

D3.35.30 The use of an Impact Protection Vehicle (IPV) (see Part 2: Operations, 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 30 mph. This applies to the incident site and also to the setting-down point.

D3.36 OTHER VEHICLE RECOVERY PROVISION

D3.36.1 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 recovery by a road recovery operator. Breakdowns can result in stationary traffic which may create a hazardous situation.

D3.36.2 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 Section D6.10).

D3.36.3 Operational issues relating to the recovery of broken-down vehicles are covered in Part 2: Operations, Sections O7.3 and O7.4.

D3.37 SURVEILLANCE/USE OF CCTV

D3.37.1 At any major layout, good communications and effective surveillance are essential to coordinate recovery and emergency services, and reduce the incident duration. The use of closed circuit television (CCTV) to monitor road works should be considered at the planning stage.

D3.37.2 Where permanent CCTV, variable message signs (VMS) and traffic information systems are available, consideration should be given to their use subject to consent by the police or appropriate service operator.

D3.38 TEMPORARY VARIABLE MESSAGE SIGNS (VMS)

D3.38.1 VMS provide a higher visual impact to passing motorists than static sign plates and are less likely to be missed. The use of temporary VMS (typically trailer-mounted) may be considered as an addition to fixed signs. Any messages displayed on these signs must comply with regulations 53(1) and 58, and Schedule 15 to the Regulations. A specification for portable variable message signs is given in document TR 2518 which is available at www.tssplansregistry.org.

D3.38.2 VMS can be particularly useful at the following locations:

- near advance road work warning signs where queues are likely to form;
- in the lane change zone (i.e. within 800 yds to 200 yds) of a lane closure in place of wicket signs indicating a closed lane (7202); and
- as additional support to keep left (or keep right) arrow signs at point of lane closure.

D3.38.3 On wider carriageways there is greater chance of near side signs being obscured to off side traffic by vehicles in the near side lanes. Certain types of temporary VMS are high mounted and this type of sign is particularly useful when a sign is required on the verge and there is no suitable location for an off side sign.

D3.39 TEMPORARY TRAFFIC REGULATION ORDERS

D3.39.1 When required, temporary traffic regulation orders should be used to ban turning movements and enforce lane and carriageway restrictions such as contra-flow working, carriageway closures and speed and vehicle restrictions which are needed to guide and control traffic safely past the works.

D3.39.2 Where temporary traffic restrictions are required, these should be established for each site and made by means of a temporary order under Section 14 of the Road Traffic Regulation Act 1984 or Article 50 of the Road Traffic Regulation (NI) Order 1997. Specific reference must be made in the order to the hard shoulder where it is being used as a running lane to ensure that it is covered by the temporary order, because in general it is not part of the carriageway. Separate orders are recommended for a lane closure and for hard shoulder running. The Highway Authority should be consulted to ascertain whether or not the above actions in respect of hard shoulders apply.

D3.39.3 The design programme for such works should make provision for the time necessary to obtain the appropriate temporary traffic regulation orders. Where there is insufficient time to obtain temporary traffic regulation orders under normal procurement procedures, consideration should be given to obtaining a traffic order under emergency notice procedures (Section 14(2) of the Road Traffic Regulation Act 1984), or in collaboration with the police under their powers.

D3.39.4 The designer may need to give consideration to the following issues:

- speed-related issues ([Section D3.7](#));
- no overtaking orders;
- signing and enforcement;
- use of the hard shoulder as a running lane;
- contra-flow running;

- road closures and prohibited turns;
- bus, cycle and taxi lane closures;
- clearways/waiting restrictions;
- width/height restrictions;
- weight restrictions and arrangements to deal with overweight vehicles;
- wording of orders to ensure they reflect pattern and phasing of works; and
- arrangements for escorted vehicles.

D3.40 PUBLICITY

D3.40.1 The designer should anticipate the effect of the works on the flow of traffic and endeavour to minimise delays whilst being careful not to compromise safety. Advance road user and frontager notification and advance signing are the first steps in addressing this problem by seeking to remove a proportion of the flow from the route. Early publicity will allow some road users to plan their journeys to avoid the congestion caused by the works and frontagers to take appropriate action.

D3.40.2 When appropriate, publicity should also cover the impact on bus routes and bus stops and should be carried out in conjunction with the relevant bus operators. To meet the needs of passengers with mobility and visual impairments, the use of different types of media including websites and local radio should also be considered.

D3.41 TUNNELS

D3.41.1 This section deals with tunnels, although underbridge and underpass structures will have certain features in common with tunnels, e.g. lighting, fire safety, access and escape provisions and may also include ventilation and lane control provisions, so many of the design comments relating to traffic management in tunnels may apply equally to these types of highway structures.

D3.41.2 Tunnels should be designed in accordance with the guidance given in BD 78 “Design of Road Tunnels” (DMRB 2.2.9), or other equivalent standards, which covers enclosed road tunnels of 150 m or more in length. The document provides information on the general considerations and specific design and operational requirements of road tunnels, including the provision of carriageway crossovers and temporary contra-flow traffic management. The temporary traffic management proposals for new and existing tunnels should be in accordance with the principles set out in this Chapter.

D3.41.3 For ventilation and fire safety reasons most new road tunnels, and particularly those on the motorway and trunk road network, comprise two separate bores, with each bore accommodating a carriageway carrying unidirectional traffic during periods of normal operation. It is normal procedure to close a bore of a twin bore tunnel to facilitate planned maintenance, unless it has been designed to support partial closure and the safety zone minimum safety clearances given in [Section D3.2](#) can be maintained.

D3.41.4 The following considerations also apply to tunnels that operate a bi-directional traffic flow, or for a single bore, where it is proposed to run traffic in the opposite direction to its normal lane/carriageway traffic flow.

D3.41.5 Where it is proposed to close one bore of a twin bore tunnel and use the other bore to operate two-way traffic, the designer should ensure that the tunnel infrastructure and equipment has been designed, or can be added/adapted, to support traffic safely in a contra-flow mode. The temporary traffic management to be provided must guide traffic safely into the temporary two-way running bore whilst preventing an errant vehicle from accidentally entering the closed bore. An access gate or traffic barrier should be considered to control access into the works tunnel site. In addition, if not already in place, the designer should consider the need to provide an emergency means of stopping traffic, such as temporary traffic signals, in the approaches before it reaches the tunnel portals.

D3.41.6 Where a tunnel has been designed to permit temporary contra-flow traffic, the traffic management designer should review the tunnel design and operation documentation against the proposed design to establish its current suitability to support the proposed contra-flow operations safely. The temporary contra-flow proposals should be discussed with the tunnel operator/maintainer, the police and other emergency services, and if necessary, the Tunnel Design and Safety Consultation Group (TDSCG) should be reconstituted to endorse, or amend, the proposals before they are incorporated into any specific scheme. Where it cannot be readily established that contra-flow traffic management can be operated and it is not feasible/appropriate to reconstitute the TDSCG, the designer will need to consider the steps set out in paragraphs **D3.41.7** to **D3.41.9** below.

D3.41.7 Many road tunnels will have been designed, or subsequently checked, to determine whether, when one bore of a twin tunnel is closed for road works, tunnel maintenance or tunnel refurbishment, the other bore can operate safely. The procedures for maintenance and refurbishment, and also the use of tunnel in a contra-flow condition when appropriate, will be included in the operation and maintenance documents relating to the tunnel. The traffic management designer should consider the adequacy of clearances, see [Sections D3.2](#) and [D3.3](#). In addition, where these have not already been installed as part of the permanent equipment, the designer may need to consider the provision of lane control signals and VMS signs in the tunnel and at the portal.

D3.41.8 Where it cannot be established that contra-flow traffic can operate safely in a tunnel, and work cannot be carried out under lane closures, the affected tunnel traffic will need to be diverted onto pre-planned diversion routes, see [Section D3.15](#). Temporary traffic diversions may also be required to allow contra-flow enabling works (such as the installation of temporary lighting and ventilation, traffic control signals and signs) to be carried in advance of the main works, where these cannot be accomplished with lane closures in low-flow conditions.

D3.41.9 For tunnels situated on a dual carriageway road, the design of signs for the approaches to the tunnel portals, lane change, lead-in (crossover), through tunnel (equivalent to works zone) and end-of-works (return crossover) zones are covered in [Section D6](#); for zone definitions, see [Section D6.14](#). Where a tunnel is not already equipped for contra-flow traffic management, consideration should be given to the provision of lane control signals and signs, and where this is not possible or appropriate, the opposing traffic flows should be separated by traffic delineators to Detail H or Detail K (narrow lanes). Where there is insufficient lateral clearance between opposing traffic flows to install Detail H or Detail K, the temporary central division should be delineated using a double white line road marking to diagram 1013.1A. These road markings must be removed and the lane markings reinstalled at completion of the works before reverting to uni-directional traffic flow (regulation 26).

D3.41.10 For works associated on tunnels situated on single carriageway roads it is most likely that traffic will require to be diverted. However, where works can be limited to half carriageway width and traffic flows are low, shuttle working using temporary traffic signals to control traffic through the tunnel could be considered, refer to [Section D5.10](#).

D3.41.11 In addition to the portal and tunnel signs covered above, the traffic management designer must ensure that any tunnel prohibition notices (signs indicating users and/or materials banned by Order from a tunnel) are installed at appropriate locations in advance of a tunnel. Appropriate diversion signs should be provided to permit prohibited users to take an alternative route.

D3.41.12 The traffic management designer should consider the risks involved with the introduction of contra-flow traffic and select an appropriate temporary mandatory speed limit. Where the permanent mandatory maximum speed limit through a tunnel is 60 mph or more, the designer should give consideration to imposing a temporary mandatory maximum speed limit on the approaches and through the tunnel of 40 mph or less, and where the permanent mandatory maximum speed limit is 40 mph or 50 mph, a temporary mandatory maximum speed limit of 30 mph or less should be considered.

D3.42 TRANSITION SECTIONS

D3.42.1 The road layout at the transition between single and dual carriageway roads, and vice versa, can vary considerably and therefore particular care is required when designing temporary traffic management for works in the vicinity of this area.

D3.42.2 Signing, particularly advance signing, should be based on the speed and nature of the approach road as this generally dictates the maximum speed at which traffic will approach the works. For example, works on a dual carriageway road, but close to an end of a single carriageway section, will reflect the speed characteristics of the single carriageway road. The location and number of approach signs for different types of road is given in [Table A1.1 \(Appendix 1\)](#).

D3.42.3 Signing on the single carriageway approach road should include a "road narrows" sign to diagram 517. It is recommended that the "lane closed ahead" sign to diagram 7202 should not be used on a single carriageway two-way road. If used on a road that consists of a single lane in each direction, this sign is likely to confuse drivers and could lead to an error of judgement resulting in a head-on collision.

D3.42.4 The start of the dual carriageway section should already be signed on the central reservation with a "keep left" sign to diagram 610 which may have a "Dual carriageway" plate to diagram 608. In addition, consideration should be given to providing "no entry" signs to diagram 616, on the end of the opposing traffic dual carriageway section.

D3.42.5 The start of the single carriageway section should already be signed by appropriate signs to diagram 520 or 521.

D3.42.6 On a single carriageway road where the works commence between the start of the dual carriageway and 600 m downstream, coning should commence at the start of the dual carriageway, effectively extending the single carriageway along the dual carriageway to direct traffic in single file past the works.

D3.42.7 On a single-carriageway road where sightlines are particularly poor, such as on left-hand bends, a duplicate set of signs should be placed on the off side of the carriageway to supplement those on the near side.

D3.42.8 If the works are on a single carriageway road just beyond the end of a dual carriageway, the advance signs that are placed on the dual carriageway should relate to those of a single carriageway, that is, the "road narrows" sign to diagram 517, although the number and spacing would relate to the speed of the dual carriageway section. When appropriate, coning should be continued from the end of the dual carriageway road narrowing so that traffic is restricted to a single file past the works and onto the single carriageway beyond.

D3.42.9 Where there are road works on, or adjacent to, a short length of dual carriageway between two lengths of single-carriageway road, coning should be used throughout the dual carriageway length to maintain single-file traffic throughout.

D3.42.10 Where one carriageway of a dual carriageway road is to be closed and the other used for contra-flow traffic, it is essential that the signing and coning is appropriate to direct traffic along the carriageway whilst restraining traffic from entering the closed carriageway. The "two-way traffic" sign to diagram 521 should be repeated in both directions along the carriageway, particularly where there are pedestrian and traffic access

points. Consideration also should be given to the provision of additional side road signing and the temporary removal or masking of any inappropriate road signs (before or along the carriageway or on side roads). This may include dual carriageway signs to diagrams 608, 818, 818.1, 818.1A, "no entry" signs to diagram 616 or "restrictive turning" signs to diagrams 606, 612, 613 where these movements are to be permitted during the works period.

D3.42.11 Plans TS1 to TS4 show the principles of the traffic management on roads for which the national speed limit applies, for works in the vicinity of the transition between a dual carriageway and a single carriageway and vice versa.

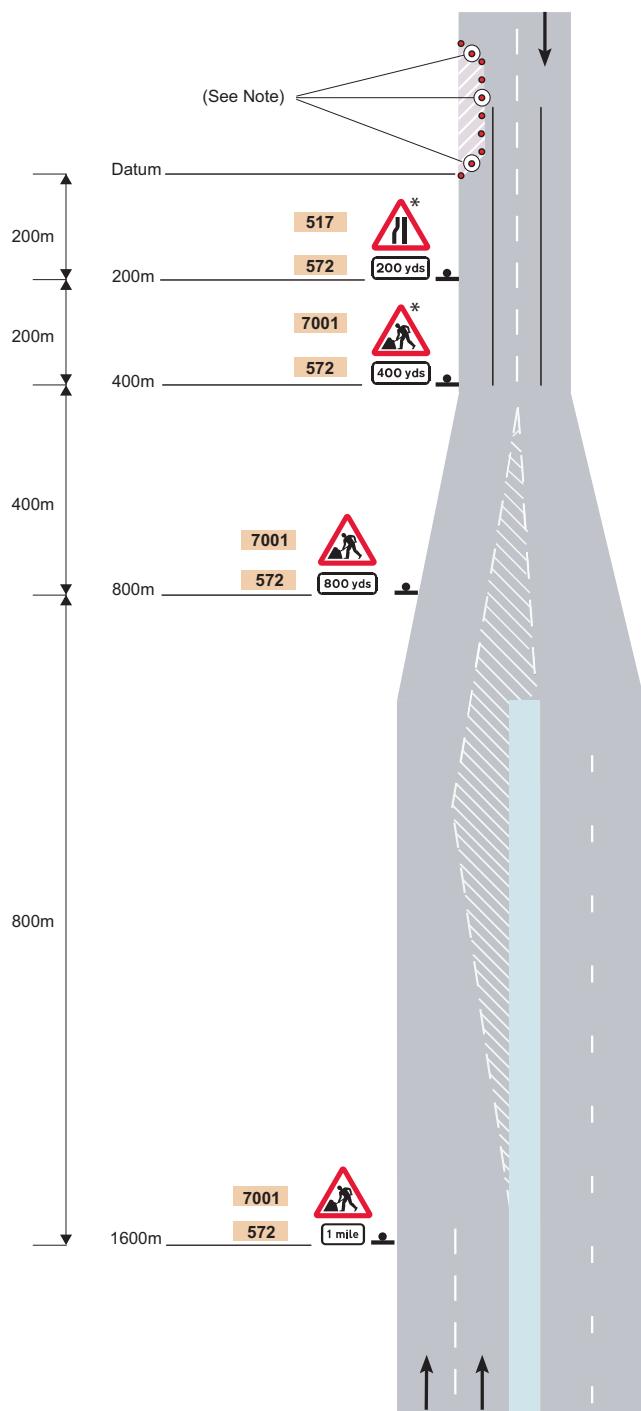
Plan TS1: Transition section (dual to single), works starting between the end of the dual carriageway and 600m downstream on the single carriageway road

The principles for the approach signing are:

- a "road works" sign (7001) with supplementary plate "1 mile" (572) placed on the near side 1600 m in advance of the works lead taper;
- a "road works" sign (7001) with supplementary plate "800 yds" (572) placed on the near side 800 m in advance of the works lead taper;
- a "road works" sign (7001) with supplementary plate "400 yds" (572) placed on the near side 400 m in advance of the works lead taper; and
- a "road narrows" sign (517) with supplementary plate "200 yds" (572) placed on the near side 200 m in advance of the works lead taper.

NOTE: Where sight lines on the single carriageway road are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

Plan TS1: Transition section (dual to single), works starting between the end of the dual carriageway and 600m downstream on the single carriageway road



* Where sight lines are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

NOTE: Details of the traffic management associated with traffic control on a single carriageway road are dealt with in [Sections D5.4 to D5.16](#). Cone spacing depends on the type of road – see [Table A1.3 \(Appendix 1\)](#).

Plan TS2: Transition section (single to dual), works starting between the start of the dual carriageway and 600m downstream, approach signing on the single carriageway road

The principles for the approach signing are:

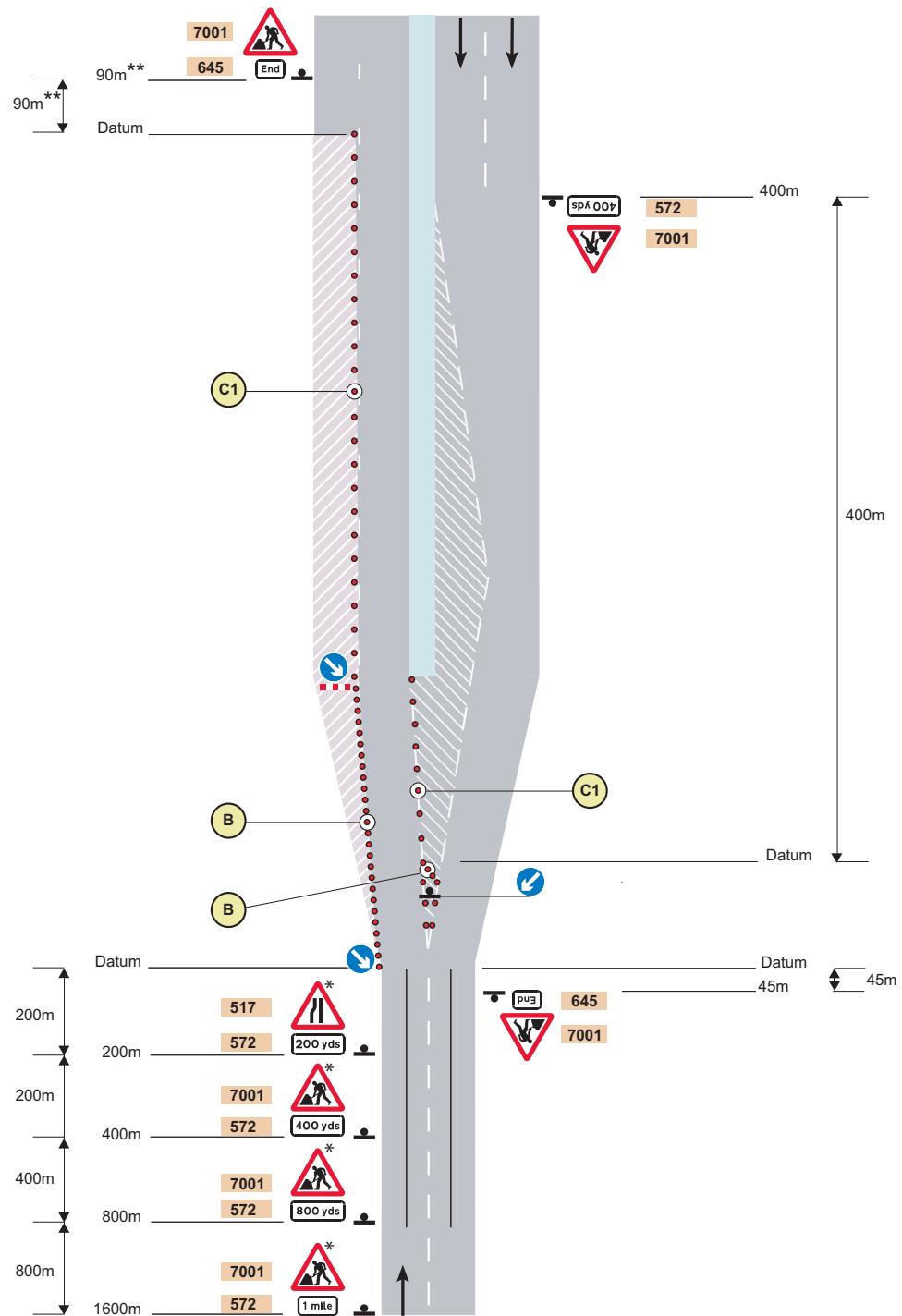
- a "road works" sign (7001) with supplementary plate "1 mile" (572) placed on the near side 1600m in advance of the works lead taper;
- a "road works" sign (7001) with supplementary plate "800yds" (572) placed on the near side 800m in advance of the first cone of initial lane closure;
- a "road works" sign (7001) with supplementary plate "400yds" (572) placed on the near side 400m in advance of the first cone of initial lane closure;
- a "road narrows" sign (517) with supplementary plate "200yds" (572) placed on the near side 200m in advance of the first cone of initial lane closure;
- a "keep right" sign (610) at the start of near side coning to Detail B, followed by coning to Detail C1;
- coning to Detail C1 at off side on the edge of hatched area;
- a "keep right" sign (610) and lane closure barrier sign (7105) should be placed in the closed carriageway at the start of the closed lane; and
- a "keep left" sign (610) at the start of the road markings hatched area, this should be protected from impact from opposing traffic by a short cone taper to Detail B within the hatched area.

Consideration should also be given to providing a "no entry" sign to diagram 616 on the off side at the end of the opposing traffic dual carriageway section.

Where sight lines on the single carriageway road are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

The above is for a near side lane closure. For an off side lane closure the advance sign to diagram 517 should indicate the road narrows on the right ahead, the near side "keep right" sign to diagram 610 is not required, the off side lane closure coning (Detail B) commences at the start of the central reservation road marking hatching, no near side coning is required, and the "keep left/right" sign to diagram 610 should indicate that traffic should pass to the left.

Plan TS2: Transition section (single to dual), works starting between the start of the dual carriageway and 600 m downstream, approach signing on the single carriageway road



* Where sight lines are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

** This distance applies to dual carriageway roads with a permanent speed limit of 50 mph or more. The distance will be 45 m when the speed limit is 40 mph or less.

Plan TS3: Transition section (single to dual), works starting between 600 m and 850 m downstream of the start of the dual carriageway, approach signing on the single carriageway road

The principles for the approach signing are:

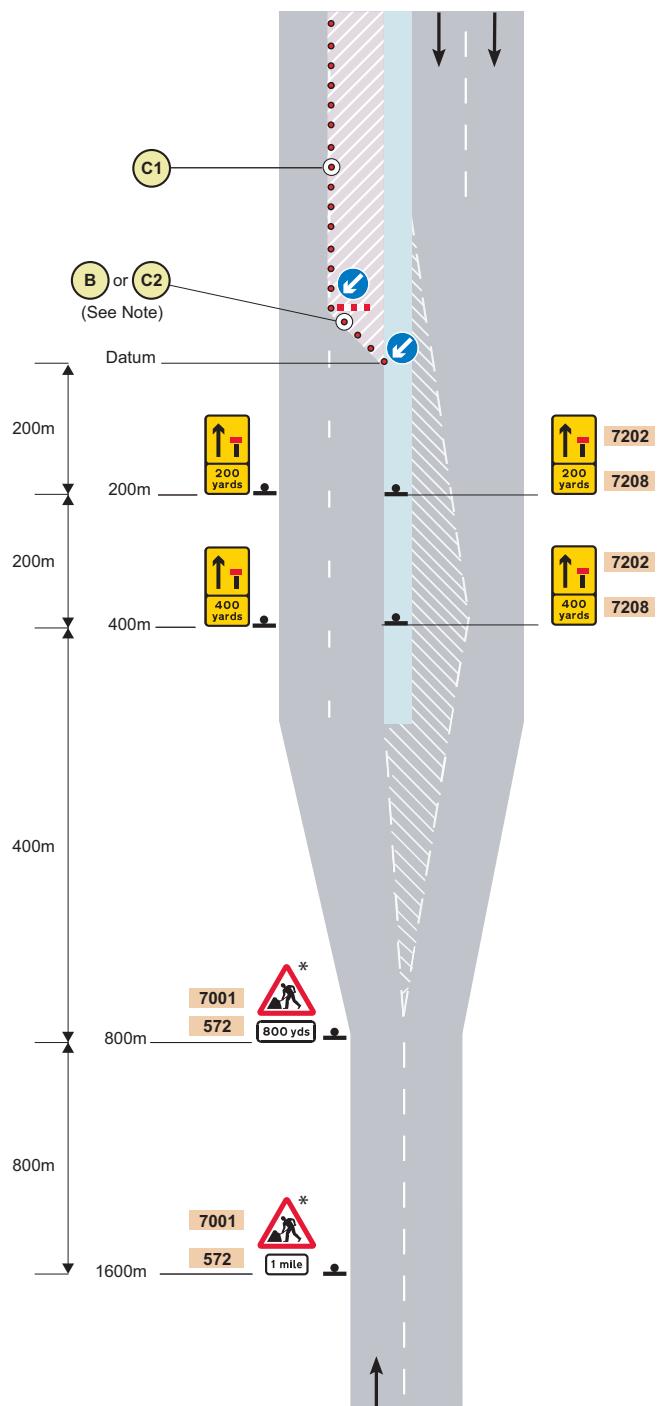
- a “road works” sign (7001) with supplementary plate “1 mile” (572) placed on the near side 1600m in advance of the works lead taper;
- a “road works” sign (7001) with supplementary plate “800yds” (572) placed on the near side 800m in advance of the first cone of initial lane closure;
- a “lane closed ahead” sign (7202) with supplementary plate “400yds” (7208) placed on the near side and the central reserve 400m in advance of the first cone of initial lane closure; and
- a “lane closed ahead” sign (7202) with supplementary plate “200yds” (7208) placed on the near side and the central reserve 200m in advance of the first cone of initial lane closure.

If the location of the works allow, then a “lane closed ahead” sign (7202) with supplementary plate “600yds” (7208) should be placed on the near side and the central reserve 600m in advance of the first cone of initial lane closure.

Consideration should also be given to providing a “no entry” sign (616) on the off side at the end of the opposing traffic dual carriageway section.

Where sight lines on the single carriageway road are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

Plan TS3: Transition section (single to dual), works starting between 600 m and 850 m downstream of the start of the dual carriageway, approach signing on the single carriageway road



* Where sight lines are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

If the location of the works allow, then a 600 yard wicket sign should be included on the dual carriageway section.

NOTE: Cone spacing depends on the type of road – see [Table A1.3 \(Appendix 1\)](#).

Plan TS4: Transition section (single to dual), works starting 850 m or more downstream of the start of the dual carriageway, approach signing on the single carriageway road

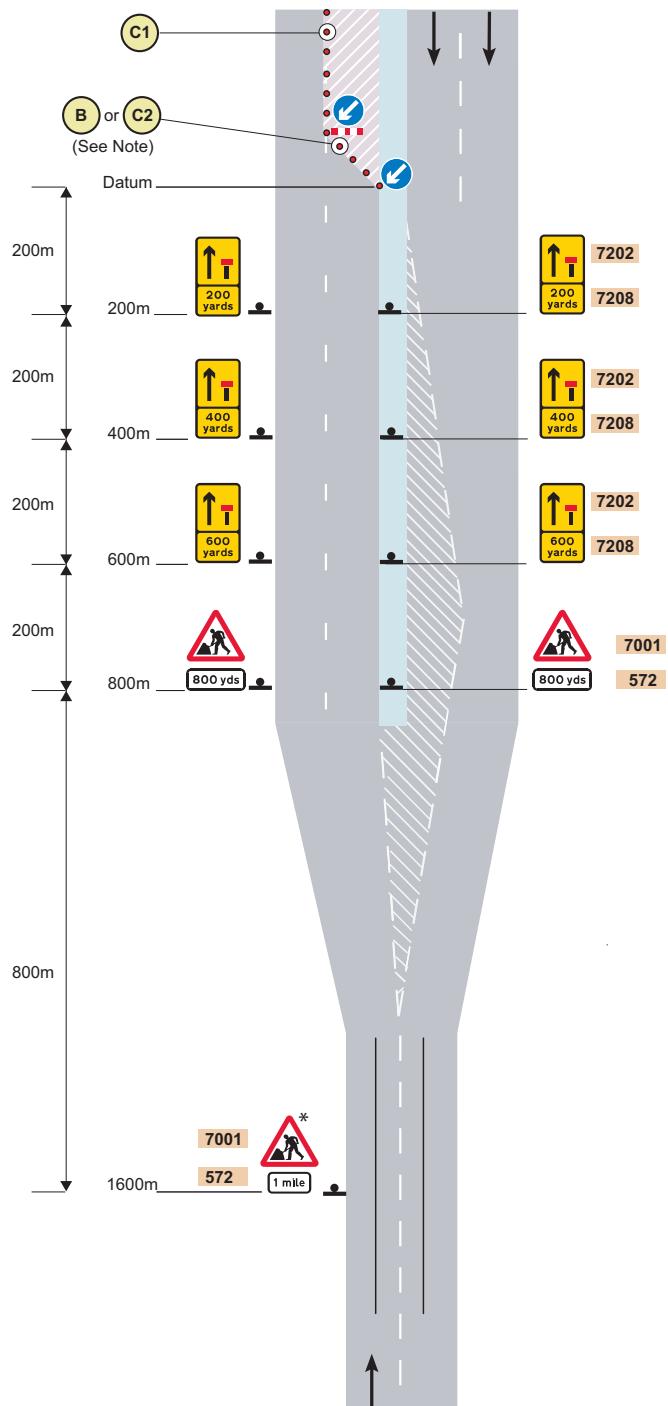
The principles for the approach signing are:

- a “road works” sign (7001) with supplementary plate “1 mile” (572) placed on the near side 1600m in advance of the works lead taper;
- a “road works” sign (7001) with supplementary plate “800yds” (572) placed on the near side and on the central reserve 800m in advance of the first cone of initial lane closure;
- a “lane closed ahead” sign (7202) with supplementary plate “400yds” (7208) placed on the near side and on the central reserve 400m in advance of the first cone of initial lane closure; and
- a “lane closed ahead” sign (7202) with supplementary plate “200yds” (7208) placed on the near side and the central reserve 200m in advance of the first cone of initial lane closure.

Consideration should also be given to providing a “no entry” sign (616) on the off side at the end of the opposing traffic dual carriageway section.

Where sight lines on the single carriageway road are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

Plan TS4: Transition section (single to dual), works starting 850 m or more downstream of the start of the dual carriageway, approach signing on the single carriageway road



* Where sight lines are particularly poor, such as on a left-hand bend, a duplicate set of signs should be placed on the other side of the single carriageway.

NOTE: Cone spacing depends on the type of road – see [Table A1.3 \(Appendix 1\)](#).

D3.43 SCAFFOLDING

D3.43.1 Where scaffolding or other type of temporary structure must 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 D3.10](#) 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 D3.2](#) should be adhered to at all times.

D3.43.2 Where scaffolding or other type of temporary structure must be 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, at least 150 mm in depth, the lower edge of the band being about 1.6 m 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.

D3.43.3 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.

D3.44 ROAD PLATES

D3.44.1 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.

D3.44.2 Road plates must be made of suitable material with an appropriate skid resistant surface and their installation must not present a hazard to cyclists or motorcyclists. See also [Part 2: Operations](#), paragraph [O3.16.13](#).

D4 SIGNING PRINCIPLES

D4.1 INTRODUCTION

D4.1.1 Effective signing is fundamental to an efficient and safe temporary road management scheme. This section details the considerations a designer should take into account when designing the signing at works sites and discusses the meaning and deployment of types of signing commonly found in temporary situations. Schedule 12 to the Regulations prescribes the key warning, informative and regulatory signs used at road works.

D4.1.2 Any prescribed sign may be used temporarily in connection with road works, at accidents, in connection with temporary traffic orders 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 will be found in the appropriate chapters of the Traffic Signs Manual.

D4.1.3 Most signs which require an Order or site approval by the Secretary of State when used permanently are subject to the same conditions when used temporarily by, or on behalf of, a Highway Authority.

D4.1.4 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. Section 22 of the Road Traffic Act 1972, which makes it an offence for a driver to disregard the indication given by a sign, applies to any sign so displayed by the police. The police in Northern Ireland do not have these powers.

D4.1.5 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.

D4.2 SIGNING CONSIDERATIONS

D4.2.1 The traffic management designer should consider all aspects of signing which forms part of the traffic management design. These include:

- traffic management signs;
- regulatory signs;
- warning signs;
- temporary diversion signs;
- driver information signs (including those placed in advance of the works); and
- variable message signs (VMS).

D4.2.2 Traffic signing equipment must comply with the relevant British or European Standard.

D4.2.3 The use of any traffic sign not prescribed by TSRGD 2002 is unlawful unless it has received special signs authorisation. Authorisations should be sought via the traffic authority from the Department. Non-prescribed signs must not be used without prior authorisation.

D4.2.4 Variable signs capable of being brought into and taken out of use by the operation of any electrical or other apparatus may also need to be type approved in accordance with direction 56. Type approvals, where

required, need to be procured from the Highways Agency in England, the Welsh Assembly Government in Wales, the Department for Regional Development in Northern Ireland and the Transport Scotland in Scotland.

D4.2.5 A number of road works signs, although prescribed by the Regulations, require temporary traffic orders. These can be identified by the inclusion of direction 7 under item 2 in the table accompanying each diagram in the Schedules to the Regulations. The traffic authority should be consulted in good time if such signs are required.

D4.2.6 Vehicle width limits should be specified in imperial units (e.g. 6'-6"). Although it is not a mandatory requirement, the use of a dual-unit sign to diagram 629A is strongly recommended. If the dual-unit sign is incorporated into a road works sign (see diagram 7283.1) note that its diameter is increased from 750 to 900 mm in order to maintain legibility. Smaller sizes are not prescribed. Similar rules apply to height limits; if the dual-unit sign to diagram 7284.1 is used, the diameter must be 900 mm.

D4.2.7 The number of temporary diversion signs may be extensive and the location of each sign will need to be specified. It is important to ensure that temporary signs are consistent with permanent signs. As in all signing design, the choice of location should take account of existing services and sight lines, and should accord with actual site conditions.

D4.2.8 The following diversion signs may be used on all roads other than motorways: signs to diagrams 2703, 2705 or 2706 should be located on the approach to a junction, whilst flag signs to diagrams 2704 or 2707 should be located at the junction exit. Unless a roundabout is very large or complex, it is not necessary to provide signs to diagram 2704 or 2707 to guide traffic around the roundabout. However, it is necessary to provide left-pointing flag signs at exits from roundabouts.

D4.2.9 Driver information signs may be required by the traffic authority to explain to road users the reason for the works and for any delays. The Specification for Highway Works, clause 117.21, provides further advice on the siting and design of driver information signs. Variable message signs on the approaches to the site may be of particular use in informing drivers about exceptional delays, e.g. due to an accident.

D4.2.10 Access to and exit from the works area requires 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.

D4.2.11 Working drawings which give details of 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.

D4.2.12 Unless otherwise stated, the speed limits referred to are the permanent mandatory speed limit that would apply to the carriageway without road works.

D4.3 TEMPORARY TRAFFIC REGULATION ORDERS

D4.3.1 Temporary traffic regulation orders will be required to impose road and carriageway closures, traffic restrictions such as lane width and speed limits. For further information, see [Section D3.39](#) and paragraph D4.2.5.

D4.4 SIZE AND SITING OF SIGNS

D4.4.1 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 must the width of the footway be reduced to less than 1 m, preferably not less than 1.5m.

D4.4.2 Speed limit repeater signs should be located immediately adjacent to traffic lanes where practicable. At sites where it is impractical to erect speed limit repeater signs immediately behind the coning within the works area, the signs shall be located on the near side verge or central reservation as appropriate. Care should be taken to ensure that these signs are not regularly obscured by site activities. If there is a risk of obscuration, consideration should be given to providing repeater signs larger than the dimensions given in [Table 3.4](#) and to mounting them at a greater height than normal.

D4.4.3 Road works signs should be located so that if a vehicle leaves the carriageway the consequences are minimised. The use of the following procedures, which are also appropriate to temporary gantries and other temporary equipment, should be considered:

- the sign could be mounted behind a length of existing vehicle safety barrier;
- a new length of temporary safety barrier could be provided around the sign;
- the sign could be mounted further away from the carriageway; or
- passively safe posts and signs designed to minimise vehicle damage and injury to occupants could be used – scaffold poles must not be used.

D4.4.4 The recommended location, number and size of warning and other signs and cones are specified in [Tables A1.1 to A1.3 of Appendix 1](#). It should be noted that these are minimum requirements for straight and level roads with verges. The presence of gradients, bends or side road junctions on the approaches to the site of any road works will call for adjustment of the siting distances.

D4.4.5 The absence of verges on which to display signs on roads with a permanent speed limit of 40 mph or less may require the use of the smallest size signs in order to minimise the encroachment upon the carriageway. On roads with a permanent speed limit of 50 or 60 mph, the appropriate size of sign should be used where this is practicable. On roads on which the national speed limit applies it is essential to use the appropriate size of sign. See [Tables A1.1 and A1.2 of Appendix 1](#).

D4.4.6 If no verge exists, signs will probably need to be erected in a similar way to permanent signs. In this case, the posts may need to be “passively safe” depending upon their size and meet the requirements of BS EN 12767. The aim should always be to give drivers adequate advance warning, so that they can adjust the speed and position of their vehicles on the road in order to pass the obstruction in complete safety. If warning signs on the left-hand side of a single carriageway are likely to be obscured or overlooked then signs should be duplicated on the right-hand side of the carriageway. On dual carriageway roads and motorways, warning signs should be duplicated on the central reservation.

D4.4.7 [Table A1.1 \(Appendix 1\)](#) specifies the size and minimum clear visibility distance to the first sign for different types of road. This table also gives the siting distances of the first signs in advance of the works in metres or miles. However, the distance to the road works given on the supplementary plate to the warning sign must be in imperial units to comply with the Regulations. Likewise speeds are given in miles per hour because they relate to speed limits.

D4.4.8 In this Chapter, siting distances are specified in metres and miles. However the Regulations require that all distances and speed limits are displayed in imperial units and accordingly these are shown as “yds” (yards), “miles” and “mph” (miles per hour). In siting signs it will not always be possible to adhere precisely to the required dimensions and variations in distance of up to 10% are generally permissible. The siting of certain signs shown on the plans have been rationalised within the permitted 10% variation, e.g. the 400 yards wicket signs being placed at 400m. Any further required adjustment in siting of these signs should take this into account in order that the placed signs remain within the permitted 10% tolerance. In practice this means that

signs can only be moved closer to the works. On signs where the numerals indicating distance may be varied, the equivalent imperial dimension shall be displayed in accordance with the appropriate item in Schedule 16 of TSRGD 2002.

D4.4.9 The x-heights of letters displayed on signs must be within the ranges prescribed by the Regulations, and be appropriate to the speed of traffic and the quantity of information on the sign. In general, longer messages take longer to read and require larger x-heights. However, advice on recommended x-heights can be found in [Table A1.2 \(Appendix 1\)](#).

D4.5 ADVANCE WARNING SIGNS

D4.5.1 Guidance on advance warning signs is as follows:

- on dual carriageway roads on which the national speed limit applies, advance warning signs should be provided at 2 miles and 1 mile. Further signs should be added at 3 miles (or more, as necessary, in 1 mile increments) if queuing is anticipated;
- on dual carriageway roads with a permanent speed limit of 60 mph, advance warning should be given at 1 mile and also at 2 miles if queuing is expected or, if the speed limit is 50 mph, at 800 m and also at 1 mile if queuing is expected;
- on single carriageway roads on which the national speed limit applies, warning should be given at between 275 and 450 m;
- the distance is less for roads with a permanent speed limit of 40 mph or less – see [Table A1.1 \(Appendix 1\)](#); and
- in certain situations additional signs may be required further in advance of the works. At works for which relaxations apply fewer signs may be required.

D4.5.2 Advance warning signs in accordance with paragraph D4.5.1 above are not required where the work is carried out off-carriageway and the conditions described in [Section D3.20](#) are satisfied. The recommended signing when the conditions are not satisfied should be as for a road works situation as shown on plans in [Sections D5 and D6](#).

D4.5.3 The “lane closed ahead” sign to diagram 7202 should not be used if there is only a narrowing of the carriageway space and no reduction in the number of lanes available to traffic.

D4.6 EXISTING SIGNS AND MARKINGS

D4.6.1 Drivers will be confused and hazards may be created if the information on existing signs or road markings cease to be applicable 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. 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. Spraying with masking material should be done neatly. Small signs should be completely obliterated or removed. Temporary signs must not be allowed to obscure existing permanent signs which still apply.

D4.6.2 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 to diagram 7019 “Light signals not in use” 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 [Section D3.25](#) and [Part 2: Operations, Section O3.13](#) and [O3.14](#).

D4.6.3 In cases where it is proposed to place barriers across crossing areas, consideration must be given to the provision of nearby drop kerb arrangements so as not to create problems for physically impaired users, pedestrians with pushchairs etc.

D4.6.4 If double white lines are to be obliterated because of road works and cannot be replaced quickly, a temporary order restricting overtaking should be made and temporary "no overtaking" signs to diagram 632 erected. See Chapter 3 of the Traffic Signs Manual for advice on siting these signs.

D4.6.5 It is important to remove any lengths of road markings which are in conflict with temporary traffic requirements, for example, 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.

D4.6.6 There should be no need to remove or cover the lane markings at a changeover position when only one lane is being switched. However, edge of carriageway markings are generally raised rib lines and so should be removed. For works for which relaxations apply, following a risk assessment, the hard shoulder/lane 1 raised rib marking may be retained at the changeover.

D4.7 TEMPORARY TRAFFIC CONTROL

Where positive traffic control is necessary at road works, the following signs may be used:



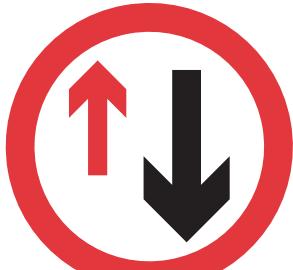
7023

D4.7.1 Manually operated "STOP" and "GO" signs to diagrams 7023 and 7024. See [Section D5.8](#) for guidance on the length/flow characteristics of this type of control. It should not be operated over distances greater than 500 m. These signs are not to be used at night unless the signs are directly illuminated. When a frame is used to support the sign this should be circular, not octagonal, as both signs are mounted on a circular substrate.

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.



7024

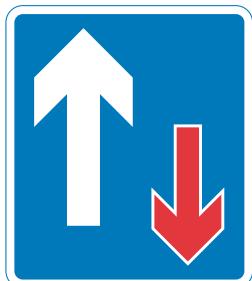


615

D4.7.2 "Priority" signs to diagrams 615 and 811 to indicate which direction of traffic flow has priority at places where the more rigid control imposed by the above means is not justified because, although the works may be of some duration, traffic is very light (for example, less than about 800 vehicles per hour). Explanatory plates to diagrams 615.1 and 811.1 must be used in combination with signs 615 and 811 respectively. See also [Section D5.7](#).

**Give way to
oncoming
vehicles**

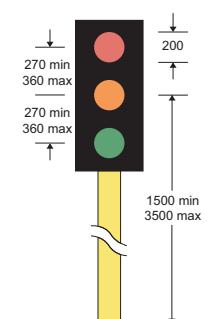
615.1



811

**Priority over
oncoming
vehicles**

811.1



3000.1

D4.7.3 Portable light signals – temporary traffic signals normally mounted on tripods which are intended for positive control of traffic on shuttle lanes for relatively short periods of time. Positive traffic control using temporary traffic signals is dealt with in [Section D5.10](#).

D4.8 GENERAL SIGNING**"ROAD WORKS" SIGN TO DIAGRAM 7001**

D4.8.1 All road works sites should have a "road works" sign to diagram 7001 exhibited on all approaches as the first sign seen by drivers. On motorways, and on all-purpose roads on which the national speed limit applies, the sign should be supplemented by a distance plate to diagram 572. The "road works" sign, supplemented where necessary by a plate to diagram 570 indicating the distance over which the hazard extends, may also be used at the hazard itself. These plates may also be used on restricted all-purpose roads, but are not necessary on roads with a permanent speed limit of 30 mph or less.

SUPPLEMENTARY PLATES AND SIGNS**Line painting**

7001.1

D4.8.2 The "road works" sign to diagram 7001 may be accompanied by a supplementary plate to diagram 7001.1 indicating the nature of the road works. The size of each supplementary plate appropriate to the size of warning triangle is set out in [Table A1.2 \(Appendix 1\)](#). Supplementary plates to diagram 7001.1 which may be appropriate for road works are listed in [Table 4.1](#) below.

Table 4.1 Supplementary plates

Grass cutting	Surveying
Tree cutting	Mobile road works
Hedge cutting	Road sweeping
Ditching	Gully emptying
Weed spraying	Gritting
Sign erection	Salting
Sign maintenance	Snow ploughing
Lighting maintenance	Blasting
Overhead works	On hard shoulder
On slip road	At level crossing

D4.8.3 The "Blasting" plate variant to diagram 7001.1 erected below the "road works" sign to diagram 7001 is appropriate where explosives are being used in connection with works on or near the road, but where it is safe to allow traffic to keep running. In these circumstances the sign is used to warn drivers of the probability of hearing an explosion. Should it be necessary to stop all traffic during blasting, suitable arrangements must be made with the Highway Authority and the police.



570

D4.8.4 This sign is used to show the distance over which a hazard or prohibition extends.



572

D4.8.5 This sign is used to show the distance ahead to the hazard.



573

D4.8.6 When one road joins another in the immediate vicinity of works, a "road works" sign to diagram 7001 accompanied by a distance and direction to hazard sign to diagram 573 should be located on the first road indicating the direction in which the works are located. In the same circumstances the sign may be used with certain other warning signs; see TSRGD and Chapter 4. The distance may be omitted.



7001.2

D4.8.7 The location of road works immediately ahead on a route indicated by a plate to diagram 7001.2 and variants must be erected below a "road works" sign to diagram 7001 before a junction. The plate warns drivers of possible delays on the "named" road so that they may opt to find an alternative route. The route number may be varied. "Northbound" may be varied, e.g. to "Southbound" or it may be omitted and "On" inserted, e.g. if works are in both directions from this junction, the sign would become "On M1".

"OTHER DANGER AHEAD" SIGN TO DIAGRAM 562



562

D4.8.8 It should particularly be noted that the "other danger ahead" sign to diagram 562 is not normally appropriate for use at road works, but should be used to warn drivers of unexpected hazards ahead. The sign must always be accompanied by the appropriate supplementary plate to diagram 563 indicating the nature of the danger, but may also be used in conjunction with signs to diagram 563.1 and 7022. Suitable x-heights and the overall sizes of the plates are set out in [Table A1.2 \(Appendix 1\)](#).



563

SUPPLEMENTARY PLATES

D4.8.9 The supplementary plates to diagram 563 which may be appropriate are listed in **Table 4.2** below:

Table 4.2 Variations of plate to diagram 563

Blasting*	Overhead cable repairs
Census	Road liable to flooding
Dust cloud	Runners in road
Fallen tree	Smoke
Frost damage	Walkers in road

* If blasting is a road works activity see paragraph **D4.8.3**



7001.3

D4.8.10 The sign is used to warn drivers of the presence of a workforce in the road and that traffic should proceed slowly.

This sign should only be used when workers are present in the live carriageway, e.g. when setting out temporary traffic management.



7015

D4.8.11 The “NO HARD SHOULDER FOR 400 YARDS” sign to diagram 7015 is used in advance of the closure, where only the hard shoulder is to be occupied by the works. This sign should indicate the closure length in the units and to the tolerance given in Schedule 16 item 6.



7104

D4.8.12 The “sharp deviation of route” sign to diagram 7104 is used to indicate to drivers the direction of the deviation and to guard the obstruction which is the cause of the change of direction. Certain minimum sizes are prescribed but there is no maximum length. The recommended heights are given in **Table A1.2 (Appendix 1)**. The sign may be used as a series of separate minimum lengths or in one continuous length, but it should not be used as a continuous fence or barrier parallel to a relatively straight carriageway. The black and white version of this sign to diagram 515 must not be used at road works.



7105

D4.8.13 The “lane closed” barrier to diagram 7105 serves as a visual and physical barrier and reinforces the need to change direction as indicated by traffic cones and other signs. This sign is then used at right angles to the line of traffic and mounted about 1m above the carriageway. The depth may be either 150 or 300mm, refer to **Table A1.2 (Appendix 1)**. A minimum length of 1.25m is prescribed which gives five panels, three coloured red and two white alternately.



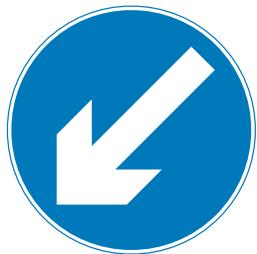
606

D4.8.14 The “turn left/right” sign to diagram 606 indicates to drivers the direction in which they must proceed. This sign must not be used without the necessary order (except the “turn left” sign when used on the main island of a roundabout or in combination with diagram 608 “Dual carriageway”), or as a directional sign.



609

D4.8.15 The “turn left/right ahead” sign to diagram 609 is used to indicate that drivers must turn left or right at a junction ahead. This sign must not be used without the necessary order, or as a directional sign, except at a road approaching its junction with a dual carriageway road.



610

D4.8.16 The “keep left/right” sign to diagram 610 is a regulatory sign, which indicates to drivers that they must pass the sign on the side indicated. No order or departmental site approval is required for its use.



612

D4.8.17 The “no right turn” sign to diagram 612 and the “no left turn” sign to diagram 613, in conjunction with the necessary order, can be used when a side road is closed and traffic cannot turn into it. In such a case the traffic has to divert by travelling ahead.



613

D4.8.18 It is important to note that the “keep left/right” sign to diagram 610 and “turn left/right sign” to diagram 606 must be correctly mounted in order to convey the intended message; see Chapter 3. Some device must be incorporated in portable frames to prevent the accidental rotation of circular signs. They must not be used to direct pedestrians when footways are diverted. The “direction of temporary route for pedestrians” sign to diagram 7018 should be used in these circumstances.



632



554



554.2



554.3



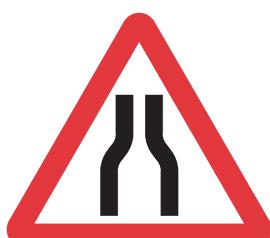
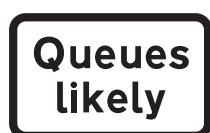
557

D4.8.19 The “no overtaking” sign to diagram 632 must not be used without an order. Its use at road works would normally be in situations where existing double white lines have been obliterated and cannot be replaced quickly; see paragraph D4.6.4.

D4.8.20 The “Flood” sign variant to diagram 554 is used to give warning of flood conditions on a road along which travel is hazardous or even impossible. Except when used as an emergency measure for short-duration standing water, it should always be followed, beyond the flooded length of road, by a “Try your brakes” sign to diagram 554.1. Depth gauges to diagram 826 or 826.1 should always be placed at sites liable to flooding and the “Flood” sign erected when conditions become dangerous; see also Chapter 4. The use of the dual unit sign to diagram 826.1 is strongly recommended. In the event of a complete road closure the “Flood” sign should be supplemented by the “ROAD CLOSED” sign variant to diagram 7010.1, if necessary preceded by “ROAD AHEAD CLOSED” sign variant to diagram 7010.1. The former is appropriate at the point where the flooding begins and the latter, accompanied by alternative route signs, at the preceding junction.

D4.8.21 The “risk of ice” signs to diagram 554.2 and 554.3 together warn of situations where ice conditions are known to be present and a particular hazard; see also Chapter 4. Warning of fog is given by the matrix signal to diagram 6011, warning of ice can also be given by 6011.1.

D4.8.22 The “slippery road” sign to diagram 557 warns of the hazard due to slippery road surfaces. The sign is intended to be used only until the problem can be rectified; see Chapter 4 for further details. It should be used with a distance plate to diagram 570.



D4.8.23 The “queues likely” sign to diagram 584 is always used in combination with a supplementary plate to diagram 584.1 (“Queues likely” or “Queues likely on slip road”). The sign should be used only where there is likely to be traffic queuing upstream of the road works or temporary situations and the end of the queue could be hidden or come upon unexpectedly, e.g. hidden by a bend or where a queue may back on to a through carriageway from an exit slip road. The sign will be sited in pairs (one on each side of the carriageway or slip road) within the verge or central reservation at one mile and two miles upstream of the works, although conditions may often require different locations; see Chapter 4 for further details.

D4.8.24 The “road narrows” signs to diagrams 516 and 517 are used to give warning that the existing carriageway width becomes restricted. The actual manner in which the carriageway width is restricted will determine which of the signs should be used. Where appropriate these signs are supplemented by a “Single file traffic” plate to diagram 518; see Chapter 4 for further details.

D4.8.25 “Two-way traffic” signs to diagrams 521 and 522 are used to warn drivers of two-way opposing or cross traffic at situations where its presence might not be readily appreciated. For example, a sign to diagram 521 is used where a length of dual carriageway road under construction narrows to a single carriageway road, or where all the traffic from one carriageway of a dual carriageway road has been diverted to the other. A sign to diagram 522 is used on a one-way road to indicate that the road 521 it joins or crosses carries two-way traffic; see Chapter 4 for further details.



518



560



561

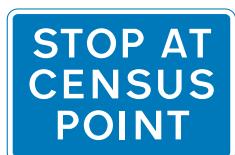
D4.8.26 The "Single file traffic" plate to diagram 518 is used with a "road narrows" sign to diagram 516 or 517 to warn that traffic previously travelling in more than one lane must proceed in single file; see Chapter 4 for further details. Where there are two lanes of opposing traffic they can be separated by cones, cylinders, reflecting road studs, barriers etc.

D4.8.27 The reflectorised "hazard marker" signs, to diagrams 560 and 561 are used on unlit or poorly lit roads to delineate the edge of the carriageway. They may be mounted on suitable posts or stakes; see Chapter 4 and BS EN 12767:2007. On single carriageway roads they must be double sided and show red on the left-hand side of the carriageway and white on the right-hand side. On dual carriageway roads they must be single sided and show red on the left-hand side of the carriageway and amber on the right-hand side. They may also be used to mark individual temporary obstructions close to the running lane, which cannot otherwise be adequately marked by cones and warning lights. This subject is dealt with in more detail in Chapter 4.



7021

D4.8.28 "TRAFFIC UNDER SIGNAL CONTROL" sign to diagram 7021. This should be used in combination with a "road works" sign to diagram 7001 at every side road leading to an uncontrolled junction within a length of road controlled by portable traffic signals. This procedure must be used only when traffic held at the signals is visible to the joining traffic.



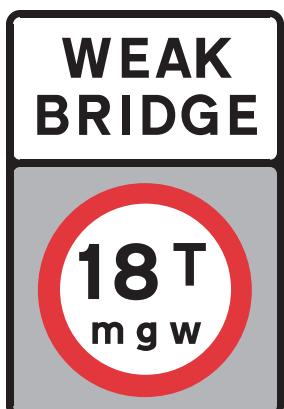
830

D4.8.29 "STOP AT CENSUS POINT" sign variant to diagram 830. This may be used in connection with a census only when the taking of the census has been approved by the traffic authority for the road, the chief officer of police of the police area in which the road is situated and by or on behalf of the Secretary of State. For more information on surveys, see [Section D3.26](#).



622.1A

D4.8.30 The “weight restriction” sign to diagram 622.1A should be used where a weight restriction is required to prohibit goods vehicles, exceeding the maximum gross weight indicated, from entering a road. Where a restriction is imposed for structural reasons, a “WEAK BRIDGE” or “WEAK ROAD” sign to diagram 626.2A should be erected. An “Except empty vehicles” bottom panel to diagram 627.1 may be added where appropriate. Use of either of these signs requires a traffic regulation order. It is usually necessary to place a sign on each side of the carriageway; see direction 8.



626.2A



7010.1

D4.8.31 “The ROAD CLOSED” sign variant of diagram 7010.1 should be used to warn traffic of a road closure ahead. The name of the road may be substituted for “ROAD”. Other permitted variants of this sign are listed in [Table 4.3](#).

Table 4.3 Permitted variants for the sign to diagram 7010.1

ADVERSE CAMBER	TRAFFIC CONTROL AHEAD
RAMP AHEAD	TRAFFIC SIGN MAINTENANCE
ROAD AHEAD CLOSED	TRAFFIC SIGNAL MAINTENANCE
SLOW WET TAR	WORK IN CENTRE OF ROAD
TEMPORARY ROAD SURFACE	

D4.9 CONES AND CYLINDERS

D4.9.1 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 shall conform to BS EN 13422:2004 “Vertical road signs. Portable deformable warning devices and delineators. Portable road traffic signs. Cones and cylinders” and must comply with regulation 56. [Table 4.4](#) summarises the minimum and optional requirements for cones and cylinders for UK roads.

Table 4.4 Cones and cylinders – requirements for UK roads

Characteristics	Cones		Cylinders		Comments
	Minimum	Optional	Minimum	Optional	
Shape	Class S1 or S2	N/A	N/A	N/A	Both shapes allowed in the Regulations
Weight	W3	None	N/A	N/A	
Category	Category B	Category A	Category B	Category A	Category A and B are defined in clause 3.4 and 3.5 of BS EN 13422:2004
Wet conditions	WT1	None	WT1	None	
Visual performance (Retroreflectivity)	R1A or R1B	R2A or R2B	R1A or R1B	R2A or R2B	
Luminance Factor	LA or LB	LAB or LB	LA or LB	LA or LB	

NOTES:

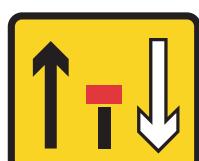
1. Classes, categories, luminance factors etc. refer to those given in BS EN 13422:2004. "Vertical road signs. Portable deformable warning devices and delineators. Portable road traffic signs. Cones and cylinders."
2. Cones and cylinders shall be tested to and meet the requirements of BS EN 13422:2004 for the category and classes given above.

D4.10 SIGNS FOR LANE RESTRICTIONS, CLOSURES AND CONTRA-FLOW WORKS

D4.10.1 The detailed design of signs for lane restrictions and lane changes is shown on the working drawings (see paragraph D1.2.2) or dealt with in Section 13 of Chapter 7. The principles for using these signs are described in Section D5 for single carriageway roads and Section D6 for dual carriageway roads.

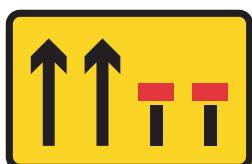
D4.10.2 Wicket signs such as those illustrated in paragraphs D4.10.5 to D4.10.10 and variants, should only be used on dual carriageway roads.

D4.10.3 The following signs are used to indicate lanes open or closed to traffic and contra-flow working.



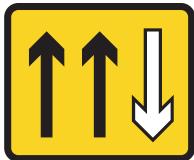
7206

D4.10.4 The centre lane of a three-lane single carriageway road is closed with traffic on the off side of the works travelling in the opposite direction.



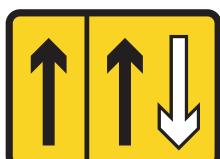
7202

D4.10.5 The two right-hand lanes of a four-lane dual carriageway are closed to traffic ahead. On this and the following signs the number of arrows indicating which lines are open or closed to traffic may be varied.



7203

D4.10.6 Two lanes of the carriageway are open to traffic with off side contra-flow working. The sign is used only where opposing flows are segregated using Details H or K, i.e. studs with traffic cylinders to diagram 7103. It is not appropriate if there is a buffer lane or a vehicle restraint barrier.



7203.1

D4.10.7 Two lanes of the carriageway are open to traffic, one of which uses the hard shoulder, with off side contra-flow working. The sign is used only where opposing flows are segregated using studs and traffic cylinders in accordance with Details H or K. It is not appropriate if there is a buffer lane or a vehicle restraint barrier.



7204

D4.10.8 Two lanes of the carriageway are open to traffic, one of which uses the hard shoulder.



7205

D4.10.9 Two lanes of the carriageway are open to traffic.



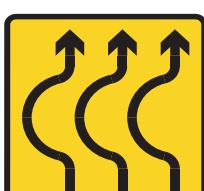
7207

D4.10.10 The right-hand lane of a three-lane dual carriageway is closed ahead; traffic may use left-hand lanes and hard shoulder now. This sign may be used with a bottom panel to diagram 7208 to indicate the distance ahead at which the conditions indicated start to apply.



7209

D4.10.11 The sign to diagram 7209 may be used in combination with signs 7203, 7203.1, 7204 and 7205 to indicate the distance over which the condition will apply.



7221

D4.10.12 The sign to diagram 7221 is used in advance of sharp bends where traffic is diverted onto a temporary road for a short distance.

D4.10.13 Other composite signs, such as the sign to diagram 7210 may consist of three panels, a centre panel with a top and a bottom panel. Signs such as those to diagrams 7211.1, 7230 etc. when used with a top panel to diagram 7260 have a lower panel "Now" to diagram 7272 to mark the point at which the hard shoulder running commences. For a list of the top and bottom panels which may be used with each centre panel see the table of combinations for that diagram in Schedule 12 to the Regulations.

D4.10.14 Top panels contain messages and instructions on lane behaviour. Only one top panel may be used on any one sign. The top panels are as follows:



7262

USE HARD SHOULDER	7260
REJOIN MAIN CARRIAGEWAY	7261
GET IN LANE	7262
STAY IN LANE	7263
NARROW LANES	7264

D4.10.15 The bottom panels contain distance and other advisory messages, as follows:



7270



7274



7275

Distance to restriction	7270-7272
Narrow lanes	7274
Advisory maximum speed	7275

LANE RESTRICTION PANELS

D4.10.16 A sign is defined by panel numbers denoting the restriction in each lane. If the centre lane or lanes of a carriageway are shown as closed, then either the left or right-hand lanes should also be shown as closed. On signs to diagram 7201.1 a symbol to diagram 7288 may be used to indicate traffic moving in the opposite direction. Note that only one symbol to diagram 7288 may be used to represent opposing traffic separated by traffic cylinders.

D4.10.17 For a full list of centre panels with which each symbol can be used see item 3 in the table below each symbol diagram in Schedule 12 to the Regulations. The design of these panels is detailed in Chapter 7.

D4.10.18 It is imperative that the signs are changed immediately to indicate the new arrangements when a road layout is changed.

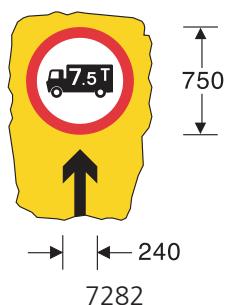
D4.10.19 The “lane restriction” symbols to diagrams 7280 to 7288 are used on dual carriageway roads and slip roads to indicate to drivers which lanes ahead are open and which are closed or restricted to particular classes of vehicles. For dimensions of symbols and x-heights of elements for the centre panel of signs see Chapter 7, Section 13 Figure 13-3. Roundels are prescribed in only one size (750 mm) for imperial unit signs, and one size (900 mm) for dual unit signs, and it is not permitted to vary these. Dual unit signs should be used wherever possible. The symbols may be used to show the restrictions applying to particular lanes, with the following meanings.



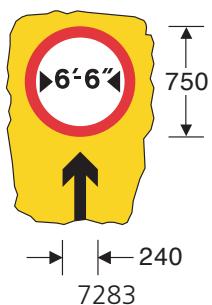
D4.10.20 Lane open to traffic.



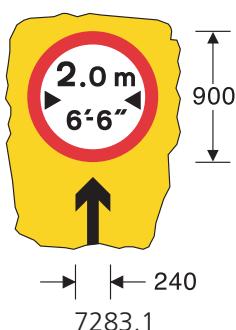
D4.10.21 Lane open to any vehicle. The x-height is 125 mm, which is equivalent to a capital letter height of 175 mm.



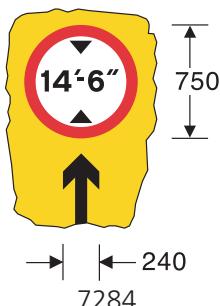
D4.10.22 Lane subject to a temporary weight restriction. The roundel is 750mm in diameter. This must be increased to 900mm diameter when used in conjunction with a symbol to diagram 7283.1 or 7284.1.



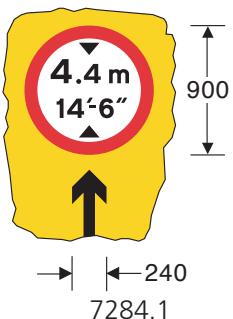
D4.10.23 Lane subject to a temporary width restriction, with width indicated in imperial units. The roundel is 750 mm in diameter. This is not to be used in conjunction with a symbol to diagram 7283.1 or 7284.1.



D4.10.24 Lane subject to a temporary width restriction, with the width indicated in both metric and imperial units. The roundel is 900 mm in diameter. If combined metric and imperial units symbols are used on a sign then all prohibitory roundels on the sign must be 900 mm diameter.



D4.10.25 Lane subject to a temporary height restriction, with the height indicated in imperial units. The roundel is 750 mm in diameter. This is not to be used in conjunction with a symbol to diagram 7283.1 or 7284.1.



D4.10.26 Lane subject to a temporary height restriction, with the height indicated in both metric and imperial units. The roundel is 900 mm in diameter. If combined metric and imperial units symbols are used on a sign then all prohibitory roundels on the sign must be 900 mm in diameter.



D4.10.27 Lane leading to a particular destination. For use only on signs to be placed on all-purpose roads.



D4.10.28 Lane leading to a particular destination at the junction shown. For use only on signs to be placed on motorways.



D4.10.29 Lane is closed.



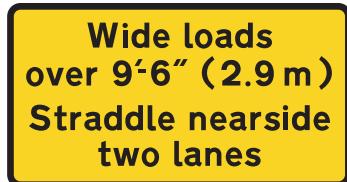
D4.10.30 Traffic is moving in the opposite direction to traffic in the other lanes which are segregated by traffic cylinders; not for use with buffer lanes or vehicle separation barriers.

WIDE LOADS



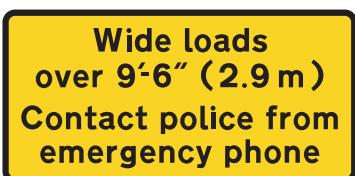
D4.10.31 On dual carriageway roads, and at other locations as appropriate, vehicles carrying wide loads may require special consideration at road works.

D4.10.32 Signs to diagram 7292 should be erected to instruct drivers of wide loads on action to be taken before reaching road works ahead. These should be sited on the near side verge at 1 km and 2 km upstream of the last carriageway exit prior to the works from which there is a suitable wide loads diversion route.



7292 variant

D4.10.33 Road works with three or more running lanes, of which the near side two lanes are contiguous, will generally permit wide loads of 2.9 m to 4.6 m (wide load straddling the near side two lanes) to pass safely through the works un-escorted, while maintaining at least one running lane for other traffic. Signs to diagram 7292, variant "Straddle nearside two lanes" should be used for such cases and should be sited on the near side verge at 2 km and 1 km upstream of the works. These signs should be repeated at the start of the works and following any junctions within the road works site.



7292 variant

D4.10.34 Where there are only two contiguous running lanes and no suitable diversion route around the road works, consideration should be given to the provision of a wide load escort facility. Signs to diagram 7292, variant "Contact police from emergency phone" should be used where the police provide a wide load escort service. The signs should be sited on the near side verge at 1 km and 2 km upstream of the emergency telephone location. Where an escort service is provided by other agencies, suitable wording and signs authorisation will be required.



7293

D4.10.35 An "emergency telephone" sign to diagram 7293 indicating to drivers of wide loads the location of the telephone should be sited in the verge adjacent to the emergency telephone.

D4.10.36 Designers should be aware that free-standing temporary emergency telephones, based on mobile phone technology, are available.

VEHICLE RECOVERY



7291

D4.10.37 The "broken-down vehicles" sign to diagram 7291 should be used if the designer has decided it is necessary to provide a free recovery service. An initial pair of signs should be sited prior to the loss of a hard shoulder (generally between 500 m and 1000 m upstream of the start of works lead-in taper, although for major works sites this may be extended 2 miles upstream of the works taper), with repeater signs at approximately every 800 m on alternate sides of the carriageway.



7291 variant

D4.10.38 The "Free recovery End" sign variant should be located at the end of the recovery service (generally between 50 m upstream and 50 m downstream of the "end of road works" sign).

D4.11 INFORMATORY SIGNS

GENERAL PRINCIPLES

D4.11.1 Informatory signs, as described in Sections D4.12 and D4.13, should be used where the temporary traffic management design identifies that there are likely to be traffic delays of two minutes or more or there is a need for specific driver information.

D4.11.2 The logo panel on signs 7003.1, 7006, 7006.1 and 7007.1 may be varied in accordance with Schedule 16 item 40 of the Regulations. For major trunk road schemes both the sign to diagram 7003.1 at the start and the sign to diagram 7006.1 at the end should display the highways authority's logo. The sign to diagram 7007.1 should be erected as indicated in paragraph D4.15.1.

D4.11.3 Informatory signs, other than for future road works, should be installed as part of the temporary traffic management arrangement and removed on completion of the works or when no longer required.

D4.11.4 For signs on adjoining Highway Authority roads, agreement will need to be reached with that authority on the need for the signs, their number and location.

D4.11.5 The provision of informative signs should be considered by the designer in order to provide the public with advance notification of works due to take place, to warn of possible delays, to explain the nature of the works and, as appropriate, to apologise for any delays or inconvenience caused. Advance signs could give travellers the opportunity to consider using an alternative route. Driver information signs are generally provided only on motorway and dual carriageway roads where there are major works, and should be used only where they can be sited safely and where they do not distract from or obscure warning, regulatory or other essential road signs. This is particularly important for signs within the works area. Some common information signs are:

7002A	Major road works at a specified location ahead (see paragraph D4.12.6)
7003.1	Starting date and duration of road works (see paragraph D4.12.2)
7004	Road works ahead and the nature of works (see paragraph D4.13.4)
7005	Delays possible for specified period owing to road works ahead (see paragraph D4.13.5)
7007.1	Scheme information board (see Section D4.15)
7008	Street works warning sign (sign for pedestrians) (see paragraph D4.15.5)

D4.11.6 A sign to diagram 7008 (see paragraph D4.15.5) must be displayed by statutory undertakers at their work sites at all times. This should identify the client or promoter and the contractor (if any) carrying out the work, together with an emergency contact telephone number. Signs must be sited where they will not cause an obstruction or be capable of being confused with another traffic sign. These signs are the responsibility of the statutory undertaker and are designed to be read by pedestrians, not by moving traffic.

D4.11.7 Scheme information boards to diagram 7007.1 (see paragraph D4.15.1) may be erected to inform the travelling public about the works. Details may be varied as appropriate, but the inclusion of telephone numbers or email addresses is not permitted as these are likely to distract drivers' attention for an excessive length of time. Signs should be erected prominently in advance of the works in both directions and at major intersections, provided that no conflict with other traffic signs or undue driver distraction will result. Wherever possible, signs should be erected within the existing or proposed highway boundary. Although traffic signs enjoy deemed consent under planning regulations, care should be taken to avoid indiscriminate siting of these relatively large signs. Local planning authority views should be sought and taken into consideration in such

cases. Where it is considered necessary to locate scheme information boards within the boundary of another Highway Authority, the agreement of the other authority should be obtained, in addition to observing the above procedures.

D4.11.8 Informatory signs are now used by most organisations to provide information about works. However, signs to diagrams 7003.1, 7004 and 7005 are normally used only on major road works on motorway and all-purpose dual carriageway high-speed roads.

D4.12 ADVANCE SIGNING FOR MAJOR ROAD WORKS

FUTURE ROAD WORKS

D4.12.1 Signs that provide information of possible future delays at road works or carriageway closures should be accurate to allow drivers to plan their future journeys effectively, so that they can either travel outside the notified period or prepare alternative routeing. Signs should be erected at least two weeks prior to the commencement of the road works or carriageway closures. If prior to commencement of works the details are changed then the legend should be modified or the sign replaced.



7003.1

D4.12.2 Starting date and duration of road works. This sign should be located on the near side verge at the start of the future works, if the duration of the works is expected to be greater than one week. The sign should also be considered for works of shorter duration where the temporary traffic management design indicates that there are likely to be moderate or severe delays of 10 minutes or more. The sign should be removed when the works commence. The words "Highways Agency" may be varied to "Welsh Assembly Government", "Transport Scotland", "Department for Regional Development" or the name of the appropriate traffic or roads authority. The Highways Agency logo should be varied accordingly.



7002.1

D4.12.3 Indication of dates when road works are to take place overnight and delays are to be expected. This sign should be located on the near side verge at the location of the start of the future night-time road works. For convoy working the bottom panel should indicate "Expect delays". For other road works situations the bottom panel should normally indicate the prescribed variant "Delays possible", but where the temporary traffic management design has identified that delays are likely to be severe (greater than 30 minutes) the bottom panel should indicate "Expect delays".



7002B

D4.12.4 Indication of time and date when a carriageway is to be closed to traffic. This sign should be located on the near side verge at the location of the future carriageway closure. Consideration should also be given to the erection of signs on the adjoining network to advise drivers of the closure.

ROAD WORKS AHEAD

D4.12.5 Signs that provide advance information of road works ahead must be accurate and located sufficiently upstream of the works to give drivers the opportunity to choose whether they proceed through the road works or divert onto an alternative route.



7002A

D4.12.6 Major road works at a specified location ahead. This sign should be sited on the near side verge upstream of the approach to road works signs. The sign should be located at least 1 mile upstream of the last exit junction prior to the works, preferably two junctions prior, to give drivers who have alternative route options the opportunity to avoid the road works. Information displayed on fixed signs should not be repeated on subsequent VMS signs. At times of severe delay, consideration should be given, in liaison with the National Traffic Control Centre, to the use of VMS outside the immediate area to divert traffic to other routes rather than use local diversions. Where delays are likely to be severe, consideration should be given to the erection of signs on adjoining connecting routes to advise of these delays.

D4.13 APPROACH AND LANE CLOSURE SIGNING

FOR MAJOR ROAD WORKS ON HIGH-SPEED DUAL CARRIAGEWAY ROADS

D4.13.1 Informatory signs to diagrams 7004 and 7005, and their permitted variants, are used on trunk roads to describe the activity being carried out or how long delays may last. The most commonly used legends are listed in paragraphs D4.13.4, D4.13.6, D4.13.9 and D4.13.11.

D4.13.2 The range of legends should be kept to a minimum while conveying clear and meaningful information to drivers.

D4.13.3 Where VMS and central reservation matrix signs are available, their use for providing temporary support of road works signs during the setting up, alteration or removal of temporary traffic management arrangements should be considered.

ROAD WORKS AHEAD – TWO MILE SIGN, MAJOR WORKS



7004 and variants

D4.13.4 This sign should be located on the near side verge 2 miles upstream from major road works. TSRGD allows the legend of sign 7004 to be varied to suit the nature of the works. For the correct layout for legends less than four lines refer to the working drawings, see paragraph D1.2.2.

Alternative legends

Line 1	Line 2	Line 3	Line 4
Renewing	damaged	bridge	deck
Repairs to	bridge		
Installing	new	hard	shoulder
Installing	new	road	markings
Installing	new	cabling	
Installing	new	lighting	
Installing	new	safety	barriers
Installing	sign	gantry	
Ground	survey	works	
Widening	and	road	repairs
Road	Repairs		

ROAD WORKS AHEAD – ONE MILE SIGN, MAJOR WORKS



7005

D4.13.5 Warning of delays for specified period at road works ahead. This sign should be located on the near side verge 1 mile upstream of the works when delays of 10 minutes or greater duration are likely. The sign should be used in conjunction with the above 2 mile sign and should be used to indicate the period over which traffic delays are likely to occur. The date legend must reflect the most accurate information available. The sign to diagram 7001 and the distance plate may be omitted.

D4.13.6 At least ten working days prior to the end of the carriageway restriction the date should be specified more precisely and updated, as necessary, until the restrictions are removed. The year may be omitted in the final stages of the works when the date is known precisely.

Legends

Line 1	Line 2	Line 3	Line 4
Delays	possible	until	Date details- see below

Lines 3 and 4 may be omitted on short-duration contracts; see working drawing.

Line 4 detail:

- Day: 1 to 31. Included when the precise date is known, particularly during the final stages of the work.
- Month may be abbreviated: Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec.
- Year may be abbreviated: 09, 10 etc. Year may be omitted when day and month are included.

D4.13.7 Where there are no delays anticipated the sign will be replaced by the "road works" sign to diagram 7001 with a 1 mile distance plate.

D4.13.8 On wide carriageways where two or more lanes merge, consideration should be given to replacing the sign with a "lane closed ahead" sign (wicket sign) to diagram 7202 with a bottom integral panel to diagram 7208 varied to "1 mile".

ROAD WORKS AHEAD – ONE MILE SIGN, ROUTINE AND MINOR WORKS



7004

D4.13.9 This sign should be located on the near side verge 1 mile upstream of the works, for both routine and minor works. The distance plate may be replaced with a plate of the type shown in diagram 570. The diagram 7001 sign and distance plate may be omitted.

Alternative legends			
Line 1	Line 2	Line 3	Line 4
Repairs due Essential	to road maintenance	accident	

LANE CLOSURE INFORMATION

D4.13.10 Lane closure information signs should be used only where they can be located safely and where they do not distract from or obscure warning, regulatory or other essential traffic signs. They should not be used if the safety considerations described in paragraphs D4.13.12 to D4.13.16 below cannot be met. Signs erected to inform the travelling public why work is suspended, or the reason for the apparent site inactivity, should be removed as soon as they cease to be applicable.



7004 variant – Style A

D4.13.11 Reason for lane closure. This sign should be located within the road works site, behind the line of traffic cones and barriers and be visible to road users, when there are lane closures and when no work activities are apparent for a set period. Generally, this sign should only be displayed when the set period exceeds one day.



7004 variant – Style B

Alternative legends

Style:	Line 1	Line 2	Line 3
A	Work suspended	Unsuitable weather	
A	Road repairs	Materials	hardening
A	Further works ahead	Lane remains closed	for safety
B	Repair work on	bridge below	
B	Lane closed	for safety	
B	Lane closed	to protect	workforce
B	Concrete	setting	
B	Damaged	road surface	

NOTE: see working drawings for correct design of Styles A and B

D4.13.12 The objective in using information signs is to allay driver concern that lanes are being taken out of operation unnecessarily. It is the situation on the work site that should be the deciding factor concerning whether signs should be displayed and the number required. All signs must accurately reflect the reason for the inactivity; they should not be used to excuse poor planning or inefficient work practices.

D4.13.13 Care should be taken in the siting of information signs to ensure that they do not represent a distraction to drivers. Road works are an obstacle in the road and drivers must concentrate on the driving process when changing lanes or carrying out lane diversion manoeuvres to negotiate the temporary traffic

management provisions. Information signs are a distraction and should not be placed within these areas where high driver concentration is required.

D4.13.14 The initial sign should be located at least 50m beyond the downstream end of a taper, or lane diversion, at a position where the length of coned-off or fenced area permits the legend to be read safely. Repeater signs, where appropriate, should be placed at about 1 km intervals through the works.

D4.13.15 Each sign should be either permanently located where it is safe and convenient to do so, or kept to one side (e.g. within the works on the verge) ready to be displayed at short notice. When not in use the sign face on permanently located signs should be covered to fully obscure the legend, or where sign faces are demountable they may be removed and stored in a safe place until they are required to be displayed.

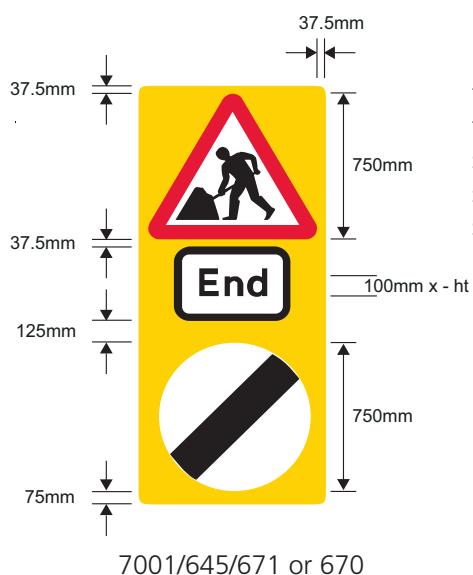
D4.13.16 Information signs must not be stored in the safety zone, propped against vehicle safety barriers or left lying in the central reservation between safety barriers. Safety barrier beams are designed to deflect when impacted and any objects, such as signs, left lying around could interfere with their performance and create a hazard to errant vehicles and other road users.

D4.14 END OF ROAD WORKS SIGNS

D4.14.1 End of road works signs are required to cancel all imposed temporary road works related traffic restrictions and to indicate that normal regulations and road conditions now apply. These signs should be placed beyond works greater than 50m in length measured between the end of the entry taper and the beginning of the exit taper. End signs are not necessary at works on minor roads as defined in [Section D5.3](#).

D4.14.2 Where a temporary mandatory speed limit is imposed and the permanent speed limit beyond the road works is different to that at the start of the works or on adjoining roads, the termination signs to diagram 670 or 671, as appropriate, must be located on both sides of the road on both single and dual carriageway roads to the size indicated in [Table A1.1 \(Appendix 1\)](#).

D4.14.3 Where a temporary mandatory speed limit is imposed and the permanent speed limit beyond the works is the same as at the start of the works and on the adjoining roads the combined sign can be used; see paragraph [D4.14.4](#) below. The Regulations only require signs to diagram 7001 with an "End" plate to diagram 645.



D4.14.4 The end of road works and permanent mandatory speed limit signs on a yellow backing board can be used for works where a temporary speed limit has been applied, see paragraph [D4.14.3](#) above for conditions. The lower sign should be to diagram 671 (national speed limit sign), or to diagram 670 in cases where the permanent speed limit is lower than the national speed limit. The sign must be sited on both sides of the carriageway.



7006

D4.14.5 For motorways and dual carriageway high-speed roads the sign 7006 should be considered only where the traffic management design indicates delays are likely to be severe. The central reservation sign should be the sign to diagram 7001 with the regulatory "End" plate to diagram 645. The words "Highways Agency" may be varied to "Welsh Assembly Government", "Transport Scotland", "Department for Regional Development" or the name of the appropriate traffic or roads authority. The Highways Agency logo should be varied accordingly.

D4.14.6 For all other situations the sign to diagram 7001 with the "End" plate to diagram 645 should be displayed. The sign should be sited on both sides of a dual carriageway road and on the near side of a single carriageway road.

D4.14.7 Sign siting distances are set out in [Table A1.1 \(Appendix 1\)](#) and appropriate sizes for "End" plates to diagram 645 in [Table A1.2 \(Appendix 1\)](#).



7006.1

D4.14.8 The sign containing the telephone information number to be used for enquiries about road works should be placed at the end of all major road works sites. The sign should be located on the near side approximately 200 m downstream from the "end of road works" sign. The words "Highways Agency" may be varied to "Welsh Assembly Government", "Transport Scotland", "Department for Regional Development" or the name of the appropriate traffic or roads authority. The Highways Agency logo and the telephone number should be varied accordingly.

D4.15 ADDITIONAL SIGNS

SCHEME INFORMATION BOARD



7007.1 variant

D4.15.1 Relevant particulars of major construction or improvement scheme being carried out on road ahead. This sign should be located on the near side verge generally 1½ miles in advance of a major road scheme site, provided that there is no conflict with other signs or with junctions and no undue driver distraction will result. For off-line schemes where 2 mile and 1 mile advance works signs are not used, the sign should be located near to the commencement of the off-line works. As a matter of courtesy the local planning authority should be informed of the proposal to erect them.

D4.15.2 The words "Highways Agency" and "Department for Transport" may be varied to "Welsh Assembly Government", "Transport Scotland", "Department for Regional Development" or the name of the appropriate traffic or roads authority. The Highways Agency logo should be varied accordingly.

D4.15.3 The scheme board legend should be varied to reflect the relevant scheme details based on the principle contained in the above sign, i.e. route, location, type of scheme and opening details.

D4.15.4 Boards erected on non-highway land will require the landowner's and local authority's permission.



7008

D4.15.5 This sign for pedestrians gives details about the nature of street works, giving name of employer and contractor, emergency telephone number, and apology for inconvenience. Signs must be sited where they will not cause an obstruction.

SPEED CAMERAS

D4.15.6 Where speed cameras are to be used to enforce a reduced mandatory speed limit the use of speed camera signs and speed check area signs should be considered. Speed control is dealt with in [Section D3.7](#).

D4.15.7 The initial speed camera signs and speed check area signs, as appropriate (see paragraphs [D4.15.8](#) and [D4.15.11](#)), should be located in pairs, one on each side of the carriageway or slip road, within the verge, central reservation or works site.



878 variant



NP 878.1



670/879



829.5

D4.15.8 The initial sign, used to indicate the area in which cameras are used to enforce mandatory speed limits, is either to diagram 878 variant or diagram NP878.1. The latter sign may now be used at sites where speed limit enforcement is being carried out by means of average speed measurement. The sign to diagram NP878.1 is currently authorised for use only on motorways and trunk roads in England and its use on any other roads will require authorisation by the Overseeing Organisation.

D4.15.9 The speed camera signs to diagram 878 variant or NP878.1 must be placed not more than 1 km from the first speed camera housing in the direction being enforced.

D4.15.10 Speed camera repeater signs to diagram 879 should be located at around 1 km intervals on alternate sides of the carriageway, downstream of the sign to diagram 878 variant or NP878.1 and should be co-located, if possible, with the speed limit repeaters on a common grey or yellow backing board as shown. The signs and the speed camera must be placed to be visible to the driver in the same view. Additional signs may be required to achieve this.

D4.15.11 The area where police carry out checks on the speed of vehicles (either by hand-held or vehicle-mounted equipment) is indicated by signs to diagram 829.5. The initial pair of signs should be located upstream of the initial mandatory speed limit signs (generally between 50 m and 100 m upstream), with repeater signs at around 1 km intervals and at intermediate junctions. Care must be taken that these signs do not obscure drivers' view of the speed limit signs. They may be displayed only if police carry out speed checks on a regular basis.

D5 SINGLE CARRIAGEWAY ROADS

D5.1 GENERAL ISSUES

D5.1.1 This section sets out the principles for signing and guarding when carrying out works on all-purpose single carriageway roads.

D5.1.2 Whenever possible, any work involving a reduction in the number of traffic lanes, particularly on heavily-trafficked commuter routes, should be avoided between the hours of 07.00 and 10.00 and between 16.00 and 19.00. Local circumstances may permit or require a variation of these times. The Highway Authority should always be advised of any works to be undertaken on public roads so that any traffic measures deemed necessary can be co-ordinated.

D5.1.3 The reduced road width caused by works on a single carriageway road will result in lower capacity and this may introduce delay. The form of control and its operation should aim to reduce any traffic delay to a minimum, subject to acceptable safety standards.

D5.1.4 Two-way traffic should be maintained wherever possible, but where this is not possible single-file traffic (shuttle working) should be considered, see [Section D3.3](#) for details of minimum lane widths.

D5.1.5 The period during which the traffic is subjected to one-way working should be kept to the absolute minimum. When possible, provision should be made for shared footways and/or exemption for cyclists during one-way working. At certain times, for example, outside normal working hours, it may be possible to reduce the extent to which the works occupy the carriageway and this should be done if, by doing so, it is possible to allow two-way working to resume during those times.

D5.1.6 On roads where flows are very high, overload of the controlled area is possible and exceptional delays may result. This can occur with two-way flows as low as 1300 vehicles per hour (for sites about 50m long) and with a one-way flow of 900 vehicles per hour (for longer sites with balanced flows) with signal control. If this is likely to occur, the designer will have to consider the implications and possible alternative options, for example, diversions or restrictions on the hours of working.

D5.1.7 Suitable diversions should be provided and adequately signed when a single carriageway road has to be completely closed. Any necessary statutory procedures should be followed in consultation with the relevant highway authorities. See [Section D3.15](#) and [Figure 3.3](#).

D5.2 WORKS CARRIED OUT FROM A VEHICLE

D5.2.1 Work may be carried out on single carriageway roads using single vehicles standing or operating in the carriageway. Single vehicle works are dealt with in [Part 2: Operations, Section O8](#).

D5.3 WORKS ON MINOR ROADS

D5.3.1 In the context of this section, a road is defined as a minor road if it does not carry a significant volume of through traffic or many large vehicles even during peak periods and if it fits either of the following descriptions:

- it is a single carriageway road in a residential or industrial district, or in a rural area. It may be an access road or possibly a local distributor, but it should not be a district distributor or a primary distributor; or
- it is either restricted to 30 mph or less or its layout and general character is such that speeds greater than 30 mph are unlikely.

D5.3.2 It will generally be characteristic of minor roads that:

- traffic flows are less than 400 vehicles per hour, of which less than 5% are heavy vehicles;
- bus services are infrequent;
- pedestrian flows are small, less than 100 per hour;
- parking or limited waiting may be allowed on one or both sides of the road; and
- cyclists will be present.

D5.3.3 Any road that does not match these descriptions, but which is otherwise regarded as meriting the description, may be treated as such by agreement between the Highway Authority and the police.

D5.3.4 For works carried out off the carriageway there will be no need for signs to warn vehicular traffic where the clearances are as given in paragraph [D3.20.2](#). Where these conditions 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, for example, [Plan SC3](#) in [Section D5.6](#).

D5.3.5 For works on the carriageway with no parked vehicles:

- 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
 - “traffic lane or carriageway closed to traffic” signs to diagram 7105.

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](#) provide details of different methods of traffic control.

D5.3.6 Permitted reduced signing for works on the carriageway with a works vehicle in attendance or parked vehicles present, refer to [Part 2: Operations, Section O3.19](#).

D5.4 TRAFFIC CONTROL

D5.4.1 The main factors affecting the decision on the type of control which is appropriate are:

- visibility through the works area;
- length of the controlled area;
- volume of traffic flow;

- duration of the works; and
- proximity of junctions, pedestrian crossings, or railway level crossings.

D5.4.2 The minimum carriageway widths for two-way working and shuttle working with traffic control are summarised in [Table 5.1](#).

Table 5.1 Minimum carriageway widths for two-way working and shuttle working with traffic control

	Normal traffic including buses and HGVs	Cars and light vehicles only
Two-way working	6.75 m minimum	5.5 m minimum
Shuttle working with traffic control	3.7 m maximum 3.25 m desirable minimum 3.0 m absolute minimum	3.7 m maximum 2.75 m desirable minimum 2.5 m absolute minimum

D5.4.3 The factors affecting the choice of traffic control method are summarised in [Table 5.2](#).

Table 5.2 Factors affecting the choice of traffic control method

Method	Maximum speed limit (mph)	Length of coned area length	Maximum traffic flow
"Give and take"	30	50 m (max)	400 veh/hr and 20 HGV/hr
Priority signs	60	80 m (max)	840 veh/hr
"STOP/GO" signs	60	100 m 200 m 300 m 400 m 500 m	1400 veh/hr 1260 veh/hr 1060 veh/hr 940 veh/hr 840 veh/hr
Portable traffic signals	60	300 m (max)	No limit
"STOP-WORKS"	60	Not applicable	Not applicable

D5.4.4 Two-way traffic, "give and take" and positive traffic control options and the criteria for their use are described in the following paragraphs. These criteria represent the best current advice in relation to the comparative merits of each, but the final decision should be made in accordance with actual site conditions and local experience.

D5.4.5 A key to the meaning of the shading and symbols used in the plans in the following sections is provided in [Table A1.4 \(Appendix 1\)](#). [Table A1.5 \(Appendix 1\)](#) explains the meaning of Details A to K in the plans and includes details of cone height and spacing where this varies according to the type of road and/or works type. Details of cone spacing are also set out in [Table A1.3 \(Appendix 1\)](#). [Table 5.3](#) below gives values for the following distances shown in the plans:

- D – normal siting distance to the first sign;
- L – minimum longitudinal safety clearance;
- T – lead-in taper length;

S – safety zone width;

E – distance to “end of road works” sign.

D5.4.6 The recommended lead-in taper length is specified in [Table 5.3](#). This should be used wherever possible. Sometimes it may be impracticable to provide the full taper. If this happens on congested roads with speed limits of 30 mph or less, it is permissible to reduce the lead-in taper to an angle of not more than 45° to the kerb, particularly if the parking of cars is usual.

Table 5.3 Distances shown in plans in Sections D5.5 to D5.8 and D5.10

		Single carriageway road: Permanent speed limit			
		30 mph or less	40 mph	50 mph	Unrestricted (60 mph)
Minimum and normal maximum siting distance D of first sign in advance of lead-in taper in metres		20* – 45	45 – 110	275 – 450	275 – 450
Minimum longitudinal clearance L in metres ¹		0.5	15	30	60
Length of taper T in metres ² :					
	1	13	20	25	25
Width of hazard (metres) including	2	26	40	50	50
safety zone S	3	39	60	75	75
	4	52	80	100	100
	5	65	100	125	125
Minimum lateral safety zone clearance		0.5	0.5	1.2	1.2
Distance E to “end of road works” sign		10 – 30	10 – 30	30 – 45	30 – 45

*When “STOP/GO” signs or portable traffic signals are used the normal siting distance (45 m) should be used – see notes in [Plans SC5](#) and [SC7](#).

NOTES:

1. The minimum longitudinal clearance applies only for traffic approaching on the same side as the works. See [Figure 3.1](#) for details of safety clearances. Where works extend across the road beyond the carriageway centre, or is in the centre of carriageway, the longitudinal clearance applies for traffic approaching in either direction.
2. Lead-in tapers used with traffic control (“give and take”, priority signs, “STOP/GO” signs, and traffic signal control), and all exit tapers, shall be at about 45° to the kerb line with cones spaced 1.2 m apart. This does not apply when guide islands are provided. In certain circumstances on congested roads with speed limits of 30 mph or less when there is no traffic control, the taper may also be reduced to 45° (see paragraph [D5.4.6](#)).
3. When a temporary speed limit is imposed on a two-way single carriageway road, to ensure that the speed limit is enforceable, the signs indicating the end of the speed restriction must be located back to back with those in the other direction that indicate the start of speed restriction. See paragraph [D3.7.15](#).
4. A minimum of 1.0 m clearance, preferably not less than 1.5 m, should be maintained for pedestrian movement where signs are placed on the footway. See paragraph [D4.4.1](#).

D5.5 TWO-WAY TRAFFIC

D5.5.1 Wherever possible two-way traffic should be maintained using normal delineated traffic management arrangements. This system may be used provided that:

- the carriageway unobstructed traffic width is as wide as is practicable, but no narrower than the minimum width given in [Section D3.3](#) and [Table 5.1](#) in [Section D5.4](#), for the appropriate conditions.
- the appropriate minimum safety clearances given in [Section D3.2](#) are achieved.
- there is always clear visibility of and through the site by the drivers of vehicles approaching from either direction.

D5.5.2 Where the above criteria cannot be met, then consideration could be given to using a "give and take" system of shuttle working; see [Section D5.6](#), or one of the positive traffic control systems should be adopted; see [Sections D5.8 to D5.10](#).

TWO-WAY TRAFFIC – PRINCIPLES FOR SINGLE CARRIAGEWAY ROADS

D5.5.3 These principles are illustrated in [Plans SC1](#) and [SC2](#). The relaxations referred to in this paragraph ([D5.5.3](#)) should not be applied when any of the following apply:

- pedestrians are directed into the carriageway, or
- when the speed limit is more than 30 mph, or
- the total two-way traffic flow exceeds 400 veh/hr; or
- the total HGV flow (including buses) is more than 20 veh/hr.

Certain other signs, "road works" (7001) and "road narrows" (517), (see [Part 2: Operations, Sections O3.19](#) and [O5.9](#)) may be omitted where either:

- there is a works vehicle with a roof-mounted beacon in continuous use and drivers can see the beacon clearly from at least 50 m in either direction (see [Part 2: Operations, Section O5.9](#)); or
- parked vehicles are present and are likely to be there for the duration of the works (see [Part 2: Operations, Section O3.19](#)).

The principles for the advance signing are:

- two advance signs are normally required;
- a "road works" sign (7001) on the near side only in both directions; a distance plate (572) is required for roads with a permanent speed limit of 50 mph or more; and
- a "road narrows" sign (517) on the near side only in both directions; on roads with a permanent speed limit of 50 mph or more a distance plate to diagram 572 is required.

On two-way single carriageway roads with three lanes, the sign to diagram 7206 is used in place of the "road narrows" sign (517) and full lanes must be closed and not closed partially as shown in [Plans SC1](#) and [SC2](#).

Relaxations:

- no relaxations for the advance signing.

The principles for the signing of the lead-in taper are:

- coning to Detail C2 or Detail B with 45° tapers is used – see [Table A1.5 \(Appendix 1\)](#); [Table 5.3](#) in [Section D5.4](#) specifies the taper length T;
- a “keep left/right” sign (610) is placed on the near side at the start of the taper; and
- a “lane closed” barrier (7105) with a “keep left/right” sign (610) is placed at the end of the taper behind the cones – the “keep left/right” sign should be mounted directly above the barrier sign or may be placed in front of the barrier or the last cone of the taper.

Relaxations:

- if a conspicuous vehicle is parked at the works behind the taper then the barrier (7105) may be omitted; and
- on congested roads, if it is impracticable to provide the full taper then the taper may be reduced to an angle of not more than 45° to the kerb using coning to Detail B.

The principles for the works zone are:

- coning to Detail C1 is used to mark the edge of the works area safety zone. No additional signing is required.

The principles for the exit taper are:

- coning to Detail B at 45° to the edge of carriageway; or
- the same coning as that of the lead-in taper for central island works sites ([Plan SC2](#)).
- a “lane closed” barrier (7105) with a “keep left/right” sign (610) is placed at the start of the taper behind the cones facing the opposing traffic – the “keep left/right” sign should be mounted directly above the barrier sign or may be placed in front of the barrier or the last cone of the taper.

Relaxations:

- if a conspicuous vehicle is parked at the works before the exit taper then the barrier (7105) and sign (610) may be omitted.

The principles for signing at the end of road works are:

- a “road works” sign (7001) with supplementary plate “End” (645) located on the near side only, a distance E from the end of the works; see [Table 5.3](#) in [Section D5.4](#).

Relaxations:

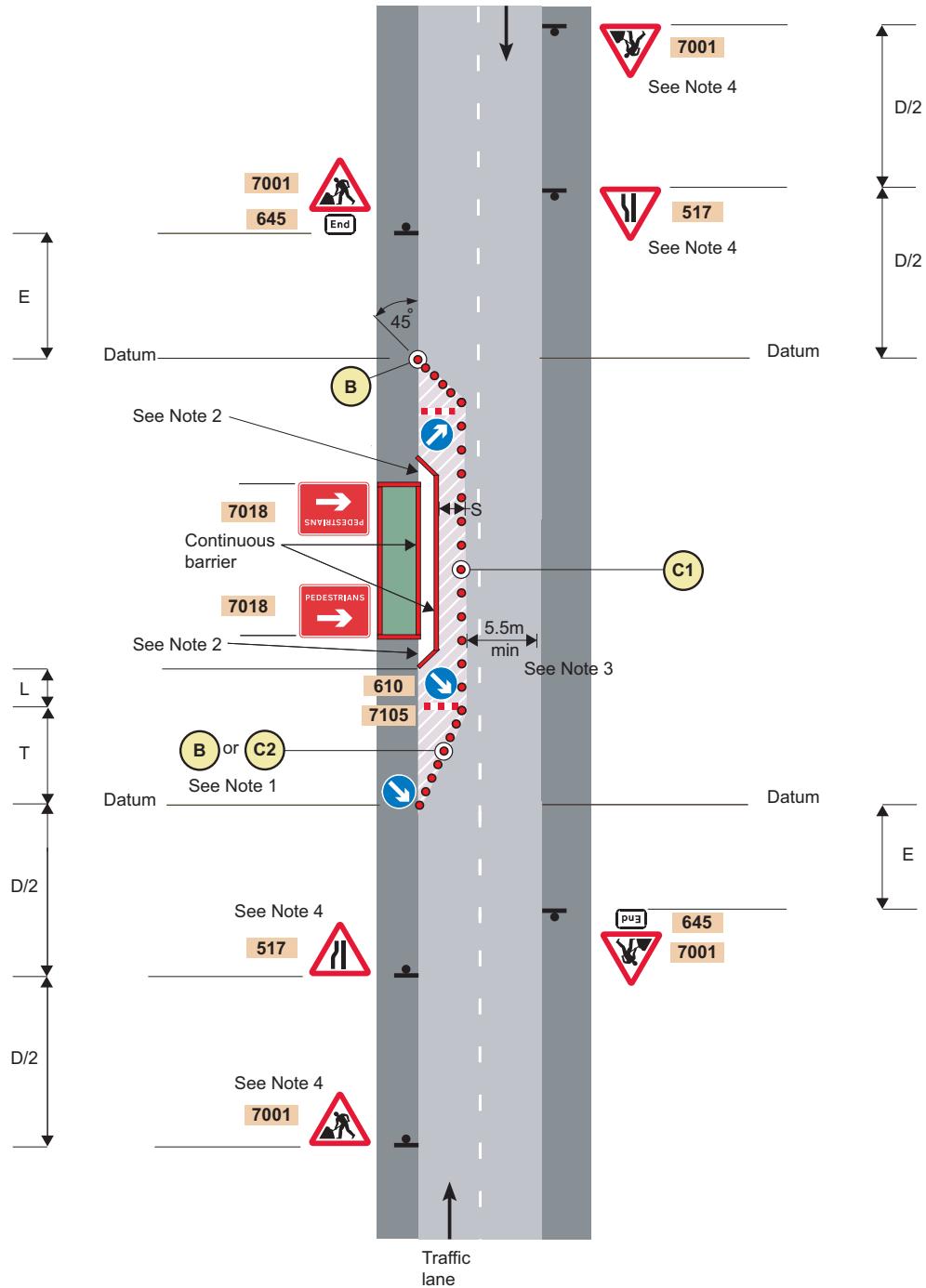
- end of road works signing may be omitted on roads with a permanent speed limit of 30 mph or less when a relaxation applies.

HIGH INTENSITY WARNING LIGHTS

For a single two-lane carriageway during the hours of darkness with the loss of one lane, or part of a lane:

- high intensity warning lights are not required where there are "STOP/GO" signs or temporary signals, but are required for priority signs during the hours of darkness where there is a loss of one lane or part of a lane;
- a high intensity warning light should be placed at the location between the end of the lead taper coning and the start of the parallel coning. It should be placed at the end of the "lane closed" barrier to diagram 7105 next to the "keep left/right" sign to diagram 610 facing the oncoming traffic; and
- if the remaining single carriageway is 5.5 m or less, then a high intensity warning light should be placed at the location between end of the parallel coning and the start of the exit taper coning. It should be placed above the coning facing the opposing oncoming traffic.

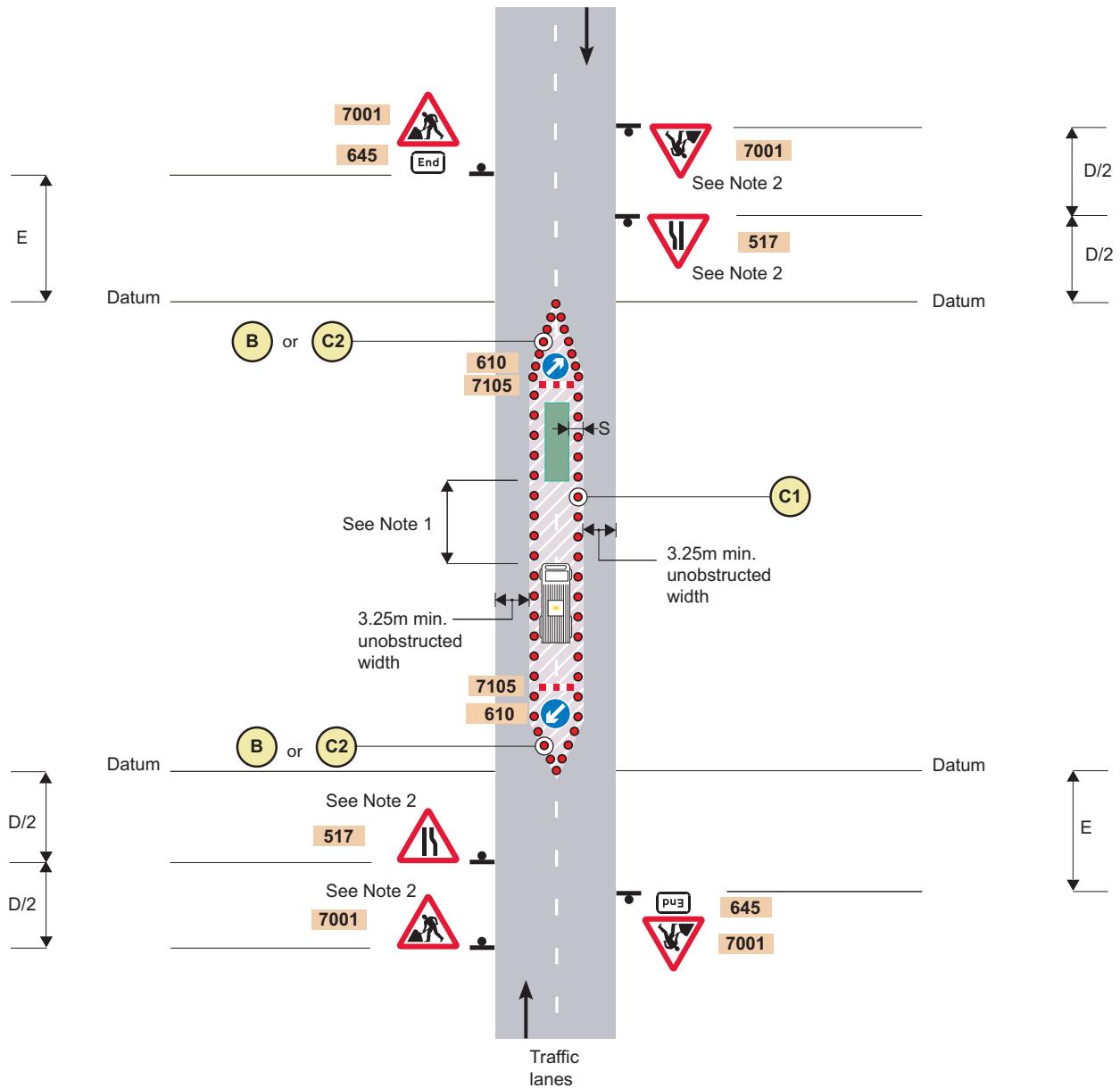
Plan SC1: Two-way traffic on a single carriageway road, footway diversion



NOTES:

1. Cone spacing will depend on the type of road – see [Table A1.3 \(Appendix 1\)](#).
2. A ramp for wheelchairs, prams etc. must be provided at the transition between the footway and carriageway.
3. See [Section D3.3](#) and [Table 5.1](#) in [Section D5.4](#) for guidance on lane widths past the works.
4. A distance plate to diagram 572 is required for roads with a permanent speed limit of 50 mph or more.
5. Additional pedestrian barriers may be provided either parallel to the kerbline or at right angles to it to guide pedestrians past the works as site conditions dictate.

Plan SC2: Two-way traffic on a single carriageway road, works in the centre of the road



NOTES:

1. If the permanent speed limit is 30 mph or less, minimum clearance is 2.0 m. If the permanent speed limit is 40 mph or more, minimum clearance is 5.0 m.
2. A distance plate to diagram 572 is required for roads with a permanent speed limit of 50 mph or more.

D5.6 "GIVE AND TAKE" TRAFFIC CONTROL

D5.6.1 The normal method of traffic operation for shuttle working during daylight at sites on minor roads will be a natural "give and take" system. This system may be used provided that:

- drivers approaching from either direction can see 50 m beyond the end of the works;
- the speed limit is 30 mph or less;
- the total two-way traffic flow is less than 400 veh/hr;
- the total HGV flow is less than 20 veh/hr; and
- the length of the works from the start of the lead-in taper to the end of the exit taper is 50 m or less.

D5.6.2 Where the above criteria for "give and take" systems cannot be met, then one of the positive traffic control systems should be adopted; see [Sections D5.8 to D5.10](#).

D5.6.3 The natural "give and take" system of shuttle working should not be operated at night or in conditions of poor visibility. If the works are to continue into the hours of darkness, traffic control should be by temporary traffic signals.

"GIVE AND TAKE" SYSTEM – PRINCIPLES FOR SINGLE CARRIAGEWAY ROADS

D5.6.4 These principles are illustrated in [Plan SC3](#). The principles for the advance signing are:

- two advance signs are normally required:
- a "road works" sign (7001) on the near side only in both directions; and
- a "road narrows" sign (517) on the near side only in both directions; a "Single file traffic" plate 518 is required.

The principles for the signing of the lead-in taper are:

- coning to Detail B at 45° tapers is used – see [Table A1.5 \(Appendix 1\)](#); [Table 5.3](#) in [Section D5.4](#) specifies the taper length T;
- a "keep left/right" sign (610) is placed on the near side at the start of the taper; and
- a "lane closed" barrier (7105) with a "keep left/right" sign (610) is placed at the end of the taper behind the cones – the "keep left/right" sign should be mounted directly above the barrier or may be placed in front of the barrier or the last cone of the taper.

The principles for the works zone are:

- coning to Detail C1 is used to mark the edge of the works area safety zone. No additional signing is required.

The principles for the exit taper are:

- coning to Detail B at 45° taper is used; and

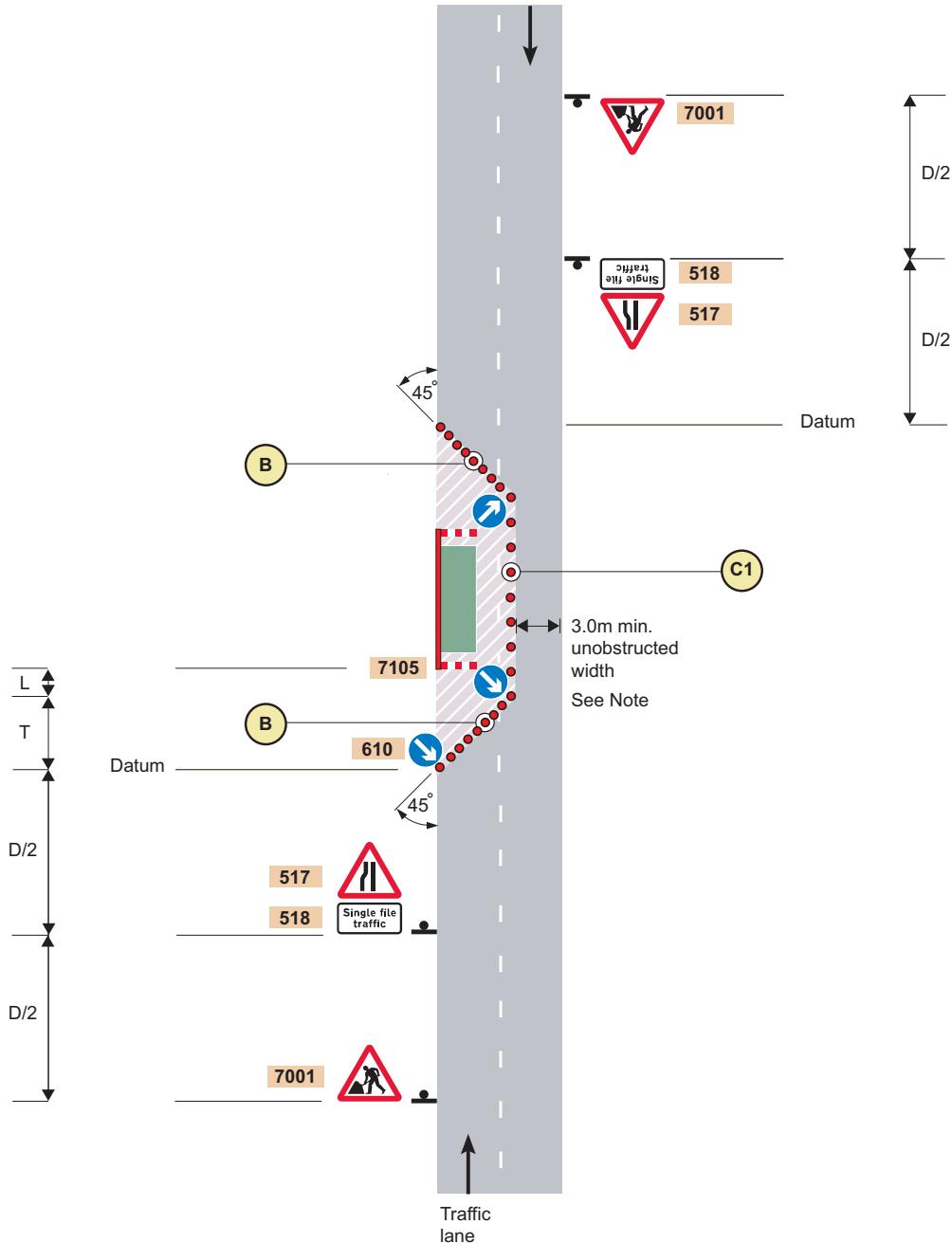
- a “lane closed” barrier (7105) with a “keep left/right” sign (610) is placed at the start of the taper behind the cones facing the opposing traffic – the “keep left/right” sign should be mounted directly above the barrier or may be placed in front of the barrier or the last cone of the taper.

The principles for signing at the end of road works are:

- none required.

Relaxations: There are no relaxations for the “give and take” system.

Plan SC3 "Give and take" system on a single carriageway road with a permanent speed limit of 30 mph or less



NOTE: See [Section D3.3](#) and [Table 5.1](#) in [Section D5.4](#) for guidance on lane widths past the works.

D5.7 PRIORITY SIGNS

D5.7.1 Priority control may be appropriate where all of the following conditions are met:

- there is clear visibility from a point 60 m before the start of the coned area to a point 60 m beyond the end of the coned area on roads with a maximum permanent speed limit of 30 mph or less; on roads with other speed restrictions the visibility distances are specified in [Table 5.4](#) below;
- the two-way traffic flow is less than 850 vehicles per hour; and
- the site length (which is measured from the first cone to the last cone of the entry and exit tapers) is not more than 80 m.

Table 5.4 Visibility distances for priority control

Maximum permanent speed limit	Visibility distance
40	70
50	80
60	100

D5.7.2 Priority control should not be used at night, unless:

- there is street lighting at the location; and
- it remains lit throughout the night; and
- the traffic signs are illuminated.

D5.7.3 Priority control should not be used where fog is commonly encountered.

D5.7.4 The “priority to vehicles from the opposite direction” sign to diagram 615, which must be used with the plate 615.1, and “priority over vehicles from the opposite direction” sign to diagram 811, which must be used with the plate 811.1, must always be used in conjunction with each other; see paragraph [D4.7.2](#). The signs may be used only on single carriageway roads. The sign to diagram 615 is used at the beginning of the priority length. The supplementary plate to diagram 615.1 may be used to indicate the relevant distance, e.g. “Give way to oncoming vehicles for 60 yds”. At the end of the priority length the sign to diagram 615 is repeated with an “End” plate to diagram 645, which may also act as the conclusion of other messages. Where the length under control is less than 50 m the end plates are not necessary.

D5.7.5 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. Priority must be given to vehicles which have an unobstructed lane past the works.

D5.7.6 The recommended signing layout for this method of control for two-lane single carriageway roads is shown in [Plan SC4](#).

PRIORITY SIGNS – PRINCIPLES FOR TWO-LANE SINGLE CARRIAGEWAY ROADS

D5.7.7 These principles are illustrated in [Plan SC4](#).

The principles for the advance signing are:

- three advance signs are required:
 - a “road works” sign (7001) on the near side only in both directions; a distance plate (572) is required for roads with a permanent maximum speed limit of 50 mph or more;
 - a “road narrows” sign (517) with supplementary plate “Single file traffic” (518) on the near side only in both directions; on roads with a permanent speed limit of 50 mph or more a site specific risk assessment should be used to decide whether “for” and a distance should be included on the diagram 518 plate; and
 - priority signs (811 in the priority direction and 615 in the “give way” direction, with explanatory plates 811.1 and 615.1 respectively) on the near side only; “for” and a distance may be incorporated these signs.

The principles for the lead-in taper are:

- one “keep left/right” sign (610) on the near side at the start of the taper;
- coning to Detail B at an angle of 45° to the edge of the road; and
- a “lane closed” barrier (7105) with a “keep left/right” sign (610) at the end of the taper.

The principles for the works zone are:

- coning to Detail C1 is used to mark the edge of the works area on single carriageway roads; no additional signing is required.

The principles for the exit taper are:

- coning to Detail B at 45° to the carriageway (the coning for the exit taper may be the same as for the lead-in taper at some works); and
- a “lane closed” barrier (7105) facing opposing traffic with a “keep left/right” sign (610).

The principles for signing at the end of the road works are:

- a “road works” sign (7001) with supplementary plate “End” (645) is located a distance E from the end of the works; see [Table 5.3](#) in [Section D5.4](#). When the length of the single file lane is less than 50m, this sign is not required.

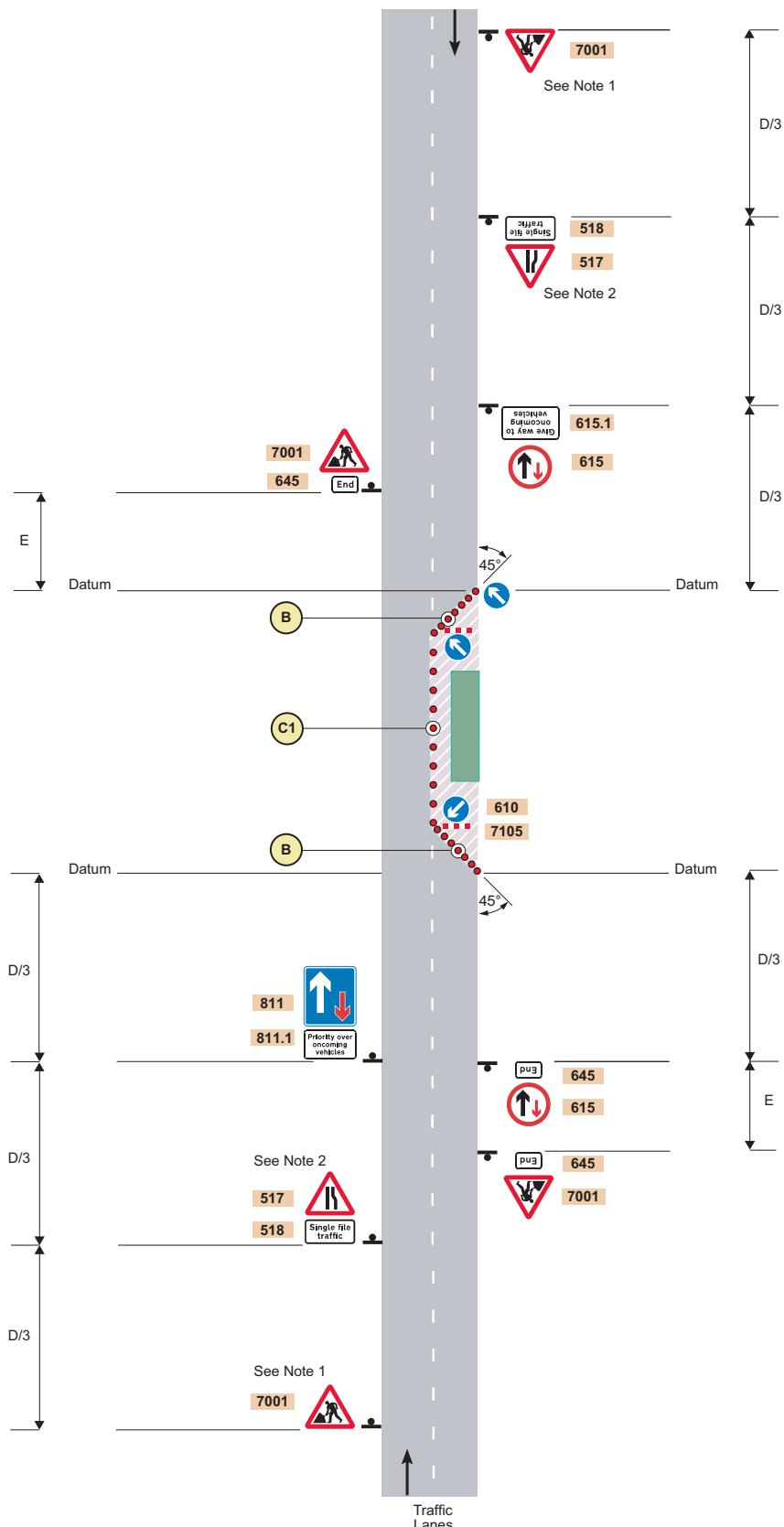
Relaxations: There are no relaxations when priority signs are used.

High intensity warning lights are required during the hours of darkness where there is a loss of one lane, or part of a lane:

- high intensity warning lights are not required where there are “STOP/GO” signs or temporary signals, but are required for priority signs during the hours of darkness where there is a loss of one lane or part of a lane;

- a high intensity warning light should be placed at the location between the end of the lead taper coning and the start of the parallel coning. It should be placed at the end of the “lane closed” barrier to diagram 7105 next to the “keep left/right” sign to diagram 610 facing the oncoming traffic; and
- if the remaining single carriageway is 5.5 m or less, then a high intensity warning light should be placed at the location between end of the parallel coning and the start of the exit taper coning. It should be placed above the coning facing the opposing oncoming traffic.

Plan SC4: Priority signs on a two-lane single carriageway road



NOTES:

1. A distance plate to diagram 572 is required for roads with a permanent speed limit of 50 mph or more.
2. On roads with a permanent speed limit of 50 mph or more a site specific risk assessment should be used to decide whether "for" and a distance should be included on the diagram 518 plate.

D5.8 "STOP/GO" BOARDS

D5.8.1 "STOP" and "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; see paragraph D4.7.1. They are combined to form a double-sided sign and used on a suitable stand or post. The operational aspects for the use of these signs are given in Part 2: Operations, Section O3.22. A system where a pair of "STOP/GO" signs is operated remotely by radio by staff on site is available.

D5.8.2 Manually rotated "STOP/GO" signs should only be used if a risk assessment has determined that the use of remotely controlled "STOP/GO" signs is not appropriate. The reasons for not using the remotely controlled "STOP/GO" signs should be documented in the method statement.

D5.8.3 It is important to note that manually rotated "STOP/GO" signs shall not be operated inside the safety zone. If this is not possible, then temporary traffic signals should be used or the road should be closed temporarily to vehicular traffic.

D5.8.4 Operators should be competent to control traffic by means of these signs. Part 2: Operations, Section O6.2 deals with the training of operatives.

D5.8.5 Manually rotated "STOP/GO" signs may be appropriate at works of short duration or where the works progress along the road quickly. The use of "STOP/GO" signs with single vehicle works is discussed in Part 2: Operations, Section O8.1. The two-way traffic flow should not exceed the figures given in Table 5.5 below for the stated site length. Intermediate values may be interpolated. The site length is measured from the first cone to the last cone of the entry and exit tapers.

Table 5.5 Permissible site lengths for manually rotated "STOP/GO" signs

Site length m	Maximum two-way flow	
	(veh/hr)	(veh/3 min)
100	1400	70
200	1250	63
300	1050	53
400	950	47
500	850	42

D5.8.6 This type of control should not be operated over distances greater than 500m and if remotely controlled "STOP/GO" signs are used, the two signs shall be no more than 200m apart. See also Part 2: Operations, paragraph O3.22.4.

D5.8.7 For very short lengths of alternating traffic movement, manually rotated signs at one end or in the middle may suffice, but if the distance exceeds about 20m, the control should be operated at both ends. If a system is used where a pair of "STOP/GO" signs is operated remotely by radio, the operator should be positioned to be in clear view of each set of signs. This equipment needs to be Type Approved.

D5.8.8 Manually rotated "STOP/GO" signs may be used where the obstruction continues round a bend, but only if both operators are in radio contact.

D5.8.9 The use of "STOP/GO" signs as a method of traffic control is most appropriate in daylight hours and good visibility, see also [O3.22.11](#). On high-speed single carriageway roads, the use of "STOP/GO" signs is not recommended at night. When "STOP/GO" signs are used at night, each sign face must be adequately illuminated by its own source of lighting; the use of reflectorised materials alone is not sufficient and does not comply with the statutory requirements.

D5.8.10 "STOP/GO" signs should not be used in conjunction with priority signs to diagrams 615 and 811.

D5.8.11 The recommended signing layout for this type of control is illustrated in [Plan SC5](#) for a single two-lane carriageway road and in [Plan SC6](#) for a single three-lane carriageway road.

"STOP/GO" SIGNS – PRINCIPLES FOR TWO OR THREE-LANE SINGLE CARRIAGEWAY ROAD

D5.8.12 These principles are illustrated in [Plans SC5](#) and [SC6](#).

The principles for advance signing are:

- a minimum of three advance signs are required:
- a "road works" sign (7001) on the near side only in both directions in advance of the works; a distance plate (572) is required for roads with a permanent speed limit of 50 mph or more;
- a "TRAFFIC CONTROL AHEAD" sign (7010.1) on the near side only in both directions in advance of the works;
- on a two-lane single carriageway road (see [Plan SC5](#)): a "road narrows" sign (517) with supplementary plate "Single file traffic" (518) on the near side only in both directions. On roads with a permanent speed limit of 50 mph or more, "for" and a distance are required on the diagram 518 plate;
- on a three-lane single carriageway road (see [Plan SC6](#)) marked as two lanes in one direction and one in the other: a sign (7206) on the near side of the two-lane approach to indicate that the centre lane is closed, with traffic on the off side of the works travelling in the opposite direction:
 - for roads with a permanent speed limit of 40 mph or less, one sign (7206) is required;
 - for roads with a permanent speed limit of 50 mph or more, one sign (7206) is required with a bottom panel (7208) indicating the distance to the works of 200 yards, placed 200 m in advance of the works, and a second sign is required with a bottom panel (7208) indicating the distance to the works of 100 yards, placed 100 m in advance of the works;
- where the works consist of surface dressing and the new road surface is to be trafficked then the initial sign (7009) with maximum advisory speed plate (513.2) should replace the "road narrows" sign (517); in situations where both signs are required, the placing of the initial surface dressing warning signs should be far enough in advance of the loose chippings to give drivers adequate distance to slow down;
- on a two-lane single carriageway road: a "STOP/GO" board (7023/7024) 15 m in advance of the start of the taper and, 15 m in advance of the board, a "WHEN STOP SIGN SHOWS WAIT HERE" sign (7011 variant). In some cases this distance may need to be increased to avoid a waiting vehicle blocking the path of vehicles as they leave the works; and

- on a three-lane single carriageway road: on the two-lane side, a "STOP/GO" board (7023/7024) on the near side opposite the end of the lead guide island and, 15m in advance of the board, a "WHEN STOP SIGN SHOWS WAIT HERE" sign (7011 variant). On the single-lane side, a "STOP/GO" board (7023/7024) half way along the lead-in taper on the near side and, 15m in advance of the board, a "WHEN STOP SIGN SHOWS WAIT HERE" sign (7011 variant).

The principles for the signing of the lead-in taper are:

- one "keep left/right" sign (610) is placed on the near side at the start of the taper;
- on a two-lane single carriageway road: coning to Detail B is used at an angle of 45° to the edge of the road;
- on a three-lane single carriageway road: coning to Detail B or C2 is used. [Table 5.3 in Section D5.4](#) specifies the taper length and the length of the guide island is dealt with in [Section D5.11](#);
- a "lane closed" barrier (7105) with a "keep left/right" sign (610) is placed at the end of the taper behind the cones; the "keep left/right" sign may be placed behind or in front of the barrier; and
- on a three-lane single carriageway road, when two lanes are crossed, one "lane closed" barrier (7105) with a high intensity warning light and a "keep left/right" sign (610) is placed in the closed lane.

Relaxation:

- if the shuttle lane is no more than 20m long and the "STOP/GO" board (7023/7024) is clearly visible from both directions, then only one board is required; this should be positioned either at one end or in the middle.

The principles for the work zone are:

- coning to Detail C1 is used to mark the edge of the works area on single carriageway roads; no additional signing is required.

The principles for the exit taper are:

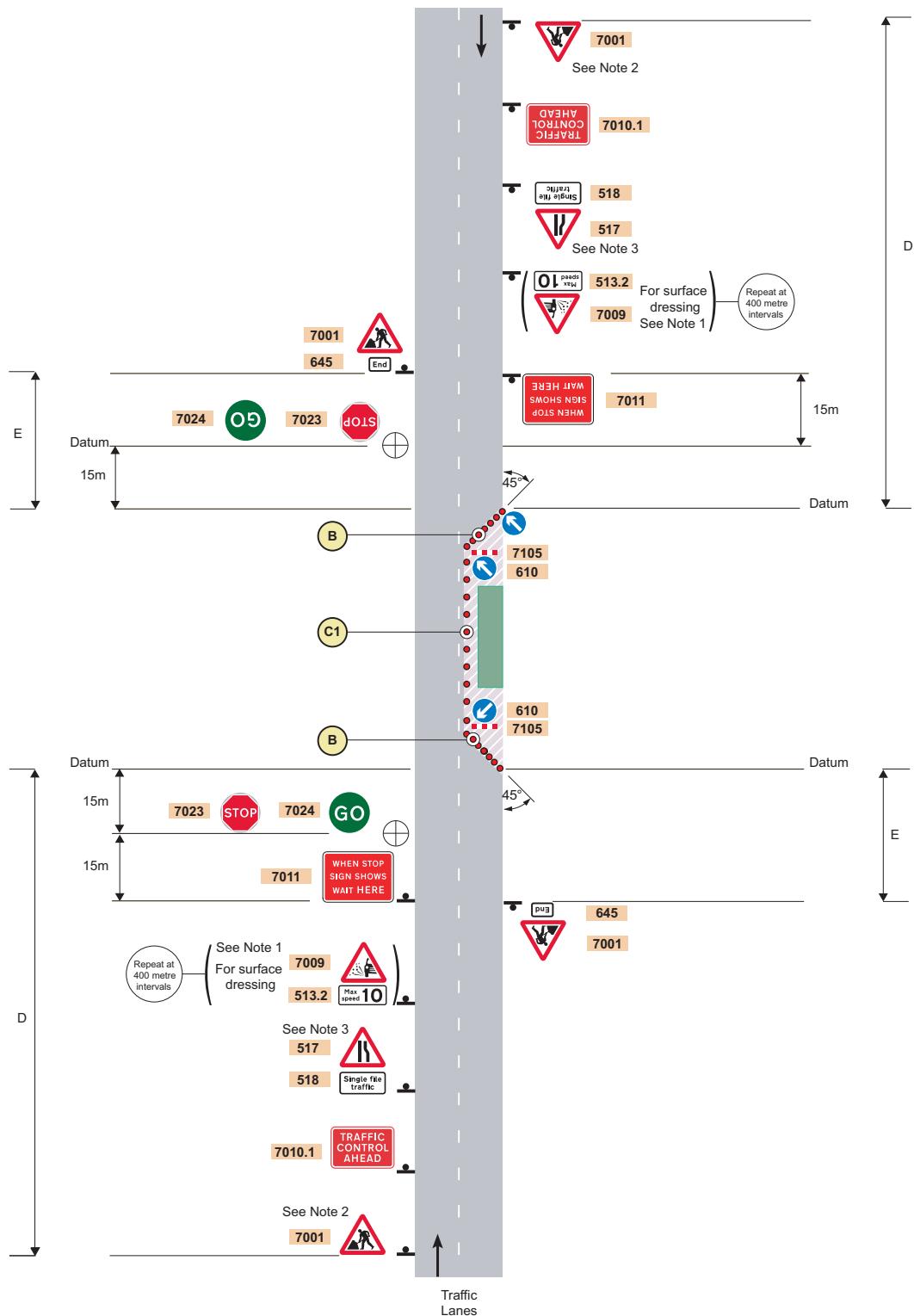
- coning on two-lane single carriageway roads to Detail B at 45° to the edge of the road;
- the coning for the exit taper on three-lane single carriageway roads is the same as for the lead-in taper; and
- a "lane closed" barrier (7105) facing opposing traffic with a "keep left/right" sign (610); on a three-lane single carriageway road these signs are positioned on the central traffic control island.

The principles for signing at the end of the road works are:

- a "road works" sign (7001) with supplementary plate "End" (645) is located a distance E from the end of the works; see [Table 5.3 in Section D5.4](#).

High intensity warning lights are not required where there is positive traffic control ("STOP/GO" signs, portable signals) but are required for priority signs during the hours of darkness where there is a loss of one lane or part of a lane.

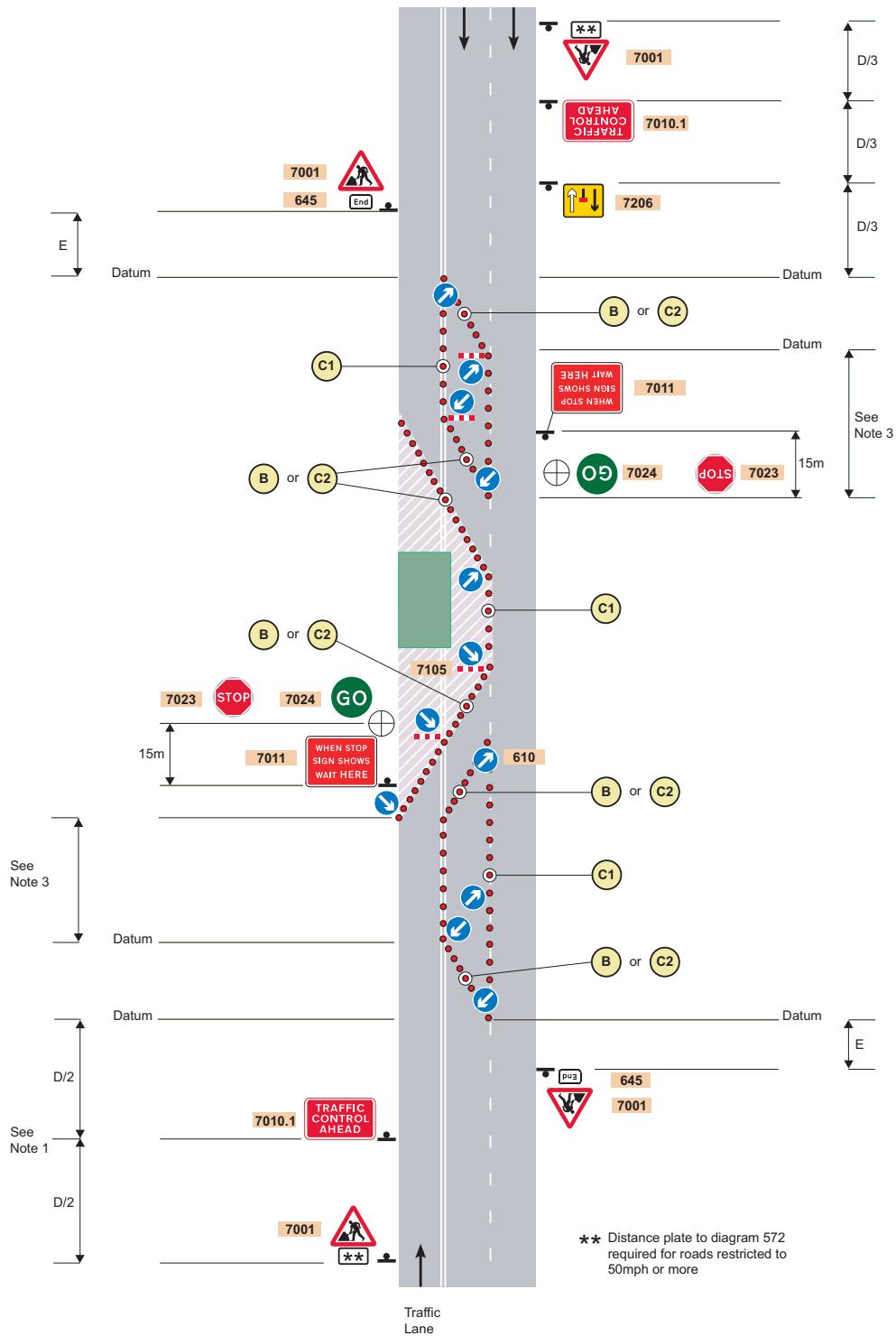
Plan SC5: "STOP/GO" signs on a two-lane single carriageway road



NOTES:

1. This sign should be used if works consist of surface dressing. The signs should be placed far enough in advance of the loose chippings to allow drivers to slow down and retain as long as the loose chippings persist; see paragraph D3.18.7.
2. A distance plate to diagram 572 is required for roads with a permanent speed limit of 50 mph or more.
3. On roads with a permanent speed limit of 50 mph or more a distance is required on the diagram 518 plate.
4. Refer to Table 5.3 in Section D5.4 for dimensions of D and E.

Plan SC6: "STOP/GO" signs on a three-lane single carriageway road



NOTES:

- Where overtaking is permitted in both directions a sign to 7206 should be erected on each approach. In this case all approach signs should be located at D/3 spacing.
- Where drivers would be required to cross continuous white lines in the lane changeover positions these should be masked or removed.
- Refer to **Table 5.6** in **Section D5.11** for the lengths of guide islands.
- Refer to **Table 5.3** in **Section D5.4** for the recommended range of distances D and E.
- Cone spacing will depend on the type of road; see **Table A1.3 (Appendix 1)**.

D5.9 "STOP-WORKS" SIGN

D5.9.1 The "STOP-WORKS" sign to diagram 7031 may be used only to stop traffic for a short period during works on or near a road, or during a temporary obstruction of 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. Paragraph D5.9.5 specifies the conditions under which the sign may be used. Particular care will be needed if the sign is to be used in the vicinity of a junction.

D5.9.2 The sign must be double sided and mounted on a black/yellow banded pole and must be held by the operator, who should be wearing high visibility clothing.

D5.9.3 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.

D5.9.4 Two "STOP-WORKS" signs may be required in circumstances such as manoeuvring plant or works vehicles.

D5.9.5 The sign should be used only when all the following apply:

- single carriageway road;
- when the stoppage is to be for a maximum period of 2 minutes; and
- the minimum clear visibility for drivers to the sign is:
 - 60 m where the speed is restricted to 40 mph or under; and
 - 75 m where the speed limit is 50 mph and above.

D5.9.6 Unless the site is already signed and guarded, additional signs "TRAFFIC CONTROL AHEAD" to diagram 7010.1 should be positioned on both approaches when any of the following conditions apply:

- the two-way traffic flow is greater than 400 vehicles per hour;
- bends in the road or other obstructions affect visibility; or
- the speed limit is 50 mph and above.

D5.10 TRAFFIC SIGNAL CONTROL

D5.10.1 Portable traffic signals are used at road works sites where positive traffic control is required and the works are to be in place long enough to justify the time taken to install and remove the equipment and/or traffic is dense. The maximum distance between signal heads should not exceed 300 m. For greater distances, consult the Highway Authority.

D5.10.2 Portable traffic signals are suitable for use at most sites, however, where the criteria for priority control or "STOP/GO" signs (see Sections D5.7 and D5.8) are met the delays to traffic will be less with those forms of control. Signal control may lead to difficulty in the following situations:

- where the site length is greater than 300 m; or
- where flows are so heavy that the restricted length of road is overloaded; see paragraph D5.1.6.

In these cases the designer should contact the Highway Authority, which will consider alternative solutions.

D5.10.3 Normally the approval of the traffic authority will be required before portable traffic signals are placed on the highway (see direction 53). Where portable traffic signals are placed on the highway by undertakers under powers in the New Roads and Street Works Act 1991 then prior approval is not required. However, the undertaker must give advance notice of the use of portable traffic signals (NRSWA 1991 sections 54 and 55). The traffic authority may give directions as to the use of portable traffic signals. Approval by the traffic authority is always required if the section operated by portable traffic signals includes a junction (direction 53).

D5.10.4 The signal equipment used must be Type Approved and traffic signals should normally be vehicle actuated unless works are being undertaken under 'use of chicanes' (see [Section D5.12](#)), 'extended all-red periods' (see [Section D5.13](#)) or unless otherwise instructed by the Highway Authority.

D5.10.5 Advice regarding signal control and setting-up procedures can be found in [Part 2: Operations, Section O3.21](#). Useful advice is also given in the Department for Transport booklet "An introduction to the use of vehicle actuated portable traffic signals".

D5.10.6 The position of the signals and signs relative to the start or finish of the shuttle lane affects the efficient flow of traffic. The recommended positions are shown in [Plans SC7](#) and [SC8](#). For most road works sites where signals are used, two-phase control for shuttle working is all that is required.

D5.10.7 The use of two traffic signals should be considered on each approach, especially where traffic approaches at high speed. In some circumstances this may not be necessary or physically possible. In such cases, [Plan SC7](#) shows alternative positions for the signals:

- on the near side of the approaching traffic at each end of the works; or
- on or near the centre line of the road at both ends of the works.

D5.10.8 The Highway Authority may require variants of these layouts to meet particular conditions. The main factors which need to be considered are the duration of the works, visibility of the signals, the magnitude of the traffic flow and whether the cable crossing can be safely accommodated; see paragraph [D5.10.9](#) below.

D5.10.9 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, this cable should be fitted in a cable protector secured against movement. The crossing protector should not present a hazard to road users passing over it, especially cyclists and motorcyclists. The Highway Authority should be satisfied that the cable crossing protector is safe and fit for use.

D5.10.10 A "RAMP" sign to diagram 7013 is required on each approach to the cable crossing.

D5.10.11 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 plate to diagram 572.

D5.10.12 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. See also paragraph [D5.15.7](#).

D5.10.13 When traffic signals are not operating (removed from use) for any significant period of time, they should be bagged. For periods of less than one week, signs to diagram 7019 may be erected instead 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, but should never be used if portable signals are in use at the same location. 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.

D5.10.14 Sign variants to diagram 7014 include “SIGNAL TIMINGS CHANGED” and “SIGNAL PRIORITIES CHANGED AHEAD”.

D5.10.15 The “HEAVY PLANT CROSSING” sign variant to diagram 511 is used at a haul route crossing; see Section D3.23.

PORTABLE TRAFFIC SIGNALS – PRINCIPLES FOR TWO AND THREE-LANE SINGLE CARRIAGEWAY ROADS

D5.10.16 These principles are illustrated in [Plans SC7](#) and [SC8](#).

The principles for advance signing are:

- a minimum of three advance signs are required:
- a “road works” sign (7001) on the near side only in both directions, in advance of the works; a distance plate (572) is required for roads with a permanent speed limit of 50 mph or more;
- a “traffic signals ahead” sign (543) on the near side in both directions, in advance of the works;
- on a two-lane single carriageway road ([Plan SC7](#)): a “road narrows” sign (517) with supplementary plate “Single file traffic” (518) on the near side only in both directions. On roads with a permanent speed limit of 50 mph or more, “for” and a distance are required on the diagram 518 plate;
- on a three-lane single carriageway road ([Plan SC8](#)) marked as two lanes in one direction and one in the other: a sign (7206) on the near side of the two-lane approach to indicate that the centre lane is closed, with traffic on the off side of the works travelling in the opposite direction:
 - for roads with a permanent speed limit of 40 mph or less, one sign (7206) is required;
 - for roads with a permanent speed limit of 50 mph or more, one sign (7206) is required with a bottom panel (7208) indicating the distance to the works of 200 yards, placed 200m in advance of the works, and a second sign is required with a bottom panel (7208) indicating the distance to the works of 100 yards, placed 100m in advance of the works; and
- a “WHEN RED LIGHT SHOWS WAIT HERE” sign (7011) on the near side only in both directions, placed 15m in advance of the works. In some cases this distance may need to be increased to avoid a waiting vehicle blocking the path of vehicles as they leave the works.

The principles for the lead-in taper are:

- one “keep left/right” sign (610) is placed on the near side at the start of the taper;
- on a two-lane single carriageway road: coning to Detail B is used at an angle of 45° to the edge of the road;
- on a three-lane single carriageway road: coning to Detail B or C2 is used. [Table 5.3](#) in [Section D5.4](#) gives the taper length and the length of the guide island is dealt with in [Section D5.11](#);

- a “lane closed” barrier (7105) with a “keep left/right” sign (610) is placed at the end of the taper behind the cones; the “keep left/right” sign may be placed behind or in front of the barrier; and
- on a three-lane single carriageway road; when two lanes are crossed, one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) is placed in the closed lane.

The principles for the works zone are:

- coning to Detail C1 is used to mark the edge of the works area on single carriageway roads; no additional signing is required.

The principles for the exit taper are:

- coning on two-lane single carriageway roads to Detail B at 45° to the edge of the road;
- the coning for the exit taper on three-lane single carriageway roads is the same as for the lead-in taper; and
- a “lane closed” barrier (7105) facing opposing traffic with a “keep left/right” sign (610); on a three-lane single carriageway road these signs are positioned on the central traffic control island.

The principles for the end of the road works are:

- a “road works” sign (7001) with supplementary plate “End” (645) is located a distance E from the end of the works; see [Table 5.3](#) in [Section D5.4](#).

Placing of signals:

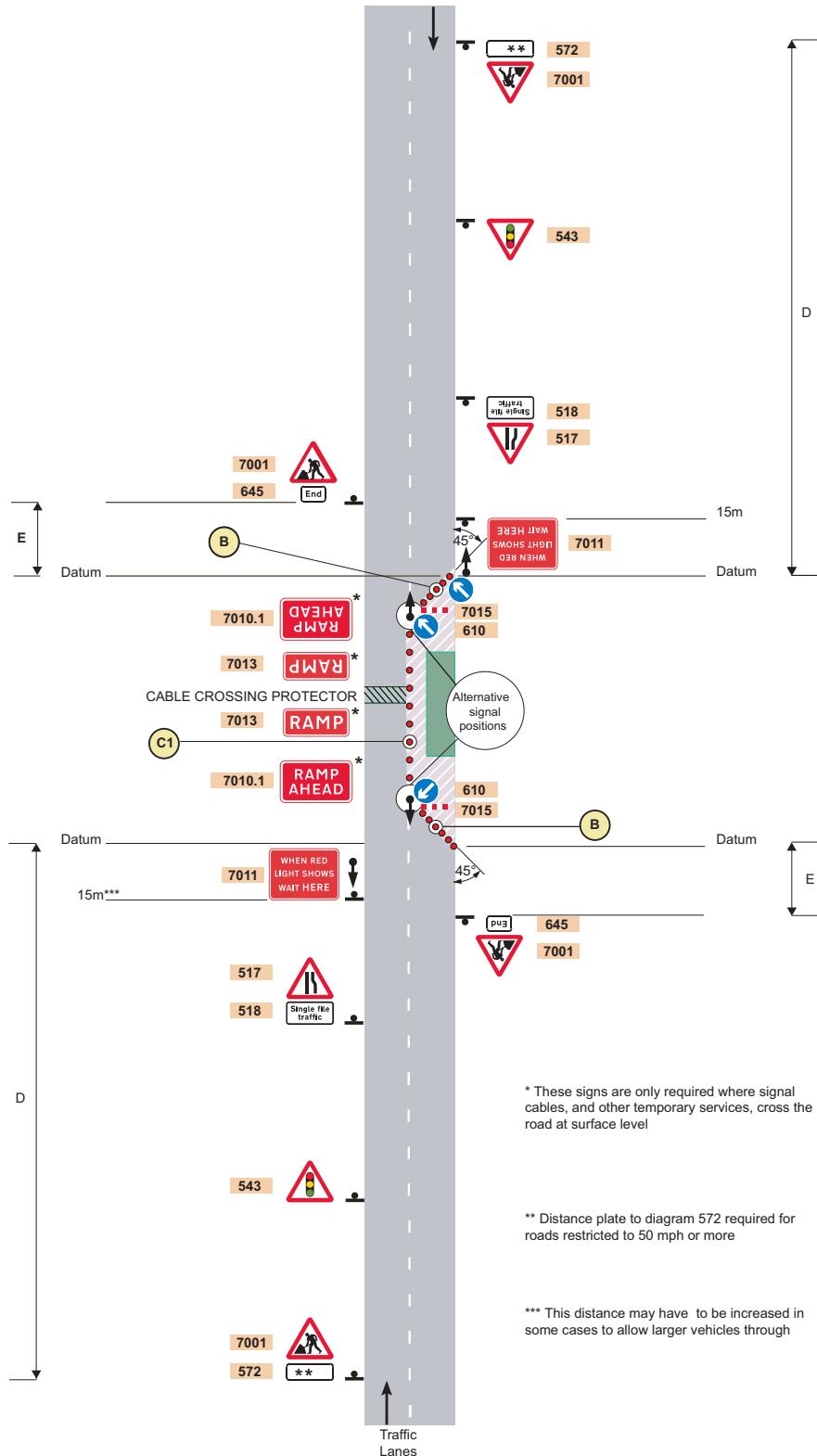
- on a two-lane single carriageway road: as per paragraph [D5.10.7](#);
- on a three-lane single carriageway road: on the two-lane side, a portable traffic signal is placed on the near side opposite the end of the lead guide island; on the single-lane side, a portable traffic sign is placed midway along the taper behind the cones.

Guide islands:

Principles for guide islands are given in [Section D5.11](#).

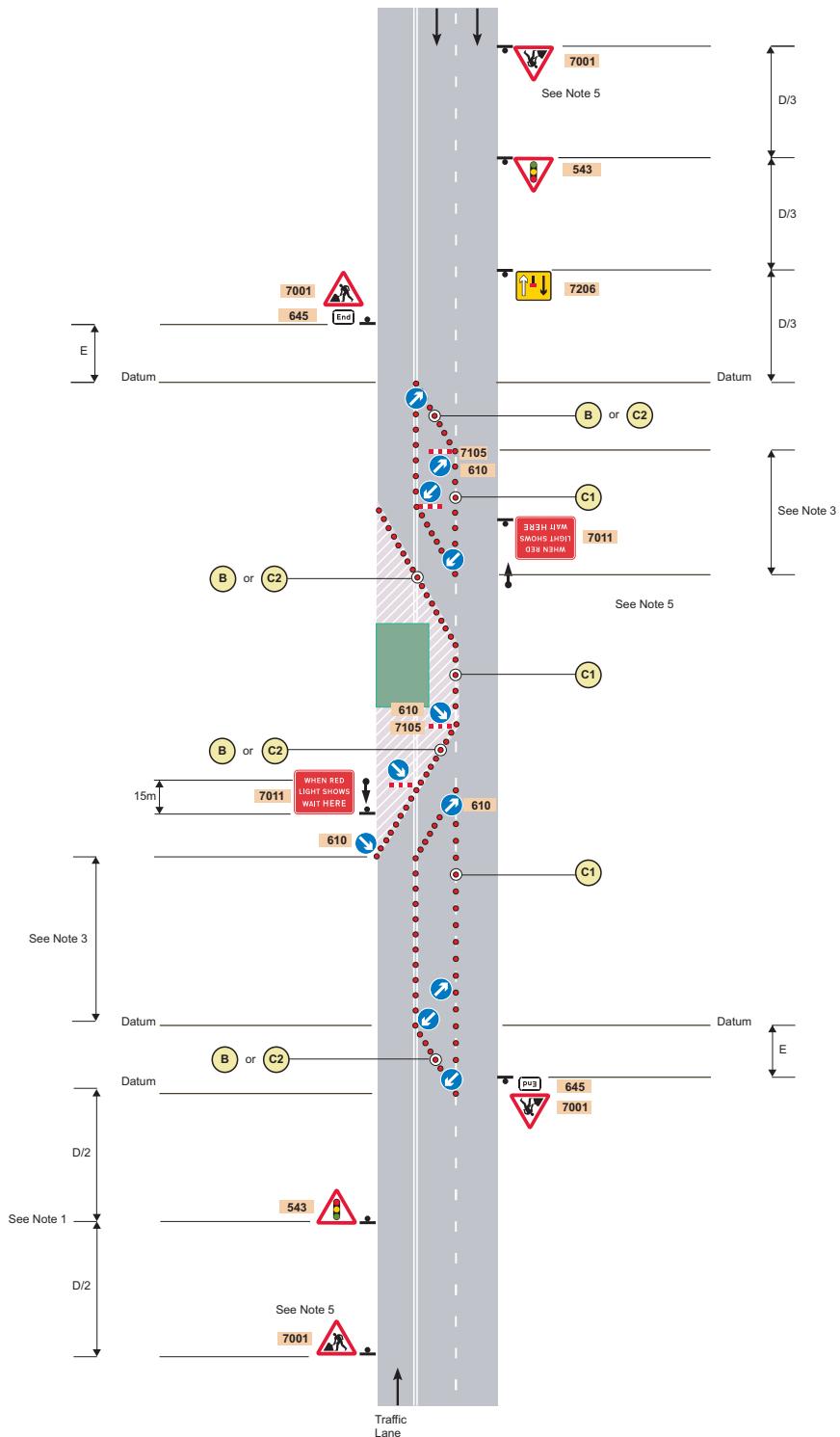
High intensity warning lights are not required where there is positive traffic control (“STOP/GO” signs, portable signals) but are required for priority signs during the hours of darkness where there is a loss of one lane or part of a lane.

Plan SC7: Portable traffic signals on a two-lane single carriageway road



NOTE: Refer to Table 5.3 in Section D5.4 for recommended range of distances for dimensions D and E.

Plan SC8: Portable traffic signals on a three-lane single carriageway road



NOTES:

- Where overtaking is permitted in both directions a sign to 7206 should be erected on each approach. In this case all approach signs should be located at D/3 spacing.
- Where drivers would be required to cross continuous white lines in the lane changeover positions these should be masked or removed.
- Refer to **Table 5.6** in **Section D5.11** for the lengths of guide islands.
- Refer to **Table 5.3** in **Section D5.4** for the recommended range of distances D and E.
- A distance plate to diagram 572 is required for roads with a permanent speed limit of 50 mph or more.

D5.11 GUIDE ISLANDS

D5.11.1 Guide islands should be provided where a single three-lane carriageway road is reduced to one or two lanes; see [Plans SC6](#) and [SC8](#). Minimum taper lengths for guide islands are given in [Table A1.3](#) ([Appendix 1](#)). Lengths of guide islands excluding tapers are given in [Table 5.6](#) below.

Table 5.6 Guide island lengths

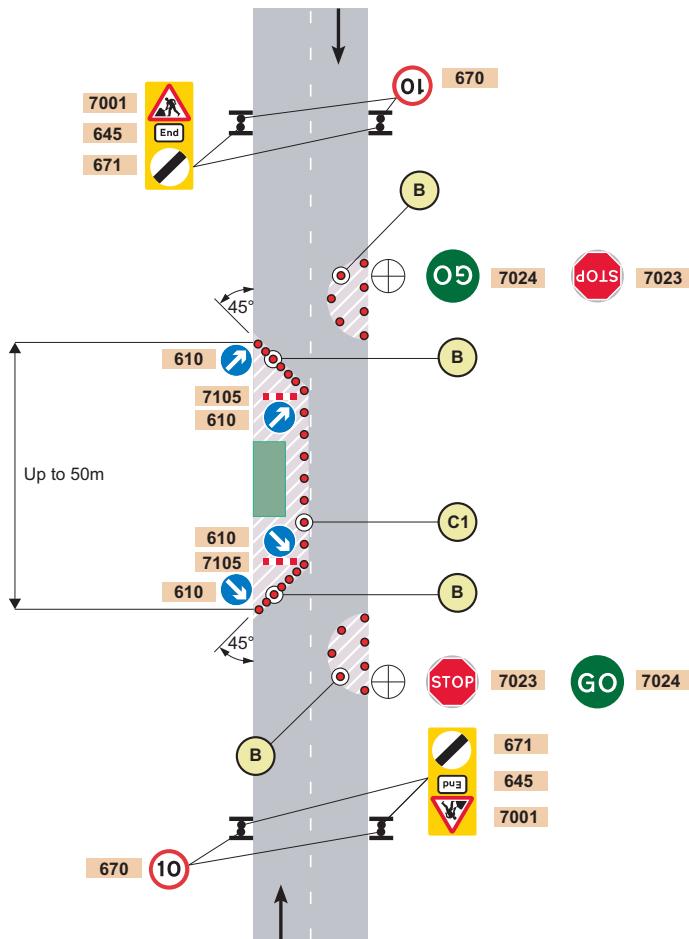
	Standard works	Relaxations
Roads for which national speed limit applies	200m	100 m
Roads with a permanent speed limit of 50 mph or less	100m	50 m

D5.11.2 When guide islands are used in conjunction with positive traffic control (priority signs, "STOP/GO" signs, and traffic signal control) the taper lengths should be as given in [Table 5.3](#).

D5.12 USE OF CHICANES

D5.12.1 For short lengths of shuttle working, i.e. 50m or less, chicanes can be used to reduce traffic speeds, where necessary, to less than 10 mph. At least one chicane in each direction is required, 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. The principle is shown in [Plan CH1](#). Where it is impracticable to provide a chicane in one direction, for example, because of the presence of a junction, an alternative traffic management arrangement should be used in that direction to ensure that traffic speeds are reduced to less than 10 mph.

Plan CH1: Use of chicanes to reduce traffic speeds to 10 mph



NOTES:

1. The signs shown are those specifically required for chicanes and a 10 mph mandatory speed limit. These supplement normal signing for either "STOP/GO" boards or temporary portable traffic signals.
2. The principles in this plan are only appropriate for short lengths of shuttle working, i.e. 50 m or less. For longer lengths, a convoy working system must be used, see [Section D7, Convoy Working](#).
3. In the event that the signs are on "STOP/STOP" for any reason, e.g. a materials delivery, there is a risk that drivers might be able to see both "STOP" and "GO" signs facing them. Therefore, the "STOP/GO" signs should be sited to minimise the risk of drivers seeing both "STOP" and "GO" signs facing them.

D5.13 USE OF EXTENDED ALL-RED PERIOD

D5.13.1 On single carriageway roads with low traffic flows an extended all-red period with portable traffic signals or "STOP/GO" boards may be used to allow a short period for certain works tasks to be carried out on the whole of the carriageway. For a definition of "low traffic flows", see [Glossary \(Appendix 2\)](#). Examples of work where the use of an extended all-red period that may be appropriate are installing traffic management, including temporary safety barriers, white-lining and tree felling.

D5.13.2 To minimise queuing on the approach to the works, the all-red period used should always be the minimum needed in order to carry out the works task. As part of the design process, it is essential to first establish the likely traffic flow at the site when the works are planned in order to calculate the maximum number of vehicles that are likely to be delayed in a queue. [Table 5.7](#) below gives example queue lengths for a range of all-red periods, depending on the traffic flow.

Table 5.7 Example all-red periods and associated queue lengths

Two-way traffic flow (veh/hr)	Maximum all-red period (minutes)	Average queue length (vehicles) ¹
200	5	8
300	4	10
400	3	10
500	2	8
600	2	10

NOTES:

1. The queue length is based on the assumption that traffic is flowing equally in both directions. The length represents the average number of vehicles that could be expected to be waiting in each queue by the end of the all-red period.

D5.13.3 It is recommended that queues in excess of 15 vehicles should be avoided because longer queues will take longer to disperse and for the traffic flow to return to normal. If a queue in excess of 20 vehicles at either end is likely or an all-red period in excess of 10 minutes is required, permission for an extended all-red period should be sought from the Highway Authority.

D5.13.4 Consideration should be given to the possible effect of queues on the surrounding roads and junctions nearby.

D5.13.5 Manually operated "STOP/GO" boards (see [Section D5.8](#)) should only be used at sites where the risk is assessed as being low.

D5.13.6 If portable traffic signals are used, an operative should be present at each signal head. They should have received specific training on communication and dispute resolution so that they are competent to communicate effectively with members of the public who may seek an explanation as to why they may not proceed. Alternatively, additional authorised signing can be used to advise waiting motorists that the signals are functioning correctly.

D5.13.7 The recommended signing layout for this type of control is illustrated in [Plan SC5](#) for a single two-lane carriageway road.

D5.13.8 It is essential that the works are able to be suspended rapidly to allow access by emergency vehicles.

D5.13.9 The use of an extended red period may be considered for use on dual carriageway roads up to 40 mph with convoy working where the one-way hourly traffic flow does not exceed 300 vehicles/hour; see [Plan CW2](#). Its use is not permitted on motorways.

D5.14 JUNCTIONS

D5.14.1 This section deals with the methods to be used to control vehicular traffic at road works which include a junction in the layout, or at which a junction is so close to the site that it should be included in the traffic management for the works.

D5.14.2 The main objective should be to maintain two-way traffic past the obstruction if it is possible and safe to do so. This may be achieved by providing temporary road markings and also "give way" road markings to assist in marshalling traffic. Turning movements may be temporarily prohibited, subject to an order being

obtained by the Highway Authority, for example, by using a “no right turn” sign to diagram 612 from the major road into the side road affected. If convenient roads are available, temporary diversions should be arranged and signed; see [Section D3.15](#).

D5.14.3 The area occupied by the works should be coned-off and the usual advance warning signs should be provided on all approaches – see [Plans SC9](#) and [SC10](#).

D5.14.4 If the road width available to traffic has to be reduced to less than 5.5 m, (see paragraph [D5.1.4](#)) it will be necessary to control traffic by means of “STOP/GO” signs or portable traffic signals as described in [Sections D5.8](#) and [D5.10](#).

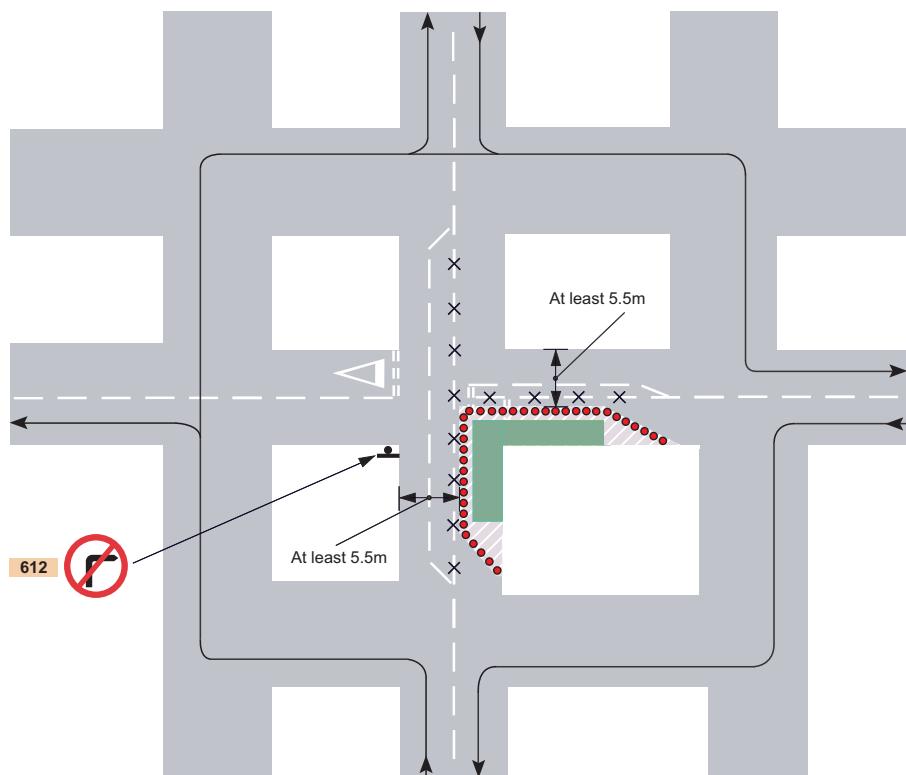
D5.14.5 On the main road, “road works” signs to diagram 7001 with distance and direction to hazard plates to diagram 573, pointing in the appropriate direction, should be used to warn drivers turning into the side road that they will encounter road works. If any turns are prohibited temporarily under an order, the appropriate “no right/left turn” signs to diagrams 612 or 613 should be provided. The “road works to left/right” signs to diagrams 7001 and 573 will not then be required. See [Plan SC10](#).

D5.14.6 If the width of road available in the side road is sufficient for one-way traffic only, all turns from the major road must be prohibited, after an order has been obtained, so that the side road operates one-way only past the obstruction. A similar effect could be achieved by using the “no entry” sign to diagram 616, again after an order has been obtained. A diversion should then be signed to permit access to the side road; see [Section D3.15](#). If side road traffic is very light and there is little risk of traffic on the main road being inconvenienced, it may be possible to operate alternate one-way working past the obstruction in the side road, but this must be treated with extreme caution.

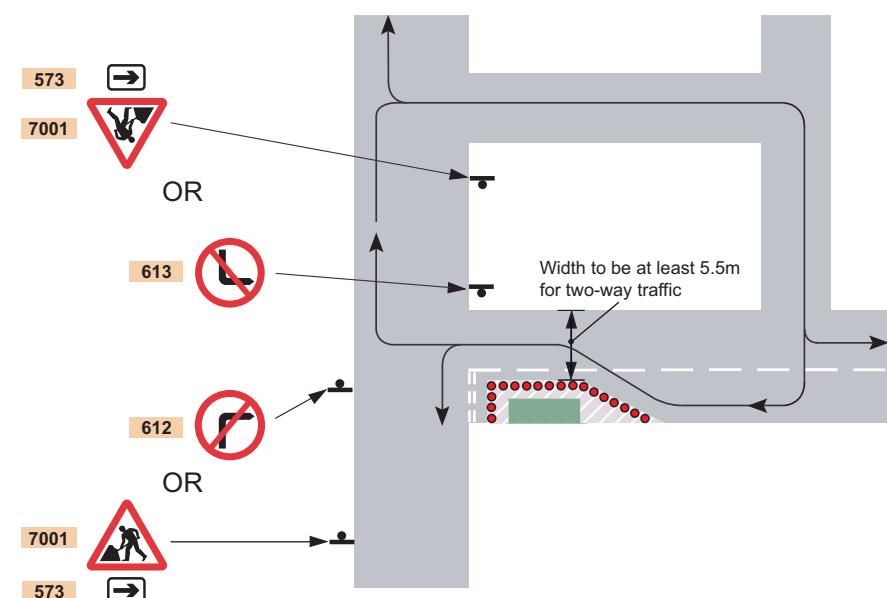
D5.14.7 Where the junction is normally controlled by “GIVE WAY” signs and the designer decides that the level of traffic or visibility problems require the minor road or access to be controlled by signals, both the junction and the shuttle lane should be controlled by a multiphase portable signal controller and the “GIVE WAY” signs and markings 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.

D5.14.8 [Plans SC9](#) and [SC10](#) show indicative locations for prohibition and warning signs in order to ban or advise of road works ahead. These signs are additional to the standard road works signing.

Plan SC9: Road works at a crossroads junction



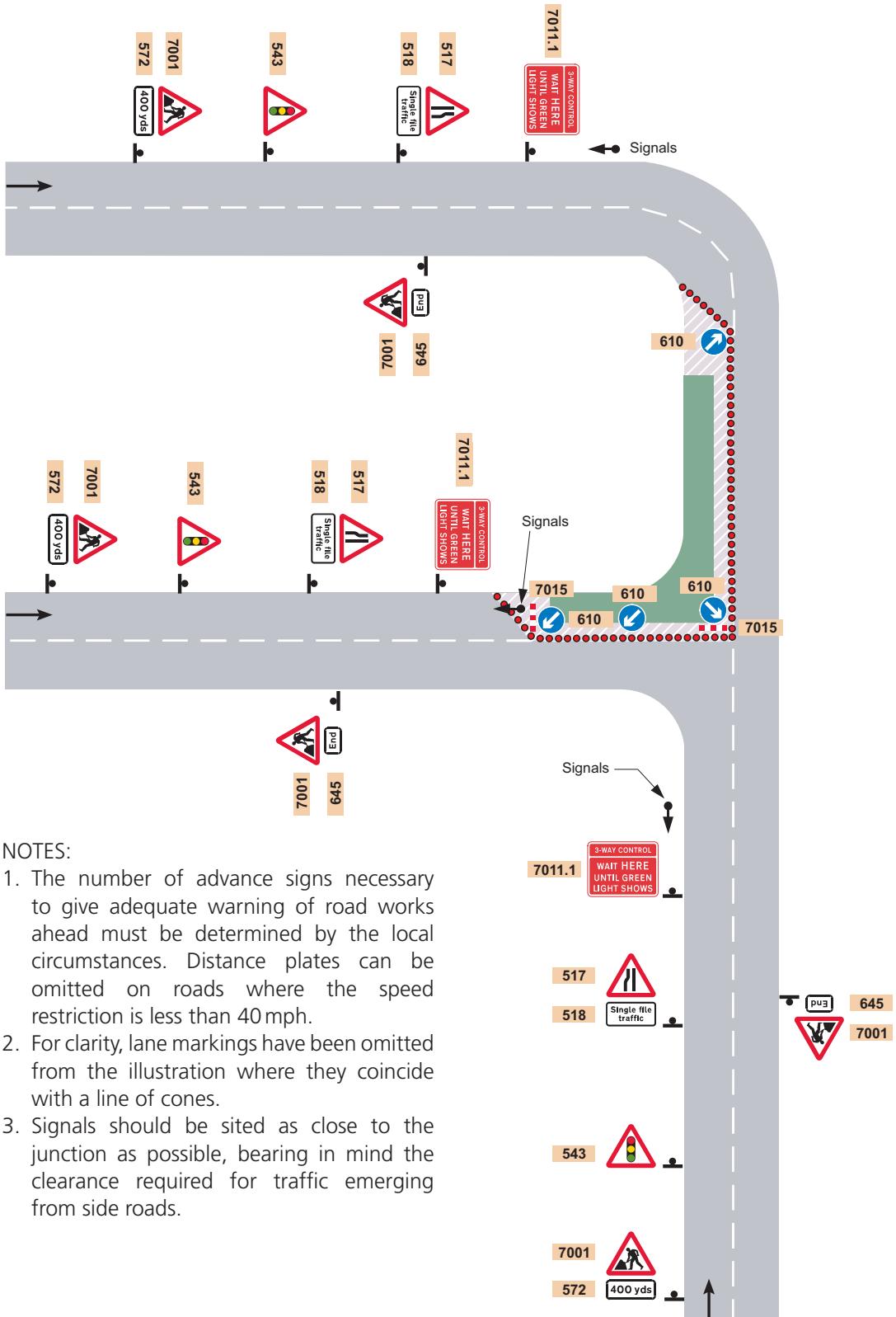
Plan SC10: Road works at a T junction



NOTES:

1. Signs to diagram 7001 are used when two-way flow can be maintained, and signs to diagrams 612 and 613 are used when only one-way flow is possible.
2. Diversion signs are not shown, but recommended traffic circulation routing is indicated.

Plan SC11: Road works at a T junction – traffic control by means of portable traffic signals



NOTES:

1. The number of advance signs necessary to give adequate warning of road works ahead must be determined by the local circumstances. Distance plates can be omitted on roads where the speed restriction is less than 40 mph.
2. For clarity, lane markings have been omitted from the illustration where they coincide with a line of cones.
3. Signals should be sited as close to the junction as possible, bearing in mind the clearance required for traffic emerging from side roads.

D5.15 SIGNAL CONTROLLED JUNCTIONS

D5.15.1 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 by the Highway Authority to provide a permanent demand on that phase. If the works are to continue for more than a few days and delays are likely due to fixed time operation, alternative detection arrangements should be considered. Where the capacity of an approach to the junction is reduced as a result of the removal of one or more lanes for an extended period, consideration should be given to adjusting the signal timings to minimise queue lengths on this approach.

D5.15.2 Other situations may require the permanent signals to be switched off temporarily to allow traffic to be controlled either by a multiphase portable signal set or by one of the manual methods of control. When the permanent signal heads cease to be the operative signs, they must be covered.

D5.15.3 Works in the vicinity of part-time signals, stand-alone crossings at roundabouts and full-time signal-controlled roundabouts can cause particular problems and the designer should contact the authority responsible before planning the necessary traffic management.

D5.15.4 Whenever portable traffic signals are to be used to control traffic at road works involving a junction, e.g. as illustrated in Plan SC11 and Plan SC12, TSRGD require (direction 53) that the traffic authority's written permission is obtained. The use of portable traffic signals is dealt with in [Section D5.10](#).

D5.15.5 Where the road works do not actually include a junction, but one is so close that difficulties may be encountered, the designer may consider that multiphase control of the junction and shuttle lane is 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" includes the use of temporary traffic signals and says they should be to the same standard as permanent signals. This allows, for example, for pedestrian phases to be used. Portable signals cannot be used with pedestrian facilities at a junction.

D5.15.6 Where the designer considers that a junction within a controlled area is of relatively minor importance and does not require to be separately signalled, consideration should be given to the provision of warning signs. 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.

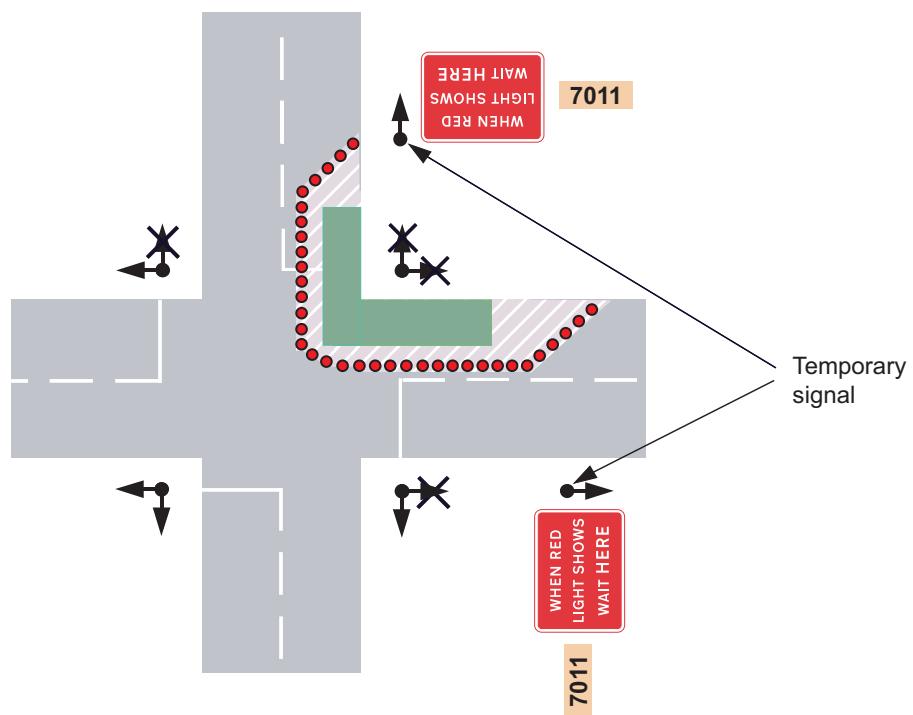
D5.15.7 The sign for traffic joining the controlled area from the side road is a sign with two arrows and the legend "TRAFFIC UNDER SIGNAL CONTROL" to diagram 7021 for use with a "road works" sign to diagram 7001. The sign to warn traffic proceeding through the controlled area is a sign with the legend "JOINING TRAFFIC NOT SIGNAL CONTROLLED" to diagram 7022 for use with an "Other danger" sign to diagram 562.

D5.15.8 The "road works" sign to diagram 7001 and diagram 7021 should be sited not more than 10m in advance of the point at which traffic emerging from the junction would give way to passing traffic. The "other danger" sign to diagram 562 in combination with diagram 7022 should be located on each approach to the controlled area and should be positioned midway between the "traffic signals ahead" sign to diagram 543 and "road narrows" sign to diagram 517. The size of these signs should be in accordance with [Table A1.2 \(Appendix 1\)](#).

D5.15.9 The "TRAFFIC UNDER SIGNAL CONTROL" sign to diagram 7021 must be erected in combination with the "road works" sign to diagram 7001 at every side road leading to an uncontrolled junction within a length of road controlled by portable traffic signals or "STOP/GO" boards. This procedure must be used only when traffic held at the signals is visible to the joining traffic.

D5.15.10 Traffic signal maintenance is dealt with in [Section D3.25](#).

Plan SC12: Road works at a crossroads junction with traffic signals



D5.16 ROUNDABOUTS

WORKS AT THE ENTRANCE TO A ROUNDABOUT

D5.16.1 The approach to the obstruction should be signed, coned and warning lights provided as usual. The "end of road works" sign to diagrams 7001 and 645 should not be provided in this case. See [Plan SC13, Case A](#).

D5.16.2 Two-way traffic past the obstruction should be maintained if possible. If not, entering traffic should be prohibited and a diversion route arranged. In this case, part of the circulatory area should be coned-off as shown, to restrict traffic to one lane going towards this exit and advance warning of road narrows to diagram 517 should be provided. If no suitable diversion routes are available, it may be necessary to adopt alternating one-way working.

WORKS IN THE CIRCULATORY AREA OF A ROUNDABOUT

D5.16.3 All movements should be maintained if possible. The obstruction should be coned, and warning lights placed and a "road narrows" sign to diagram 517 provided. See [Plan SC13, Case B](#).

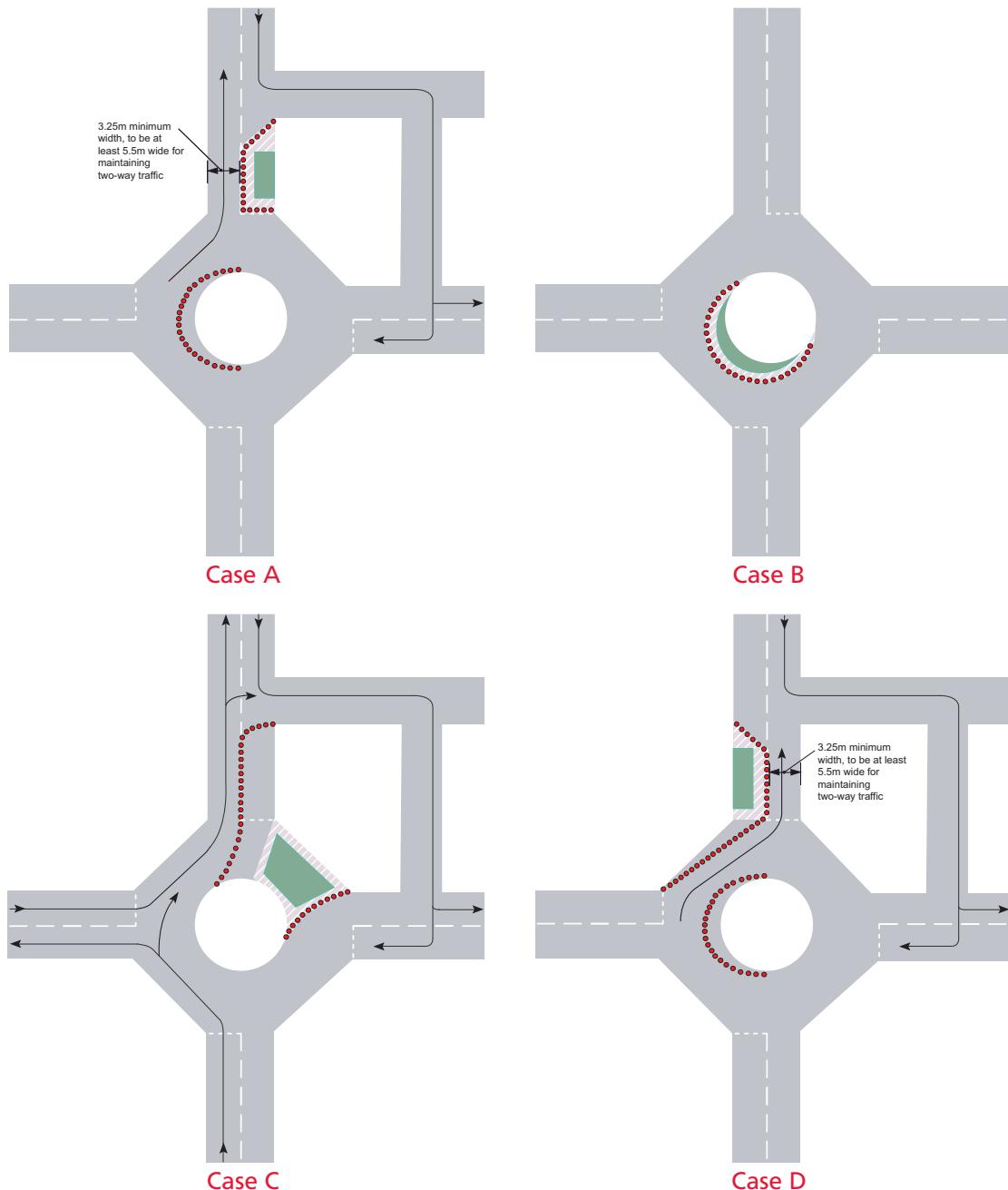
WORKS COMPLETELY OBSTRUCTING THE CIRCULATORY AREA OF A ROUNDABOUT

D5.16.4 The obstruction should be coned and warning lights placed. See [Plan SC13, Case C](#). If suitable roads are available, diversion routes should be provided. TSRGD (direction 53) require that the traffic authority's written permission is obtained. The use of portable traffic signals is dealt with in [Section D5.10](#).

WORKS AT THE EXIT FROM A ROUNDABOUT

D5.16.5 The obstruction should be coned and warning lights placed. See [Plan SC13, Case D](#). Two-way traffic past the obstruction should be maintained if possible, otherwise the road should be operated as an exit only from the roundabout and a diversion route signed for entering traffic. In this case, part of the circulating area should be coned-off to restrict traffic to one lane going towards this exit and advance warning provided using the “road narrows” sign to diagram 517.

Plan SC13: Road works at a roundabout



NOTES:

1. Diversion signs are not shown.
2. For roundabouts with two or more lanes, the coning used to restrict carriageway width for circulatory traffic, as shown on Cases A and D, may be omitted.

WORKS AT A MINI-ROUNDABOUT

D5.16.6 The traffic management for works at a mini-roundabout, i.e. a roundabout with the marking to diagram 1003.4 instead of a physical central island, should be as for a junction of two roads, i.e. a T junction or crossroads; see [Section D5.14](#).

D5.17 RAILWAY LEVEL CROSSINGS

D5.17.1 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. Operational aspects of conducting works near or on level crossings are dealt with in [Part 2: Operations, Section O3.25](#).

D5.17.2 There are three main types of railway level crossings.

- Automatic level crossings, with or without barriers, which 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.

D5.17.3 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”.

CONSULTATION

D5.17.4 Any authority, utility company or other body intending to carry out work on a road at or near any type of level crossing in England must follow the procedures set out in Appendix C of the Code of Practice “Co-ordination of Street Works and Works for Road Purposes and Related Matters”. For level crossings in Wales, Scotland and Northern Ireland refer to the appropriate Overseeing Organisation for the relevant procedures.

D5.17.5 The local office of the railway authority must be consulted when such works are planned, giving as much notice as possible. Consideration should be given to consulting the police. The following points about the procedure are emphasised:

- the railway authority must be consulted regarding all works in the vicinity of the level crossing that may cause congestion and hence blocking back over the crossing; and
- the works must not proceed until the satisfactory conclusion of the consultation.

TRAFFIC CONTROL – WORKS AT OR ON ANY RAILWAY LEVEL CROSSING

D5.17.6 The following very important points should be remembered when designing traffic management for works at or on any level crossing:

- use of portable signals is only permitted under regulation 35; these may be used only when work in relation to that crossing is being carried out; and
- when portable signals are used at a level crossing, they must be under manual control so that the operator can maintain the all-red period for a sufficient length of time to allow the train to pass.

TRAFFIC CONTROL – WORKS NEAR ANY RAILWAY LEVEL CROSSING

D5.17.7 The following very important points should be remembered when designing traffic management for works near any railway level crossing:

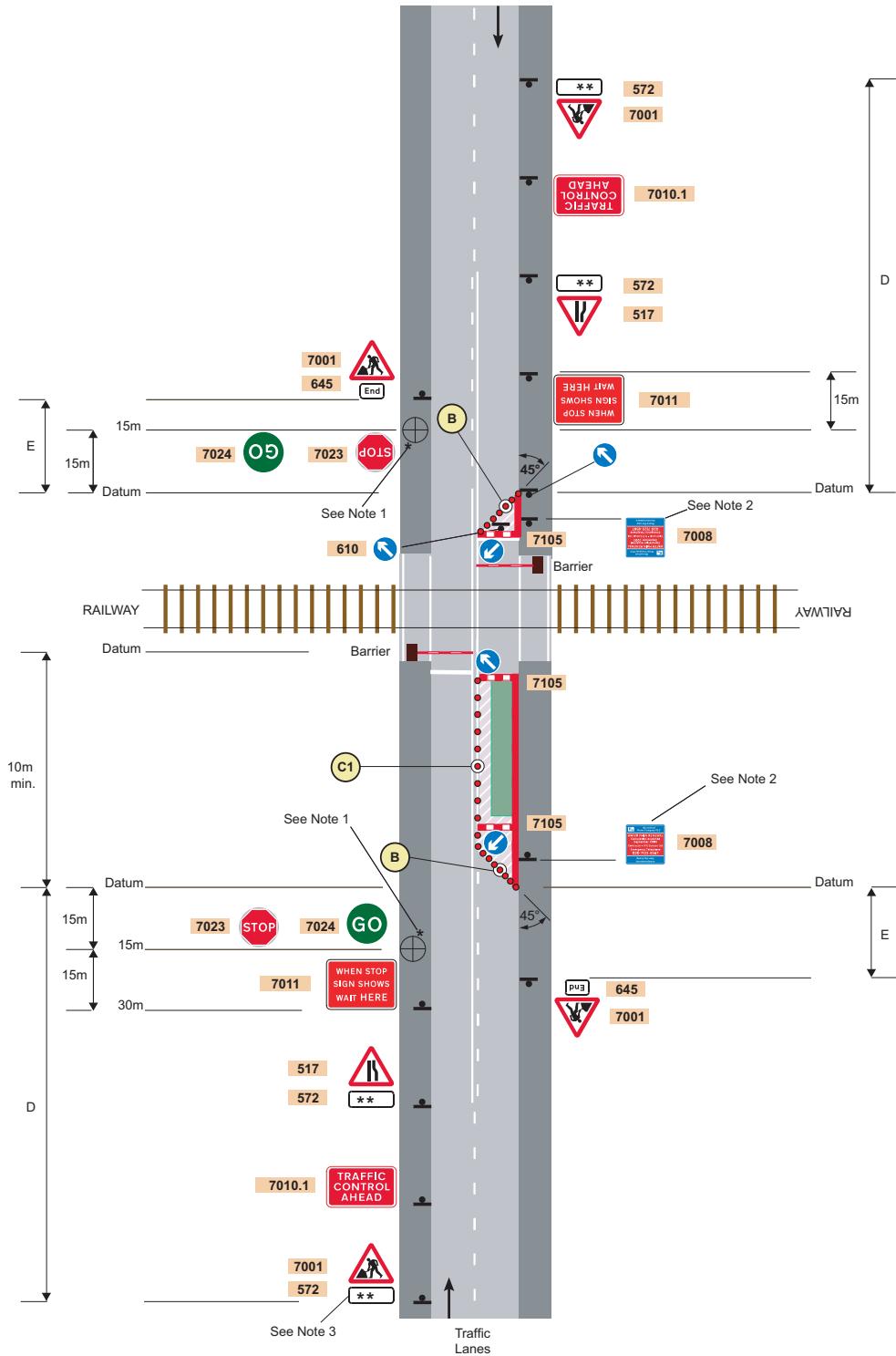
- avoid blocking back at all times – where works are near to, but not on the crossing, designers should ensure that traffic cannot block back and stop on the crossing; care must therefore be exercised in the traffic control arrangements;
- traffic control by means of “STOP/GO” sign boards – “STOP/GO” should be used at works that straddle a level crossing, or within 50 m of the level crossing stop line where the level crossing is equipped with twin red flashing traffic signals; and
- traffic controlled by means of portable signals – under no circumstances should portable traffic light signals be used at works within 50 m of the level crossing stop line; even with works at 50 m or more from the level crossing, if it is considered that road traffic may block back to the level crossing, the traffic control should be by means of “STOP/GO” boards.

TRAFFIC MANAGEMENT ARRANGEMENTS

D5.17.8 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.

D5.17.9 The traffic management arrangements for works at the various types of level crossing are set out in [Plans SC14](#) and [SC15](#). The plans illustrate traffic management on roads with a footway. Where there is no footway, the signs are to be placed on the verge.

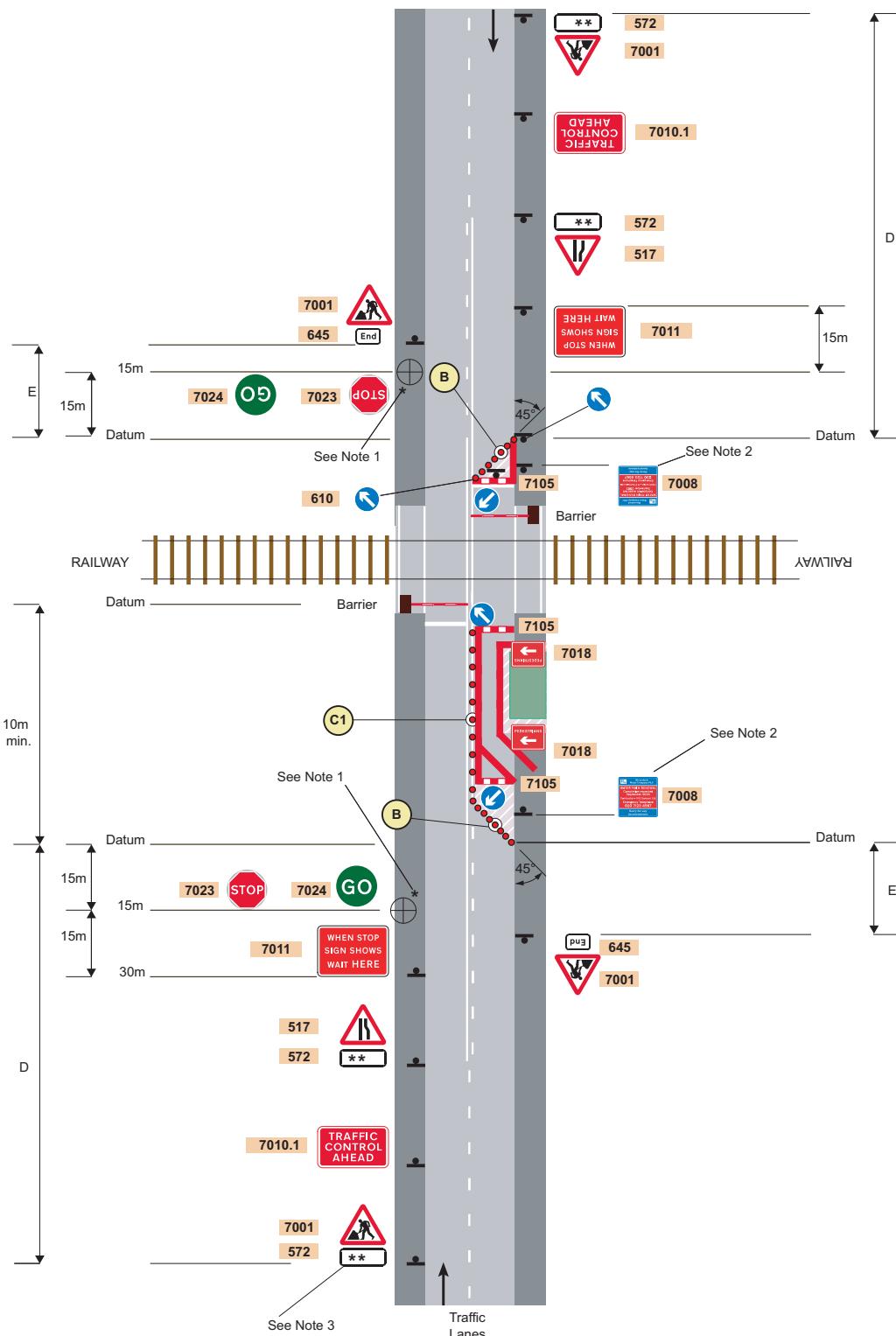
Plan SC14: Road works near a level crossing on a single carriageway road with the footway not obstructed



NOTES:

1. The "STOP/GO" sign should be placed where it will be in full view of approaching drivers and may be located on either side of the carriageway (see [Section D5.8](#)).
2. These signs are additional to the road works signing and are provided by the statutory undertakers for pedestrians' information.
3. Distance plate to diagram 572 required for roads with a permanent speed limit of 50 mph or more.

Plan SC15: Road works near a level crossing on a single carriageway road with the footway obstructed



NOTES:

1. The "STOP/GO" sign should be placed where it will be in full view of approaching drivers and may be located on either side of the carriageway (see [Section D5.8](#)).
2. These signs are additional to the road works signing and are provided by the statutory undertakers for pedestrians' information.
3. Distance plate to diagram 572 required for roads with a permanent speed limit of 50 mph or more.

D5.18 EMERGENCY ACCESS THROUGH WORKS

D5.18.1 Access for emergency vehicles through the site must be maintained at all times whenever practicable. Proposals for emergency access need to be discussed with the emergency services early in the design; see [Section D2.6](#). The designer should make adequate provision for such access and the risk assessment must consider how to make allowances for this without compromising any safety zone requirements. If convenient roads are available, temporary diversions may need to be arranged and signed; see [Section D3.15](#).

D5.19 WORKS NEAR TRAMWAYS

D5.19.1 Special safety precautions must be taken when works are to be carried out near a tramway. 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.

D5.19.2 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 0.5 m away from the edge of the swept path.

D5.19.3 Where the safety zone sideways clearance would intrude on the swept path, the transport authority should be consulted. The safety zone may be reduced to 300 mm and the transport authority may impose a speed restriction on tramcars, and/or provide a lookout.

D5.19.4 Tramway electrical cables consist of overhead lines and underground cables that may be placed outside the swept path. The 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.

D5.19.5 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 D5.17](#)).

D6 DUAL CARRIAGEWAY ROADS

D6.1 GENERAL ISSUES

D6.1.1 This section deals with temporary traffic management design on dual carriageway roads, including motorways, both with and without hard shoulders.

D6.1.2 In order to determine the most appropriate temporary traffic management arrangement, a detailed survey of the highway is required. Precise carriageway widths, edge and drainage conditions and the presence and strength of any hardening of the central reservation will need to be determined.

D6.1.3 The designer should also review the traffic characteristics of the site. Traffic counts should be taken in each direction to record maximum flows. Seasonal variations may need to be taken into account. High proportions of commercial vehicles may preclude some layout designs where only one lane in each direction is allocated to vehicles wider than 6'-6" (2.0 m) (wider vehicles). Where cycle lanes are affected by road works the safety of cyclists will need to be considered.

D6.2 HARD SHOULDER USE

D6.2.1 Where road works may seriously reduce the carriageway capacity, consideration should always be given to using the hard shoulder as a temporary running lane in order to maintain capacity and to avoid undue delay. The designer needs to ensure that this is acceptable to the Highway Authority and is discussed with the emergency services.

D6.2.2 A temporary traffic regulation order will be required in order to use the hard shoulder as a running lane. For further information on temporary traffic regulation orders, see [Section D3.39](#).

D6.2.3 Provided that the hard shoulder is continuous, has adequate headroom and is strong enough to carry the expected traffic load, it should always be brought into use as a running lane if the expected traffic demand is likely to exceed the capacity of the normal traffic lanes left open. Thus the hard shoulder, when suitable, should be brought into use when the centre and right-hand lanes of a dual three-lane carriageway road are taken out of use or when the right-hand lane of a dual two-lane carriageway road is taken out of use, unless the traffic is expected to be light or the duration of the work short.

D6.2.4 Hard shoulders are sometimes of limited width, so the Highway Authority or the agent acting on its behalf must be consulted on the suitability of any length for use as a running lane. Emergency telephones and permanent signs may be situated close to the back of the hard shoulder, so the available clearance should be checked. The temporary removal of emergency telephones and permanent signs and the installation of new or additional vehicle restraint safety barrier may be necessary.

D6.2.5 Where hard shoulders are to be used as temporary running lanes carrying heavy traffic during maintenance works, they must 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.

D6.2.6 Assessment of the surface condition of the hard shoulder and the need for remedial works are integral parts of the planning of all major maintenance works. These need to be undertaken well in advance to ensure that the investigations are adequate and that remedial works are effected without prejudicing the works programme. Advance treatment of the hard shoulder surface might not always be possible and it will then be necessary to rely on warning signs.

D6.2.7 Any adverse camber likely to cause driving problems should be eliminated if possible or otherwise suitable warning signs must be erected to warn drivers.

D6.2.8 Where there are chambers, manholes or other features within the hard shoulder the designer should ensure that these will adequately support the running lane traffic for the duration of the works. Where

there is any doubt, the structures should be replaced or strengthened prior to the works or, where appropriate, temporarily plating over may be considered.

D6.2.9 The effects of existing and proposed carriageway drainage and hard shoulder runoff shall be taken into consideration.

D6.2.10 Special care will be needed in respect of works near entry and exit slip roads, service areas etc. It may be necessary to close slip roads and service areas and arrange suitable diversions. Provision for these arrangements should be included in the works where appropriate.

D6.2.11 Where the hard shoulder is to be utilised as a running lane and there is no refuge for any broken-down vehicle then a recovery vehicle service is recommended. The provision of a recovery service should depend on the length of road without hard shoulder or refuge and the implications of delay in removal of the broken-down vehicle on congestion and delay. The recovery vehicle service should be located on the approach to the affected length of hard shoulder so that the broken-down vehicle may be removed as quickly as possible to a suitable place of safety. These recovery vehicles should be available throughout the period of hard shoulder usage. The provision of a temporary CCTV system as an aid to the detection of broken-down vehicles and other incidents that could adversely affect traffic flow should be considered. See Sections D3.35 and D3.36.

D6.2.12 Where the hard shoulder is used as a running lane, the provision of temporary verge refuges (suitably signed) should be considered to assist drivers of failing vehicles to pull off the highway beyond the running lanes. These should be provided every 500 m and should be a minimum of 50 m in length. As HGVs may need to use them the length and construction depth needs to be adequate for a loaded HGV.

D6.2.13 The carriageway edge condition should be considered when running on the hard shoulder, see Section D3.19.

D6.2.14 In order to comply with Motorway Regulations it will always be necessary to use a special sign to indicate to drivers that they may use the hard shoulder. This should be the "USE HARD SHOULDER" panel to diagram 7260 with a symbolic sign to diagram 7211.1, 7230, 7233 or 7234. The "REJOIN MAIN CARRIAGEWAY" panel to diagram 7261 with a symbolic sign to diagram 7231 or 7232 should be displayed in advance of the point where use of the hard shoulder should be discontinued. Traffic cones, warning lights and barriers will also be needed to indicate the path traffic should follow at the beginning of the obstruction. "Keep right" signs variant to diagram 610 must be used in conjunction with cones, warning lights and barriers at the end of the affected length to return traffic to the main carriageway, and to cancel the "USE HARD SHOULDER" message. Signs to diagram 7203.1, 7204 and variants, together with distance plates to diagram 7209, are to be used at $\frac{1}{2}$ mile intervals to advise drivers of the status of the hard shoulder and adjacent lanes.

D6.3 USE OF NARROW LANES

D6.3.1 Works on dual carriageway roads may require some traffic lanes to be reduced in width to less than 3.0 m. Whenever this situation arises, advance warning of the narrow lanes should be given. In most situations it will be necessary to re-mark the carriageway showing the new lanes. Signs incorporating the "NARROW LANES" panel to diagram 7264 may also be used for cases where the lane reduction is less severe. If the lane width is less than 3.0 m the symbol indicating a temporary width restriction, diagram 7283 or 7283.1, should be included for the appropriate lane or lanes.

D6.3.2 Where the number of wider vehicles allows, narrower traffic lanes can be used to enable more lanes to be provided past the works area. The normal motorway lane width is 3.65 m. Where heavy vehicles including public service vehicles, caravans etc. are expected, the lane width may be reduced only to 3.25 m (desirable minimum) and, where there is a shortage of space, an absolute minimum of 3.0 m. However, where the traffic is expected to consist only of cars and other light vehicles the lane width may be reduced to 2.75 m (desirable minimum) or 2.5 m (absolute minimum).

D6.3.3 The operation of a layout using narrow lanes, where there is only one lane suitable for wider vehicles (e.g. HGVs and PSVs) in each direction, is limited by the number of such vehicles using the road. Calculations based on local flow characteristics should be carried out to ascertain the ability to carry anticipated wider vehicle flows before utilisation of this method. In the absence of such data, guidance may be found in [Section D3.4](#) and [Section D6.12](#). Where one lane is insufficient to carry the number of wider vehicles using the site, it may be possible to provide a second 3.0 m wide lane if the carriageway will accommodate this, or carriageway widening may be an option. Where two lanes are required to carry the number of wider vehicles expected, it is recommended that the near side lane should be a minimum of 3.25 m wide.

D6.3.4 Where a temporary mandatory speed limit is applied at road works, there may be scope to reduce the set-back and extend the paving to the central reservation or verge, refer also to paragraph [D3.2.13](#). The extent of any reduction in set-back will depend on the requirements of TD 19 "Requirement for road restraint systems" (DMRB 2.2.8) and TD 27 "Cross-sections and headrooms" (DMRB 6.1.2). Where the paving is extended to the central reservation or verge specially to accommodate the reduction in set-back, it should be strong enough to carry the expected traffic load.

D6.3.5 Narrow lanes require a raised level of driver concentration and this should be taken into consideration when determining the maximum length of the scheme. The maximum length of a site is 4 km, except where otherwise agreed with the Highway Authority; see also [Section D3.5](#).

D6.3.6 Ideally there should be no difference in the surface characteristics between any parts of the carriageway. The reconfiguration of the carriageway may place the longitudinal joints or the original road studs within the new lanes and in some cases in line with the vehicle wheel tracks. Road studs must be removed. Where the designer considers that retaining the road stud bases may cause problems to drivers (especially motorcyclists), these should be removed and the carriageway reinstated before introducing traffic to the narrow lane layout. It may require a special traffic arrangement to achieve this.

D6.3.7 The lane delineation markings should be to diagram 1004.1 (6 m mark, 3 m gap) instead of the conventional marking to diagram 1005.1 (2 m mark, 7 m gap) where the permanent speed limit is more than 40 mph. On roads with a permanent speed limit of 40 mph or less, lane delineation markings should be to diagram 1004 (4 m mark, 2 m gap) instead of the conventional marking to diagram 1005 (1 m mark, 5 m gap).

D6.3.8 To avoid driver confusion, before the carriageway is re-marked to the new temporary configuration, it is essential that the original road markings that do not form part of the temporary lane markings are thoroughly removed. The hard shoulder/lane 1 continuous marking need not be removed where it aligns with the temporary lane markings, only the sections at changeover positions should be removed where traffic has to traverse it.

D6.3.9 Contra-flow systems on three-lane carriageways can be extended by completely removing the existing markings from the secondary carriageway and re-marking it into five reduced-width lanes; see [Plan DZ5](#) in [Section D6.18](#). For information on temporary road markings and studs, see [Section D3.11](#). For information regarding minimum acceptable lane widths through the contra-flow section, see [Section D3.3](#). See [Section D6.5](#) regarding the design of crossovers.

D6.3.10 Narrow lane systems tend to even out the disruption to the traffic on the two carriageways. However, it may be necessary to change the lane allocations (i.e. restrict the "primary" traffic to two lanes and allow the full three lanes for the "secondary" traffic) where, say, there is an adverse imbalance in directional flows during peak periods, or because of the presence of slow-moving vehicles travelling up an incline.

D6.4 CONTRA-FLOW OPERATION

D6.4.1 Prior agreement of the Highway Authority must be obtained before contra-flow operation may be used. Traffic regulation orders are required to close carriageways and/or install two-way operation.

D6.4.2 During contra-flow, i.e. when one carriageway of a dual carriageway road is to be operated temporarily to carry two-way traffic, the opposing traffic streams should be physically separated by means of a buffer zone or lane. Buffer zones are usually delineated by a line of cylinders with a line of temporary road studs either side as shown in Details H and K, see [Table A1.5 \(Appendix 1\)](#). Alternatively, separation may be effected using a temporary vertical restraint safety barrier. Advice on the use of temporary vertical restraint safety barriers is given in [Section D3.10](#) and in TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

D6.4.3 Contra-flow sections of road should be subject to a mandatory speed limit (normally 50 mph). Advice on the use of temporary speed limits is given in [Section D3.7](#).

D6.4.4 In contra-flow situations it is essential that there is a continuous, well-defined and unobstructed route through the site which is available for use at all times by emergency vehicles; see [Section D6.7](#).

D6.4.5 The signing arrangements required to operate two-way traffic on dual carriageway roads are illustrated in [Sections D6.17 to D6.19](#).

D6.4.6 Signs to diagram 7210 to 7214 are used to show the diversion of one or more lanes from the primary carriageway on to the secondary carriageway. Each sign may have upper or lower panels added to describe particular characteristics; see paragraphs [D4.10.14](#) and [D4.10.15](#).

D6.4.7 Signs to diagram 7215 to 7220 are used to show the diversion from the secondary carriageway back on to the primary carriageway. Each sign may have upper or lower panels added to describe particular characteristics; see paragraphs [D4.10.14](#) and [D4.10.15](#).

D6.4.8 The need for signing, lighting and temporary barriers for pedestrians should be assessed where a contra-flow is to be introduced on an all-purpose dual carriageway road, particularly in an urban area; see [Section D3.32](#).

D6.4.9 Designers should consider whether barriers should be used to restrict crossing points and whether additional signing is necessary to warn pedestrians of unusual or changed traffic movements, particularly in urban areas. If two-way working is to be introduced on a former one-way street then a "PEDESTRIANS LOOK BOTH WAYS" sign to diagram 7017 will be a minimum additional requirement. Carriageway markings will also need to be amended where appropriate and consideration should be given to the need for road markings to diagram 1029 "LOOK LEFT" or "LOOK RIGHT" to warn pedestrians that traffic may be approaching from an unexpected direction.

D6.4.10 The designer must take into consideration the effect of contra-flow working on signalled pedestrian and cycle crossings.

D6.4.11 Where it is necessary for traffic on one carriageway to be diverted on to the other carriageway, it is essential that the transition or temporary crossover is designed to an acceptable standard; see [Section D6.5](#).

D6.4.12 Signs to diagrams 7230 to 7239, and prescribed variants, are used to show the diversion of individual lanes on one carriageway. Signs to diagrams 7230 to 7234 direct traffic to use the hard shoulder or rejoin the main carriageway. Signs to diagram 7234 direct one lane on to the hard shoulder with the other lane or lanes being directed to the right-hand side of the carriageway. Signs to diagram 7233 direct traffic to use the hard shoulder in order to leave at a junction ahead. Signs to diagrams 7235 and 7236 indicate the start and end of a section of narrow lane widths.

D6.4.13 Signs to diagrams 7237 to 7239 are used to show the diversion of lanes across the carriageway, without use of the hard shoulder. The sign to diagram 7240 is used to indicate access to a destination reached from a junction. Signs to diagrams 7250 and 7251 are used to indicate traffic lanes leaving and joining at a junction, whilst signs to diagram 7252 and 7253 are used to indicate traffic joining at a junction. Signs to diagram 7202 and 7255 are used to show the start and end of a lane closure.

D6.4.14 Opposing flows may be separated by a buffer zone, a buffer lane or a vehicle restraint safety barrier. Where opposing lanes of traffic are separated by a buffer zone (see paragraph D6.4.2), signs to diagram 7201.1 variant, 7203, 7203.1, or their variants, should be provided at $\frac{1}{2}$ mile intervals to indicate the existence of the adjacent opposing lane. Signs to diagram 7201.1 variant are used where there are lane width restrictions and the opposing lanes of traffic are indicated by a single reverse white arrow with black outline, symbol diagram 7288. The bottom panel to diagram 7201.1 variant and the supplementary plate to diagram 7209 for signs to diagrams 7203, 7203.1, and variants, are used to indicate the distance over which the contra-flow condition applies. Signs to diagram 7203.1 and variants are used to indicate where a hard shoulder is used as a running lane and the hard shoulder/lane 1 continuous road marking remains in place.

D6.4.15 Where opposing lanes of traffic are separated by a buffer lane or by a temporary vehicle restraint safety barrier (see paragraph D6.4.2 and Plan DZD3 in Section D6.18) signs to diagrams 7204/7205 must be used instead of 7203/7203.1.

D6.4.16 The overall width of the contra-flow buffer zone may be reduced from 1.2m to 0.9m but 1.2m should be used where width permits and desirable minimum lane widths have been accommodated; see paragraph D6.3.2.

D6.4.17 Partial contra-flow is not normally operated on two-lane carriageway roads because there is insufficient width to operate three running lanes.

D6.4.18 Subject to a site specific risk assessment, a relaxation case for a single lane crossover is permitted (Plan DZC6) which enables part-time or short-term contra-flow operation. Following a risk assessment, any existing road markings and studs that traffic overruns in the crossover lane may be retained.

D6.5 CROSSES

D6.5.1 It is essential that the transition or temporary crossover is designed to an acceptable design speed and mandatory or advisory speed restrictions set accordingly. TA 92 "Crossover and changeover design" (DMRB 8.4.6) provides advice on crossover and changeover design. Alternatively Tables 6.1 to 6.4 below provide crossover lengths for some commonly used layouts, see paragraph D6.5.7. A smooth 'S' shaped curve to suit the site conditions should be used. It may be necessary to change the layout of safety fencing and provision of lighting to accord with the design of the adjacent section of carriageway. The design of crossovers should take account of the following:

- curvature of swept paths and vertical alignment considerations – it is essential that radii and crossfalls are consistent with anticipated speeds and speed limits;
- position in relation to existing road layout, street furniture, gantries and lighting columns;
- surface condition and skid resistance;
- removal or covering of existing road markings where appropriate;
- required construction depth in relation to existing central reservation construction;
- blanking off bases from removed lighting columns, safety fence post sockets and illuminated signs;
- severance of existing safety barrier and space required for temporary anchorages – terminal ends should be anchored in accordance with TD 19 "Requirement for road restraint systems" (DMRB 2.2.8) – attempting to secure dropped ends of safety fence lengths with sandbags is not acceptable and is likely to cause serious injury in the event of vehicle impact;

- communication and electricity cables in the central reservation;
- temporary drainage of the crossover surfacing;
- reuse for future maintenance;
- illumination requirements (see paragraph D6.5.4 below and Part 2: Operations, Section O4.8); and
- arrangements for access to roads and properties within the closed section.

D6.5.2 Crossovers should be designed and constructed so that the design speed is consistent with the proposed temporary mandatory speed limit for the works (see TA 92 "Crossover and changeover design" (DMRB 8.4.6)). In such cases, "keep left/right" signs to diagram 610 and "lane closed" barriers to diagram 7105 should be used behind the coning to mark the crossover.

D6.5.3 If the crossover cannot be designed for this proposed speed limit then it should be designed for an appropriate lower design speed limit and the temporary mandatory speed limit should be further reduced locally at the crossover. In this case, the length of the local mandatory speed limit will normally be less than 800 m. This is acceptable in this case as the overall length of speed controlled zone (i.e. the blanket temporary mandatory speed limit) is greater than 800 m. In these cases "turn left/right" signs to diagram 606 and "sharp deviation of route" signs to diagram 7104 should be used behind the coning to mark the crossover. See also paragraph D3.7.18.

D6.5.4 On unlit roads where horizontal or vertical alignments, or the road surface through the crossover, are below standard, the application of temporary street lighting to the crossover and approach areas should be considered. The lighting of crossovers is dealt with in British Standard BS5489-1:2003. Additional advice is given in Section 5 of TA 92.

D6.5.5 The detailed arrangements for crossovers are shown in Section D6.17 on Plan DZC6 for a single-lane crossover on a two-lane dual carriageway and Plan DZC7 for a two-lane crossover on a three-lane dual carriageway. Plan DZC8 shows the arrangements for a crossover for three narrow lanes.

D6.5.6 On completion of the works the crossing should be closed and the safety barrier re-instated. For further advice on safety barriers see TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

D6.5.7 The required crossover lengths may be calculated using Tables 6.1 to 6.4 below, depending on whether survey parameters are known or not. The distances have been calculated from TA 92 and rounded up to the nearest 9 metres for ease of use. Where an off side lane goes into an off side lane, the paved length is equal to the crossover length.

D6.5.8 TA 92 uses the concept of design speed for crossovers. This speed is directly related to the temporary mandatory speed limit of the road rather than the permanent speed limit and TA 92 gives details of this relationship. The distances given in Tables 6.1 to 6.4 are given in terms of the temporary mandatory speed limit.

D6.5.9 The term "step increase" is used in TA 92. The range of this increase is from 0 to 4 and the greater the step increase the more adverse parameters exist at the site. If the following parameters are known and have the values given, then the 0 step increase lengths in Tables 6.1 to 6.4 may be used.

- worst case resultant camber less than 2.5 %;
- no change from assisting superelevation to adverse camber through entry or exit curve;
- crest K value is "desirable";

- there is not an approach bend with a superelevation larger than 2.5 %;
- absolute change in camber less than 5 %.

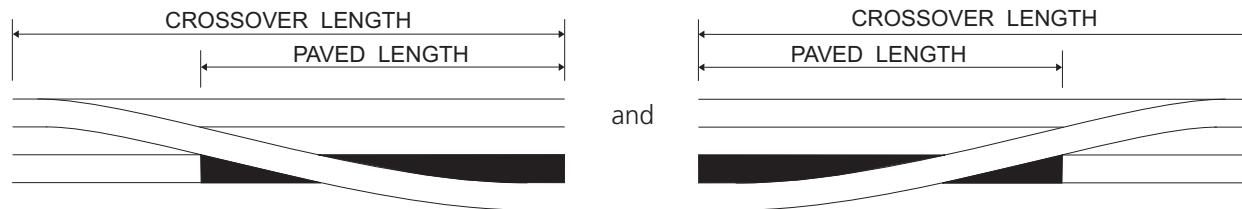
D6.5.10 If any of the information given above is not available, it is recommended that the 3 step increase lengths should be used. These figures are valid where:

- maximum adverse crossfall less than 7 %;
- maximum adverse camber from downhill gradient-crossfall combination less than 7 %;
- absolute change in camber less than 10 %.

If any of the values for the 3 step increase lengths are exceeded then the site is not recommended as a suitable location for a crossover.

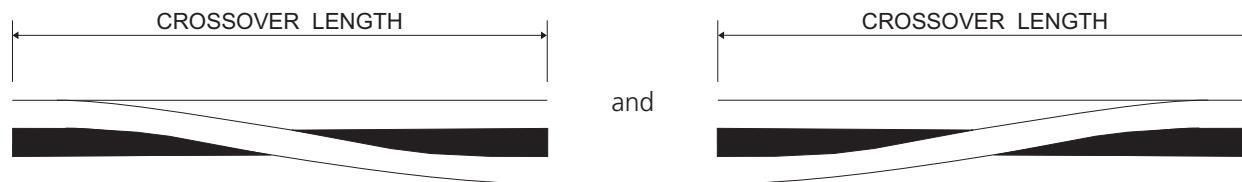
D6.5.11 If the characteristics of the road do not match those covered by paragraphs D6.5.9 or D6.5.10, or if site constraints mean that a shorter crossover is required, then the advice from TA 92 should be used.

Table 6.1 Lane 1 or 2 into off side lane

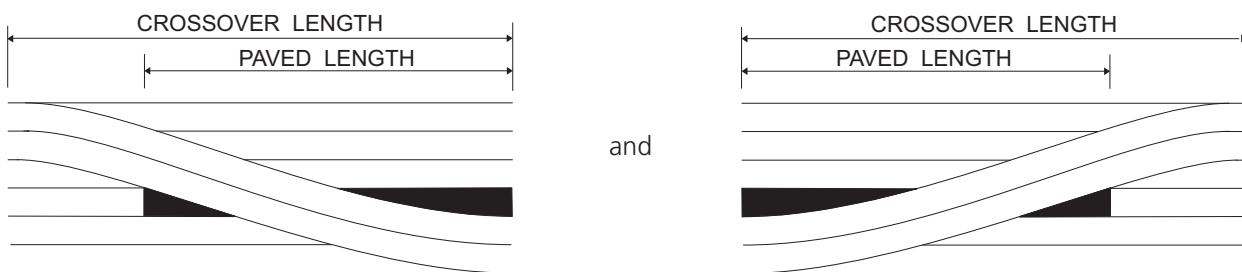


	Temporary mandatory speed limit					
	30 mph		40 mph		50 mph	
	Step increase	Crossover length (m)	Paved length (m)	Crossover length (m)	Paved length (m)	Crossover length (m)
0	108	72	135	81	153	99
3	180	108	216	135	261	153

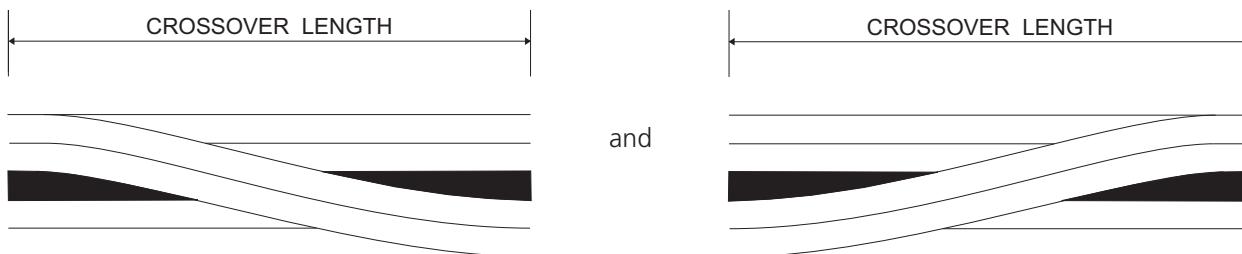
Table 6.2 Off side lane into off side lane



	Temporary mandatory speed limit			
	30 mph		40 mph	
	Step increase	Crossover length (= paved length) (m)	Crossover length (= paved length) (m)	Crossover length (= paved length) (m)
0	90	108	126	
3	153	180	216	

Table 6.3 Lanes 1 & 2 into lanes 3 & 2

	Temporary mandatory speed limit						
	30 mph		40 mph		50 mph		
	Step increase	Crossover length (m)	Paved length (m)	Crossover length (m)	Paved length (m)	Crossover length (m)	Paved length (m)
0		126	90	153	99	180	117
3		207	135	252	162	297	198

Table 6.4 Lanes 2 & 3 into lanes 3 & 2

	Temporary mandatory speed limit			
	30 mph		40 mph	
	Step increase	Crossover length (= paved length) (m)	Crossover length (= paved length) (m)	Crossover length = paved length (m)
0		108	126	153
3		180	216	261

D6.6 CHANGEOVERS

D6.6.1 TA 92 "Crossover and changeover design" (DMRB 8.4.6), which provides advice on changeover design, uses the concept of design speed for crossovers. This speed is directly related to the temporary mandatory speed limit of the road rather than the permanent speed limit and TA 92 gives details of this relationship. The distances given in Tables 6.5 and 6.6 are given in terms of the temporary mandatory speed limit.

D6.6.2 Table 6.5 below may be used to calculate the changeover length required for roads with a permanent speed limit of 50 mph or more depending on the design speed and the number of lane changes. A smooth 's' shaped curve to suit the site conditions should be used. The lengths have been calculated from TA 92 and rounded up to the nearest 9 metres for ease of use. If a shorter changeover is required, then advice from TA 92 should be used.

Table 6.5 Changeover lengths (m) where permanent speed limit is 50 mph or more

Number of lanes changed	Temporary mandatory speed limit				
	30 mph	40 mph	50 mph	60 mph	70 mph
1	63	81	90	108	126
2	90	108	126	153	180
3	108	126	153	180	216

D6.6.3 Table 6.6 below uses the same calculation with the measurements rounded to the nearest 6 m for ease of use on roads with a permanent speed limit of less than 50 mph. A straight “taper” layout or smooth ‘s’ shaped curve to suit site conditions should be used.

Table 6.6 Changeover lengths (m) where permanent speed limit is less than 50 mph

Number of lanes changed	Temporary mandatory speed limit	
	30 mph	40 mph
1	66	78
2	90	108
3	108	126

D6.7 EMERGENCY ACCESS THROUGH THE WORKS

D6.7.1 On motorways and dual carriageway roads, the provision of a site access lane may be required on major reconstruction works, see paragraph D3.2.15 and Figure 3.2. This access lane should be a minimum of 3 m in width to allow access by HGVs etc.

D6.7.2 The designer should note that, where a site access lane is to be provided, the police may require this lane to be used by general traffic in the event of an accident blocking the running lanes. Where a site access lane is not being provided, or is not continuous throughout the works site, the designer must ensure that the design makes suitable provision for access through the works area for use in an emergency. In 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 and unobstructed route through the site will be available for use at all times by emergency vehicles. Emergency route proposals need to be discussed early in the design with the emergency services; see Section D2.6.

D6.8 TAPERS

D6.8.1 The recommended lengths of lead-in tapers and the number of cones required in the tapers are set out in Table A1.3 (Appendix 1). Exit tapers, where provided, should be at 45° to the edge of the road.

D6.8.2 The initial taper at lane closures will normally impose a merge-to-the-left manoeuvre even if traffic has to be switched subsequently to the right. A merge-to-the-right manoeuvre will normally only be permitted on works for which a relaxation applies (see Section D1.6) when:

- lane 1 of a three or more lane dual carriageway road is being closed; or
- lanes 1 and 2 of a three or more lane dual carriageway road are being closed where the road is lightly trafficked; or
- lane 1 of a two-lane dual carriageway road is being closed where the road is lightly trafficked.

For the purpose of this paragraph, lightly trafficked means not carrying more than 1200 vehicles per hour per traffic lane left open throughout the period in which the works will be taking place.

D6.8.3 For hard shoulder running on two-lane carriageways, one lane should be closed initially and then the remaining lane should be moved to run on the hard shoulder as appropriate. Where a hard shoulder forms part of the running lanes, the number of lanes on the main carriageway should be reduced to match those being diverted prior to the changeover.

D6.8.4 Generally, on carriageways with three or more lanes, the initial taper of cones in advance of works should be direct, i.e. if two lanes are being closed it should be by the use of one continuous taper; see [Plan DZB7](#) in [Section D6.16](#). On carriageways with four or more lanes, if flows are very low, then more than two lanes may be closed in one continuous taper. However, if traffic is to run only on the hard shoulder, closing all lanes with a direct taper to allow hard shoulder running is not permissible.

D6.8.5 Whilst stepped tapers are not generally recommended, if their use is considered ([Plan DZB8](#), [Section D6.16](#)), the designer should take into account the additional length of the traffic management necessary, the extra equipment required, and also time needed for installation and removal. The use of sequential flashing warning lights on the second taper may be beneficial, see paragraph [D6.8.6](#) below.

D6.8.6 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 warning 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 lights shall not be used on barriers to diagram 7105 within the taper.

D6.8.7 The lights have been authorised for use on the motorway and trunk road network. However, 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.

D6.8.8 On motorways and dual carriageway trunk roads in with a permanent speed limit of 50 mph or more, backlit sequentially flashing warning lights shall be used to highlight both lead-in tapers involving a lane drop and intermediate stepped tapers.

D6.9 GUIDE ISLANDS

D6.9.1 Guide islands should be provided where traffic is to be merged to the left prior to a left lane closure and traffic is transferred to the right-hand lanes; see [Plan DZC2](#) in [Section D6.17](#). Lengths of guide islands excluding tapers are as follows:

- roads with a permanent speed limit of more than 50 mph 200 m
- roads with a permanent speed limit of 50 mph or less 100 m

D6.9.2 Where a guide island is to be used and two or more lanes have to be switched to the right to pass a left lane closure, it will be necessary to modify the carriageway markings to ensure that the traffic lanes are continuous at the changeover.

D6.9.3 Where a merge-to-the-right layout may be used, for those cases for which relaxations may apply, then the right-hand guide island and modified lane markings may be omitted. In this case, the appropriate lane restriction signs to diagram 7202 variant should be provided.

D6.10 HARD SHOULDER WORKING

D6.10.1 The guidance in this section only applies for stops of over 90 minutes duration. Guidance covering stops on the hard shoulder of up to 90 minutes duration is contained in the document "Guidance for works on the hard shoulder and road side verges on high speed dual carriageways." This is Highways Agency document IAN115/08 and it is available on the following website: www.standardsforhighways.co.uk. This document is not valid in Northern Ireland and guidance for short and medium duration inspection stops in Northern Ireland is given in [Appendix A4](#).

D6.10.2 The requirements for signing on the hard shoulder are shown on [Plan DC1](#). Designers need to take into account the fact that motorists in difficulty may need access to the coned-off area of the hard shoulder. However, signs advising drivers to use a coned-off area in the event of an emergency must not be used.

D6.10.3 The length of coned-off area should be limited to that required to provide safe access, works area/working space and site exit. Excessive lengths of coning between discontinuous sites as a works link access route are to be avoided as the hard shoulder is primarily provided as a safety refuge for motorists in trouble who need to pull off the carriageway. Consideration should also be given to reducing the length of coned-off hard shoulder when there is no works activity.

D6.10.4 The risks associated with extending hard shoulder closures to provide continuous lengths between sites should be compared with those for providing more discrete hard shoulder closures and should take account of the need to provide safe refuge for motorists in trouble and safe haulage of plant between the sites.

D6.10.5 If the use of temporary vehicle restraint safety barriers is being considered by the designer, reference should be made to [Section D3.10](#) and TD 19 "Requirement for road restraint systems" (DMRB 2.2.8).

D6.10.6 The "NO HARD SHOULDER FOR 400 YARDS" sign to diagram 7015 or variant should be used in advance of the closure where only the hard shoulder is closed or to be occupied by the works.

D6.10.7 The length of the hard shoulder works should be limited to 4 kilometres. Where the hard shoulder is removed from service for a length in excess of 1.5 kms, provision of a free recovery operation should be considered; see [Section D3.35](#) and paragraph [D4.10.37](#).

D6.10.8 If a temporary mandatory speed limit is imposed, the initial temporary speed limit signs to diagram 670 should be located 100 m in advance of the initial closure of the hard shoulder, i.e. the first signing to Detail A. Repeater signs will be required through the works; see [Table 3.4](#) in [Section D3.7](#). A "road works" sign to diagram 7001 with distance plate to diagram 572 showing "1 mile" is required on the near side and off side one mile in advance of the initial closure, and a "road works" sign to diagram 7001 with distance plate "800yds" to diagram 572 is required on the near side (in place of the plate "On hard shoulder" to diagram 7001.1) and on the off side 800 m in advance of the initial closure. An "end of road works" sign to diagrams 7001/645 is also required on the off side, as well as the near side.

D6.10.9 If works on the hard shoulder are undertaken close to exit slip roads (i.e. within 500 m of the slip road), there may be additional risks to the workforce from diverging vehicles. In this case, additional protection may be required. Consideration should also be given to extending the closure to include the slip road hard shoulder, where one exists, to minimise the conflict between exiting works vehicles and main carriageway traffic.

Plan DC1: Dual carriageway road, hard shoulder closure only

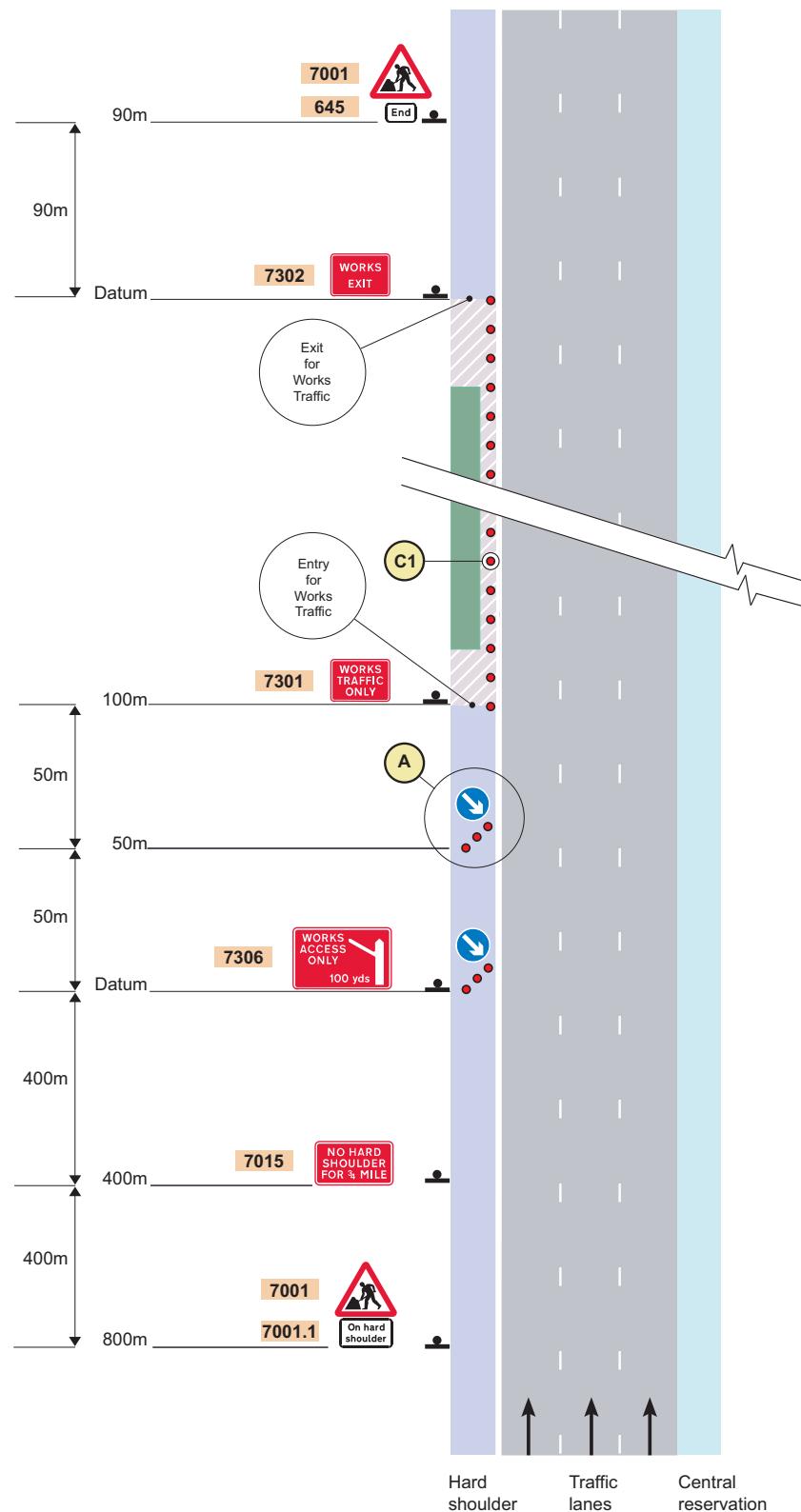
The principles are:

- a “road works” sign (7001) with plate “On hard shoulder” (7001.1) on the near side, placed 800 m in advance of the initial closure of the hard shoulder, i.e. the first signing to Detail A;
- a “NO HARD SHOULDER FOR ¾ MILE” sign (7015) on the near side only, placed 400 m in advance of the initial closure of the hard shoulder i.e. the first signing to Detail A. The distance shown may be varied but must be expressed to the nearest 10 yards for distances less than ½ mile, to the nearest ¼ mile for distances of ½ mile or more but less than 3 miles and to the nearest mile for distances over 3 miles; the distance shall be expressed as “YARDS”, “MILE” or “MILES”;
- a “WORKS ACCESS ONLY 100yds” sign (7306) on the near side only, adjacent to initial closure of the hard shoulder, i.e. the first signing to Detail A;
- signing to Detail A on the hard shoulder 100 m in advance of the first cone of longitudinal coning to Detail C1, repeated 50 m from the first cone of longitudinal coning to Detail C1;
- a “WORKS TRAFFIC ONLY” sign (7301) located on the near side only adjacent to the first cone of longitudinal coning to Detail C1;
- coning to Detail C1 adjacent to the works area – coning to Detail D (18 m) may be used beyond the works area on long straight lengths parallel to the line of traffic, where coning is required for safety reasons;
- a “WORKS EXIT” sign (7302) on the near side only at the end of the coning; and
- at the end of the works, a “road works” sign (7001) in combination with sign “End” (645) placed on the near side of the carriageway, 90 m from the end of the works.

If a temporary mandatory speed limit is imposed, then the following additional principles apply:

- a “road works” sign (7001) with distance plate (572) showing “1 mile” on the near side and off side, one mile in advance of the initial closure of the hard shoulder, i.e. the first signing to Detail A;
- a “road works” sign (7001) with distance plate “800yds” (572) on the near side (in place of the plate “On hard shoulder” (7001.1)) and off side, placed 800m in advance of the initial closure of the hard shoulder;
- one pair of temporary speed limit signs to diagram 670 located 100m in advance of the initial closure of the hard shoulder;
- speed limit repeater signs are required throughout the works; see [Table 3.4](#) of [Section D3.7](#); and
- an “end of road works” sign (7001/ 645) is also required on the off side, as well as the near side.

Plan DC1: Dual carriageway road, hard shoulder closure only



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

NOTE: If a temporary mandatory speed limit is imposed, additional signs will be required, see principles.

D6.11 ISLAND SITES

D6.11.1 Island sites, i.e. sites in which live traffic travelling in the same direction passes on both sides of the works area, must not be used on dual carriageway roads where workers would need to work between lanes of live traffic.

D6.11.2 Where it is essential to maintain traffic capacity by opening an extra lane, an island site may sometimes be necessary, but only at times when no work is in progress and the presence of the workforce is not required, e.g. curing concrete etc. In such exceptional cases suitable measures need to be taken to protect the isolated area and to split the traffic.

D6.11.3 Where it is necessary to operate on an island site on a dual carriageway road, the approach to the site should be as for the closure of a right-hand lane with traffic split and diverted either side of the closed lane or lanes using a sign to diagram 7234 or 7238, as appropriate, together with suitable coning etc. to guide the traffic into the lanes each side of the island.

D6.11.4 At the end of the island site, suitable coning, together with signs to diagram 7231, 7232 or 7239 as appropriate, will be required to ensure that no conflict arises as the traffic joins together.

D6.12 RESTRICTION OF HEAVY GOODS VEHICLES

D6.12.1 There should be a presumption that heavy goods vehicles should be prohibited from all but the left-hand lane where there are only two lanes and from all but the near side two left-hand lanes where there are three or more lanes except where:

- it is expected that the flow of heavy goods vehicles will exceed 850 vehicles per lane per hour, in any hour – flows in excess of this volume cannot be accommodated in single lanes; or
- an investigation on the relevant section of carriageway shows there is insufficient clearance for heavy goods vehicles under any of the structures in the near side lanes; see paragraph D6.12.3.

D6.12.2 A sign incorporating the symbol shown in diagram 7282 should be used where a lane is required to have a weight restriction. Where there is the need to restrict vehicles above a certain width, signs incorporating diagram 7283 or 7283.1 should be used, indicating the appropriate restricted lanes.

D6.12.3 Where there is the need to restrict vehicles above a certain height, signs incorporating diagram 7284 or 7284.1 should be used, indicating the appropriate restricted lanes.

D6.12.4 Where an entry slip road joins a section of two-lane contra-flow, the limit of 850 heavy goods vehicles per hour may need to be reduced. An individual assessment of each such situation is necessary and the designer shall carry out a detailed risk assessment to demonstrate that all risks have been addressed.

D6.13 WIDER CARRIAGEWAYS ON MOTORWAYS

D6.13.1 The key issues associated with implementing temporary traffic management on wider carriageways are:

- personnel crossing the carriageway;
- availability of reliable gantry sign technology;
- sign obscuration; and
- sign size and space requirements.

D6.13.2 To minimise the need for personnel to cross the carriageway, consideration should be given to using permanently mounted remotely controlled signs in the central reservation. The main requirements for such signs are that they should be adequately protected from collision and should not need attention that requires a person to cross the carriageway.

D6.13.3 Gantry signing can be used for advising road users of incidents and accidents and can also be used to provide advice about static and mobile temporary traffic management.

D6.13.4 The newer generation of gantry signal systems being developed are capable of displaying a greater range of signs, with greater resilience to damage or failure and these may be used to display traffic management messages and signs.

D6.13.5 These gantries may also be used to support temporary signs where this facility is included in the design. Careful planning, installation and removal are required to avoid damage to the gantry sign.

D6.13.6 Most wide carriageways are equipped with MIDAS and MS3/MS4 motorway signals. The newer traffic control centre equipment now enables these variable message signs to display messages and symbols appropriate to the traffic management layout. When planning works on the wider carriageways, discussions should be held with the control centre to identify an appropriate MS3/MS4 signing plan.

D6.13.7 For static road works signing, obscuration of the signs is considered to be the overriding problem with five or six lanes of traffic for drivers travelling in the centre lanes. Signs located on the hard shoulder and in the central reservation (if sufficient space is available) are likely to be obscured much of the time.

D6.13.8 Overnight closure of the carriageway allows the works to be carried out quickly with little risk to the workers and minimal delays for drivers. In order to close the carriageway, it will be necessary to deploy temporary traffic management to first impose a 50 mph speed limit, and then to reduce the number of lanes to single-lane running before requiring the traffic to leave the motorway. To avoid problems with sign obscuration, the overhead gantries in advance of the closure will need to be used. At least two sets of matrix signs to diagram 6002 (move to the next lane) per lane being closed should be used, followed by a light signal to diagram 6031.1 (red cross prohibition signal) on the following two gantries before the start of the static traffic management closure; see [Section D6.20](#).

D6.13.9 Before this option is chosen, the suitability of the diversion route will need to be assessed along with the increased level of accident risk imposed on the alternative route. Reference should be made to [Section D3.15](#) for advice on diversion routes.

D6.13.10 For works close to the start of a wider carriageway section, any lane closures required should be installed upstream of the wider carriageway section, in the section of motorway that has no more than four lanes. This will allow standard temporary traffic management signing to be used to sign the lane closures.

D6.13.11 On carriageways with five lanes, where the above is not feasible, and the works require closure of the near side lane, the following ‘near side only lane closure and signing’ technique should be considered. The principles are based on those given in [Plans DZB6, DZB7 and DZB8](#) but in this case the wicket signs (diagram 7202) in the central reservation are omitted. This technique should only be considered where the traffic volume on the lane to be closed, together with the volume of traffic on the two lanes adjacent to the closed lane through the works, does not exceed 2,400 vehicles per hour. This technique can also be applied on carriageways with six lanes where the works require closure of the near side two lanes.

D6.13.12 Where neither [D6.13.10](#) nor [D6.13.11](#) applies, the initial closure should constitute the outside lane on a five-lane carriageway or the outside two lanes on a six-lane carriageway. Setting out signs and cones for this closure may require the use of the mobile lane or carriageway closure techniques and these are covered in [Sections D6.26 and D6.27](#). Additional signing can then be implemented in the closed lanes using the standard signs without obscuration and sign size being a problem.

D6.13.13 Where controlled or managed motorway signal systems are used to provide advance signing and lane control in preference to static signs, physical protection of workers must be provided by mobile lane or carriageway closure techniques. See paragraphs D6.13.2 to D6.13.6 for the use of gantry signing.

D6.14 STATIC TRAFFIC MANAGEMENT

D6.14.1 The following sections cover the principles and plans which guide the design of temporary traffic management arrangements. The design is divided into five zones, these are as follows:

- The **approach zone** starts at the first sign and continues to 100m upstream of the first sign requiring a lane-change decision.
- The **lane-change zone** starts 100m upstream of the first sign requiring a lane-change decision, and continues to the point at which all lane changes should have been completed.
- The **lead-in zone** starts at the point at which all lane changes, if required, should have been completed and continues to the beginning of the longitudinal safety zone.
- The **works zone** starts at the beginning of the longitudinal safety zone and continues to the end of the works area.
- The **end-of-works zone** starts at the end of the works area and continues to the last sign.

The zones are illustrated in Figure 6.1.

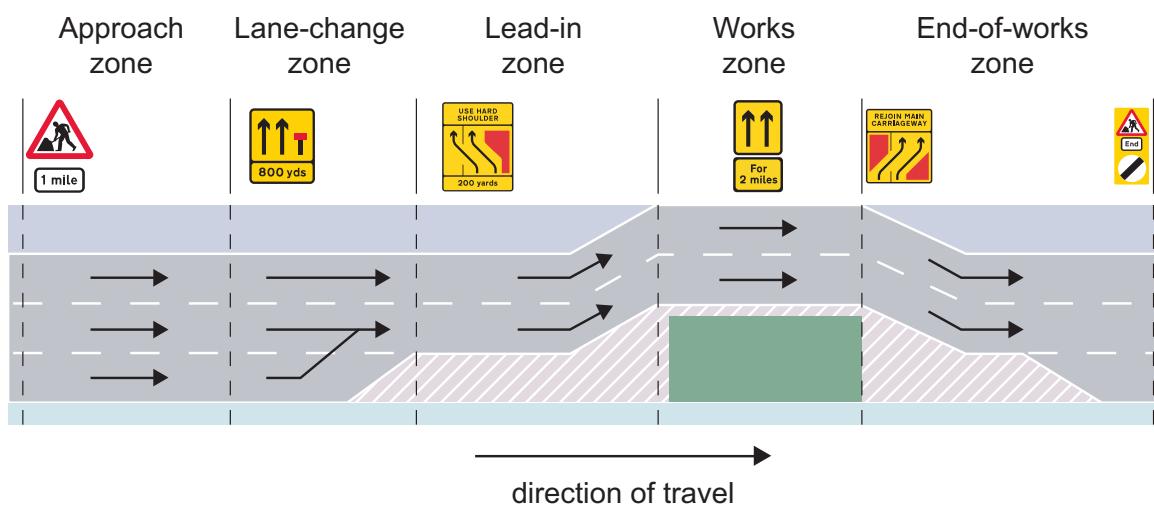


Figure 6.1 Dual carriageway road design zones

D6.14.2 Unless otherwise stated, the speed limits referred to in headings indicating road type are the permanent mandatory speed limit that would apply to the carriageway without road works.

D6.14.3 A key to the areas shown in the plans in the following sections is provided in Table A1.4 (Appendix 1). Table A1.5 (Appendix 1) explains the meaning of Details A to K in the plans and includes details of cone and cylinder height and spacing where this varies according to the type of dual carriageway road or works type. Details of cone spacing are also specified in Table A1.3 (Appendix 1).

D6.14.4 The plans generally show signing in the primary direction. In some plans, e.g. tidal flow, signing and coning demonstrating lane closures and lane changes in the opposing direction are included for clarity. The principles which guide the design of temporary traffic management arrangements for the primary direction also guide the design for the secondary direction and designers will need to apply them appropriately in order to produce the full temporary traffic management design.

D6.15 APPROACH ZONE

D6.15.1 The approach zone starts at the first sign and continues to 100 m upstream of the first sign requiring a lane-change decision.

D6.15.2 List of plans:

Plan DZA1 Approach zone for a dual carriageway road with a permanent speed limit of 40 mph or less

Plan DZA2 Approach zone for a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

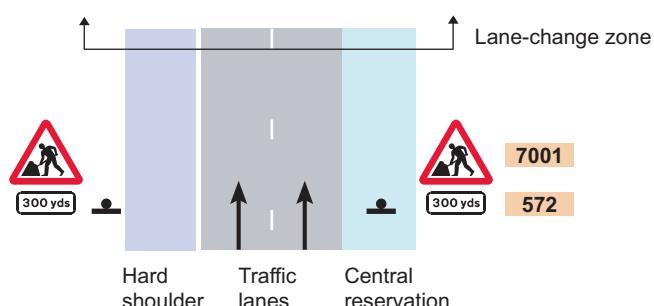
Plan DZA3 Approach zone for a dual carriageway road for which the national speed limit applies, where queuing is expected

PRINCIPLES OF DESIGN FOR THE APPROACH ZONE

Plan DZA1: Approach zone for a dual carriageway road with a permanent speed limit of 40 mph or less

The principles for advance signing are:

- “road works” signs (7001) with distance plate (572) on the near side and the off side, placed 300m in advance of the works;
- where the speed limit is 30 mph the distance plates may be omitted.



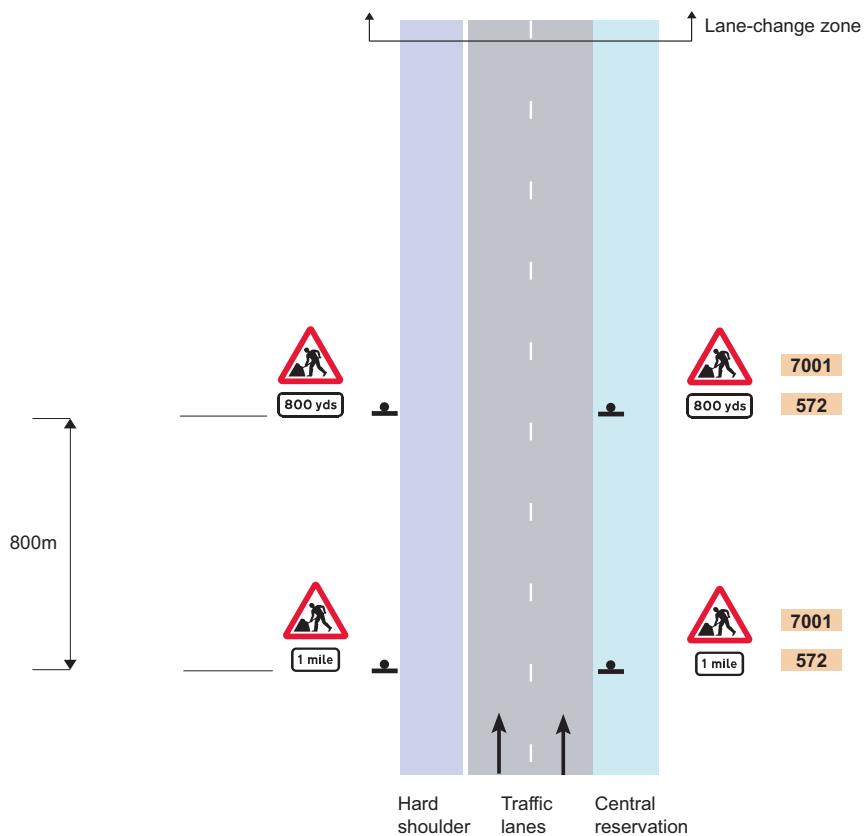
Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

NOTE: The distance on the supplementary plate refers to the location of the initial cone of the works lead taper.

Plan DZA2: Approach zone for a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

The principles for advance signing are:

- “road works” signs (7001) with distance plate “1 mile” (572) on the near side and the off side, placed one mile in advance of the works lead taper – these signs are always required on motorways but are not required for works on all-purpose dual carriageway roads for which relaxations apply; and
- “road works” signs (7001) with distance plate “800yds” (572) on the near side and the off side, placed 800 m in advance of the works lead taper – these signs are not required for works on all-purpose dual carriageways or motorways that require to have 800yds wicket signs (7202) at 800 m.



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of Appendix 1.

NOTES:

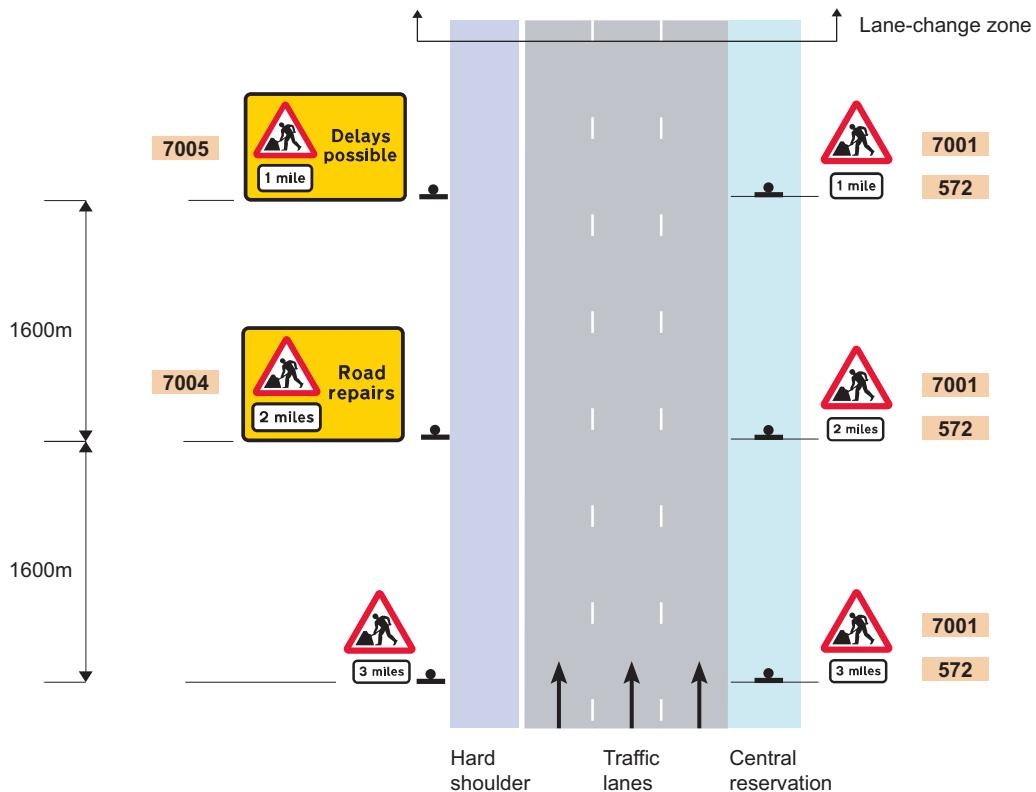
1. The distances on the supplementary plates refer to the location of the initial cone of the works lead taper.
2. Where the lane-change zone commences with 800yds wicket signs (7202) at 800m, these wicket signs replace the above 800yds “road works” signs (7001).
3. On roads with a permanent speed limit of 50 mph, the 1 mile “road works” signs (7001) are only required where congestion is likely.

Plan DZA3: Approach zone for a dual carriageway road for which the national speed limit applies, where queuing is expected

The principles for advance signing are:

- if queues are expected to extend more than two miles from the works, "road works" signs (7001) with distance plate "3 miles" (572) on the near side and the off side, placed three miles in advance of the works – further signs with distance plate "4 miles", "5 miles" etc. should be placed as appropriate if queues are expected sometimes to extend this far;
- a "road works ahead" sign (7004), incorporating the "road works" sign (7001) with distance plate "2 miles" on the near side, and a "road works" sign (7001) with distance plate (572) on the off side, placed two miles in advance of the works; and
- a "road works ahead" sign (7005), incorporating the "road works" sign (7001) with distance plate "1 mile" on the near side, and a "road works" sign (7001) with distance plate (572) on the off side, placed one mile in advance of the works.

On dual carriageway roads with carriageways of five lanes or more when the works require closure of the near side lane(s), subject to certain flow limits (see paragraph [D6.13.11](#)), the "road works" sign (7001) on the off side of the carriageway may be omitted.



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

NOTES:

- The distances on the supplementary plates refer to the location of the initial cone of the works lead taper.
- Where queuing is not expected the 3 mile "road works" sign is not required, and where in addition a relaxation applies the advance signs signing may be omitted and replaced with 1 mile "road works" signs (7001), as shown on [Plan DZA2](#).

D6.16 LANE-CHANGE ZONE

D6.16.1 The lane-change zone starts at 100m upstream of the first sign requiring a lane-change decision, and continues to the point at which all lane changes should have been completed.

D6.16.2 List of plans:

Plan DZB1 Entry taper for a dual carriageway road with a permanent speed limit of 40 mph or less

Plan DZB2 Entry taper for a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

Plan DZB3 Entry taper for a dual carriageway road for which the national speed limit applies

Plan DZB4 Lane-change zone for a single lane closure on a dual carriageway road with a permanent speed limit of 40 mph or less

Plan DZB5 Lane-change zone for a single lane closure on a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

Plan DZB6 Lane-change zone for a single lane closure on a dual carriageway road for which the national speed limit applies

Plan DZB7 Lane-change zone for a two-lane closure (direct taper) on a dual carriageway road for which the national speed limit applies

Plan DZB8 Lane-change zone for a stepped taper lane closure on a dual carriageway road for which the national speed limit applies

Plan DZB9 Lane-change zone for a lane closure and lane width restriction ahead on a dual carriageway road for which the national speed limit applies

Plan DZB10 Lane-change zone for a narrow lane layout with no lane closures on a dual carriageway road for which the national speed limit applies

D6.16.3 Where speed control is required and there is no speed limit order then advisory speed signs to diagram 7294 should be placed at the same locations as shown for mandatory speed limit signs.

PRINCIPLES OF DESIGN FOR THE LANE-CHANGE ZONE

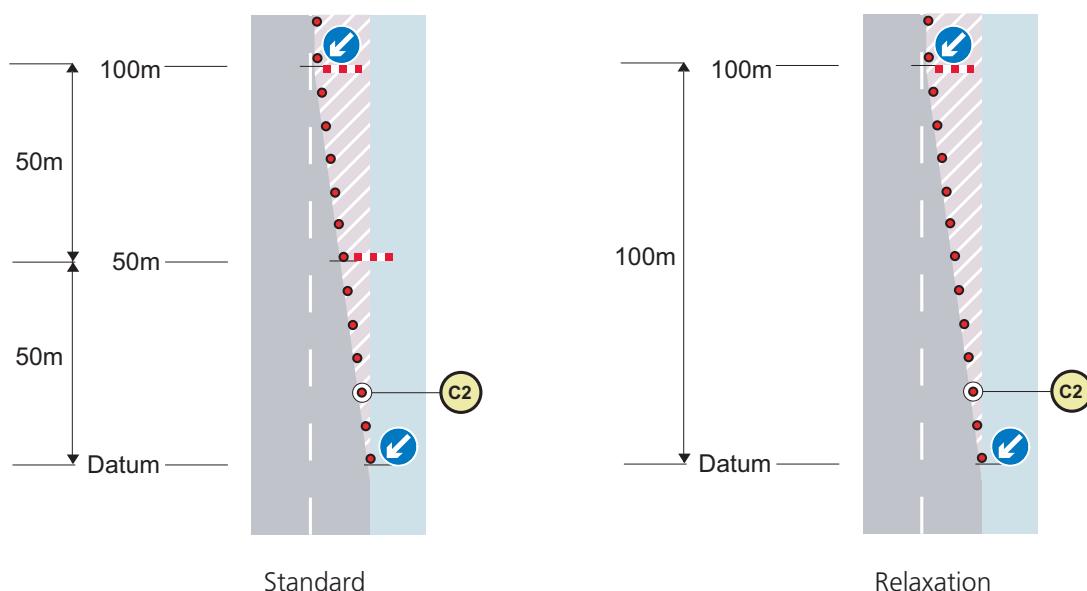
Plan DZB1: Entry taper for a dual carriageway road with a permanent speed limit of 40 mph or less

Principles for entry tapers are:

- length of taper is 100 m/lane closed;
- coning to 3m spacing, Detail C2 – see [Table A1.5 \(Appendix 1\)](#);
- one “keep left/right” sign (610) at the start of the taper;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each closed lane of the taper; and
- one “lane closed” barrier (7105) with a high intensity warning light midway along the length of each closed lane of the taper.

Principles for entry tapers for works for which relaxations apply are as for standard works except:

- the “lane closed” barrier (7105) with a high intensity warning light midway along the length of each closed lane of the taper may be omitted.



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

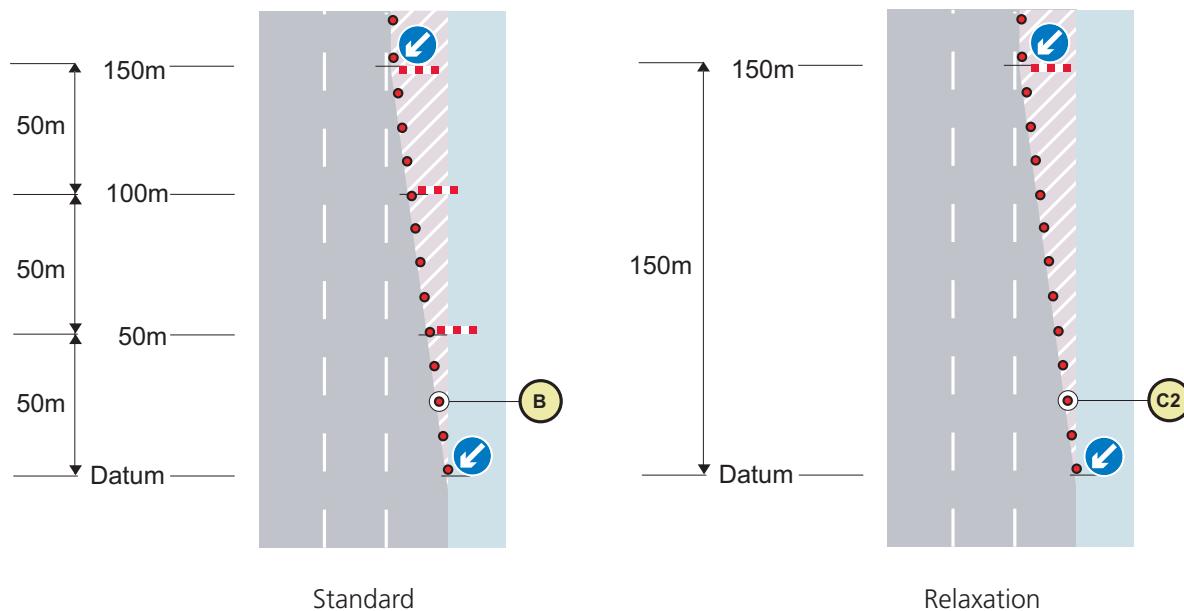
Plan DZB2: Entry taper for a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

Principles for entry tapers are:

- length of taper is 150 m/lane closed;
- coning to 1.5 m spacing, Detail B – see [Table A1.5 \(Appendix 1\)](#);
- one “keep left/right” sign (610) at the start of the taper;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each closed lane of the taper; and
- one “lane closed” barrier (7105) with a high intensity warning light every 50 m along the length of each closed lane of the taper.

Principles for entry tapers for works for which relaxations apply are as for standard works except:

- coning to 3 m spacing, Detail C2 – see [Table A1.5 \(Appendix 1\)](#); and
- the “lane closed” barrier (7105) with a high intensity warning light every 50 m along the length of each closed lane of the taper may be omitted.



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of Appendix 1.

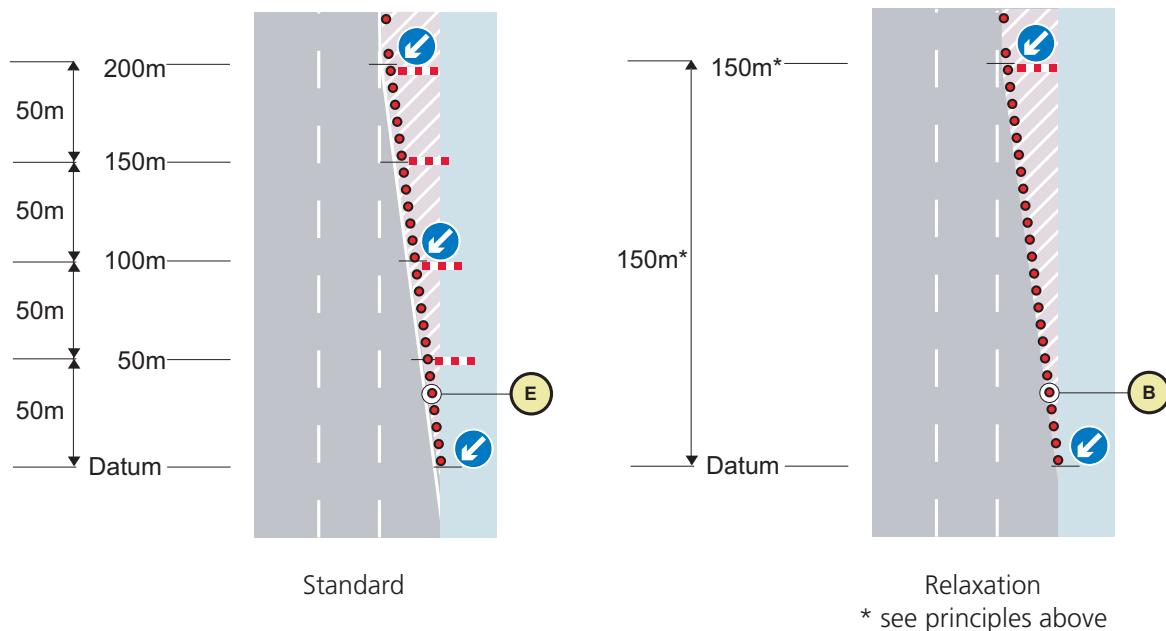
Plan DZB3: Entry taper for a dual carriageway road for which the national speed limit applies

Principles for entry tapers are:

- length of taper is 200 m/lane closed;
- coning to 1.5 m spacing with marking to Detail E – see [Table A1.5 \(Appendix 1\)](#);
- one “keep left/right” sign (610) at the start of the taper;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each closed lane of the taper; and
- one “lane closed” barrier (7105) with a high intensity warning light every 50m along the length of the taper, the barrier midway along the length of each closed lane to have a “keep left/right” sign (610)

Principles for entry tapers for works for which relaxations apply are as for standard works except:

- length of taper is 150 m/lane closed – however, where it is anticipated that site conditions may change to such an extent that it may become necessary to upgrade to standard works at some point during the works, it is recommended that the length of taper installed should be 200 m/lane closed to facilitate that upgrade;
- coning to 3m spacing, Detail B – see [Table A1.5 \(Appendix 1\)](#); and
- the “lane closed” barrier (7105) with a high intensity warning light every 50m along the length of the taper, the barrier midway along the length of each closed lane with the “keep left/right” sign (610) may be omitted.



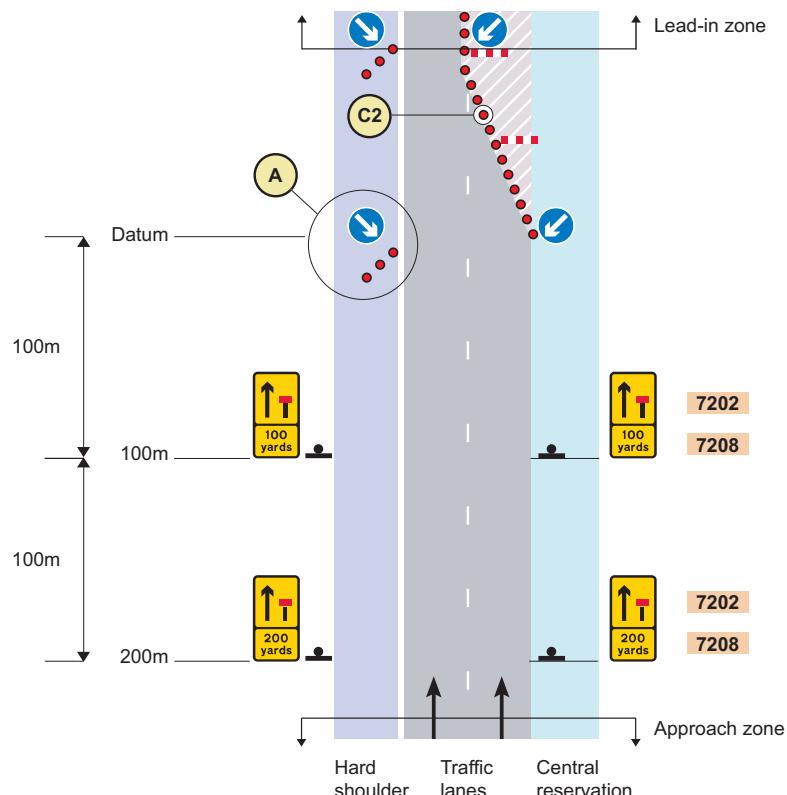
Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DZB4: Lane-change zone for a single lane closure on a dual carriageway road with a permanent speed limit of 40 mph or less

Two pairs of advance signs are required at 100m intervals:

- wicket signs indicating the closed lane (7202) with distance panel "200 yards" (7208) on the near side and the off side, placed 200m in advance of the works lead taper; and
- the wicket signs with distance plate "100 yards" are repeated 100m in advance of the works lead taper.

For entry taper details, including relaxations, see [Plan DZB1](#).



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

NOTES:

1. Where no hard shoulder is present, no signing to Detail A is required.
2. On roads with a permanent speed limit of 30 mph, the distance plates may be omitted.

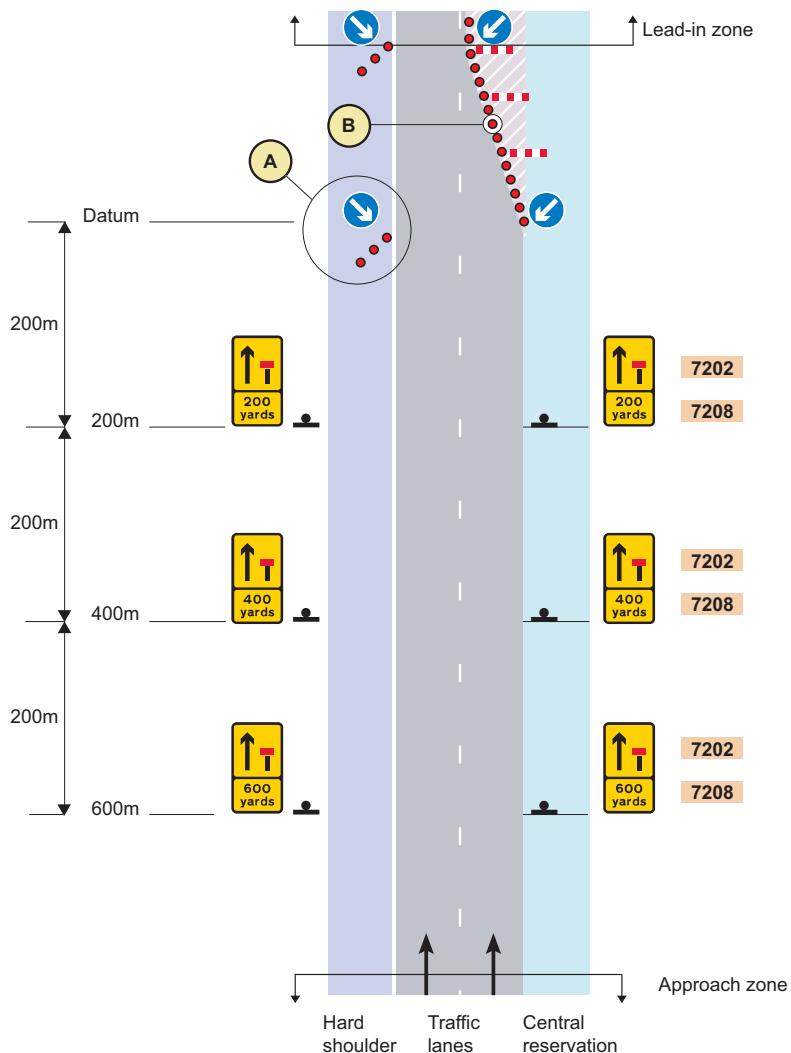
Plan DZB5: Lane-change zone for a single lane closure on a dual carriageway road with a permanent speed limit of 50 mph or 60 mph

Three pairs of advance signs are required at 200 yard intervals:

- wicket signs indicating the closed lane (7202) with distance panel "600 yards" (7208) on the near side and the off side, placed 600m in advance of the works lead taper; and
- the wicket signs with appropriate distance panel (400 yards and 200 yards) are placed at 400m and 200m in advance of the works lead taper.

For entry taper details, including relaxations, see [Plan DZB2](#).

Where a speed limit lower than the permanent speed limit is required, signs to diagram 670 should be placed as shown on [Plan DZB6](#).



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

NOTE: Where no hard shoulder is present, no signing to Detail A is required.

Plan DZB6: Lane-change zone for a single lane closure on a dual carriageway road for which the national speed limit applies

Four pairs of advance lane closure signs are required:

- wicket signs indicating the closed lane (7202) with distance panel "800 yards" (7208) on the near side and the off side, placed 800 m in advance of the works lead taper. These signs, with appropriate distance plates (600 yards, 400 yards and 200 yards), are placed at 600 m, 400 m and 200 m in advance of the works lead taper; and
- on dual carriageway roads of five lanes when the works require closure of the near side lane, and on dual carriageway roads of six lanes when the closure of two near side lanes is required, subject to certain flow limits (see paragraph [D6.13.11](#)), the wicket signs indicating the closed lane (7202) on the off side of the carriageway may be omitted.

Where a temporary mandatory speed limit is in place, one pair of temporary speed limit signs is required, followed by repeater signs:

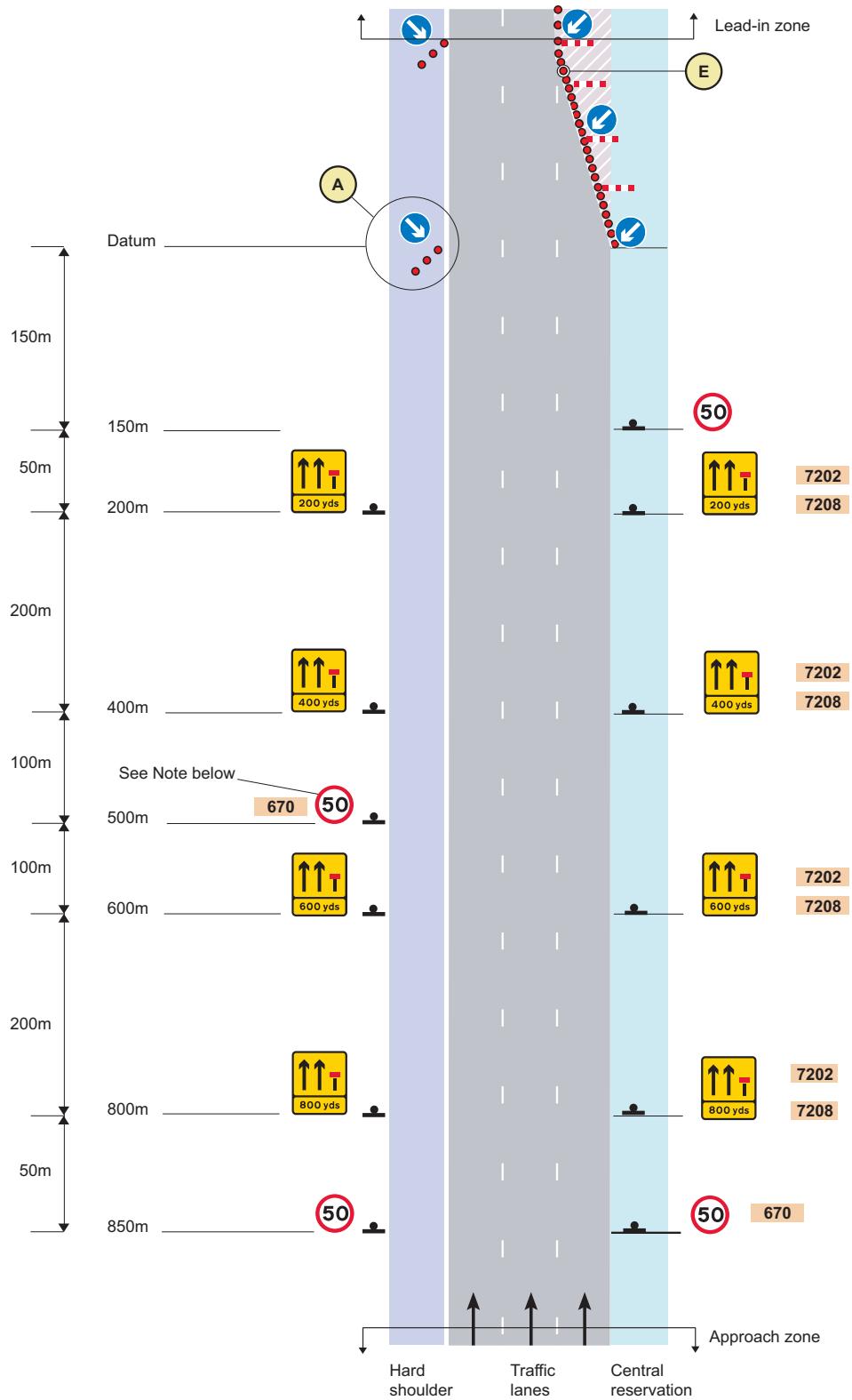
- the temporary speed limit sign (670), which will generally be 50 mph, is to be placed on the near side and on the central reservation 50 m in advance of the first sign indicating lane closures or restrictions (e.g. signs to diagram 7201, 7202, 7201.1); and
- for a temporary speed limit of 50 mph the distance between successive repeater signs on the same side of the carriageway should not exceed 700 m, with a maximum of 450 m between consecutive repeater signs on alternate sides of the carriageway. For temporary mandatory speed limits of 40 mph or less, see [Table 3.4](#), Note 1.

For entry taper details, including relaxations, see [Plan DZB3](#).

Signing to Detail A is located on the hard shoulder opposite the "keep left/right" sign (610) at the start of the taper and at the end of the taper.

For works for which relaxations apply, the size of signs to diagram 7202 in the left-hand side of the carriageway should be as given in [Tables A1.1](#) and [A1.2 \(Appendix 1\)](#) 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.

Plan DZB6: Lane-change zone for a single lane closure on a dual carriageway road for which the national speed limit applies



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Where no hard shoulder is present, no signing to Detail A is required.

NOTE: For the spacing of speed limit repeater signs, see Table 3.4, Note 1.

Plan DZB7: Lane-change zone for a two-lane closure (direct taper) on a dual carriageway road for which the national speed limit applies

Four pairs of advanced lane closure signs are required:

- wicket signs indicating the closed lane (7202) with distance panel "800 yards" (7208) on the near side and off side, placed 800 m in advance of the works. These signs are repeated, with the appropriate distance plate, at 200 yard intervals to a point 200 yards in advance of the works, i.e. at 600 m, 400 m and 200 m; and
- on dual carriageway roads of five lanes or more when the works require closure of the near side lane(s), subject to certain flow limits (see paragraph [D6.13.11](#)), the wicket signs indicating the closed lane (7202) on the off side of the carriageway may be omitted.

Where a temporary mandatory speed limit is in place, one pair of temporary speed limit signs is required, followed by repeater signs:

- the temporary speed limit sign (670), which will generally be 50 mph, is to be placed on the near side and on the central reservation 50m in advance of the first sign indicating lane closures or restrictions (e.g. signs to diagram 7201, 7202, 7201.1); and
- for a temporary speed limit of 50 mph the distance between successive signs on the same side of the carriageway should not exceed 700 m, with a maximum of 450 m between consecutive repeater signs on alternate sides of the carriageway. For temporary mandatory speed limits of 40 mph or less, see [Table 3.4](#), Note 1.

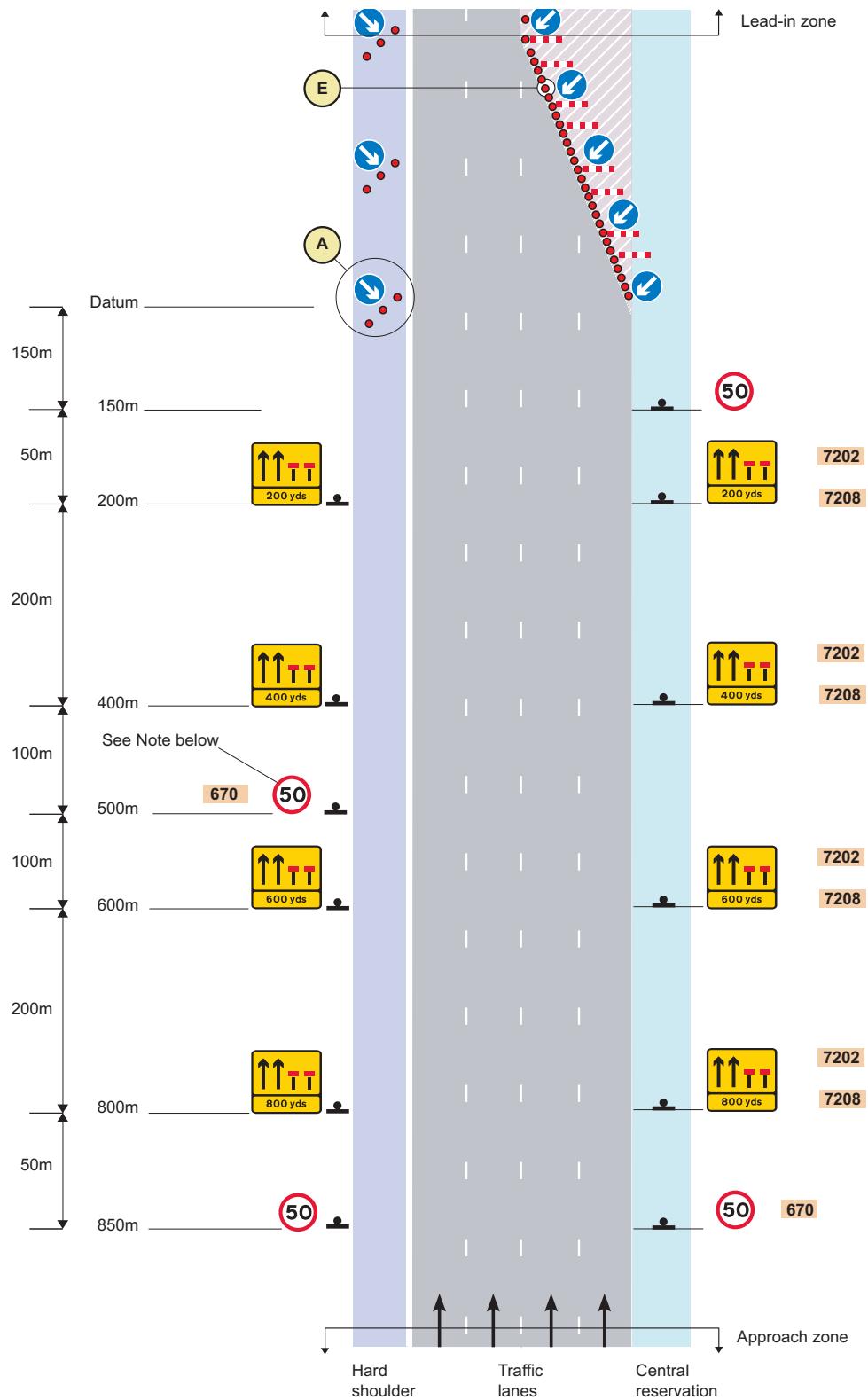
For entry taper details, including relaxations, see [Plan DZB3](#).

Signing to Detail A is located on the hard shoulder opposite the "keep left/right" sign (610) at the start of the taper and opposite the "lane closed" barrier (7105) and "keep left/right" sign (610) at the end of each closed lane.

A direct lane closure of near side lanes 1 and 2 on a three or more lane dual carriageway road is permitted at low traffic flows. For a definition of "low traffic flows", see [Glossary \(Appendix 2\)](#).

For works for which relaxations apply, the size of signs to diagram 7202 in the left-hand side of the carriageway should be as given in [Tables A1.1](#) and [A1.2 \(Appendix 1\)](#) 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.

Plan DZB7: Lane-change zone for a two-lane closure (direct taper) on a dual carriageway road for which the national speed limit applies



Keys to the plans are given in [Tables A1.4 and A1.5 of Appendix 1](#).

Where no hard shoulder is present, no signing to Detail A is required.

NOTE: For the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

Plan DZB8 Lane-change zone for a stepped taper closure on a dual carriageway road for which the national speed limit applies

The principles are:

- when lanes are closed using stepped taper lane closures, the distance between the closures is a minimum of 800 m;
- a second set of wicket signs indicating the closed lane (7202) with distance plate "800 yards" (7208) on the near side and off side, is placed 800m in advance of the works. These signs are repeated, with the appropriate distance plate, at 200 yard intervals to a point 200 yards in advance of the works, i.e. at 600m, 400m and 200m; and
- on dual carriageway roads of five lanes or more when the works require closure of the near side lane(s), subject to certain flow limits (see paragraph [D6.13.11](#)), the wicket signs indicating the closed lane (7202) on the off side of the carriageway may be omitted.

Where a temporary mandatory speed limit is in place, one pair of temporary speed limit signs is required, followed by repeater signs:

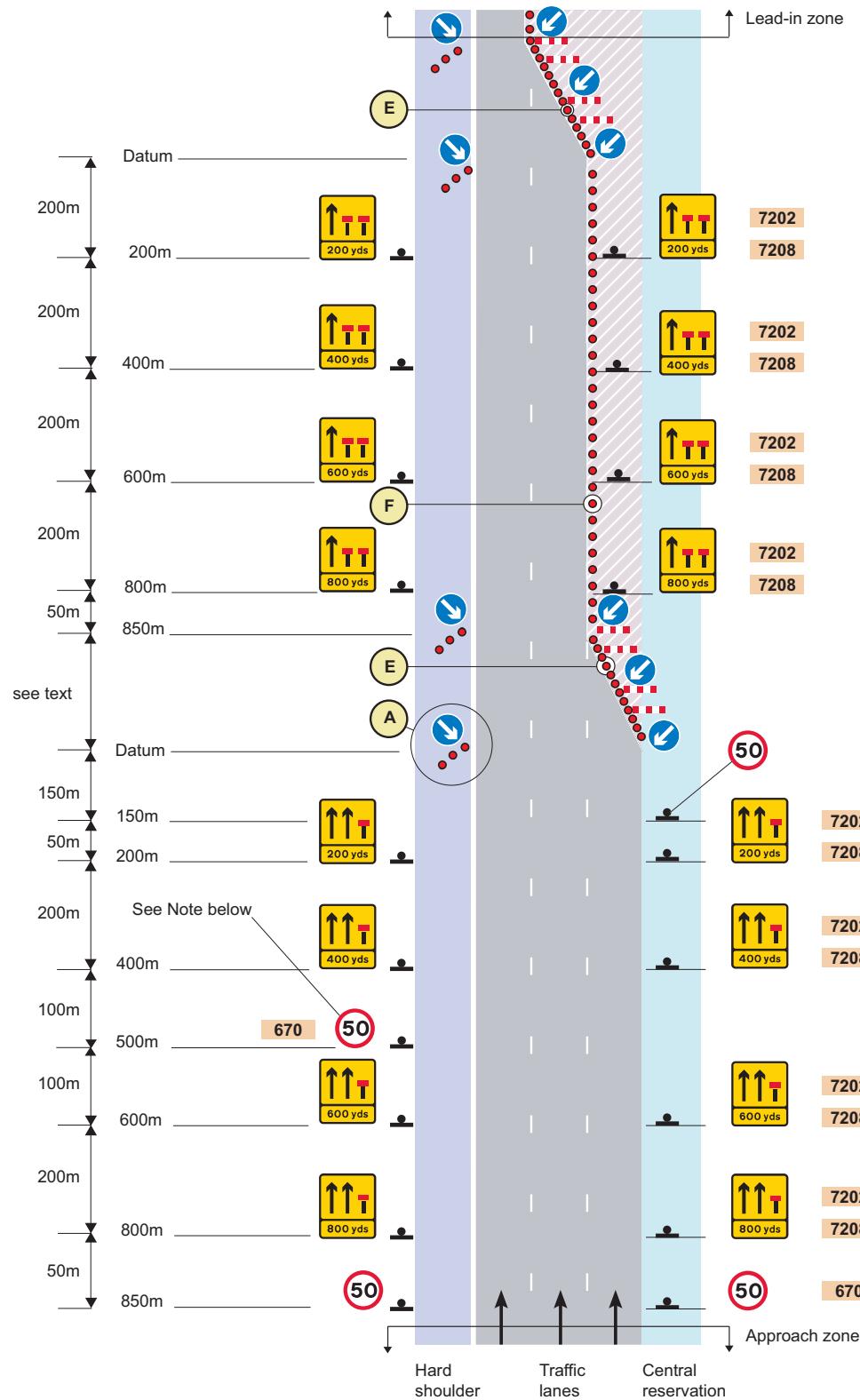
- the temporary speed limit sign (670), which will generally be 50 mph, is to be placed on the near side and on the central reservation 50m in advance of the first sign indicating lane closures or restrictions (e.g. signs to diagram 7201, 7202, 7201.1); and
- for a temporary speed limit of 50 mph the distance between successive signs on the same side of the carriageway should not exceed 700 m, with a maximum of 450 m between consecutive repeater signs on alternate sides of the carriageway. For temporary mandatory speed limits of 40 mph or less, see [Table 3.4](#), Note 1.

For entry taper details, including relaxations, see [Plan DZB3](#). Consideration should be given to the use of backlit sequentially flashing warning lights on the tapers to highlight the taper coning and distinguish it from the long straight stretches of coning (see paragraph [D3.12.2](#)).

Signing to Detail A is located on the hard shoulder opposite the "keep left/right" sign (610) at the start of the taper and opposite the end of the taper.

For works for which relaxations apply, the size of signs to diagram 7202 in the left-hand side of the carriageway should be as given in [Tables A1.1](#) and [A1.2 \(Appendix 1\)](#) 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.

Plan DZB8 Lane-change zone for a stepped taper closure on a dual carriageway road for which the national speed limit applies



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Where no hard shoulder is present, no signing to Detail A is required.

NOTE: For the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

Plan DZB9: Lane-change zone for a lane closure and lane width restriction ahead on a dual carriageway road for which the national speed limit applies

Four pairs of advance signs are required:

For lane restrictions, other than simple lane closures, the “Restrictions ahead” signs (7201 and 7201.1) are used incorporating symbols 7281 to 7288:

- 800 and 600 yards signs – top panel “GET IN LANE” (7262) and bottom panel “800/600 yards” (7271) on the near side and off side, placed 800 m/600 m in advance of the works; and
- 400 and 200 yards signs – top panel “STAY IN LANE” (7263) and bottom panel “400/200 yards” (7271) on the near side and off side, placed 400 m/200 m in advance of the works.

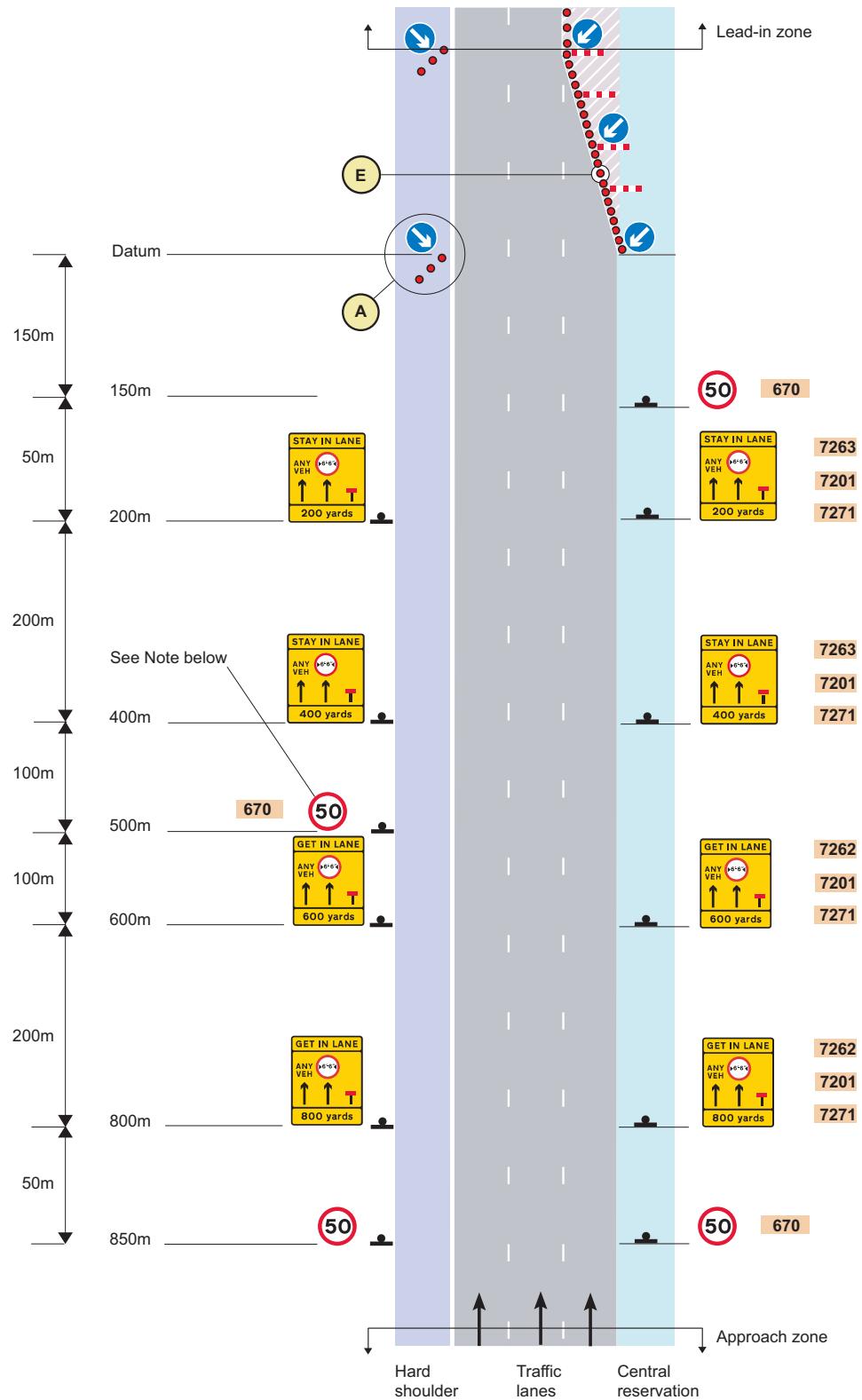
Where a temporary mandatory speed limit is in place, one pair of temporary speed limit signs is required, followed by repeater signs:

- the temporary speed limit sign (670), which will generally be 50 mph, is to be placed on the near side and on the central reservation 50 m in advance of the first sign indicating lane closures or restrictions (e.g. signs to diagram 7201, 7202, 7201.1); and
- for a temporary speed limit of 50 mph the distance between successive signs on the same side of the carriageway should not exceed 700 m, with a maximum of 450 m between consecutive repeater signs on alternate sides of the carriageway. For temporary mandatory speed limits of 40 mph or less, see [Table 3.4](#), Note 1.

For entry taper details see [Plan DZB3](#). Consideration should be given to the use of backlit sequentially flashing warning lights on the tapers to highlight the taper coning and distinguish it from the long straight stretches of coning (see paragraph [D3.12.2](#)).

Signing to Detail A is located on the hard shoulder opposite the “keep left/right” sign (610) at the start of the taper and opposite the end of the taper.

Plan DZB9: Lane-change zone for a lane closure and lane width restriction ahead on a dual carriageway road for which the national speed limit applies



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Where no hard shoulder is present, no signing to Detail A is required.

NOTE: For the spacing of speed limit repeater signs, see Table 3.4, Note 1.

Plan DZB10: Lane-change zone for a narrow lane layout with no lane closures on a dual carriageway road for which the national speed limit applies

Three pairs of advance signs are required:

- 600 and 400 yards signs: the “restrictions ahead” sign (7201) is used incorporating symbols 7281 and 7283 or 7283.1, with a top panel “GET IN LANE” (7262) and a bottom panel “600/400 yards” (7271) on the near side and off side, placed 600m and 400m in advance of the works; and
- 200 yards sign: the “narrow lanes” sign (7235) is used incorporating symbols 7281 and 7283 or 7283.1, with a top panel “NARROW LANES” (7264), or if the hard shoulder is to be used “USE HARD SHOULDER” (7260) and a bottom panel “200 yards” (7271) on the near side and off side placed 200m in advance of the works. If the hard shoulder is to be used then this sign is replaced by the “move to the hard shoulder” sign (7230) incorporating symbols 7281 and 7283 or 7238.1.

Where a temporary mandatory speed limit is in place, one pair of temporary speed limit signs is required, followed by repeater signs:

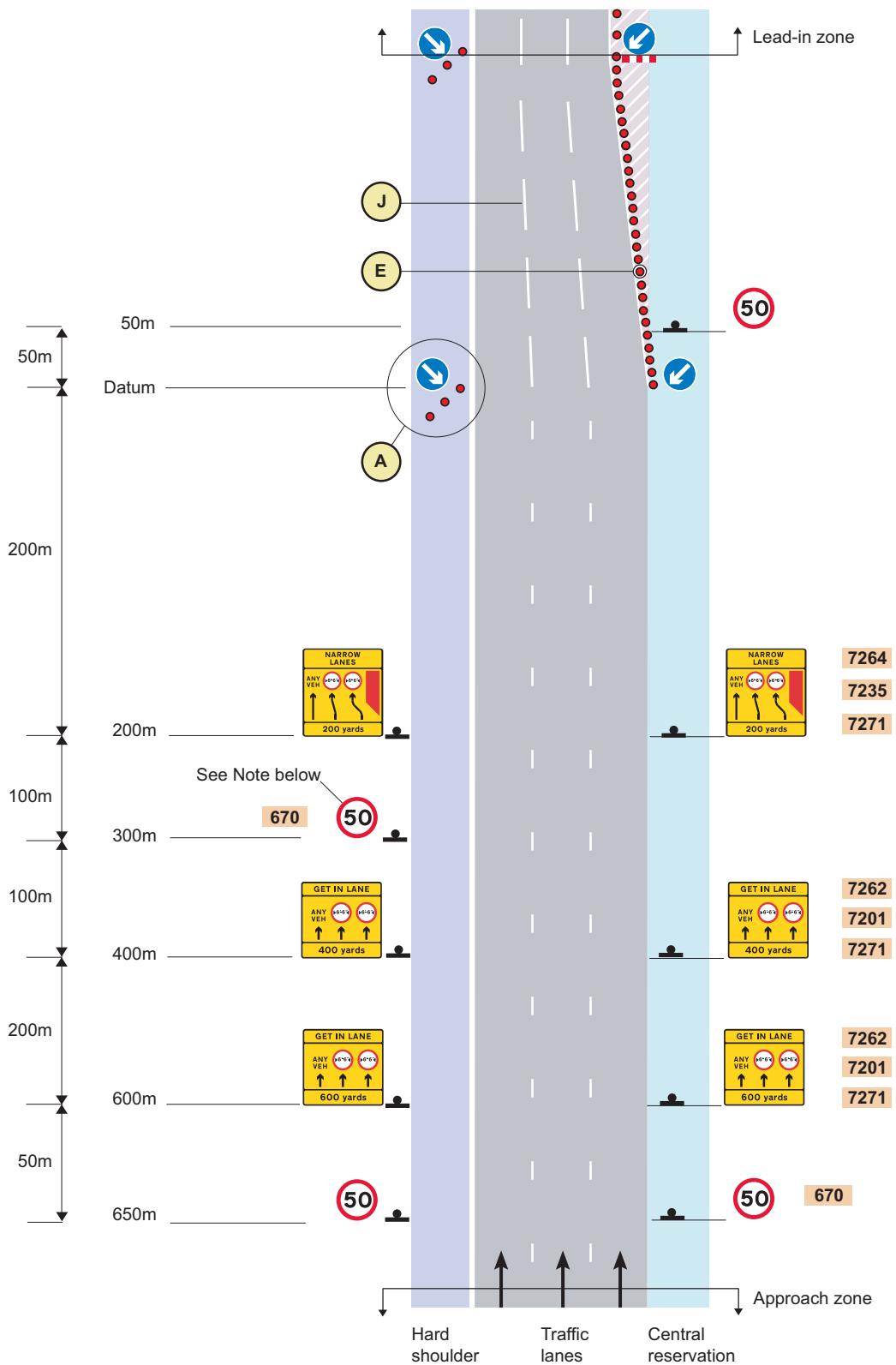
- the temporary speed limit sign (670), which will generally be 50mph, is to be placed on the near side and on the central reservation 50m in advance of the first sign indicating lane closures or restrictions (e.g. signs to diagram 7201, 7202, 7201.1); and
- for a temporary speed limit of 50mph the distance between successive signs on the same side of the carriageway should not exceed 700m, with a maximum of 450m between consecutive repeater signs on alternate sides of the carriageway. For temporary mandatory speed limits of 40mph or less, see [Table 3.4](#), Note 1.

For narrowing the lanes:

- the length of the taper will depend on the rate of taper, see [Table A1.3 \(Appendix 1\)](#), and the width of the restriction;
- one “keep left/right” sign (610) at the start of the narrowing;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the narrowing;
- for tapers of 100m or greater, additional “lane closed” barriers (7105) with high intensity warning lights are required at 50m spacing;
- coning to 1.5m spacing with marking to Detail E; see [Table A1.5 \(Appendix 1\)](#);
- signing to Detail A located on the hard shoulder opposite the “keep left/right” sign (610) at the start of the narrowing and also at the end of the narrowing; and
- white lining or temporary studs to Detail J used as road markings between lanes from the start of the narrowing.

No relaxations apply.

Plan DZB10: Lane-change zone for a narrow lane layout with no lane closures on a dual carriageway road for which the national speed limit applies



Keys to the plans are given in [Tables A1.4 and A1.5 of Appendix 1](#).

Where no hard shoulder is present, no signing to Detail A is required.

NOTE: For the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

D6.17 LEAD-IN ZONE

D6.17.1 The lead-in zone starts at the point at which all lane changes, if required, should have been completed and continues to the beginning of the longitudinal safety zone.

D6.17.2 List of plans:

Plan DZC1 Lead-in zone for a single-lane changeover on a dual carriageway road with a permanent speed limit of 40 mph or less

Plan DZC2 Lead-in zone for a single-lane changeover on a high-speed dual carriageway road

Plan DZC3 Lead-in zone for a two-lane changeover

Plan DZC4 Lead-in zone for a single-lane changeover onto the hard shoulder

Plan DZC5 Lead-in zone for a two-lane changeover with narrow lanes using the hard shoulder

Plan DZC6 Lead-in zone for a single-lane crossover

Plan DZC7 Lead-in zone for a two-lane crossover

Plan DZC8 Lead-in zone for a three-lane crossover with narrow lanes

Plan DZC9 Lead-in zone for splitting lanes for a changeover onto the hard shoulder and a single-lane crossover

PRINCIPLES OF DESIGN FOR THE LEAD-IN ZONE

Plan DZC1: Lead-in zone for a single-lane changeover on a dual carriageway road with a permanent speed limit of 40 mph or less

Guidance on the design of the changeover is given in [Section D6.6](#).

Principles for the guide island are:

- coning to Detail F is used to guide traffic past the island – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used; and
- the length of the guide island, excluding tapers, is 100 m.

Principles for the guide island for which relaxations apply are as for standard works except:

- coning to Detail C1 is used to guide traffic past the island.

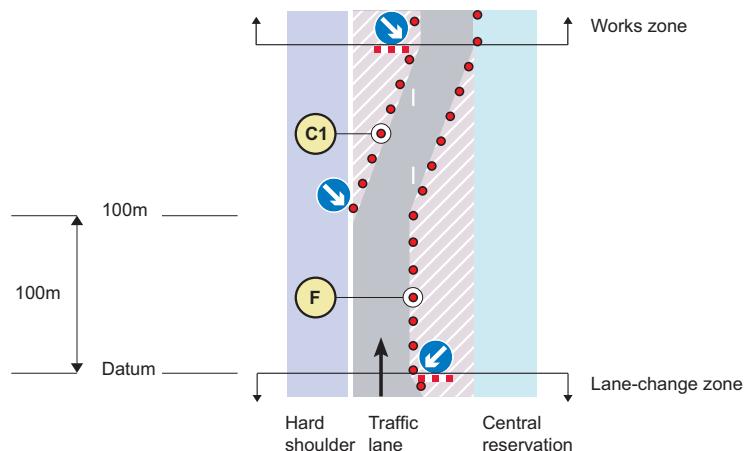
Principles for the changeover are:

- straight “taper” or smooth ‘s’ shaped curve layout;
- length of changeover as detailed in [Table 6.6](#);
- coning to 9 m spacing either side of the changeover (Detail C1 – see [Table A1.5 \(Appendix 1\)](#));

- one “keep left/right” sign (610) at the start of the changeover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

A sign to diagram 7237 should be considered for single-lane changeovers where the changeover is below standard.



NOTES:

1. For changeover length see [Table 6.6](#).

Plan DZC2: Lead-in zone for a single-lane changeover on a high-speed dual carriageway road

Guidance on the design of the changeover is given in [Section D6.6](#).

Principles for the guide island are:

- coning to Detail F is used to guide traffic past the island – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used; and
- the length of the guide island, excluding tapers, is 200 m.

Principles for the guide island for which relaxations apply are as for standard works except:

- coning to Detail C1 is used to guide traffic past the island.

Principles for a single-lane changeover are as follows:

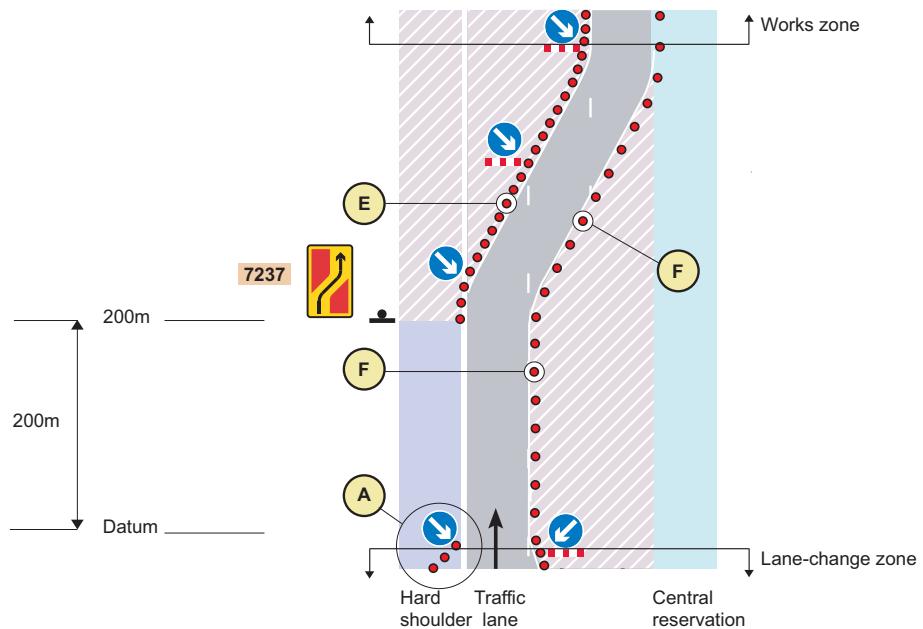
- one “keep left/right” sign (610) at the start of the changeover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

Principles for a single-lane changeover for works for which relaxations apply are as for standard works except:

- coning to Detail B is used on the near side; and
- coning to Detail C1 is used on the off side.

The sign to diagram 7237 at the start of the changeover may be omitted.

Where the hard shoulder is not used for a works entry and works access signs are not in place, an additional Detail A should be placed at the start of the coning blocking the hard shoulder.

Plan DZC2: Lead-in zone for a single-lane changeover on a high-speed dual carriageway road

Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC3: Lead-in zone for a two-lane changeover

Guidance on the design of the changeover is given in [Section D6.6](#).

Principles for the guide island are given in [Plan DZC2](#).

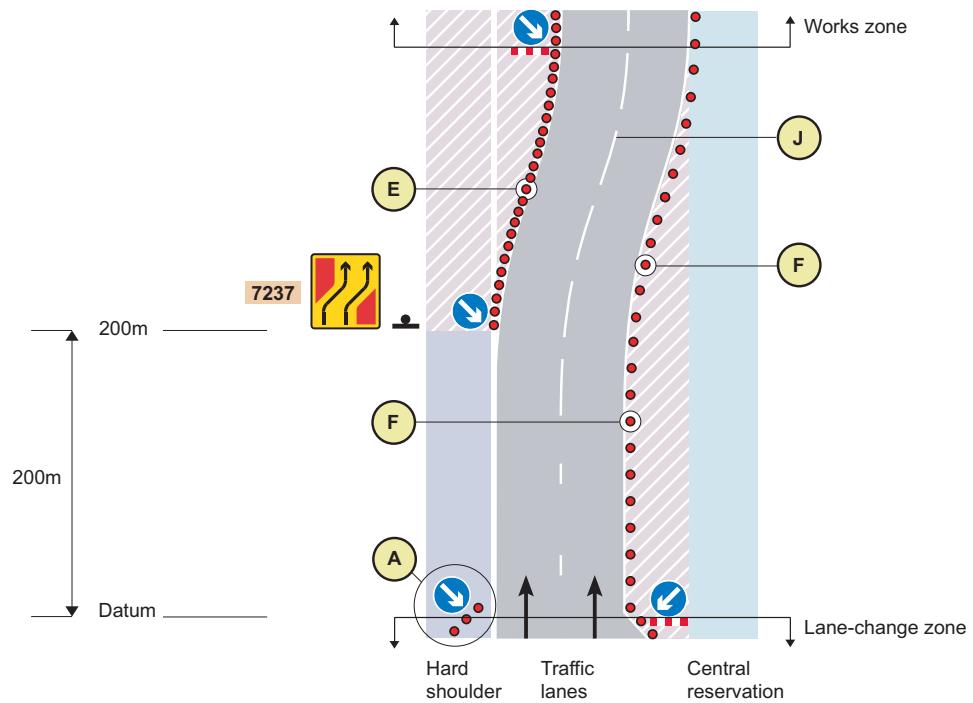
Principles for the changeover are as follows:

- a “diversion of lanes” sign (7237) is located on the near side at the start of the changeover;
- one “keep left/right” sign (610) at the start of the changeover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side;
- lane markings to Detail J are used between the two lanes; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Where the hard shoulder is not used for a works entry, and works access signs are not in place, an additional Detail A should be placed at the start of the coning blocking the hard shoulder.

Plan DZC3: Lead-in zone for a two-lane changeover



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC4: Lead-in zone for a single-lane changeover onto the hard shoulder

Guidance on the design of the changeover is given in [Section D6.6](#).

The principles for moving a lane to the hard shoulder are as follows:

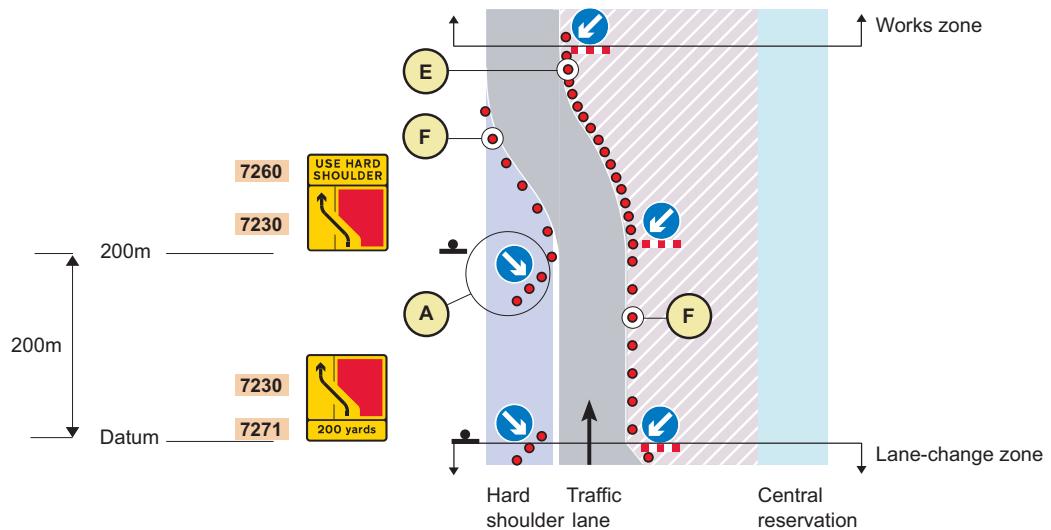
- the minimum signing requirement is the “use hard shoulder” sign (7230) with the top panel “USE HARD SHOULDER” (7260) at the start of the changeover in advance of the coning; the “use hard shoulder” sign (7230) with the bottom panel “200yds” (7271) placed 200m in advance of the start of the changeover should also be considered;
- one “keep left/right” sign (610) at the start of the changeover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the central reservation, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed;
- coning to Detail F is used on the near side;
- coning to Detail E is used on the off side;
- signing to Detail A is used on the hard shoulder at the start of the lane move in advance of the coning; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

For signs where the lanes are split in advance of the hard shoulder running, between hard shoulder and secondary carriageway, see [Plan DZC9](#).

The principles for works for which relaxations apply are as for standard works except:

- coning to Detail C1 is used on the near side;
- coning to Detail B is used on the off side; and
- following a risk assessment the hard shoulder/lane 1 raised rib marking may be retained at the changeover.

Plan DZC4: Lead-in zone for a single-lane changeover onto the hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC5: Lead-in zone for a two-lane changeover with narrow lanes using the hard shoulder

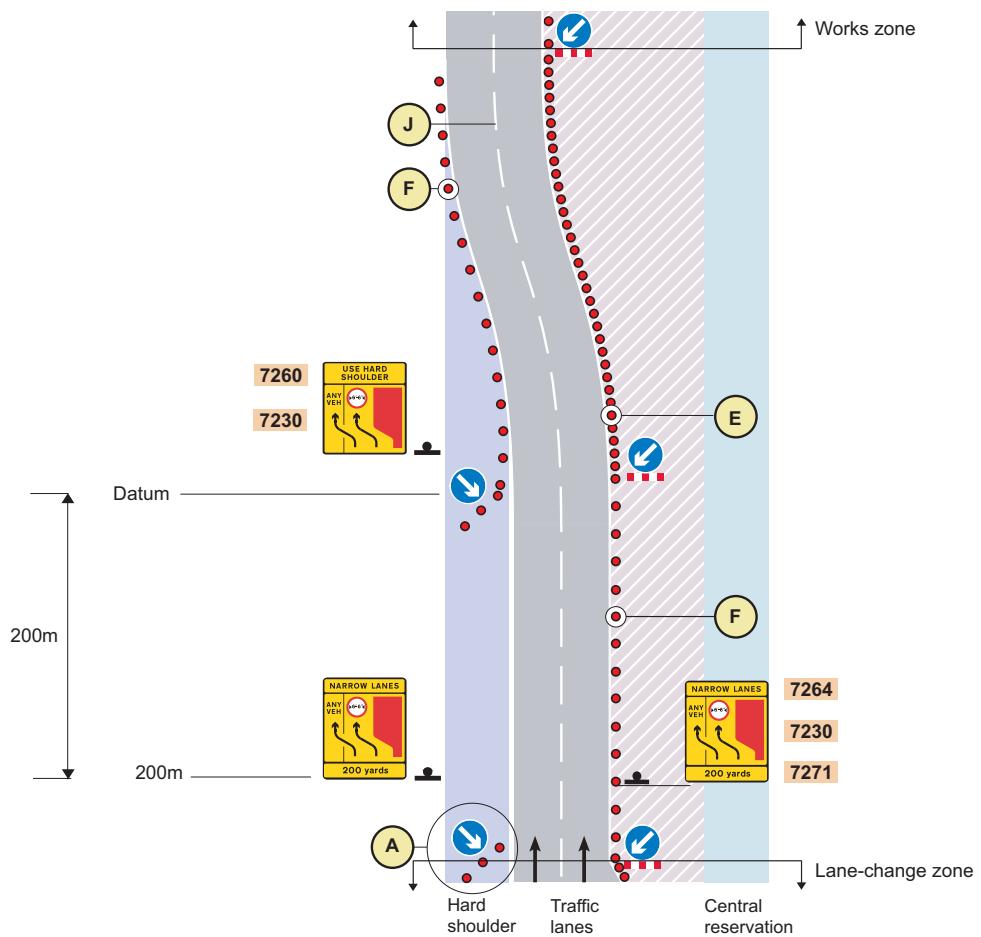
Guidance on the design of the changeover is given in [Section D6.6](#).

The principles for the changeover are as follows:

- a “move to the hard shoulder” sign (7230 with symbols 7281 and 7283) with top panel “NARROW LANES” (7264) and bottom panel “200 yds” (7271) on the near side and off side placed 200 m in advance of the changeover – this sign may be located in the lane-change zone if the lane move is the first manoeuvre of the road works as in the secondary direction of a partial contra-flow system;
- a “move to the hard shoulder” sign (7230 with symbols 7281 and 7283) with top panel “USE HARD SHOULDER” (7260) on the near side placed at the start of the changeover;
- coning to Detail F is used on the near side;
- coning to Detail E is used on the off side;
- one “keep left/right” sign (610) at the start of the changeover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the central reservation, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed;
- white lining or temporary studs to Detail J is used as road marking between lanes;
- signing to Detail A is used on the hard shoulder at the start of the changeover; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Plan DZC5: Lead-in zone for a two-lane changeover with narrow lanes using the hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC6: Lead-in zone for a single-lane crossover

Guidance on the design of the crossover is given in [Section D6.5](#).

Principles for the crossover are as follows:

- a “diversion of lane onto the other carriageway” sign (7210) located on the off side at the start of the crossover;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side;
- if a buffer zone is present the coning to Detail F on the off side is followed by cylinders and studs to Detail H (as shown), Detail K is used if narrow lanes are present; if a buffer lane is present, then the coning to Detail F is followed by coning to Detail C1;
- one “keep left/right” sign (610) at the start of the crossover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the crossover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; in this context the central reservation is equivalent to either one or two lanes crossed, depending on its width; and
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

Principles for a single-lane crossover for works for which relaxations apply are as for standard works except:

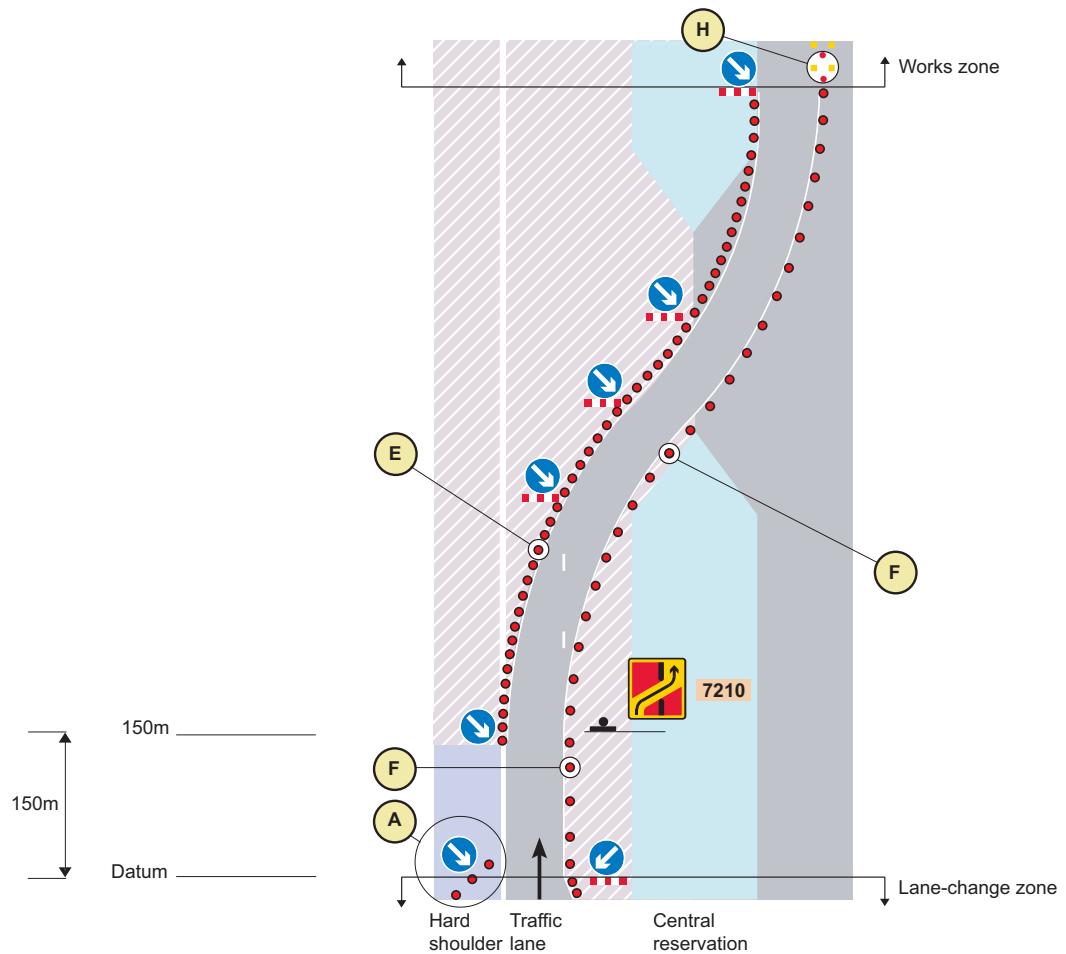
- coning to Detail B is used on the near side; and
- coning to Detail C1 is used on the off side.

For crossovers with a sharp deviation (see paragraph [D6.5.3](#)), “sharp deviation of route” signs (7104) with “turn left/right” signs (606) should replace the “lane closed” barriers (7105) and “keep left/right” signs (610).

Where the hard shoulder is not used for a works entry, and works access signs are not in place, an additional Detail A should be placed at the start of the coning blocking the hard shoulder.

For dual carriageways without hard shoulders it may be appropriate for traffic to be in lane 2 or 3 approaching the crossover in order to enable works access from lane 1.

Plan DZC6: Lead-in zone for a single-lane crossover



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC7: Lead-in zone for a two-lane crossover

Guidance on the design of the crossover is given in [Section D6.5](#).

Principles for the crossover are as follows:

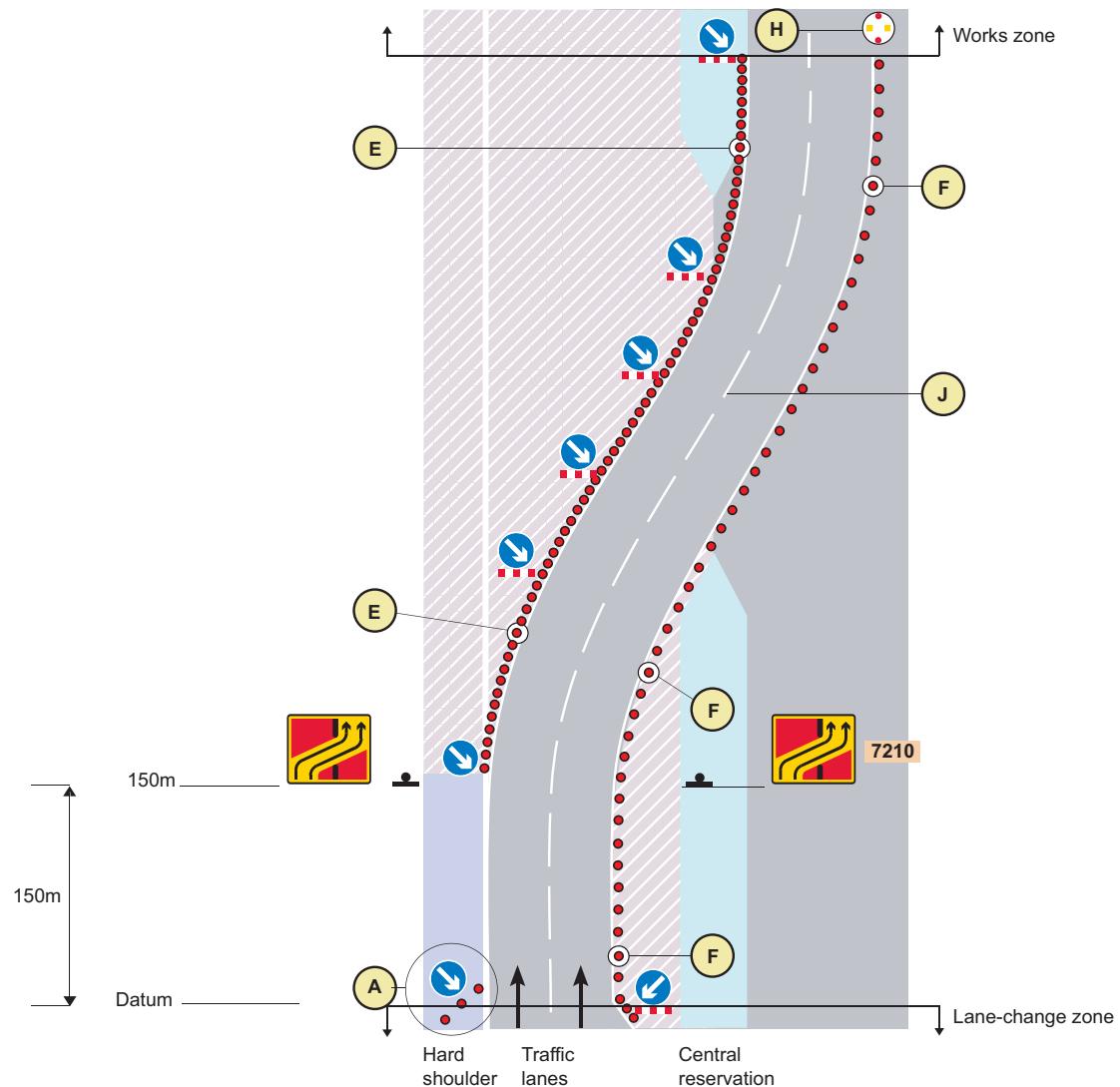
- two “diversion of lanes onto the other carriageway” signs (7210) located on either side of the carriageway at the start of the crossover;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side;
- if a buffer zone is present, the coning to Detail F on the off side is followed by cylinders and studs to Detail H (as shown); Detail K is used if narrow lanes are present; if a buffer lane is present, then the coning to Detail F is followed by coning to Detail C1;
- one “keep left/right” sign (610) at the start of the crossover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the crossover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; in this context the central reservation is equivalent to either one or two lanes crossed, depending on its width;
- white lining or temporary studs to Detail J used as road marking between lanes; and
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Where the hard shoulder is not used for a works entry, and works access signs are not in place, an additional Detail A should be placed at the start of the coning blocking the hard shoulder.

For dual carriageways without hard shoulders it may be appropriate for traffic to be in lanes 2 and 3 approaching the crossover in order to enable works access from lane 1.

Plan DZC7: Lead-in zone for a two-lane crossover



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC8: Lead-in zone for a three-lane crossover with narrow lanes

Guidance on the design of the crossover is given in [Section D6.5](#).

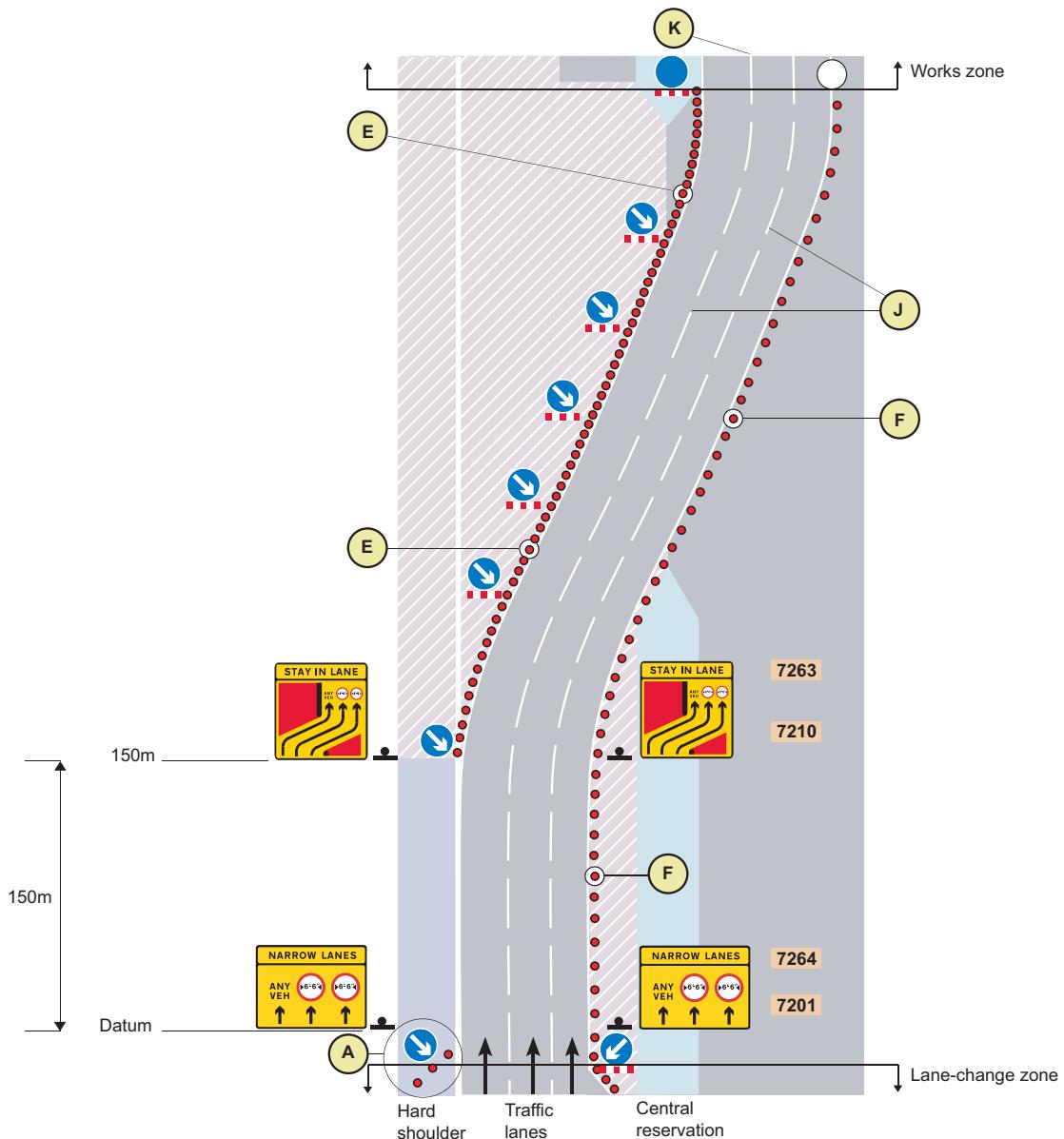
The principles for the crossover are:

- “lane restriction” signs (7201 with symbols 7281 and 7283 or 7283.1) with top panel “NARROW LANES” (7264) on the near side and off side 150 m in advance of the start of the crossover;
- two “diversion of lanes onto other carriageway” signs (7210) located on either side of the carriageway at the start of the crossover;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side;
- if a buffer zone is present the coning to Detail F on the off side is followed by cylinders and studs to Detail K, (if narrow lanes are not present then Detail H is used);
- one “keep left/right” sign (610) at the start of the crossover; if this is placed in a closed lane, as opposed to a normally non-trafficked area such as the verge, a footway or a hard shoulder, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the crossover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; in this context the central reservation is equivalent to either one or two lanes crossed, depending on its width;
- white lining or temporary studs to Detail J used as road marking between lanes; and
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Where the hard shoulder is not used for a works entry, and works access signs are not in place, an additional Detail A should be placed at the start of the coning blocking the hard shoulder.

Plan DZC8: Lead-in zone for a three-lane crossover with narrow lanes



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZC9: Lead-in zone for splitting lanes for a changeover onto the hard shoulder and a single-lane crossover

Guidance on the design of the crossover and changeover is given in [Sections D6.5](#) and [D6.6](#).

The principles for splitting lanes are as follows:

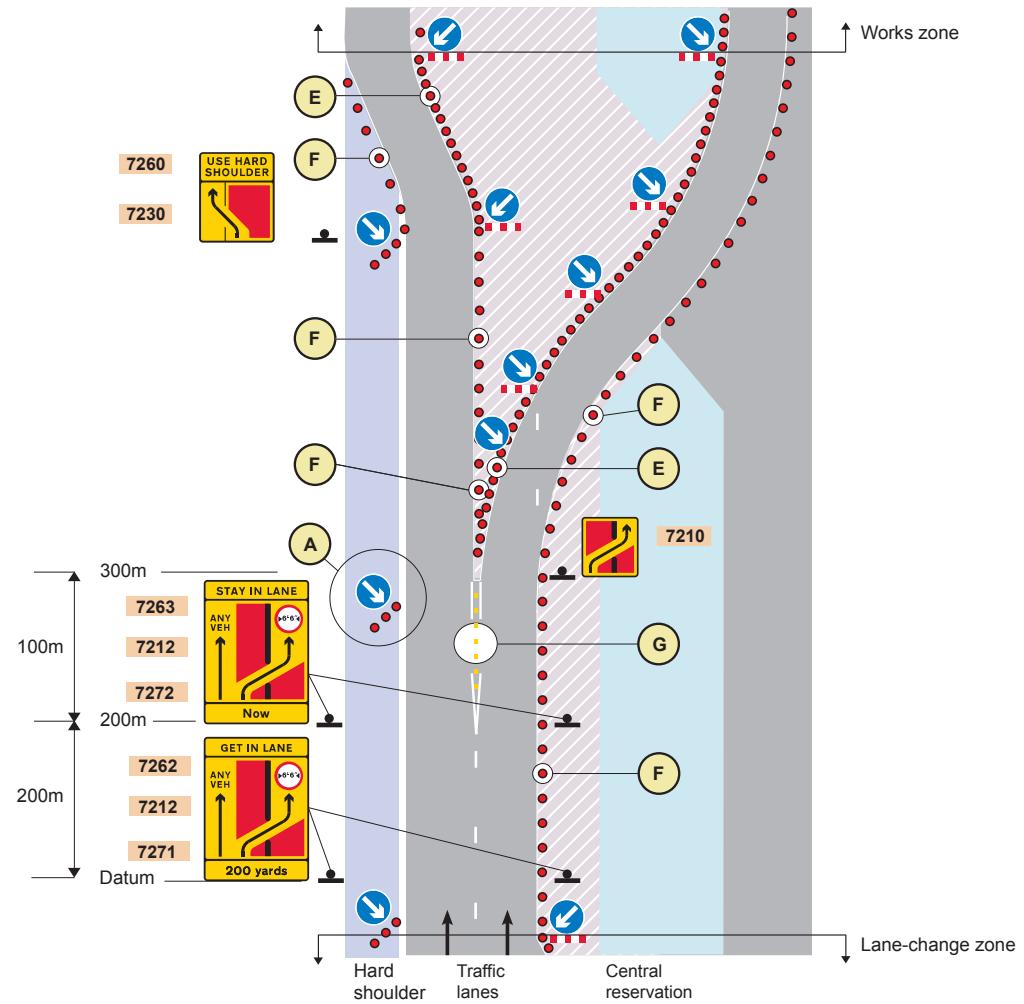
- studs and cylinders, or studs and road markings, to Detail G for a minimum length of 100m up to the “nose” of the divide – there are two options:
 - using studs and traffic cylinders – a minimum of 50m of Detail G2 followed by a minimum of 50m of Detail G1; or
 - using studs and road markings – a minimum of 100m of Detail G3;
- a “diversion of right-hand lane onto the other carriageway” sign (7212) with “GET IN LANE” top panel (7262) and a “200yds” bottom panel (7271) is located on both sides of the carriageway 200m from the start of Detail G – the signs to diagram 7212 can include an indication of a motorway exit if appropriate;
- a “diversion of right-hand lane onto the other carriageway” sign (7212) with “STAY IN LANE” top panel (7263) and a “NOW” bottom panel (7272) is located on both sides of the carriageway at the start of Detail G – the signs to diagram 7212 can include an indication of a motorway exit if appropriate;
- a “diversion onto the other carriageway” sign (7210) is located on the off side at the start of the crossover;
- a “use hard shoulder” sign (7230) with a “USE HARD SHOULDER” top panel (7260) is located on the near side at the start of the changeover onto the hard shoulder; and
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lane-change zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

The principles for the changeover to the hard shoulder are given in [Plan DZC4](#).

The principles for a single-lane crossover are given in [Plan DZC6](#).

No relaxations apply.

Plan DZC9: Lead-in zone for splitting lanes for a changeover onto the hard shoulder and a single-lane crossover



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

D6.18 WORKS ZONE

D6.18.1 The works zone starts at the beginning of the longitudinal safety zone and continues to the end of the works area.

D6.18.2 For full contra-flow layouts the works area should include a continuous and unobstructed emergency route through the site, available for use at all times.

D6.18.3 List of plans:

Plan DZD1 Works zone for a full lane closure on a dual carriageway road with a permanent speed limit of 40 mph or less

Plan DZD2 Works zone with the running lane on the same carriageway

Plan DZD3 Works zone showing a buffer lane

Plan DZD4 Works zone showing a buffer zone

Plan DZD5 Works zone with narrow lanes

Plan DZD6 Works zone including a junction (primary carriageway)

Plan DZD7 Works zone including a junction (secondary carriageway)

PRINCIPLES OF DESIGN FOR THE WORKS ZONE

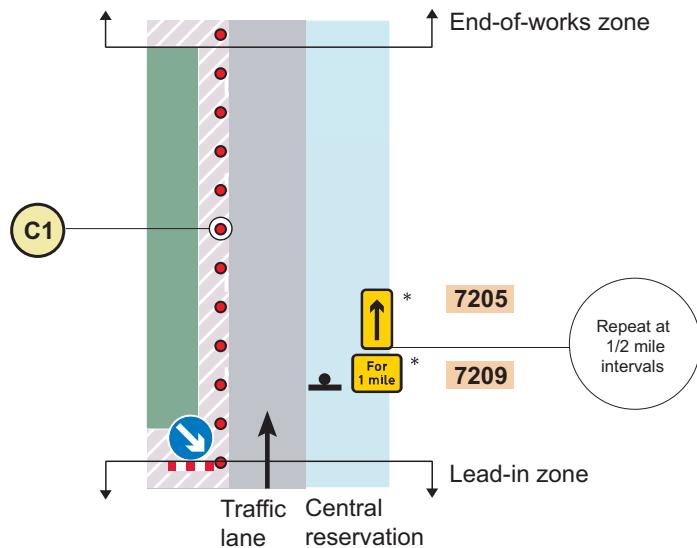
Plan DZD1: Works zone for a full lane closure on a dual carriageway road with a permanent speed limit of 40 mph or less

The principles are:

- coning to Detail C1 is required;
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) "For x miles" is required located on the off side at $\frac{1}{2}$ mile intervals – these are not required for works for which relaxations apply; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lead-in zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

If a section of the works zone is used purely for access then consideration should be given to placing a "keep left/right" sign (610) on the approach to any works area located after the access. The designer shall assess if additional 610 signs are needed where specific risks in the works zone or changes in road geometry would justify additional guidance to road users.

Similar signing is required for right-hand closures.



* Not required where there is a relaxation.

Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DZD2: Works zone with the running lane on the same carriageway

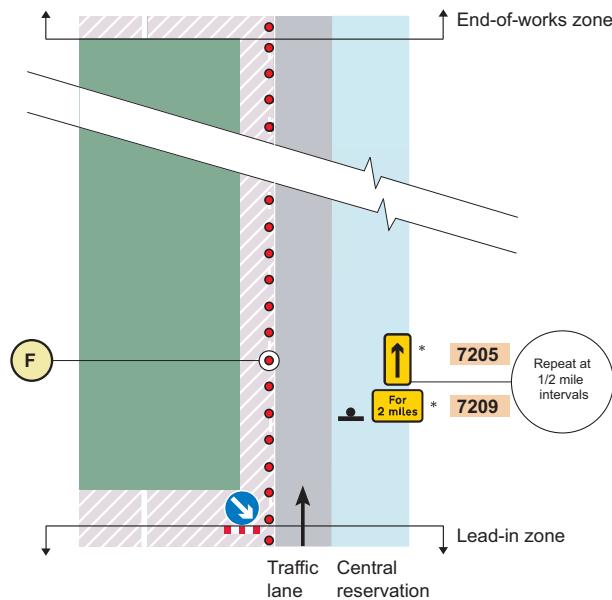
To mark the running lanes through the works area, the principles are:

- if the running lane is adjacent to the works, then coning to Detail F is used – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used;
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) “For x miles” is required located on the off side at $\frac{1}{2}$ mile intervals; and
- where a temporary mandatory speed limit is in place, signs to diagram 670 should be continued from the lead-in zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

If a section of the works zone is used purely for access then consideration should be given to placing a “keep left/right” sign (610) on the approach to any works area located after the access. The designer shall assess if additional 610 signs are needed where specific risks in the works zone or changes in road geometry would justify additional guidance to road users.

In the case of a non contra-flow situation a relaxation may apply. The principles are as for standard works except:

- coning to Detail F or C1 may be replaced by coning to Detail C1 or D – the cone spacing depends on the permanent speed limit – see [Table A1.3 \(Appendix 1\)](#); and
- the signs indicating the number of lanes open to traffic (7205) with distance plate (7209) “For x miles” are not required.



* Not required where there is a relaxation.

Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DZD3: Works zone showing a buffer lane

The principles for marking the running lanes on the primary carriageway alongside the works area are:

- coning to Detail F is used – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used; and
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) is required – this combination is repeated every $\frac{1}{2}$ mile on the near side of the carriageway.

If a section of the works zone is used purely for access then consideration should be given to placing a “keep left/right” sign (610) on the approach to any works area located after the access. The designer shall assess if additional 610 signs are needed where specific risks in the works zone or changes in road geometry would justify additional guidance to road users.

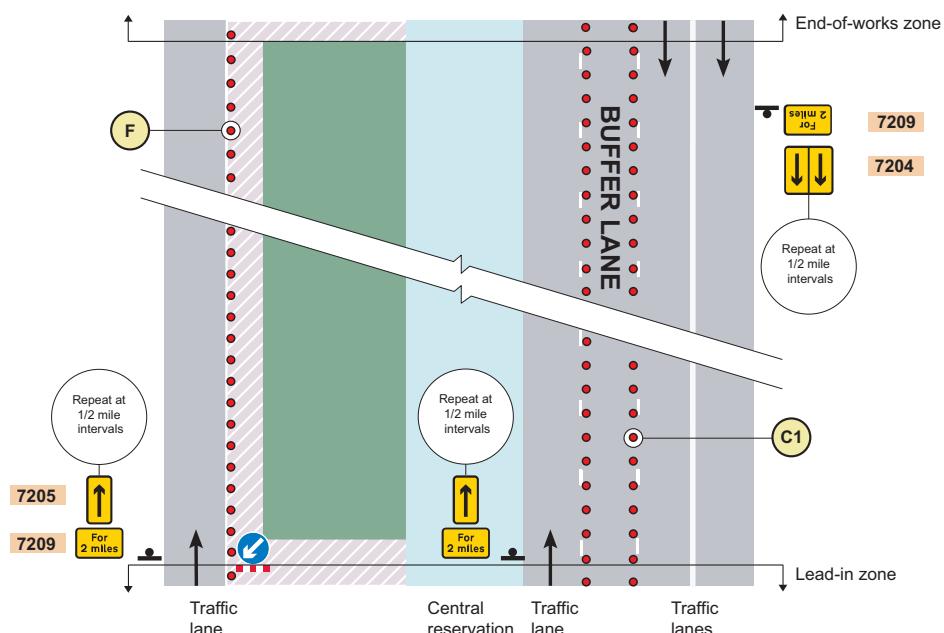
The principles for marking the running lanes on the secondary carriageway are:

- for a running lane adjacent to a buffer lane, coning to Detail C1 is used placed inside the existing road marking – where existing road markings are not suitable coning to Detail F is used. Signs to diagram 7203 are not used;
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) is required; this combination is repeated every $\frac{1}{2}$ mile on the central reservation for vehicles required to cross over and use the secondary carriageway; and
- in the secondary direction a sign indicating the number of lanes open to traffic, one of which uses the hard shoulder (7204) with distance plate (7209) is required; this combination is repeated every $\frac{1}{2}$ mile on the near side.

A temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lead-in zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

For works for which relaxations apply, the principles are as for standard works except:

- coning to Detail F may be replaced by coning to Detail C1 or D – the cone spacing depends on the permanent speed limit – see [Table A1.3 \(Appendix 1\)](#).



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DZD4: Works zone showing a buffer zone

The principles for marking the running lanes on the primary carriageway alongside the works area are:

- coning to Detail F is used – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used; and
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) is required; this combination is repeated every ½ mile on the near side of the carriageway.

If a section of the works zone is used purely for access then consideration should be given to placing a “keep left/right” sign (610) on the approach to any works area located after the access. The designer shall assess if additional 610 signs are needed where specific risks in the works zone or changes in road geometry would justify additional guidance to road users.

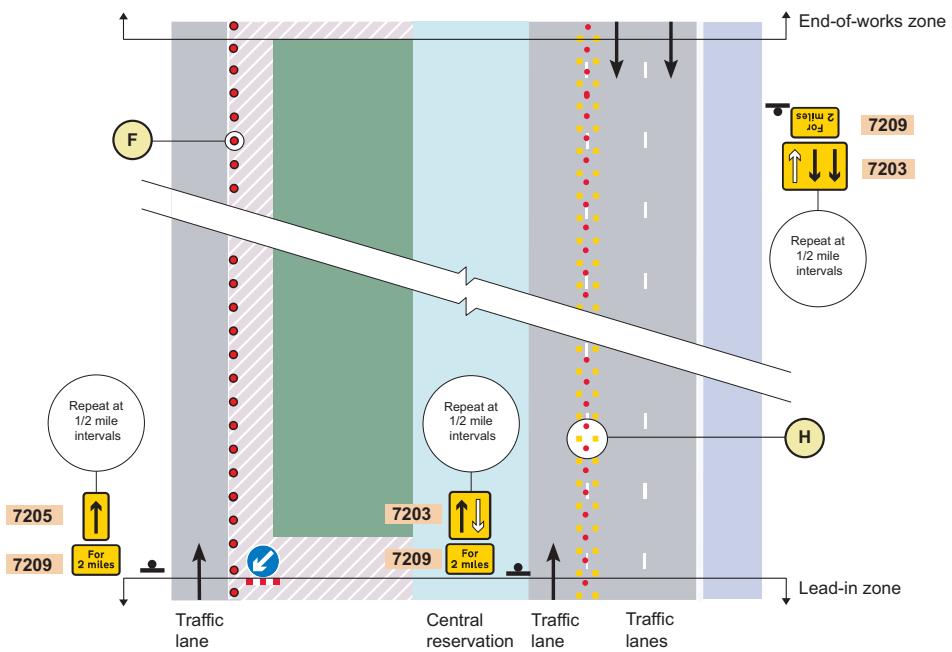
The principles for marking the running lanes on the secondary carriageway are:

- if the running lane is adjacent to a buffer zone, then cylinders and studs to Detail H are used; (coning to Detail E is used at the diversion of the primary carriageway, to and from the buffer zone, whilst coning to Detail F is used on the secondary carriageway in advance of and following the buffer zone);
- where the diverted carriageway is adjacent to a buffer zone, signs indicating the number of lanes open to traffic and off side contra-flow working (7203) with distance plate (7209) are placed on the central reservation for primary carriageway traffic using the secondary carriageway; if HGV restrictions apply then this sign is replaced by the restriction sign (7201.1) which can incorporate symbols 7280 to 7284.1 and 7288 as appropriate;
- in the secondary direction a sign indicating the number of lanes open to traffic and off side contra-flow working (7203) with distance plate (7209) is required; this combination is repeated every ½ mile on the near side; and
- if a temporary vehicle safety restraint barrier is used to separate opposing flows, signs to diagram 7203 must be replaced by diagram 7205 (or 7204 if the hard shoulder is used as a running lane).

A temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lead-in zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Plan DZD4: Works zone showing a buffer zone



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZD5: Works zone with narrow lanes

The principles for marking the running lanes on the primary carriageway alongside the works area are:

- coning to Detail F is used – if existing carriageway markings are suitably located and in good condition then Detail C1 may be used; and
- a sign indicating the number of lanes open to traffic (7205) with distance plate (7209) "For x miles" is required located on the near side at $\frac{1}{2}$ mile intervals.

If a section of the works zone is used purely for access then consideration should be given to placing a "keep left/right" sign (610) on the approach to any works area located after the access. The designer shall assess if additional 610 signs are needed where specific risks in the works zone or changes in road geometry would justify additional guidance to road users.

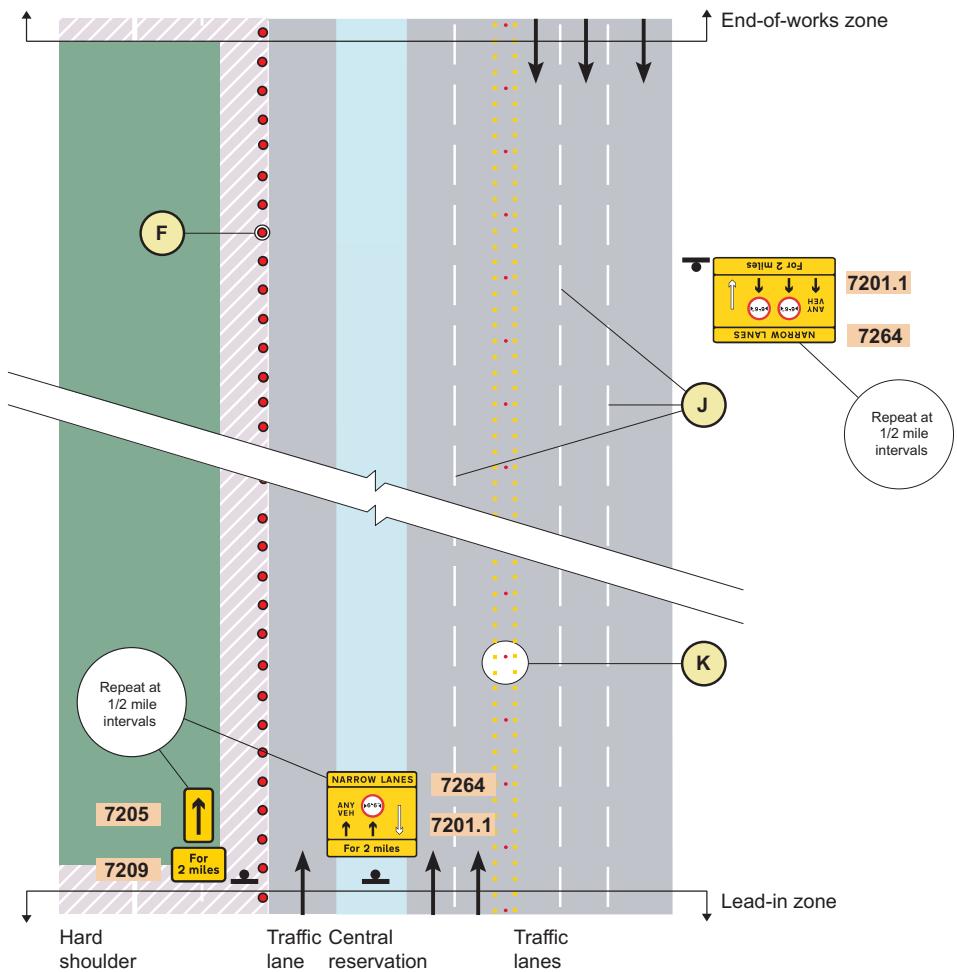
The principles for marking the running lanes on the secondary carriageway are:

- the buffer zone is marked with cylinders and studs to Detail K;
- white lining or temporary studs to Detail J used as marking between running lanes;
- signs indicating the distance over which the current conditions apply (7201.1 with symbols 7280 to 7284.1 and 7288) with a top panel "NARROW LANES" (7264) are placed on the central reservation for primary carriageway traffic using the secondary carriageway and repeated at $\frac{1}{2}$ mile intervals through the contra-flow; the first sign is located at the end of the initial crossover;
- signs on the central reservation should be screened from traffic on the primary carriageway;
- in the secondary direction signs indicating the distance over which the current conditions apply (7201.1 with symbols 7280 to 7284.1 and 7288) are placed on the near side for secondary carriageway traffic and repeated at $\frac{1}{2}$ mile intervals through the contra-flow; the first sign is located opposite the start of the return crossover in the secondary direction; and
- if a temporary vehicle safety restraint barrier is used to separate opposing flows, signs to diagram 7201.1 must not incorporate the contra-flow symbol shown in diagram 7288.

A temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the lead-in zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

No relaxations apply.

Plan DZD5: Works zone with narrow lanes



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZD6: Works zone including a junction (primary carriageway)

Plan DZD7: Works zone including a junction (secondary carriageway)

These plans illustrate segregated contra-flow by destination, where diverging and merging traffic uses the hard shoulder.

SLIP ROADS

Joining carriageways and slip roads should be reduced to a single lane unless there is a lane gain on the main carriageway. Where the joining carriageway is a dual carriageway the general principles for the advance signing required and the entry taper details should be taken from [Plan DZB5](#) in [Section D6.16](#). For a motorway/motorway intersection [Plan DZB6](#) in [Section D6.16](#) should be used. Where a speed limit lower than the permanent speed limit is in place speed limit signs will be required, placed on both sides of the carriageway.

MAIN CARRIAGEWAY

Where a lane diverges prior to a junction the following signs are used to direct traffic to the junction:

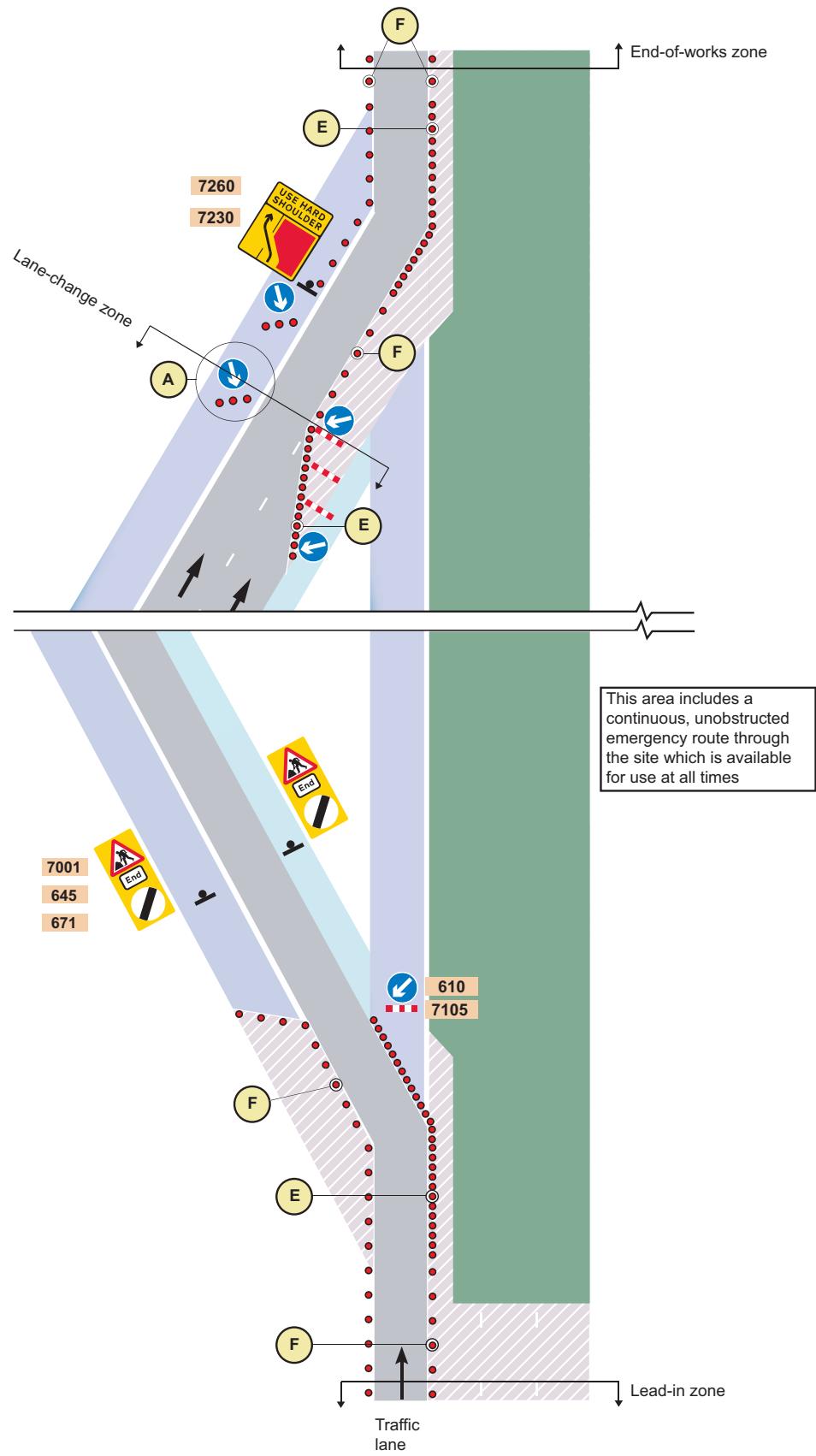
- the existing final direction sign and any advance direction signs, including the 300, 200 and 100 yards countdown signs (823, 824 and 825) or road markings, downstream of the diverge that contain incorrect information should be covered up or removed, as appropriate;
- where required to direct traffic to a junction exit the lane-change signs should be to diagram 7201 displaying route and junction number;
- one pair of diversion signs (7211.1) with a “USE HARD SHOULDER” top panel (7260) and, where appropriate, a route and junction number may be shown on the main panel above the diversion arrow and any symbol – the sign to be placed on the near side and off side of the carriageway directly before the hard shoulder diverge (part of the lead-in zone, see [Plan DZC9](#) in [Section D6.17](#));
- at the nosing of the hard shoulder diverge bifurcation (part of the lead-in zone, see [Plan DZC9](#) in [Section D6.17](#)), a yellow direction sign with route number and a direction arrow (7241 on a motorway and 7242 on other roads); and
- a “lane closed” barrier (7105) and “keep left/right” arrow (610) are located behind the coning on the off side, facing approaching traffic at the start of slip road;

GENERAL

- coning to Detail F is required on long straight stretches, this can be replaced with Detail C1 should existing lane lines be suitable, coning to Detail E should be used where coning is facing oncoming traffic;
- existing bifurcation arrows (1039) should be removed or masked;
- signs to diagram 7250 to 7254 should be used on the slip road and main carriageway to indicate that additional traffic lanes from the slip road are joining the main carriageway;
- signs to diagrams 7250 and 7251 are used to indicate traffic lanes leaving and joining at a junction, whilst signs to diagram 7252 and 7253 are used to indicate traffic joining at a junction; and
- a temporary mandatory speed limit will be in place; initial and repeater signs to diagram 670 are required on the main carriageway and on the slip or link road prior to joining the motorway.

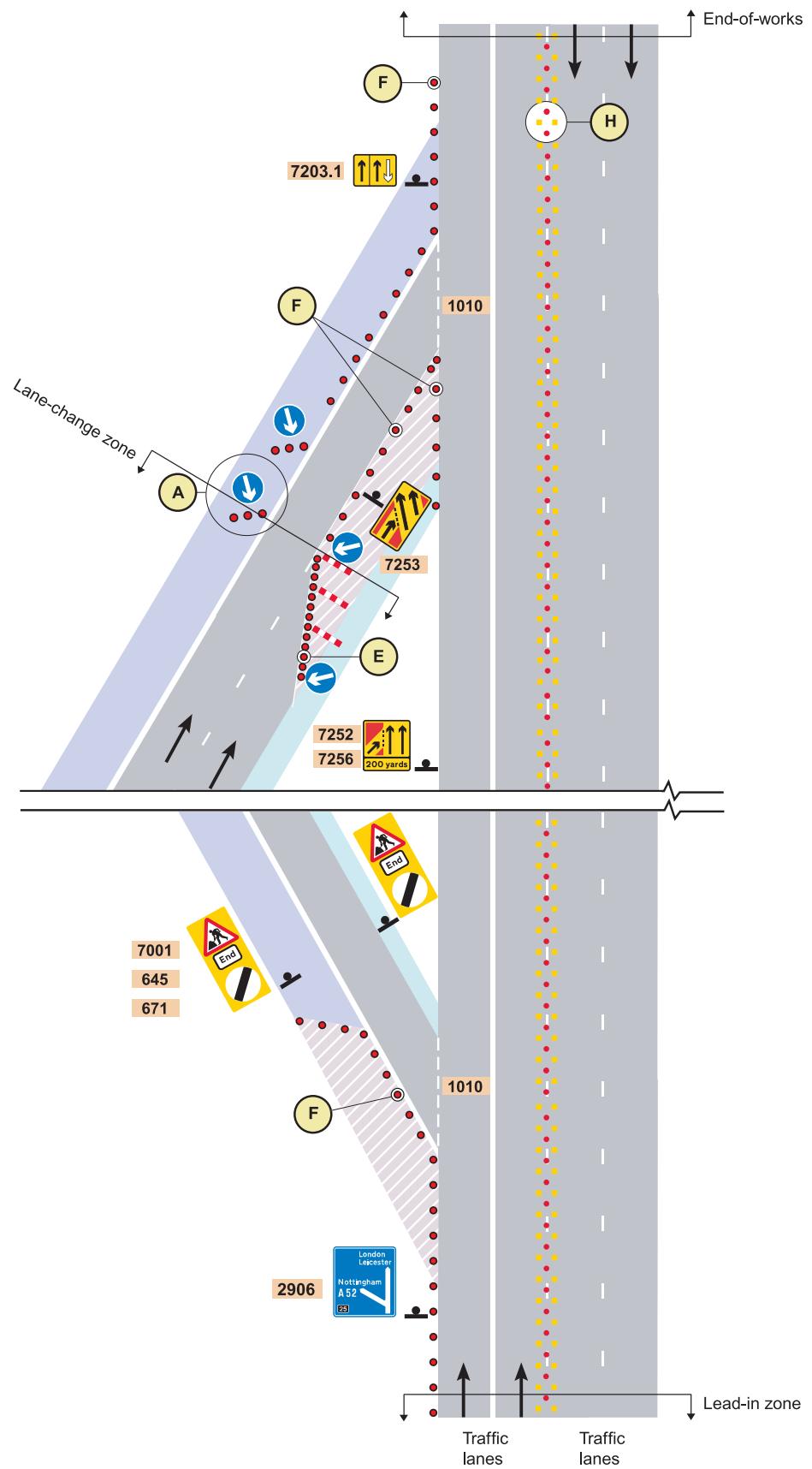
For advice on minimum desirable merge/diverge lengths see TD 22 "Layout of grade separated junctions" (DMRB 6.2.1).

Plan DZD6: Works zone including a junction (primary carriageway)



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of Appendix 1.

Plan DZD7: Works zone including a junction (secondary carriageway)



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

D6.19 END-OF-WORKS ZONE

D6.19.1 The end-of-works zone starts at the end of the works area and continues to the last sign.

D6.19.2 List of plans:

Plan DZE1 End-of-works zone for a dual carriageway road

Plan DZE2 End-of-works zone for a single-lane return changeover from the hard shoulder

Plan DZE3 End-of-works zone for a single-lane return crossover

Plan DZE4 End-of-works zone for a single-lane return crossover with a single-lane changeover from the hard shoulder

Plan DZE5 End-of-works zone for a two-lane return crossover

Plan DZE6 End-of-works zone for a two-lane return crossover with a single-lane changeover from the hard shoulder

PRINCIPLES OF DESIGN FOR THE END-OF-WORKS ZONE

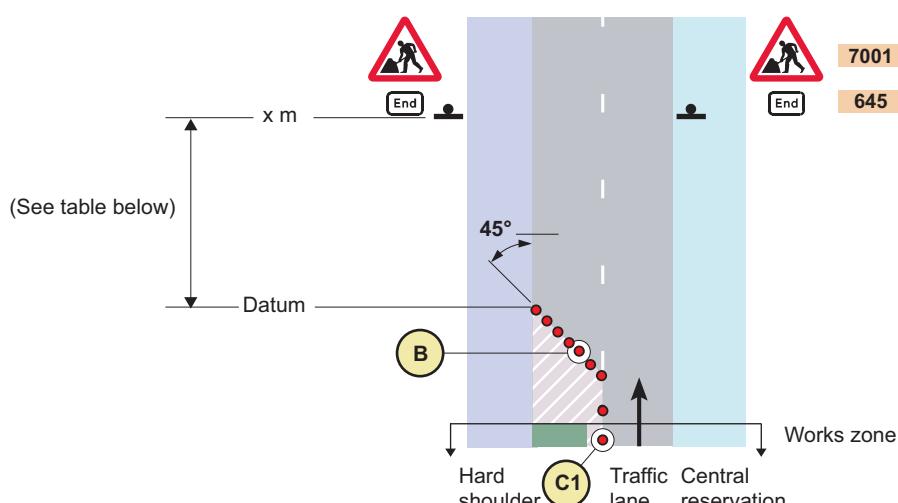
Plan DZE1: End-of-works zone for a dual carriageway road

The principles are as follows:

- for works on dual carriageway roads with a permanent speed limit of 40 mph or less, a "road works" sign (7001) in combination with an "End" plate (645) is placed on the near side and off side of the carriageway, 45 m from the end of the works; for relaxations these signs are not required;
- for dual carriageway roads with a permanent speed limit of 50 mph or more, this sign is placed on the near side and off side of the carriageway, 90 m from the works; and
- if no temporary speed limit is in place the sign on the off side may be omitted

Exit taper:

- an exit taper with coning to Detail B at 45° to the carriageway is required, unless an exit is needed for works traffic in which case the cones may be omitted; see Plan DWA2 in Section D6.22.



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Table 6.7

Speed limit	Distance to final sign "x"
40 mph or less	45 m
50 mph or more	90 m

Plan DZE2: End-of-works zone for a single-lane return changeover from the hard shoulder

Guidance on the design of the changeover is given in [Section D6.6](#).

The principles for moving a lane from the hard shoulder are as follows:

- the minimum signing requirement is the “rejoin main carriageway” sign (7231) with the top panel “REJOIN MAIN CARRIAGEWAY” (7261) at the start of the changeover in advance of the coning; if two lanes are returning then two signs to diagram 7231 are used, one on the near side and one on the off side;
- one “keep left/right” sign (610) at the start of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the changeover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed;
- coning to Detail E is used on the near side;
- coning to Detail F is used on the off side;
- coning to Detail C1 is used on the hard shoulder at the end of the changeover; and
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the works zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1.

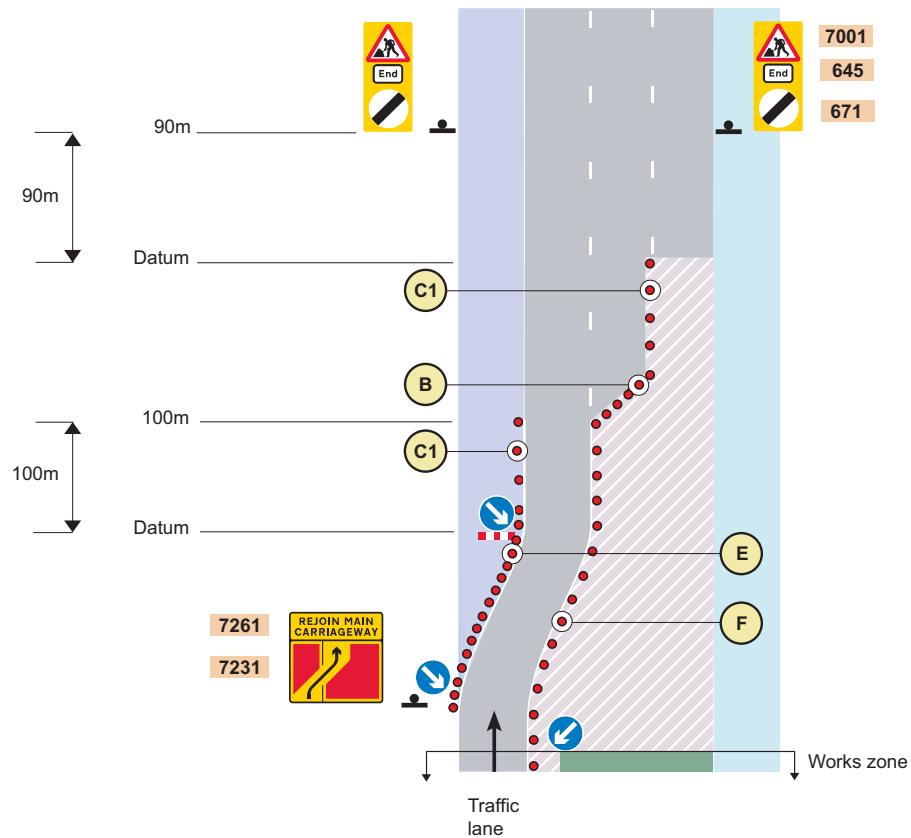
Where works traffic may be merging at the end of the works, additional coning to Detail C1 should be used to prevent traffic moving into the lane. For the additional signing required, see [Plan DWA3](#) in [Section D6.22](#). If the lane will not be used by works traffic then an exit taper with coning to Detail B at 45° to the carriageway is required.

Where the road's permanent speed limit does not change within the works site a sign combining the signs to diagram 7001, 645 and 671 or 670 on a yellow background should be used on both sides of the carriageway to mark the end of the road works and all associated restrictions, in place of the signs to diagram 7001 and 645. Where the permanent speed limit does change terminal speed limit signs are required (see paragraph [D6.19.3](#)).

The principles for works for which relaxations apply are as for standard works except:

- coning to Detail B is used on the near side;
- coning to Detail C1 is used on the off side; and
- following a risk assessment the hard shoulder/lane one raised rib marking may be retained at the changeover.

Plan DZE2: End-of-works zone for a single-lane return changeover from the hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZE3: End-of-works zone for a single-lane return crossover

Guidance on the design of the crossover is given in [Section D6.5](#).

Principles for the crossover are as follows:

- a “return of lane to original carriageway” sign (7215) 50 m in advance of the start of the crossover (this sign may be located towards the end of the works zone);
- coning to Detail F is used on the near side;
- coning to Detail E is used on the off side; this follows on from Detail C1 for a buffer lane (as shown), from Detail H for a buffer zone with standard width lanes and from Detail K for a buffer zone with narrow lanes;
- one “keep left/right” sign (610) at the start of the crossover; if this is placed in a closed lane, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the crossover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; in this context the central reservation is equivalent to either one or two lanes crossed, depending on its width;
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the works zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1; and
- a speed limit repeater sign (670) is required at the start of the crossover, located on the off side, in addition to the standard repeater sign provision.

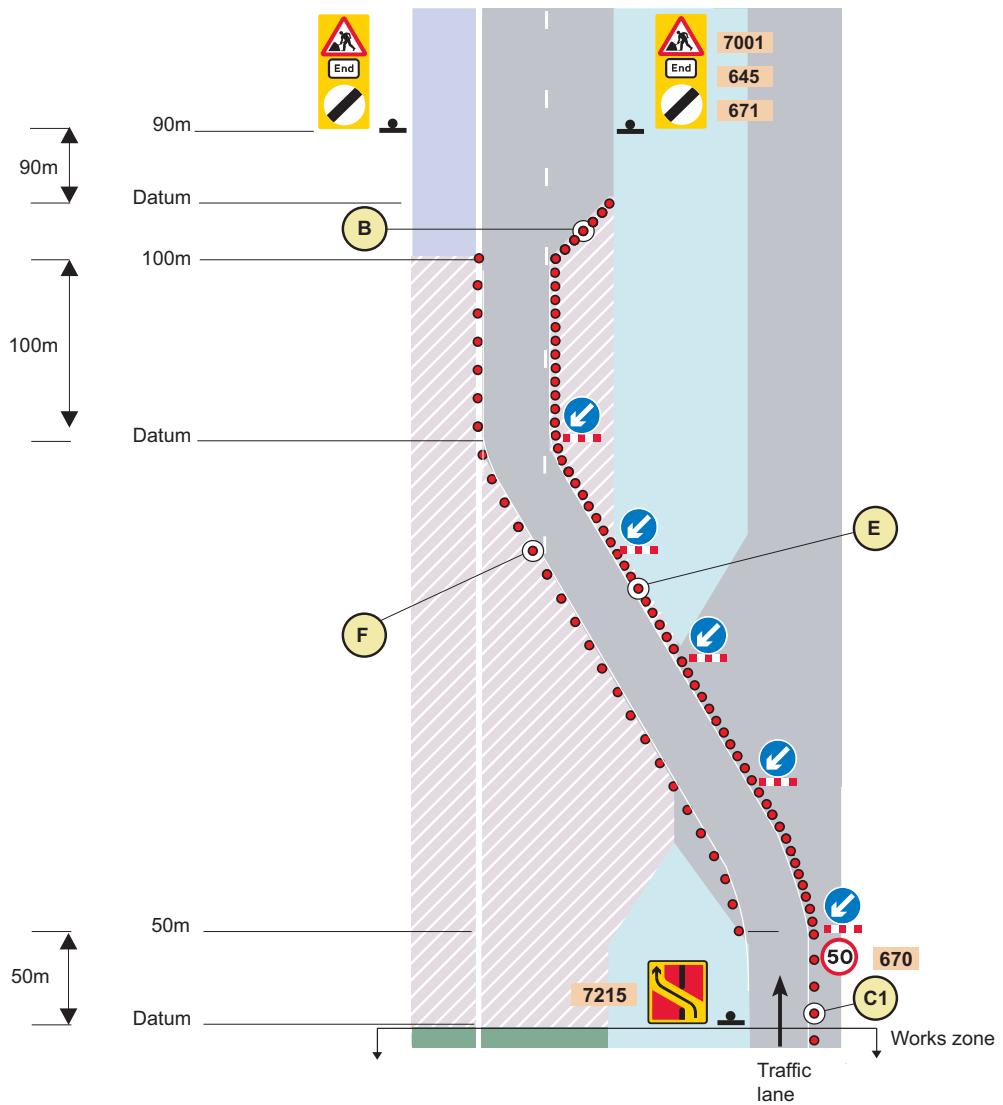
Principles for a single-lane crossover for works for which relaxations apply are as for standard works except:

- coning to Detail C1 is used on the near side; and
- coning to Detail B is used on the off side.

For crossovers with a sharp deviation, see paragraph [D6.5.3](#).

Where the road’s permanent speed limit does not change within the works site, a sign combining the signs to diagram 7001, 645 and 671 or 670 on a yellow background should be used on both sides of the carriageway to mark the end of the road works and all associated restrictions, in place of the signs to diagram 7001 and 645. Where the permanent speed limit does change terminal speed limit signs are required (see paragraph [D6.19.3](#)).

Plan DZE3: End-of-works zone for a single-lane return crossover



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DZE4: End-of-works zone for a single-lane return crossover with a single-lane changeover from the hard shoulder

Guidance on the design of the crossover and changeover is given in [Sections D6.5](#) and [D6.6](#).

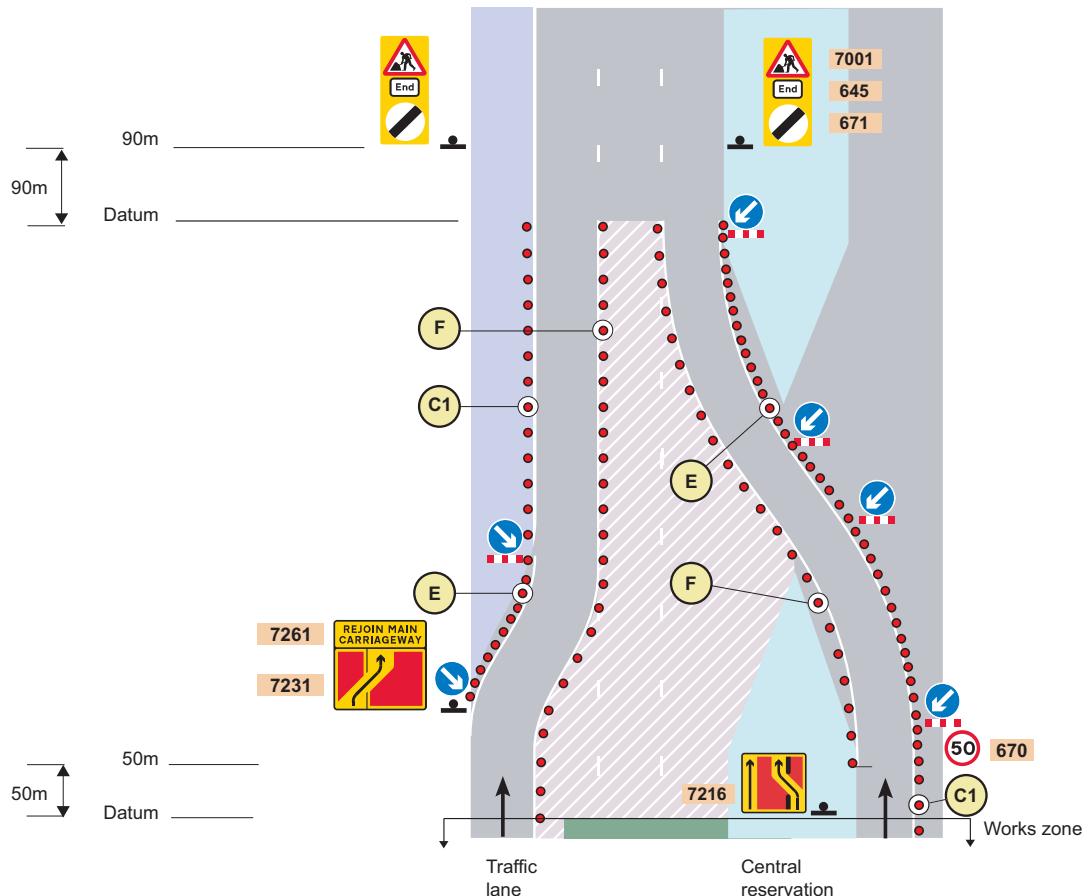
For principles for the changeover see [Plan DZE2](#).

For principles for the crossover see [Plan DZE3](#).

For crossovers with a sharp deviation; see paragraph [D6.5.3](#).

Where the road's permanent speed limit does not change within the works site, a sign combining the signs to diagram 7001, 645 and 671 or 670 on a yellow background should be used on both sides of the carriageway to mark the end of the road works and all associated restrictions, in place of the signs to diagram 7001 and 645. Where the permanent speed limit does change terminal speed limit signs are required (see paragraph [D6.19.3](#)).

Plan DZE4: End-of-works zone for a single-lane return crossover with a single-lane changeover from the hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZE5: End-of-works zone for a two-lane return crossover

Guidance on the design of the crossover is given in [Section D6.5](#).

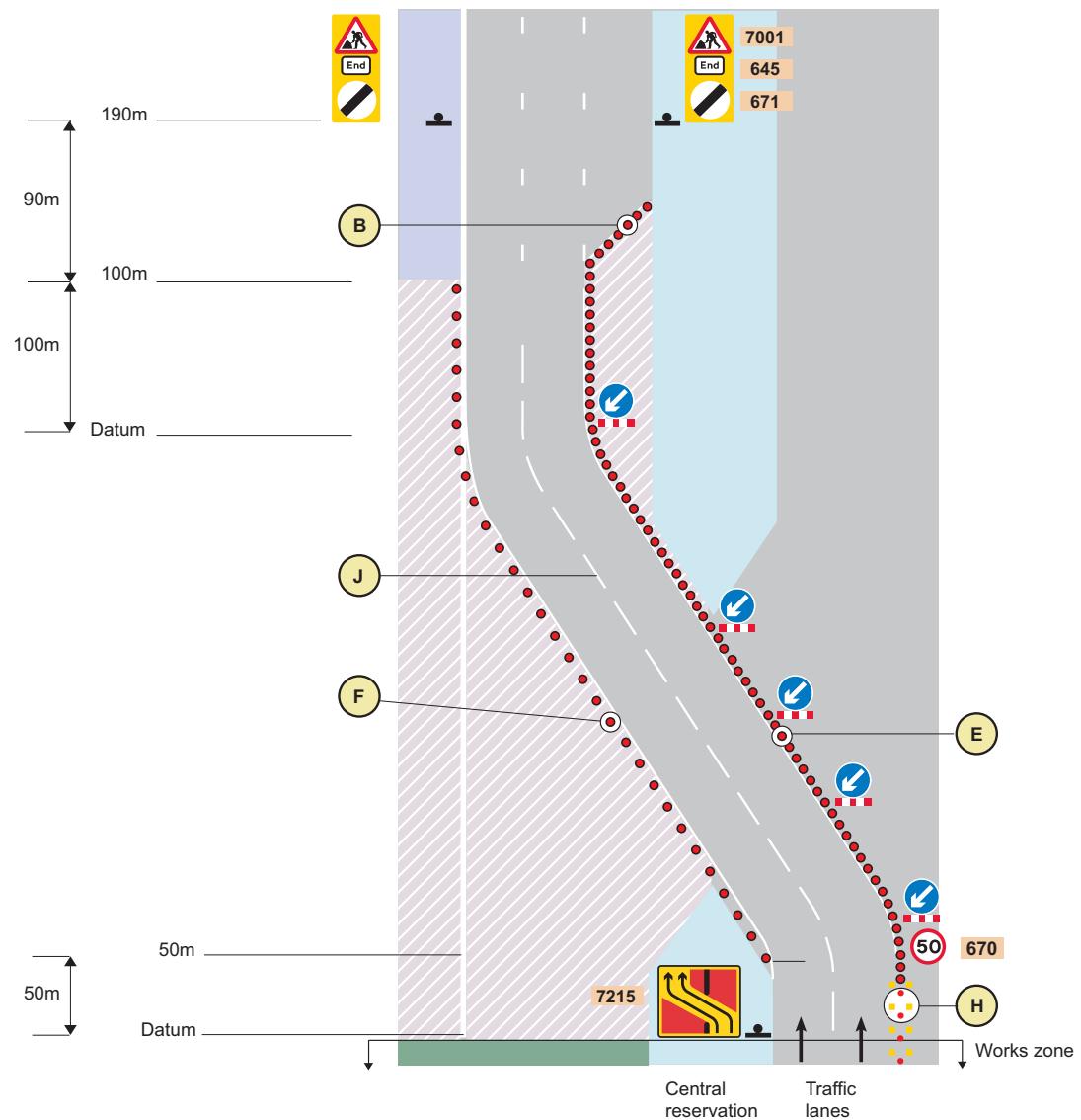
Principles for the crossover are as follows:

- one “lane returns to original carriageway” sign (7215) located on the near side 50 m in advance of the return crossover (this sign may be located towards the end of the works zone);
- coning to Detail F is used on the near side;
- coning to Detail E is used on the off side; this follows on from Detail C1 for a buffer lane, from Detail H for a buffer zone with standard width lanes (as shown) and from Detail K for a buffer zone with narrow lanes;
- one “keep left/right” sign (610) at the start of the crossover; if this is placed in a closed lane, then a “lane closed” barrier (7105) with a high intensity warning light should be added;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of the crossover;
- one “lane closed” barrier (7105) with a high intensity warning light and a “keep left/right” sign (610) at the end of each lane crossed; in this context the central reservation is equivalent to either one or two lanes crossed, depending on its width;
- a temporary mandatory speed limit will be in place; signs to diagram 670 should be continued from the works zone; for the spacing of speed limit repeater signs, see [Table 3.4](#), Note 1; and
- a speed limit repeater sign (670) is required at the start of the crossover, located on the off side, in addition to the standard repeater sign provision.

No relaxations apply.

Where the road’s permanent speed limit does not change within the works site, a sign combining the signs to diagram 7001, 645 and 671 or 670 on a yellow background should be used on both sides of the carriageway to mark the end of the road works and all associated restrictions, in place of the signs to diagram 7001 and 645. Where the permanent speed limit does change terminal speed limit signs are required (see paragraph [D6.19.3](#)).

Plan DZE5: End-of-works zone for a two-lane return crossover



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

Plan DZE6: End-of-works zone for a two-lane return crossover with a single-lane changeover from the hard shoulder

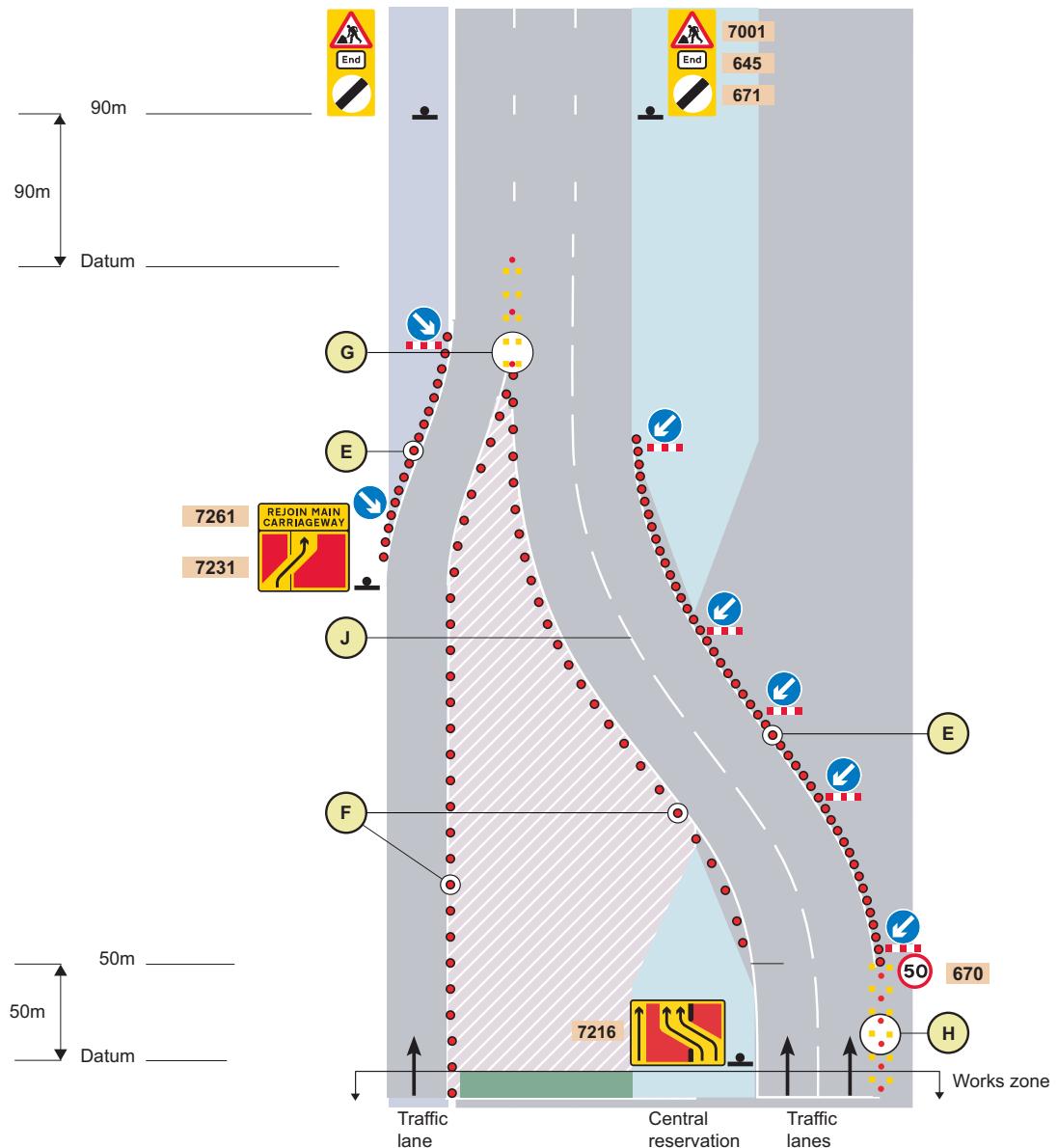
For principles for the changeover see [Plan DZE2](#).

For principles for the crossover see [Plan DZE5](#).

Studs and cylinders to Detail G1 are used for a minimum of 50 m at the return splitter arrangement where the return crossover lanes run alongside the lane that returns from running on the hard shoulder.

Where the road's permanent speed limit does not change within the works site, a sign combining the signs to diagram 7001, 645 and 671 or 670 on a yellow background should be used on both sides of the carriageway to mark the end of the road works and all associated restrictions, in place of the signs to diagram 7001 and 645. Where the permanent speed limit does change terminal speed limit signs are required (see paragraph [D6.19.3](#)).

Plan DZE6: End-of-works zone for a two-lane return crossover with a single-lane changeover from the hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

ADDITIONAL INFORMATION

D6.19.3 On dual carriageway roads, coning may continue after the end of the works area, in particular in the primary direction if there is a works exit present after the contra-flow lanes have returned to the primary carriageway. In these cases the following principles apply:

In the primary direction:

- for non contra-flow works affecting one carriageway only, the coning is to Detail C1 ([Plan DZE2](#)); for works for which a relaxation may apply coning to Detail D may be used;
- for contra-flow works on two-lane dual carriageway roads, coning to Detail F is used on the near side, and coning to Detail E is used on the off side of a single lane returning from the other carriageway ([Plan DZE3](#));
- for contra-flow works on three-lane dual carriageway roads, coning to Detail F is used on the nearside of the carriageway and Detail E on the off side of a single lane returning from the other carriageway, with coning to Detail C1 along the hard shoulder and Detail F on the off side ([Plan DZE4](#)); and
- for contra-flow works on three-lane dual carriageway roads with two lanes returning, coning to Detail F is used on the near side and coning to Detail E on the off side ([Plan DZE5](#)) – however if a single lane has remained on the primary carriageway then Detail G is used to separate the returning lanes from this lane ([Plan DZE6](#)).

In both directions:

- where delays are expected to be moderate or severe, an “end of road works” sign with courtesy message (7006) may be located on the near side 90m from the end of the works on dual carriageway roads with a permanent speed limit of 50 mph or more and 45m on other dual carriageways, in place of the signs to diagram 7001/645, if required by the Highway Authority;
- for high-speed roads where a temporary speed limit has been applied, the “end of road works” sign should be the combined “road works”, “End” plate and permanent mandatory speed limit sign on a single backing board: diagrams 7001, 645 and 671 (national speed limit sign), or 670 for cases where the permanent speed limit is lower than the national speed limit. The assembly will be sited on both sides of the carriageway 90m downstream of the last cone for works on dual carriageway roads with a permanent speed limit of 50 mph or more;
- for all other situations, a sign to diagram 7001 with an “End” plate to diagram 645 should be displayed; the sign should be sited on both sides of the carriageway 90 m downstream of the last cone for works on dual carriageway roads with a permanent speed limit of 50 mph or more and 45 m for works on other dual carriageways; and
- if no temporary speed limit is in place the sign on the off side may be omitted.

D6.20 CARRIAGEWAY CLOSURE

D6.20.1 For short-term works, closure of the carriageway overnight or at a weekend may be appropriate since this allows the works to be carried out quickly with little risk to the workforce. General guidance on the design of road closures and diversions is given in [Section D3.15](#). Before the option of a carriageway closure is chosen, the suitability of the diversion route will need to be assessed along with the increased level of accident risk imposed on the alternative route.

D6.20.2 It is good practice to give advance warning of the closure indicating the time and date when the carriageway will be closed, for example, using the sign to diagram 7002B (see paragraph D4.12.4). Publicity is dealt with in [Section D3.40](#).

D6.20.3 In order to close the carriageway, it will be necessary to deploy temporary traffic management to reduce the number of lanes before requiring the traffic to leave the carriageway. Appropriate traffic management should be designed in accordance with the principles given in [Sections D6.15 to D6.17](#) for the approach, lane-change and lead-in zones.

D6.20.4 An assessment should be made whether to keep one or two lanes open for traffic leaving the carriageway by the exit slip road; this will depend on traffic volumes expected (see [Section D3.4](#)). Usually one lane will be sufficient for an overnight closure.

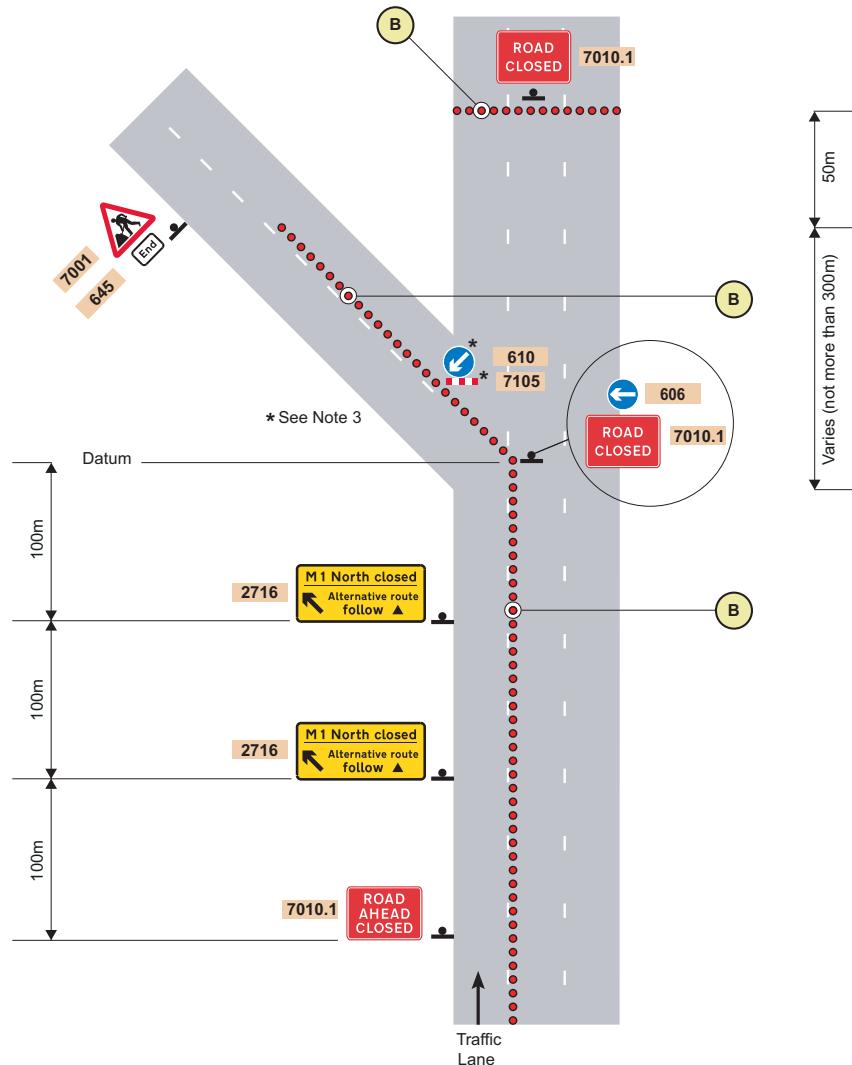
D6.20.5 A typical layout and signing for a carriageway closure is given in [Plan DCC1](#). All coning is to Detail B, and a transverse line of cones and a "ROAD CLOSED" sign variant to diagram 7010.1 should be positioned on the main carriageway 50 m downstream from the final cone on the slip road.

D6.20.6 To intercept any vehicles that may breach the closure, it is advisable for the closure point to be staffed, particularly if there is a works access point.

D6.20.7 If the works site is a significant distance from the closure point, further transverse lines of cones to Detail B and "ROAD CLOSED" sign variant to diagram 7010.1 should be positioned on the main carriageway at 1 km intervals.

D6.20.8 For a short-term carriageway closure, the replacement of permanent road markings at the exit slip road with temporary ones will not usually be needed. For a longer-term closure, for example, over a weekend, the replacement of permanent road markings with temporary ones may be necessary.

Plan DCC1: Example of a signing layout for the complete closure of a dual carriageway road



NOTES:

1. Certain signs have been omitted for clarity.
2. All coning is to Detail B.
3. If the curvature of the exit slip road is severe, the use of signs to diagram 606 and 7104 should be considered.

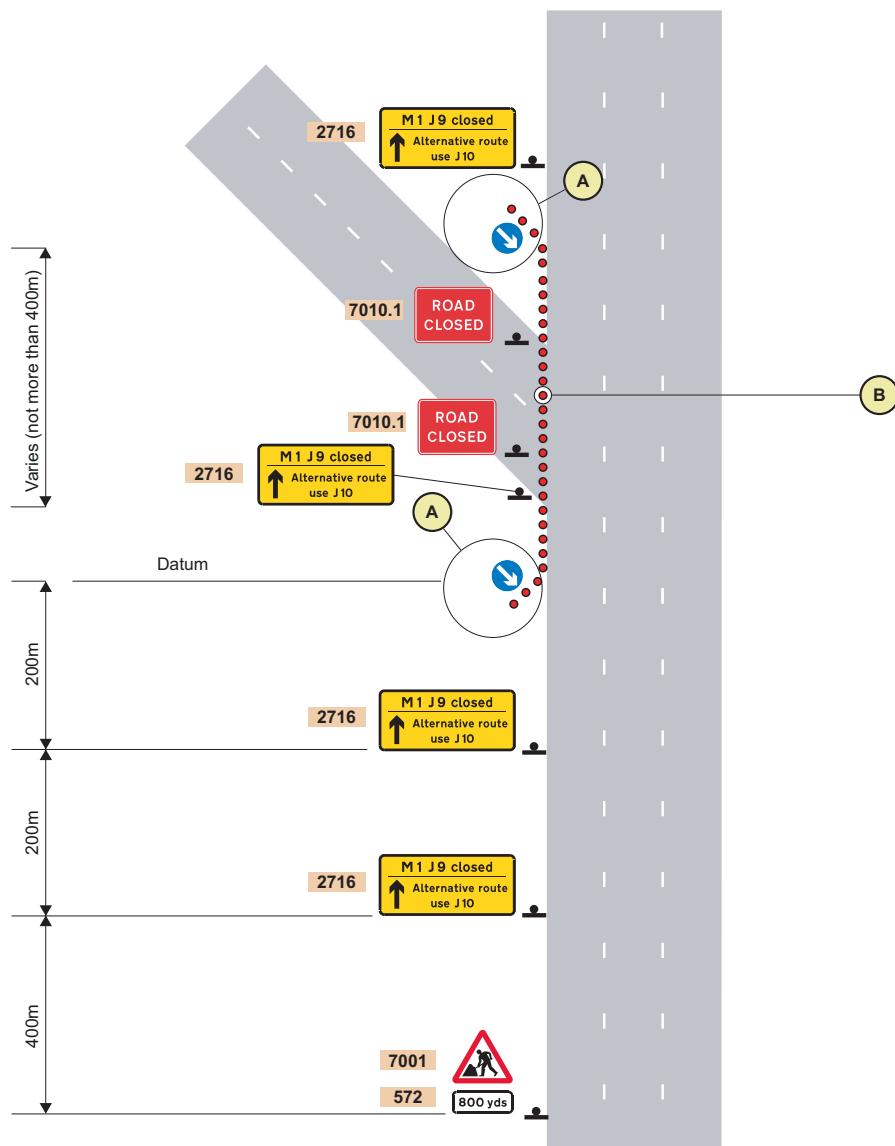
D6.21 SLIP ROAD CLOSURE

D6.21.1 Before the option of a slip road closure is chosen, the consequences to drivers in terms of the length, quality and signing of the diversion route should be considered.

D6.21.2 It is good practice to give advance warning of the closure indicating the time and date when the slip road will be closed, for example, using the sign to diagram 7002B (see paragraph D4.12.4). Publicity is dealt with in [Section D3.40](#).

D6.21.3 Where an exit slip road is closed, a suitable diversion route should also be signed on the main carriageway. The diversion route that is indicated will depend on whether solely a slip road or the full junction is closed and whether the destinations accessed from the affected junction can best be reached via the previous or following junction. Consideration should be given to erecting signs advising of the closure in advance of previous junctions. Variants of signs to diagram 2716 should be used in advance of the slip road and on the carriageway after the slip road to indicate the alternative route to be followed. An example of the signing required is shown in Plan SRC1.

Plan SRC1: Exit slip road closure

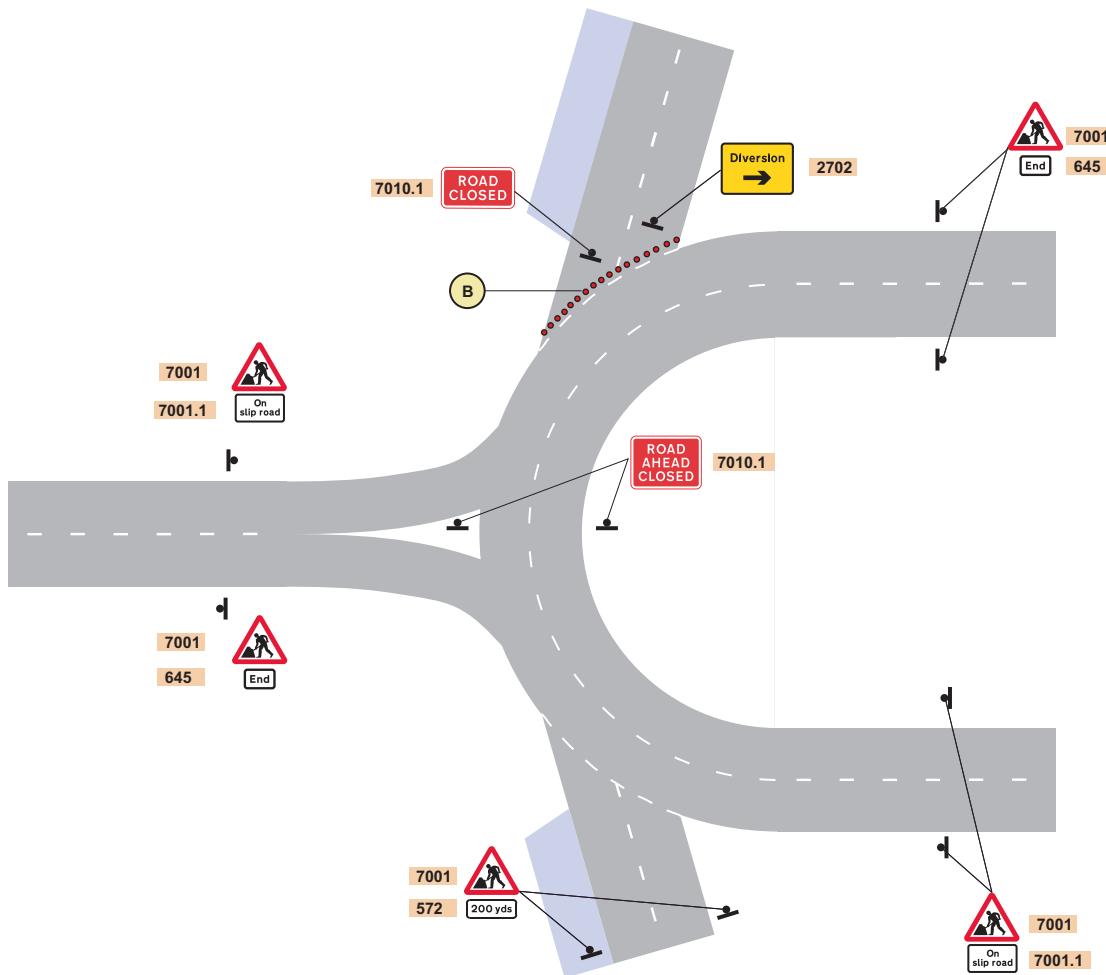


NOTES:

1. Certain signs have been omitted for clarity.
2. All coning is to Detail B.

D6.21.4 Where a motorway or dual carriageway entry slip road is closed a suitable diversion route should be signed. An example of the signing required is given in Plan SRC2. One option, if appropriate, would be to direct traffic onto the opposing carriageway to join the affected carriageway at the previous junction.

Plan SRC2: Entry slip road closure



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. If it is normally unlit, at the top of the slip road the use of temporary floodlighting should be considered to highlight the coning and signing used at the closure.
3. Keys to the plan are given in Tables A1.4 and A1.5 of Appendix 1.

D6.22 WORKS ACCESSES AND EXITS

D6.22.1 Works accesses and exits are covered in [Section D3.21](#). Care needs to be taken to ensure that signs are positioned so that they can be seen by road users and do not prevent works vehicles from accessing the site or exiting from the site safely.

D6.22.2 The principles for signing works accesses and exits are as follows.

D6.22.3 For works located on the near side of the carriageway of a dual carriageway road with a hard shoulder, entry to the works area is from the hard shoulder ([Plan DWA1](#)).

The principles are:

- a "WORKS ACCESS ONLY 100yds" * sign (7306) is placed on the near side 100m in advance of the works access;
- a "WORKS TRAFFIC ONLY" sign (7301 variant) is placed on the near side at the start of the works access, opposite the start of the entry taper;
- a "WORKS TRAFFIC MERGING 100yds" * sign (7307) is placed within the safety zone coning adjacent to the near side running lane 100m in advance of the works exit; and
- a "WORKS EXIT" sign (7302) is placed on the near side at the works exit at the end of the works.

If a risk assessment indicates that locating the site access just prior to the taper is likely to cause confusion then the coning in advance of the taper should be lengthened to 50m.

If the hard shoulder is of insufficient width for the required access, then access will be required from the single running lane past the works, see [Plans DWA2](#) and [DWA3](#). Works exit may also be required into the running lane, see paragraph [D6.22.6](#) below.

* Signs to diagrams 7306 and 7307 may have the distances varied if required.

D6.22.4 For works located on the near side of the carriageway of a dual carriageway road without a hard shoulder, entry to the works area is from the safety zone in advance of the works area ([Plan DWA2](#)). The principles are:

- a "WORKS ACCESS ONLY 100yds" * sign (7306) is placed on the near side, after the end of the entry taper, 100m in advance of the works access;
- a "WORKS TRAFFIC ONLY" sign (7301 variant) is placed on the near side immediately before the start of the works access;
- a "WORKS TRAFFIC MERGING 100yds" * sign (7307) is placed within the safety zone coning adjacent to the near side running lane 100m in advance of the works exit;
- a "WORKS EXIT" sign (7302) is placed on the near side at the works exit at the end of the works; and
- coning to Detail B is used either side of the entry for works traffic.

* Signs to diagrams 7306 and 7307 may have the distances varied if required.

D6.22.5 For works located on the off side of the carriageway of a dual carriageway road, entry to the works area is from the safety zone in advance of the works area ([Plan DWA3](#)).

The principles are:

- a “WORKS ACCESS ONLY 100yds”* sign (7306) is placed on the off side, after the end of the entry taper, 100m in advance of the works access;
- a “WORKS TRAFFIC ONLY” sign (7301 variant) is placed within the safety zone coning adjacent to the off side running lane immediately before the start of the works access;
- a “WORKS TRAFFIC MERGING 100yds”* sign (7307) is placed within the safety zone coning adjacent to the off side running lane 100m in advance of the works exit;
- a “WORKS EXIT” sign (7302) is placed on the off side in the central reservation at the works exit at the end of the works; and
- coning to Detail B is used either side of the entry for works traffic.

In locating the entry for works traffic consideration should be given to the volume of delivery vehicles particularly during surfacing operations to ensure adequate storage space is available within the works area to keep the access point clear at all times.

* Signs to diagrams 7306 and 7307 may have the distances varied if required.

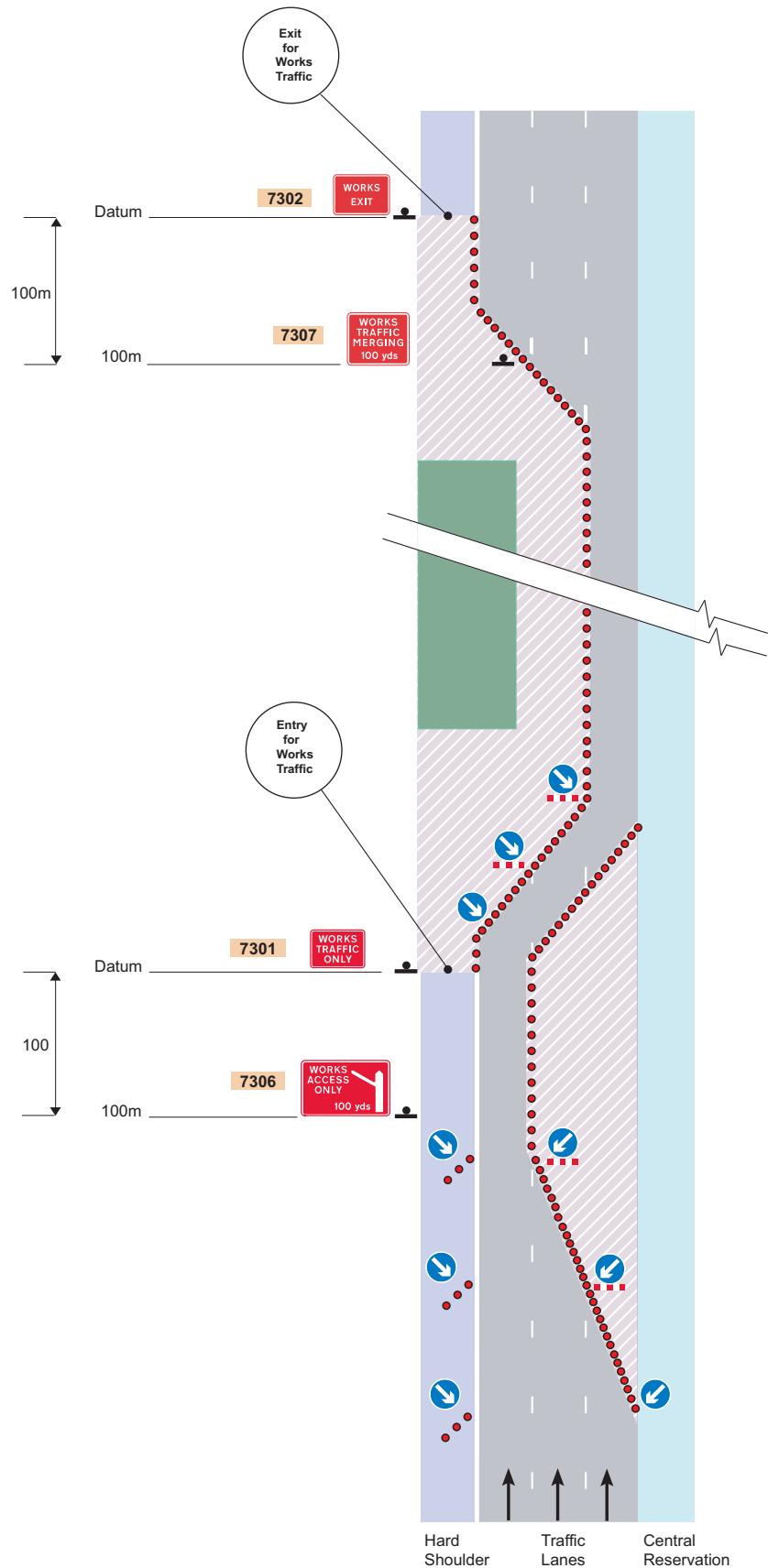
D6.22.6 When partial contra-flow works are in progress, works traffic may not be able to exit from the works into a dedicated running lane (see [Plan DZE6, Section D6.19](#)). In such cases exit from the works area will be required through the safety zone following the works area. Exit into the near side lane is preferable to the contra-flow lane.

The principles for such an exit are:

- a “WORKS TRAFFIC MERGING 100yds” sign (7307) is placed within the safety zone 100yds in advance of the works exit;
- a “WORKS EXIT” sign (7302) is placed within the safety zone immediately before the works exit; and
- coning to Detail B is used either side of the exit for works traffic.

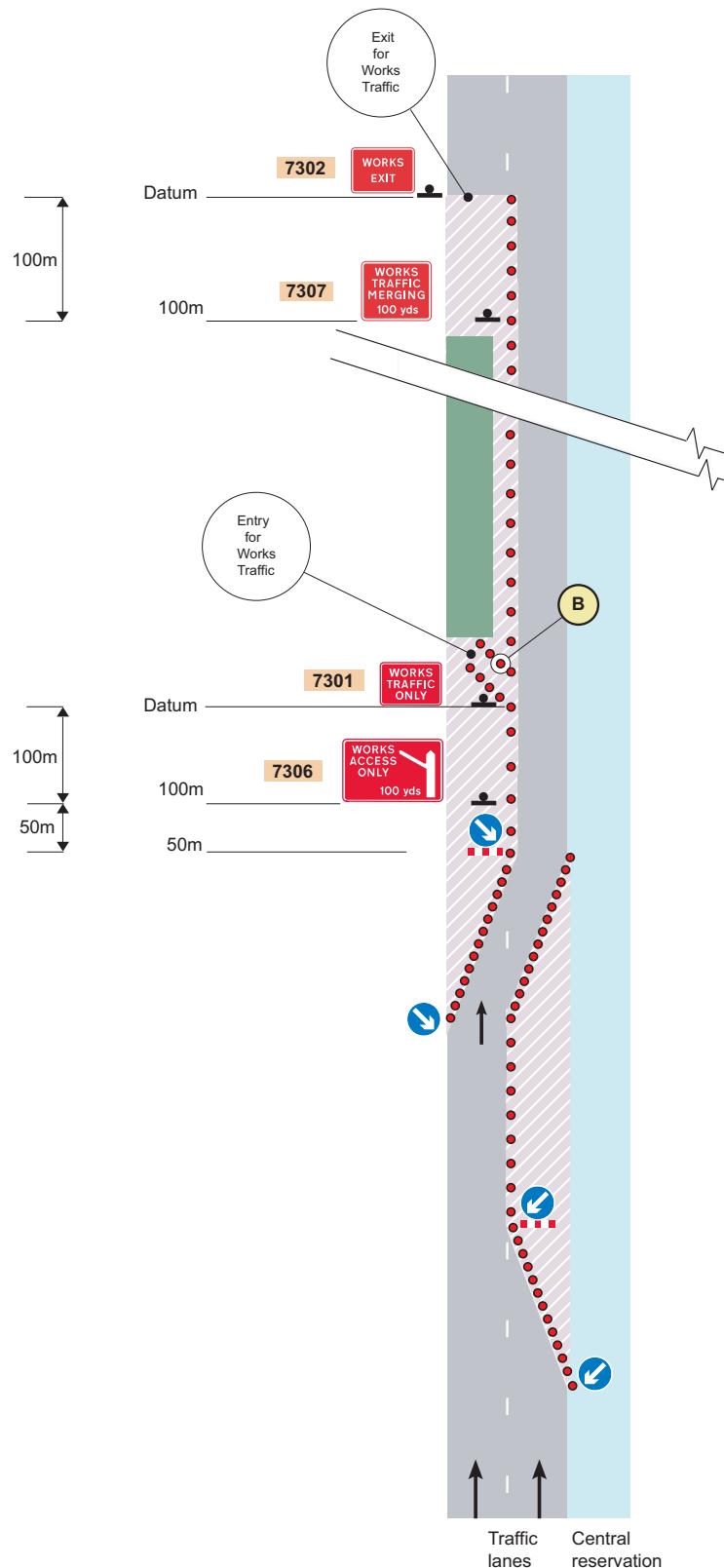
D6.22.7 The following plans show the signs specifically required for signing works accesses and exits. These supplement the normal traffic management signing shown in [Sections D6.15 to D6.19](#). Only coning and certain selected signs have been shown for clarity.

Plan DWA1: Works access and exit for works located on the near side of a dual carriageway road with a hard shoulder



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

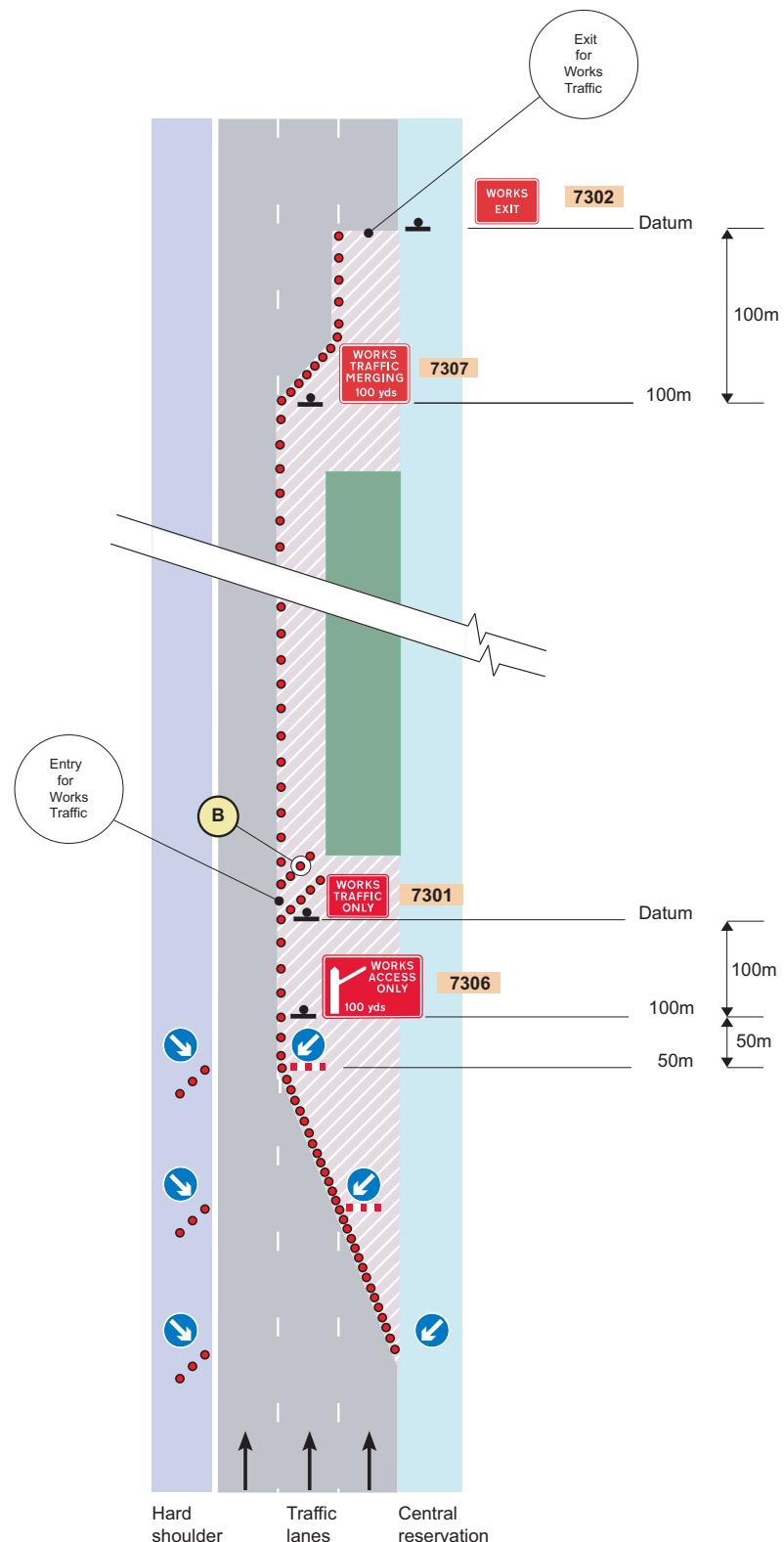
Plan DWA2: Works access and exit for works located on the near side of a dual carriageway road without a hard shoulder



Notes:

1. The use of close spaced coning, for example, to Detail C2, either side of the works access point may aid works vehicles locating the works access from a distance.
2. Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DWA3: Works access and exit for works located on the off side of a dual carriageway road



Notes:

1. The use of close spaced coning, for example, to Detail C2, either side of the works access point may aid works vehicles locating the works access from a distance.
2. Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

D6.23 MERGE IN TURN SIGNING

D6.23.1 This section provides guidance on the use of merge in turn signing which may be used to supplement lane closure signing at sites where a two-lane dual carriageway is being reduced to one lane, and regular and substantial queuing is likely to occur. It is likely to be particularly useful at sites where single-lane queues block back and affect secondary junctions.

D6.23.2 There is currently no evidence to indicate that merge in turn signing is suitable for three to one or three to two-lane closure situations and therefore such signing arrangements for carriageways with three or more lanes are not included in this document.

D6.23.3 Merge in turn is the process of two traffic flows combining into one by shared alternate priority.

D6.23.4 Merge in turn should only be considered when significant queuing is likely on the approach to lane closures at road works for substantial parts of the day. It should be noted, however, that the technique involves the deployment of a significant number of additional signs.

D6.23.5 The equal use of both lanes for queuing shortens the physical extent of the queues and so reduces delays arising from interference with upstream junctions.

D6.23.6 Merge in turn signing should be used only where there is a temporary mandatory speed limit of 50 mph or less imposed at the works site.

D6.23.7 Merge in turn is facilitated by using signs "WHEN QUEUING USE BOTH LANES" and "MERGE IN TURN" in addition to the standard temporary lane closure signing. Both signs should carry legends with an x-height of 125 mm (175 mm capital letter height), use white legend on a red background when used on all-purpose roads, and black legend on a yellow background on motorways. The legend on each sign should be arranged to read as follows:

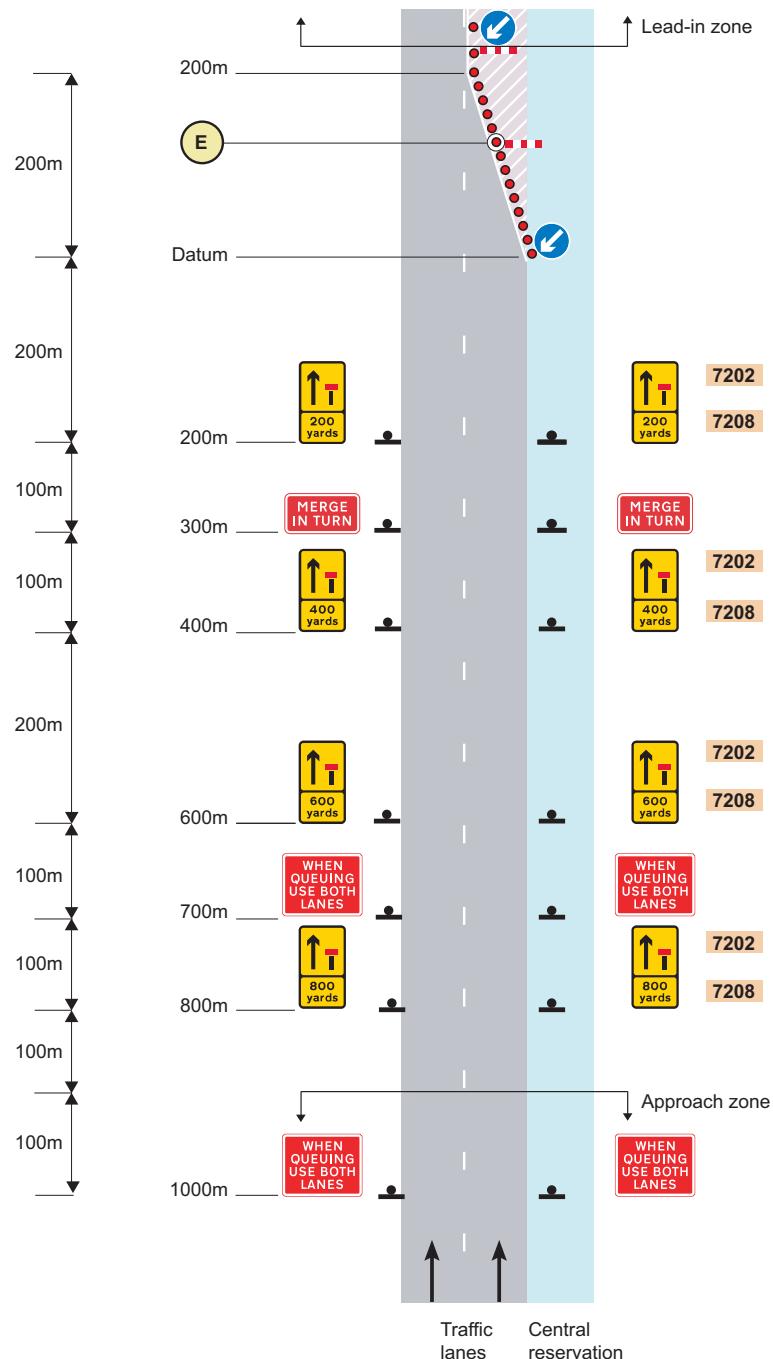
WHEN	
QUEUING	MERGE
USE BOTH	IN TURN
LANES	

D6.23.8 The "WHEN QUEUING USE BOTH LANES" sign should be located on both sides of the carriageway and located 1000 m and 700 m in advance of the taper, and for longer queues at 500 m intervals to the furthest point upstream to which queues are likely to extend. The "MERGE IN TURN" sign should be deployed on both sides of the carriageway and located 300 m in advance of the taper. [Plan DMT1](#) shows a simple merge in turn layout.

D6.23.9 Merge in turn signing does not require special sign authorisation because it is deemed to be prescribed by regulation 53(1)(e)(i) in TSRGD 2002. The use of the two merge in turn signs, described in paragraphs [D6.23.7](#) and [D6.23.8](#) above and illustrated in [Plan DMT1](#), is recommended when merge in turn signing is being considered for works in England.

D6.23.10 The design of the merge in turn signs used in Wales and Scotland may differ from that specified in paragraphs [D6.23.7](#) and [D6.23.8](#). When the use of such signing is being considered in one of these countries, the appropriate Overseeing Organisation should be consulted.

Plan DMT1: Example of a simple merge in turn signing layout on an all-purpose dual carriageway road



NOTES:

1. Certain signs have been omitted for clarity.
 2. "WHEN QUEUING USE BOTH LANES" signs, on both sides of the carriageway, should be extended, at 500 m intervals, to the limit of likely queues.
 3. The design of the sign may be different in Wales and Scotland (see paragraph D6.23.10).

D6.24 MOBILE TRAFFIC MANAGEMENT

D6.24.1 Work may be carried out on dual carriageway roads using single vehicles standing or operating in the carriageway. Single vehicle works are dealt with in [Part 2: Operations, Section O8](#).

D6.24.2 Mobile traffic management is used for mobile road works which involve short-duration lane closures where the traffic signs used are essentially vehicle mounted, although some static signs may also be required. The works must be carried out in good visibility only. They include continuous mobile operations, as well as those which involve movement and periodic stops and short-duration static works and may be carried out on carriageways both with and without hard shoulders. They also include minor works, often to public utilities, carried out from a single or a small number of vehicles.

D6.24.3 Mobile works should be carried out only during periods of low risk and during low traffic flows when congestion is unlikely to occur. Agreement of the Highway Authority may be necessary.

D6.24.4 Works on roads with full-width hard shoulders should be carried out using the Mobile Lane Closure (MLC) technique, except for inspection stops and salting and gritting operations which may be carried out as single vehicle works as described in [Section D6.25](#).

D6.24.5 Works on dual carriageway roads without hard shoulders for which the national speed limit applies should be carried out using MLC techniques, except for works carried out at normal road speeds such as salting and gritting. Works on dual carriageway roads with speed limits less than the national speed limit may be carried out using either single vehicle works or MLC techniques.

D6.24.6 The types of continuously mobile works which may be carried out using these techniques include:

- road marking;
- weed spraying (particularly on central reservations);
- grass cutting;
- overband joint sealing;
- replacement of inserts in depressible road studs; and
- longitudinal work on the hard shoulder or central reservation.

D6.24.7 Other works operations which involve repeated movement along the road and periodic stops and short-duration static works may also be carried out using these techniques. Examples are:

- road lighting maintenance;
- fire hydrant checking;
- gully emptying;
- some works arising from the Code of Practice for Highway Maintenance, including condition surveys such as CHART, concrete carriageway inspections and work associated with Routine Maintenance Management Systems (RMMS); and
- some public utilities works.

Signs to diagram 7001 should be used with the appropriate supplementary plate to diagram 7001.1.

D6.24.8 Signs on the carriageway and hard shoulder must always be vehicle or trailer-mounted. Signs on the verge may be vehicle or trailer-mounted or static.

D6.25 SINGLE VEHICLE WORKS

D6.25.1 When it is necessary to work across junctions, a static 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. If the works are on one side of the junction only, a plate to diagram 573 should be used. Distances may be omitted.

D6.25.2 Works such as gritting and salting and works undertaken at normal road operating speeds should not normally require special precautions other than those appropriate to the specialist vehicle concerned. Exceptionally, where the scale of these operations is unusual, a sign to diagram 7001 with appropriate supplementary plate "Gritting" or "Salting" to diagram 7001.1 variant should be used to give advance warning. The use of a VMS message, "GRITTING IN PROGRESS", should be considered in support of motorway gritting operations.

D6.26 MOBILE LANE CLOSURE TECHNIQUE

D6.26.1 The MLC technique is not suitable for use on single carriageway roads with the exception of one-way slip roads. It is best suited to work on motorways and other dual carriageway roads with hard shoulders. In these circumstances, the technique can be used day or night (regardless of the presence of street lighting). MLCs can also be carried out on dual carriageway roads without hard shoulders but these operations are more complicated and greater care and preparation are required. Night-time operations on roads without hard shoulders can be especially problematic and while they can be used they are much more difficult to plan and execute.

D6.26.2 The designer should note that the MLC technique uses fewer lane closure signs than static traffic management signs. The advance signs should be positioned to concentrate the warning information presented to passing drivers by ensuring that they are able to see, at any instant, at least two consecutive signs.

D6.26.3 On wider carriageways there is an increased likelihood that the mobile advance sign vehicles on the hard shoulder will be obscured by vehicles on the near side lanes to motorists in the off side lanes. The use of motorway signals should be considered to provide additional warning in support of the mobile sign vehicles.

D6.26.4 When deciding on the acceptability of the use of the MLC technique the designer must carry out an initial risk assessment to confirm that the proposed method of working minimises the risk compared with alternative ways of carrying out the same work. 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 Part 2: Operations, Sections O10.7 and O10.8), matrix signals, and Variable Message Signs (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. Control measures could include the use of higher visibility light arrows (see Part 2: Operations, Sections O10.7 and O10.8), matrix signals and VMS.

D6.26.5 The use of MLC techniques is restricted by certain traffic volume parameters, see Table 6.8 below. 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 permanent speed limit of 40 mph or less will probably be limited and would require a detailed risk assessment.

Table 6.8 Maximum allowable traffic flows for MLCs

Type of closure	Maximum allowable traffic flow	
	Veh/hr	Veh/3 mins
Dual two-lane carriageway		
Lane 1	1200	60
Lane 2	1200	60
Dual three-lane carriageway		
Lane 1	2400	120
Lane 3	2700	135
Lane 1 + 2	1200	60
Lane 2 + 3	1200	60
Dual four-lane carriageway		
Lane 1	3600	180
Lane 4	3900	195
Lane 1 + 2	2400	120
Lane 3 + 4	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 [Part 2: Operations, Section O10.4](#).
- 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) ([Part 2: Operations, Section O10.5](#)) and the light arrow sign ([Part 2: Operations, Sections O10.7 and O10.8](#)) should be used.
- For work on four-lane dual 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 [Part 2: Operations, Sections O10.7 and O10.8](#).

D6.26.6 Full details of the operations of the Mobile Lane Closure technique are given in [Part 2: Operations, Section O10](#).

D6.27 MOBILE CARRIAGEWAY CLOSURE TECHNIQUE

D6.27.1 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.

D6.27.2 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.

D6.27.3 On wider carriageways the mobile carriageway closure technique can be used to set up and remove off side traffic signs and cones. This avoids the need for personnel to cross live traffic lanes.

D6.27.4 The technique may be used for temporary traffic management operations that have been planned, for example, the installation of temporary traffic management layouts, contra-flow crossovers, 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).

D6.27.5 Details of the operation of the Mobile Carriageway Closure technique are given in [Part 2: Operations, Section O11](#). Planning issues, for example, the working windows possible and also consideration of likely queue lengths are considered in [Section O11.4](#).

D6.28 TIDAL FLOW

D6.28.1 At sites where there is a marked daily change in the direction of the dominating flow, contra-flow schemes can be modified to permit tidal flow operation. This allows additional lanes to be run in the direction of the higher flow at the expense of the other (less trafficked) direction, reversing as necessary the configuration to accommodate changes in the balance of flows.

D6.28.2 During the design stage, it is essential to determine the tidality of the traffic flow, not only to be able to predict the effectiveness of the proposed traffic management system, but also to determine the time when the lanes should be changed.

D6.28.3 Consideration needs to be given to the installation procedure. Tidal flow layouts take longer to set out (and to change phases) than conventional contra-flow systems, due in part to the additional buffer zone. Given the amount of equipment to install and the requirement that the layout cannot be left in an unsafe temporary configuration, the feasibility of installation should be addressed at the design stage of the scheme. This would need to take account of the traffic flows and windows of opportunity.

D6.28.4 Consideration should be given to the practicability of installing a signing system where the legends of signs that need to be changed can be operated electronically.

D6.28.5 Full tidal flow systems on two-lane carriageways are shown in [Figure 6.2](#). Approaching traffic is marshalled into lanes and guided through the contra-flow. Access to, and exit from, the tidal lane is controlled by "gates" at key locations as shown in [Figure 6.2](#) and [Plans DTF1, DTF2 and DTF7](#) in [Section D6.29](#). Each "gate" should be formed by a line of traffic cones, at 1.5 m centres (Detail B) and, at the gates at which there is a reduction in traffic lanes, there shall also be three "lane closed" barriers to diagram 7105, each surmounted by a "keep left/right" sign to diagram 610.

D6.28.6 It is not possible to operate partial contra-flow system on a two-lane carriageway.

D6.28.7 Tidal flow systems on three-lane carriageways are shown in [Figure 6.4](#) for a full contra-flow system and in [Figure 6.6](#) for a partial contra-flow arrangement. There is a limitation to the use of full contra-flow systems which arises from the match between lane allocation (1+3 and 2+2) and the peak traffic demand pattern.

D6.28.8 In order to provide a second buffer zone to a full contra-flow narrow lane layout (3+2) for a standard carriageway, the lane widths would have to be less than the absolute minimum dimensions given in paragraph [D6.3.2](#) and so this option should not be considered.

D6.28.9 A temporary mandatory speed limit will be in place and signs to diagram 670 should be located as indicated in [Table 3.4](#) in [Section D3.7](#).

TIDAL FLOW CONDITIONS

D6.28.10 With tidal flow operations, approaching traffic is marshalled into physically divided lanes which then guide the vehicles through the contra-flow. Access to the tidal lane is controlled by four “gates” at key locations. There are two operating conditions for each tidal flow operation depending on the direction of flow along the tidal lane.

D6.28.11 Table 6.9 specifies the tidal flow operating conditions. For each condition shown, the first number is the number of lanes running in the primary direction, the second is the number of lanes running in the secondary direction.

Table 6.9 Tidal flow operating conditions

Tidal flow operation	Condition 1	Condition 2
Full contra-flow on two-lane carriageway (Figures 6.2 and 6.3)	1 + 2	2 + 1
Full contra-flow on three-lane carriageway (Figures 6.4 and 6.5)	1 + 3	2 + 2
Partial contra-flow on three-lane carriageway (Figures 6.6 and 6.7)	2 + 3	3 + 2

NOTE: Partial contra-flow is not operated on two-lane carriageways

D6.28.12 In the following figures, the convention is adopted that a gate is “open” if it lies parallel to the carriageway lane lines, and “closed” when it is drawn at an angle across the lane.

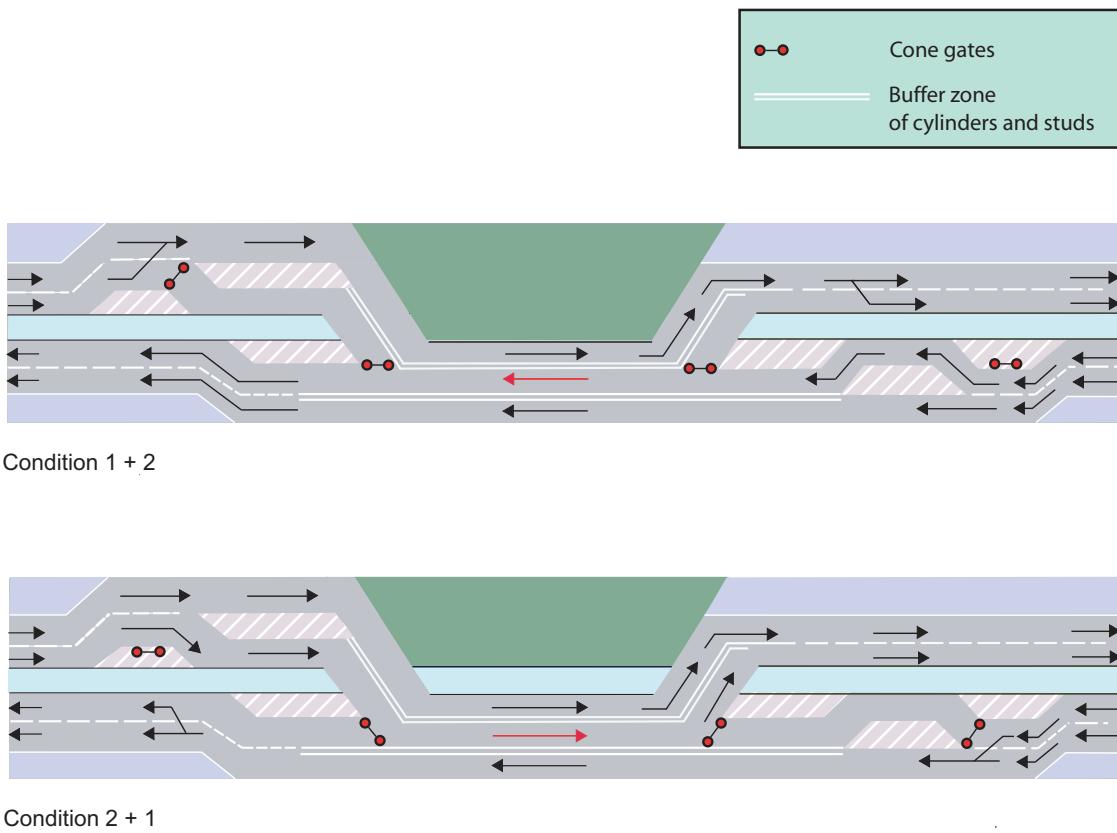
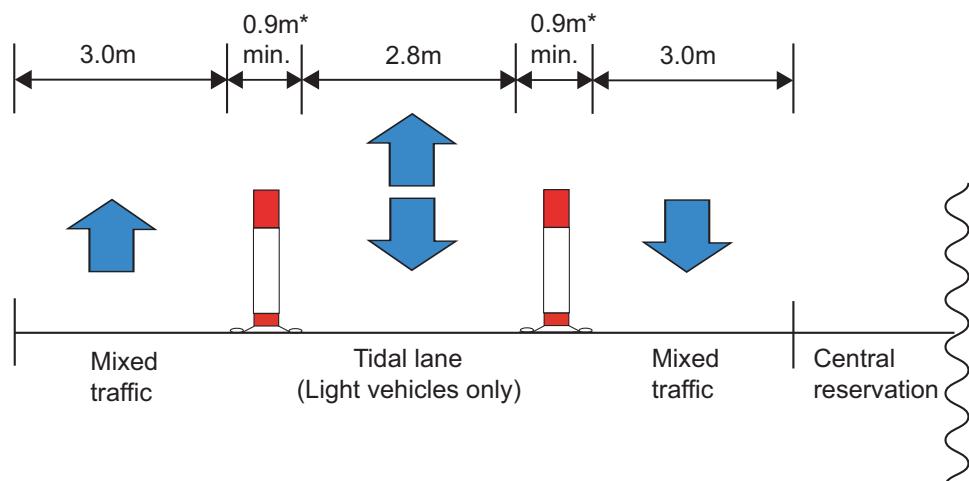


Figure 6.2 Schematic of tidal flow layout for full contra-flow on two-lane carriageways



* Existing stud insert housings may be used for the cylinders. The rows of saturn yellow studs either side of the cylinders should be positioned to maintain a 0.9m minimum width of buffer zone (Detail K). Dimensions for the cylinder buffer zone width are to the outside edge of the studs.

Figure 6.3 Cross section of tidal flow layout for full contra-flow on two-lane carriageways

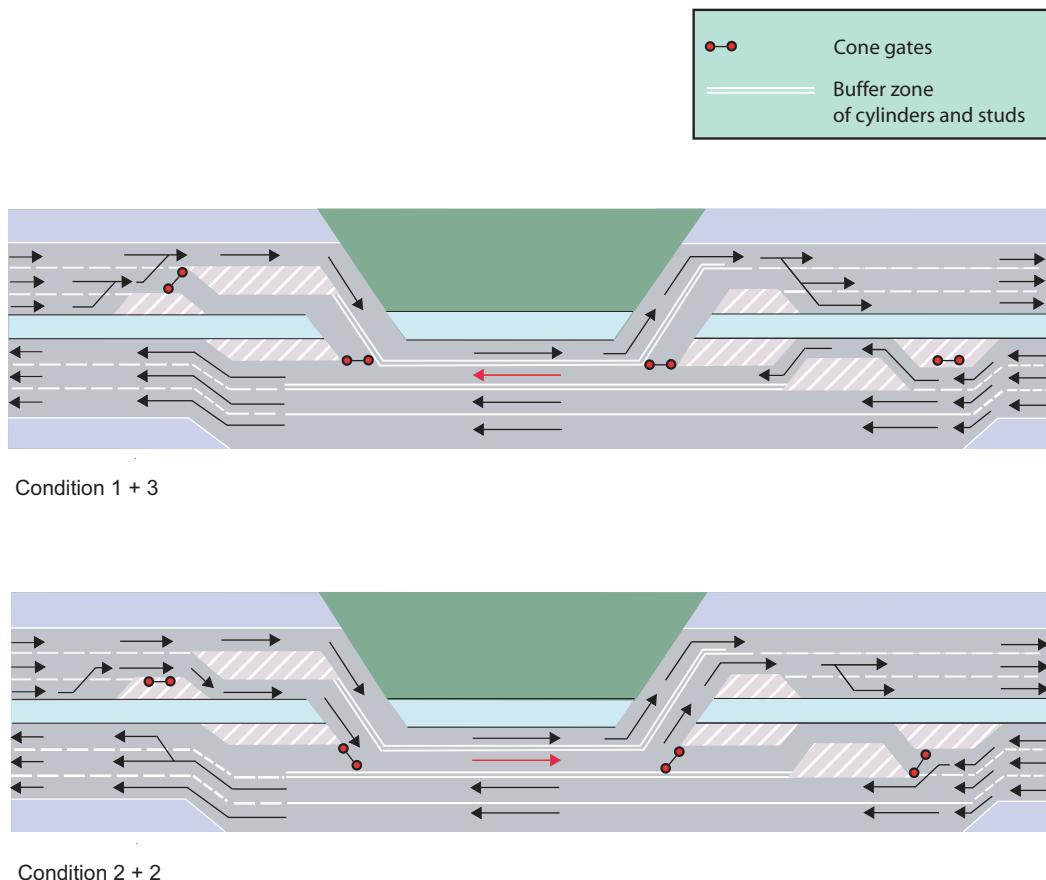
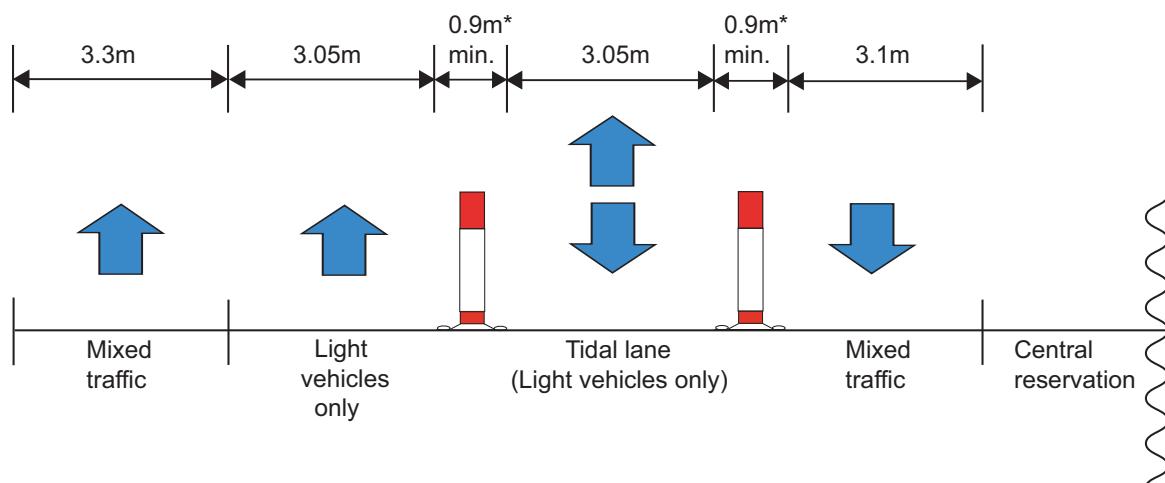


Figure 6.4 Schematic of tidal flow layout for full contra-flow on three-lane carriageways



* Existing stud insert housings may be used for the cylinders. The rows of saturn yellow studs either side of the cylinders should be positioned to maintain a 0.9m minimum width of buffer zone (Detail K). Dimensions for the cylinder buffer zone width are to the outside edge of the studs.

Figure 6.5 Cross section of tidal flow layout for full contra-flow on three-lane carriageways

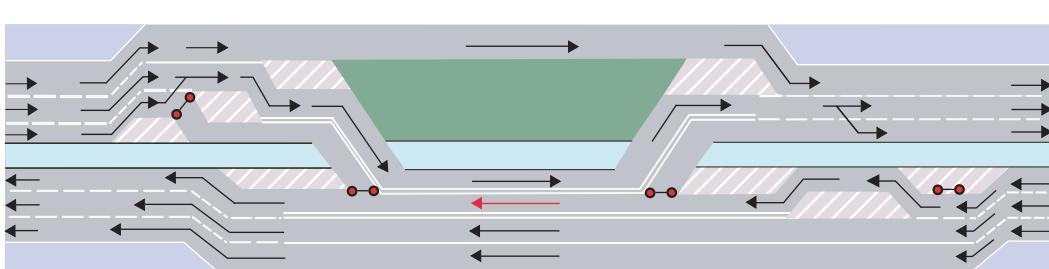
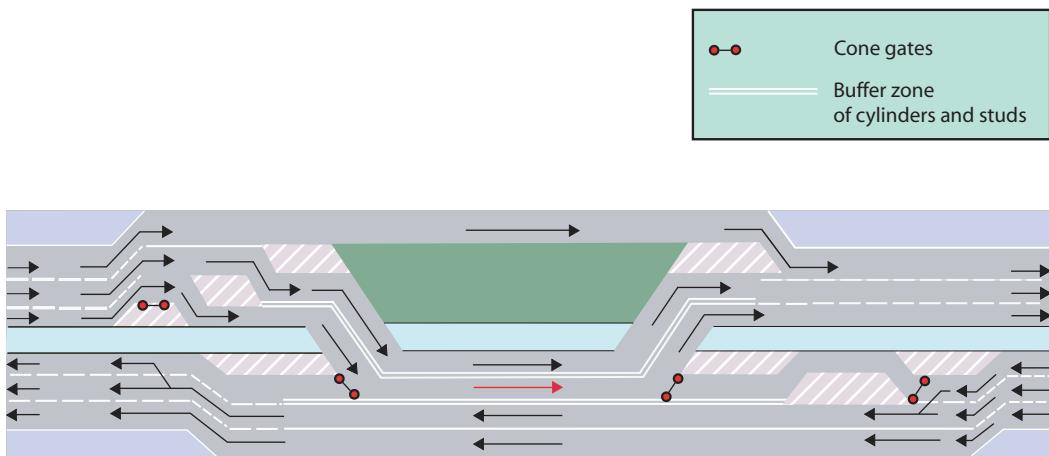


Figure 6.6 Schematic of tidal flow layout for partial contra-flow on three-lane carriageways

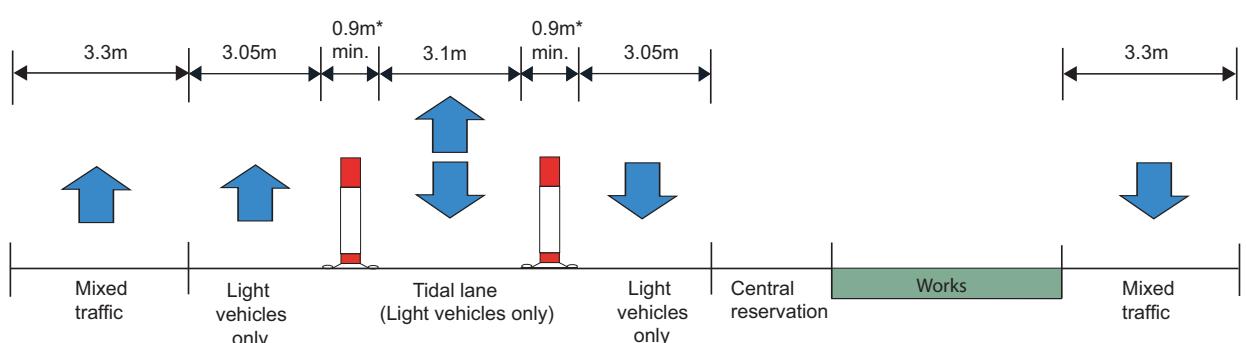


Figure 6.7 Cross section of tidal flow layout for partial contra-flow on three-lane carriageways

D6.29 PRINCIPLES AND PLANS FOR TIDAL FLOW OPERATIONS

THE APPROACH ZONE

D6.29.1 The principles for approach signing for tidal flow operations are as shown in [Plan DZA3](#).

THE LANE-CHANGE ZONE

D6.29.2 If a lane closure is involved in the lane-change zone then the detailed principles and signing requirements are as shown in [Plan DZB9](#).

D6.29.3 If no lane closure is involved then the detailed principles and signing requirements are as shown in [Plan DZB10](#).

THE LEAD-IN ZONE

D6.29.4 This zone includes crossovers, i.e. moving lanes, and the initial crossover.

D6.29.5 The detailed principles and signing requirements for moving lanes to the hard shoulder are as shown in [Plan DZC4](#).

D6.29.6 The detailed principles and signing requirements for moving lanes across the carriageway are as shown in [Plans DZC2 and DZC3](#).

ADVANCE WARNING SIGNS

D6.29.7 The type and exact location of the advance warning signs vary with the direction of flow and the condition in operation.

D6.29.8 For lane closures, signs are placed on the near side and off side at 600 m, 400 m and 200 m measured from the start of the closed gate.

D6.29.9 In the primary direction, the following signs are required:

For full contra-flow on two-lane carriageways ([Plan DTF1](#)):

- for Condition 1 + 2:
 - “lane closed ahead” signs (7201 – see paragraph [D6.29.11](#)) with bottom panel “x yards” (7271);
- for Condition 2 + 1:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate.

For full contra-flow on three-lane carriageways:

- for Condition 1 + 3:
 - “lane closed ahead” signs (7201 – see paragraph D6.29.11) with bottom panel “x yards” (7271);
- for Condition 2 + 2:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate.

For partial contra-flow on three-lane carriageways ([Plan DTF3](#)):

- for Condition 2 + 3:
 - “lane closed ahead” signs (7201 with symbols from 7281 to 7286, see paragraph D6.29.11) with bottom panel “x yards” (7271);
- for Condition 3 + 2:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate.

D6.29.10 In the secondary direction the following signs are required:

For full contra-flow on two-lane carriageways ([Plan DTF2](#)):

- for Condition 1 + 2:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate;
- for Condition 2 + 1:
 - “lane closed ahead” signs (7201 – see paragraph D6.29.11) with bottom panel “x yards” (7271).

For full contra-flow on three-lane carriageways:

- for Condition 1 + 3:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate;
- for Condition 2 + 2:
 - “lane closed ahead” signs (7201 with symbols from 7281 to 7286, see paragraph D6.29.11) with bottom panel “x yards” (7271).

For partial contra-flow on three-lane carriageways ([Plan DTF4](#)):

- for Condition 2 + 3:
 - “diversion of traffic” sign (7238 with symbols from 7281 to 7286) with top panel “STAY IN LANE” (7263) and bottom panel “x yards” (7271) on the near side and off side at 600 m, 400 m and 200 m measured from the end of the open gate;
- for Condition 3 + 2:
 - “lane closed ahead” signs (7201 with symbols 7280 to 7287, see paragraph [D6.29.11](#)) with bottom panel “x yards” (7271).

D6.29.11 Special sign authorisation is required for signs to diagram 7201 as the hard shoulder line is not a permitted variant.

GATES

D6.29.12 The general principles for signing gates are:

- each gate consists of a line of closely spaced cones at 1.5 m centres (Detail B);
- if there is a reduction in lanes at the gate then three “lane closed” barriers (7105) each with a keep left sign (610) are required, the cone taper length should be as given in [Table A1.3 \(Appendix 1\)](#);
- advance warning signs are placed on the near side and off side at 200 m intervals from 600 m in advance of the gate to 200 m in advance of the gate.

D6.29.13 When lanes are divided at the end of a closed gate:

- cylinders and studs to Detail G (see [Plan DZC9](#) for details of splitter) for a length of 150 m up to the nose of the divide;
- if one lane is to proceed on the hard shoulder, as in a partial contra-flow then cylinders and studs to Detail K are used; and
- a sign to diagram 611 is located in advance of the split, this sign is used where traffic using either route reaches the same destination (where one route has an alternative end destination, two 610 arrows need to be displayed side by side).

CROSSOVERS

D6.29.14 For guidance on the design of crossovers see [Section D6.5](#).

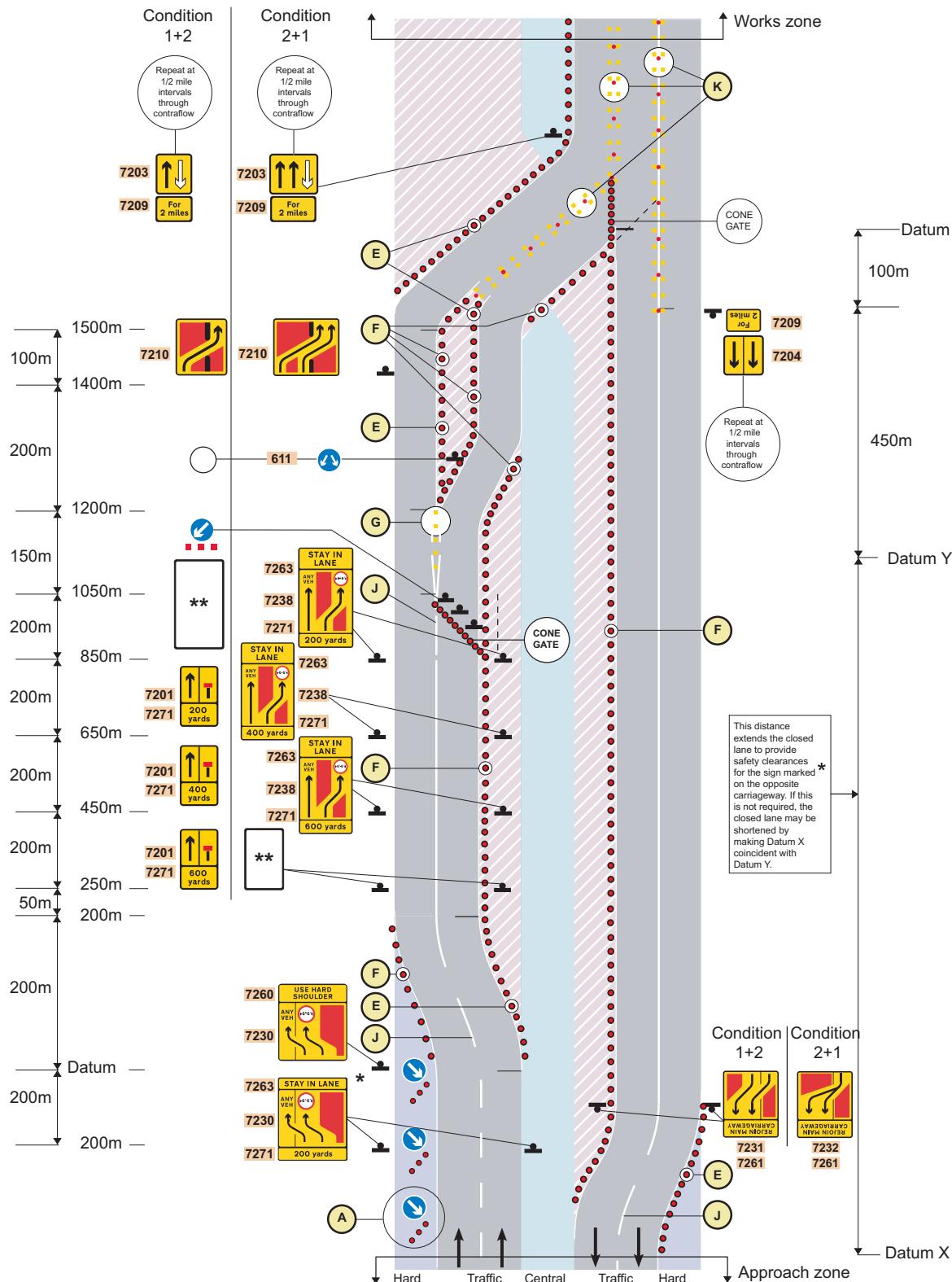
D6.29.15 The number of lanes in a crossover varies depending on the condition of the tidal flow system. In the layouts illustrated the crossover can work as either a single-lane or a two-lane crossover.

D6.29.16 The detailed principles and signing requirements for the initial crossover are as shown in [Plans DZC6](#) and [DZC7](#).

D6.29.17 The principles for tidal flow operations are illustrated in the following plans, [DTF1](#) to [DTF4](#).

D6.29.18 Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

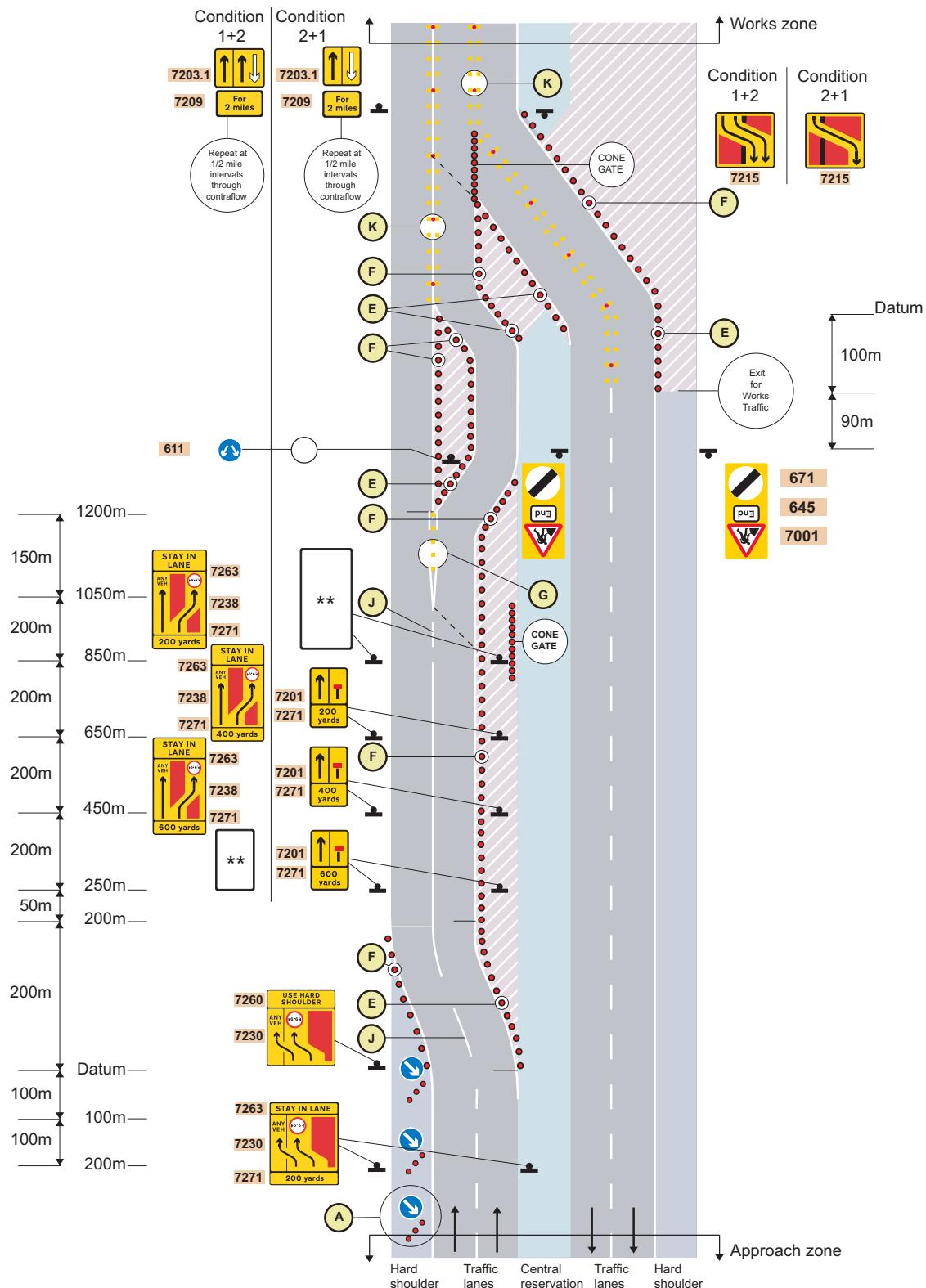
Plan DTF1: Tidal flow layout, lead-in zone for full contra-flow on a two-lane carriageway road (primary direction)



NOTE: All cone gates are shown in position for "Condition 1+2". Positions for "Condition 2+1" are shown dotted.

** indicates where a sign required for one condition but not for the other should be covered or removed when not required.

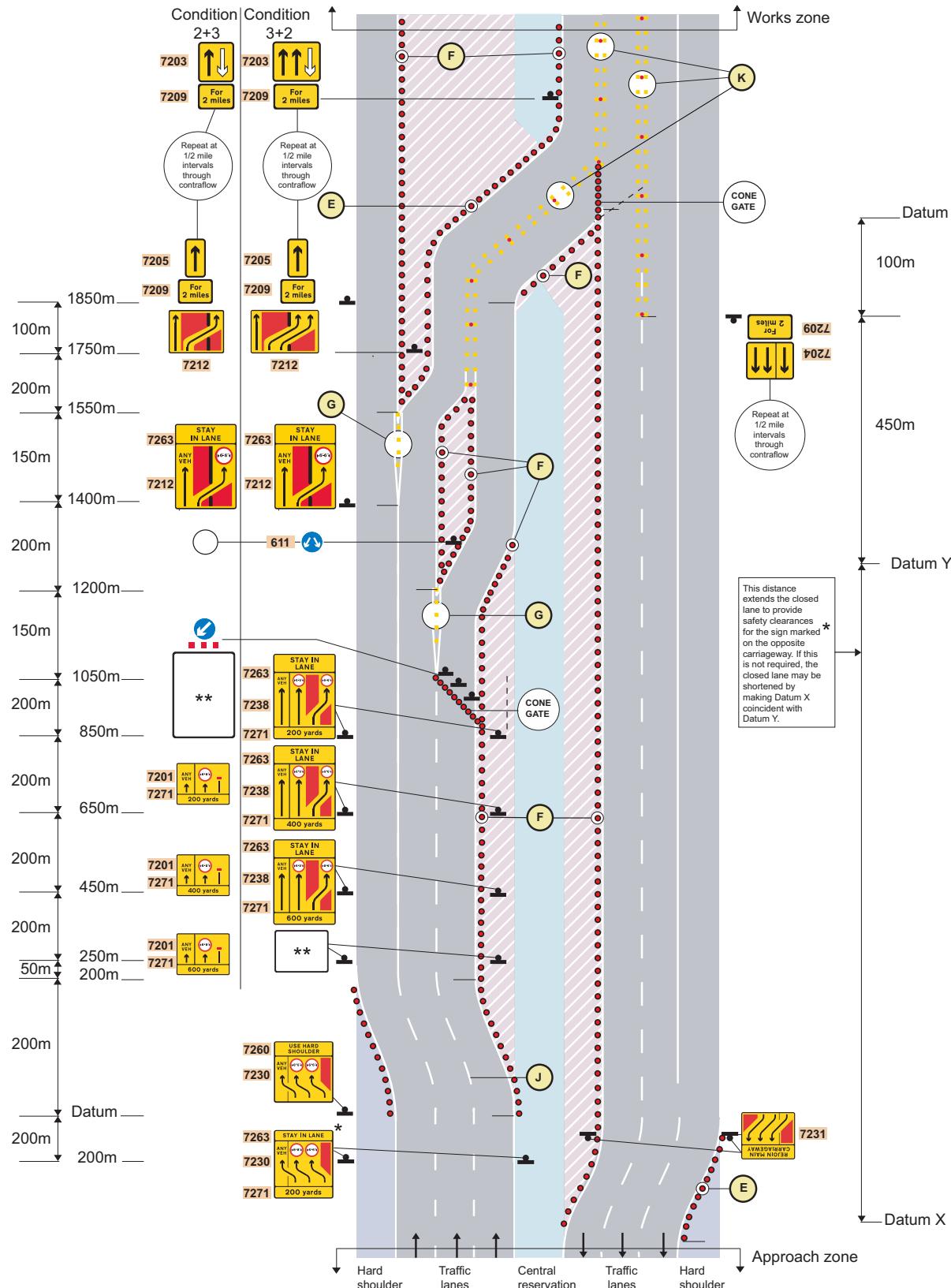
Plan DTF2: Tidal flow layout, lead-in zone for full contra-flow on a two-lane carriageway road (secondary direction)



NOTE: All cone gates are shown in position for "Condition 1+2". Positions for "Condition 2+1" are shown dotted.

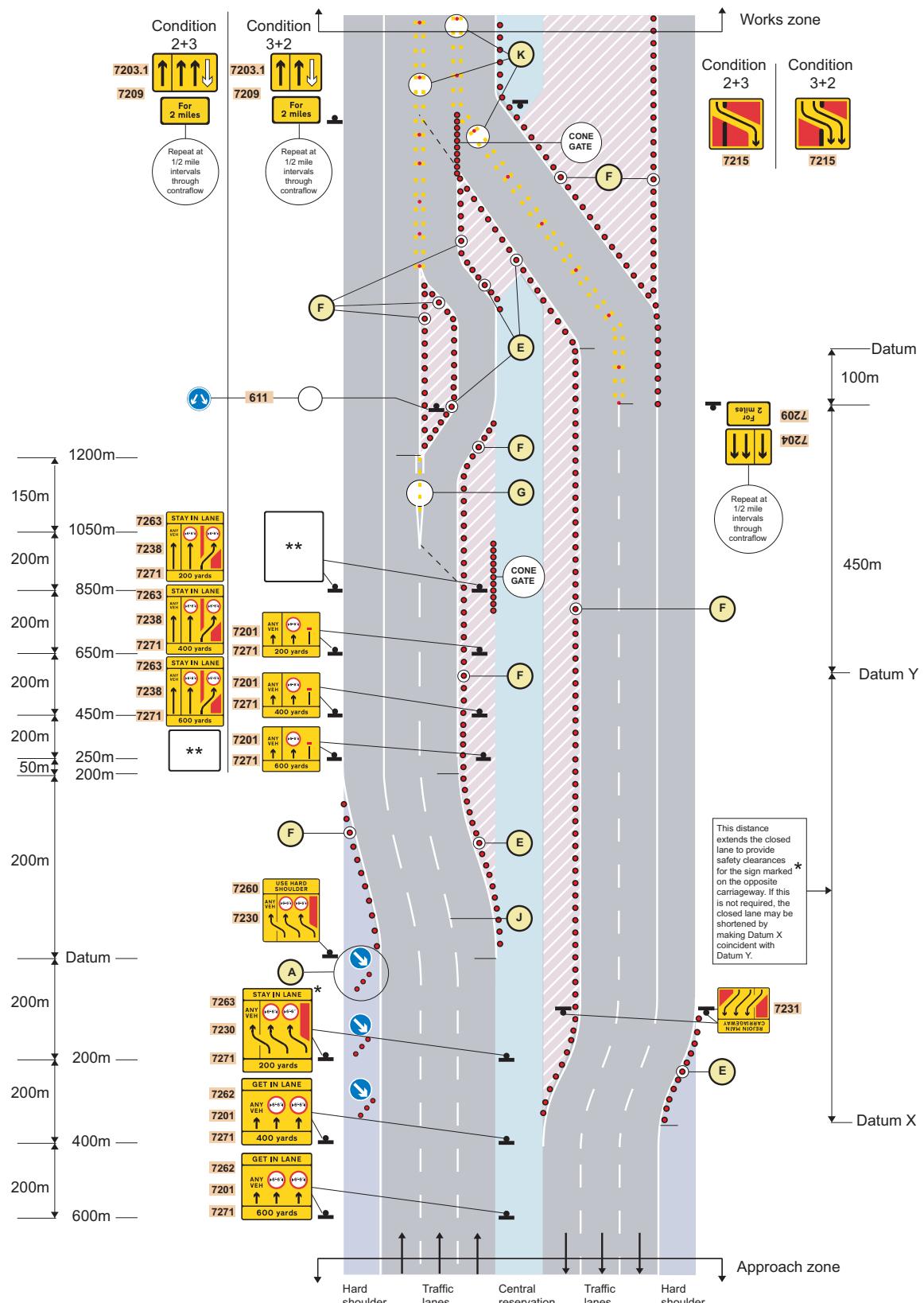
** indicates where a sign required for one condition but not for the other should be covered or removed when not required.

Plan DTF3: Tidal flow layout, lead-in zone for partial contra-flow on a three-lane carriageway road (primary direction)



NOTE: All cone gates are shown in position for "Condition 2+3". Positions for "Condition 3+2" are shown dotted.
** indicates where a sign required for one condition but not for the other should be covered or removed when not required.

Plan DTF4: Tidal flow layout, lead-in zone for partial contra-flow on a three-lane carriageway road (secondary direction)



NOTE: All cone gates are shown in position for "Condition 2+3". Positions for "Condition 3+2" are shown dotted.
** indicates where a sign required for one condition but not for the other should be covered or removed when not required.

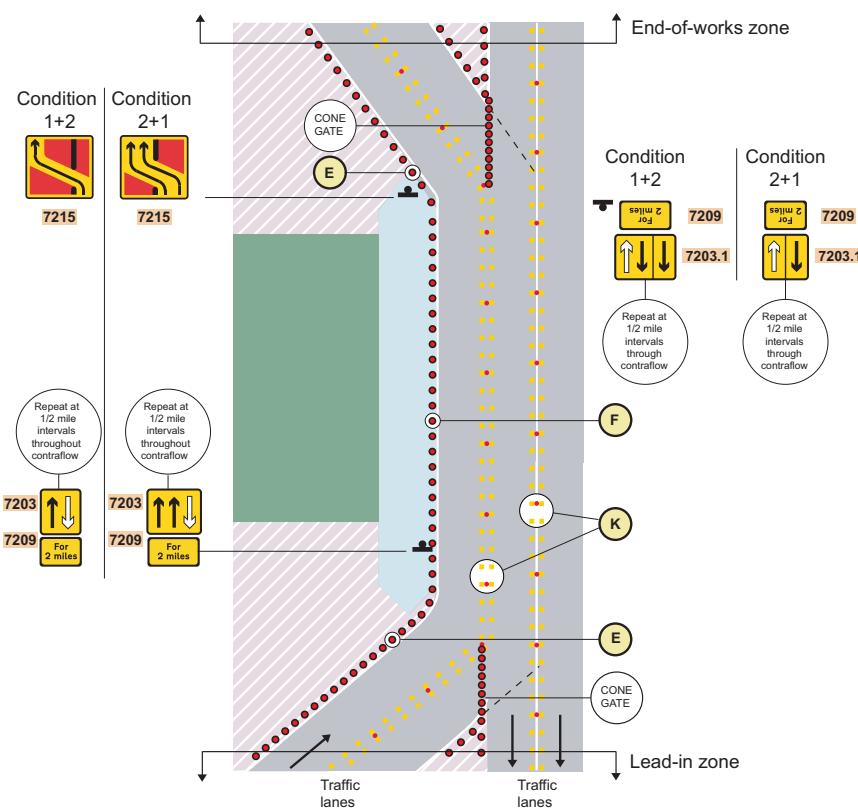
WORKS ZONE

D6.29.19 The principles for the works area are as follows:

- to mark the contra-flow running lanes:
 - cylinders and studs to Detail K;
 - in the primary direction, a sign indicating open and contra-flow lanes (7203) with distance plate "For x miles" (7209) placed on the near side and repeated at $\frac{1}{2}$ mile intervals through the contra-flow; and
 - in the secondary direction, a sign indicating hard shoulder, open and contra-flow lanes (7203.1) with supplementary plate "For x miles" (7209) placed on the near side and repeated at $\frac{1}{2}$ mile intervals through the contra-flow.

D6.29.20 Plan DTF5 illustrates a works zone for a tidal flow layout for a full contra-flow on a two-lane carriageway and Plan DTF6 illustrates a works zone for a tidal flow layout for a partial contra-flow on a three-lane carriageway.

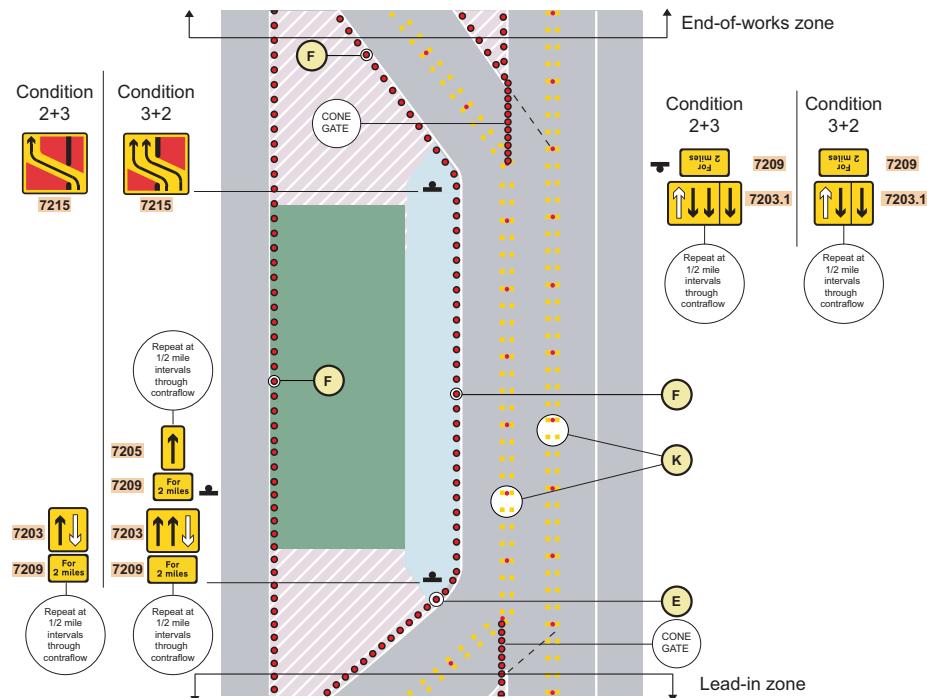
Plan DTF5: Tidal flow layout, works zone for full contra-flow on a two-lane carriageway road



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

NOTE: All cone gates are shown in position for "Condition 1+2". Positions for "Condition 2+1" are shown dotted.

Plan DTF6: Tidal flow layout, works zone for partial contra-flow on a three-lane carriageway road



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

NOTE: All cone gates are shown in position for "Condition 2+3". Positions for "Condition 3+2" are shown dotted.

END-OF-WORKS ZONE

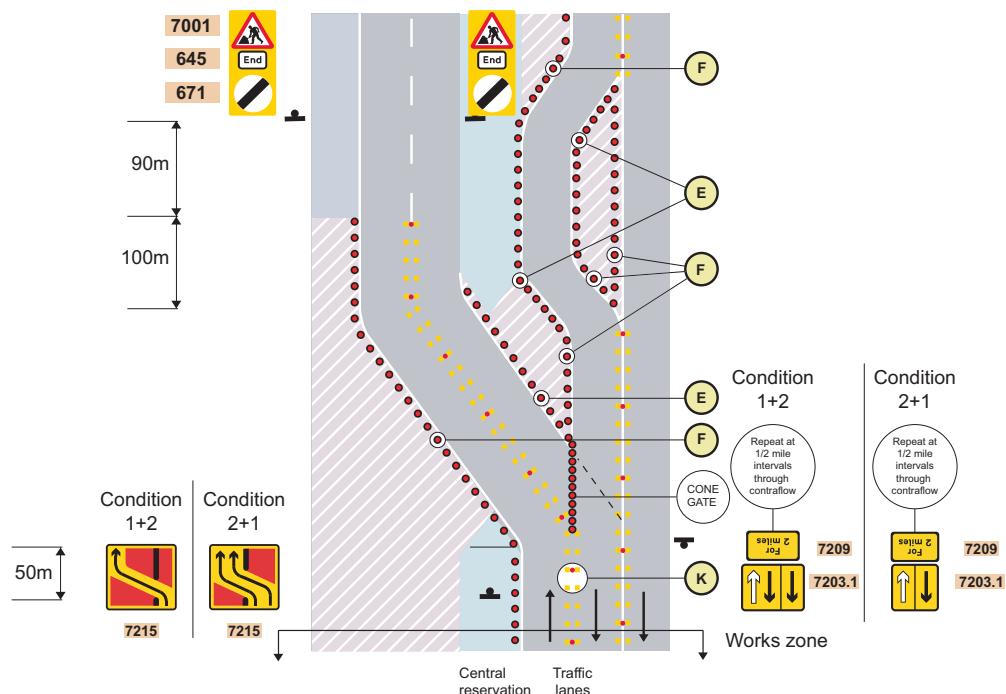
D6.29.21 The detailed principles and the signing required for changeovers from the hard shoulder are as shown in [Plan DZE2](#).

D6.29.22 The detailed principles and the signing required for the return crossover are as shown in [Plans DZE3](#) and [DZE5](#).

D6.29.23 On three-lane carriageways where the secondary carriageway central reservation approach sign (7230) needs, for safety clearance purposes, to encroach into lane 3 of the primary carriageway the two-lane crossover returned traffic should be to lanes 1 and 2. Lane 3 should be coned off using Detail F to provide the necessary sign protection; see [Plan DTF4](#).

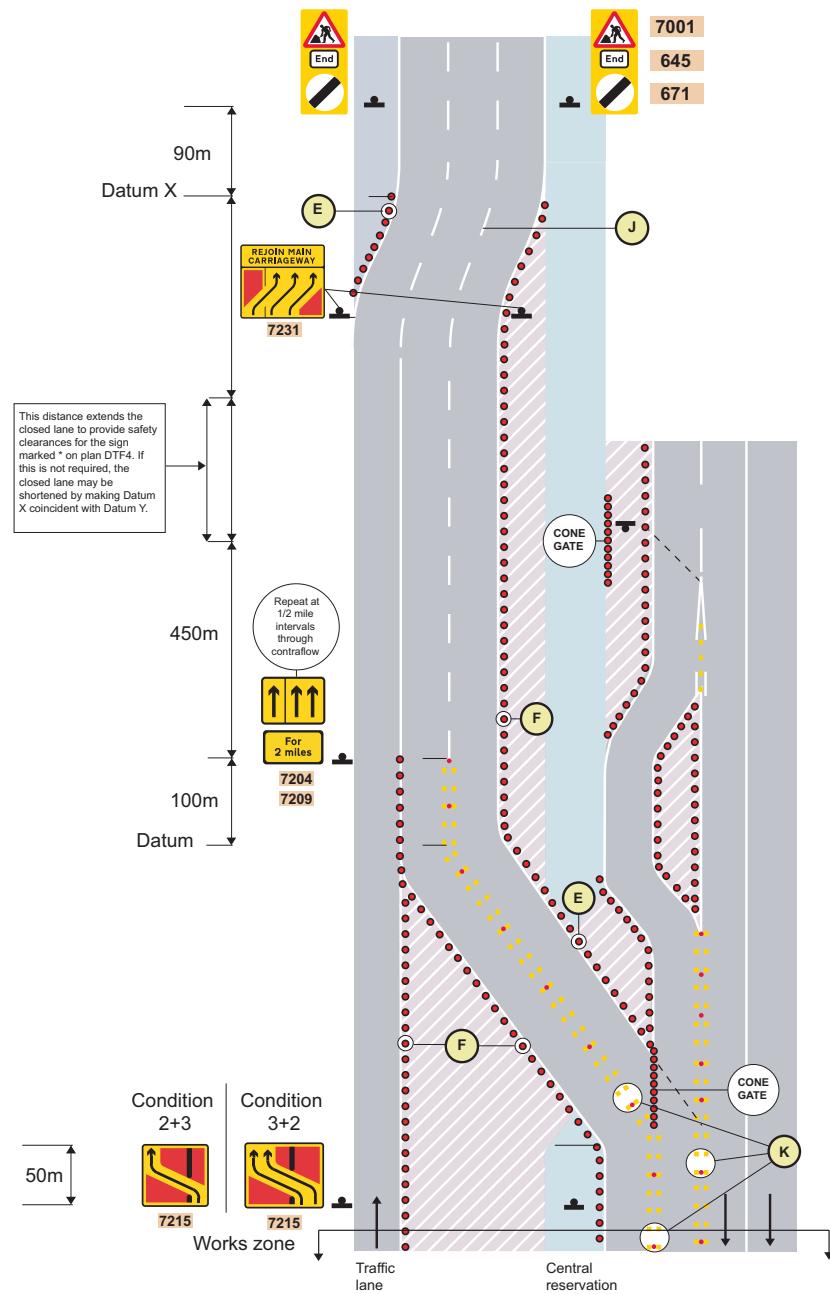
D6.29.24 [Plan DTF7](#) illustrates an end-of-works zone for a tidal flow layout for a full contra-flow on a two-lane carriageway and [Plan DTF8](#) illustrates a works zone for a tidal flow layout for a partial contra-flow on a three-lane carriageway.

Plan DTF7: Tidal flow layout, end-of-works zone for full contra-flow on a two-lane carriageway road



Keys to the plans are given in [Tables A1.4](#) and [A1.5](#) of [Appendix 1](#).

Plan DTF8: Tidal flow layout, end-of-works zone for partial contra-flow on a three-lane carriageway road



Keys to the plans are given in Tables A1.4 and A1.5 of Appendix 1.

D7 CONVOY WORKING

D7.1 GENERAL

D7.1.1 Where normal traffic management arrangements are not feasible because of restricted highway width, and diversion is impracticable, a method of convoy traffic management may be used. In this method, traffic is brought to a halt in advance of road works and is then led slowly in single file through the site past the works by an appropriately signed works vehicle.

D7.1.2 This method of convoy traffic management shall not be used on motorways.

D7.1.3 It is essential with little or no safety zone clearance that traffic speeds past the working space must be reliably reduced to 10 mph or less, and an agreed safe method of working imposed on the site.

D7.1.4 Convoy working may be used during the hours of daylight or darkness and can be used on:

- single carriageway roads 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.

D7.2 TRAFFIC FLOWS

D7.2.1 Convoy working can be used successfully on single carriageway roads with two-way peak hour flows of 900-1000 vehicles/hour. However, at these flow levels it may be necessary to restrict peak time working or make provision to withdraw convoy traffic management periodically to disperse queues. In this event the work activity must also be suspended until the passing speed of traffic can again be reduced to 10 mph or less and convoy traffic management reinstalled.

D7.2.2 On dual carriageway roads, convoy traffic management can be used successfully where the one-way hourly traffic flow does not exceed 600 vehicles/hour.

D7.3 PLANNING

D7.3.1 For general planning of the works refer to [Section D2](#).

D7.3.2 The pre-planning should include:

- planning the works and individual operations to minimise their possible effect on traffic delay and interference with the convoy system; if applicable, provision for pedestrians should also be considered;
- arranging the works to avoid junctions occurring within the convoy site;
- planning an appropriate convoy system, which will ensure that the speed of all traffic passing the works is reliably reduced to 10 mph or less;
- determining a queue management strategy including levels of congestion which trigger special action, and safe methods of working for the withdrawal of convoy working;

- determining the method to be adopted for the management of side road traffic; and
- determining suitable locations for the convoy vehicle to pull out of the running lane at the end of the works.

D7.3.3 A risk assessment of the actual work activity and the effects of convoy traffic management on the workforce and highway users must be conducted in order to determine whether this system is appropriate for the particular task and location. Risk assessments are dealt with in detail in Part 2: Operations, Sections O2.1, O2.2 and O2.3.

D7.3.4 On dual carriageway roads, if it is not considered appropriate to operate convoy working on the main carriageway, an alternative method of working is to divert all traffic from the main carriageway at the interchange (see 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.

D7.4 LEGAL ISSUES

D7.4.1 A temporary mandatory speed limit must be imposed as described in Section D7.8 in order to prevent accusations of escort vehicles being driven without due consideration for other road users or of causing an obstruction of the highway.

D7.5 SIGNING

D7.5.1 All traffic signs used in connection with this technique should be to Class RA2 of BS EN 12899-1 "Fixed, vertical road traffic signs", or use a suitable microprismatic material. A sign stating "CONVOY VEHICLE NO OVERTAKING" (diagram 7029) is to be displayed to the rear of each escort vehicle. On dual carriageway roads, where the escort vehicle is unable to turn round within half a mile of the end of the works, consideration may be given to omitting the words "NO OVERTAKING" from the sign legend. However, in this case static mandatory no overtaking signs (diagram 632) should be used where overtaking is considered to be a problem, but only where an order prohibiting overtaking is in force.

D7.5.2 The working space, which is dealt with in Section D3.2, must be adequately delineated by cones or other means unless alternative safe working practices are implemented to compensate for the omission of delineation and adequate warning is provided to road users.

D7.5.3 10 mph terminal speed limit signs are required on both sides of the carriageway at the start of the works and are required anywhere traffic might join from a side road (see also paragraphs D3.7.21 and D3.7.22). Repeater signs should also be placed at 200m intervals. Speed limit signing is required at the end of the works. This will either be a sign to diagram 7001 with an "End" plate to diagram 645, or a pair of speed limit signs showing the permanent limit now resumed. Section D3.7 gives guidance on speed control and temporary speed limits.

D7.5.4 The traffic management plans given in Plans CW1 and CW2 are not complete in themselves. They supplement whichever plans given in Section D5 for single carriageway roads or Section D6 for dual carriageway roads are appropriate for the road and traffic management arrangement appertaining to the particular work site. The plans cover the signing requirements relating to both manually operated portable traffic signals and manually operated "STOP/GO" boards.

D7.5.5 On single carriageway roads with two-way peak hourly traffic flows in excess of 900 vehicles or which are subject to very high traffic speeds or restricted forward visibility, a warning sign (diagram 7025) and instruction signs (diagram 7027 and 7028) in Plan CW1 should also be placed on the off side of the carriageway. The x-height of the warning sign (diagram 7025) should also be increased from 75 mm to 150 mm. Cones should be increased from 450 mm to 750 mm where possible.

D7.5.6 On single carriageway roads, the “traffic queues likely” sign (diagram 584) with the supplementary plate “Queues likely” (diagram 584.1) should be used when visibility on the approach to the traffic control is restricted. The size and siting of the warning sign and the size of supplementary plate shall be in accordance with Chapter 4 of the Traffic Signs Manual, Appendices A and B respectively. The hazard is defined as the rear of the possible queue.

D7.5.7 On dual carriageway roads, **Plan CW2**, traffic should be reduced to single file using a single lane closure at least 500 m in advance of the traffic control. In addition to regularising the traffic in advance of the works, this also acts as a stacking lane for queuing traffic. The “traffic queues likely” sign (diagram 584) with the supplementary plate “Queues likely” (diagram 584.1) should be positioned downstream of the lead-in taper at the start of the stacking lane.

D7.5.8 There is a greater possibility of long queues developing at convoy traffic management sites than at normal sites; therefore the siting distance of the first sign in advance of the works should equal or exceed the highest figure given in the second column of **Table A1.1 (Appendix 1)**.

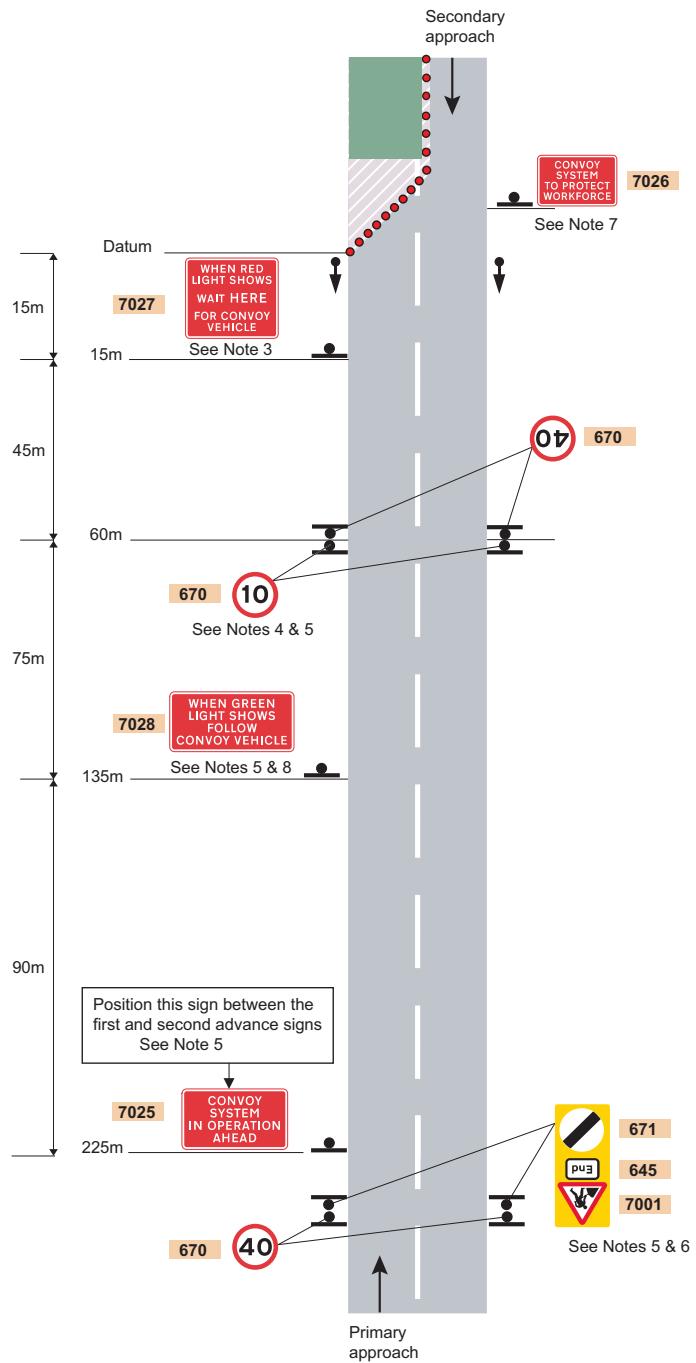
D7.5.9 If convoy working is to take place at night on a dual carriageway road, the “Night-time works Expect delays” sign (diagram 7002.1) should be placed two miles upstream of the works. This should be left in place during the day.

D7.5.10 For signs on side roads see **Section D7.9**.

D7.6 PLANS

D7.6.1 **Plan CW1** shows signs to diagrams 7025, 7026, 7027, 7028 specifically required for convoy traffic management on single carriageway roads. These supplement the normal traffic management signing and may be used with either manually operated traffic signals or “STOP/GO” boards.

Plan CW1: Convoy working on a single carriageway road



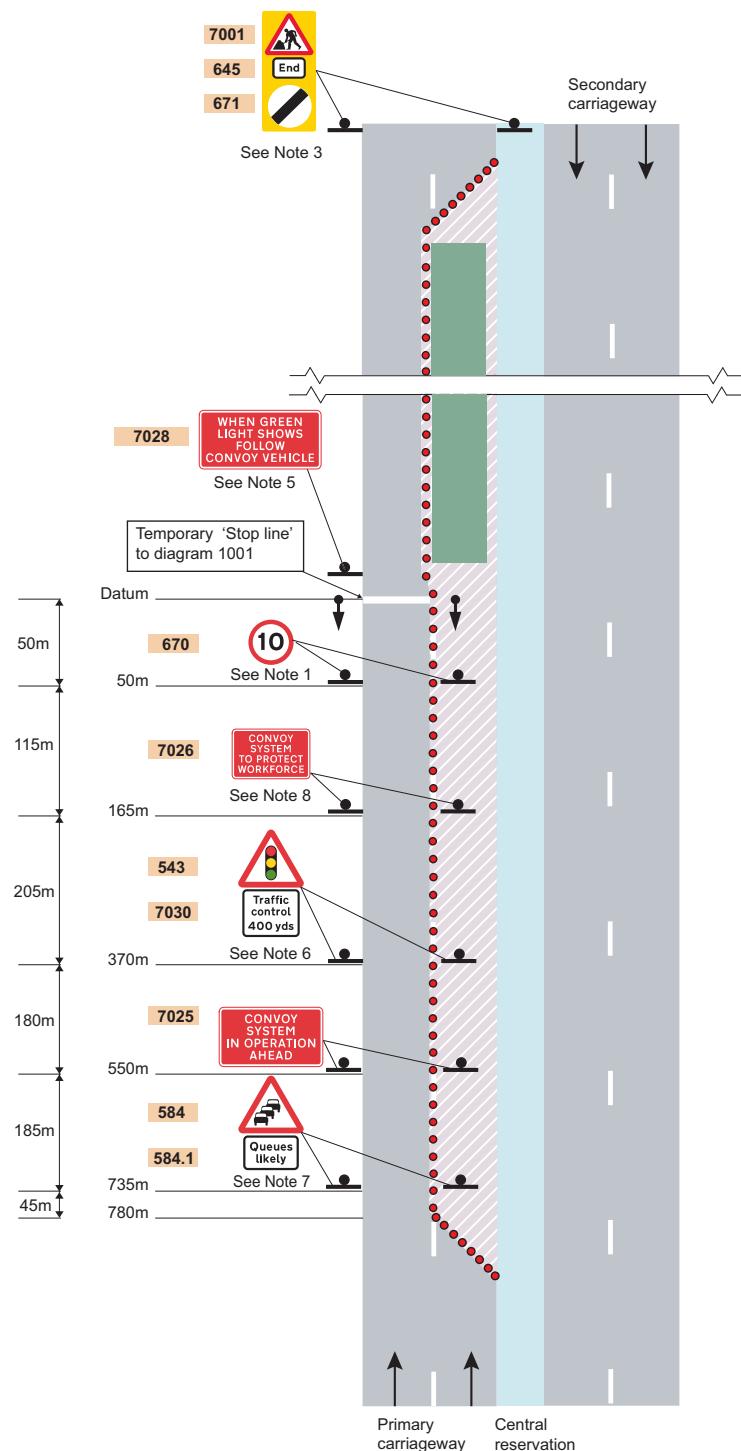
The signs shown are those specifically required for convoy working. These supplement normal signing for traffic control using either traffic signals or "STOP/GO" boards.

NOTES:

1. For one-way working, signs should be provided only for traffic in the relevant direction.
2. For two-way working the same signing is used on the primary and secondary approaches to the works.
3. When "STOP/GO" boards are used, the legend on diagram 7027 shall be changed by substituting "STOP SIGN" for "RED LIGHT". The position of the sign in relation to the signals or "STOP/GO" boards shall be the same as the sign to diagram 7011 shown in [Plan SC7](#).
4. A pair of speed limit signs must be placed at the point where the temporary limit begins, and repeater signs should be placed throughout the works site at 200m intervals on alternate sides of the road.
5. Position each sign so that it does not obscure any other sign and is not obscured itself.
6. The end of the restrictions may be indicated by a sign to diagram 7001 with an "End" plate to diagram 645. If the temporary speed limit masks a change in the permanent speed limit at some point within the works, a sign showing the new limit must be erected on each side of the carriageway at the end of the works.
7. The sign to diagram 7026 should be repeated at 200m intervals through the site.
8. When "STOP/GO" boards are used, the legend on diagram 7028 shall be changed by substituting "AT TRAFFIC CONTROL" for "WHEN GREEN LIGHT SHOWS".
9. The extent of the area provided for convoy vehicles to turn should be assessed to ensure adequate clearances.

D7.6.2 Plan CW2 shows signs to diagrams 7025, 7026, 7028 and 7030 specifically required for convoy working on individual carriageways of dual carriageway roads. These supplement the normal traffic management signing for off side lane closures and may be used with either manually operated traffic signals or "STOP/GO" boards.

Plan CW2: Convoy working on a dual carriageway road



The signs shown are those specifically required for convoy working. These supplement normal signing for a lane closure.

NOTES:

1. A pair of speed limit signs must be placed at the point where the temporary limit begins, and repeater signs should be placed throughout the works site at 200m intervals on alternate sides of the road.
2. Where the near side lane is closed, traffic should be directed into the off side lane immediately after passing the traffic signals.
3. The end of the restrictions may be indicated by a sign to diagram 7001 with an "End" plate to diagram 645. If the temporary speed limit masks a change in the permanent speed limit at some point within the works, a sign showing the new limit must be erected on each side of the carriageway at the end of the works.
4. For night-time works diagram 7002.1 should be placed between the 1 mile and 2 mile advance signs. This should be left in place during the day.
5. When "STOP/GO" boards are used, the legend on diagram 7028 shall be changed by substituting "AT TRAFFIC CONTROL" for "WHEN GREEN LIGHT SHOWS".
6. When "STOP/GO" boards are used, the sign and supplementary plate to diagrams 543 and 7030 shall be replaced with the diagram 7010.1 variant, "TRAFFIC CONTROL AHEAD".
7. A "traffic queues likely" sign to diagram 584 must be placed in combination with the supplementary plate to diagram 584.1 "Queues likely".
8. The sign to diagram 7026 should be repeated at 200m intervals through the site.

D7.7 TRAFFIC CONTROL

D7.7.1 Positive traffic control should be provided by means of manually operated portable traffic signals or manually operated "STOP/GO" boards on single or dual carriageway roads, and at side road junctions with dual carriageway roads, with manually operated "STOP/GO" boards only. During the hours of darkness each sign face must be adequately illuminated by its own source of lighting; see paragraph D4.7.1. These methods of control are as described in [Section D5.10](#) (portable traffic signals) and [Section D5.8](#) ("STOP/GO" boards).

D7.7.2 On single carriageway roads the length of site subject to traffic control should normally be restricted to a maximum length of 300m for portable traffic signals and 500m for manually operated "STOP/GO" boards, these being the maximum permitted lengths; see [Section D5.8](#).

D7.7.3 On dual carriageway roads the length of site subject to traffic control by portable traffic signals or manually operated "STOP/GO" boards should be restricted to a maximum of 1500m.

D7.7.4 On high-speed single carriageway roads and dual carriageway roads, two signal heads should be used, one on the near side verge and one on the off side verge. On other roads a single head should be used, positioned to optimise its visibility to approaching traffic. In most cases a position to the centre of the carriageway behind the traffic management coning at each end of the works will be satisfactory.

D7.8 SPEED LIMITS

D7.8.1 It is important that the arrangements for imposition of mandatory limits are discussed and agreed with the police.

D7.8.2 A temporary mandatory 10 mph limit must be imposed throughout the length of the works which is subject to convoy working. This should extend a short distance beyond the works so that the tail of the convoy is held to 10 mph 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.

D7.8.3 Consideration should be given to making the speed limit variable so that a 30 or 40 mph restriction comes into force when the appropriate signs are displayed, i.e. 30 (or 40) mph for use when the convoy vehicles have been withdrawn. If the permanent limit is 30 mph, the existing "30" terminal signs (and "30" repeaters if this was an unlit road subject to a 30 mph limit) would be uncovered. Where the permanent speed limit exceeds 30 mph, a temporary 40 mph limit would be imposed and new terminal and repeater signs would have to be provided. Any existing speed limit signs must be completely covered or removed.

D7.8.4 On all high-speed roads, a temporary mandatory limit of 20 mph below the permanent limit prevailing on the road should be imposed in advance of the temporary 10 mph limit; see [Section D3.7](#).

D7.8.5 Repeater temporary speed limit signs must be provided; these should be sited at the intervals indicated in [Plans CW1](#) and [CW2](#). On dual carriageway roads a 750 mm diameter repeater sign should be used and 600 mm diameter on single carriageway roads.

D7.8.6 Where a side road joins a section of a road subject to convoy working, a 10 mph speed limit sign must be provided on each side of the side road, and any conflicting signs covered or removed.

D7.8.7 Provision needs to be made for whenever convoy working is required to be withdrawn. The 10 mph signs must be covered or removed until such time as they are required to be reinstated. Checks should be made between changes of speed limit that there are no conflicting signs; this is particularly important after the last change at the completion of the working day.

D7.9 SIDE ROADS WITHIN THE SITE

D7.9.1 Except when there are high flows on the minor road, control of side road traffic should be provided by manually operated "STOP/GO" boards. During the hours of darkness each sign face must be adequately illuminated by its own source of lighting; see paragraph D4.7.1. When manually operated "STOP/GO" boards are used, the "TRAFFIC CONTROL AHEAD" sign (diagram 7010.1) should be erected after a "road works" sign (diagram 7001) at every side road leading to an uncontrolled junction within a length of road controlled by portable traffic signals or "STOP/GO" boards. This procedure must be considered only when traffic being held at the signals will be visible to the joining traffic. These signs should be supplemented with convoy signs to diagrams 7025 and 7028, 100m and 50m respectively in advance of the junction and the "WAIT HERE" sign to diagram 7027, using the "STOP SIGN" sign variant of the legend, at the junction stop or give way.

D7.9.2 For a minor road with high flows, where a suitable diversion exists for the minor road traffic, a road closure should be implemented to close it in the vicinity of the junction. Where there is no suitable diversionary route, the works should, if possible, 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. 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.

D7.10 SLIP ROAD MERGES

D7.10.1 Experience has shown that the convoy system can be used successfully at slip road merges. See Part 2: Operations, paragraph O9.11.3.

D7.11 EMERGENCY VEHICLES

D7.11.1 The designer should include contingency measures in the design to allow the free passage of emergency vehicles through the convoy lane, after discussion with the local emergency services.

D7.12 PUBLICITY

D7.12.1 It is essential that the public are made aware of the reasons for carrying out the convoy method. Wherever possible the opportunity should be taken to detail the method of working and the benefits to the workforce and the public in local newspapers, local radio and TV.

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 – 45 m	60	600	10 – 30
Single carriageway road (40 mph)	45m – 110 m	60	750	30 – 45
Single carriageway road (50 mph or more)	275m – 450 m	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 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 30mph or less)	Single carriageway road (permanent speed limit of 40mph)	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	Single carriageway road (permanent speed limit of 30 mph or less)	Single carriageway road (permanent speed limit of 40mph)	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
Rate of taper (see Note 3)	1 in 13	1 in 20		1 in 25		1 in 25	
Taper length (m) for hazard of standard carriageway width between 3.6m and 4m	50	80	100	100	100	150	150
Minimum number of cones	18	28	68	35	35	101	135
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	3	1.5
Longitudinal	Minimum cone size (mm)	450	450	750	450	750	1000
	Maximum cone spacing (m)	9	(see Note 1)	9	(see Note 1)	9	(see Note 5) (see Note 5)
	Maximum warning light spacing (m)	9	(see Note 2)	9	18	18	18
							18

NOTES:

1. For longitudinal coning for work sites of over 180 m in length for which relaxations apply, the 9 m traffic cone spacing may be increased to 18 m. This applies only to cones placed in straight lengths parallel to the line of traffic.
 2. For longitudinal coning for work sites of over 180 m in length for which relaxations apply, the 9 m warning light spacing may be increased to 18 m. 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, 1 m 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 1 m and 750 mm cones it is recommended that all cones should be 1 m cones. In Northern Ireland, on all motorways and dual carriageway roads with hard shoulders, only 1 m 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 9 m 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 1.2 m 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 [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](#) (9 m and 18 m) may be increased by up to 50% (13.5 m and 27 m 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 [Part 2: Operations](#), 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

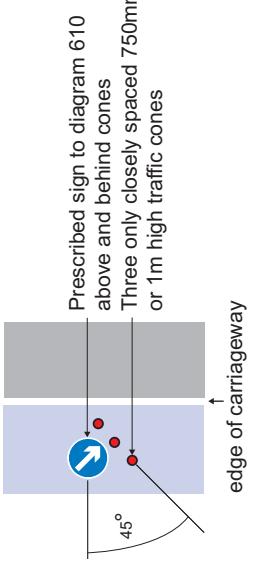


Sign

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)

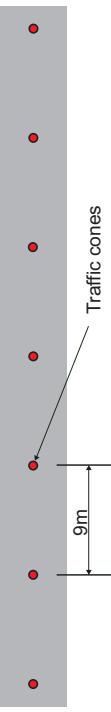
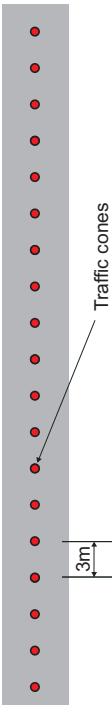


Cone spacing 1.5m					
Cone 450 mm	Cone 750 mm	Cone 450 mm	Cone 750 mm	Cone 750 mm	Cone 750 mm
Cone 450 mm	Cone 750 mm	Cone 450 mm	Cone 750 mm	Cone 750 mm	Cone 750 mm

NOTES:

- 1) During darkness, warning lights to BS EN 12352:2006 should be provided in accordance with [Table A1.3 \(Appendix 1\)](#).
- 2) 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.

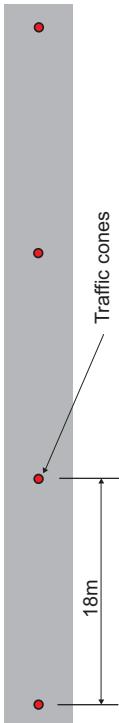
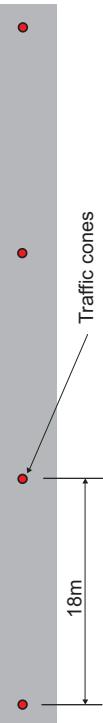
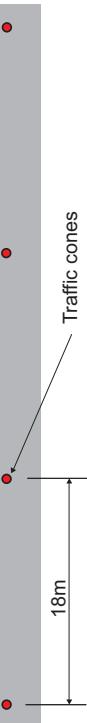
Table A1.5 Details A to K used in plans (minimum sizes given)

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:		Cones 450 mm	Cones 750 mm	Cones 450 mm	Cones 750 mm	Cones 750 mm
Method C2:						
		Cones 450 mm	Cones 750 mm	Cones 450 mm	Cones 750 mm	Cones 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) For relaxation to Detail C1 see [Table A1.3 \(Appendix 1\)](#).

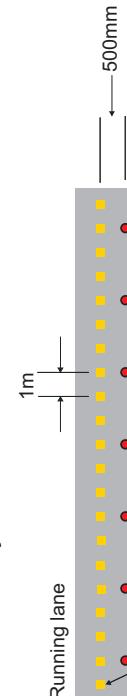
Table A1.5 Details A to K used in plans (minimum sizes given)

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 Cones 450 mm Cones 750 mm 18m</p>	 <p>Traffic cones Cones 450 mm Cones 750 mm 18m</p>	 <p>Traffic cones Cones 450 mm Cones 750 mm 18m</p>

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)

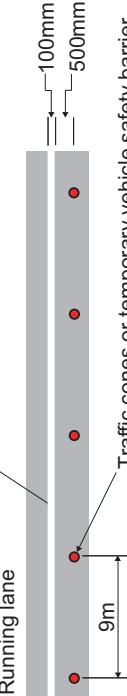
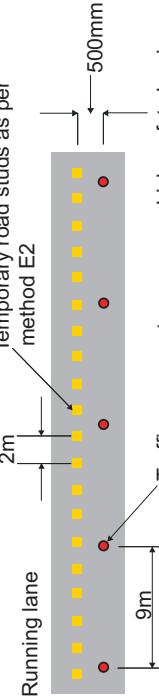
Details A to K used in plans (minimum sizes given)		Single carriageway road (permanent speed limit of 40 mph or less)	Single carriageway road (permanent speed limit of 50 mph or more)	Dual carriageway road (permanent speed limit of 40 mph or less)	Dual carriageway road (permanent speed limit of 50 mph 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  Traffic cones or temporary vehicle safety barrier				Cone spacing 750 mm –	Cone spacing 750 mm –	Cone spacing 750 mm (min) –
Method E2: Using studs and traffic cones or temporary vehicle safety barrier Running lane  Temporary road studs* Traffic cones or temporary vehicle safety barrier				Cone spacing 3 m –	Cone spacing 1.5 m –	Relaxation 3 m Relaxation 9 m

* 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 10/2.1 (retroreflective) in material complying with BS EN 1790					
Running lane					
					
			Traffic cones or temporary vehicle safety barrier		
Method F2: Using studs and traffic cones or temporary vehicle safety barrier					
Temporary road studs as per method E2					
Running lane					
					
			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)

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					

Diagram for Detail H:

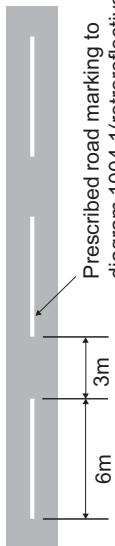
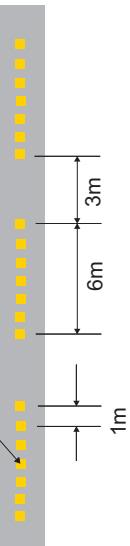
The diagram illustrates a temporary vehicle safety barrier. It is 9m long and 1.5m max high. The barrier consists of traffic cylinders (750 mm) and temporary road studs. The distance from the barrier to the edge of the carriageway is 1.2m, and the total width of the barrier is 1.4m**.

* 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**					
Temporary road studs*		Applicable	Applicable	Applicable	Applicable

* 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)
Detail K				

Detail K

The diagram illustrates Detail K for a single carriageway road. It features a grey rectangular area representing the road surface. Inside this area, there is a grid of yellow squares representing traffic cylinders. Two red dots are placed on the grid. Arrows point from these red dots to text labels: 'Traffic cylinders' points to the yellow squares, and 'Temporary road studs*' points to the red dots. On the left side of the grey area, a horizontal double-headed arrow indicates a width of '6m max'. On the right side, another horizontal double-headed arrow indicates a width of '1.5m max'. Above the grey area, a vertical double-headed arrow indicates a height of '0.9m min' between the top of the grey area and the top of the yellow squares.

* With fluorescent saturn yellow (yellow/green) bodies and reflectors which are:
 i bi-directional when delineating a tidal lane; and
 ii 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 (SR1997 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)

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A4 APPENDIX – INSPECTION STOPS IN NORTHERN IRELAND

A4.1 The signing and guarding requirements differ depending on the location and duration of the works, as set out below;

Stops on hard shoulder:

- short duration (up to 15 minutes): no temporary traffic management required;
- medium duration (from 15 minutes up to 90 minutes): refer to [PlanINI1](#); and
- long duration (greater than 90 minutes): comply with the hard shoulder closure requirements in [Section D6.10](#).

Stops on verges on roads with or without hard shoulders:

- short duration (up to 15 minutes): no temporary traffic management required; and
- durations greater than 15 minutes: refer to [PlanINI2](#).

A4.2 The planning of any hard shoulder or roadside verge work should include the following non-exclusive list of considerations:

- the length of time needed to carry out the work;
- traffic volumes and patterns, including when and where the peak traffic flows occur;
- worker visibility, including whether the work will be carried out in darkness;
- available parking locations, including the number of vehicles required for the work; and
- getting into and out of the work location.

A4.3 Vehicles should be parked facing in the same direction as the traffic flow; at least 0.5 m away from the live lane in a manner that avoids obscuring sightlines. If this distance cannot be achieved then alternative temporary traffic management arrangements will be required.

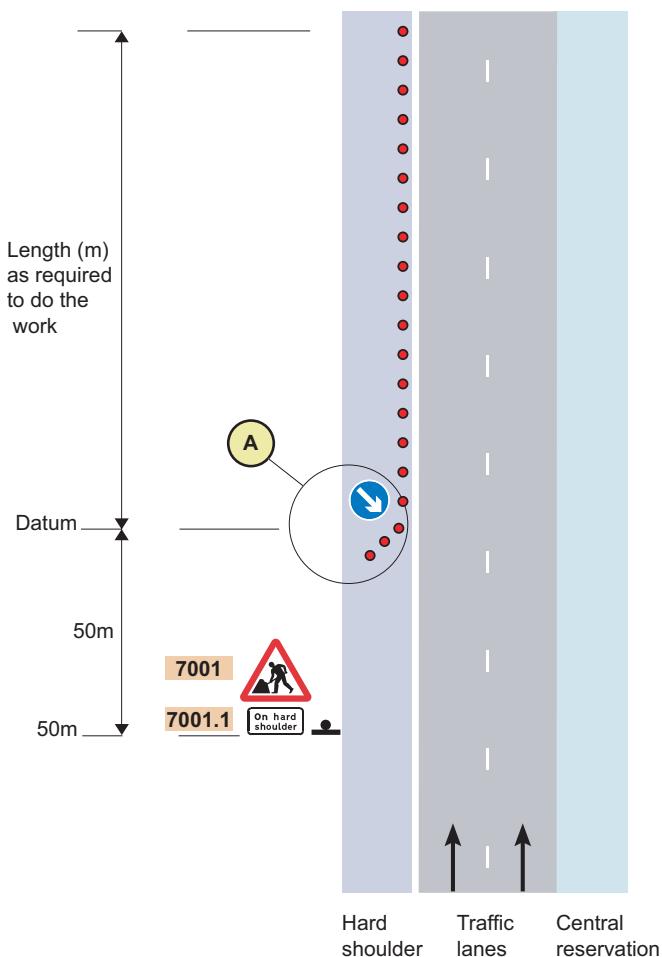
A4.4 A roof-mounted flashing amber warning beacon, visible through 360°, is to be used throughout the work period for short-duration stops (up to 15 minutes). For all other stops (durations greater than 15 minutes) the beacon is only to be used when entering and leaving the works.

A4.5 In addition to complying with the safe working methods for their specific work activity personnel:

- should be at least 1.2 m away from the live lane. (Note: If this distance cannot be achieved then alternative temporary traffic management arrangements will be required);
- wear a high visibility jacket to BS EN 471, Table 1: Class 3 throughout the work period;
- get in and out the vehicle from the nearside if possible;
- load and unload tools and equipment from the nearside of the vehicle; and
- work at least 18m from the front of the works vehicle(s), facing oncoming traffic (Note: If this is not practical an additional person may be needed to act as a look-out).

PlanINI1: Working on the hard shoulder – Northern Ireland

Medium duration stops (from 15 minutes up to 90 minutes)

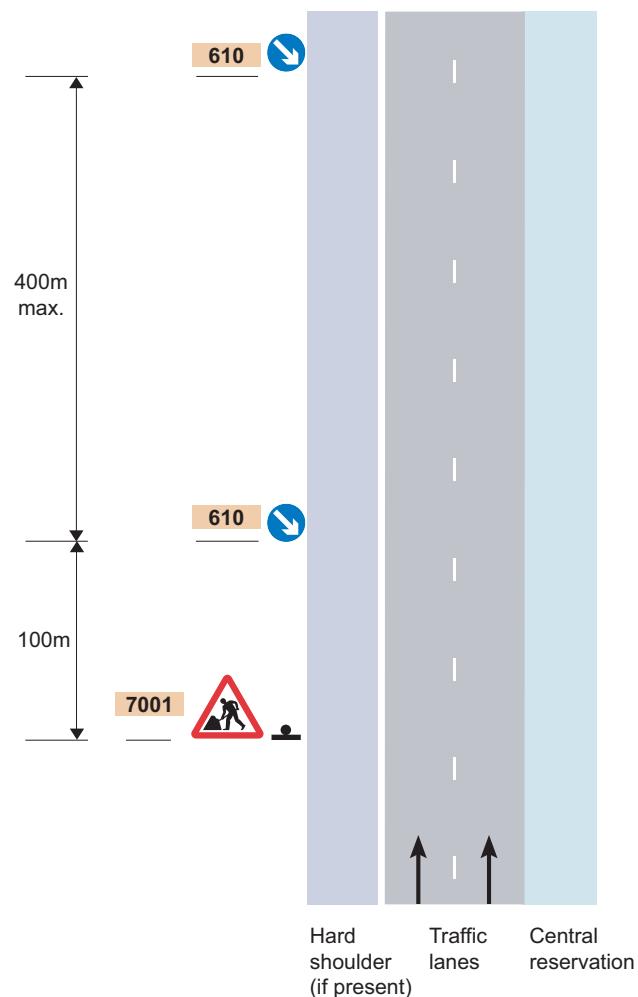


NOTES:

1. Sign and cone sizes as recommended in [Tables A1.2](#) and [A1.3](#).
2. Longitudinal cone spacing 18m.
3. If a private vehicle is to be used it should be positioned behind the arrow sign.
4. 610 arrow to be repeated at 400m intervals.

PlanINI2: Working on the roadside verge – Northern Ireland

Stops greater than 15 minutes



NOTES:

1. Sign and cone sizes as recommended in [Tables A1.2](#) and [A1.3](#).
2. If a private vehicle is to be used it should be positioned behind the arrow sign.
3. 610 arrow to be repeated at 400 m intervals.

A5 APPENDIX – LIST OF PLANS

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