

## **8. Temporary Traffic Measures and Signs for Roadworks**



# Traffic Signs Manual

## Chapter 8 Temporary Traffic Measures and Signs for Roadworks

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## 8.1 Introduction

### 8.1.1 General

- 8.1.1.1 The Traffic Signs Manual, of which this Chapter forms a part, provides details of the traffic signs which may be used on roads in Ireland, including their layout and symbols, the circumstances in which each sign may be used and rules for positioning them.
- 8.1.1.2 This Chapter outlines temporary traffic measures to be used at work sites on all public roads to warn, instruct and guide road users in the safe negotiation through or around the work site. It also describes the special signs to be used at roadworks.
- 8.1.1.3 The objective of this Chapter is to provide any party carrying out construction and maintenance work on a public road with a set of uniform guidelines for the signing and delineation that will promote the safety of both the road user and road worker.
- 8.1.1.4 The uniform and consistent treatment of similar hazards at roadwork sites by the application of standardised layouts will promote safety by assisting the public in recognising the potential hazards and negotiating safe passage through or around the works.
- 8.1.1.5 For the purposes of this Manual:
- **Shall** or **must** indicates that a particular requirement is mandatory;
  - **Should** indicates a recommendation; and
  - **May** indicates an option.
- 8.1.1.6 References in this document to chapter numbers indicate references to the other chapters of the Traffic Signs Manual. The other chapters of the Manual are listed in the Preface, and further information on the use of the Manual is given in Chapter 1. References to Section numbers indicate references to other sections of this Chapter.

### 8.1.2 Glossary of Terms and Organisations

#### *Entities*

- Contractor** – Any party undertaking works on or affecting the public road.
- Designer** – Party preparing the design for the temporary traffic measures.
- DoEHLG** – Department of the Environment, Heritage and Local Government.
- DoT** – Department of Transport.
- NRA** – National Roads Authority.
- Pedestrians** – Term includes mobility impaired pedestrians, pushchairs and wheelchair users.
- Road Authority** – Any local authority in charge of the public road.

#### *Documents*

- BS** – British Standard.
- IS EN** – European Standard.
- NRA DMRB** – National Roads Authority Design Manual for Roads and Bridges.
- NRA TD** – Standard produced by the NRA, as part of the NRA DMRB, setting out requirements for elements of design for roads.

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## Terms

**Emergency Lane** – This is a dedicated lane provided for the express use of emergency vehicles only. This lane may form part of the Lateral Safety Zone, if required.

**Near-Side Lane** – This is the left-hand lane on a carriageway with two or more lanes but does not include the hard shoulder if present.

**Off-Side Lane** – This is the right-hand lane on a carriageway with two or more lanes but does not include the hard strip if present.

The terms ‘**roadworks**’ and ‘**emergency roadworks**’ have the meanings assigned to them in Section 101D of the Road Traffic Act 1961 (as inserted by Section 9 of the Dublin Transport Authority (Dissolution) Act 1987):

‘**roadworks**’ means repairs, maintenance, alterations, improvements or installations or any other works to, above or under, a public road;

‘**emergency roadworks**’ means roadworks, the carrying out of which is immediately required in order to prevent, or reduce the risk of, loss, injury or damage to persons or property.

**Safety Zone** – Longitudinal and Lateral Safety Zones are areas between the works and the cones or barriers adjacent to the running traffic lane. They are required for the safety of the workers.

**Set Back** – This is the minimum clearance from the edge of the traffic lane to the front face of a temporary barrier or cones.

**Working Width** – The distance required behind a safety barrier, free from obstruction, to enable the barrier to deflect when hit by a vehicle. See NRA TD 19 and IS EN 1317.

**Works Area** – The actual area required by the Contractor to carry out the work.

Definitions of the terms used for the layouts of temporary traffic measures are given in Section 8.3.2 and those for the design of crossovers in Section 8.6.2.

## Abbreviations

<b>AADT</b>	– Annual Average Daily Traffic
<b>ADT</b>	– Average Daily Traffic
<b>HGV</b>	– Heavy Goods Vehicle
<b>km/h</b>	– Kilometres per hour
<b>LED</b>	– Light Emitting Diode
<b>LMCC</b>	– Lorry Mounted Crash Cushion (see Sections 8.2.6 and 8.5)
<b>m</b>	– Metre
<b>mm</b>	– Millimetre
<b>MLC</b>	– Mobile Lane Closure (see Section 8.5)
<b>RRB</b>	- Rolling Road Block (see Section 8.5.8)
<b>RUS</b>	- Regulatory Upright Sign. The sign number associated with RUS is a reference to the number assigned to a regulatory traffic sign in the Road Traffic (Signs) Regulations 1997-to date and referred to in Road Traffic (Traffic and Parking) Regulations 1997-to date. The use of these signs is described in Chapter 5.
<b>SSLC</b>	– Semi-Static Lane Closure (see Section 8.4)
<b>VMS</b>	– Variable Message Sign
<b>veh/h</b>	– Vehicles per hour
<b>vpd</b>	– Vehicles per day

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### 8.1.3 Scope

- 8.1.3.1 In the context of the Traffic Signs Manual, roadworks may be defined as occurring where the normal function of the public road used by any road user, including pedestrians, cyclists, equestrians, etc. is affected or interrupted at any time to facilitate the construction or maintenance of the public road, public or private utilities or any adjoining or overhead sites.
- 8.1.3.2 This document is not intended to cover low risk urban type routine works which have minimum impact, if any, on the movement of vehicles or pedestrians. If for these type of works signs are required, following an appropriate hazard identification and risk assessment, then the roadworks signs in this document should be used appropriately.
- 8.1.3.3 From planning through to completion, priority should be given to the safety of the road user and the workers. All reasonable steps should be taken to ensure that the disruption due to the works is reduced to a minimum. No one set of temporary traffic measures outlined in the following sections may satisfy all conditions for a given project, but this document has been developed and the layouts chosen to demonstrate the principles to be applied in the treatment of various situations.
- 8.1.3.4 This document is not however intended to replace the statutory obligations imposed pursuant to the Safety Health and Welfare at Work Act 2005 and/or the Safety Health and Welfare at Work (Construction) Regulations 2006 (or any legislation which amends or replaces either), including the obligations to carry out site specific hazard identifications and risk assessments.
- 8.1.3.5 All those involved in the design, implementation and use of temporary traffic measures and signs at roadworks must have regard to current legislation concerning health and safety and construction and must also comply with any contract documents or specific requirements relating to the particular site.
- 8.1.3.6 In a similar vein, this document does not define who should undertake the work associated with temporary traffic measures: instead, it simply recommends that certain actions be undertaken or standards achieved. The duties and applied responsibilities of the parties involved in roadworks will vary, depending on the nature of the work and the contractual arrangements.
- 8.1.3.7 The Road Authority has overall responsibility for the maintenance and construction of the public road. Also the Garda Síochána is the traffic authority, with responsibilities for matters relating to the control of traffic. Therefore, these bodies should normally be consulted before any temporary traffic measures are deployed.

#### *“Road Opening” Licence*

- 8.1.3.8 In order to carry out an excavation in a public road, a person or body must have the consent of the Road Authority or must be acting under specific enabling legislation such as applies to Statutory and Licensed Undertakers. Section 13(6) of the Roads Act 1993 provides powers whereby a Local Authority may allow a person or group of persons to carry out maintenance on a local road. This work could also entail opening and backfilling of trenches. Section 13(10) of the Act prohibits a person from defacing, damaging or excavating a public road without lawful authority or consent of the Road Authority.

## *Road Closure*

8.1.3.9 If a public road closure is proposed as part of the temporary traffic measures, then the statutory process for a full road closure in Section 75 of the Roads Act 1993 should be followed. This procedure is a function of the Road Authority and requires consultation with the public, inviting and answering any objections and is likely to take a number of weeks. See also Section 8.3.6.

8.1.3.10 If the effect of the proposed road closure on road users, local residents or businesses is likely to be severe, an information campaign should be undertaken in advance of any works. This may include some of the following:

- Letter drop to the surrounding area explaining the nature, diversions, duration and necessity for the works;
- Notification to local radio stations and AA Road Watch, etc.;
- Advance signs detailing the nature, duration and necessity for the works; and
- Liaison meetings with the emergency services, local residents and businesses to explain the nature, duration and necessity for the works.

## 8.1.4 Other Relevant Documents

- 8.1.4.1 This Chapter should be read in conjunction with other relevant chapters of the Traffic Signs Manual; these are listed in the Preface.
- 8.1.4.2 Regulatory traffic signs are prescribed by the Minister for Transport. The principal regulations are the Road Traffic (Signs) Regulations 1997. A range of new and amending regulations have been made since 1997 and a full listing is on [www.transport.ie](http://www.transport.ie). The regulations specify the type of signs which must be used by road authorities if they are providing road traffic regulatory signs. There must be strict compliance with the form and content of these signs. Details are given of the commencement date for the provision and use of each regulatory sign and this information should be consulted for confirmation before any regulatory sign is used. A full and comprehensive guide to legislation relating to traffic signs and temporary traffic measures at roadworks is outside the scope of this Manual.
- 8.1.4.3 The provisions of Section 101D of the Road Traffic Act 1961 (as inserted by Section 9 of the Dublin Transport Authority (Dissolution) Act 1987) in relation to roadworks are of particular importance. This section empowers certain local authorities to give a direction in writing to any person in relation to the carrying out of roadworks in its functional area, the matters that must be taken into regard in relation to the giving of such a direction and, as applicable, compliance with and enforcement of any such direction.
- 8.1.4.4 Other documents of relevance to temporary traffic measures and signs for roadworks include:
- Guidance for the Control and Management of Traffic at Roadworks – DoT, Local Government Management Services Board and NRA;
  - Guidelines for the Application of Special Speed Limits – DoT;
  - Guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads – DoEHLG;
  - NRA Design Manual for Roads and Bridges (NRA DMRB), which includes:
    - NRA TD 9 – Road Link Design;
    - NRA TD19 – Safety Barriers;
  - TS4: Guidelines, Certification Scheme and Specification for Construction of Traffic Signs – DoT/DoEHLG.

## 8.1.5 Design, Implementation and Removal of Temporary Traffic Measures.

- 8.1.5.1 It is the responsibility of the Designer of temporary traffic measures to apply the guidelines described in this Chapter and to use relevant road design principles, where appropriate, to provide a safe working area and a safe and efficient flow of traffic through the works. The principles outlined apply to all roadworks which affect a public road, and are applicable regardless of who carries out the works.
- 8.1.5.2 It is recognised that in a great many situations (particularly on roads which have evolved rather than been designed to a standard and less so, on designed roads) it may be necessary for the temporary traffic management Designer to deviate from the exact detail provided in this Chapter. However, in such circumstances, it is essential that the Designer, bearing in mind the Designer's obligations pursuant to health and safety legislation, consider carefully the characteristics of the site, and by the application of the guidelines described in this document, devise a traffic management scheme which best addresses the site constraints in a safe manner, in so far as is reasonably practicable.
- 8.1.5.3 When designing and implementing safe temporary traffic measures, and subsequently removing them, the following aspects should be considered where applicable:

### *Design*

- (a) Clarify the working area requirements for carrying out the work. If the working area provided is not adequate, there may be a temptation for the site staff to alter the temporary traffic measures and hence affect and possibly endanger the workforce and the road user.
- (b) Identify any particular hazards to the workforce or road user and, by using these guidelines, minimise the risks.
- (c) Design the temporary traffic measures to the guidelines provided in this chapter to provide a safe environment, so far as is reasonably practicable, for both road users and workers and to keep traffic flowing as freely as possible. The typical layouts shown in Section 8.8 should be adhered to as closely as possible and only signs contained in the Traffic Signs Manual used, to maintain consistency for road users when encountering temporary traffic measures.
- (d) Consult with all relevant parties such as the Road Authority, The Garda Síochána, etc. This will require forward planning as these agencies require notification and time to consider the design.
- (e) Liaise with bus operators and emergency services. It is important to inform bus operators and consult with the Gardaí if moving or suspending a bus stop. Also, the emergency services need to be aware of roadworks along their preferred routes.
- (f) Consider the closing of cycle tracks, footways, lay-bys, parking areas and loading bays. Alternatives may need to be provided, with associated signing.
- (g) Where required, obtain a road opening licence and/or a road closure order from the Road Authority.
- (h) Consider whether a roadworks speed limit would be advisable. If so, consult with the Road Authority and arrange to follow the procedures for seeking a Road Works Speed Limit Order.
- (i) Where roadworks which will last for more than twelve months are being planned, consider whether a special speed limit would be advisable. If so, consult with the Road Authority and arrange to follow the procedures for the making of special speed limit bye-laws.
- (j) Consider how the implementation and removal of temporary traffic

measures will be carried out. Some major temporary traffic measures will require a road or lane closure to actually implement the final temporary traffic measures.

*Implementation and Removal*

- (k) Implement the temporary traffic measures in accordance with the approved design. Any changes or short cuts made on site could have a negative safety implication and hence put the workforce and road users at risk.
- (l) Take down or cover existing signs or signals that may contradict the temporary traffic measures. Temporary traffic measures by their nature change the layout of the road and it is imperative that existing information be hidden from view if no longer correct and the new information correctly positioned.
- (m) Maintain the temporary traffic measures during the works. Due to the nature of construction work, dust and mud may be generated and hence regular cleaning of cones, signs, reflectors and road surfaces is required. Also signs and cones can be knocked over or displaced and should regularly be checked and rectified.
- (n) Remove all temporary traffic measures once the works are completed. In order to encourage the road users to take notice of temporary traffic measures it is important that all signs, cones, etc. be removed or covered when not required. If road users pass signs and cones in place with no operation being carried out, they may disregard the signs and cones when the operation is underway.
- (o) Re-erect or uncover relevant permanent signs or signals once the works are completed. Once the temporary traffic measures are removed then the road reverts to the permanent layout and all regulatory and warning signs must be in place and operational. A check to ensure this has been done should be carried out once the removal of the temporary traffic measure is complete.

## 8.1.6 Classification of Roads for Roadworks Sites

- 8.1.6.1 This section describes six road classifications and five roadwork types derived for the purpose of designing temporary traffic measures. The design parameters and typical layouts in the subsequent sections refer to these road classifications and roadwork types and any dimensions or guidelines for temporary traffic measures are tabulated accordingly.
- 8.1.6.2 It is envisaged that these road classifications and roadwork types will cover most scenarios but, if a situation arises that falls between the classifications or types, the design parameters for the higher road classification or roadwork type should be applied.
- 8.1.6.3 The speed limits stated in Table 8.1.1 are the speed limits on the approaches to the roadworks. These will normally be the limit posted on the road prior to the temporary traffic measures being introduced. However, if a mandatory roadworks speed limit is used to reduce the travelling speed of the traffic before it reaches the start of the roadworks, then the parameters for the reduced speed limit may be applied.
- 8.1.6.4 Where it is considered that the approach speed of traffic on a road is significantly different from the speed limit, the classification of the road may be based on the '85-percentile approach speed of private cars'. This is the speed which is exceeded by only 15% of cars in dry weather and may be measured by normal speed survey methods.

**Table 8.1.1: Road Classifications**

Road Classification	Type of Road	Speed Limit	Traffic Volume
Level 1 (LV1)	Single Carriageway	30 km/h	All traffic volumes
Level 2 (LV2)		50 or 60km/h	All traffic volumes
Level 3 (LV3)		80 or 100km/h	ADT ≤ 5000 vpd
Level 4 (LV4)		80 or 100km/h	ADT > 5000 vpd
Level 5 (LV5)	Dual Carriageway and Motorway	50, 60 or 80km/h	All traffic volumes
Level 6 (LV6)		100 or 120km/h	

Note: ADT = Average Daily Traffic – the total two-way vehicular traffic flow on a specific day.

- 8.1.6.5 There are three roadwork Types relating to static roadworks, depending primarily on their duration. Guidance on the temporary traffic measures for these Types is given in Section 8.3. The Types are:
- **Type A** – Full-time roadworks that remain in operation in all traffic flows and all visibility conditions. This type of works typically includes temporary traffic measures that will remain in position for a duration in excess of 24hrs.
  - **Type B** – Part-time roadworks that remain in operation when the expected traffic flow is less than the available carriageway capacity. This type of works typically includes temporary traffic measures at off-peak

times. With this type of works, the roadworks are such that they can be removed if necessary to minimise potential traffic delays.

- **Type C** – Roadworks that are of a short duration and involve the use of one or two vehicles, typically maintenance to utilities or street furniture, in all visibility conditions, when the expected traffic flow is less than the available carriageway capacity or the works do not reduce the carriageway width significantly.

8.1.6.6 In addition, two roadwork types may be used for operations of very short duration which are progressively moving along a road. These are:

- **Semi Static Lane Closure (SSLC)** – Roadworks where the operations are mobile or only stationary for very short periods, but where static warning signs and temporary traffic measures are used. SSLC is normally only suitable on single carriageway roads and in good visibility conditions. SSLC is described in Section 8.4.
- **Mobile Lane Closure (MLC)** – Roadworks where the operations are mobile or only stationary for very short periods, where mobile (truck mounted) warning signs and temporary traffic measures are used. MLC is normally only suitable on motorways, dual carriageway roads and the larger single carriageway roads, in good visibility conditions. MLC is described in Section 8.5.



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## 8.2 Equipment for Temporary Traffic Measures

### 8.2.1 Static Signs

8.2.1.1 Clear and effective traffic signs are essential at roadworks for the efficient operation of the road network, for the safety of both road users and workers, and for enforcement of traffic regulations.

8.2.1.2 Traffic signs at roadworks may be divided into three broad types:

- **Warning** – signs which warn of hazards/danger on the road ahead or advise persons of the precautions to be taken against such danger, or both.
- **Regulatory** – signs which give instructions or apply prohibitions or restrictions which road users must obey; and
- **Information** – signs which give directions and distances to destinations on the road ahead or on intersecting roads, or which provide other information relevant to the road user;

8.2.1.3 A special type of warning sign is used at roadworks: most are diamond shaped with black legend on an orange background. The warning signs and supplementary plates for use at roadworks are depicted in Tables 8.2.1 and 8.2.2. These signs have been authorised by a directive from the Minister of Transport under Section 95(16) of the Road Traffic Act 1961: no other warning signs shall be used, unless supported by a subsequent directive. Details of the designs of these signs are available from the Department of Transport's website [www.transport.ie](http://www.transport.ie).

8.2.1.4 Table 8.2.1 contains a list of warning signs that may be used in temporary traffic measures and Table 8.2.2 contains a list of supplementary plates which may be used in conjunction with them. How they should be used is shown in the layouts in Section 8.8.

8.2.1.5 Yellow warning signs may be used, or retained throughout roadworks to warn of existing hazards. These signs are described in Chapter 6 and details of their designs may be obtained from the Department of Transport's website.

8.2.1.6 Regulatory signs used at roadworks are the same as those used elsewhere. See Chapter 5 for these signs and their use. Only those regulatory signs depicted in the relevant Regulations may be provided at roadworks. Design details of these signs may also be obtained from the Department of Transport's website.

8.2.1.7 Directional signs used at roadworks shall be similar in design to directional signs used elsewhere (see Chapter 2), and shall have the same background colours as would be required in a permanent situation except for diversion route signs as per WK 093.

8.2.1.8 Where it is necessary to display text, it should be in accordance with the requirements set out in Chapter 2.

8.2.1.9 Information signs used at roadworks shall be similar to information signs used elsewhere (see Chapter 4), but shall have an orange background.

8.2.1.10 Some other types of sign are used frequently at roadworks. These are chevrons, barrier boards, and the Stop and Go discs, as shown in Table 8.2.4. Any of the regulatory signs contained in Chapter 5 may also be used at roadworks, where appropriate.

8.2.1.11 All sign faces are to be of retro-reflective material and the retro-reflectivity, colours, chromaticity and luminance factors shall be as specified in the Specification TS4 or any further amendments or replacement.

**Table 8.2.1 – Warning Signs for Use at Roadworks**

Sign No.	Sign Face	Description
WK 001	  	<p><b>Roadworks Ahead:</b> this sign shall be the first temporary sign visible to the road user on the approach to any roadworks. It may be supplemented with a Supplementary Plate P 082 indicating the nature of the works.</p> <p>At some sites, it is necessary to provide additional Signs WK 001 well in advance of the start of the roadworks. Where this is the case, the signs shall have a Supplementary Plate P 001 indicating the distance to the start of the works.</p> <p><b>End of Roadworks:</b> the ‘Roadworks Ahead’ sign shall be erected together with a Supplementary Plate P 010, End, as the last temporary sign visible to the road user leaving any roadworks. This ‘End’ plate marks the finish of all other roadworks warning signs used within the site.</p> <p><b>Cautionary Speed:</b> the ‘Roadworks Ahead’ sign may also be used at intervals through the roadworks together with Supplementary Plate P 011, Cautionary Speed (see Section 8.3.3).</p>
WK 010		<p><b>One-lane Crossover (Out):</b> this sign should be used on divided carriageways to depict traffic crossing the central reserve in a single lane from one carriageway to that of the opposing traffic, forming a contra flow.</p>
WK 011		<p><b>One-lane Crossover (Back):</b> this sign should be used on divided carriageways to depict traffic crossing the central reserve in a single lane from the carriageway of the opposing traffic back to the original side at the end of a contraflow.</p>
WK 012		<p><b>Move to Left (One Lane):</b> this sign should be used to depict traffic being diverted to the left by approximately one lane width, once the traffic is operating in a single lane.</p> <p>When this sign is used to direct traffic onto the hard shoulder, it should be used in conjunction with Supplementary Plate P 083, Use Hard Shoulder.</p>
WK 013		<p><b>Return to Main Carriageway (One Lane):</b> this sign should be used to depict traffic being diverted to the right. It is generally used to direct traffic back from the hard shoulder into the near-side lane of the main carriageway.</p>
WK 014		<p><b>Move to Left (Two Lanes):</b> this sign should be used on a two or more lane carriageway to depict two lanes of traffic being diverted to the left by approximately one lane width.</p> <p>When this sign is used to direct traffic onto the hard shoulder, it should be used together with Supplementary Plate P 083, Use Hard Shoulder.</p>

Table 8.2.1 – Warning Signs for Use at Roadworks

WK 015		<b>Return to Main Carriageway (Two Lanes):</b> this sign should be used on a two or more lane carriageway to depict traffic deviating to the right from the hard shoulder and lane 1 back onto the normal lanes. It may also be used for similar manoeuvres in three or more lane carriageways.
WK 016		<b>Obstruction Between Lanes:</b> this sign should be used to depict traffic travelling in the same direction being divided to pass on either side of an obstruction.
WK 017		<b>End of Obstruction Between Lanes:</b> this sign should be used to depict the end of traffic travelling in the same direction being divided on either side of an obstruction.
WK 018		<b>Start of Central Reserve or Obstruction:</b> this sign should be used to depict the start of a separation of traffic travelling in opposing directions either side of a central reserve or obstruction.
WK 019		<b>End of Central Reserve or Obstruction:</b> this sign should be used to depict the end of a central reserve or obstruction separating traffic travelling in opposing directions.
WK 020		<b>Lanes Diverge at Crossover:</b> this sign should be used on a dual carriageway to depict traffic in the near-side lane carrying straight on by deviating to the left and traffic in the off-side lane crossing the central reserve to the opposite carriageway at the start of a contra-flow.
WK 021		<b>Lanes Rejoin at Crossover:</b> this sign should be used on a dual carriageway to depict traffic in the near-side lane carrying straight on by deviating back to the right and traffic in the off-side lane crossing back over the central reserve at the end of a contra-flow.
WK 022		<b>Two-lane Crossover (Out):</b> this sign should be used on a dual carriageway to depict two lanes of traffic crossing the central reserve to the opposing carriageway side by side at the start of a contra-flow.
WK 023		<b>Two-lane Crossover (Back):</b> this sign should be used on a dual carriageway to depict two lanes of traffic crossing back over the central to the left-hand carriageway side by side at the end of a contra-flow.

Table 8.2.1 – Warning Signs for Use at Roadworks

WK 030		<b>Single Lane (for Shuttle Working):</b> this sign should be used to indicate that a length of road is operating with a single lane of traffic where the opposing traffic is either stopped or diverted. It is intended to reassure drivers that they will not encounter oncoming traffic.
WK 031		<b>Two-way Traffic:</b> this sign should be used where a one-way street or part of a dual carriageway is converted to a two-way operation for the purpose of carrying out roadworks.  It may also be used to highlight a two-way diversion around the works.
WK 032		<b>Road Narrows on Left:</b> this sign should be used to depict roadworks on the left side of the carriageway on sections of two-lane road where a sudden reduction in carriageway width creates a potential hazard.  It may also be used at roadworks with 'Priority', 'Give and Take' or shuttle working.
WK 033		<b>Road Narrows on Right:</b> this sign should be used to depict roadworks on the right side of the carriageway on sections of two-lane road where a sudden reduction in carriageway width creates a potential hazard.  It may also be used at roadworks with 'Priority', 'Give and Take' or shuttle working.
WK 034		<b>Road Narrows on Both Sides:</b> this sign should be used to depict roadworks on both sides of the carriageway on sections of two-lane road where a sudden reduction in carriageway width creates a potential hazard.  It may also be used at roadworks with 'Priority', 'Give and Take' or shuttle working.
WK 040		<b>Offside Lane (of Two) Closed:</b> this sign should be used on a two-lane one-way street or dual carriageway to depict an offside lane closure.
WK 041		<b>Nearside Lane (of Two) Closed:</b> this sign should be used on a two-lane one-way street or dual carriageway to depict a nearside lane closure.
WK 042		<b>Offside Lane (of Three) Closed:</b> this sign should be used on a three-lane one-way street or dual carriageway to depict an offside lane closure.

Table 8.2.1 – Warning Signs for Use at Roadworks

WK 043		<b>Nearside Lane (of Three) Closed:</b> this sign should be used on a three-lane one-way street or dual carriageway to depict a nearside lane closure.
WK 044		<b>Two Offside Lanes (of Three) Closed:</b> this sign should be used on a three-lane one-way street or dual carriageway to depict closure of both the centre and offside lanes.
WK 045		<b>Two Nearside Lanes (of Three) Closed:</b> this sign should be used on a three-lane one-way street or dual carriageway to depict closure of both the centre and nearside lanes.
WK 046		<b>Offside Lane (of Four) Closed:</b> this sign should be used on a dual four-lane carriageway to depict an offside lane closure.
WK 047		<b>Nearside Lane (of Four) Closed:</b> this sign should be used on a dual four-lane carriageway to depict a nearside lane closure.
WK 048		<b>Two Offside Lanes (of Four) Closed:</b> this sign should be used on a dual four-lane carriageway to depict closure of lanes 3 and 4 on the offside.
WK 049		<b>Two Nearside Lanes (of Four) Closed:</b> this sign should be used on a dual four-lane carriageway to depict closure of lanes 1 and 2 on the nearside.
WK 050		<b>Side Road on Left:</b> this sign should be used to indicate the presence of a road junction ahead to the left created by the roadworks.
WK 051		<b>Side Road on Right:</b> this sign should be used to indicate the presence of a road junction ahead to the right created by the roadworks.

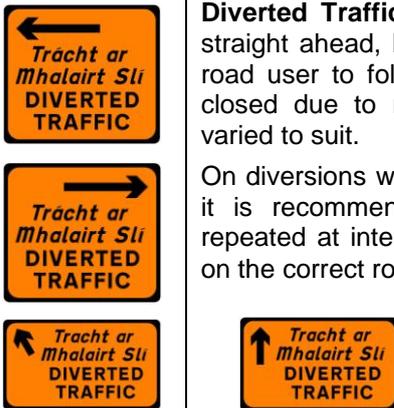
**Table 8.2.1 – Warning Signs for Use at Roadworks**

<b>WK 052</b>		<p><b>Site Access on Left:</b> this sign should be used to indicate the position of a site entrance and/or exit to the left.</p> <p>On roads with a speed limit of &gt;80km/h., an additional sign WK 052 should be positioned 100m in advance of the entrance, with a Supplementary Plate P001 stating the distance.</p> <p>At sites with several entrances, a supplementary colour code or numbering system may be used with this sign.</p>
<b>WK 053</b>		<p><b>Site Access on Right:</b> this sign should be used to indicate the position of a site entrance and/or exit to the right.</p> <p>On roads with a speed limit of &gt;80km/h., an additional sign WK 053 should be positioned 100m in advance of the entrance, with a Supplementary Plate P 001 stating the distance.</p> <p>At sites with several entrances, a supplementary colour code or numbering system may be used with this sign.</p>
<b>WK 060</b>		<p><b>Temporary Traffic Signals:</b> this sign should be used to indicate the presence ahead of traffic control by means of temporary traffic signals.</p> <p>This sign may be used with a Supplementary Plate P 001 stating the distance if forward visibility is poor and on roads with speed limits of &gt;80km/h.</p>
<b>WK 061</b>		<p><b>Flagman Ahead:</b> this sign should be used to indicate the presence ahead of manual or automated traffic control by means of Stop &amp; Go/Téigh discs.</p> <p>This sign may be used with a Supplementary Plate P 001 stating the distance if forward visibility is poor and on roads with speed limits of &gt;80km/h.</p>
<b>WK 062</b>		<p><b>Queues Likely:</b> this sign should be used where queues are likely to occur in an unexpected location due to roadworks. It may be used on high-speed roads or where a queue may form just after a bend.</p> <p>This sign shall always be preceded by a Roadworks Sign WK 001 with a Supplementary Plate P 001 stating the distance to the start of the roadworks.</p>
<b>WK 070</b>		<p><b>Hump or Ramp:</b> this sign should be used to indicate the presence of a hump in the road either due to roadworks or to a traffic calming measure.</p>

Table 8.2.1 – Warning Signs for Use at Roadworks

<p><b>WK 071</b></p>		<p><b>Uneven Surface:</b> this sign may be used to indicate that there is an uneven surface for vehicles, usually associated with the different layers of surfacing.</p> <p>At the start of the relevant section of road, this sign should be erected with supplementary Plate P 080, Slow.</p> <p>Sign WK 071 with Supplementary Plate P 010, End, should be erected to mark the end of the section affected. However, if this coincides with the end of the roadworks, Sign WK 001 with Supplementary Plate P 010 should be erected instead.</p>
<p><b>WK 072</b></p>		<p><b>Slippery Road:</b> this sign should be used to warn that the danger of vehicles skidding is greater than normal. The degree of danger cannot be defined as it depends on the skid resistance, speed of traffic, superelevation, weather and other factors. The sign will normally be used where traffic is running on a temporary surface or the final surfacing has not yet been laid.</p> <p>Supplementary Plate P 085, Unfinished Road Surface, and Plate P 011, Cautionary Speed, may be used in conjunction with Sign WK 072.</p> <p>Sign WK 072 with Supplementary Plate P 010, End, should be erected to mark the end of the section affected. However, if this coincides with the end of the roadworks, Sign WK 001 with Supplementary Plate P 010 should be erected instead.</p> <p>Where roadworks are substantially complete but it is necessary for a road to remain for a period with a surface other than the permanent final surface course, Sign WK 072 should be used. Since this is a roadworks sign with an orange background, it must be preceded by Sign WK 001 even though other traffic management measures are removed.</p>
<p><b>WK 073</b></p>		<p><b>Loose Chippings:</b> this sign should be used to indicate that there is a risk of airborne chips or stones due to a surfacing operation being undertaken.</p> <p>At the start of the relevant section of road, this sign may be erected with Supplementary Plate P 080, Slow, or P 011, Cautionary Speed.</p> <p>Sign WK 073 with Supplementary Plate P 010, End, should be erected to mark the end of the section affected. However, if this coincides with the end of the roadworks, Sign WK 001 with Supplementary Plate P 010 should be erected instead.</p>

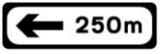
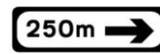
**Table 8.2.1 – Warning Signs for Use at Roadworks**

<b>WK 074</b>		<p><b>Soft Verges:</b> Where it is considered necessary to warn drivers of soft verges, Sign WK 074, Soft Verges, may be erected.</p> <p>Sign WK 074 with Supplementary Plate P 010, End, should be erected to mark the end of the section affected. However, if this coincides with the end of the roadworks, Sign WK 001 with Supplementary Plate P 010 should be erected instead.</p>
<b>WK 080</b>		<p><b>Pedestrians Cross to Left:</b> this sign should be used to indicate that a footway is closed ahead and pedestrians should cross to the left at this point.</p>
<b>WK 081</b>		<p><b>Pedestrians Cross to Right:</b> this sign should be used to indicate that a footway is closed ahead and pedestrians should cross to the right at this point</p>
<b>WK 090</b>		<p><b>Detour:</b> these signs should be used in advance and at the start of a diversion route for any road that is closed due to roadworks. They indicate to the traffic the distance to the start of the detour. The distance displayed should be in accordance with Table 8.2.3.</p>
<b>WK 091</b>		<p><b>Diverted Traffic:</b> these signs should be used to indicate straight ahead, left or right at every decision point, for the road user to follow a diversion route for any road that is closed due to roadworks. The arrow direction may be varied to suit.</p> <p>On diversions with long distances between decision points, it is recommended that the straight ahead variant be repeated at intervals, to reassure drivers that they are still on the correct route.</p>
<b>WK 092</b>		<p><b>End of Detour:</b> this sign should be placed at the end of a diversion route, to advise drivers that they are back on the original route.</p>
<b>WK 093</b>	 <p style="text-align: center;">Typical sign</p>	<p><b>Detour Destination:</b> for complicated diversion routes, Signs WK 093, are to be used in place of the Diverted Traffic (along the diversion) signs.</p> <p>These are direction or advance direction signs, designed in accordance with Chapter 2 but with an orange background. Such signs should show one or more destinations and the route number and only be used for diversion routes.</p> <p>Existing direction signs that do not contradict the roadwork signs, shall remain in place for the duration of the works.</p>

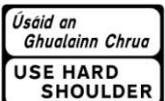
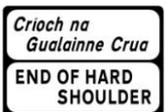
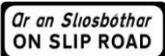
**Table 8.2.1 – Warning Signs for Use at Roadworks**

<b>WK 094</b>		<p><b>Road Closed:</b> this sign should only be used in conjunction with WK 001 when a road has been closed to facilitate roadworks.</p>
<b>WK 095</b>		<p><b>Stop Here On Red:</b> this sign may be used to indicate to drivers where to stop when temporary traffic controls are in place.</p>
<b>WK 096</b>		<p><b>Free Recovery:</b> this sign should be used to indicate to drivers that there is a free recovery service in operation within the works. The sign should be repeated at 500m intervals.</p> <p>The telephone number must be varied to suit.</p>
<b>WK 097</b>		<p><b>Free Recovery End:</b> this sign should be used to indicate to drivers where the end of the free recovery service takes effect beyond the works.</p>
<b>WK 098</b>		<p><b>Convoy System in Operation:</b> this sign should be used, in conjunction with either sign WK 060 or WK 061, to indicate to drivers that a convoy system is in operation through the works.</p>
<b>WK 099</b>		<p><b>Follow Convoy Vehicle:</b> this sign should be displayed on the back of the convoy vehicle.</p>
<b>WK 143</b>		<p><b>Cyclists:</b> is available for use where it is considered necessary to warn traffic of the likely presence of a significant number of cyclists. Where the length over which a significant number of cyclists may be encountered is longer than about 250m, Supplementary Plate P 002, Length, may be used to indicate the length</p>
<b>WK 144</b>		<p><b>Slippery for Cyclists:</b> should be provided in places, where road works may, due to a slippery surface, cause problems for cyclists. In such locations Sign WK 144, Slippery for Cyclists, may be provided.</p>

**Table 8.2.2: Supplementary Plates for Use at Roadworks**

Plate No.	Sign Face	Description
P 001		<b>Distance:</b> This plate may be used in conjunction with any roadworks sign to indicate the distance to a hazard. The distance shown on the plate shall be in accordance with Table 8.2.3.
P 002		<b>Length:</b> This plate may be used in conjunction with any roadworks sign to indicate the extent of the hazard. The distance shown on the plate shall be in accordance with Table 8.2.3.
P 003L  P 003R	  	<b>Direction:</b> These plates may be used in conjunction with any roadworks sign to indicate the direction to a hazard.
P 004L  P 004R	  	<b>Direction and Distance:</b> These plates may be used in conjunction with any roadworks sign to indicate the direction and distance to a hazard. The distance shown on the plate shall be in accordance with Table 8.2.3.
P 010		<b>End:</b> this plate may be used in conjunction with any roadworks sign to highlight to the road user that the end of a specific hazard or operation has been reached.
P 011		<b>Cautionary Speed:</b> this plate may be used in conjunction with Sign WK 001, Roadworks Ahead, Sign WK 072, Slippery Road, or Sign WK 073, Loose Chippings, to indicate the speed which traffic is recommended not to exceed. The speed displayed must be one from the following list: 25, 35, 45, 55, 65 or 75km/h. See Section 8.3.3.
P 067		<b>Safe Height for Overhead Electric Cables:</b> this plate must be used in conjunction with sign W 111 to advise vehicles of the safe height available. The safe height should be agreed with the owner of the electrical cables and rounded down to the nearest 0.1m.
P 080		<b>Slow:</b> this plate may be used in conjunction with any roadworks sign to highlight to the road user that speed should be reduced when passing a particular hazard or operation.

**Table 8.2.2: Supplementary Plates for Use at Roadworks**

Plate No.	Sign Face	Description																																				
P 081		<b>Concealed Entrance:</b> this plate may be used in conjunction with signs WK 050, WK 051, WK 052 or WK 053 to indicate the presence of a concealed site entrance or existing entrance within the works.																																				
P 082	 Typical sign	<b>Type of Works:</b> these plates may be used in conjunction with Sign WK 001 at the start of roadworks to highlight to the road user a specific type of operation is being carried out. One of the following alternatives, in bilingual format, should be used as appropriate: <table style="width: 100%; border: none;"> <tr> <td>Bridge Inspection</td> <td>Iniúchadh Droichid</td> </tr> <tr> <td>Bridge Repairs</td> <td>Deisiú Droichid</td> </tr> <tr> <td>Grass Cutting</td> <td>Bearradh Féir</td> </tr> <tr> <td>Gritting</td> <td>Grean á Leagan</td> </tr> <tr> <td>Gully Emptying</td> <td>Folmhú Clasáin</td> </tr> <tr> <td>Hedge Cutting</td> <td>Bearradh Fáil</td> </tr> <tr> <td>Line Painting</td> <td>Línphéinteáil</td> </tr> <tr> <td>Litter Picking</td> <td>Bailiú Brusca</td> </tr> <tr> <td>Mobile Roadworks</td> <td>Oibreacha Bóthair Soghluaiste</td> </tr> <tr> <td>Road Marking</td> <td>Marcáil Bóthair</td> </tr> <tr> <td>Road Repairs</td> <td>Deisiú Bóthair</td> </tr> <tr> <td>Road Resurfacing</td> <td>Athdhromchlú</td> </tr> <tr> <td>Salting</td> <td>Sailleadh</td> </tr> <tr> <td>Stud Fitting</td> <td>Feistiú Stoda</td> </tr> <tr> <td>Surveying</td> <td>Suirbhéireacht</td> </tr> <tr> <td>Sweeping</td> <td>Scuabadh</td> </tr> <tr> <td>Tree Cutting</td> <td>Bearradh Crann</td> </tr> <tr> <td>Weed Spraying</td> <td>Spraeáil Fiaíilí</td> </tr> </table>	Bridge Inspection	Iniúchadh Droichid	Bridge Repairs	Deisiú Droichid	Grass Cutting	Bearradh Féir	Gritting	Grean á Leagan	Gully Emptying	Folmhú Clasáin	Hedge Cutting	Bearradh Fáil	Line Painting	Línphéinteáil	Litter Picking	Bailiú Brusca	Mobile Roadworks	Oibreacha Bóthair Soghluaiste	Road Marking	Marcáil Bóthair	Road Repairs	Deisiú Bóthair	Road Resurfacing	Athdhromchlú	Salting	Sailleadh	Stud Fitting	Feistiú Stoda	Surveying	Suirbhéireacht	Sweeping	Scuabadh	Tree Cutting	Bearradh Crann	Weed Spraying	Spraeáil Fiaíilí
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Tree Cutting	Bearradh Crann																																					
Weed Spraying	Spraeáil Fiaíilí																																					
P 083		<b>Use Hard Shoulder:</b> this plate may be used in conjunction with Signs WK 012 and WK 014 where it is necessary for the hard shoulder to be used as a traffic lane.																																				
P 084		<b>Hard Shoulder Closed:</b> this plate may be used in conjunction with Sign WK 001 to indicate that the hard shoulder, but not the traffic lanes, is closed temporarily.																																				
P085		<b>Unfinished Road Surface:</b> this plate should be used in conjunction with Sign WK 072, Slippery Road, to indicate that the final surfacing has not yet been laid.																																				
P086		<b>On Slip Road:</b> this plate should be used in conjunction with sign WK001 and all other advanced warning signs on the mainline or side roads to indicate that the works are being carried out on the diverge or merge slips.																																				

**Table 8.2.3: Distances for Supplementary Plates**

<b>Measured Distance to Hazard</b>	<b>Distance on Plate to be Rounded to Nearest</b>
< 100m	10m
$\geq 100\text{m} < 500\text{m}$	50m
$\geq 500\text{m} < 900\text{m}$	100m
$\geq 900\text{m} < 4,000\text{m}$	0.5km
$\geq 4,000\text{m}$	1km

**Table 8.2.4: Other Signs for Use at Roadworks**

Sign No.	Sign Face	Description
W 062		<p><b>Chevron Boards:</b> Chevron boards are used to direct traffic at a change of direction. At roadworks, they are normally situated behind a line of cones or other barrier in the line of sight of approaching drivers.</p> <p>Standard chevron boards have two or three chevrons, but longer boards may be used (see Chapter 6).</p>
		
W 063		
		
W 110		<p><b>Restricted Headroom:</b> Where a warning sign is appropriate, Sign W 110 should be used, with the available headroom indicated in metres to one decimal place.</p>
W 111	  	<p><b>Overhead Electrical Cables:</b> Where there is a danger that high vehicles may contact overhead electrical cables, Sign W 111, Overhead Electrical Cables, should be provided on each approach (see Chapter 6).</p> <p>Sign W 111 shall be erected together with Supplementary Plate P 067, Safe Height, to advise vehicles of the safe height available. The safe height should be agreed with the owner of the electrical cables and rounded down to the nearest 0.1m.</p>
W 183		<p><b>Barrier Boards:</b> Barrier boards indicate that a lane is closed. At roadworks, they are normally situated behind a line of cones or other barrier to indicate the start of a closed lane. Barrier boards may be repeated at intervals along the closed lane.</p> <p>Standard barrier boards have three, four or five red bars. They shall always start and finish with a red bar (see Chapter 6).</p>
W 184		
W185		
RUS 039 to RUS 044	 RUS 043   RUS 042	<p><b>Speed Limit:</b> Speed limit signs (RUS 039 to RUS 044) indicate the maximum allowable speed applying to a length of road. At roadworks, they may indicate the permanent speed limit for that length of road, or a roadworks speed limit implemented for the particular works.</p> <p>Speed Limit signs may show a speed of a 120, 100, 80, 60, 50 or 30km/h. No other speed limit value shall be used. A speed limit sign should be erected on both sides of the carriageway.</p> <p>Repeater signs should be provided at a maximum of 500m intervals and after a junction.</p> <p>See Section 8.3.3 and Chapter 5 for further details.</p>

Table 8.2.4: Other Signs for Use at Roadworks

Sign No.	Sign Face	Description
RUS 014	 	<p><b>No Overtaking:</b> No Overtaking sign prohibits overtaking at locations where it is considered dangerous to do so (see Chapter 5).</p> <p>At the point where the overtaking restriction ends, Sign RUS 014 shall be erected together with a Supplementary Plate P 010, End.</p>
RUS 026		<p><b>Yield:</b> The Yield Sign imposes a requirement on all approaching vehicular traffic to yield (see Chapter 5). It is generally provided in association with a Yield Line, RRM 018 (see Chapter 7).</p>
RUS 027		<p><b>Stop:</b> The Stop Sign imposes a requirement on all approaching vehicular traffic to stop (see Chapter 5). It is generally provided in association with a Stop Line, RRM 017 (see Chapter 7).</p>
RUS 001		<p><b>Keep Left:</b> Traffic must pass to the left of the sign. Used at a nosing or similar, where <u>all</u> traffic must pass to the left (see Chapter 5).</p>
RUS 002		<p><b>Keep Right:</b> Traffic must pass to the right of the sign. Used at a nosing or similar, where <u>all</u> traffic must pass to the right (see Chapter 5).</p>
RUS 003		<p><b>Pass Either Side:</b> Traffic may pass to either the left or right of the sign. Used at a nosing or similar, where traffic splits to pass either side of an island, or some traffic diverges (see Chapter 5).</p>
RUS 060 RUS 061		<p><b>Stop and Go:</b> Stop and Go discs shall display 'STOP' with a red background on one side and 'GO' or 'Teigh' with a green background on the reverse. These signs are used for controlling traffic by manual or automated methods. See Sections 8.2.7 and 8.3.9 and Chapter 5.</p> <p>If a sign is to be used to stop both streams of traffic at the one time, such as at a site exit, then a panel displaying 'STOP' on both sides should be used.</p>
RUS ...	Various	<p><b>Other Regulatory Signs:</b> Where a need arises, any of the regulatory signs in Chapter 5 may be used at roadworks.</p>
F401		<p><b>Speed Limit Ahead:</b> this sign may be used to warn traffic of a roadworks speed limit ahead. The distance shown on the plate shall be in accordance with Table 8.2.3. The speed limit displayed shall match the regulatory speed limit for which this sign is advance notification. See Section 8.3.3 and Chapter 4.</p>

## 8.2.2 Size, Positioning and Layout of Signs

- 8.2.2.1 Chapter 1 provides guidance on the orientation, height and lateral clearances of signs. This advice should be followed as far as practicable for signs at roadworks. Where a lower mounting height is required a minimum of 500mm clearance from the underside of the sign to the adjacent carriageway is permitted. However it should be noted that lower mounted signs will require more frequent cleaning. The positioning and number of signs recommended are tabulated in Section 8.3 for each road classification and roadwork type. Typical layout diagrams are shown in Section 8.8.
- 8.2.2.2 Signs used to control works traffic movements within the site should be positioned so that they do not cause confusion by being visible to the road user.
- 8.2.2.3 The size of signs at roadworks and any text required on these signs is directly related to the road type and the speed limit of the road. Table 8.2.5 shows the recommended sizes for diamond and rectangular shaped warning signs and circular regulatory signs for each of the different road classifications. The sizes of other signs should be in keeping with these signs. Refer to the working drawings, available from the Department of Transport, for the exact 'x' height, dimensions of signs and supplementary plates containing text.

**Table 8.2.5: Roadworks Sign Dimensions**

Road Classification	Speed Limit	Type of Road	Diamond Warning Sign Length of Side (mm)	Circular Regulatory Sign Diameter (mm)	Rectangular Warning Signs (‘x’ height)
Level 1	30 km/h	Single Carriageway	600mm	600mm	50
Level 2	50 or 60 km/h		600mm	600mm	75
Level 3	80 or 100 km/h		600mm	750mm (600mm)	100
Level 4	80 or 100 km/h		750mm	900mm (750mm)	100
Level 5	50, 60 or 80 km/h	Dual Carriageway and Motorway	900mm	900mm (750mm)	100
Level 6	100 or 120 km/h		1200mm	1200mm (1500mm)	120

Notes:

1. The dimension for a diamond shaped sign is measured along an edge.
2. The dimension for a rectangular shaped sign is based on the ‘x’ height. Where necessary an ‘x’ height one step below may be provided for signs required in a central reserve with restricted space.
3. Refer to Chapter 2 for details of ‘x’ heights and how they are applied to sign design.
4. The recommended ‘x’ height for supplementary plate text is shown on the working drawings.

## 8.2.3 Static Sign Supports or Stands

8.2.3.1 Temporary sign supports or stands should be designed in accordance with Specification TS4.

### *Signs With Large Diameter Poles and Foundations*

8.2.3.2 Where temporary signs require foundations and large diameter steel posts, consideration should be given to the provision of safety barriers. On roads with speeds of >85km/h, posts with a diameter greater than 90mm require a safety barrier: see NRA TD 19 for specific requirements.

8.2.3.3 As an alternative, passively safe signposts to IS EN 12767 may be used for larger signs, as this type of post does not require safety barriers. It should be noted that passively safe signposts are not permitted in the central reserve as, in an accident, a post or sign face may cause a secondary accident by being displaced into the adjacent carriageway.

8.2.3.4 On roads with speeds of >100km/h Variable Message Signs should be regarded as a hazard and treated in the same way as described for large static signs. They can be located behind existing safety barriers, or temporary safety barriers may be provided to provide separation from the traffic.

## 8.2.4 Variable Message Signs

- 8.2.4.1 Variable Message Signs (VMS) may be used at roadworks to depict a regulatory sign such as a Keep Left arrow or a warning sign such as a chevron. Recommendations for the use of VMS are contained in Chapter 3 and the NRA Guidelines for the Use of Variable Message Signs on National Roads.
- 8.2.4.2 The design and specification of VMS at roadworks should be in accordance with Chapter 3 and the NRA VMS Guidelines.
- 8.2.4.3 Several factors influence the effectiveness of VMS displays, independent of the technology in use. These govern the size, location, display characteristics and message content to ensure an effective sign. The factors are:
- (a) **Conspicuity** – Is there adequate forward visibility and does the sign attract attention in the environment in which it is placed? The geometry of the road or vegetation can obscure the sign from view. Is the area cluttered with existing signs?
  - (b) **Legibility** – Can the road user read the words or symbols displayed? This factor is governed by the distance from which the sign is first legible, which depends on the form and spacing of characters, words and lines, character height, and the duration for which the sign is legible.
  - (c) **Information Load** – Do drivers have sufficient time to read and understand the entire message without unduly diverting their attention from driving? If too much information or too many sequences of messages are used, the road user will take in only a fragment of the information or, worse, be distracted from driving.
  - (d) **Comprehensibility** – Can the road user understand the message? Clarity and consistency of message is required, particularly in relation to symbols, use of abbreviations and the amount of instructions to be assimilated by the road user.
  - (e) **Response** – Does the road user have adequate time (distance) to respond safely and correctly to the instruction? This depends on the forward visibility and location of the VMS.
  - (f) **Credibility** – Can the road user rely on the information displayed? This will depend on the correct use of the VMS only during the works and how well the system is operated and updated.
- 8.2.4.4 The defined character matrix boxes are formed by an array of light emitting diodes (LEDs) that form a single character generally 5 LEDs wide by 7 high and the sign face will consist of a number of these boxes. A fully flexible matrix consists of LEDs that cover the entire face without gaps; it can be used for text or pictograms.
- 8.2.4.5 If a VMS is to be used to show text, the message should consist of either one or two phases. Table 8.2.6 shows the recommended minimum text sizes for the various speed limits.

**Table 8.2.6 – VMS Character Size**

Speed Limit	Minimum Text Size
<b>50 - 80 km/h</b>	250mm
<b>100 km/h</b>	400mm
<b>120 km/h</b>	700mm

- 8.2.4.6 The requirements in relation to the positioning of VMS are similar to those for static signs in that a lateral clearance and clear visibility, free of obstruction from vegetation, road geometry and street furniture, are essential.
- 8.2.4.7 If a light emitting VMS is used it can be affected by sunlight, giving rise to two problems:
- **Wash out** – the contrast between the light source and sign face can be lost, rendering the message faint or even invisible to drivers;
  - **Phantom Messages** – characters or messages appear to be visible to the driver even if the sign is switched off.
- 8.2.4.8 If these problems occur then mitigating measures such as a canopy, hood or louvre may be required to avoid mis-communication and confusion to the road user.

## 8.2.5 Delineation Devices

- 8.2.5.1 Delineation devices such as cones, cylinders, lightweight barriers and temporary road studs should be manufactured in a material that can be struck without causing damage to the impacting vehicle and with the capability of returning to their original shape after impact. Cones or cylinders should be designed in accordance with IS EN 13422 and manufactured specifically for use in temporary traffic measures.
- 8.2.5.2 Temporary road markings, where required at road works, should be to IS EN 1436.
- 8.2.5.3 The retro-reflective material used on delineation devices should be to IS EN 13422 and have a smooth, sealed outer surface that will display approximately the same colour day or night.
- 8.2.5.4 The recommended positioning, spacing, size and tapers for delineation devices are tabulated in Section 8.3 for each road classification and roadwork type. Details of typical layout diagrams are shown in Section 8.8.

### *Cones and Cylinders*

- 8.2.5.5 Cones should be sufficiently stable to remain upright in service and have a base design to stop the cone from rolling if knocked over. Table 8.2.7 shows the sizes of cones to be used for the different types of road and speed limits. Refer to Tables 8.3.1 to 8.3.5 for spacing of cones.

**Table 8.2.7 – Cone Size and Spacing**

Road Level	Speed Limit	Type of Road	Minimum Height of Cone (mm)
Levels 1 & 2	30 – 60 km/h	Single Carriageway	750
Levels 3 & 4	80 km/h		750
Levels 3 & 4	100 km/h		750
Level 5	50 – 80 km/h	Dual Carriageway and Motorway	750
Level 6	100 – 120 km/h		1000

Note: 450mm high cones are permitted for works such as road marking and surveying on single carriageway roads only.

- 
- 8.2.5.6 At night, lines of cones in un-lit areas should be fitted with steady state lamps with amber light or a combination of steady amber lamps and rotating amber reflectors at regular intervals. Rotating reflectors are not permitted on lead in tapers.
- 8.2.5.7 Cylinders type delineators should be designed to allow them to be attached/fixed to existing road stud sockets or bolted to the road surface. Cylinders may be used to separate opposing traffic. As they have less visibility than other devices, they should only be used in situations where space is restricted.

### *Barriers*

- 8.2.5.8 There are five principal types of temporary barrier that may be used to provide varying degrees of protection as part of temporary traffic measures, depending on the risk presented and the item to be protected. The different types are;
- (1) Pedestrian barriers;
  - (2) Temporary barriers for guiding vehicles when a traffic lane or part of a lane is closed;
  - (3) Lightweight temporary barriers to delineate the edges of safety zones and works areas on low speed roads;
  - (4) Temporary safety barriers with specified containment values to delineate the edge of safety zones and work areas on high speed roads; and
  - (5) Permanent safety barriers with specified containment values.
- 8.2.5.9 The first three types provide visual guidance to delineate the areas where pedestrians or traffic should go. They are not designed to prevent errant vehicles encroaching into the area of the roadworks.
- 8.2.5.10 The last two types, temporary and permanent safety barriers are intended to restrain errant vehicles. Their design shall be in accordance with IS EN 1317 and NRA TD 19, which specify the performance parameters and testing regime required for safety barriers for use on public roads. For further guidance, refer to NRA TD 19 and see Section 8.3.13.
- 8.2.5.11 The emergency lane, if required, may form part of the working width behind the safety barrier but no operations, stationary vehicles or materials shall be permitted within the working width/lateral safety zone at any time.
- 8.2.5.12 All barriers must be fitted with reflective strips and/or steady state lamps with amber light to ensure visibility at night.
- 8.2.5.13 Lightweight barriers should be of a stable design that will accommodate either sandbag or water ballast.

### *Road Markings*

- 8.2.5.14 Temporary road markings used at road works should conform to IS EN 1436 and be as per the road markings defined in Chapter 7.
- 8.2.5.15 Existing road markings should be removed or obscured prior to the application of temporary road markings.
- 8.2.5.16 Temporary road markings must be removed and replaced to represent any change in the temporary traffic management layout or when the permanent layout is completed.
- 8.2.5.17 In circumstances where it is necessary to highlight to road users the presence of roadworks and/or the temporary nature of the road surface, orange road markings may be used. These orange markings will be for centre line, edge lines, traffic lane lines, hatching and direction arrows with dimensions and their use as defined in Chapter 7.

### *Road Studs*

- 8.2.5.18 If a section of an existing road with road studs or markings is altered for any extended period of time, then temporary road studs may be used to define the temporary traffic lanes.
- 8.2.5.19 Temporary road studs should be to IS EN 1463, be luminous orange and fixed to the road surface in a way that permits removal without damaging the surface.
- 8.2.5.20 Temporary road studs should be used for one application only.

## **8.2.6 Lorry Mounted Crash Cushions**

- 8.2.6.1 Lorry Mounted Crash Cushions (LMCC) are crash cushions mounted on the back of a vehicle. They may be used to mitigate the effects of errant vehicles colliding with a stationary obstacle, works vehicle or work site. Their function is to decelerate the errant vehicle smoothly to a stop with minimum damage or injury. Their main use is in mobile lane closures (see Section 8.5). However, they may on occasion be useful as part of static temporary traffic measures.
- 8.2.6.2 If the longitudinal safety zone specified in the design parameters in Section 8.3 cannot be achieved, then consideration should be given to the use of a LMCC to mitigate the effects of the reduced zone length.
- 8.2.6.3 LMCCs should, as a minimum, conform to the performance specification described in Appendix A of the UK Highways Agency Standard TD 49.
- 8.2.6.4 LMCCs should be crashworthy and periodically inspected to verify that they have not been damaged previously or that they have been repaired or replaced and re-tested. They should be designed to stop or redirect errant vehicles under prescribed conditions and meet all vehicle requirements recommended by the manufacturer. They shall be fitted with a device which automatically activates the block vehicle's brakes when any contact is made with the rear of the LMCC. This will reduce the risk of the LMCC vehicle rolling forward and possibly causing a secondary accident.
- 8.2.6.5 Vehicles fitted with LMCCs may be considered abnormal vehicles, in which case they will need an appropriate licence from the Vehicle Licensing Authority or a permit from the Road Safety Authority.
- 8.2.6.6 All vehicles fitted with LMCCs shall provide, for all occupants, seat belts with a minimum of three points of anchorage and head restraints correctly positioned.

## 8.2.7 Temporary Traffic Control

- 8.2.7.1 Temporary portable traffic signals are frequently required to control traffic at roadworks, either as part of revised junction layouts, or to control alternate shuttle working. Refer to Chapter 9 - Section 9.2 - Temporary Signals for Temporary Traffic Management for the permitted signal head configurations and maximum and minimum mounting heights.
- 8.2.7.2 It is desirable that temporary traffic signals should be vehicle actuated, especially where warranted by the traffic volumes. The controller should be capable of providing a minimum of a two-phase operation or, where required, more phases to cater for more complicated layouts. Loops, microwave, infrared or radar detectors may be used to detect and control the movement of traffic. Where traffic flows are low, the system should ensure that red aspects are not of too long a duration. See also Section 8.3.9.
- 8.2.7.3 Where simple traffic control is adequate, such as at plant crossings or short lengths of shuttle working, STOP & GO/*Téigh* discs may be used. These consist of a double-sided circular panel showing Sign RUS 060, STOP, on one side and Sign RUS 061, GO (or *Téigh*), on the other (see Table 8.2.4). If a sign is to be used to stop both streams of traffic at the one time, such as at a plant crossing, then a disc displaying STOP on both sides should be used. See also Section 8.3.9.
- 8.2.7.4 STOP & GO/*Téigh* discs may also be used where traffic flow in one direction might be significantly higher and the maximum timing for actuated traffic signals may not be appropriate.

## **8.2.8 Temporary Lighting**

- 8.2.8.1 The layout of temporary overhead lighting should be designed to ensure that a constant level of light is achieved and road users are not dazzled or shadows cast on the carriageway.
- 8.2.8.2 If high masts are used to protect then temporary safety barriers should be provided in accordance with IS EN 1317 and NRA TD 19. Other low level lighting apparatus should be positioned within the works area and protected by cones.
- 8.2.8.3 For complex traffic management layouts or to enhance the visibility of the works boundary, a steady lamp showing amber light and reflective strips should be used in unlit areas at regular intervals along the trafficked edge of the cones or barriers.
- 8.2.8.4 Rotating reflectors may be used in place of steady state lamps on the longitudinal sections of cones or barriers adjacent to the trafficked edge but may not be used on lead taper sections.
- 8.2.8.5 These amber lamps or rotating reflectors may be mounted on cones provided the apparatus does not block any of the reflective strips of the cones or protrude into the carriageway.

## 8.3 Static Operations

### 8.3.1 General

- 8.3.1.1 Static operations are those carried out within a fixed work site area. The length of a fixed site should be kept to the minimum required to carry out the operation safely.
- 8.3.1.2 When designing temporary traffic measures the optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m.
- 8.3.1.3 The residual road space which forms the traffic lane for one-way traffic should be a minimum width of 3.25m and maximum lane width of 3.7m. In difficult circumstances, the single lane width may be reduced as noted above.
- 8.3.1.4 For two-way traffic the minimum road width should be 6.0m. Where there are two lanes of traffic travelling in the same direction the near-side lane should be a minimum of 3.25m and the off-side lane a minimum of 3.0m.
- 8.3.1.5 Where temporary traffic measures are likely to have a significant impact on the capacity of the road, the anticipated queue lengths and delays should be estimated by the Designer. Traffic management should be designed to minimise delays. It is important that WK 001, Roadworks Ahead, and the subsequent warning sign WK 062, Queues Likely, be positioned to ensure that, regardless of queue length, approaching traffic is forewarned of queues ahead.
- 8.3.1.6 Where a shuttle system is to be put in place, then the maximum length of work site should be kept to a minimum, with a recommended maximum of 500m. In urban areas it will be necessary to limit the work site to shorter lengths.
- 8.3.1.7 In the case where the capacity is not greatly reduced and the permanent number of lanes is maintained, the length can be increased but only to facilitate continuous operations. Long lengths of restricted width traffic lanes, with no apparent activity being carried out, will tend to encourage drivers to disregard the signage and directions being given, with attendant risks to site operatives and drivers as a consequence of inappropriate driver behaviour. It is recommended that the maximum length should not exceed 5km.
- 8.3.1.8 The minimum length to the next section of roadworks on the same route should ideally be at least 10km, or as agreed with the Road Authority. This requirement is to allow platoons of traffic to dissipate and to avoid continued delays and driver stress. Designers of roadworks close to a Road Authority boundary should consult with the Road Authority in the adjoining county in order to plan and co-ordinate roadworks.
- 8.3.1.9 Advance signs are used to alert the driver to an unexpected road layout or hazard ahead. To achieve the desired effect the use of signs must be standardised and appropriate. It is important to ensure that the end of the roadworks is signed.
- 8.3.1.10 If permanent road signs display a contradictory message to the roadworks signs, they must be covered for the duration of the works and the relevant signs uncovered or reinstated during the removal of the temporary traffic measures.
- 8.3.1.11 There will often be a requirement to implement different stages of temporary traffic measures as the works progress. Each subsequent stage will be governed by the same design parameters, but could present an additional risk to the workforce and road user as the layout of the road may differ from what they had become used to. It is important for each stage to be properly engineered to manage the traffic as necessary and to be marked and signed clearly to avoid confusion.

- 8.3.1.12 For short-term work sites on roads with speed limits of 60km/h or less, where the traffic lanes are shifting daily due to the nature of the works, then cones or temporary barriers with steady beacons can be used to channel the traffic. However, the temporary traffic measures must clearly define, over and above any existing markings, the route through the works, especially on un-lit roads during hours of darkness, or poor visibility.
- 8.3.1.13 For a similar scenario on roads with a speed limit in excess of 60 km/h, where the use of cones may not impart a clear layout then temporary road markings or road studs will normally be required.
- 8.3.1.14 On an existing road with road studs, if temporary traffic measures are required during the hours of darkness or in poor visibility then temporary road studs should be provided. This is necessary as the visual impact on the driver is affected if a short section of road has no road studs and could possibly lose their positioning.
- 8.3.1.15 Where there are two or more lanes of traffic travelling in the one direction through the works, it is recommended temporary road studs be used as it is important to ensure appropriate delineation is provided between the lanes. Any conflicting road studs or markings should be removed or obscured.
- 8.3.1.16 During the programme of the works consideration should be given to the possibility of removing the traffic management measures in order to deal with:
- Particularly high traffic volumes due to a sporting or other event;
  - Adverse weather conditions;
  - Emergency access; or
  - Times when work is not in progress.
- 8.3.1.17 Once the works are completed, the removal of traffic management measures should only be carried out if it is possible to ensure the road is safe and free from any obstructions, all road surfacing is completed and all permanent signs, road markings, safety barriers and other items are in place.

### 8.3.2 Design Parameters for the Different Classifications of Roads

8.3.2.1 Temporary traffic measures should be designed in accordance with the parameters in Tables 8.3.1 to 8.3.5 for the six road classifications and as indicated on the drawing below showing the diagrammatic representation. The following is an explanation of each of the parameters:

- Speed Limit – The permanent posted speed limit or, if applicable, the roadworks speed limit for the temporary traffic management measures being implemented. Refer to Section 8.3.3.
- Sign Visibility – The uninterrupted sight distance of an approaching vehicle to the first Sign WK 001, Roadworks Ahead.
- Number of Signs – This is the number of signs required in advance of the start of the taper. The first sign shall be Sign WK 001. The number of signs specified is for the left hand side only. For roads with two or more lanes in one direction additional signs should be placed on the right hand side of the road or on the central reserve at the same spacing.
- Cumulative Distance – Spacing of signs is measured by placing the first Sign WK 001 at the cumulative distance of the spacing of all the advance signs from the start of the taper.
- Distance between – The distance between signs measured from the first Sign WK 001 at the specified distance.
- Taper – The required length for the reduction in width of a single lane or hard shoulder. The taper length is calculated using the specified rate of taper multiplied by the hazard width, including lateral safety zones, and rounded up to the nearest cone spacing.
- Transition Length – The distance required between the first taper and the start of the next taper for the reduction of a number of lanes on multi-lane carriageways. A transition length will be needed following each lane closed when two or more lanes are closed on the same carriageway.
- Safety Zone – Longitudinal and Lateral Safety Zones are areas between the works and the cones or barriers adjacent to the running traffic lane. They are the minimum clear distances required for the safety of the workers and must be clearly defined and kept free of all operations, stationary vehicles or materials except for mobile lane vehicles or crash cushions.  
  
Lateral Safety Zone is measured from the trafficked edge of the cone or barrier to the edge of the works area. This area must be kept free of all operations, stationary vehicles, materials and personnel thus ensuring a clear safe distance back from the edge of the live traffic.  
  
Longitudinal Safety Zone is measured from the end of the taper to the start of the works. It provides a clear area for an errant vehicle to come to a stop before reaching the works area.
- Set Back – The minimum clearance, required on Level 6 roads, from the edge of the traffic lane to the front face of a temporary barrier or cones. It is provided for the safety of the road user and allows for driver judgement when travelling next to a physical barrier. Set back does not include the space required for the swing or overhang of

	site vehicles.
Cone Spacing –	The recommended maximum spacing of cones required at tapers and longitudinally. Closer spacing may be needed at some locations, e.g. at short lengths of roadworks in urban areas or on tight bends.
Cone Height -	This is the minimum height of cone permitted.
Lamp -	Lamps to be used along lines of cones or barriers are to be battery operated steady state lamps with amber light.
Min Lane Width –	The minimum width of traffic lane to be maintained at all times for use by the road user. This may vary depending on the characteristics of the traffic being catered for. See Paragraphs 8.3.1.2 to 8.3.1.4.

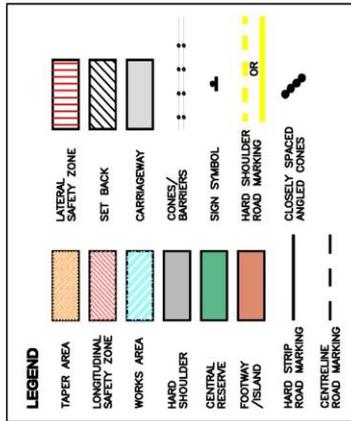
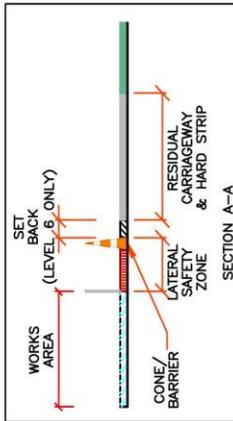
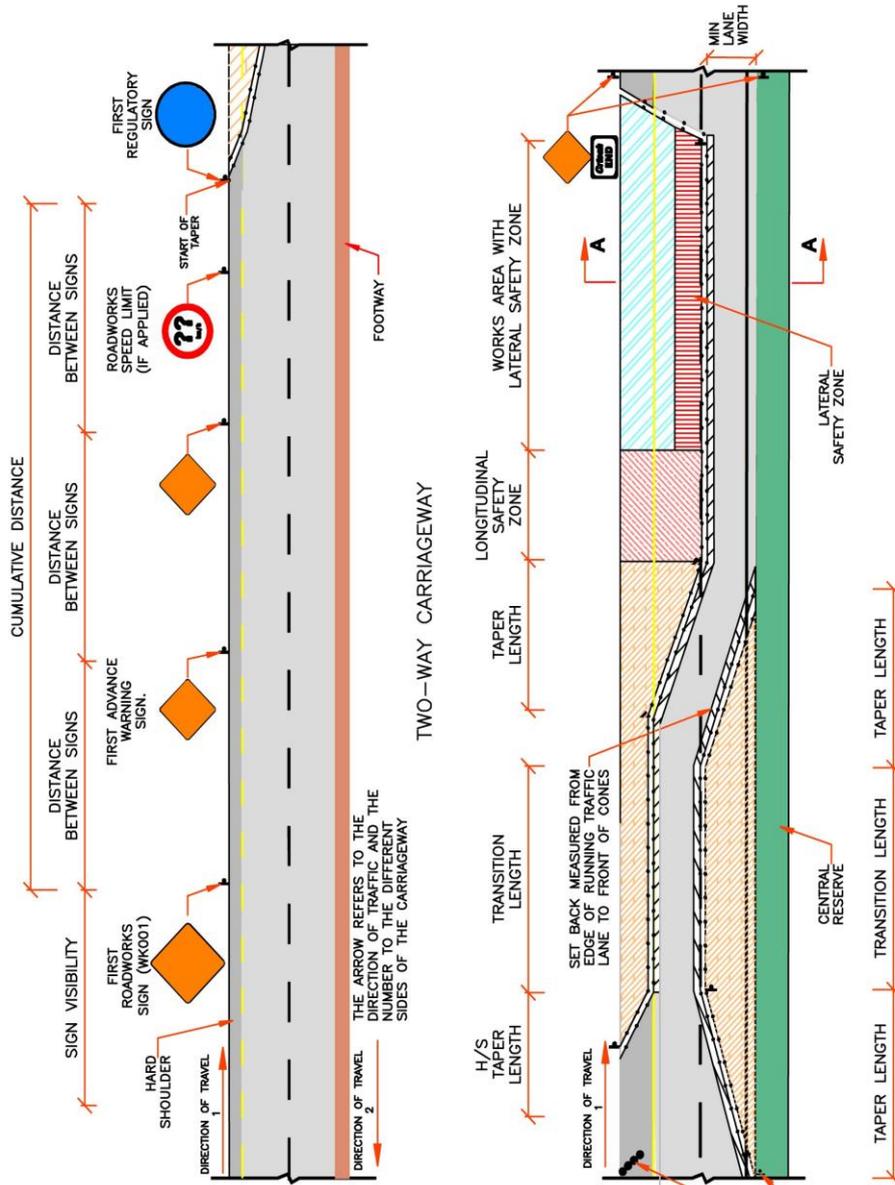
8.3.2.2 The following notes apply to the design parameters for the different road classifications:

- 1 If a Road Works Speed Limit Order is introduced for the duration of the contract, so as to reduce the travelling speed of the traffic before it reaches the start of the roadworks, then the classification of the road may be based on the temporary speed limit providing this is a true reflection of the actual speeds through the works. See Section 8.3.3.
- 2 Distances, spacings and lengths are in metres.
- 3 Taper length should be rounded up to the nearest multiple of the cone spacing.
- 4 Roadwork Types A, B and C are defined in Section 8.1.6.
- 5 Safety zones may not always be achievable and the method of working should be refined to allow for these zones. It may be necessary to deviate from the requirements set out in the guidelines; this should be considered carefully and best addressed by the Designer insofar as is reasonably practicable.
- 6 On one-way streets, dual carriageways or motorways, advance signs and end of roadworks signs should be placed on both sides of the carriageway.

8.3.2.3 The design parameters listed in the following tables are for the six road classifications. They should be applied, as indicated on the diagrammatic drawing below, when designing temporary traffic measures for all roadwork operations.

8.3.2.4 The diagrams in Section 8.8 give examples of typical layouts based on the parameters in Tables 8.3.1 to 8.3.5. Figure 8.8.0.1 illustrates diagrammatically some of the design parameters in a typical layout.

# DIAGRAMMATIC REPRESENTATION OF DESIGN PARAMETERS



- FOR MOTORWAYS USE CLOSELY SPACED CONES PLACED AT AN ANGLE ACROSS HARD SHOULDER TO DETER VEHICLES
- FIRST REGULATORY SIGN
- NOTES
1. REFER TO DRAWINGS IN SECTION 8.8 FOR DETAILED LAYOUTS
  2. ROADWORK SIGNS 8.2.1 TO 8.2.4 FOR ON ONE-WAY STREETS OR DUAL CARRIAGEWAYS SIGNS SHALL BE PLACED ON BOTH SIDES OF THE CARRIAGEWAY

**Table 8.3.1: Design Parameters for Level 1  
(Single Carriageway 30km/h)**

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-time)	Roadworks Type C (Short Duration)
Speed Limit	30 km/h		30 km/h
<b>Temporary Signs</b>			
Sign Visibility (m)	50		50
Number of Signs	2		2
Cumulative Distance (m)	50		50
Distance between advance signs (m)	25		25
<b>Minimum Rate of Taper</b>			
Taper at Lane (m)	1 in 10		1 in 5
Taper at Hard Shoulder (m)	1 in 5		1 in 5
<b>Maximum Lamp Spacing</b>			
At Taper (m)	6		6
Longitudinal (m)	12		12
<b>Maximum Cone Spacing</b>			
At Tapers (m)	3		3
Longitudinal (m)	6		6
Cone Height (mm)	750		750
<b>Safety Zone</b>			
Longitudinal (m)	5		5
Lateral (m)	0.5		0.5
<b>Minimum Lane Width</b>			
Min Lane Width (m)	3.0		3.0

Note:

1. Refer to Section 8.3.2 for definition of design parameters.
2. 45 degree taper is required at active temporary traffic controlled layouts with cones at 1m centres.
3. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing should be reduced accordingly.
4. The optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Paragraphs 8.3.1.2 to 8.3.1.4.

**Table 8.3.2: Design Parameters for Level 2  
(Single Carriageway 50 or 60km/h)**

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-Time)	Roadworks Type C (Short Duration)
Speed Limit	50 or 60 km/h		50 or 60 km/h
<b>Temporary Signs</b>			
Sign Visibility (m)	50		50
Number of Signs	3		2
Cumulative Distance (m)	75		50
Distance between advance signs (m)	25		25
<b>Minimum Rate of Taper</b>			
Taper at Lane (m)	1 in 15		1 in 5
Taper at Hard Shoulder (m)	1 in 10		1 in 5
<b>Maximum Lamp Spacing</b>			
At Taper (m)	6		6
Longitudinal (m)	12		12
<b>Maximum Cone Spacing</b>			
At Tapers (m)	3		3
Longitudinal (m)	6		6
Cone Height (mm)	750		750
<b>Safety Zone</b>			
Longitudinal (m)	25		5
Lateral (m)	0.5		0.5
<b>Minimum Lane Width</b>			
Min Lane Width (m)	3.0		3.0

Note:

1. Refer to Section 8.3.2 for definition of design parameters.
2. 45 degree taper is required at active temporary traffic controlled layouts with cones at 1m centres.
3. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing shall be reduced accordingly.
4. The optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Paragraphs 8.3.1.2 to 8.3.1.4.

**Table 8.3.3: Design Parameters for Levels 3 and 4  
(Single Carriageway 80 or 100km/h)**

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-Time)	Roadworks Type C (Short Duration)
Speed Limit	80 km/h or 100 km/h		80 km/h or 100 km/h
<b>Temporary Signs</b>			
Sign Visibility (m)	120		120
Number of Signs	4		3
Cumulative Distance (m)	800		600
Distance between advance signs (m)	200		200
<b>Minimum Rate of Taper</b>			
Taper at Lane (m)	1 in 55		1 in 40
Taper at Hard Shoulder (m)	1 in 30		1 in 20
<b>Maximum Lamp Spacing</b>			
At Taper (m)	6		6
Longitudinal (m)	12		12
<b>Maximum Cone Spacing</b>			
At Tapers (m)	3		3
Longitudinal (m)	12		12
Cone Height (mm)	750		750
<b>Safety Zone</b>			
Longitudinal (m)	60		45
Lateral (m)	1.2		1.2
<b>Minimum Lane Width</b>			
Min Lane Width (m)	3.0		3.0

Note:

1. Refer to Section 8.3.2 for definition of design parameters.
2. 45 degree taper is required at active temporary traffic controlled layouts with cones at 1m centres.
3. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing shall be reduced accordingly.
4. The optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Paragraphs 8.3.1.2 to 8.3.1.4.

**Table 8.3.4: Design Parameters for Level 5  
 (Dual Carriageway or Motorway 50, 60 or 80km/h)**

Design Parameters	Roadworks Type A or B (Full or Part-Time)		Roadworks Type C (Short Duration)	
	50 or 60 km/h	80 km/h	50 or 60 km/h	80 km/h
<b>Temporary Signs</b>				
Sign Visibility (m)	50	90	50	90
Number of Signs	3	4	3	3
Cumulative Distance (m)	600	800	600	600
Distance between advance signs (m)	200	200	200	200
<b>Minimum Rate of Taper</b>				
Taper at Lane (m)	1 in 20	1 in 40	1 in 10	1 in 35
Taper at Hard Shoulder (m)	1 in 10	1 in 20	1 in 5	1 in 10
Transition length (m)	2 x Taper (Lane)	2 x Taper (Lane)	2 x Taper (Lane)	2 x Taper (Lane)
<b>Maximum Lamp Spacing</b>				
At Taper (m)	6	6	6	6
Longitudinal (m)	12	12	12	12
<b>Maximum Cone Spacing</b>				
At Tapers (m)	3	3	3	3
Longitudinal (m)	6	12	6	12
Cone Height (mm)	750	750	750	750
<b>Safety Zone</b>				
Longitudinal (m)	15	45	15	45
Lateral (m)	0.5	1.2	0.5	1.2
<b>Minimum Lane Width</b>				
Min Lane Width (m)	3.25	3.25	3.25	3.25

Note:

1. Refer to section 8.3.2 for definition of design parameters.
2. Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates the spacing shall be reduced accordingly.
3. Where two lanes are being maintained the minimum lane widths should be near side lane 3.25m and the off side lane 3.0m. Where one lane is to be maintained the optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Paragraphs 8.3.1.2 to 8.3.1.4.

**Table 8.3.5: Design Parameters for Level 6  
(Dual Carriageway or Motorway 100 or 120km/h)**

Design Parameters	Roadworks Type A (Full-Time)	Roadworks Type B (Part-Time)	Roadworks Type C (Short Duration)
Speed Limit	100 km/h or 120 km/h		
<b>Temporary Signs</b>			
Sign Visibility (m)	160		
Number of Signs	5		
Cumulative Distance (m)	1000		
Distance between advance signs (m)	200		
<b>Minimum Rate of Taper</b>			
Taper at Lane (m)	1 in 60		
Taper at Hard Shoulder (m)	1 in 30		
Transition length (m)	2 x Taper (Lane)		
<b>Maximum Lamp Spacing</b>			
At Taper (m)	3		
Longitudinal (m)	12		
<b>Maximum Cone Spacing</b>			
At Tapers (m)	1.5		
Longitudinal (m)	12		
Cone Height (m)	1		
<b>Safety Zone</b>			
Longitudinal (m)	60		
Lateral (m)	1.2		
Set Back (m)	0.5		
<b>Minimum Lane Width</b>			
Min Lane Width (m)	3.25		

Note:

1. Refer to Section 8.3.2 for definition of design parameters.
2. Cone spacing shown is the maximum permitted.  
Where geometry or any other site specific reason dictates the spacing of cones shall be reduced accordingly.  
On sections of roadworks on 100 or 120 km/h dual carriageways and motorways, where the roadworks length is greater than 200m excluding tapers, the longitudinal cone spacing may be increased to 24m on straights and radii greater than 1000m.
3. Where two lanes are being maintained the minimum lane widths should be near side lane 3.25m and the off side lane 3.0m. Where one lane is to be maintained the optimum lane width for all classes of vehicles is 3.25m. This may be reduced to a minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Paragraphs 8.3.1.2 to 8.3.1.4.

### 8.3.3 Speed Limits

- 8.3.3.1 The speed limits stated in Tables 8.3.1 to 8.3.5 are the speed limits on the approaches to the roadworks. These will normally be the limit posted on the road prior to the temporary traffic measures being introduced. However, if a roadworks speed limit is used to reduce the travelling speed of the traffic before it reaches the start of the roadworks, then the classification and associated design parameters of the road may be based on the roadworks speed limit.
- 8.3.3.2 Where it is considered that the approach speed of traffic on a road is significantly different from the speed limit, the classification of the road may be based on the '85-percentile approach speed of private cars'. This is the speed which is exceeded by only 15% of cars in dry weather and may be measured by normal speed survey methods.
- 8.3.3.3 In some instances it may be possible to reduce the speed of traffic through the roadworks by careful design of the temporary road layout. However, speeds may also be reduced by means of a mandatory Road Works Speed Limit Order or by signing a Cautionary Speed using Supplementary Plate P 011. Advance warnings of the speed limit may also be provided by using Sign F401. These alternatives are discussed below.

#### *Road Works Speed Limit Order*

- 8.3.3.4 If the Designer of the temporary traffic measures considers that a speed limit, lower than the posted speed limit for the road, is advisable during the roadworks, it will be necessary to discuss this with the Road Authority and follow the required procedures.
- 8.3.3.5 City and County Managers have powers under the Road Traffic Act 2004 to make a Road Works Speed Limit Order for the purpose of applying a speed limit to a part of a road where roadworks are being carried out. This process requires notification and a consultation period to consider or accommodate, where possible, any objections made by the public or any other bodies. The order requires a predefined extent and duration (not exceeding 12 months) and it is, therefore, important that the need for a Road Works Speed Limit Order be considered well in advance.
- 8.3.3.6 On national roads, the consent of the National Roads Authority is required for a Road Works Speed Limit Order.
- 8.3.3.7 Where a Road Works Speed Limit Order is made, the speed limit determined in the order applies in lieu of the speed limit that normally applies to the relevant part of the road. The order can apply for any period up to 12 months.
- 8.3.3.8 Advice on the use of Road Works Speed Limit Orders and the procedure for making the orders, is given in the Department of Transport publication "Guidelines for the Application of Special Speed Limits". That advice is not repeated here.
- 8.3.3.9 A roadworks speed limit must be one (30, 50, 60, 80 or 100km/h) from the range of speed limits set out in the Road Traffic Act 2004, No other speed limit shall be used.
- 8.3.3.10 The speed limit chosen should be, in general, not more than two speed limit steps below the permanent posted speed limit and should be appropriate to the speed at which a vehicle could drive through the roadworks with reasonable safety. It should preferably be the design speed adopted for the geometric layout of the traffic route through the works. However, on high-speed roads it may not be practicable or appropriate to install a layout with a low geometric design speed. In this case the speed limit should, in general, provided the site

specific risk assessment does not require otherwise, be reduced by a maximum of two speed limit steps below the posted speed and reduced further at a specific location such as a crossover if necessary.

- 8.3.3.11 The speed limit signs shall be in accordance with the Regulations and Chapter 5 of this Manual. The signs are the same as for other speed limits: **no other signs shall be used**. The minimum sizes of terminal and repeater speed limit signs are given in Chapter 5.
- 8.3.3.12 The speed limit signs to depict the start and end of the Road Works Speed Limit Order must be placed at the locations determined in the Order. The person responsible for drafting the order should, therefore, ensure that the locations described provide adequate visibility to the signs.
- 8.3.3.13 Where the sign at the start or end of a roadworks speed limit is not at a location with good visibility, consideration should be given to providing a repeater speed limit sign soon after the start (or end) of the speed limit for the benefit of those who may not have noticed the first sign. As it is a repeater sign, its position can be chosen to provide good visibility. This repeater sign should be the same size as the sign at the start (or end).
- 8.3.3.14 The first temporary sign to be placed at the start of the roadworks is Sign WK 001, Roadworks Ahead. Therefore, where a Road Works Speed Limit Order is to be implemented, the first Sign WK 001 shall be positioned before the sign displaying the roadworks speed limit. The Sign WK 001 should have a supplementary plate stating the distance to the start of the roadworks taper. Similarly, the Sign WK 001 with an End plate shall be positioned before the permanent speed limit.
- 8.3.3.15 The roadworks speed limit must be displayed at any side roads entering the temporary traffic measures. Adequate visibility should be provided to these signs.
- 8.3.3.16 Where a roadworks speed limit is applied, it is particularly important to display that speed limit on repeater signs at regular intervals on all classes of road. The spacing of repeater signs is detailed in the "Guidelines for the Application of Special Speed Limits". Consideration should be given to the type of road and the nature of the works. However, a repeater sign should be placed after junctions and not be more than 500m apart. It is appropriate to use repeater signs in association with all roadworks, including where the special or roadworks speed limit is 30 or 50 km/h.

#### *Cautionary Speed*

- 8.3.3.17 Where it is not appropriate or practicable to impose a mandatory roadworks speed limit, a Cautionary Speed may be signed. Examples would be where the works are of short duration, or of short length, or are due to an emergency. Such a speed is non-regulatory. It should represent the speed at which a private car could drive through the roadworks with reasonable safety. It should preferably be the design speed adopted for the geometric layout of the traffic route through the works. However, on high-speed roads it may not be practicable or appropriate to install a layout with a low geometric design speed.
- 8.3.3.18 A Cautionary Speed sign does not require an Order, but the Designer should consult with the Road Authority before implementing the temporary traffic measures.
- 8.3.3.19 The speed chosen shall be one from the following list: 25, 35, 45, 55, 65 or 75km/h. These speeds are deliberately different from the regulatory speed limits. Very slow speeds should not be used unless absolutely necessary.
- 8.3.3.20 A Cautionary Speed may be signed by erecting Sign WK 001, Roadworks

Ahead, with Supplementary Plate P 011 depicting the recommended maximum speed. **No other signs to denote cautionary speeds shall be permitted.** The sign and plate should be erected, within the roadworks, where the Cautionary Speed is intended to start, and at intervals throughout the required length. A maximum spacing of 500m between signs and following every junction within the works is recommended, but some layouts will require closer spacing. It may be appropriate to erect signs on both sides of the carriageway.

- 8.3.3.21 Where the Cautionary Speed is signed because of an unfinished or temporary road surface or because of loose chippings, Supplementary Plate P 011 may be erected in conjunction with Signs WK 072 or WK 073 as appropriate and be preceded by the first Sign WK 001, which shall have a supplementary plate stating the distance to the roadworks. See also Paragraphs 8.3.3.24 to 8.3.3.28.

#### *Speed Limit Ahead*

- 8.3.3.22 Sign F401, Speed Limit Ahead, may be used to inform drivers that they are approaching a regulatory roadworks speed limit. Its use is recommended on motorways and rural dual carriageways, but it may be used on other roads where the roadworks speed limit is considerably lower than the approach speed of traffic. Sign F401 shall only be used where a regulated speed limit is in force.
- 8.3.3.23 On high speed roads, Sign F401 should be placed at about 1km in advance of the roadworks, with the distance panel marked accordingly. On other roads lesser distances may be appropriate. The sign shall always be preceded by the first Sign WK 001, which shall also have a supplementary plate stating the distance to the roadworks.

#### *Speed Limits for Unfinished Road Surfaces*

- 8.3.3.24 Where traffic is to travel on an unfinished road surface during the active phase of the roadworks, Signs WK 072, Slippery Road, with Supplementary Plate P085, Unfinished Road Surface, should be displayed, and be preceded by the first Sign WK 001. If considered necessary, these may be accompanied by additional Signs WK 072 with Supplementary Plate P 011, Cautionary Speed, or, where the relevant procedures have been completed, a regulatory roadworks speed limit.
- 8.3.3.25 In some cases, however, it will be necessary to leave the unfinished road surface carrying traffic (and which would not meet the surface texture and aggregate requirements of HD 36). Such an unfinished road should receive a surface dressing (or other suitable surface course) as soon as is practicable. Work should be planned so as to reduce the need for traffic travelling on such overlays for long periods of time.
- 8.3.3.26 In such circumstances the rest of the roadworks may have been finished and most of the temporary traffic measures removed pending the application of the final surface. Adequate signs should be erected including Sign WK 001 and Sign WK 072 together with Supplementary Plate P 085, to alert drivers to the temporary nature of the road surface. If appropriate, a regulatory roadworks speed limit could remain in force, or additional Signs WK 072 could be erected with Supplementary Plate P 011 indicating a Cautionary Speed.
- 8.3.3.27 Since orange roadworks signs are used, they must be preceded by a Sign WK 001, Roadworks, and at the end of the relevant section a Sign WK 001 shall be erected with Supplementary Plate P 010, End.
- 8.3.3.28 If road markings are required on an unfinished road refer to Section 8.2.5.

### **8.3.4 Single Vehicle Operations**

8.3.4.1 Single vehicle operations are minor roadworks carried out using a single vehicle. In most cases this type of work involves a vehicle being parked at the side of the road or on a footway, or periodically moving forward at a much slower speed than the travelling traffic. The following is a non-exhaustive list of possible operations:

- Maintenance of street furniture: e.g. public lighting, traffic signals, gullies, etc.;
- Maintenance of utilities: e.g. telephone, electricity, gas, water, etc.;
- Grass or hedge cutting;
- Road marking, etc.

8.3.4.2 Since they are almost always of short duration, single vehicle operations are generally Type C roadworks. In all cases suitable roadworks signage should be provided to give advance notification of the works to road users. The temporary traffic measures should be in accordance with the design parameters given in Tables 8.3.1 to 8.3.5 for Type C roadworks.

8.3.4.3 For all single vehicle operations, consideration should be given to facilitating pedestrians, cyclists and vehicular traffic.

8.3.4.4 Organisations such as Road Authorities and statutory undertakers involved in routine maintenance operations, should employ generic traffic management measures for such works.

8.3.4.5 The advice in Section 8.3.7 for installation and removal of static temporary traffic management also applies for single vehicle operations.

8.3.4.6 For continuously moving operations where the works vehicles travel at a much slower speed than the rest of the traffic, see Sections 8.4, Semi-Static Lane Closures, and 8.5, Mobile Lane Closures.

## 8.3.5 Lane and Hard Shoulder Closures

### *Hard Shoulder Closure*

8.3.5.1 For the closure of a hard shoulder on a single or dual carriageway road, the following procedure is recommended. Advance notification of the roadworks is given using Sign WK 001, followed by another Sign WK 001 with a Supplementary Plate P 084 indicating the hard shoulder is closed ahead. A taper, as specified in the tables in Section 8.3.2, is applied to close the shoulder. It is recommended that the closure of the hard shoulder be kept to a minimum length, as it is an area for traffic to use in an emergency. To deter traffic from using the hard shoulder in advance of the works, angled lines of cones (3 to 4 cones) across the hard shoulder may be used 25m and 50m in advance of the start of the taper.

### *Lane Closures*

8.3.5.2 On a single carriageway road with three or more lanes, or on a one-way street or dual carriageway road with two or more lanes in one direction, complete lanes may be closed, with traffic channelled into the remaining lane(s). Recommended layouts are described below for dual two and three lane roads. The same principles may be applied to other multi-lane roads.

### *Off Side Lane Closure*

8.3.5.3 On dual carriageway roads with hard shoulders wide enough to be used as temporary traffic lanes, an off-side lane closure may be effected by diverting all traffic one lane to the left, so the near-side lane is diverted onto the hard shoulder. Such a layout has the advantage that there is no reduction in the number of traffic lanes. The hard shoulder is first closed as described in Paragraph 8.3.5.1 and then tapers, as specified in the tables in Section 8.3.2, are applied to direct traffic one lane to the left. The same principles may be used to divert traffic on a single carriageway road onto the hard shoulder.

8.3.5.4 For an off-side lane closure reducing the number of lanes, the off-side lane is closed using a merge taper from the right and the traffic directed past the works in the near-side lane. If more than one lane is to be merged then a transition length should be provided between the merges to allow the traffic to settle. If traffic is to be diverted onto the hard shoulder, a further merge is required to move traffic from the near-side lane.

### *Near Side Lane Closure*

8.3.5.5 The hard shoulder is always closed as part of any near-side lane closure.

8.3.5.6 On a two-lane carriageway, a near-side lane closure requires the closure of the off-side lane first. This allows traffic in the off-side lane to be deflected and merge into the near-side lane, using a merge taper from the right. A transition length is then provided in the near-side lane before the near-side single lane of traffic is deflected back into the off-side lane and then past the works.

8.3.5.7 For the closure of the near-side lane on a three-lane carriageway the near-side lane is closed, by providing a taper across the hard shoulder and the near-side lane. This forces the traffic in the near-side lane to merge into the middle lane.

### *Multi - Lane Closure*

- 8.3.5.8 If the near-side and middle lanes on a three-lane carriageway are to be closed, then the same principle of closing the near-side lane on the two-lane carriageway is applied. The off-side lane is merged into the middle lane and a transition applied before the traffic is then merged into the near-side lane. The single lane of traffic is then directed across to the right, using the appropriate taper, before the traffic passes the works.
- 8.3.5.9 For the closure of the off-side and middle lane, the hard shoulder is closed off and the off-side lane is merged into the middle lane. A transition length is then applied before the traffic is merged into the near-side lane and past the works.
- 8.3.5.10 These principles can be applied to other multi-lane configurations or if the off-side and near-side lanes are being merged into one and then deflected into the hard shoulder. A transition length should be provided following each merge and before the works area.

### *Traffic Queues*

- 8.3.5.11 Whenever there are lane closures or restrictions, queues of traffic may occur at busy times. The likely lengths of queues should be estimated when planning the temporary traffic measures and actual lengths checked when the measures are in operation. It is important that sufficient warning of the roadworks and likely queues be given to approaching drivers. The advance warning signs indicated in Tables 8.3.1 to 8.3.5 and illustrated in Section 8.8 are the minimum required. Where significant queues are likely, additional signs will be required, extending further from the works and including Sign WK 062, Queues Likely. The first sign encountered must always be WK 001, Roadworks Ahead.
- 8.3.5.12 When long traffic queues are caused by roadworks, the layout of the temporary traffic measures should be reviewed to see if any alterations can be made to reduce the queue lengths and delays. In some cases minor adjustments may eliminate pinch points.

### 8.3.6 Road Closures and Detours

#### *Road Closure*

- 8.3.6.1 When a road closure is required, the procedure set out in Section 75 of the Roads Act 1993 should be followed and can only be implemented by the Road Authority.
- 8.3.6.2 The proposed diversion route must be approved by the relevant Road Authorities. If this diversion route crosses a county boundary, the Road Authority in the adjoining county will need to be included in the approval and implementation procedure.
- 8.3.6.3 The statutory process then entails the Road Authority advertising the proposed closure in a newspaper, to invite consultation with the public. With a further advertisement required prior to the closure to confirm the commencement date and duration of the works. Adequate time needs to be allowed for this procedure.
- 8.3.6.4 When a closure is required, a diversion route capable of accommodating the types and volumes of traffic needs to be provided. Some routes have a higher percentage of HGVs or buses and the diversion route should be suitable for this traffic. With the prior approval of the Road Authority, the diversion route can consist of the construction of a temporary road, a diversion using the surrounding road network or a combination of both. It will normally be necessary to sign the diversion route.
- 8.3.6.5 If a temporary road is constructed, consideration needs to be given to the possible presence of utilities or street furniture that may need relocating, protecting or diverting. Any height restrictions should be clearly signed and protected.

#### *Detours*

- 8.3.6.6 For a diversion route using the existing road network, the following guidelines should be considered when choosing a route:
- Characteristics of the roads on the diversion route should be as similar to the road to be closed as possible. If this is not achievable, then it may be appropriate to consider the use of a single lane diversion for one direction of traffic only or two separate diversions for the traffic in each direction.
  - Knowledge of the volume of traffic and types of vehicles using the diversion is required. Consideration should be given to junction layouts and available lane widths to accommodate HGVs and buses.
  - The shortest route possible should be used.
  - For short uncomplicated diversion routes Signs WK 090 and WK 091 can be used to direct traffic, but for longer more complicated diversion routes then a destination or route number may be shown in addition to the text and arrow (see Section 8.2.1).
- 8.3.6.7 The relevant Road Authorities (more than one if the diversion crosses a county boundary) should be consulted concerning the proposed diversion and their approval sought.
- 8.3.6.8 Not all diversion routes will satisfy the above guidelines. Therefore, engineering methods, such as junction improvement, signal alteration, road markings, temporary portable signals or flagmen with Stop & Go/*Téigh* discs or convoy methods may be an option to improve the route and flow of traffic.

### **8.3.7 Installation and Removal of Temporary Traffic Measures**

- 8.3.7.1 Installation of any temporary traffic measures should be carried out in a manner to ensure the safety of the works personnel and road users. It is recommended that all personnel charged with supervising temporary traffic management should complete all obligations required by the Health and Safety Regulations.
- 8.3.7.2 By using the general principles and design parameters described in this document, a consistency will be achieved at all sites nationwide and road users will become accustomed to temporary traffic management and understand the instructions given.
- 8.3.7.3 Installation of temporary traffic measures must accurately follow the design layout. For complex temporary traffic management schemes a road safety audit may be required by the Road Authority. NRA HD 19 sets out the requirements for road safety audits on national roads.
- 8.3.7.4 All existing signs or markings that conflict with the temporary situation should be covered or taken down during the works and the appropriate ones reinstated once the temporary traffic measures have been removed.
- 8.3.7.5 The general recommendations for the implementation and removal of temporary traffic measures are as follows;
- (a) Minimise the hazard or danger to the road user or workforce while installing temporary traffic measures.
  - (b) Long-term traffic management measures may require temporary traffic measures to allow implementation.
  - (c) Plan the order of site establishment to ensure a safe method of work and continued use by the road users.
  - (d) Temporary traffic measures are to be installed according to the agreed proposals.
  - (e) Ensure the correct use, installation and positioning of signs, cones, lamps, reflectors and barriers in accordance with the agreed proposals and manufacturers' specifications. All signs and barriers should be secured with consideration given to expected weather conditions.
  - (f) Site entrances and exits should be signed using Signs WK 052 and WK 053. The length and ease of access/egress will be determined by the expected speed of general traffic during the construction of the works. The access points need to be designed to suit the types of vehicle that will be using them.
  - (g) Carry out a drive through / visual check prior to the use of the temporary traffic measures by the public, or as soon as possible thereafter. This check should confirm that the site is safe, compliant and installed in accordance with the agreed proposals ensuring the signs, cones and barriers give a clear message to the road users and works personnel.
  - (h) The removal of the temporary traffic measures should normally be the reverse of the order of establishment. This allows temporary signs, cones, etc. to be removed and existing signs reinstated against the flow of traffic, thereby avoiding confusion for the road user.

### **8.3.8 Operation and Maintenance of Temporary Traffic Measures**

8.3.8.1 The effectiveness of a good temporary traffic management plan is maintained by constant maintenance during the works. The following procedures should be adopted:

- (a) Regular inspection of the temporary traffic measures should be undertaken to ensure that the measures have been implemented as intended, all signs, cones, barriers, etc. are still in place and are in reasonable condition, and that the measures appear to be working satisfactorily. Any defects should be rectified without delay. It is good practice to maintain records of such inspections.
- (b) Due to the nature of construction work, dust and mud may be generated and hence regular cleaning of cones, signs, reflectors and road surfaces is required, as their reflectivity is greatly reduced by just a thin covering of dust or mud. Particular attention should be given to cleaning reflectors on temporary safety barriers. Also signs and cones can be knocked over or displaced and should be checked regularly and rectified.
- (c) Queuing should be monitored while temporary traffic measures are in place, and appropriate action taken to alleviate the queuing if excessive. The positioning of warning signs on the approach to the queue should be checked and, if necessary, adjusted.
- (d) In general, temporary traffic measures should not be altered to facilitate the works, as this could have a detrimental effect. If a change is considered necessary, this must be assessed and either implemented by the Supervisor or re-designed and possibly re-submitted for approval.
- (e) For unattended sites, the actual size of the works area should be reduced as much as possible and made safe, secure and stable. A separate set of proposals that details the revised site layout while unattended should be prepared.

### 8.3.9 Active Traffic Management

- 8.3.9.1 The Garda Síochána must be consulted prior to the implementation of any active traffic management using temporary traffic signals or Stop & Go/Téigh discs.
- 8.3.9.2 The design parameters for these operations are contained in Table 8.3.1, 8.3.2 and 8.3.3. See Paragraphs 8.3.1.2 to 8.3.1.4 for minimum lane widths.
- 8.3.9.3 The work site for all active traffic management layouts should be limited to 500m maximum length, including 45 degree tapers. In urban areas it will be necessary to limit the work site to a shorter length.
- 8.3.9.4 It is important that when implementing active traffic management layouts that the gap provided for traffic to deviate around the works and then back on line should be a minimum of 10m and increased if necessary to ensure vehicles can manoeuvre through the works reasonably freely.
- 8.3.9.5 Active traffic management is an effective means of regulating the flow of traffic through temporary traffic measures. The following are a few methods of active traffic management that may be used:

#### *Stop & Go/Téigh Discs*

- 8.3.9.6 STOP & GO/Téigh discs (Signs RUS 060 and RUS 061) using manual or mechanical methods can be used at plant crossing points, site exits or on single carriageway roads where the traffic is reduced to a shuttle operation. This method provides control at crossings or exits, and in a shuttle operation allows the traffic flows to move according to the demand. This operation must be undertaken by trained personnel, using Stop & Go/Téigh discs and wearing high visibility garments.
- 8.3.9.7 Using this operation the flow of traffic should be based on the actual demand at the extremities of the works. These demands vary at peak times and can be unbalanced at off-peak times, so manually operated traffic control can react to the actual demand.
- 8.3.9.8 Shuttle working is implemented by positioning two operators, one at each end of the section being controlled. The operator showing the 'STOP' side of the disc to one flow traffic contacts the operator showing the 'GO' side of the disc to the other flow of traffic and asks that the sign be reversed to show STOP. Once this is completed and the traffic flow cleared, the first operator can then reverse his sign to show 'GO'. The procedure is repeated at timed intervals based on traffic demand.
- 8.3.9.9 Both operators should preferably be inter-visible but must be in contact by means of a suitable and reliable communication system. However, care should be taken to make sure the traffic being asked to stop cannot see or misinterpret the 'GO' disc of the far operator.
- 8.3.9.10 If there is a junction within the length being controlled by Stop & Go/Téigh discs, a third operator may be required to control traffic on the side road.
- 8.3.9.11 Remotely operated Stop & Go/Téigh discs may be used during daylight hours provided the operator has an unobstructed view of both ends of the site and is not more than 100m from either end.
- 8.3.9.12 Where shuttle working is in operation, the operator should be positioned sufficiently far from the end of the one-lane section to allow traffic emerging from the one-lane section to cross back onto the correct side of the road before encountering the stationary traffic waiting at the red signal. Sign WK 095, Stop Here on Red, will clearly define where the vehicles should stop.

- 8.3.9.13 For 20m in advance of the STOP/GO stop position, cones should be placed along the centre line if space permits and if not along the verge, to highlight to the driver that they are close to the manually controlled stopping point. This is necessary as a truck stopped at the stopping point may block the operator and the following vehicle may inadvertently try to overtake that vehicle assuming it is parked or broken down. If necessary an additional sign WK 061 may be positioned 15 to 20m from this point.
- 8.3.9.14 For short lengths of work, for example site crossing points or site exits on a two-way road, a single operator may be used to control the traffic using a double-sided Stop disc. The operator, like a traffic warden, stops both flows of traffic for the duration of the operation and then leaves the carriageway and signals to the traffic to proceed. This system should only be in operation if both directions of traffic have clear visibility of the operator and disc at all times. If the length of the site is too long for this then a two-disc operation is required as described above.

#### *Temporary Traffic Signals*

- 8.3.9.15 Portable temporary traffic signals may be used at plant crossing points or site entrances and exits. They may also be used on single carriageway roads where the traffic is reduced to a shuttle operation, at all times on low volume roads, and at off-peak times only on roads with high volumes. Where traffic flows are low, the system should ensure that red aspects are not of too long a duration.
- 8.3.9.16 It is desirable that temporary traffic signals should be vehicle actuated especially where warranted by the traffic volumes. The controller should be capable of providing a minimum of a two-phase operation or, where required, more phases to cater for more complicated layouts. Loops, microwave, infrared or radar detectors may be used to detect and control the movement of traffic.
- 8.3.9.17 Temporary traffic signals are frequently preferable to other means of temporary traffic control such as flagmen with Stop & Go/Téigh discs. It will, however, be the decision of the Road Authority as to when and where temporary traffic signals will be allowed. At peak times flagmen with Stop & Go/Téigh discs may be required to react manually to actual traffic demands.
- 8.3.9.18 Temporary traffic signals should be positioned with adequate forward visibility and, where possible, have inter-visibility. They should also have a power supply capable of lasting the duration of the works or when unattended at night. Where provided the vehicle-actuated temporary signals should operate in this mode at all times unless otherwise agreed with the Road Authority.
- 8.3.9.19 Where shuttle working is in operation, the temporary traffic signals should be positioned sufficiently far from the end of the one-lane section to allow traffic deviating onto and emerging from the one-lane section to cross back onto the correct side of the road before encountering the stationary traffic waiting at the red signal. Sign WK 095, Stop Here on Red, will clearly define where the vehicles should stop.
- 8.3.9.20 For 20m in advance of the stop position cones should be placed along the centre line if space permits and if not along the verge, to highlight to the driver that they are close to the signal controlled stopping point. This is necessary as a truck stopped at the signal may block the signals and the following vehicle may inadvertently try to overtake that vehicle assuming it is parked or broken down. If necessary an additional sign WK 060 may be positioned 15 to 20m from this point.

8.3.9.21 The design and calculation of timings and inter-green requirements should be as for permanent traffic signal design. The design should include fixed or variable timings where applicable and allow for the length of restriction, as all these factors will influence queue lengths.

*Give and Take*

8.3.9.22 A passive/self regulating 'Give and Take' layout may be used for shuttle working in daylight hours provided that:

- There is clear visibility of and through the site for drivers approaching the works from either end;
- The speed is limited to 50km/h or less;
- Expected two-way traffic volumes should be less than 400veh/h;
- The total HGV traffic is less than 20veh/h; and
- The length of the shuttle lane past the works does not exceed 50m from start of entry taper to end of exit taper; and
- Advance warning is given to drivers by means of Signs WK 032, WK 033 or WK 034 as appropriate.

*Priority (Yield Sign)*

8.3.9.23 A 'Priority' layout may be used where one flow of traffic is made to yield to the oncoming traffic. The Yield Sign, RUS 026, should be used facing one direction of traffic. This method should only be implemented when the following apply:

- The obstacle in the traffic lane is of a short length and not more than 80m from start of entry taper to end of exit taper;
- There must be clear visibility for the yielding traffic to the oncoming traffic (see Table 8.3.7); and
- Expected traffic volumes should be less than 850veh/h; and
- Advance warning is given to drivers by means of Signs WK 032, WK 033 or WK 034 as appropriate.

**Table 8.3.7: Clear Visibility Requirements**

Maximum Permitted Speed	Clear Visibility Before and After Coned Area
50km/h	60m
60km/h	70m
80km/h	80m
100km/h	100m

8.3.9.24 This method should not be used if the area is prone to fog or at night unless approaches and works area are lit.

8.3.9.25 The extent of the works area should be highlighted with flashing lamps to indicate to road users the presence of the hazard.

### *All Stop*

- 8.3.9.26 The 'All Stop' method should only be used for short duration stops (maximum 10 minutes) where traffic flows are light (less than 300veh/h) and a diversion route would be inappropriate by virtue of length and nature of the route.
- 8.3.9.27 For this method 'STOP/GO' discs are all displayed on STOP, controlling the traffic whilst work is being carried out.
- 8.3.9.28 These works should be of the type that can be suspended easily if traffic congestion builds up.
- 8.3.9.29 This method can also be used to interrupt other active traffic management in place to allow emergency vehicles through the works or the final completion of a task previously carried out under alternative traffic management. It may also be appropriate at plant crossings of minor roads or to accommodate deliveries.

### *Convoy Working*

- 8.3.9.30 Where the parameters defined in Tables 8.3.1 to 8.3.5 are not achievable due to the existing road width and a diversion is impractical due to its extensive length or inadequate road standard, a method of convoy working may be used.
- 8.3.9.31 This method uses 'STOP & GO/Téigh' discs to stop all the traffic similar to that described in Paragraphs 8.3.9.6 to 8.3.9.14. A convoy vehicle or vehicles, appropriately signed with WK 099 "Follow Convoy Vehicle", conspicuous and fitted with three point seatbelts and headrests is then used to lead the traffic, in single file, through the works at a controlled speed. This vehicle then does a U-turn after the end of the works and travels back through the works followed by the traffic in that direction. If required, a second convoy vehicle controls the waiting flow of traffic and a third vehicle joins the back of the queue in order to limit the number of vehicles allowed through on a cycle. Traffic volumes will dictate whether one or three vehicles are required. The operation of convoy working is illustrated in Figure 8.8.7.1 to 8.8.7.8 in Section 8.8.
- 8.3.9.32 For 20m in advance of the STOP/GO stop position cones should be placed along the centre line if space permits and if not along the verge, to highlight to the driver that they are close to the manually controlled stopping point. This is necessary as a truck stopped at the stopping point may block the operator and the following vehicle may inadvertently try to overtake that vehicle assuming it is parked or broken down. If necessary an additional sign WK 061 may be positioned 15 to 20m from this point.
- 8.3.9.33 WK098, Convoy System in Operation is use in advance of the stop position, in conjunction with WK 060 and WK 061 to inform drivers of the system in operation. The number of signs used is as described in Tables 8.3.1 to 8.3.5 but includes sign WK 098 and Wk 095 as one. Sign WK 095, Stop Here on Red, is positioned at the stop location to clearly define where the vehicles should stop.
- 8.3.9.34 Using this method a lateral safety zone and set back are not required. See Paragraphs 8.3.1.2 to 8.3.1.4 for minimum lane widths.
- 8.3.9.35 Convoy working should only be used when the reduced capacity of the road (reduced due to convoy working) is capable of accommodating actual traffic demand. It may be necessary to restrict peak time working or make provisions to withdraw convoy traffic management in order to periodically disperse queues.
- 8.3.9.36 When planning a convoy operation care should be taken to make sure there is adequate space for the convoy vehicle(s) to park and pull out of the running lane at the end of the works. Where possible the length of works should be kept to a minimum and avoid crossing a junction as this method would become very complex to control.

- 8.3.9.37 Convoy working should not be employed on motorways.
- 8.3.9.38 Convoy working should only be used on dual carriageways roads with a traffic flow of 600veh/h (one-way) or less or on all other roads with a traffic flow of 1000veh/h (two-way) or less.
- 8.3.9.39 A roadworks speed limit or cautionary speed matching the speed at which the convoy vehicle will be travelling may be posted. No Overtaking signs (RUS 014) may be placed at the start of the running lane and repeated on long lengths.
- 8.3.9.40 The manual control operatives should, at all times, be in contact with each other and the driver(s) of the convoy vehicle(s). The method used to ensure this communication may depend on the location of the site and the extent of the works.
- 8.3.9.41 Consideration should be given to emergency vehicles and how they can be escorted through the works if required. One method is to go to 'All Stop' and for the operatives to ensure the running lane is clear of vehicles and then allow the emergency vehicle through.

#### *Application of Active Traffic Management*

- 8.3.9.42 All options to maintain two-way traffic should be considered, but once the decision to use shuttle working with active traffic management has been made then the following items need to be identified:
- Duration of the works – this will dictate the measures required as temporary traffic signals will be required if the restriction is in place overnight. Flagmen with Stop & Go/Téigh discs may be required at peak times and for 'All Stop' and 'Convoy Working'.
  - Length of the works – The length of the works should be kept to a minimum in order to minimise the effect on the traffic flows, ideally 500m maximum. The inclusion of junctions within the works area should be avoided if possible.
  - As queue lengths cause driver stress, delays should be minimised. Advance notice of the works through the media is recommended and where practicable an alternative route should be signed.
  - A method of monitoring queues should be put in place so that the demand can be catered for if traffic flows are uneven. When the flows are relatively even in both directions the cycle time should be evenly split.
  - To determine the length of each cycle the signal designer should calculate the optimum cycle time to maintain flow and minimise queues.
- 8.3.9.43 The positioning of active traffic management should be such that the equipment:
- Is visible at all times especially at dawn or dusk;
  - Is well lit during the hours of darkness or poor visibility;
  - Does not obstruct the road users' view of other signs; and
  - Is not hidden by the geometry of the road, other signs or street furniture, or by stationary traffic.

### 8.3.10 Night Work

8.3.10.1 Where possible, short-term works on high volume roads should be carried out at off-peak times including night-time working.

8.3.10.2 For work within the hours of darkness, additional factors over and above daytime criteria need to be considered, such as:

- (a) Traffic volumes will be less but traffic speeds may increase as the congestion has eased and drivers do not expect to encounter roadworks.
- (b) Visibility and awareness is reduced both for road users and site personnel due to tiredness and poor visibility and lighting.
- (c) The correct retroreflectivity of materials must be used and their surfaces kept clean to ensure proper visibility of signs, cones, etc. at night and during poor visibility.
- (d) If active traffic management or tidal flow operations are in place during the day they may be different or the layout may be changed at night, potentially causing confusion to regular road users. Advance notification of a changed layout should be provided in addition to signs positioned for daytime operations.
- (e) Additional temporary lighting, over and above the existing public lighting, may be required for pedestrian and cycle detours, the works area, safety zones or manual traffic controllers. The Designer of the temporary traffic measures should determine if any additional lighting is required.
- (f) This temporary lighting should be positioned so as to not interfere with or dazzle road users.
- (g) Where public lighting is not provided along the site, steady beacons, rotating reflectors or reflective strips should be installed on barriers to highlight their presence especially during the hours of darkness or poor visibility. Steady beacons should be maintained and reflective strips and signs kept clean.
- (h) All signs shall be retro-reflective.

### **8.3.11 Pedestrians and Cyclists**

- 8.3.11.1 For the purpose of this document provisions for pedestrians and cyclists will also include able-bodied pedestrians, wheel-chair users, mobility impaired pedestrians, pushchairs and equestrians if present. It is not always evident that the different categories are likely to be present.
- 8.3.11.2 At all roadwork sites, where there is existing provision for pedestrians/cyclists, consideration must be given to providing or maintaining facilities or access.
- 8.3.11.3 Where footways or off-road cycle tracks are affected by construction or maintenance work, a safe route should be provided for pedestrians and cyclists, at all times past the works area. This may be done by channelling the footway or track, or providing a route on the carriageway by using suitable barriers and, where necessary, providing the appropriate signs indicating that the footway is closed.
- 8.3.11.4 When a footway is closed, pedestrians should be notified at the closest existing crossing point and directed to cross at this point.
- 8.3.11.5 A temporary footway or off-road cycle track should be defined from the works area, as a minimum, by a suitable barrier to show the extent of the footway or track. This will also indicate the route to site staff, to ensure equipment does not infringe upon this allocated space. If there is any risk to pedestrians or cyclists from equipment, works vehicles, excavations or the work area then the temporary pedestrian barrier must be sufficient in height to avoid any conflicts.
- 8.3.11.6 The route of any temporary footway or off-road cycle track should be clear of obstacles, trip hazards and overhanging objects and the surface should be to a standard suitable for all pedestrians, especially mobility impaired pedestrians, pushchairs or cyclists, to travel upon.
- 8.3.11.7 Consideration should be given to the needs of disabled or vision impaired pedestrians. Site staff should be made aware if the site is located close to nursing homes or schools for the disabled, blind or deaf, so that assistance can be given when required.
- 8.3.11.8 The preferred width for a temporary footway is 1.8m and for a one-way cycle track is 1.5m but, where possible, the width provided should be suitable to accommodate expected volumes. The absolute minimum width allowed for pedestrians is 1.2m and for a one-way cycle tracks is 1.25m. If a shared facility is to be provided then a minimum width of 3m should be provided.
- 8.3.11.9 A buffer zone should be provided between the pedestrians and/or cyclists and the works area where possible by means of a suitable barrier. Similarly, separation between pedestrians and cyclists should be provided where possible. Care is needed to ensure that the barriers used do not cause a trip hazard or become a hazard if displaced or vandalised.
- 8.3.11.10 If pedestrian/cyclist demand is high then there may be a requirement to maintain existing signalised crossing or provide additional temporary signalised crossing points or flagmen with Stop & Go/Téigh discs.
- 8.3.11.11 Crossing points or exits for site vehicles should be highlighted to pedestrians and cyclists, and exiting site traffic made aware of the possible presence of pedestrians or cyclists.
- 8.3.11.12 Where site conditions do not allow for temporary walkways or cycle tracks through or around the works, a safe diversion route should be provided. Signing should be placed along the diversion route with temporary lighting and signals where required.
- 8.3.11.13 An adequately signed diversion route should be provided if cyclists are to be diverted independently from other vehicular traffic. This may occur if the lane

widths are too narrow and there is an alternative safer route for cyclists. However, cyclists are unlikely to accept lengthy delays or long detours.

- 8.3.11.14 Where cyclists are to be accommodated on the roadway, the design of temporary traffic measures should ensure that the lane widths are adequate to accommodate cyclists as well as vehicular traffic. Where speeds are 60km/h or less, a minimum lane width of 3.25m is required to allow a car to overtake a cyclist safely. If narrow lanes are required where there is a high percentage of cyclists, lane widths between 2.75m and 3.25m should be avoided, since car drivers may attempt to overtake cyclists with inadequate room.
- 8.3.11.15 If it is not possible to maintain an on-road cycle facility, temporary signs should be provided to highlight to cyclists that the cycle track has been suspended for the duration of the works and indicate the preferred route they should use.
- 8.3.11.16 Temporary traffic signals should give cyclists sufficient opportunity to pass safely through roadworks, particularly in shuttle systems where oncoming traffic cannot pass without conflict. This is an important consideration for any active traffic management system.
- 8.3.11.17 Cyclists are particularly vulnerable to rough road surfaces, such as temporary surfaces, potholes, metal plates, sloping fillets and cable protectors. Therefore, the road surface should be kept as level as possible, especially where cycling demand is known to exist.

### 8.3.12 Work Vehicles and Equipment

8.3.12.1 The following considerations apply to works traffic when moving within a roadworks site and also when exiting and entering the works area. They should be part of the induction course for relevant personnel entering the site:

- (a) Where site vehicles are visible from the public road and on the left hand side of road traffic, it is preferable to avoid driving in the opposite direction to the general traffic. Drivers can be confused by traffic coming towards them on their left, especially at night. In some instances it may be practicable to provide screening.
- (b) Clearance from overhang of plant or slewing of machines. Site personnel should be familiar with specific clearances for all plant on site and should position plant where it will not interfere with the passing public or the temporary traffic measures. If necessary, traffic and pedestrians will need to be controlled while the vehicle carries out its manoeuvre. If there is insufficient room for plant to slew within the works area, the traffic measures and method of working need to be redesigned to suit.
- (c) Works vehicles using the public roads should be conspicuous in colour and fitted with appropriate signs and flashing beacons.
- (d) Site personnel should be instructed as to when and where works vehicles can be used and also in the use of flashing amber lights. Vehicles entering and exiting the site at specified locations should activate the flashing amber light to indicate to road users of their intention to enter or exit the site.
- (e) If works vehicles are to be used on the public road they must be licensed to do so and roadworthy.
- (f) Vehicles, materials and equipment stored within the works area should, where possible, be away from live traffic lanes, footways or cycle tracks. At no time should they cause an obstruction to the general public outside the works area.
- (g) Safety zones should be kept clear at all times.
- (h) Loading and unloading. Consideration should be given to designating areas for loading and unloading so as to not cause a hazard or interfere with live traffic, pedestrians or cyclists.

### 8.3.13 Temporary Safety Barriers

- 8.3.13.1 Temporary safety barriers are designed to contain errant vehicles by redirecting them along the line of the barrier. They help lower the risk of vehicles entering a works area while minimising injuries to the vehicle occupants and also protecting the workforce, cyclists and pedestrians. They are also a means of preventing access to a potentially hazardous area such as an unattended works area or excavation.
- 8.3.13.2 The layouts shown in Section 8.8 are based on directing traffic through roadworks using delineators and safety zones rather than on the use of restraint systems. They do not, therefore, indicate the use of temporary safety barriers.
- 8.3.13.3 Safety barriers can themselves form a hazard to road users. They should only be used, therefore, where the benefits outweigh the risks involved in their installation and use.
- 8.3.13.4 The choice of temporary barrier depends on what is to be protected (e.g. an excavation, a structure, the workforce or the road user) and the nature of the road (type, layout, etc.), the speed and volume of traffic, and the duration of the roadworks. Their use should be based on an engineering design including consideration of flares/tapers, anchorages, containment levels, clearances and working widths.
- 8.3.13.5 The performance parameters of the safety barriers (containment level, impact severity level and working width) should be selected to suit the particular requirements of the site. The barriers must conform to IS EN 1317. The containment level shall be normal, higher or very high as appropriate to circumstances. Refer to NRA TD 19 and IS EN 1317.
- 8.3.13.6 For lengths of temporary barriers in excess of 50m a reflective disc or strip 50cm<sup>2</sup> to 100cm<sup>2</sup> in area or a steady lamp should be used at regular intervals along the line of the barrier. The reflective strips shall be red in colour when used on the nearside of the carriageway and white when used on the offside. They should be kept clean and the batteries maintained in the lamps in order to maintain conspicuity during the hours of darkness or poor visibility.
- 8.3.13.7 Where a set-back is required on dual carriageways or motorways, an additional line of temporary road studs or road marking should be provided to highlight the lateral clearance from the live traffic to the front edge of the barrier.
- 8.3.13.8 The placement of barriers should allow for the required working width. This working width can be included as part of the lateral safety zone. The lateral safety zone/working width may be used for the purpose of an emergency lane. At no time should vehicles be parked, materials stored, or operations be carried out within the working width or lateral clearance.
- 8.3.13.9 The design of the layout of barriers must adhere to the manufacturer's requirements to ensure the temporary safety barrier acts as intended on impact. Some of these requirements are:
- (a) Anchorage of terminals and tensioning where required;
  - (b) Specified minimum length of barrier;
  - (c) Maintaining clear working width;
  - (d) Barrier supports or foundations; and
  - (e) Interlocking of units, e.g. on concrete barriers.
- 8.3.13.10 Barriers should only be moved on the basis of the agreed temporary traffic plan.



## 8.4 Semi-Static Lane Closures

- 8.4.1.1 Some roadwork operations require the workforce and plant either to move continuously along a road or to make frequent short duration stops to carry out maintenance work. For works of this type, where the operation effects the movement of vehicles and/or pedestrians it is often impracticable to provide the signs and cones required for Type C (single vehicle) static roadworks. Instead, warning signs are placed at intervals on the verge, in advance of the works, and moved forward as the work progresses. Such works are referred to as a Semi-Static Lane Closure (SSLC); it is normally only suitable for single carriageway roads. On dual carriageway roads it is generally necessary to implement the more rigorous Mobile Lane Closures when undertaking similar maintenance work (see Section 8.5).
- 8.4.1.2 This document is not intended to cover low risk urban type routine works which have minimum impact if any on the movement of vehicles or pedestrians. If for these type of works signs are required, following an appropriate hazard identification and risk assessment, then the roadworks signs in this document should be used appropriately.
- 8.4.1.3 The following is a non-exhaustive list of operations where SSLC may be appropriate on single carriageway roads:
- Installation of road markings or studs;
  - Testing public lighting or replacing bulbs;
  - Hedge cutting;
  - Mowing, weeding or other vegetation management;
  - Pavement sweeping;
  - Cleaning gullies or manholes;
  - Installation of road closures or other temporary traffic measures;
  - Litter and debris pick-up;
  - Road pavement testing;
  - Surveying;
  - Road inspections; and
  - Minor road surface repairs.
- 8.4.1.4 An SSLC is implemented by erecting warning signs on the verge in advance of the works. Two Signs WK 001, Roadworks Ahead, should be provided, closely spaced, the first with Supplementary Plate P 002 stating the distance over which the roadworks may be encountered, and the second with Supplementary Plate P 082 stating the type of operation. These signs should preferably be within 1km of the works, but never more than 2km. Additional signs may be placed on the verge at intervals between the first set and the roadworks. By using several sets, the rearmost signs can be moved forward at intervals, leapfrogging the other signs, so that the warnings are always at the appropriate distance from the works.
- 8.4.1.5 As an alternative to static signs, vehicle mounted signs may be used. The vehicle and signs should comply with the recommendations for mobile lane closures (see Section 8.5). Thus, the signs should be mounted on a yellow backing board with flashing amber beacons. The vehicle should park clear of the traffic lane on the verge or where possible, moving forward to the next suitable location as necessary. When moving from one location to the next, the vehicle should travel at normal road speed.

8.4.1.6 Single carriageway roads can have high volumes of low speed traffic in urban situations and low volumes of high-speed traffic in rural areas; both can pose problems when a SSLC is in operation. The design of the SSLC should, where appropriate, take the following matters into account:

- (a) Maximum allowable traffic flow – This is the maximum traffic flow which can be tolerated during a SSLC: the traffic flow should be capable of allowing a vehicle to overtake the operation in a single manoeuvre and also capable of using the remaining available traffic lane(s) without causing major delays. Short (3 minute) traffic counts should be carried out prior to the implementation of the SSLC to ensure the demand does not outweigh the available capacity. The operation should only proceed once the person in charge is satisfied the traffic flows are in accordance with the agreed proposals. A watch should be kept on the traffic flows during the works, to ensure that flows are not too high. It may be necessary to repeat the traffic counts at intervals.
- (b) Stopping Sight Distance – This is the distance at which approaching traffic can see the works area. Appropriate stopping sight distances for different speeds are given in NRA TD 9.
- (c) Road Geometry – Consideration needs to be given to the geometry of the road to ensure visibility requirements are met, as bends and crests may reduce the sight distance of approaching drivers. Poor geometry may make some roads unsuitable for SSLC.
- (d) Weather Conditions – Heavy rain, fog, dazzling sunlight or sunlight low on the horizon will reduce visibility for the approaching traffic and should be considered when implementing a SSLC.
- (e) Working through junctions and roundabouts – At junctions and roundabouts the approaching traffic from the other arms will need to be warned. Therefore, warning signs should be provided on the approaching arms and removed once the work is completed.

## **8.5 Mobile Lane Closures**

### **8.5.1 General**

- 8.5.1.1 Mobile Lane Closure (MLC) may be used as a temporary traffic measure to protect roadwork operations which require the work force and plant either to move continuously along a road or to make frequent short duration stops to carry out maintenance or other work.
- 8.5.1.2 Mobile lane closures are suitable for use on motorways and dual carriageways and on single carriageways with hard shoulders. MLCs can be carried out on dual carriageways without hard shoulders, but these operations are more complicated and require greater care and preparation. Working through junctions requires particular care. For these reasons, and because of restricted sight lines, the use of mobile lane closures on roads of an urban nature or with a speed limit of 60km/h or less will be limited.
- 8.5.1.3 If visibility is reduced below an acceptable level due to fog, glare from the sun, rain, snow, spray etc., the MLC should not be implemented as these conditions increase the risk of accidents. The MLC should only be implemented if there is adequate stopping sight distance as described in NRA TD 9.
- 8.5.1.4 This method can be used for a continuously moving operation or one that may stop for a maximum of fifteen minutes. If a longer stop time is required to complete the work, agreement can be sought from the road authority if traffic disruption is not too great or alternatively a static temporary traffic management system should be provided. The operations listed in Section 8.4, as suitable for semi-static lane closures, are also suitable for mobile lane closures.
- 8.5.1.5 Mobile lane closures are put into effect by positioning Advance Warning Vehicles with appropriate signs mounted on the rear either in the hard shoulder or the near-side lane. In front of the Advance Warning Vehicle a Block Vehicle(s) with lorry mounted crash cushion(s) moves into position in a particular sequence, displaying the appropriate regulatory sign(s) at the rear and closes the lane(s).
- 8.5.1.6 These vehicles travel in the same direction as the traffic but at a much slower speed than the normal traffic flow and may stop for short periods. The vehicle drivers must operate as a team, with a supervisor in charge of all operations.
- 8.5.1.7 The emphasis at all times must be on safety. All vehicles and equipment should be in full working order. All operatives involved in MLC must receive suitable training to the UK Sector Scheme 12C or similar. Weather and traffic flows must also be favourable.
- 8.5.1.8 Example layouts for mobile lane closures are illustrated in Section 8.8.

## 8.5.2 Planning a Mobile Lane Closure

- 8.5.2.1 Careful planning is required for mobile lane closures. Advance signing requirements and placement positions need to be planned, allowing for any particular circumstances. On roads without hard shoulders, stopping points for advance warning vehicles should be identified. Similarly, a suitable location for assembling the vehicle train should be decided upon. Due account should be taken of other roadworks in the area and allowance should be made for school or public holidays, major sporting events, etc.
- 8.5.2.2 As with all roadworks, it is important to take account of traffic leaving and joining at junctions. Merges and diverges at grade separated junctions can have a significant effect on the procedures to be followed. In certain situations, the assistance of the Garda Síochána may be required.
- 8.5.2.3 Mobile operations should be used at off-peak times or at night and only when the traffic volumes are substantially less than the available carriageway capacity.
- 8.5.2.4 The lane closure layouts described in this section and illustrated in Section 8.8 should not be kept in operation above certain traffic flows. Table 8.5.1 gives the absolute maximum flows that relate to fairly level and well aligned dual carriageways with hard shoulders. These figures may need to be reduced for sites on roads with steeper than normal gradients, difficult horizontal alignments (in particular left hand curves) or roads lacking an adequate hard shoulder. At higher flows, the MLC should not be implemented or, if in operation, should be removed.
- 8.5.2.5 On single carriageway roads the traffic volume needs to be significantly less than the carriageway capacity to allow vehicles to overtake the block vehicle and works area in a single safe manoeuvre.
- 8.5.2.6 Providing adequate care is taken, it is considered that, in general, the flow figures in Table 8.5.1 apply equally to day and night mobile works. However, night working, and whether the carriageway is lit or unlit, should be considered when assessing the appropriate flow limit.
- 8.5.2.7 Consultation will be required with the Road Authority and the Garda Síochána.

**Table 8.5.1 Maximum Traffic Flows for Mobile Lane Closures**

Type of Closure	Maximum allowable Traffic Flow per Carriageway	
	Veh/hr	Veh/3 mins
<b>Dual Two Lane Carriageway</b>		
Lane 1	1200	60
Lane 2	1200	60
<b>Dual Three Lane Carriageway</b>		
Lane 1	2400	120
Lane 3	2700	135
Lanes 1 + 2	1200	60
Lanes 2 + 3	1200	60
<b>Dual Four Lane Carriageway</b>		
Lane 1	3600	180
Lane 4	3900	195
Lanes 1 + 2	2400	120
Lanes 3 + 4	2700	135

Notes:

1. Where the HGV content is high, the above figures may need to be reduced. Typically HGV content is 15 to 20%. If the HGV content is 30% then the figures in this table should be reduced by 10%.

2. When working past slip roads the maximum flow on the slip road should not exceed 500 vehicles per hour (25 veh/3 mins) without Garda Síochána assistance with traffic control.

### 8.5.3 Vehicles for Mobile Lane Closures

- 8.5.3.1 MLC vehicles carrying mounted signs are likely to be abnormal, in which case they need a permit. They must be equipped with a communication system capable of linking all drivers and the supervisor. The number of vehicles involved in the operation will vary, but the following types of vehicles may be used:
- (a) Advance Warning Vehicles – positioned on the verge or travelling along the hard shoulder. They carry signs at the rear warning and informing drivers of the roadworks and lane restrictions ahead.
  - (b) Block Vehicles – travelling behind the working area as trailing vehicles. They carry Sign RUS 002, Keep Right (or RUS 001, Keep Left), at the rear, warning and instructing drivers which side to pass, and provide protection to the work force.
  - (c) Working Vehicle – the vehicle carrying out the work or supporting operatives on foot at the working area. This vehicle (or vehicles) is positioned at the start of the works area and carries a vehicle-mounted sign showing Sign RUS 002, Keep Right (or RUS 001, Keep Left), at the rear. Working vehicles shall not be counted as a block vehicle.
  - (d) Lead Pilot Vehicle – positioned directly in advance of the operation, where personnel are on foot in the carriageway or to give advance warning of the mobile operation to vehicles travelling in the opposite direction on two-way roads without central reserves.
- 8.5.3.2 The advance warning, block and lead pilot vehicles should be yellow but not reflective. Working vehicles should be of a conspicuous colour, kept clean and maintained regularly. They should be fitted with flashing amber beacons with 360 degrees visible.
- 8.5.3.3 Block vehicles are normally 17 tonne Maximum Gross Weight and should be loaded to have an on-road weight of between 10 and 15 tonnes. This is the preferred configuration for nearside closures especially when work is being carried out on foot, but the choice of block vehicles should reflect the acceleration and manoeuvrability required of them by the method of working. The vehicles should be fitted at the rear with the appropriate warning sign mounted on a yellow backing board (see Section 8.5.4). The sign and backing board may be mounted on a trailer towed by the vehicle.
- 8.5.3.4 Block vehicles should be fitted with lorry mounted crash cushions (see Section 8.2.7). A device which automatically activates the vehicle's brakes when contact is made with the rear of the lorry mounted crash cushion should be fitted to block vehicles to minimise roll forward and the risk of any secondary accident in the event of a collision. Due to the possibility of rear end collisions, it is important for the vehicles to be fitted with three-point safety belts and that the head restraints are correctly adjusted. Due to the long overhang of the lorry mounted crash cushion, special authorisation may be required from the vehicle licensing authority.
- 8.5.3.5 A reliable communication system should be provided between all vehicles, to maintain control and positioning of all elements of the mobile operation.
- 8.5.3.6 The need for a lead pilot vehicle will depend on the nature of the works being undertaken and the type of road. The typical layouts in Section 8.8 do not show a lead pilot vehicle.
- 8.5.3.7 All vehicles and trailers should be fitted with at least one rotating amber beacon, which can be viewed from 360 degrees, whether the signboard is displayed or in the transport position. It is important that the rotating beacons are visible to oncoming drivers when the signboards are being erected or folded. The rotating beacons should not be used when the four amber flashing lanterns are in use.

- 8.5.3.8 The number and positioning of the vehicles required for a MLC are detailed in layouts in Section 8.8. However, where there is a risk of traffic entering the zone between the block vehicle and the working vehicle, the distance between these vehicles should be the minimum stated. To minimise the risk of the block vehicle being shunted into the working vehicle this distance should never be less than 50m.
- 8.5.3.9 All vehicles involved in mobile lane closures shall provide, for all occupants, seat belts with a minimum of three points of anchorage and head restraints correctly positioned.

## 8.5.4 Signs for Mobile Lane Closures

- 8.5.4.1 All regulatory signs used for MLCs shall accord with the relevant requirements of the Road Traffic (Signs) Regulations, and all warning signs shall comply with the requirements of this Chapter. The Road Authority must consult with the Garda Síochána prior to implementing any regulatory signs.
- 8.5.4.2 The first advance warning vehicle shall display Sign WK 001, Roadworks Ahead, together with the appropriate sign depicting the lane closure and Supplementary Plate P 001 indicating the distance to the closure. Subsequent advance warning vehicles should display the appropriate lane closure sign and supplementary plate showing the remaining distance to the closure. Block vehicles should display Sign RUS 002, Keep Right (or RUS 001, Keep Left), at the rear, warning and instructing drivers which side to pass.
- 8.5.4.3 The working vehicle and lead pilot vehicle should display Sign RUS 001 or RUS 002 mounted on a yellow backing board as described below. Depending on the vehicle design, it may be convenient for these signs to be trailer mounted. If a sign and backing board is not practicable, the vehicle should be fitted with a Keep Left/Right sign (RUS 001 or RUS 002) with a diameter of 1,500mm.
- 8.5.4.4 All the rear-facing vehicle (or trailer) mounted signs shall be mounted on yellow backing boards with flashing amber lanterns, as illustrated in Figures 8.8.5.1 and 8.8.5.2 in Section 8.8. The backing boards shall be non-reflective, while the signs shall be retro-reflective in accordance with IS EN 12899 and directly lit. The illumination should be uniform over the sign face and should be screened to avoid shining towards oncoming traffic. In order to avoid problems with specular reflection, the sign should be fixed so that the top of the sign is tipped towards the front of the vehicle at an angle of about 5 degrees. The lower edge of the backing board should be at least 0.75m above the road surface.
- 8.5.4.5 On vehicles with Keep Left/Right signs (RUS 001 or RUS 002), the arrow should be capable of indicating either direction. To avoid displaying an incorrect instruction during the set up and removal of the MLC, the rotation of the arrow, or covering of the sign, should be carried out remotely from the driver's cab, with a means for the driver to verify the arrow direction or the state of the sign.
- 8.5.4.6 Signs on the carriageway or the hard shoulder shall always be vehicle or trailer mounted and attended at all times. Signs on the verge may be vehicle or trailer mounted, or static.
- 8.5.4.7 Signs should not be changed manually when the sign vehicle is standing on a live traffic lane.
- 8.5.4.8 The rear facing flashing amber lanterns on the backing board should have a diameter of 300mm  $\pm$ 10mm. Each lamp shall show an intermittent amber light at a rate of flashing not less than 60 nor more than 90 flashes per light per minute, and in such a manner that the lights of one horizontal pair are always shown when the lights of the other horizontal pair are not.
- 8.5.4.9 The light intensity of the lanterns on the principal axis shall be measured when the lamps are continuously energised and shall be:
- Daylight: 2,000 candelas minimum;
  - Night-time: 400 to 800 candelas maximum.
- 8.5.4.10 The light intensity at night must not exceed 800 candelas, since this could cause glare and make the sign difficult to read. Day and night intensities shall be measured with yellow lenses in place and with the measuring device 7m from the lantern. Yellow lenses shall be signal yellow (Class A) to EN 12368. The angle of half intensity shall be between 2.250 and 2.50. Adjustment of the

light intensity of the lanterns for night-time operation should be carried out by an automatic light sensitive multistage light dimming device.

- 8.5.4.11 All signs should be covered or removed from view to ensure they are not visible when not in use. The flashing lanterns must also be switched off at the same time. If covers or blinds are used, they should be opaque and preferably yellow. They must be capable of being fastened securely in two positions: i.e. to reveal the sign fully or cover it fully.
- 8.5.4.12 If flap type Variable Message Signs are used, they should be constructed to facilitate opening and closing by a person in a safe position. They should be fitted with a means of securing them in both the open and closed positions. The construction and colouring of these signs should be such that their appearance is not compromised. Particular attention should be paid to the flap hinge design in this regard.
- 8.5.4.13 A high visibility supplement to Sign RUS 001 and RUS 002 is recommended for use on the block vehicles. This sign consists of a flashing light arrow to supplement the message given by the Keep Left/Right signs. The light arrow should be mounted on a grey non-reflective panel above the yellow backing board. The arrow consists of a number of amber lamps which flash in unison and are arranged in the form of an arrow pointing down and to the left (or right).
- 8.5.4.14 The use of static Variable Message Signs and matrix signs to give drivers advance notification of the operation ahead can be valuable and should be used where possible. At no time should a variable message sign displaying a message be towed as part of a MLC operation.

## 8.5.5 Design of Mobile Closures

8.5.5.1 Motorways and dual carriageways can have a high risk factor due to the high traffic volumes and speeds. The design of the MLC should take the following matters into account:

- (a) Maximum allowable traffic flows as described in Section 8.5.2. Short (3 minute) traffic counts should be carried out prior to the implementation of the MLC to ensure the demand does not outweigh the available capacity. The operation should only proceed once the supervisor is satisfied the traffic flows are in accordance with the agreed proposals. A watch should be kept on the traffic flows during the works, to ensure that flows are not too high. It may be necessary to repeat the traffic counts at intervals.
- (b) Stopping Sight Distance – This is the distance at which approaching traffic can see the first block vehicle. Appropriate stopping sight distances for different speeds are given in NRA TD 9. The desirable minimum is 295m for 120km/h roads and 215m for 100km/h roads.
- (c) Road Geometry – Consideration needs to be given to the geometry of the road to ensure visibility requirements are met, as bends and crests may reduce the sight distance of approaching drivers. Poor geometry may make some roads unsuitable for MLC.
- (d) Weather Conditions – Heavy rain, fog, dazzling sunlight or sunlight low on the horizon will reduce visibility for the approaching traffic and should be considered when implementing a MLC.
- (e) Inter-visibility – The distance between the MLC vehicles needs to ensure inter-visibility between adjacent vehicles at all times.
- (f) Communications - A dedicated communication system is essential to allow communication between all the vehicles and operatives. Coverage for mobile phones and/or radios must be checked and areas of low coverage may require special consideration.
- (g) A method of positioning and maintaining the position of the vehicles, such as maintaining a constant speed, needs to be agreed between all operators.
- (h) The work should be planned so as to minimise the number of lane closures and stops required.
- (i) Working through junctions and roundabouts – At junctions and roundabouts the approaching traffic from the other arms will not be able to see the rear mounted signs or lanterns. In this situation the vehicles involved in the operation must have their flashing beacons turned on and appropriate signing must be provided on the approaching arms.
- (j) Working through merge/diverge lanes at grade-separated junctions requires the convoy vehicles to negotiate the merge/diverge individually and then regain position once past the merge/diverge. This creates an increased hazard due to the weaving traffic at these locations.
- (k) Roads without a hard shoulder – Suitable stopping positions or temporary hard standing need to be provided on roads without hard shoulders. If this is not possible then static traffic measures should be implemented.

8.5.5.2 Layouts of typical mobile lane closures, for different roads and different lanes closed, are shown in Section 8.8.

## 8.5.6 Establishing and Operating a Mobile Lane Closure

### *Establishing a Closure*

- 8.5.6.1 Normally the supervisor will require the team of drivers to report to a depot for final briefing and a check on all equipment such as vehicles, signs and lighting. Drivers should then take their vehicles to a pre-arranged rendezvous, where they should space their vehicles out, on the hard shoulder if possible, at the requisite distance apart. At this stage all signs are covered, with the exception of the block vehicles, which should have their lorry mounted crash cushions lowered in the operating position and Sign RUS 002, Keep Right, displayed.
- 8.5.6.2 All equipment and materials necessary to complete the operation, such as white lining and weed spray, should be carried on the working vehicle where practical, or positioned at convenient locations. When required the convoy should stop, for not more than 15 minutes, to allow refilling. If a longer stop time is required agreement can be sought from the road authority if traffic disruption is not too great or alternatively a static temporary traffic management system should be provided.
- 8.5.6.3 The supervisor should arrange for a three minute traffic count to be made, to check that flows are not too high. If the result is satisfactory, The Garda Síochána should be contacted to check that no incidents have been reported on the stretch of road where the works are to take place, or the surrounding network, that may affect traffic volumes. In the event of an incident that may affect the safety of the works personnel, vehicles or public traffic the supervisor will need to decide what course of action to take.
- 8.5.6.4 The signs should now be uncovered showing the correct lane indications and flashing beacons switched on. The lanterns are not to be lit yet. As the vehicles are positioned on the left, the regulatory arrow signs must all indicate Keep Right. For off-side lane closures, arrows on the works and block vehicles will later need to rotate to indicate Keep Left as they take up their working positions. When it is confirmed that all is ready, the team should be instructed to start the operation.
- 8.5.6.5 The advance warning vehicle lanterns should now be switched on. The block and working vehicles should move at normal speed into the lane(s) to be closed, approach with the traffic, switch on their lanterns and slow down into the working mode. The advance warning vehicles follow the block vehicles, maintaining station. Alternatively, the working vehicle may wait until the closure has been established and then take up position.

### *Operating a Closure*

- 8.5.6.6 The supervisor should arrange for three-minute traffic counts to be carried out at intervals to ensure that the flow remains less than the agreed maximum. The closure should not be taken off simply on the grounds of traffic flow levels until either of the following occurs:
- Two successive counts give results above the appropriate value; or
  - The counts show a rising trend with the last one above the appropriate value.
- 8.5.6.7 If for any reason the supervisor considers it dangerous to continue, the operation should be aborted.
- 8.5.6.8 Reduced visibility, due to spray from wet roads, heavy rain, fog, etc., increases the risk of accidents. If such conditions occur, the mobile lane closure should not be operated. Similarly, MLC should not be operated when drivers approaching the works are heading towards sun low on the horizon.

- 8.5.6.9 It may be difficult for the advance warning vehicles to keep their correct stations. Station keeping can be helped by the supervisor regularly reporting the position and speed of the leading vehicles.
- 8.5.6.10 The supervisor will need to coordinate the activities involved in recharging the tanks of working vehicles, for example during road marking or weed spraying operations. He will need to be aware of the distances that can be travelled on each charge of material.
- 8.5.6.11 During the operation the supervisor should warn other members of the team of any hazard on the road or hard shoulder such as debris or more importantly a stationary vehicle. It is then the responsibility of each of the drivers to negotiate the hazard accordingly and maintain position as safely and quickly as possible, keeping the supervisor informed.
- 8.5.6.12 If any of the vehicles need to stop for more than about twenty seconds, then the driver should inform the supervisor and all other vehicles will be stopped accordingly in order to maintain correct distances between the vehicles.
- 8.5.6.13 Where there is a hard shoulder discontinued for up to 400m, the working vehicle(s) and block vehicle(s) should proceed together and advise the rest of the train of their position. When the leading advance warning vehicle reaches the discontinuity, all warning vehicles should stop. The leading warning vehicle should proceed on its own to regain the hard shoulder after the discontinuity, when the rearmost block vehicle is about 100m beyond the start of the hard shoulder on the far side. If the train is slow-moving this distance will have to be increased to ensure the leading warning vehicle does not catch the train up and reduce the actual distance between itself and the block vehicle to less than 200m as the plate will be displaying this figure. The following warning vehicle should then negotiate the discontinuity in turn in a similar manner, although maintaining station with the leading warning vehicle while negotiating the discontinuity is temporarily less important.
- 8.5.6.14 Work on sections exceeding 400m in length without hard shoulders should either be carried out by means of a lane closure using static signs and cones or by a MLC specifically designed for that length of road.
- 8.5.6.15 In addition on particular sections of road it may be necessary to reduce the distance between advance warning vehicles to ensure that the next vehicle in the convoy can be seen by road users before they have passed the preceding one. Drivers should be instructed to make this temporary adjustment as necessary.

#### *Working Through Junctions Without a Hard Shoulder*

- 8.5.6.16 As the MLC approaches a junction without a hard shoulder, the supervisor should instruct team members on the procedure to be followed. This will depend on the nature of the works being undertaken, the junction layout and the volume of traffic on both the subject road and the joining road. A static Sign WK 001, Roadworks Ahead, with Supplementary Plate P 082, Mobile Roadworks, should be displayed to joining traffic just prior to the arrival of the convoy and removed after it has passed. Instead of the static sign, a mobile sign, similar to that displayed on the first advance warning vehicle (see Section 8.5.4), may be displayed.

### *Working Through Junctions With a Hard Shoulder*

- 8.5.6.17 As the MLC approaches a junction with a hard shoulder, the supervisor should instruct team members to put into position the static or mobile signs described in Paragraph 8.5.6.17 on the entry slip road. The signs should be displayed just before the entry slip is reached by the first vehicle in the convoy and removed just after the last sign-bearing vehicle has passed.
- 8.5.6.18 On reaching an exit slip road the MLC vehicles should be prepared to stop if necessary, to give way to traffic leaving the main carriageway. They should then continue in their normal line and at the pre-arranged speed. As the advance warning vehicles on the hard shoulder reach the exit slip road they should follow the same procedure. Each warning vehicle driver waiting to cross the exit slip road should notify the drivers behind that he has stopped (to prevent bunching). When the vehicle has successfully crossed the slip road the driver should inform the following driver so that they can recover lost ground and regain position as quickly as possible.
- 8.5.6.19 On reaching the entry slip road the advance warning vehicles should stop in turn at the end of the hard shoulder at the extremity of the nose of the junction. The vehicle should then be driven across the slip road on to the hard shoulder as and when a suitable gap in the traffic occurs and regain position as quickly as possible. Drivers should inform following drivers as and when they are waiting to cross or have completed crossing the entry slip road.
- 8.5.6.20 When work is to be carried out on the main carriageway and then on an exit slip road, as the working vehicle reaches the start of the taper for the exit slip road the convoy must stop and the closure is removed. The distance plate on each of the advance warning vehicles should then be changed to Supplementary Plate P 086, On Slip Road, and, if the number of lanes on the slip road is different from the main carriageway, the lane closure signs should be changed accordingly. The working vehicle should then work its way along the exit slip road with a block vehicle showing the "Keep Right/Left" sign as appropriate. The remaining mobile signs should remain in position on the hard shoulder of the main carriageway. When the working vehicle reaches the end of the exit slip road the closure should be removed.
- 8.5.6.21 When it is necessary to work on an entry slip road and then on the main carriageway, static or mobile signs as described in Paragraph 8.5.6.17 should be displayed at the start of the slip road. The working vehicle, escorted by a block vehicle showing the "Keep Right/Left" sign as appropriate, should work along the slip road while the remainder of the sign-bearing vehicles wait on the hard shoulder of the main carriageway with their beacons switched off. As the working vehicle reaches the main carriageway, the beacons on the waiting vehicles should be switched on and they should move off and take up station in the normal way. If the slip road exceeds 400m in length, additional mobile signs will be required on the slip road.

## **8.5.7 Removing a Mobile Lane Closure**

- 8.5.7.1 When a closure is being removed the supervisor should instruct the drivers of the working and block vehicles to move off the carriageway onto the hard shoulder, if available, while the rest of the team maintains station. For a right lane closure this may involve accelerating in the lane occupied and then manoeuvring to the left as gaps in the traffic occur.
- 8.5.7.2 Once the lane closure vehicles are off the carriageway the supervisor should instruct all the vehicles to stop, all signs to be covered and flashing beacons to be switched off.
- 8.5.7.3 Where there is no hard shoulder, as soon as the work has been completed and the working and block vehicles have moved off, the signs on the advance warning vehicles should be covered at their last stationary position clear of live traffic.
- 8.5.7.4 If the train is required to move further along to another work site, the drivers should be instructed to take their vehicles to the next site independently. If the next location is less than 3km the convoy can be kept together with the closure operational and travelling at 20 – 25km/h to the next site. Otherwise the closure should be removed and the signs covered.

## **8.5.8 Rolling Road Block (RRB)**

- 8.5.8.1 A Rolling Road Block (RRB) is a full mobile carriageway closure implemented using Advance Warning Vehicles displaying sign WK 062 'Queues Likely' positioned 500m and 1km from the rear of the queuing traffic and Block Vehicles displaying Sign RUS 014, No Overtaking, in each lane at the head of the queue.
- 8.5.8.2 A static Sign WK 001 should be positioned 1km in advance of the start of the RRB and then at every 500m up to the works area. Supplementary Plate P 001 should not be provided with these WK 001 signs as it is a mobile operation. A Sign WK001 with Supplementary Plate P 010, End, must be provided 50 to 100m beyond the works area.
- 8.5.8.3 RRBs shall only be implemented by trained personnel and may require the presence of the Gardaí Síochána. They should be implemented when conditions suit the parameters set out for the establishment and operation of a mobile lane closure.
- 8.5.8.4 The vehicles used for an RRB are the same as those used in mobile lane closures. The RRB is implemented by positioning the Advance Warning Vehicles 500m and 1km from the line of Block Vehicles which move from the near side lane into position, one in each running lane and in line with each other. The hard shoulder is closed using a 3 tonne vehicle equipped with impact protection and appropriate flashing amber lights and signage which travels in line with the block vehicles thus forming a full carriageway closure.
- 8.5.8.5 A Monitoring Vehicle travels ahead of the Block Vehicles, following the last of the traffic ahead of the closure. Once the Monitoring Vehicle has passed through the works area the works may commence. The Monitoring Vehicle should report any stationary vehicles encountered to the supervisor.
- 8.5.8.6 The Block Vehicles continue at a predetermined speed (30 to 50km/h) holding the traffic behind them until it reaches the works area, by which time the works must have been completed and removed from the carriageway.
- 8.5.8.7 As they proceed along the carriageway the Advance Warning Vehicles need to position themselves correctly in relation to the end of the queuing traffic.
- 8.5.8.8 Once the Block Vehicles and hard shoulder vehicle reaches the works area, the carriageway must have been cleared of all debris, equipment, material and personnel. Then the vehicles can one by one move to the hard shoulder, turn off their lights, cover the signs and let the traffic continue as normal.
- 8.5.8.9 When planning a RRB the distance in advance of the works area and the appropriate speed (30 to 50km/h) must be calculated to ensure that all vehicles can move into position and travel at the designated speed and reach the works area allowing sufficient time to carry out the works operation. The slower the speed (30km/h) the better as this reduces the length to the works area and the disruption to the mainline traffic. However slower speeds require sharper deceleration from vehicles joining the back of the queue.
- 8.5.8.10 Once the route is calculated the number of junctions encountered by the RRB can be determined and navigated accordingly. Vehicles accessing the mainline will be held before the Monitoring Vehicle passes through and allowed access once the Block Vehicles have passed through the junction.
- 8.5.8.11 During the procedure the length of the queuing traffic should be monitored and if deemed necessary the works suspended to clear the backlog.



## 8.6 Crossover Design for Contra-flow Working

### 8.6.1 General

8.6.1.1 A crossover allows traffic from one side of a dual carriageway to be moved to the opposite carriageway and operate in a contra-flow layout.

8.6.1.2 The main features that influence the decision to use a crossover are:

- (a) Available positions of crossover points – This depends on the distance between junctions and the availability of longitudinal distance to accommodate lead-in tapers, radii and transition lengths;
- (b) Demountable barrier at crossover locations;
- (c) Geometry of the road (horizontal and vertical curves) – Level differences, adverse cross-falls and stopping sight distances have to be considered, as these factors influence the design and positioning of the crossover. Also, is the available carriageway able to cater for the required number and width of lanes to be maintained in operation during the contra-flow?
- (d) Lighting, Drainage, etc. – If items such as lighting, utilities, etc. have to be diverted or protected then the cost of the works will increase and the ease and benefit of implementing the crossover may be reduced;
- (e) Economic costs – The benefits of the contra-flow system must outweigh the cost of constructing the crossover.

### 8.6.2 Definitions Specific to Crossover Design

8.6.2.1 This section applies to all crossovers, but the terminology used is applicable to the first crossover in a traffic management system. The following terms are given a specific meaning in relation to crossovers:

*Crossover* – the location where one or more of the lanes on a dual carriageway or motorway are diverted onto the opposing carriageway. This is normally where a contra-flow is required to carry out the works on the primary carriageway.

*Primary Carriageway* – the carriageway on which the works are being carried out and, therefore, from which the crossover commences.

*Secondary Carriageway* – the carriageway on the opposite side to the primary carriageway.

*Crossover length* – the length to move traffic from the primary carriageway across to the secondary carriageway.

*Bend* is used to describe a horizontal radius in the existing road alignment.

*Curve* is used to describe the crossover 'S' shape.

*Entry Curve* is used to describe the first curve of the 'S' shape in the crossover length.

*Exit Curve* is used to describe the second curve of the 'S' shape in the crossover length.

*Non-Assisting Superelevation* describes the superelevation that assists traffic in the non-works area but adversely affects traffic in the contra-flow travelling through the crossover length.

*Longitudinal Alignment* is measured along the centreline of the temporary alignment.

*Rollover factor* is used to describe the possibility of overturning, particularly in relation to large vehicles.

### **8.6.3 Traffic Management for Crossovers**

8.6.3.1 Crossovers are designed to a lesser geometric standard than most roads due to the fact the contra-flow traffic is travelling on the opposing carriageway and hence the camber is often adverse. Also space restrictions will determine the maximum horizontal curves and there may be a level difference between the two carriageways.

8.6.3.2 To accommodate these factors the following should be considered when designing the traffic management:

- (a) It may be appropriate to apply a reduced roadworks speed limit through the contra-flow operation, to accommodate the lesser geometric design of the crossover.
- (b) Where feasible the HGV traffic should be channelled into a non-crossover lane, due to the increased effect the sub-standard layout and reduced lane widths in the contra-flow lane can have on HGV traffic.
- (c) Adequate signing and the spacing of the signs and cones should highlight to the drivers the severity of the traffic measures in place.
- (d) A buffer zone should be provided between the two opposing lanes of traffic travelling on the same carriageway at the start and end of the contra-flow operation. This buffer zone should preferably be a lane width but can be reduced to 1.2 or 0.7m. The zone can be constructed using barriers at the start and end of the crossover with cones at close spacing along the straight.

## 8.6.4 Planning a Crossover

- 8.6.4.1 The choice of location of the crossover points is a critical factor affecting safe use and construction costs. Ideally a crossover should be located away from junctions, on a straight and relatively flat section of road, with ideally traffic route lighting and minimal equipment in the central reserve.
- 8.6.4.2 The design considerations that will affect the vehicle and driver are:
- Roadworks speed limit;
  - Maximum acceptable sideways acceleration;
  - Maximum overturning force (affecting rollover of large vehicles); and
  - Stopping sight distances.
- 8.6.4.3 The design considerations that will affect the cost of the crossover are:
- Width of the central reserve. The narrower the reserve, the lower the amount of pavement construction, but tighter radii may be required;
  - For crossover alignments the more lateral width available to manoeuvre the crossing traffic across the central reserve the better and could help reduce the effect of any level difference. For example move traffic from the near side lane to the opposing off side lane;
  - Proximity of structures and junctions. These complicate the design as traffic diversions will be required if the contra-flow extends through a junction;
  - Location of utilities' plant, lighting, drainage, etc. These will need to be diverted or protected if present.
- 8.6.4.4 Other influencing factors are:
- Private accesses. Access will have to be maintained at all times. Where a private access is affected by the temporary traffic management measures the owners should be approached in advance to determine if alternative arrangements could be made.
  - Pedestrians and cyclists. Allowance will need to be made for non-motorised road users. A diversion should be provided where possible.
  - The need to accommodate wide loads should be considered.
  - Access for emergency vehicles may be needed through the roadworks.
  - Recovery of broken down vehicles and access for the recovery vehicles needs to be considered. It is generally necessary to provide a free breakdown service which will tow broken-down vehicles to a point clear of the roadworks.
  - The length of the contra-flow will have an effect on driver stress and delays associated with the recovery of vehicles.
  - The location of crossovers has a direct effect on the physical length of the temporary traffic measures.
  - Any structure at or near a proposed crossover may cause difficulties or preclude the use of that location completely. Even where the structure does not interfere directly with the layout or visibility, all safety aspects need to be considered and appropriate measures employed to protect against collision, ensure visibility of signs, etc.
  - A sharp horizontal bend immediately before the crossover is undesirable and could rule out the location by reducing visibility through the temporary traffic measures. It will also affect the layout of the crossover.
  - Steep gradients and cross-falls and large level differences should be avoided, as they would affect the comfort and stability of vehicles.

- (k) Crossovers with their associated traffic management signs, plant and operatives are points where drivers have a heavy information load to assimilate. Care should be taken if existing roadside features could cause driver distraction and have an effect on safety.
- (l) The exact locations of and requirements for utilities' plant should be checked prior to the crossover location being finalised.
- (m) An assessment of the strength and suitability of the adjacent carriageways and possible paved central reserves will be required.
- (n) Contact should be made with the relevant bodies responsible for the movement of abnormal wide loads and they should be informed as to where and when restrictions will be in place. Also the Garda Síochána should be aware of these restrictions as they may affect their day to day operations also the gardaí can confirm these restrictions to any person applying for permission to move such loads.
- (o) The successful operation of a contra-flow will depend on maintaining sufficient traffic lanes to accommodate the traffic flows. An assessment of the traffic and its composition should be carried out to ensure the correct number of lanes and lane widths are provided.
- (p) Crossovers should be located to avoid or minimise traffic diversions and be as far away from junctions as possible. This is particularly important where restrictions for different types of vehicles apply to specific lanes, as a lane could be dedicated to exiting at the next junction but HGVs are required to use this lane due to width restrictions.
- (q) A location should be provided for breakdown vehicles just beyond the works to allow the recovery vehicle access.

## 8.6.5 Geometric Design of Crossovers

- 8.6.5.1 Crossovers can be difficult to design satisfactorily. The work should therefore be entrusted to an experienced road designer. The design will require closely spaced cones/barriers and the correct number of signs, so drivers can be made aware of the constraining temporary situation ahead and the layout engineered to reduce speed.
- 8.6.5.2 One of the principal factors influencing the horizontal and vertical geometric design is the achievable design speed. Where possible, the design speed and roadworks speed limit to be applied for the crossover should be the same as the roadworks speed limit applied to the rest of the works. However, it may, exceptionally, be necessary to apply a lower roadworks speed limit over the length of the crossover to accommodate the achievable design speed. It should be noted that the minimum speed limit permissible is 50km/h on motorways and the minimum permissible road works speed limit is 30km/h.
- 8.6.5.3 The design parameters set out in NRA TD 9 and other relevant documents of the NRA DMRB should be adopted where possible, but may not always be achievable. Where normal design standards cannot be achieved, the process of applying progressive 'Relaxations' or 'Departures' (see NRA TD 9) may be tried. The final design should contain compatible standards, to the highest reasonable design speed, for the horizontal and vertical alignment, lane widths and cross-fall.
- 8.6.5.4 Where reduced horizontal curve radii are adopted, care should be taken to ensure all vehicles can operate in the lane widths, alignments and curves provided. Tight radii will need increased lane widths to allow for swept paths of HGVs.
- 8.6.5.5 The section of road being considered should have minimum cross-fall to both carriageways where possible. Where the road falls to the near-side verge of each carriageway, the cross-falls will form adverse camber on both curves through the crossover. Camber changes greater than 10% (e.g. -5% to +5%) are not recommended as they may cause high vehicles to roll over. At no time should a crossover be positioned on an adverse cross-fall of 7%.
- 8.6.5.6 Combinations of downhill gradients and adverse crossfalls need to be used with caution. If the gradients exceed 4% the cross-fall should not exceed 5%.
- 8.6.5.7 Stopping sight distance (see NRA TD 9) will need to be measured for each lane, taking account of the effects of both the vertical and horizontal alignments. Sighting outside the line of cones or barriers (i.e. across the works area) is not permitted when measuring stopping sight distance.



## 8.7 AM and PM Tidal Flow Operations

- 8.7.1.1 On a four-lane urban road where there are predominant AM and PM demands, it may be appropriate to introduce a tidal flow operation as part of the temporary traffic measures for roadworks, so as to maintain a three-lane configuration allowing two lanes in the direction of traffic with the highest demand at that time and changing the layout at off-peak times for the second peak demand.
- 8.7.1.2 Traffic surveys should be carried out to determine the traffic flows in each direction during the AM and PM peaks. If the tidal flow operation is to be successful the single lane must be capable of accommodating the expected traffic volume and types of vehicles.
- 8.7.1.3 All pedestrian movements need to be maintained and, if a footway or cycle track is to be suspended to accommodate the lane widths, then suitable diversion routes should be provided.
- 8.7.1.4 Proposals for tidal flow operations should be discussed at an early stage with the Road Authority and The Garda Síochána.
- 8.7.1.5 General principles that influence the design of tidal flow layouts are:
- (a) Available road width – When calculating the available space for the traffic lanes, due allowance should be made for the space required to carry out the works together with the width of cones or barriers. Lane widths should be at least 3.0m each for the two-lane flow and at least 3.25m for the remaining single lane. Where possible, the left-hand lane of the two-lane direction should be at least 3.25m wide and HGV traffic should be channelled into this lane.
  - (b) Traffic volumes and vehicle make up – If there is high percentage of HGVs then the minimum lane widths in all three lanes should be 3.25m.
  - (c) If a tidal flow operation extends though a signalised junction then the position, phasing, and timings of the signals may require alteration and new loops may need to be installed.
  - (d) Allowable speed restrictions – A roadworks speed limit may need to be introduced to reduce the vehicle speeds. Closely spaced cones and the correct number of signs should be used to engineer down the traffic speed and highlight to drivers the constrained geometry of the temporary layout ahead. It may be appropriate for the speed limit through the tidal flow area to be lower than the speed limit through the rest of the works. This would further reduce the speed of the traffic and minimise the risk of accidents in the length where drivers may be confused by a layout which changes daily.
  - (e) Ease of installation and change over of direction – A tidal flow operation can cause confusion to the road user as the layout changes during the day. When changing the layout during the off-peak period, a road closure or assistance from the Garda Síochána may be required.
  - (f) Adequate signing and the spacing of the signs should highlight to the drivers the severity of the traffic measures in place.
  - (g) A buffer zone should be provided between the two opposing lanes of traffic if possible. If the space is available, a barrier or a double line of cones should be used between the opposing traffic flows at the start and end of the temporary traffic management measures. If possible, the barrier or cones should be continued along the whole length of the tidal flow.
  - (h) Cylinder delineators should be used as a minimum separation between opposing traffic lanes.



## 8.8 Signs and Layout Diagrams

8.8.1.1 At the end of this chapter are figures, as listed below, illustrating the temporary traffic measures required in a number of typical situations for the various Levels of road. These are examples only; other layouts may be suitable. The first figure, Figure 8.8.0.1, shows the design parameters diagrammatically and includes the legend used on all the subsequent figures.

Figure Number	Title
8.8.0.1	Diagrammatic Representation of Design Parameters

### 8.8.1 Level 1 Category Roads (Single Carriageway 30km/h)

8.8.1.1	Advance Signs - Direction of Travel 1
8.8.1.2	Advance Signs - Direction of Travel 2
8.8.1.3	Taper Lengths
8.8.1.4	Signs for Work Site Area - Direction of Travel 1
8.8.1.5	Signs for Work Site Area - Direction of Travel 2
8.8.1.6	Manual or Signal Controlled Shuttle System Advance Signs - Direction of Travel 1
8.8.1.7	Manual or Signal Controlled Shuttle System Advance Signs - Direction of Travel 2
8.8.1.8	Manual or Signal Controlled Shuttle System Signs for Work Site Area - Direction of Travel 1
8.8.1.9	Manual or Signal Controlled Shuttle System Signs for Work Site Area – Direction of Travel 2

### 8.8.2 Level 2 Category Roads (Single Carriageway 50 or 60km/h)

8.8.2.1	Advance Signs - Direction of Travel 1
8.8.2.2	Advance Signs - Direction of Travel 2
8.8.2.3	Taper Lengths
8.8.2.4	Signs for Work Site Area – Direction of Travel 1
8.8.2.5	Signs for Work Site Area – Direction of Travel 2
8.8.2.6	Manual or Signal Controlled Shuttle System Advance Signs - Direction of Travel 1
8.8.2.7	Manual or Signal Controlled Shuttle System Advance Signs - Direction of Travel 2
8.8.2.8	Manual or Signal Controlled Shuttle System Signs for Work Site Area - Direction of Travel 1
8.8.2.9	Manual or Signal Controlled Shuttle System Signs for Work Site Area - Direction of Travel 2

### **8.8.3 Level 3 and 4 Category Roads (Single Carriageway 80 or 100km/h)**

- 8.8.3.1 Advance Signs - Direction of Travel 1
- 8.8.3.2 Advance Signs - Direction of Travel 2
- 8.8.3.3 Taper Lengths
- 8.8.3.4 Signs for Work Site Area – Direction of Travel 1
- 8.8.3.5 Signs for Work Site Area – Direction of Travel 2
- 8.8.3.6 Manual or Signal Controlled Shuttle System  
Advance Signs - Direction of Travel 1
- 8.8.3.7 Manual or Signal Controlled Shuttle System  
Advance Signs - Direction of Travel 2
- 8.8.3.8 Manual or Signal Controlled Shuttle System  
Signs for Work Site Area - Direction of Travel 1
- 8.8.3.9 Manual or Signal Controlled Shuttle System  
Signs for Work Site Area - Direction of Travel 2

### **8.8.4 Level 5 and 6 Category Roads (Dual Carriageway or Motorway)**

- 8.8.4.1 Advance Signs - Direction of Travel 1
- 8.8.4.2 Advance Signs for Merge and Diverge Slips
- 8.8.4.3 Taper Lengths
- 8.8.4.4 Advance Signs for Consecutive Transitions – Direction of Travel 1
- 8.8.4.5 Signs for Work Site Area – Direction of Travel 1

#### **Contraflow Crossover Layouts**

- 8.8.4.6 Advance / End Signs for Crossover Layout
- 8.8.4.7 Layout for Single Lane Contra-flow Crossover

### **8.8.5 Mobile Lane Closures**

- 8.8.5.1 Mandatory Sign for use at Mobile Lane Closure
- 8.8.5.2 Roadworks and Lane Closure Signs for use at Mobile Lane Closure
- 8.8.5.3 Layout A: Case 1 – Layout for Left Lane Closure, Dual 2 Lane Road Without Hard Shoulder
- 8.8.5.4 Layout A: Case 2 – Layout for Right Lane Closure, Dual 2 Lane Road Without Hard Shoulder
- 8.8.5.5 Layout A: Case 3 – Layout for Left Lane Closure, Dual 3 Lane Road Without Hard Shoulder
- 8.8.5.6 Layout A: Case 4 – Layout for Right Lane Closure, Dual 3 Lane Road Without Hard Shoulder
- 8.8.5.7 Layout A: Case 5 – Layout for Centre and Left Lane Closure, Dual 3 Lane Road Without Hard Shoulder
- 8.8.5.8 Layout A: Case 6 – Layout for Centre and Right Lane Closure, Dual 3 Lane Road Without Hard Shoulder

- 8.8.5.9 Layout B: Case 1 – Layout for Left Lane Closure, Dual 2 Lane Road With Hard Shoulder
- 8.8.5.10 Layout B: Case 2 – Layout for Right Lane Closure, Dual 2 Lane Road With Hard Shoulder
- 8.8.5.11 Layout B: Case 3 – Layout for Left Lane Closure, Dual 3 Lane Road With Hard Shoulder
- 8.8.5.12 Layout B: Case 4 - Layout for Right Lane Closure, Dual 3 Lane Road With Hard Shoulder
- 8.8.5.13 Layout B: Case 5 - Layout for Left and Centre Lane Closure, Dual 3 Lane Road With Hard Shoulder
- 8.8.5.14 Layout B: Case 6 - Layout for Right and Centre Lane Closure, Dual 3 Lane Road With Hard Shoulder
- 8.8.5.15 Layout C: Layout for Hard Shoulder Closure, Dual Carriageway and Motorway

#### **Rolling Road Block**

- 8.8.5.16 Regulatory Sign for use at Rolling Road Blocks
- 8.8.5.17 Roadworks and Queues Likely Signs for use at Rolling Road Blocks
- 8.8.5.18 Vehicles Required for Rolling Road Block
- 8.8.5.19 Vehicles Move Into Position for Rolling Road Block
- 8.8.5.20 Rolling Road Block in Operation
- 8.8.5.21 Rolling Road Block Reaches Works Area

#### **8.8.6 AM and PM Tidal Flow Layouts**

- 8.8.6.1 Advance / End Signs for a Tidal Flow Operation (Phase 1) – Direction of Travel 1 and 2.
- 8.8.6.2 Advance / End Signs for a Tidal Flow Operation (Phase 1) – Direction of Travel 2 and 1.
- 8.8.6.3 Advance / End Signs for a Tidal Flow Operation (Phase 2) – Direction of Travel 1 and 2.
- 8.8.6.4 Advance / End Signs for a Tidal Flow Operation (Phase 2) – Direction of Travel 2 and 1.
- 8.8.6.5 Layout of Taper Lengths for a Tidal Flow Operation (Phase 1)
- 8.8.6.6 Layout of Taper Lengths for a Tidal Flow Operation (Phase 2)
- 8.8.6.7 Signs for Work Site Area for a Tidal Flow Operation (Phase 1)
- 8.8.6.8 Signs for Work Site Area for a Tidal Flow Operation (Phase 2)

## **8.8.7 Layouts for Convoy Working**

- 8.8.7.1 Layout for Convoy Working using One Vehicle – Phase 1a.
- 8.8.7.2 Layout for Convoy Working using One Vehicle – Phase 1b
- 8.8.7.3 Layout for Convoy Working using One Vehicle – Phase 2a
- 8.8.7.4 Layout for Convoy Working using One Vehicle – Phase 2b.
- 8.8.7.5 Layout for Convoy Working using Three Vehicles – Phase 1a.
- 8.8.7.6 Layout for Convoy Working using Three Vehicles – Phase 1b
- 8.8.7.7 Layout for Convoy Working using Three Vehicles – Phase 2a
- 8.8.7.8 Layout for Convoy Working using Three Vehicles – Phase 2b.

## **8.8.8 Layout for Semi-Static Working**

- 8.8.8.1 Layout for Semi-Static Closure, Single Carriageway.

## Appendix 8A: References

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Roads Act 1993 (No. 14 of 1993).

Road Traffic Act 1961 (No. 24 of 1961).

Road Traffic Act 2004 (No. 44 of 2004).

Road Traffic (Signs) Regulations 1997- to date.

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Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005).

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## Standards

EN 12368, Specification for Colours of Light Signals.

IS EN 1317, Road Restraint Systems:

IS EN 1317-1: Part 1, Terminology and General Criteria for Test Methods.

IS EN 1317-2: Part 2, Performance Classes, Impact Test Acceptance Criteria and Test Methods for Safety Barriers.

IS EN 1317-3: Part 3, Performance Classes, Impact Test Acceptance Criteria and Test Methods for Crash Cushions.

IS ENV 1317-4: Part 4, Performance Classes, Impact Test Acceptance Criteria and Test Methods for Terminals and Transitions of Safety Barriers.

IS EN 1317-5: Part 5, Product Requirements and Evaluation of Conformity for Vehicle Restraint Systems.

IS EN 1436 – Road Marking Materials – Road Marking Performance for Road Users. NSAI, Dublin.

IS EN 1463: Road Marking Materials – Retroreflecting Road Studs:

IS EN 1463-1: Part 1, Initial Performance Requirements

IS EN 1463-2: Part 2, Road Test Performance Specification

IS EN 12767: Passive Safety of Support Structures for Road Equipment – Requirements, Classification and Test Methods.

IS EN 12899: Fixed, Vertical Road Traffic Signs:

IS EN 12899-1: Part 1, Fixed Signs.

IS EN 12899-4: Part 4, Factory Production Control.

IS EN 12899-5: Part 5, Initial Type Testing.

IS EN 13422: Vertical Road Signs – Portable Deformable Warning Devices and Delineators – Portable Road Traffic Signs, Cones and Cylinders.

## Appendix 8B: Summary of Signs for Roadworks:

### Warning Signs for Roadworks



WK 001



WK 010



WK 011



WK 012



WK 013



WK 014



WK 015



WK 016



WK 017



WK 018



WK 019



WK 020



WK 021



WK 022



WK 023



WK 030



WK 031



WK 032



WK 033



WK 034



WK 040



WK 041



WK 042



WK 043



WK 044



WK 045



WK 046



WK 047



WK 048



WK 049



WK 050



WK 051



WK 052



WK 053



WK 060



WK 061



WK 062



WK 070



WK 071



WK 072



WK 073



WK 074



WK 080



WK 081



WK 090



WK 091



WK 092



WK 093



WK 094



WK 095



WK 096



WK 097



WK 098



WK 099



WK 143



WK 144

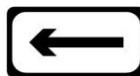
### Supplementary Plates



P 001



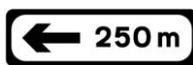
P 002



P 003L



P 003R



P 004L



P 004R



P 010



P 011



P 067



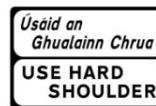
P 080



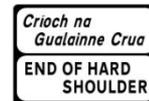
P 081



P 082



P 083



P 084



P 085



P 086

## Other Signs Commonly Used at Roadworks

### Warning Signs (See Chapter 6)



W 063L



W 063R



W 110



W 111



W 183



W 184



W 185

### Regulatory Signs (See Chapter 5)



RUS 001



RUS 002



RUS 003



RUS 014



RUS 026



RUS 027



RUS 039



RUS 040



RUS 041



RUS 042



RUS 043



RUS 044



RUS 060



RUS 061



RUS 061

### Information Sign (See Chapter 4)

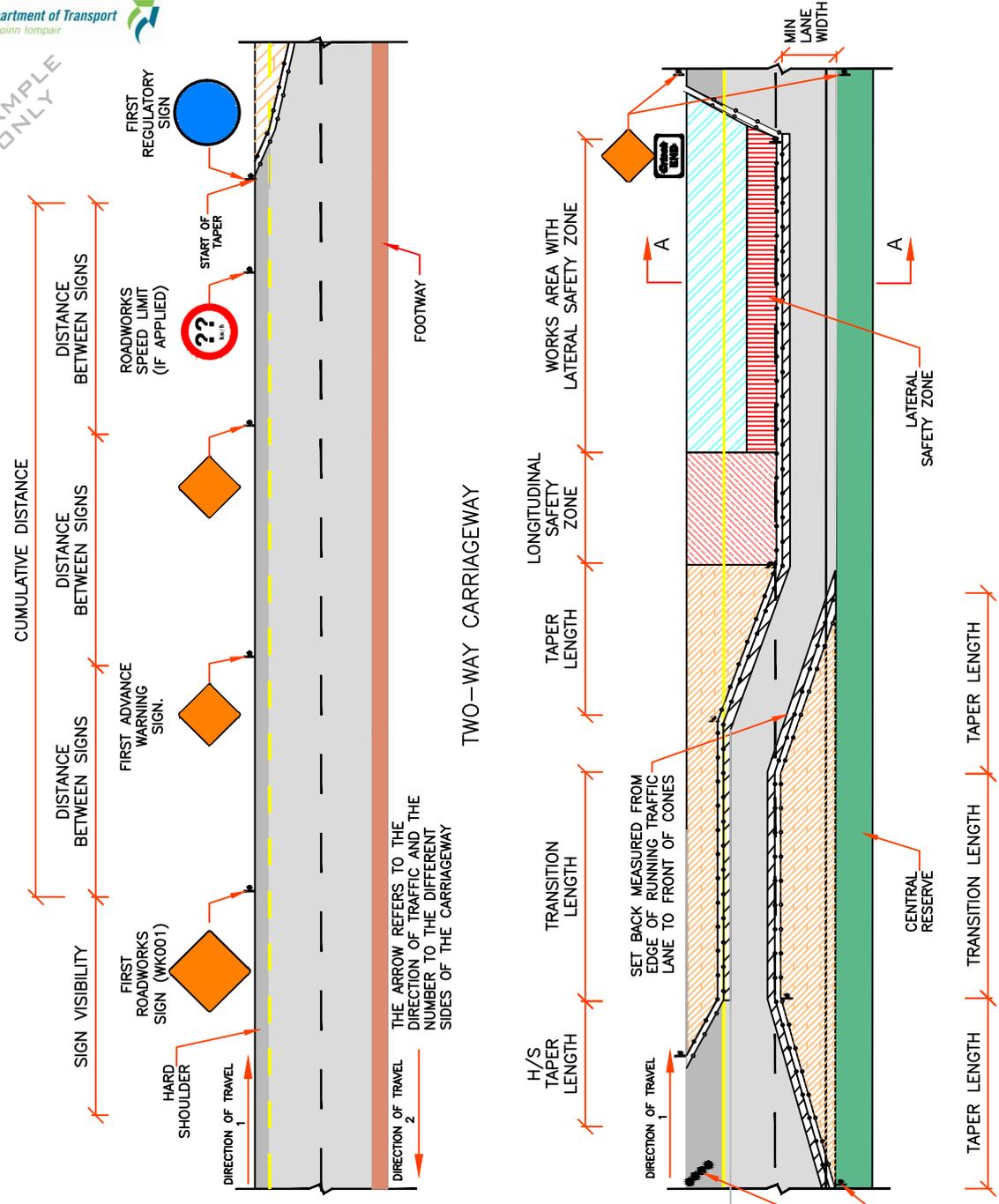


F 4401

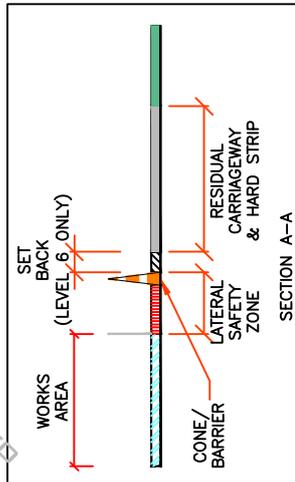


EXAMPLE ONLY

# DIAGRAMMATIC REPRESENTATION OF DESIGN PARAMETERS



NOT TO SCALE



LEGEND

	TAPER AREA		LATERAL SAFETY ZONE
	LONGITUDINAL SAFETY ZONE		SET BACK
	WORKS AREA		CONES/BARRIERS
	HARD SHOULDER		SIGN SYMBOL
	CENTRAL RESERVE		HARD SHOULDER ROAD MARKING
	FOOTWAY / ISLAND		CLOSELY SPACED ANGLED CONES
	HARD STRIP ROAD MARKING		CENTRELINE ROAD MARKING

FOR MOTORWAYS USE CLOSELY SPACED CONES PLACED AT AN ANGLE ACROSS HARD SHOULDER TO DETER VEHICLES

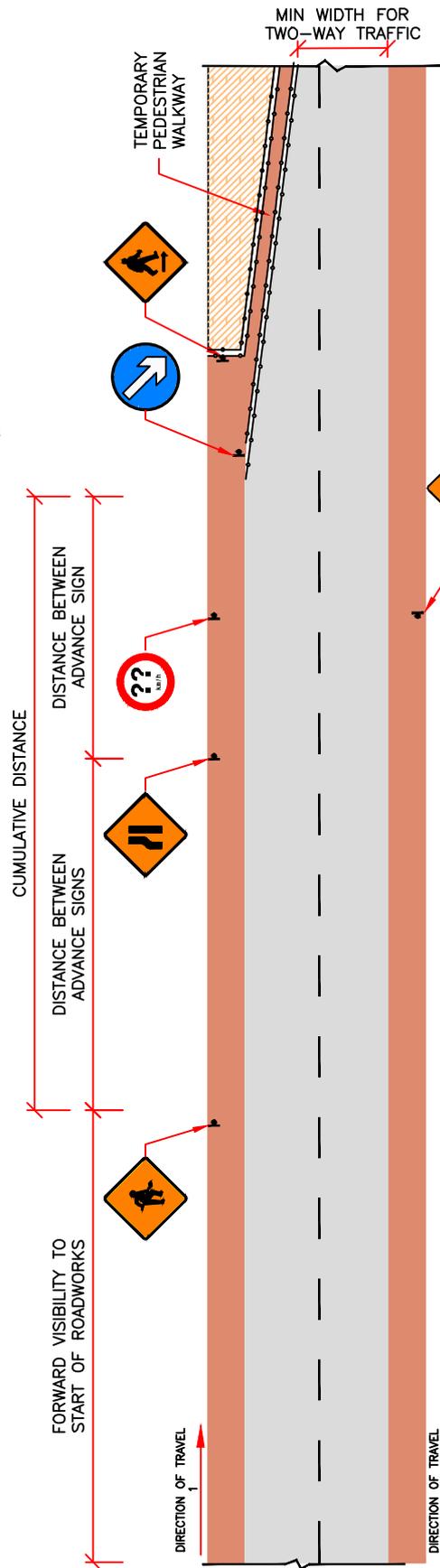
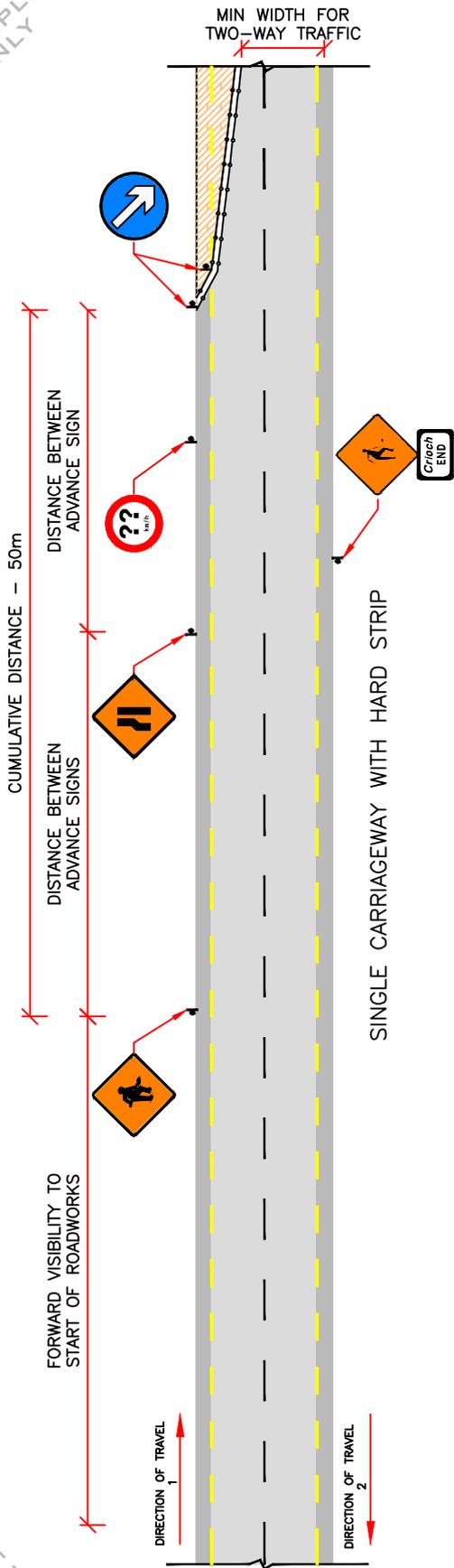
- NOTES
1. REFER TO DRAWINGS IN SECTION 8.8 FOR DETAILED LAYOUTS
  2. REFER TO TABLE 8.2.1 TO 8.2.4 FOR ROADWORK SIGNS
  3. ON ONE-WAY STREETS OR DUAL CARRIAGEWAYS SIGNS SHALL BE PLACED ON BOTH SIDES OF THE CARRIAGEWAY AS AN ALTERNATIVE TO THAT SHOWN ON THE FOLLOWING EXAMPLES THE TEMPORARY WALKWAY FOR PEDESTRIANS MAY BE ROUTED THROUGH THE CONED OFF AREA PROVIDED FOR THE TAPER AND THE LONGITUDINAL SAFETY ZONE.

MOTORWAY / DUAL CARRIAGEWAY

NOT TO SCALE

FIGURE 8.8.0.1

# ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVEL 1



- NOTES:
1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND DESIGN PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PAST THE WORKS AND PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  7. SAME NUMBER OF ADVANCED SIGNS SHOULD BE PLACED AT THE SAME DISTANCES ON ANY APPROACH ROADS.
  8. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.

FIGURE 8.8.1.1

EXAMPLE ONLY

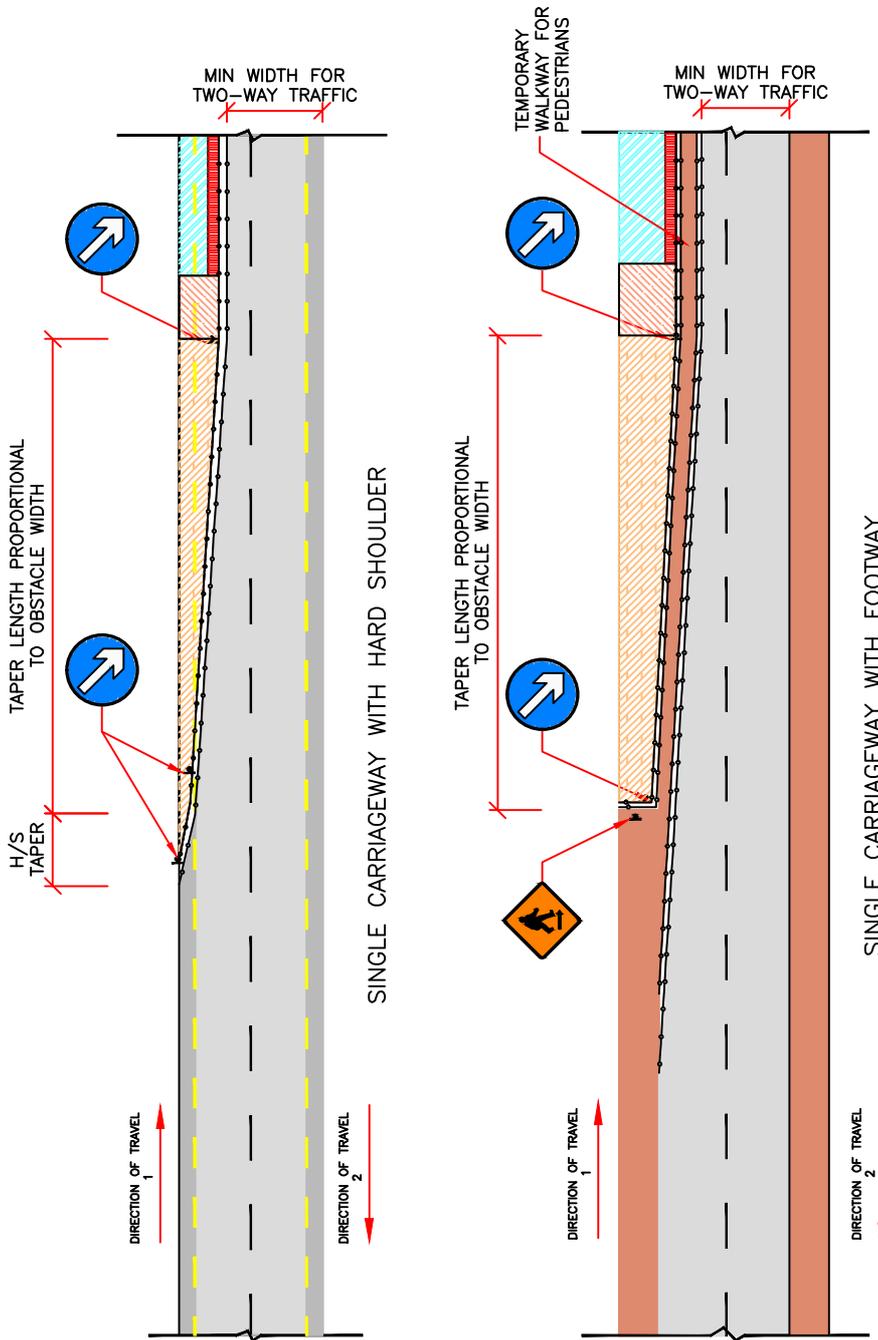
NOT TO SCALE



EXAMPLE ONLY

NOT TO SCALE

### TAPER LENGTHS LEVEL 1



NOTES:

1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND DESIGN PARAMETERS FOR TYPE A, B AND C WORKS
2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PAST THE WORKS AND PROTECTED BY CONES OR BARRIERS.
6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
7. SAME NUMBER OF ADVANCED SIGNS SHOULD BE PLACED AT THE SAME DISTANCES ON ANY APPROACH ROADS
8. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
9. 45° TAPER AT THE END OF THE WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION

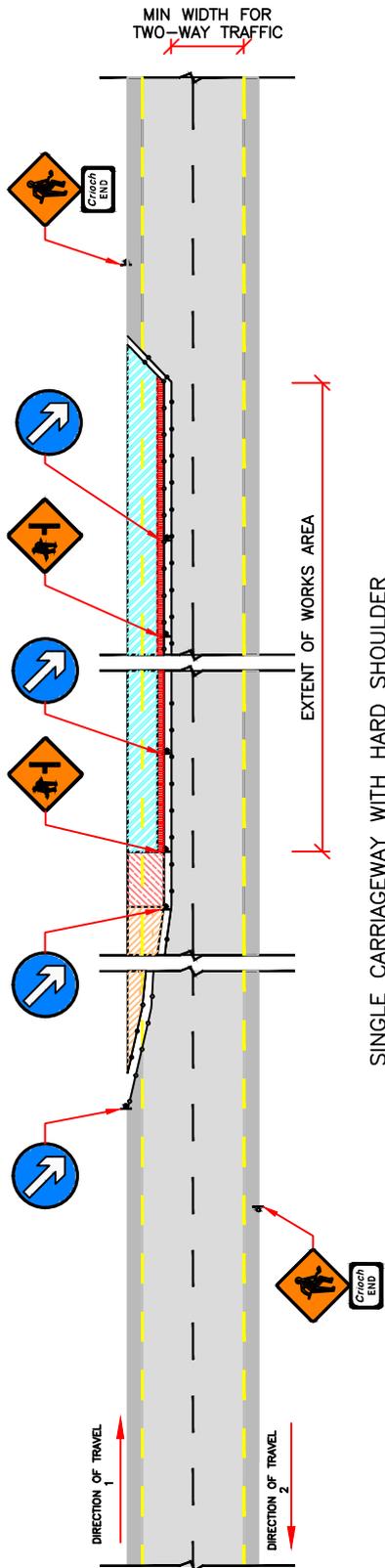
NOT TO SCALE

NOT TO BE REUSED

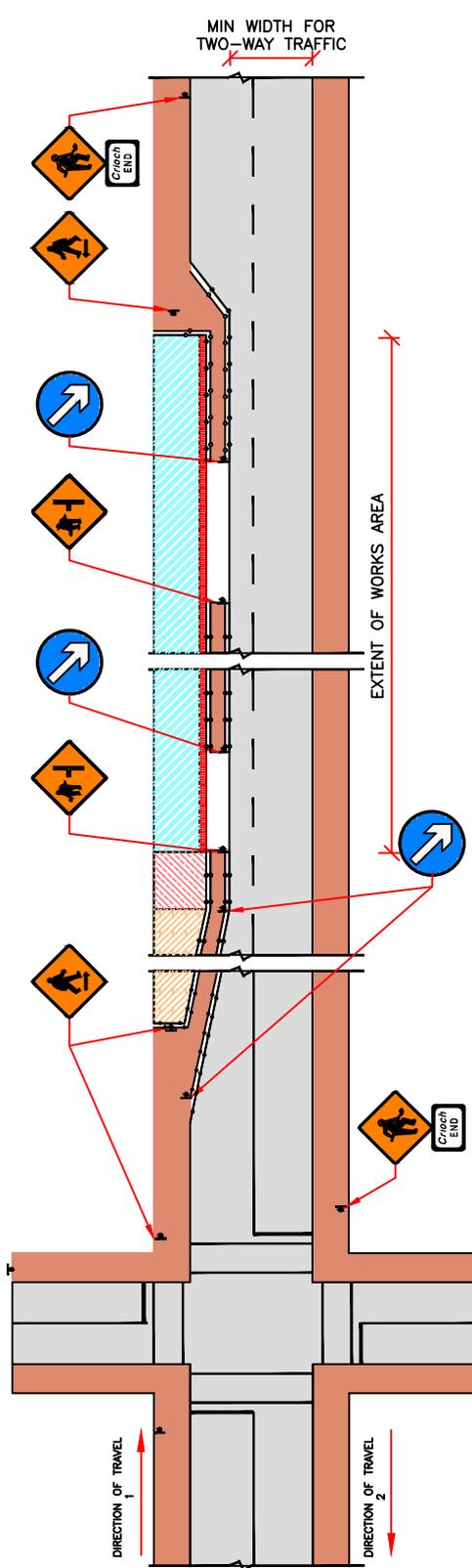
FIGURE 8.8.1.3

EXAMPLE ONLY

### SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVEL 1



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOT TO SCALE

- NOTES:
1. REFER TO TABLE B.3.1 FOR DIMENSIONS AND DESIGN PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. WIDTH OF SITE EXIT/ENTRY TO BE ABLE TO ACCOMMODATE SWEPH PATHS OF DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING
  4. REFER TO TABLE B.2.1 FOR DEFINITION OF ROADWORK SIGNS
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PAST THE WORKS AND PROTECTED BY CONES OR BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  8. SAME NUMBER OF ADVANCED SIGNS SHOULD BE PLACED AT THE SAME DISTANCES ON ANY APPROACH ROADS
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

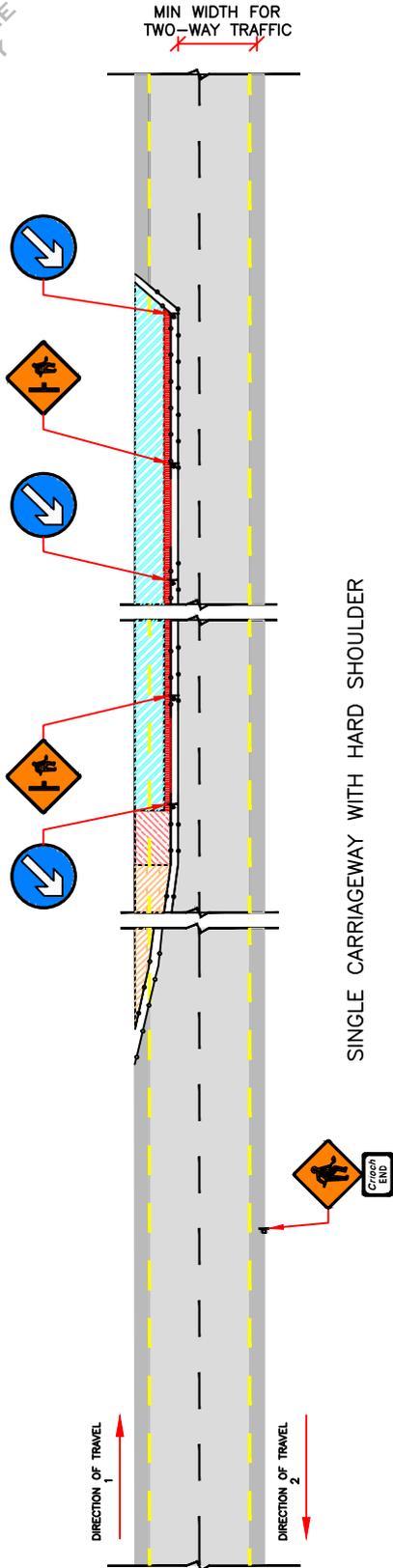
FIGURE 8.8.1.4

NOT TO BE REUSED

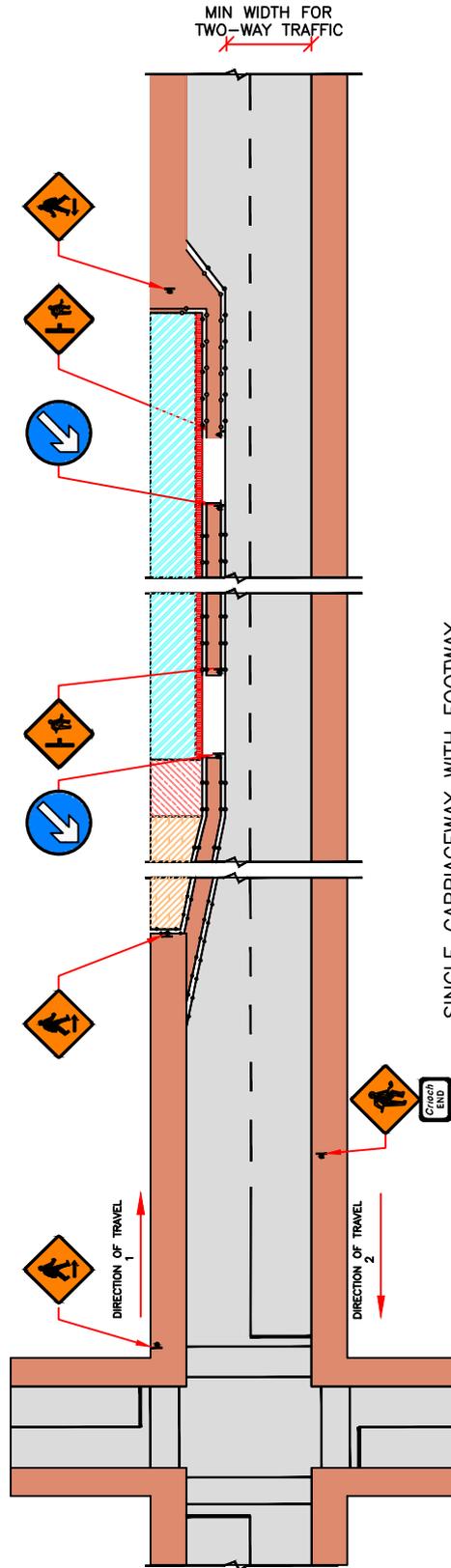
NOT TO SCALE

EXAMPLE ONLY

SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2  
LEVEL 1



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOT TO SCALE

- NOTES:
1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND DESIGN PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. WIDTH OF SITE EXIT/ENTRY, TO BE ABLE TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING
  4. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PAST THE WORKS AND PROTECTED BY CONES OR BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  8. SAME NUMBER OF ADVANCED SIGNS SHOULD BE PLACED AT THE SAME DISTANCES ON ANY APPROACH ROADS
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

NOT TO SCALE

NOT TO BE REUSED

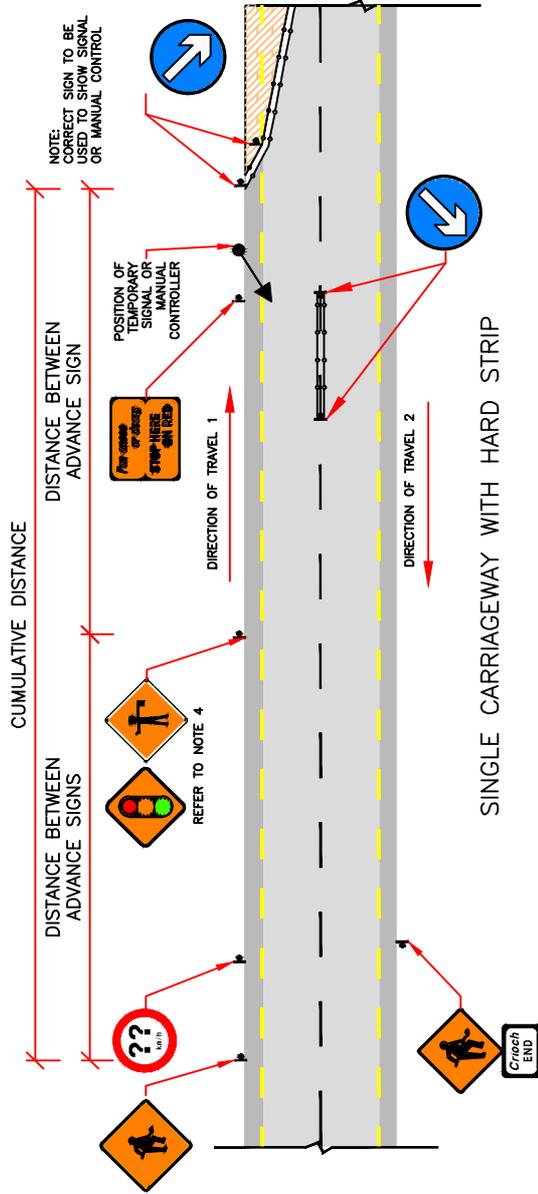
FIGURE 8.8.1.5

EXAMPLE  
ONLY

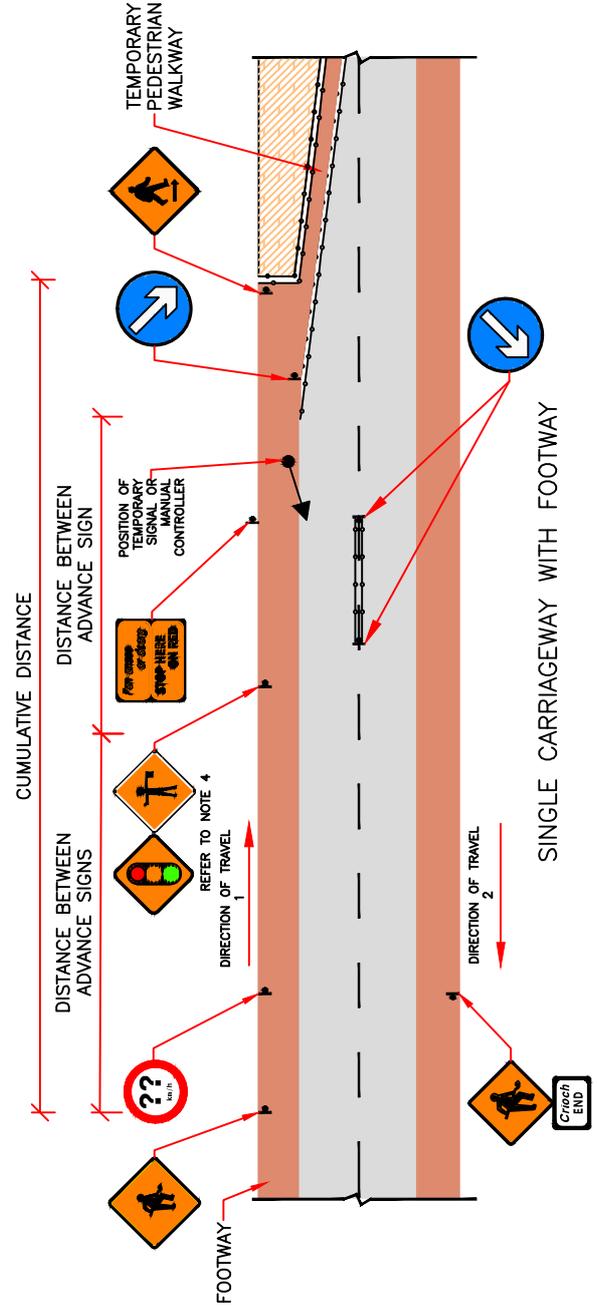
NOT TO  
SCALE

# MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVEL 1

- NOTES:
- REFER TO TABLE 8.3.1 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  - MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS, ETC.
  - REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  - THE APPROPRIATE SIGN SHOULD BE DISPLAYED TO MATCH TYPE OF ACTIVE TRAFFIC MANAGEMENT INSTALLED.
  - SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  - MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEPTH PATHS OF DIFFERENT TYPES OF VEHICLES.
  - FOOTPATH CLOSED SIGN SHOULD BE PLACED TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PAST THE WORKS AND PROTECTED BY CONES OR BARRIERS.
  - PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS
  - SAME NUMBER OF ADVANCED SIGNS SHOULD BE PLACED AT THE SAME DISTANCES ON ANY APPROACH ROADS
  - AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  - END OF ROADWORKS\* SIGN PLACED 20 TO 50m FROM END OF WORKS AREA



SINGLE CARRIAGEWAY WITH HARD STRIP



SINGLE CARRIAGEWAY WITH FOOTWAY

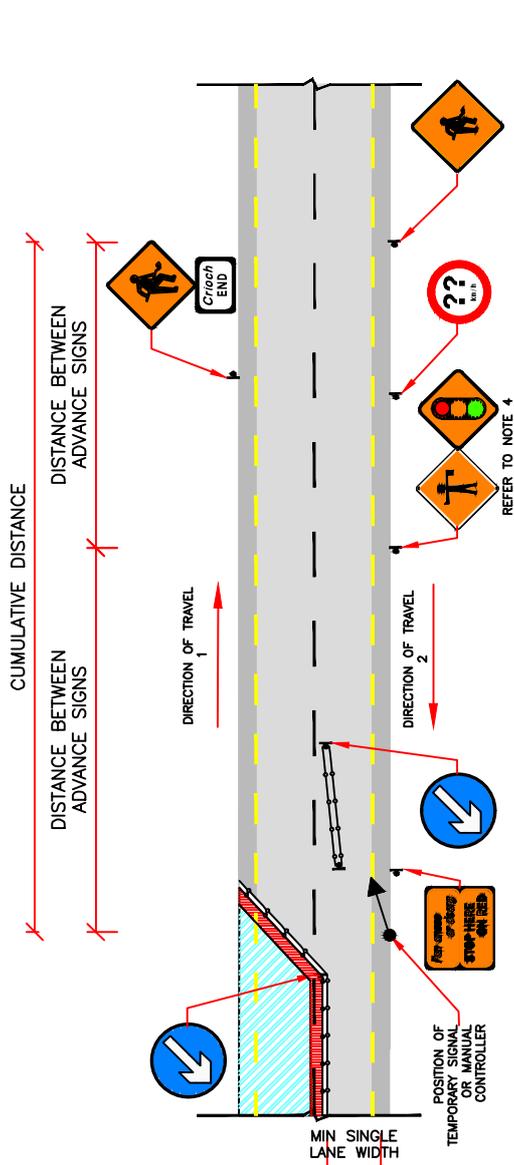
NOT TO BE  
REUSED

FIGURE 8.8.1.6

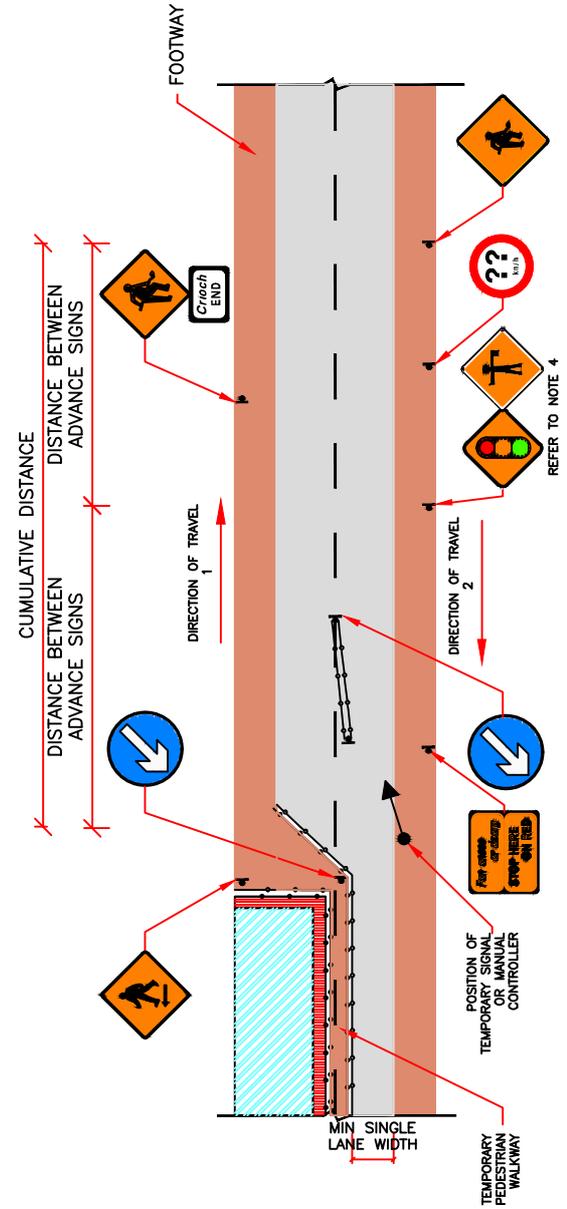
EXAMPLE ONLY

NOT TO SCALE

# MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM ADVANCE SIGNS - DIRECTION OF TRAVEL 2 LEVEL 1



## SINGLE CARRIAGEWAY WITH HARD STRIP



## SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. THE APPROPRIATE SIGN SHOULD BE DISPLAYED TO MATCH THE TYPE OF ACTIVE TRAFFIC MANAGEMENT INSTALLED.
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEPTH PATHS OF DIFFERENT TYPES OF VEHICLES.
  7. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  8. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  9. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  10. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT IS REQUIRED.
  11. 'END OF ROADWORKS' SIGN TO BE PLACED 20 TO 50m FROM END OF WORKS AREA.

NOT TO SCALE

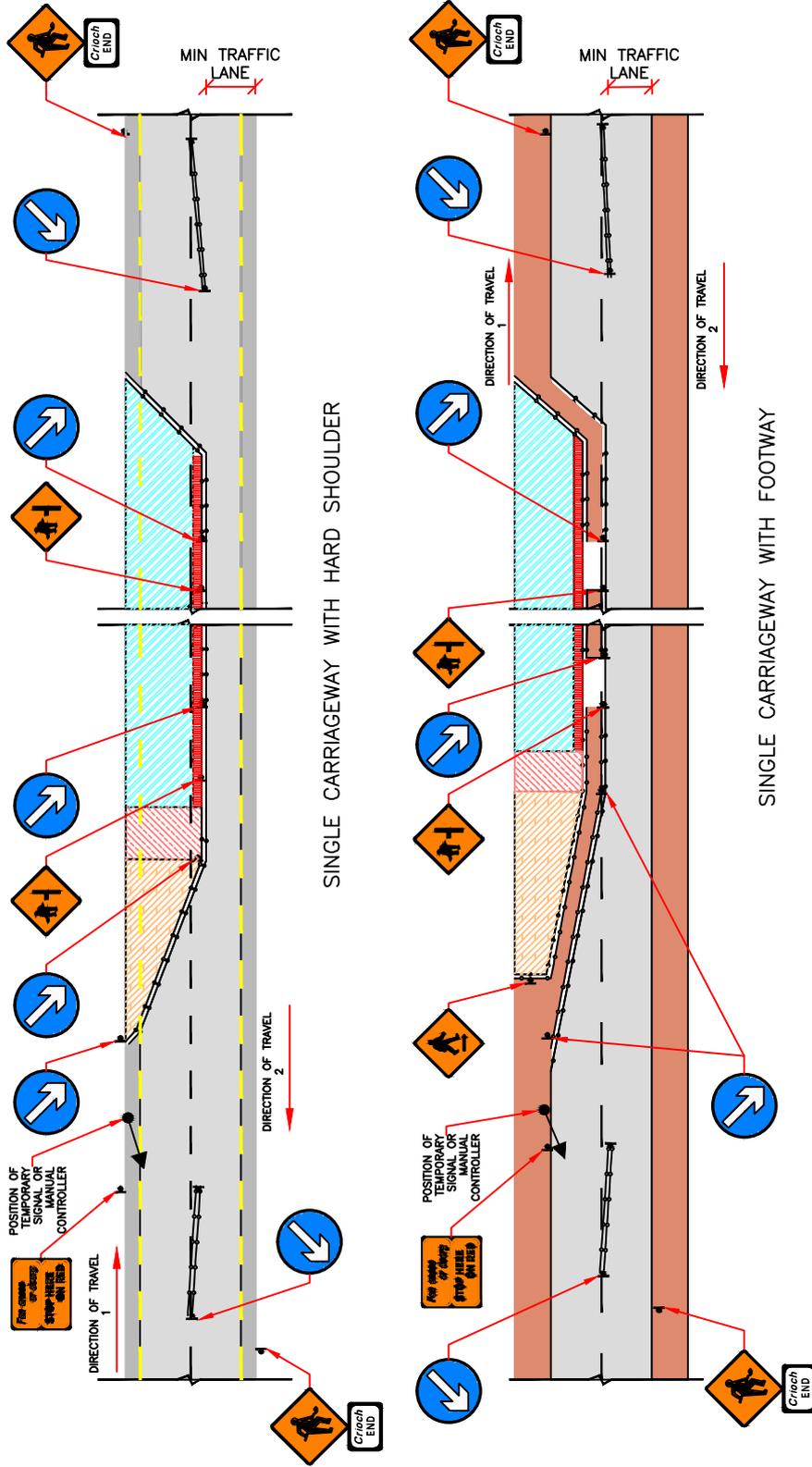
NOT TO BE REUSED

FIGURE 8.8.1.7

EXAMPLE ONLY

NOT TO SCALE

# MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVEL 1



- NOTES:
1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  2. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEPETH PATHS OF DIFFERENT TYPES OF VEHICLES.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  8. "END OF ROADWORKS" SIGN PLACED 20 TO 50M FROM END OF WORKS AREA

NOT TO SCALE

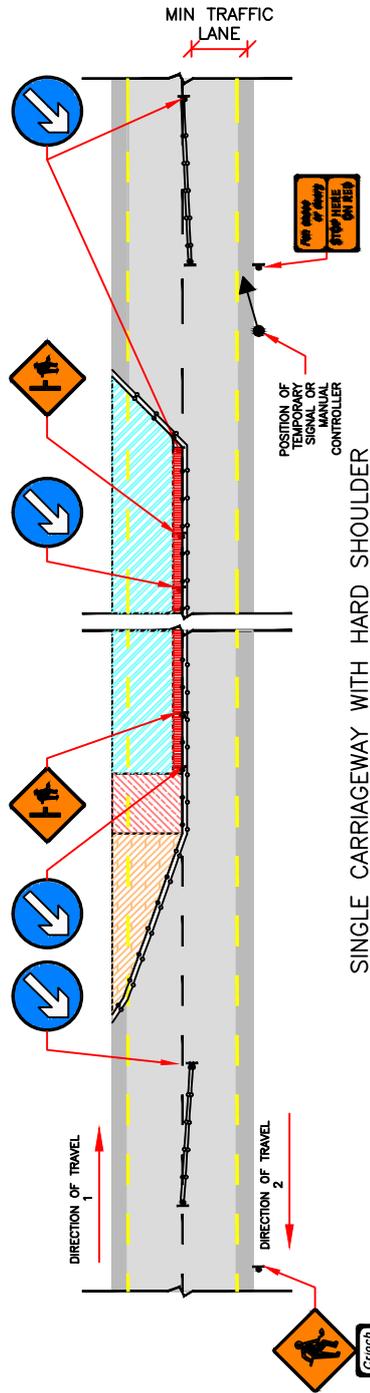
NOT TO BE REUSED

FIGURE 8.8.1.8

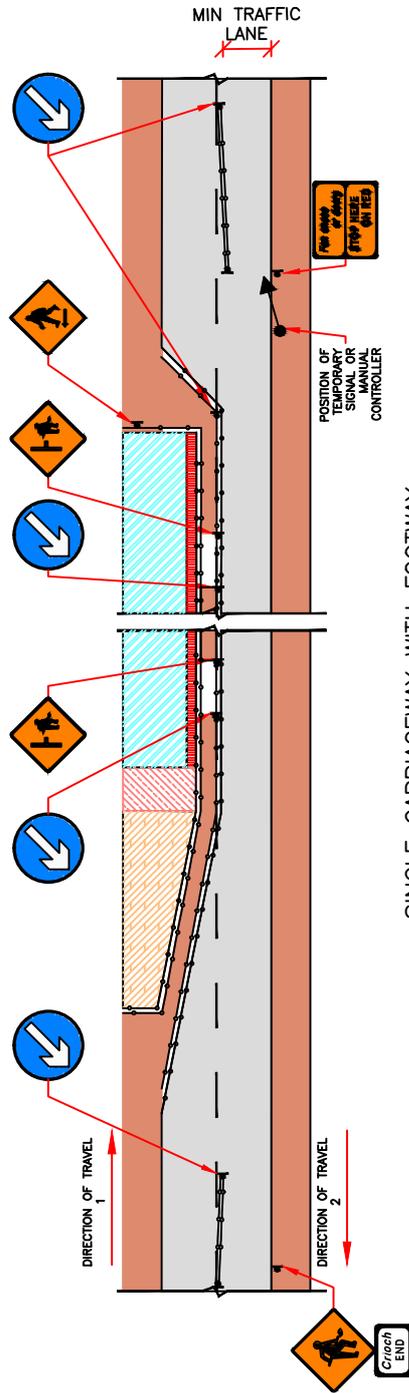
EXAMPLE ONLY

NOT TO SCALE

### MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2 LEVEL 1



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOTES:

1. REFER TO TABLE 8.3.1 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEPH PATHS OF DIFFERENT TYPES OF VEHICLES.
4. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
6. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD; THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD

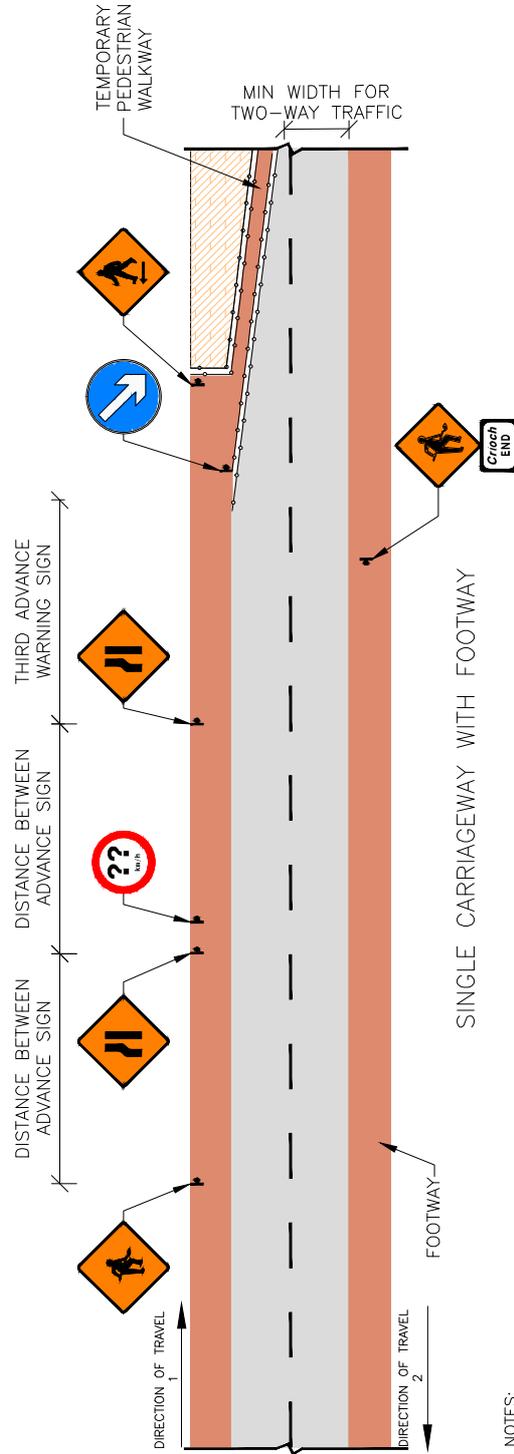
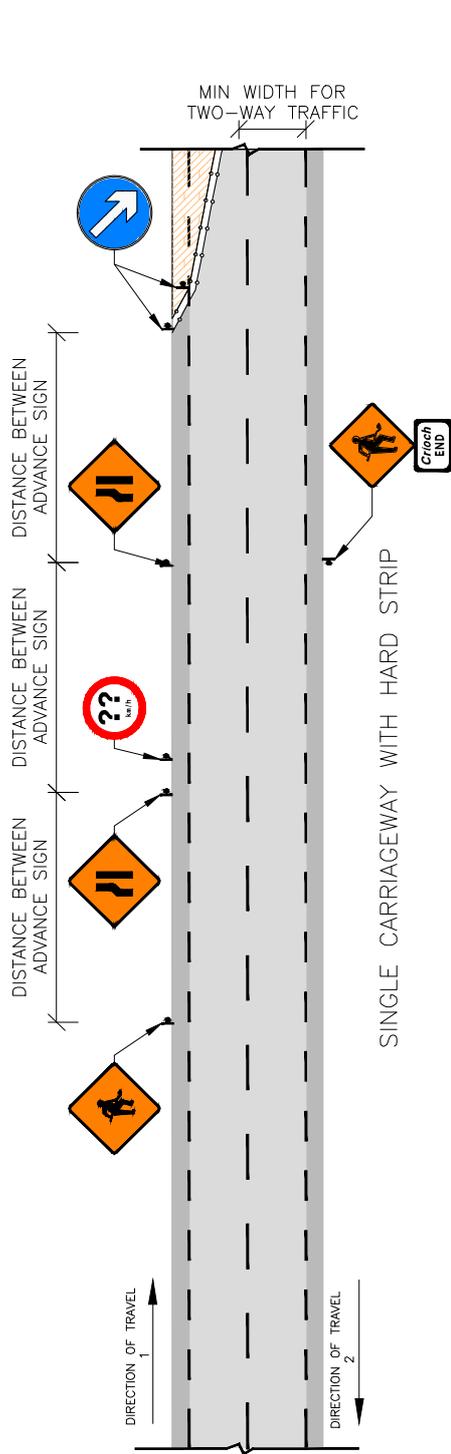
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.1.9

EXAMPLE ONLY

# ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVEL 2



- NOTES:
1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. WIDTH OF SITE EXIT/ENTRY TO BE ABLE TO ACCOMMODATE SWEPTH PATHS OF DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING
  4. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD .
  9. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  10. "END OF ROADWORKS" SIGN PLACED 20 TO 50M FROM END OF WORKS AREA

NOT TO SCALE

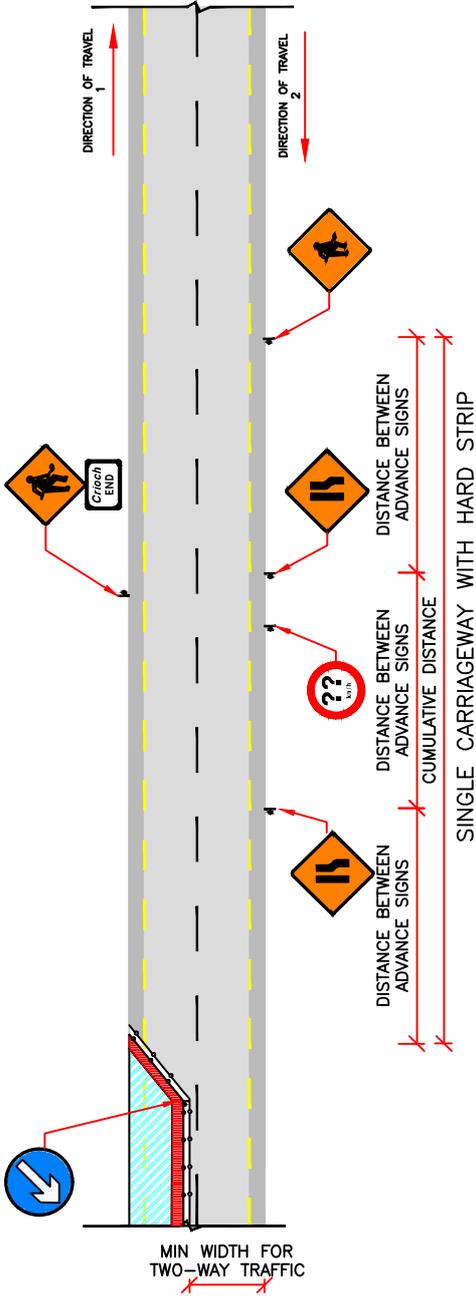
NOT TO SCALE

NOT TO BE REUSED

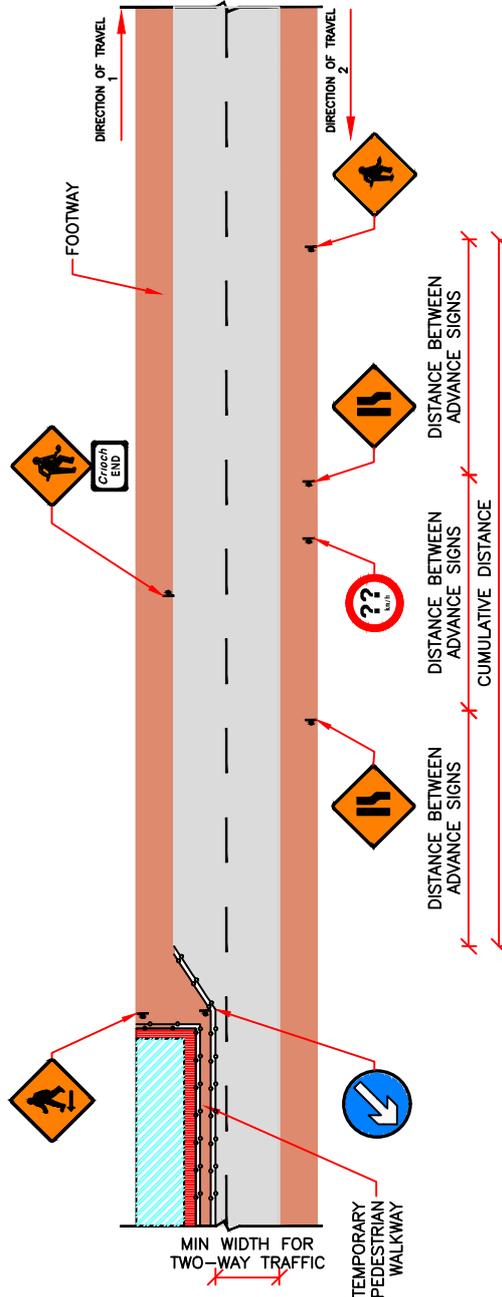
FIGURE 8.8.2.1

EXAMPLE ONLY

## ADVANCE SIGNS - DIRECTION OF TRAVEL 2 LEVEL 2



SINGLE CARRIAGEWAY WITH HARD STRIP



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  8. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

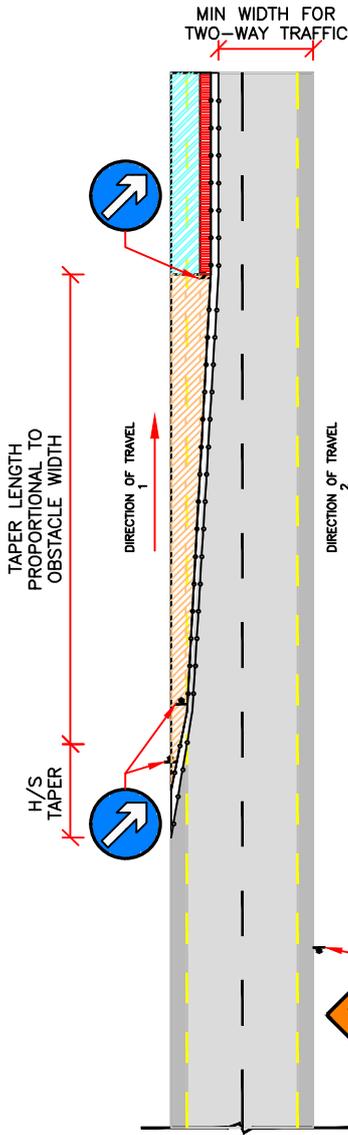
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NOT TO SCALE

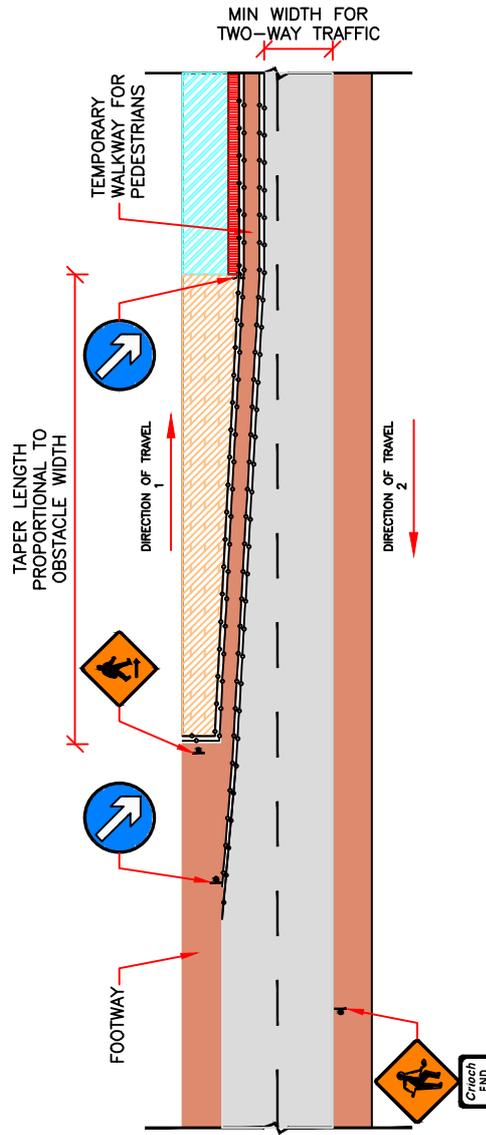
FIGURE 8.8.2.2

EXAMPLE ONLY

### TAPER LENGTHS LEVEL 2



### SINGLE CARRIAGEWAY WITH HARD SHOULDER



### SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  8. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

NOT TO SCALE

NOT TO SCALE

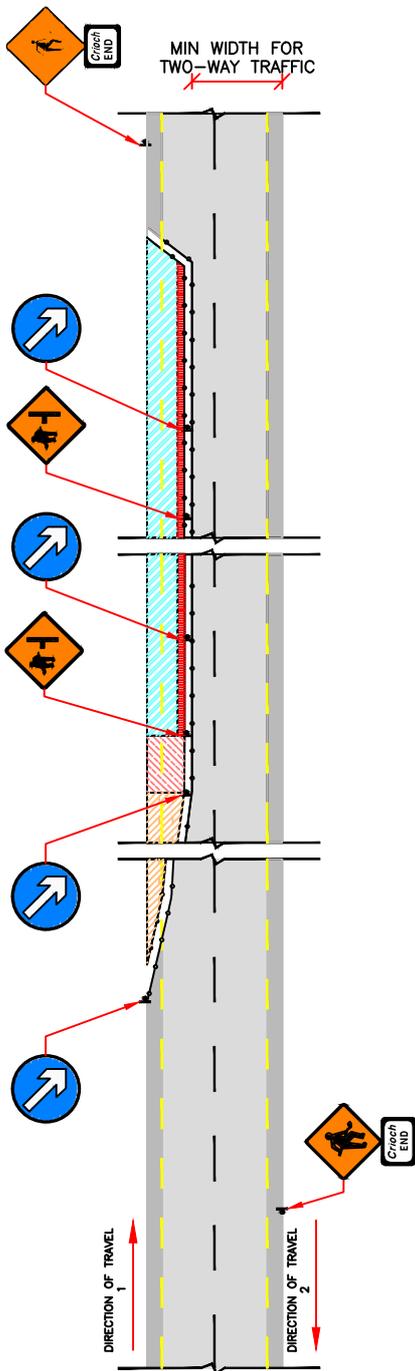
NOT TO BE REUSED

FIGURE 8.8.2.3

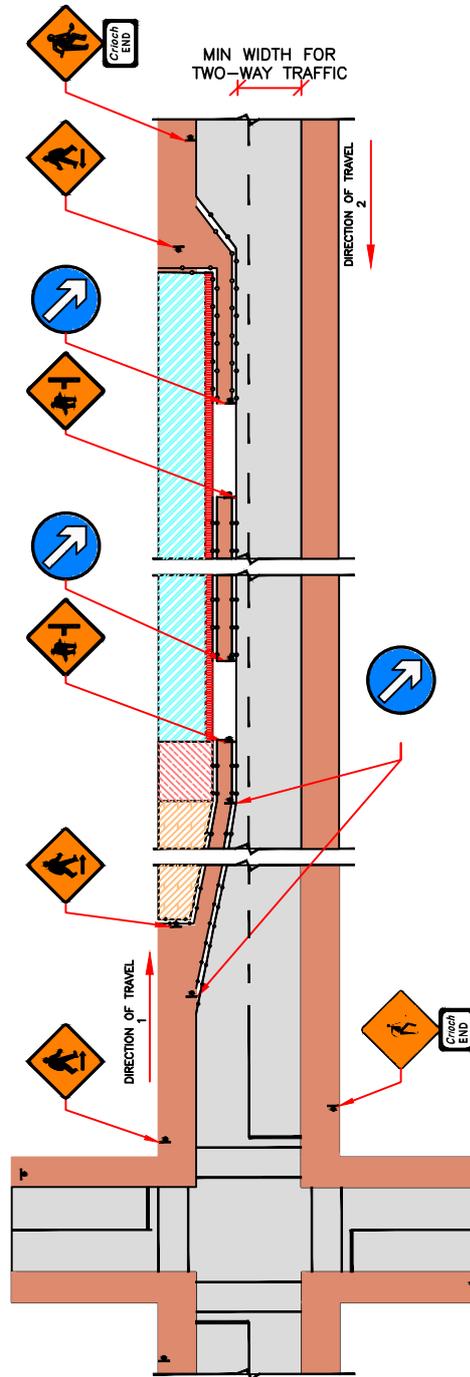
EXAMPLE ONLY

NOT TO SCALE

### SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVEL 2



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOTES:

1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
5. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD. THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
8. 'END OF ROADWORKS' SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
9. 45° TAPER AT END OF THE WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION

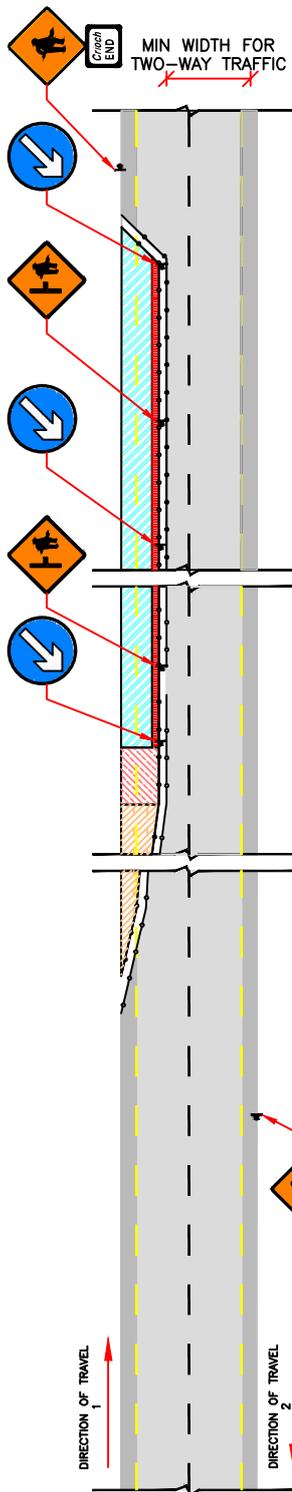
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NOT TO BE REUSED

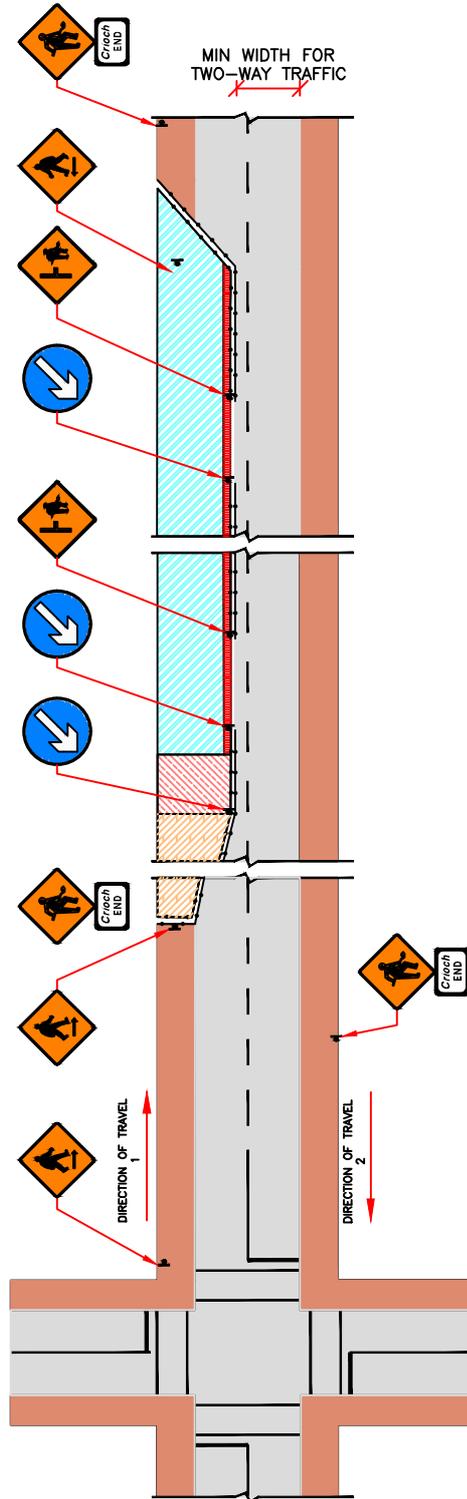
FIGURE 8.8.2.4

EXAMPLE ONLY

### SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2 LEVEL 2



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT EXITING PEDESTRIAN CROSSING AND AT THE BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  8. 'END OF ROADWORKS' SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
  9. 45° TAPER AT END OF WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION

NOT TO SCALE

NOT TO SCALE

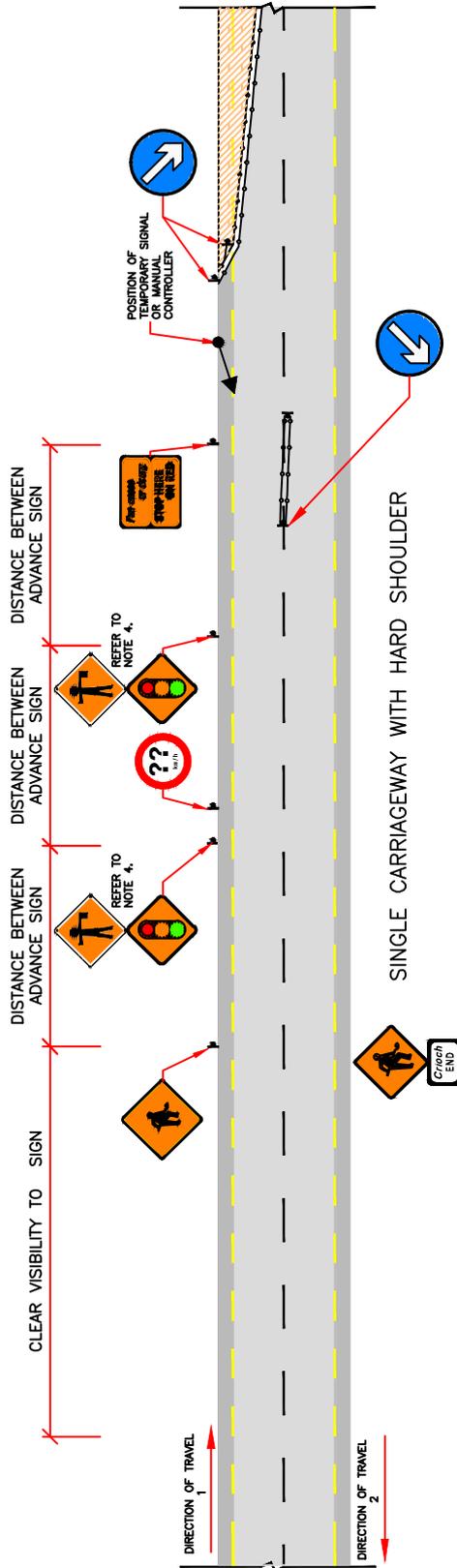
NOT TO BE REUSED

FIGURE 8.8.2.5

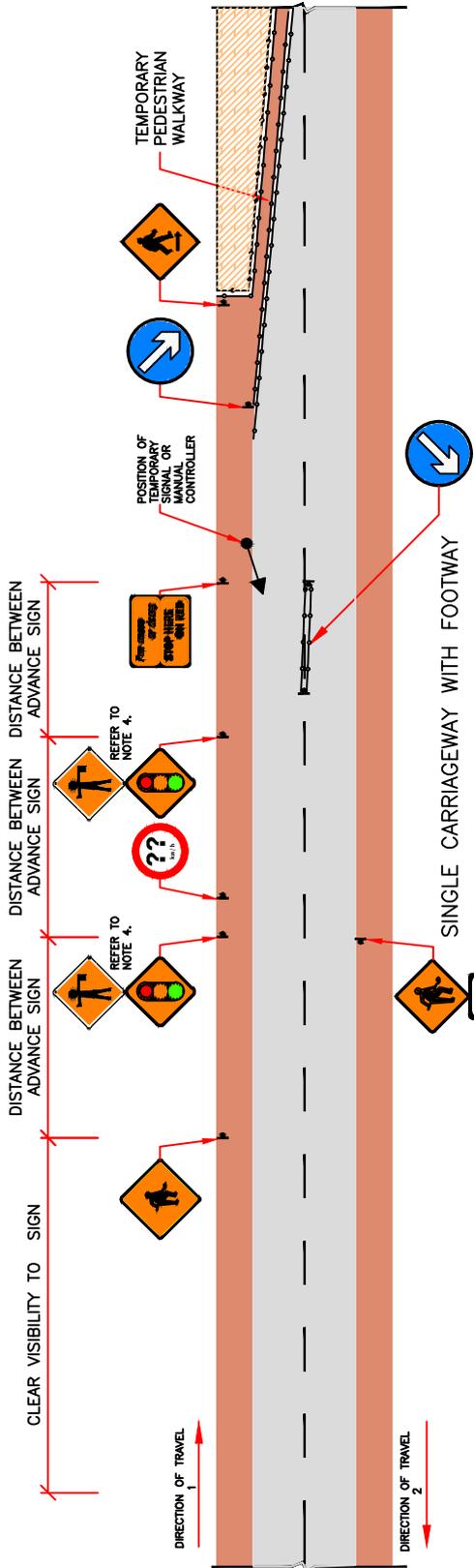
EXAMPLE ONLY

NOT TO SCALE

# MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVEL 2



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE B.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE B.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  4. THE APPROPRIATE SIGN SHOULD BE DISPLAYED TO MATCH TYPE OF ACTIVE TRAFFIC MANAGEMENT INSTALLED.
  5. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.
  6. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  7. 'END OF ROADWORKS' SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
  8. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS TO THE TEMPORARY WALKWAY.
  9. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  10. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  11. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  12. 'END OF ROADWORKS' SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

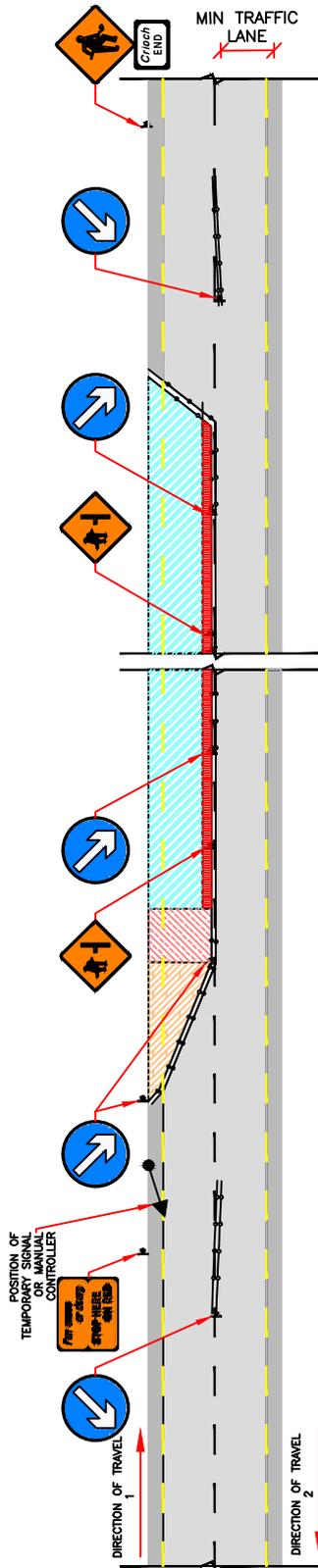
NOT TO BE REUSED

FIGURE 8.8.2.6

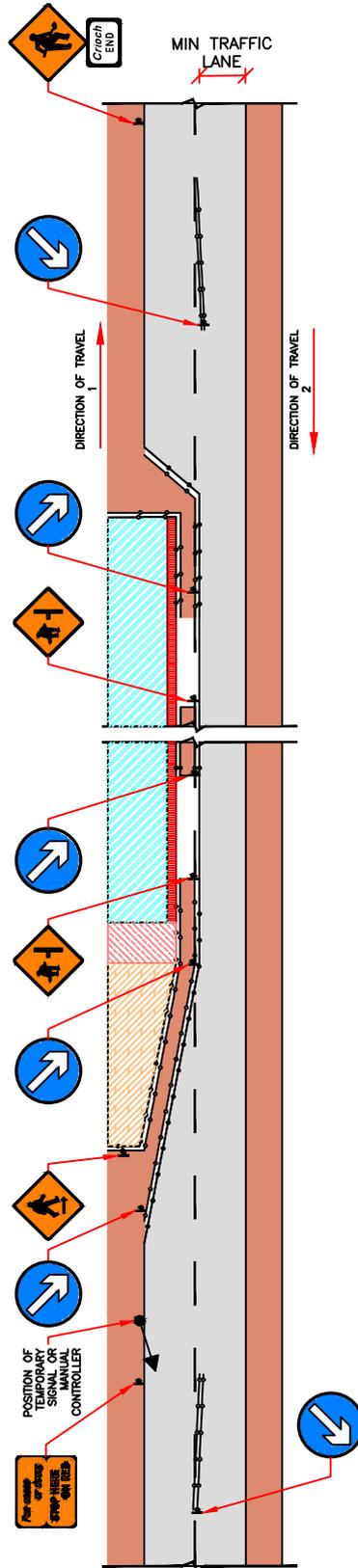


EXAMPLE ONLY

### MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVEL 2



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  5. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  8. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
  9. 45° TAPER AT END OF THE WORKS TO DEFLECT THE TRAFFIC BACK TO THE ORIGINAL LANE CONFIGURATION

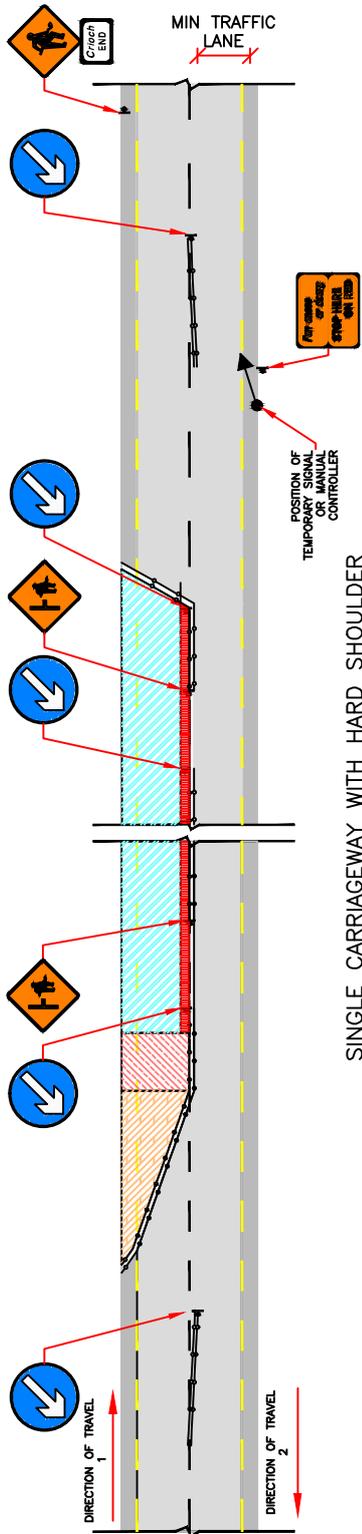
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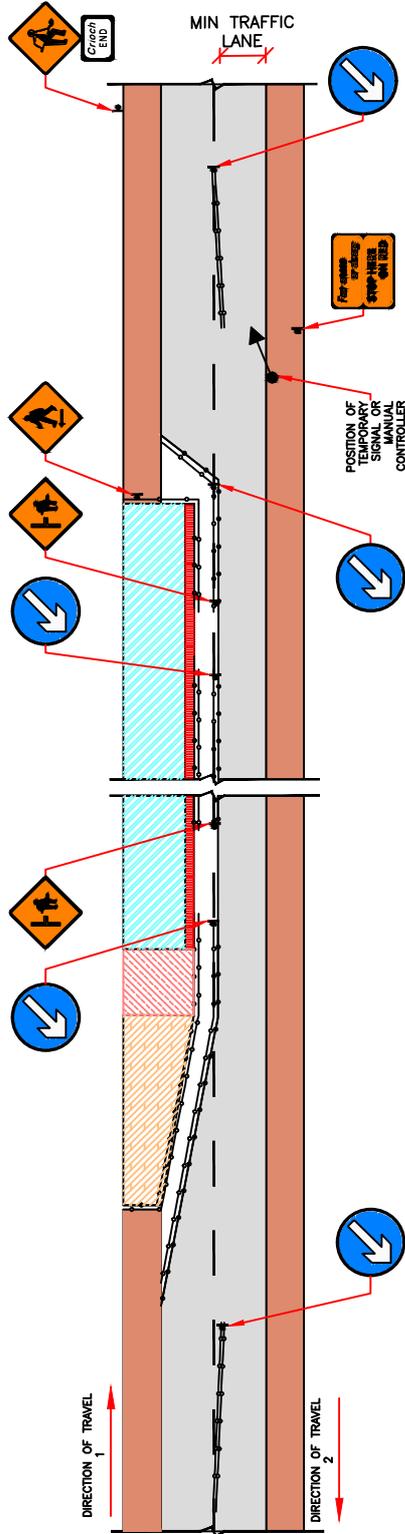
FIGURE 8.8.2.8

EXAMPLE ONLY

MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM  
SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2  
LEVEL 2



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOTES:

1. REFER TO TABLE 8.3.2 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
5. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
8. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.

NOT TO BE REUSED

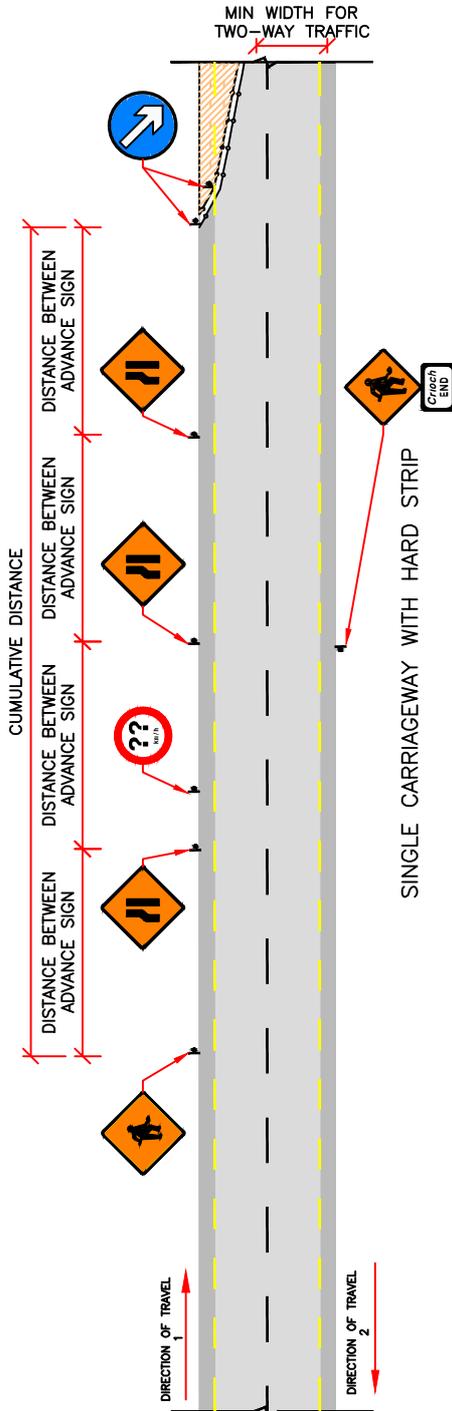
NOT TO SCALE

FIGURE 8.8.2.9

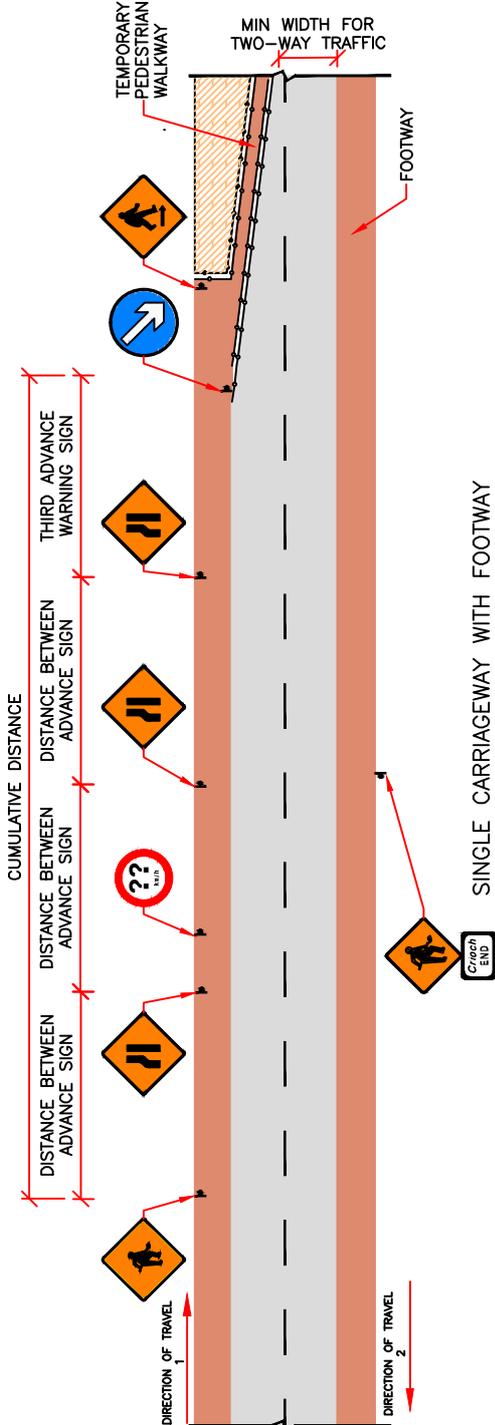
EXAMPLE ONLY

NOT TO SCALE

### ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD STRIP



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
- REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  - MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  - REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  - SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
  - PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  - SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  - AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  - "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

NOT TO SCALE

NOT TO BE REUSED

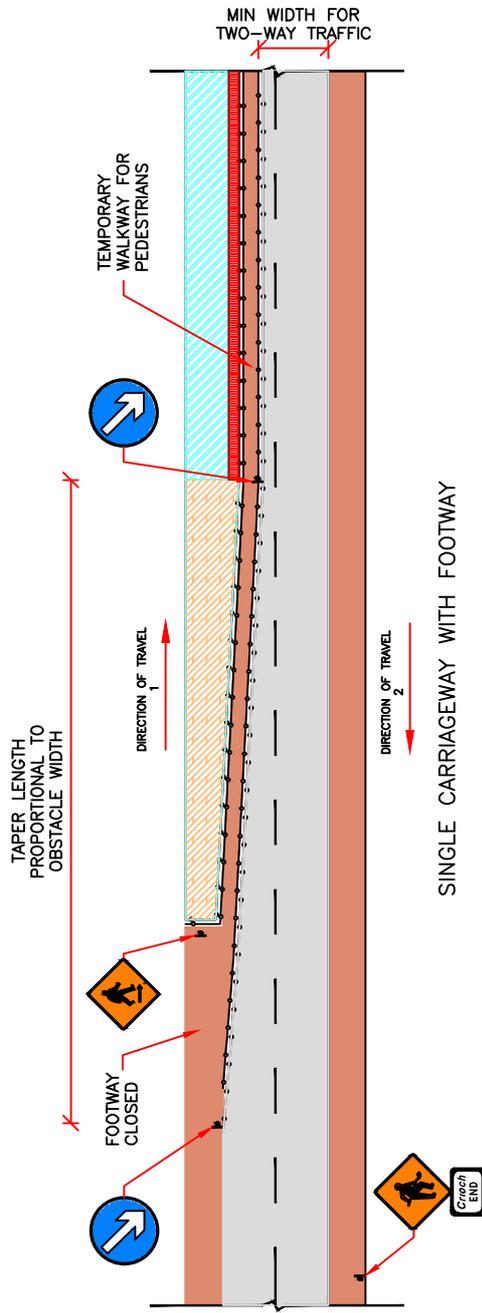
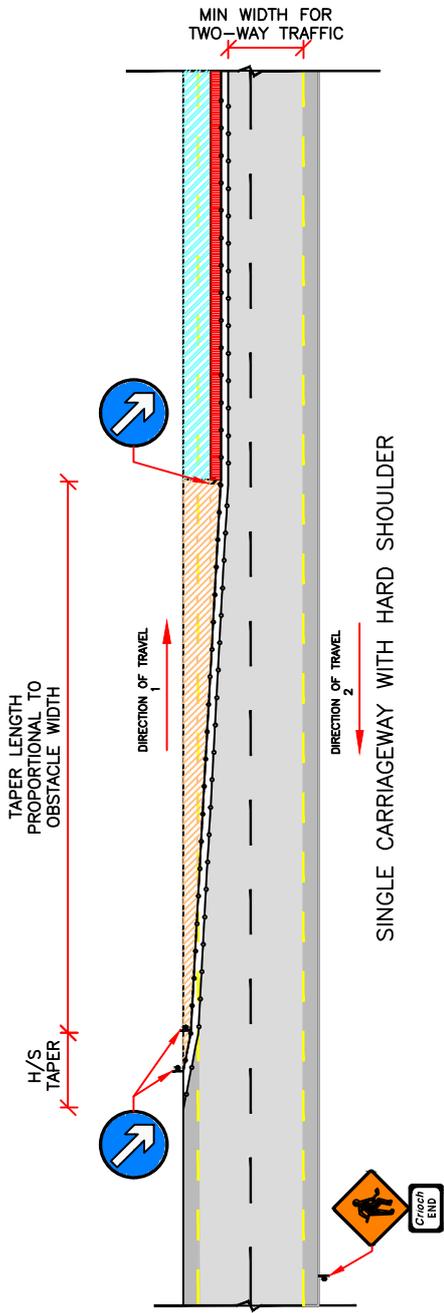
FIGURE 8.8.3.1



EXAMPLE ONLY

NOT TO SCALE

### TAPER LENGTHS LEVELS 3 & 4



- NOTES:
1. REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS.
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION.
  5. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  8. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.

NOT TO SCALE

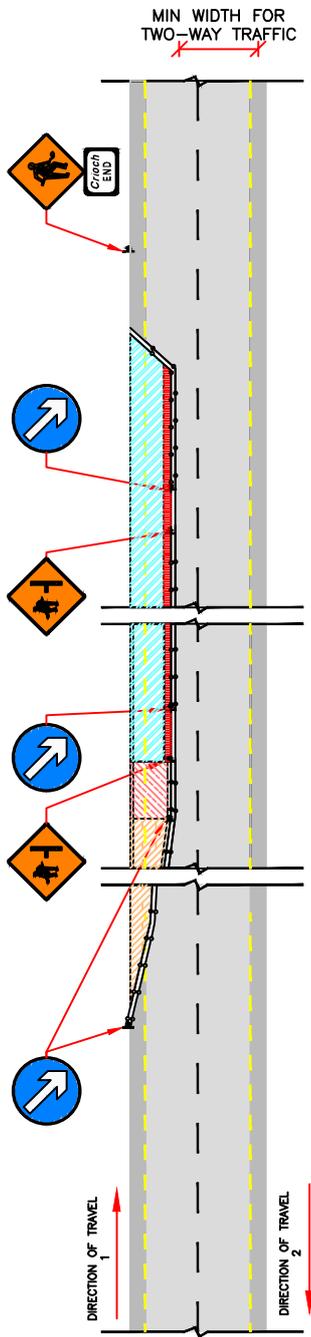
NOT TO BE REUSED

FIGURE 8.8.3.3

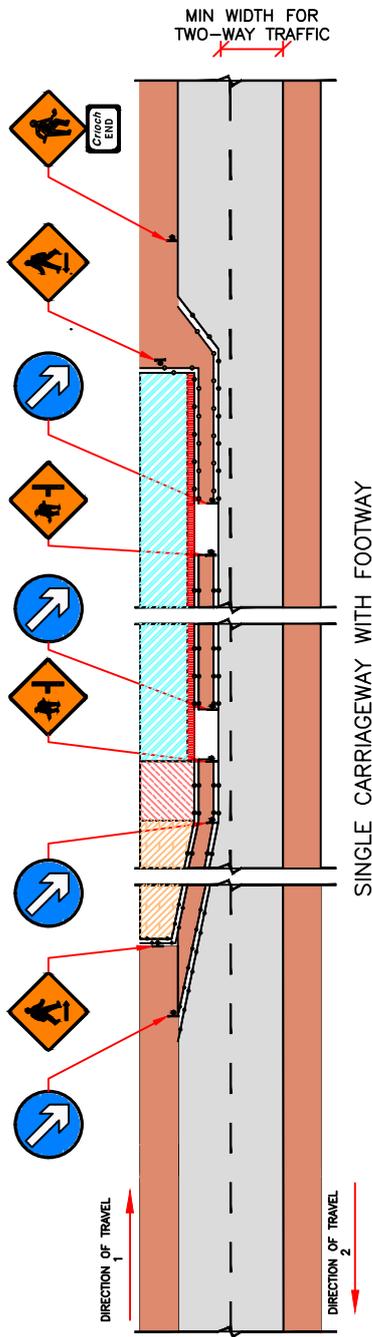
EXAMPLE ONLY

NOT TO SCALE

### SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOTES:

1. REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
9. 'END OF ROADWORKS' SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

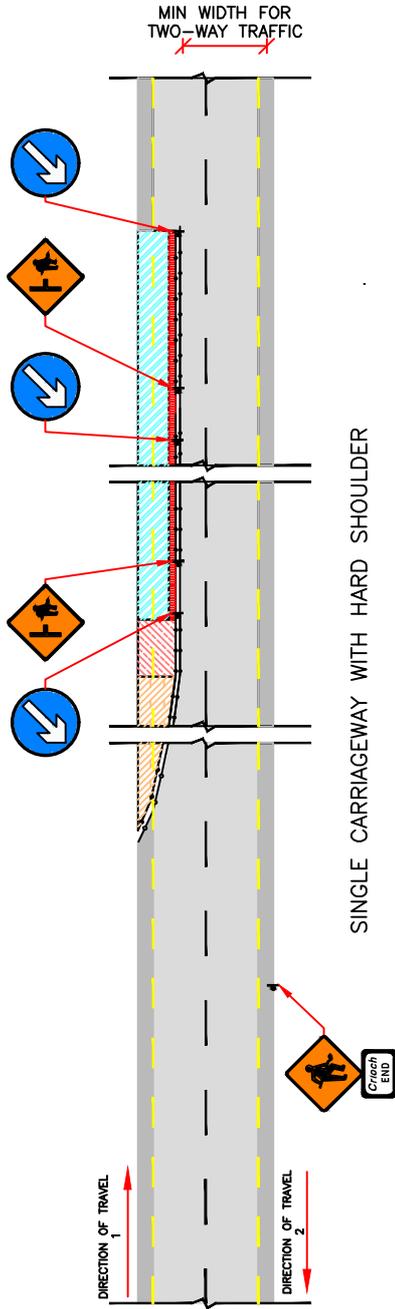
NOT TO SCALE

NOT TO BE REUSED

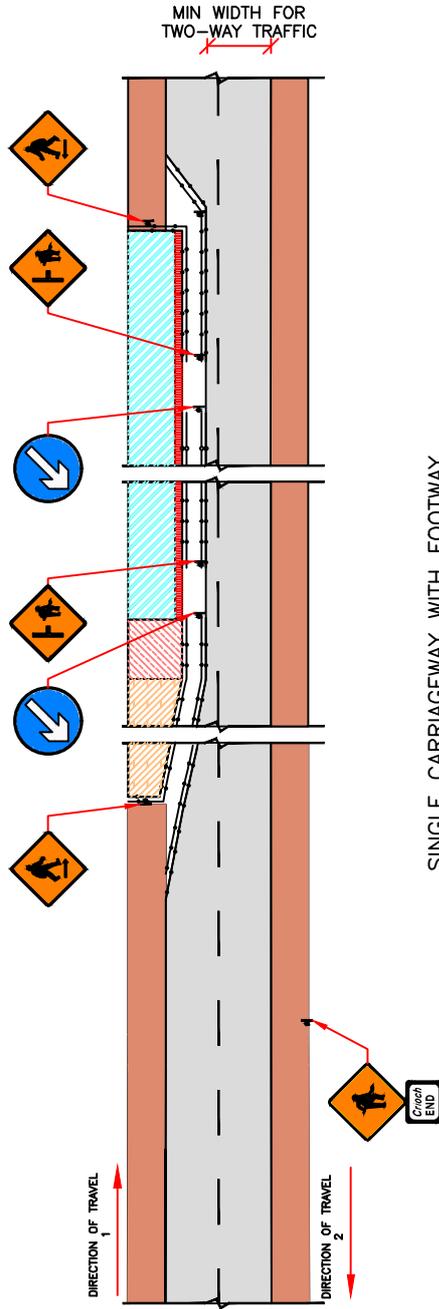
FIGURE 8.8.3.4

EXAMPLE  
ONLY

SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2  
LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

- NOTES:
1. REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  2. MIN WIDTH FOR TWO-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS .
  8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

NOT TO  
SCALE

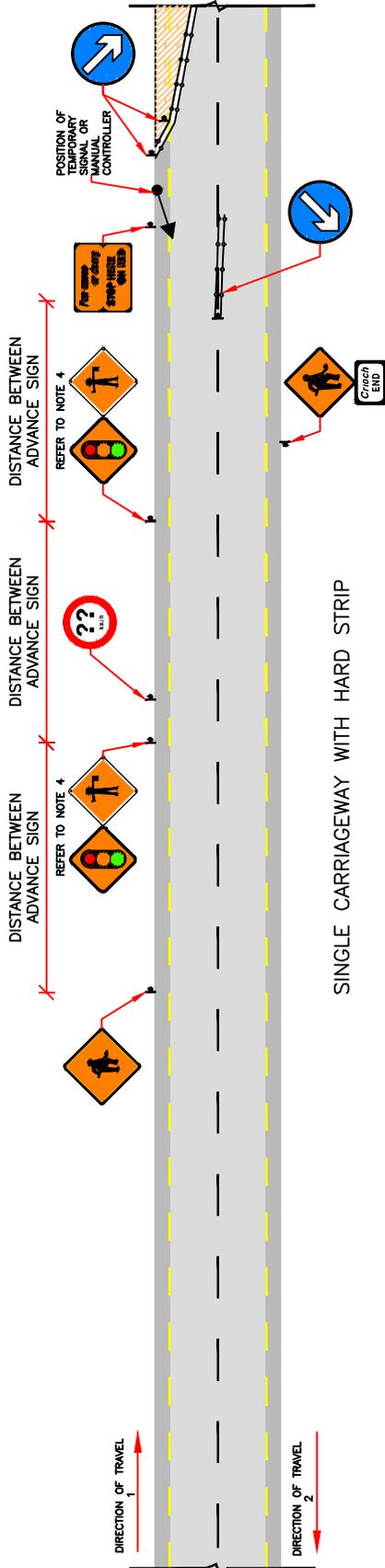
NOT TO  
SCALE

NOT TO BE  
REUSED

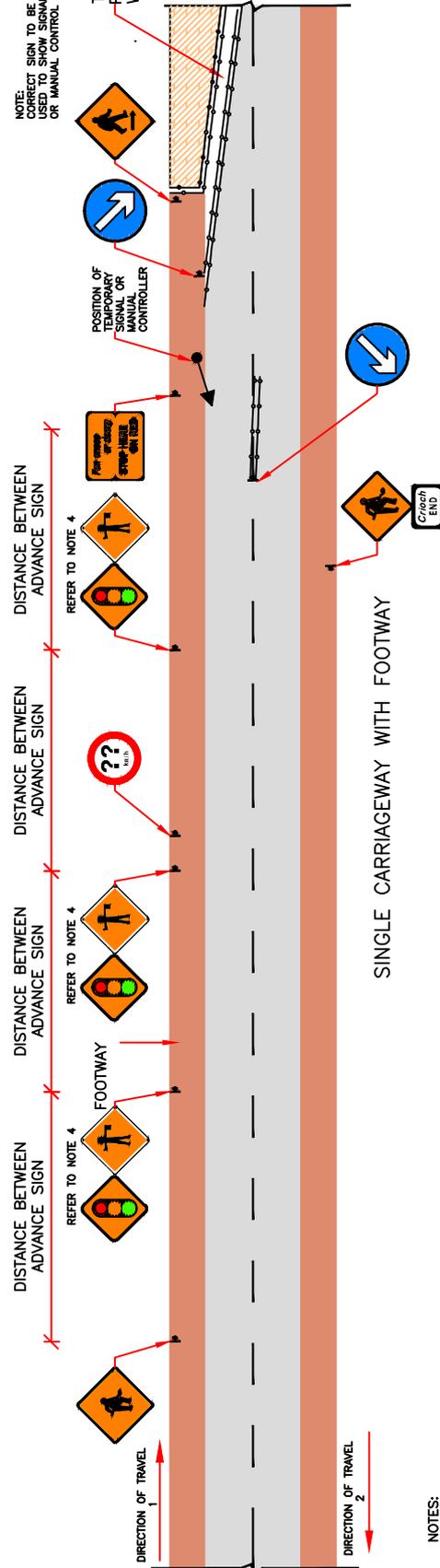
FIGURE 8.8.3.5

EXAMPLE ONLY

# MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD STRIP



SINGLE CARRIAGEWAY WITH FOOTWAY

NOT TO SCALE

- NOTES:
- REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS
  - MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  - REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  - THE APPROPRIATE SIGN SHOULD BE DISPLAYED TO MATCH TYPE OF ACTIVE TRAFFIC MANAGEMENT INSTALLED.
  - MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEPATH PATHS OF DIFFERENT TYPES OF VEHICLES.
  - SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS
  - FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  - SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD,
  - AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS' SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  - "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA

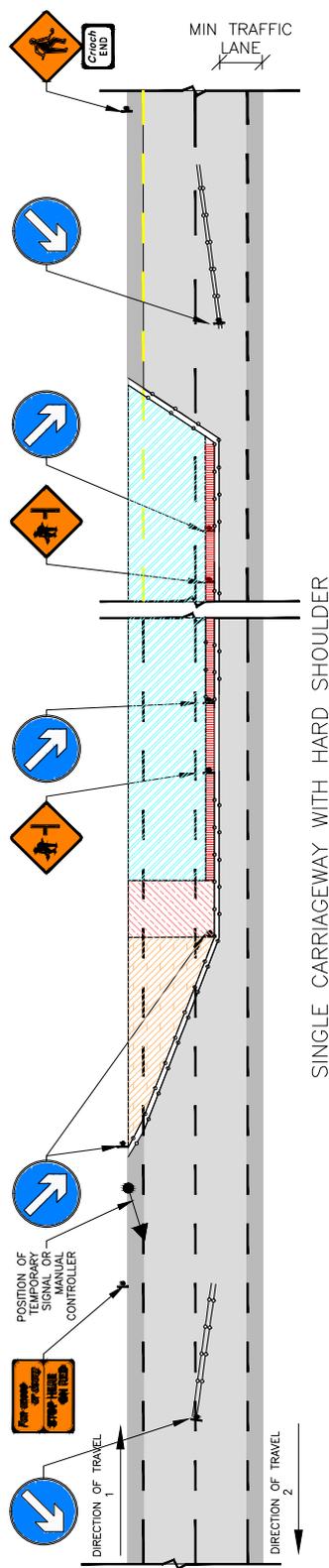
NOT TO BE REUSED

FIGURE 8.8.3.6

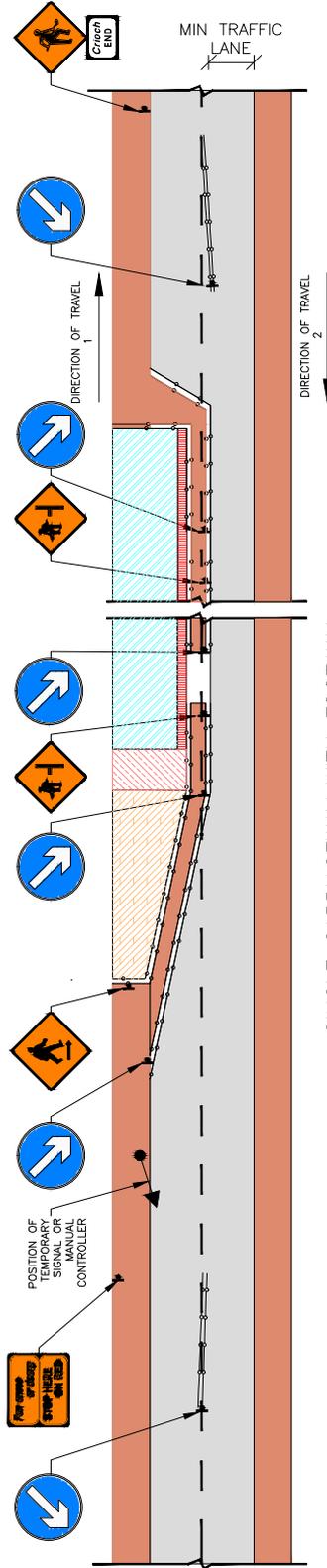


EXAMPLE ONLY

### MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOTES:

1. REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B AND C WORKS.
2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEPH
5. PATHS OF DIFFERENT TYPES OF VEHICLES.
6. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
7. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
8. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
9. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
10. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.

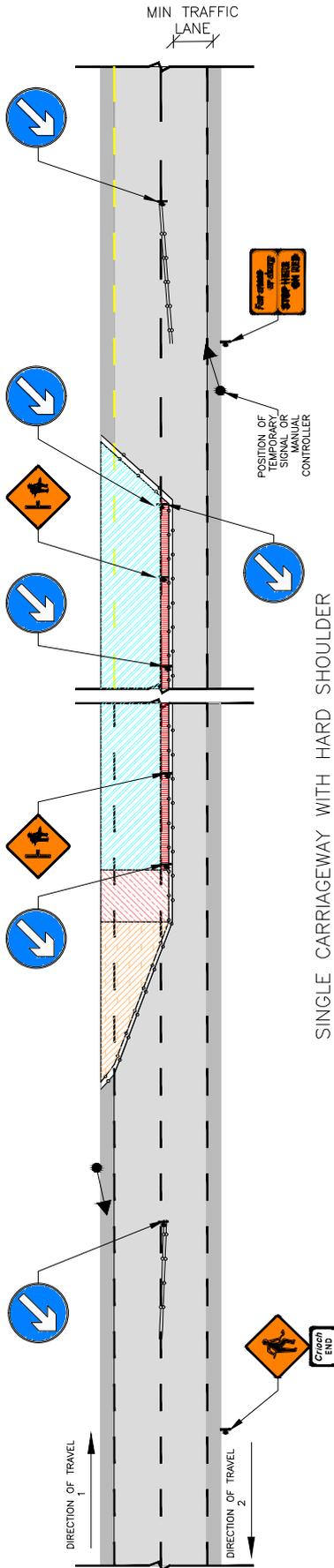
NOT TO BE REUSED

NOT TO SCALE

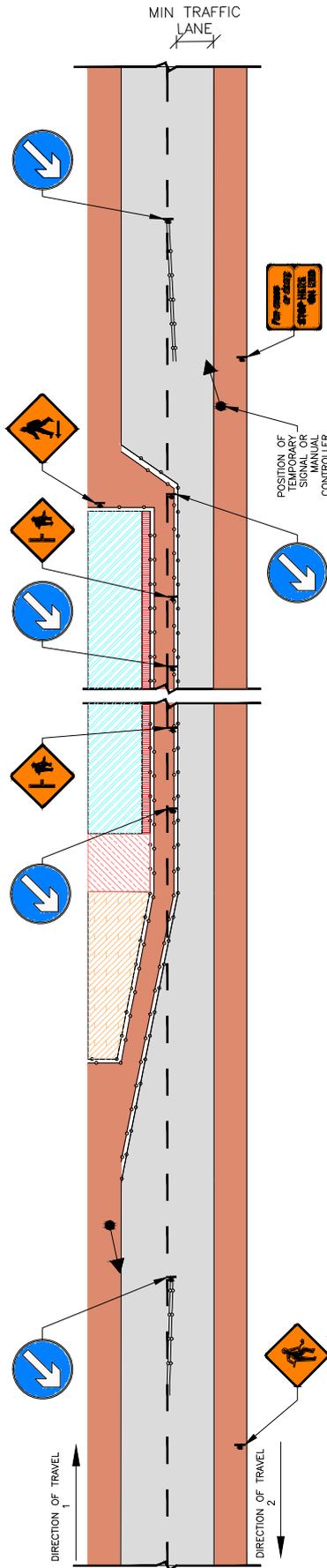
FIGURE 8.8.3.8

EXAMPLE ONLY

MANUAL OR SIGNAL CONTROLLED SHUTTLE SYSTEM  
SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 2  
LEVELS 3 & 4



SINGLE CARRIAGEWAY WITH HARD SHOULDER



SINGLE CARRIAGEWAY WITH FOOTWAY

NOT TO SCALE

NOTES:

1. REFER TO TABLE 8.3.3 FOR DIMENSIONS AND PARAMETERS FOR TYPE A, B, AND C WORKS
2. MIN WIDTH FOR ONE-WAY TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEPH PATHS OF DIFFERENT TYPES OF VEHICLES.
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA
9. 45° TAPER AT END OF WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION

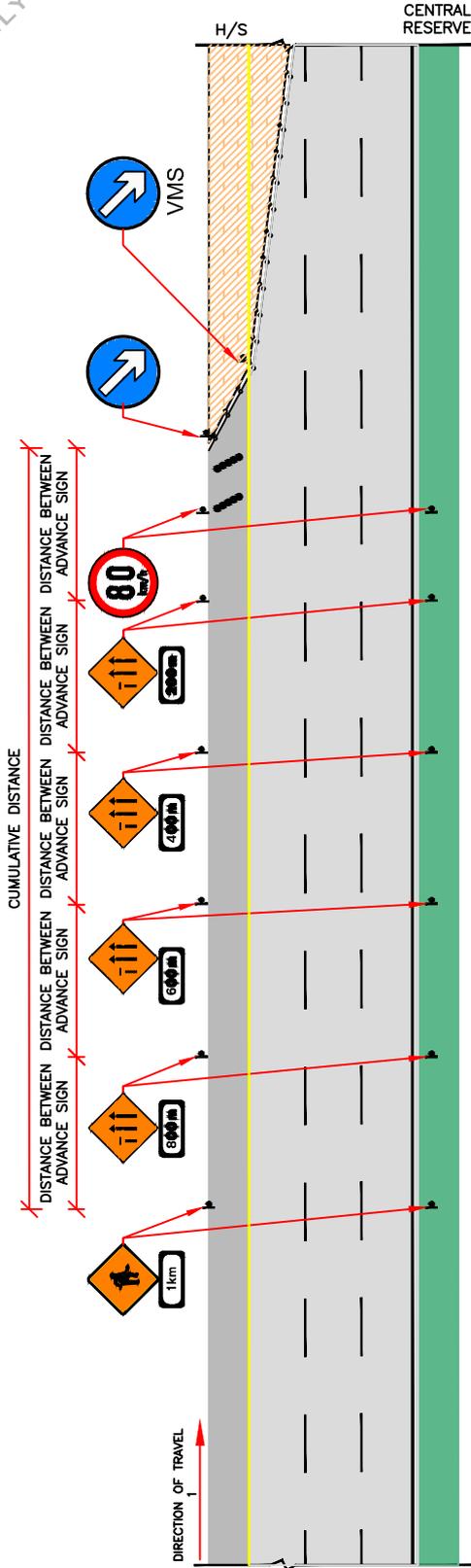
NOT TO BE REUSED

FIGURE 8.8.3.9

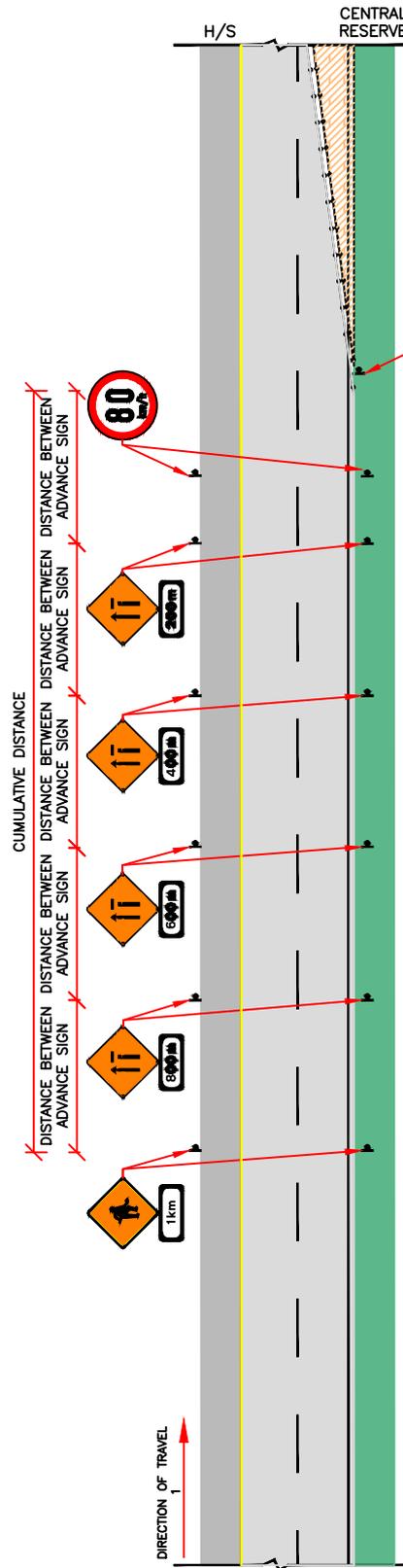
NOT TO SCALE

EXAMPLE ONLY

### ADVANCE SIGNS - DIRECTION OF TRAVEL 1 LEVELS 5 & 6



### DUAL THREE OR MORE LANE CARRIAGEWAY NEAR SIDE LANE CLOSURE



### DUAL TWO LANE CARRIAGEWAY OFF SIDE LANE CLOSURE

- NOTES:
1. REFER TO TABLES 8.3.4 AND 8.3.5 FOR DIMENSIONS FOR TYPE A, B AND C WORKS
  2. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  3. SIGNS SHOULD BE PLACED IN THE VERGE AND CENTRAL RESERVE AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION
  4. ADVANCED SIGNS ON APPROACH ROADS TO BE PLACED AT DISTANCES AS PER FOR THE ROAD CLASSIFICATION
  5. FOR MERGE AND DIVERGE SLIPS REFER TO FIGURE 8.8.4.2
  6. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE STATIC REGULATORY SIGN.
  7. ON DUAL THREE OR FOUR LANE CARRIAGEWAYS THE NEAR SIDE LANE MAY BE CLOSED DIRECTLY BUT ON TWO LANE CARRIAGEWAYS THE OFF SIDE LANE MUST BE CLOSED IN ADVANCE AND THE TRAFFIC CHANNELLED PAST THE WORKS ACCORDINGLY.
  8. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  9. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.

NOT TO SCALE

NOT TO SCALE

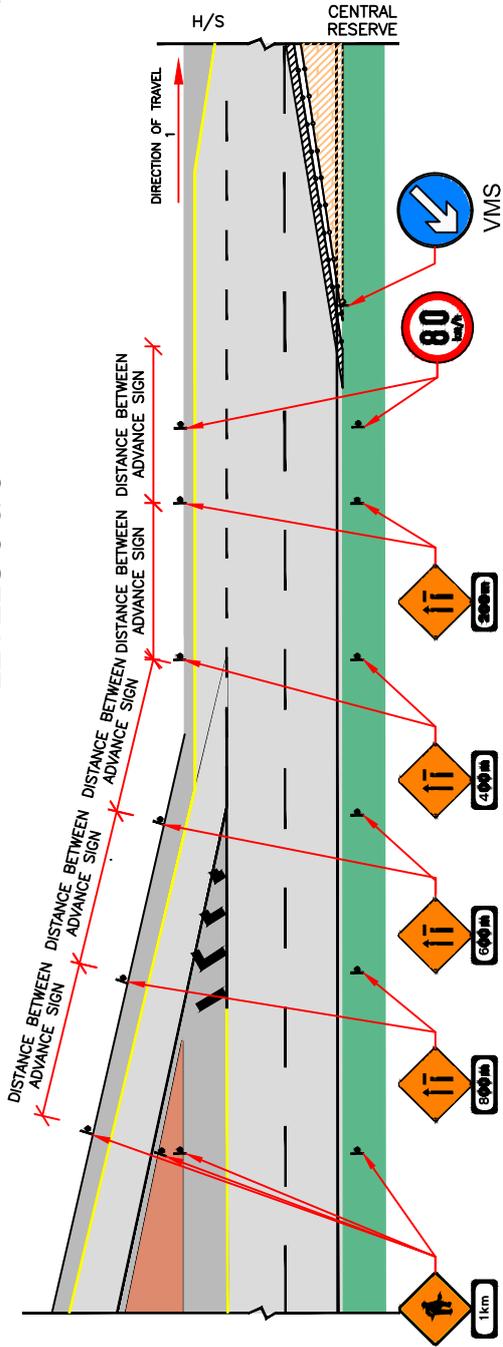
NOT TO BE REUSED

FIGURE 8.8.4.1

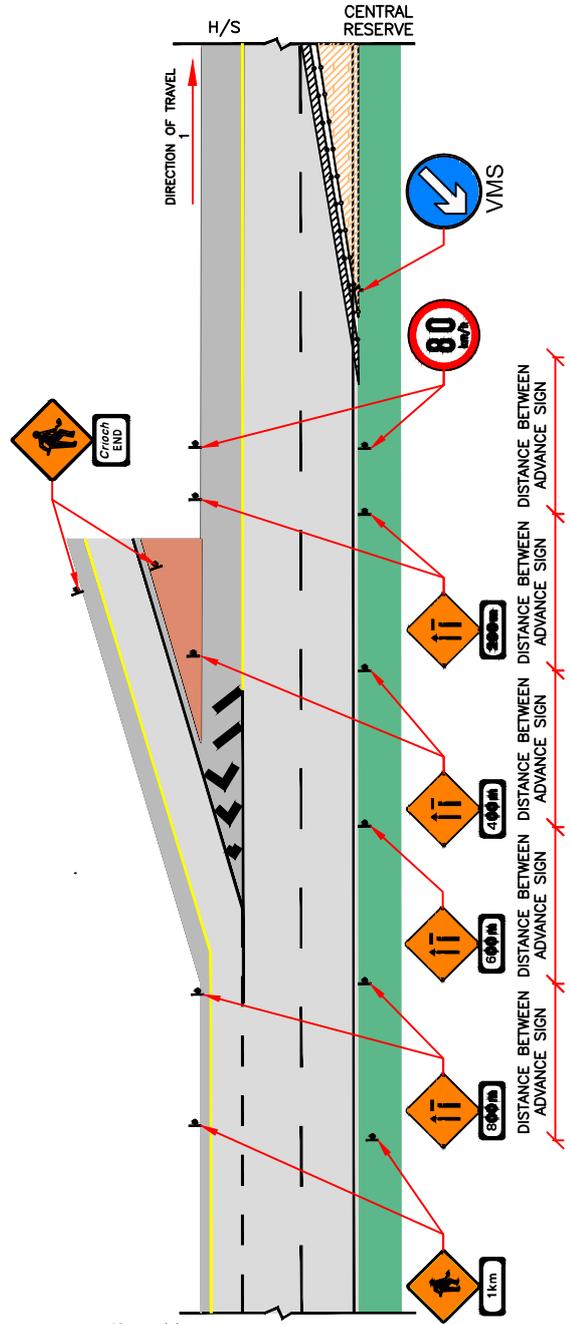
EXAMPLE ONLY

NOT TO SCALE

# ADVANCE SIGNS FOR MERGE AND DIVERGE SLIPS LEVELS 5 & 6



MERGE RAMP LAYOUT



DIVERGE RAMP LAYOUT

- NOTES:
1. REFER TO TABLES 8.3.4 AND 8.3.5 FOR DIMENSIONS FOR TYPE A, B AND C WORKS.
  2. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  3. SIGNS SHOULD BE PLACED IN THE VERGE ON BOTH SIDES OF THE SLIP AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION.
  4. DISTANCE BETWEEN SIGNS AS PER THE DISTANCE SPECIFIED FOR THE MAIN LINE.
  5. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
  6. DEPENDING ON PROXIMITY OF END OF MERGE TO THE TAPER IT MAY BE NECESSARY TO REDUCE THE MAINLINE TO ONE LANE IN ADVANCE OF THE START OF THE MERGE.
  7. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.

NOT TO SCALE

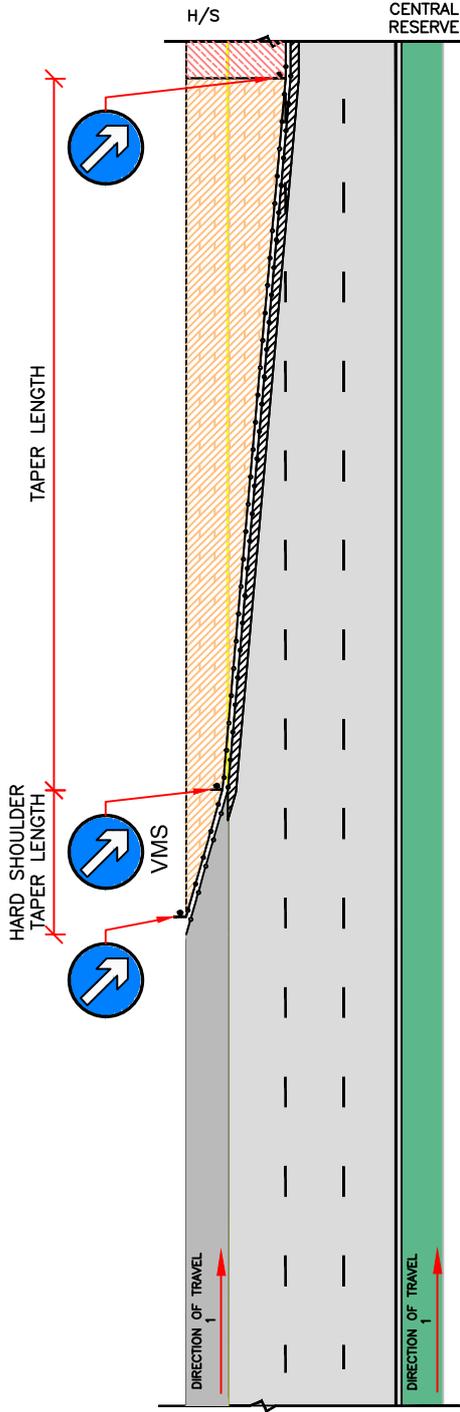
NOT TO BE REUSED

FIGURE 8.8.4.2

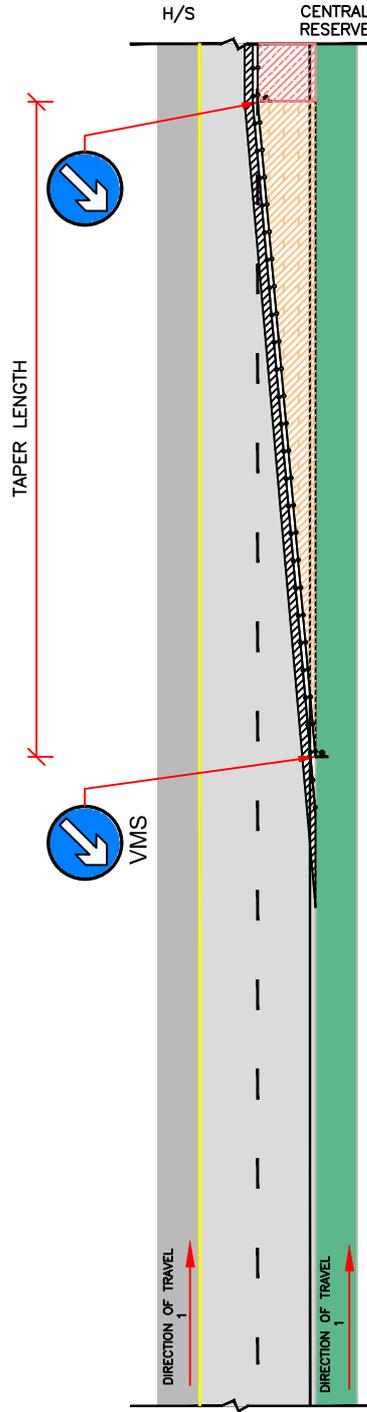
EXAMPLE ONLY

NOT TO SCALE

### TAPER LENGTHS LEVELS 5 & 6



DUAL THREE OR MORE LANE CARRIAGEWAY NEAR SIDE LANE CLOSURE



DUAL TWO LANE CARRIAGEWAY OFF SIDE LANE CLOSURE

**NOTES:**

1. REFER TO TABLES 8.3.4 AND 8.3.5 FOR DIMENSIONS FOR TYPE A, B AND C WORKS.
2. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
3. SIGNS SHOULD BE PLACED IN THE VERGE AND MEDIAN AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION.
4. ADVANCED SIGNS ON APPROACH ROADS TO BE PLACED AT DISTANCES AS PER THE ROAD CLASSIFICATION.
5. FOR MERGE AND DIVERGE SIPS REFER TO FIGURE 8.8.4.2.
6. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED.
7. ON ALL OTHER HIGH SPEED ROADS, THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
8. DIRECT NEAR SIDE CLOSURE IS ONLY PERMITTED ON CARRIAGEWAY WITH THREE OR MORE LANES.
9. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.

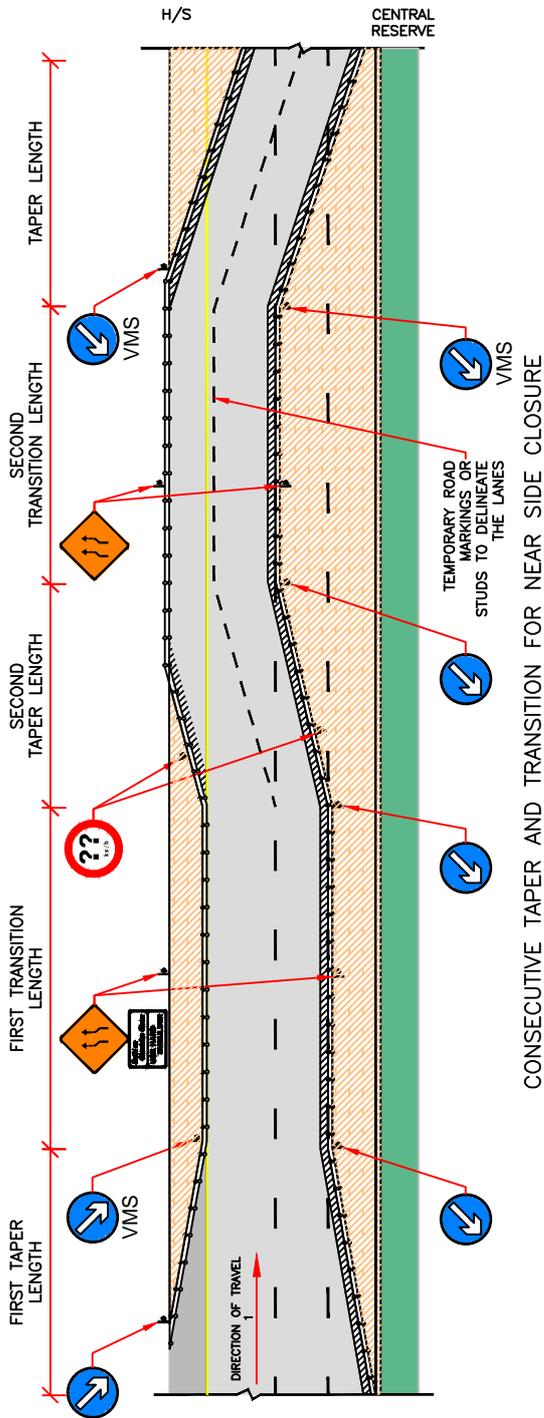
NOT TO SCALE

NOT TO BE REUSED

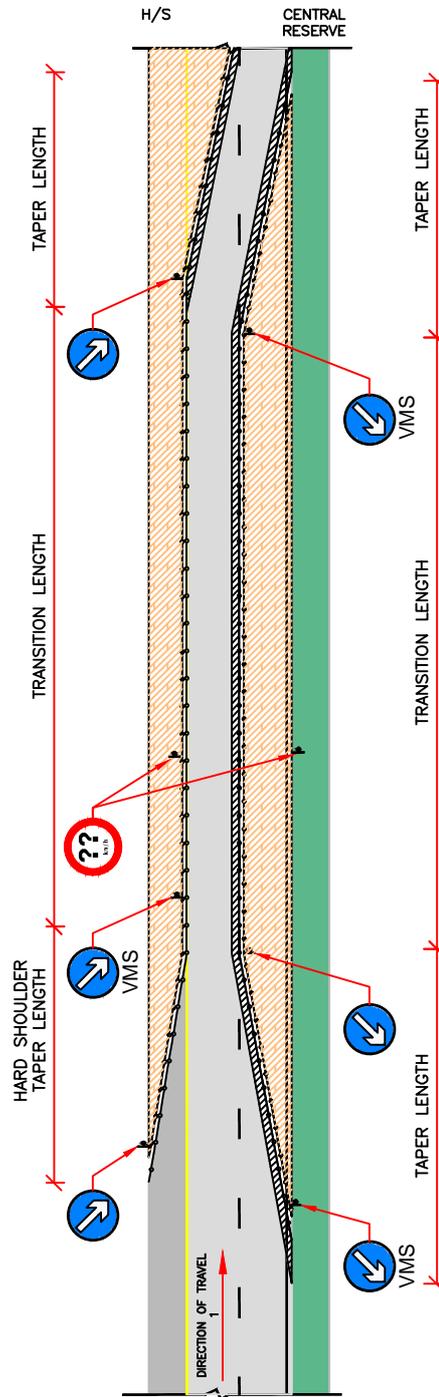
FIGURE 8.8.4.3

EXAMPLE ONLY

# ADVANCE SIGNS FOR CONSECUTIVE TRANSITIONS - DIRECTION OF TRAVEL 1 LEVELS 5 & 6



# CONSECUTIVE TAPER AND TRANSITION FOR NEAR SIDE CLOSURE



# TRANSITION FOR NEAR SIDE LANE CLOSURE

- NOTES:
1. REFER TO TABLES 8.3.4 AND 8.3.5 FOR DIMENSIONS FOR TYPE A, B AND C WORKS
  2. TRANSITION LENGTH IS EQUAL TO TWICE THE TAPER LENGTH APPLIED TO LANE
  3. LANE WIDTHS DETERMINED BY TYPES AND VOLUME OF VEHICLES EXPECTED
  4. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  5. SIGNS SHOULD BE PLACED IN THE VERGE AND CENTRAL RESERVE SO AS NOT TO CAUSE AN OBSTRUCTION
  6. TEMPORARY ROAD MARKINGS OR STUDS SHALL BE USED TO DIFFERENTIATE BETWEEN THE TEMPORARY LANES AND CHANNEL THE TRAFFIC EFFICIENTLY.
  7. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.
  8. THE USE OF VMS SIGNS AT THE CHANGE IN DIRECTION OF TRAFFIC IS A REQUIREMENT FOR LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
  9. AN INDICATIVE LOCATION FOR A REPEATER STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.

NOT TO SCALE

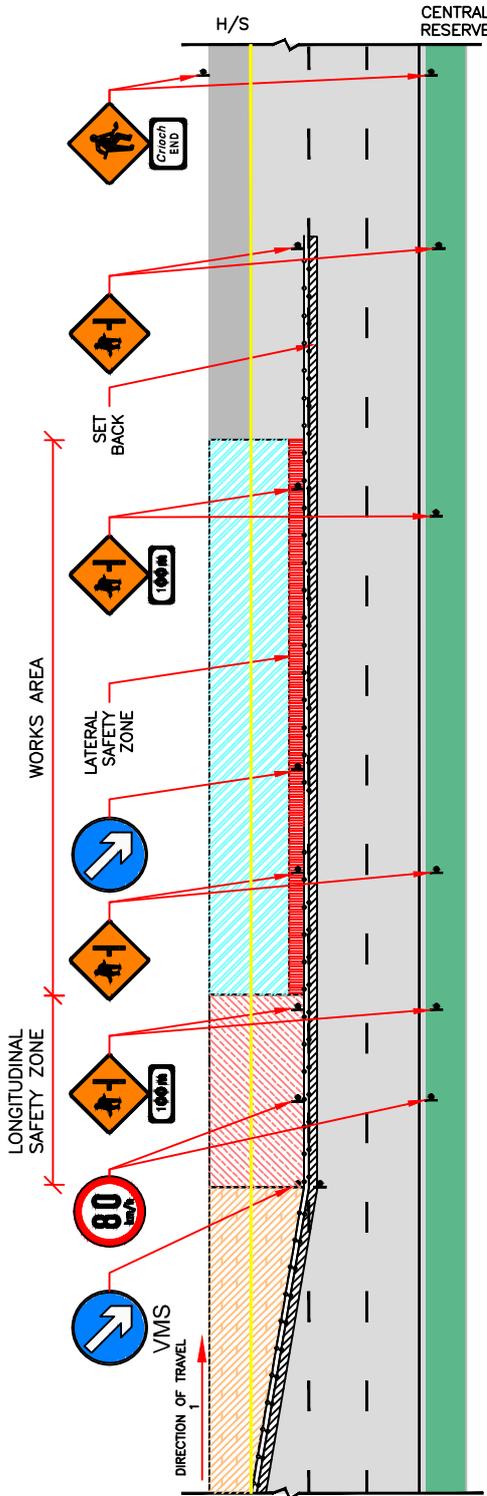
NOT TO SCALE

NOT TO BE REUSED

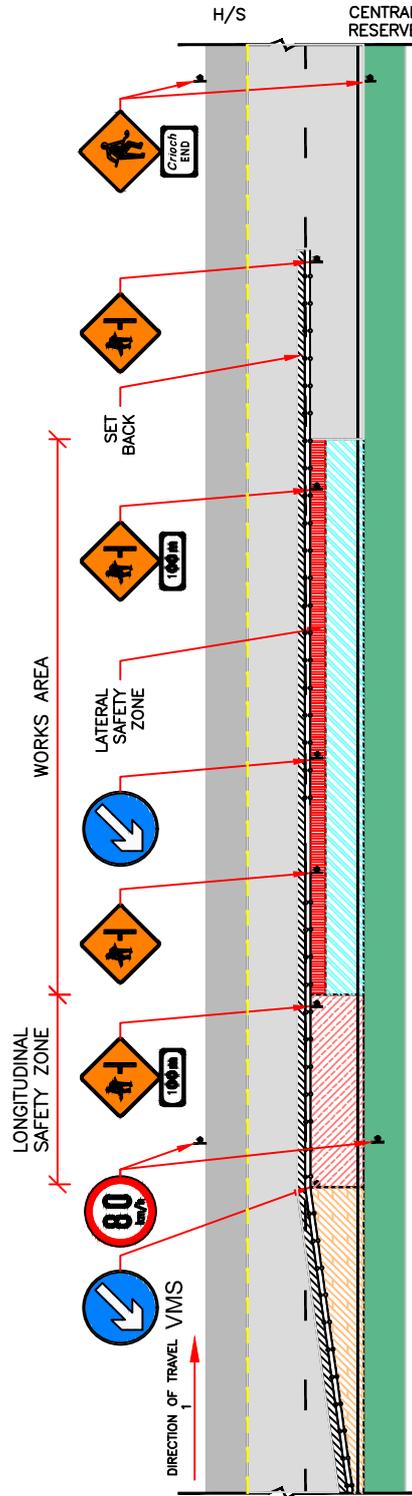
FIGURE 8.8.4.4

EXAMPLE ONLY

# SIGNS FOR WORK SITE AREA - DIRECTION OF TRAVEL 1 LEVELS 5 & 6



## NEAR SIDE WORKS AREA ON A THREE LANE CARRIAGEWAY



## OFF SIDE WORKS AREA

- NOTES:
1. REFER TO TABLES 8.3.4 AND 8.3.5 FOR DIMENSIONS FOR TYPE A, B AND C WORKS.
  2. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  3. SIGNS SHOULD BE PLACED IN THE VERGE AND CENTRAL RESERVE AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION.
  4. ADVANCED SIGNS ON APPROACH ROADS WITHIN THE WORKS AREA TO BE PLACED AT DISTANCES AS PER THE ROAD CLASSIFICATION.
  5. FOR MERGE AND DIVERGE SLIPS REFER TO FIGURE 8.8.4.2.
  6. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
  7. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.
  8. AN INDICATIVE LOCATION FOR A REPEATER STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.

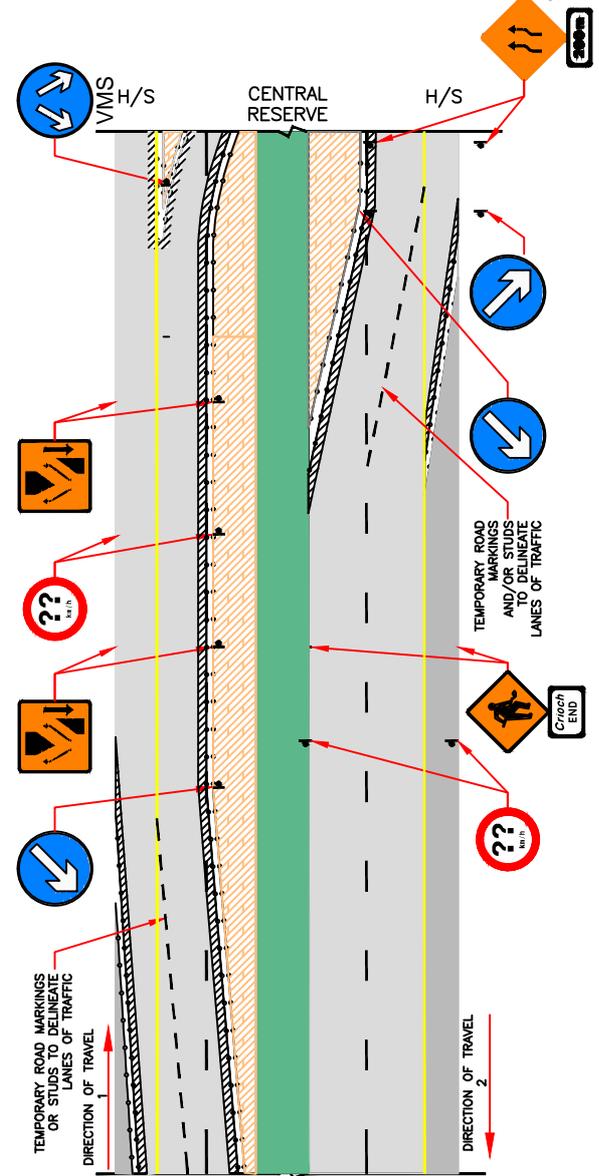
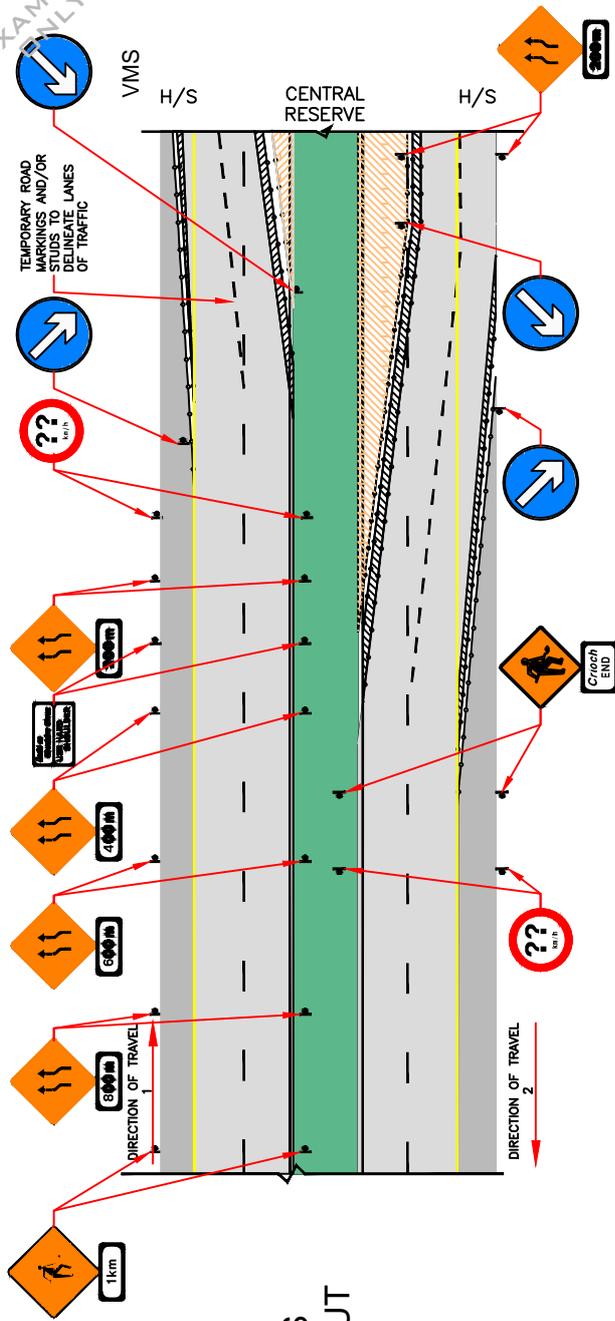
NOT TO BE REUSED

NOT TO SCALE

FIGURE 8.8.4.5

EXAMPLE ONLY

NOT TO SCALE



### ADVANCE / END SIGNS FOR CROSSOVER LAYOUT LEVELS 5 & 6

- NOTES:
- REFER TO TABLE 8.3.5 AND 8.3.6 FOR DIMENSIONS.
  - REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  - SIGNS SHOULD BE PLACED IN THE VERGE AND CENTRAL RESERVE AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION.
  - WARNING OR REGULATORY SIGNS WITHIN THE TAPER AND WORKS AREAS TO BE POSITIONED 50 TO 100M APART TO ENSURE VISIBILITY.
  - ADVANCED SIGNS ON APPROACH ROADS TO BE PLACED AT DISTANCES AS PER THE ROAD CLASSIFICATION.
  - FOR MERGE AND DIVERGE SLIPS REFER TO FIGURE 8.8.4.2.
  - THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
  - OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF ROADWORKS SPEED LIMIT.
  - THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.
  - AN INDICATIVE LOCATION FOR A REPEATER STATUTORY ROADWORKS SPEED LIMIT S SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  - OPERATING SPEED LIMIT TO BE PROVIDED BEYOND THE END OF ROADWORKS' SIGN.

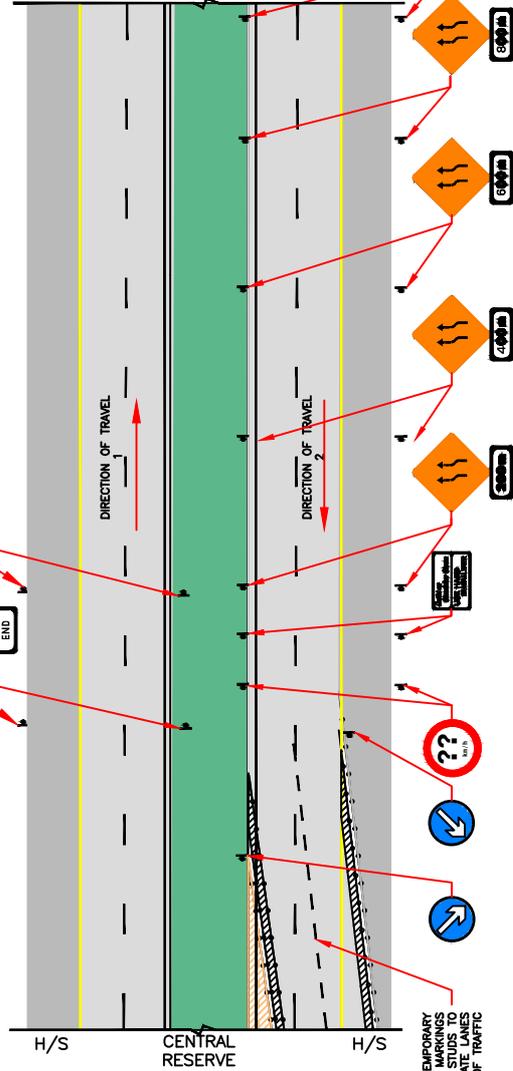
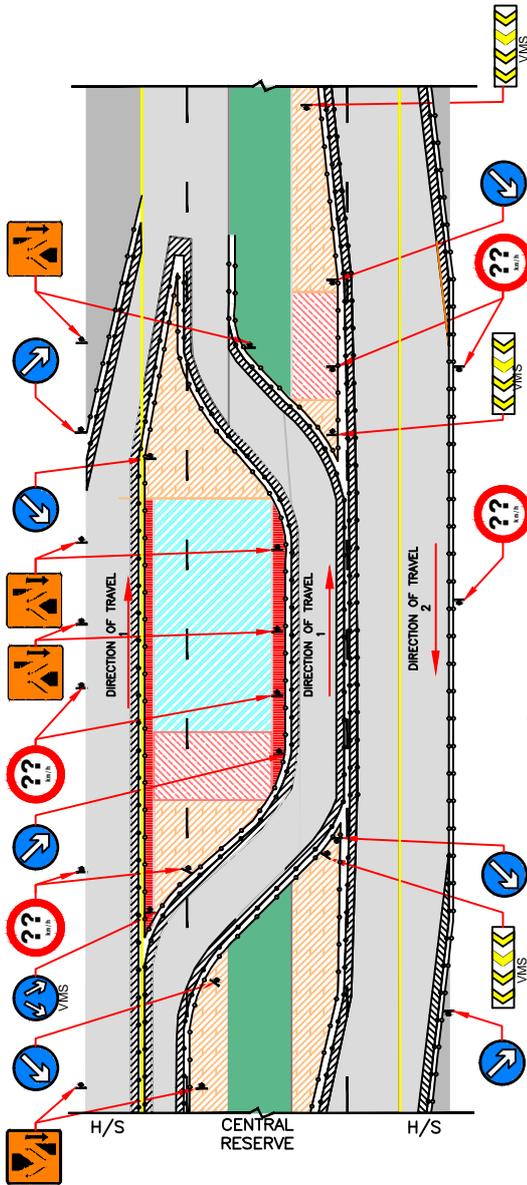
FIGURE 8.8.4.6

NOT TO SCALE

NOT TO BE REPRODUCED

EXAMPLE ONLY

# LAYOUT FOR SINGLE LANE CONTRA-FLOW CROSSOVER LEVELS 5 & 6



TEMPORARY ROADWORKS OR STUDS TO DELINEATE LANES OF TRAFFIC

- NOTES:
1. REFER TO TABLE 8.3.4 AND 8.3.4 FOR DIMENSIONS.
  2. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  3. SIGNS SHOULD BE PLACED IN THE VERGE AND CENTRAL RESERVE AND POSITIONED SO AS NOT TO CAUSE AN OBSTRUCTION.
  4. ADVANCED SIGNS TO BE PLACED ON MERGE SLIPS IF WITHIN 1KM OF WORKS.
  5. FOR TYPICAL MERGE AND DIVERGE SLIPS REFER TO FIGURE 8.4.2.
  6. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS A REQUIREMENT ON LEVEL 6 ROADS AND IS RECOMMENDED ON ALL OTHER HIGH SPEED ROADS. THE VMS MUST BE ACCOMPANIED BY THE SAME STATIC REGULATORY SIGN.
  7. SITE ENTRANCES/EXITS TO BE POSITIONED WITH CLEAR VISIBILITY FOR BOTH THE MAINLINE TRAFFIC AND THE EXITING SITE VEHICLES AND HAVE APPROPRIATE SIGNING.
  8. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.
  9. THE SET BACK SHALL BE DEFINED USING A SOLID WHITE LINE OR A LINE OF CLOSELY SPACED TEMPORARY ROAD STUDS.
  10. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT AND REPEATERS IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  11. OPERATING SPEED LIMIT TO BE PROVIDED BEYOND THE END OF ROADWORKS' SIGN.

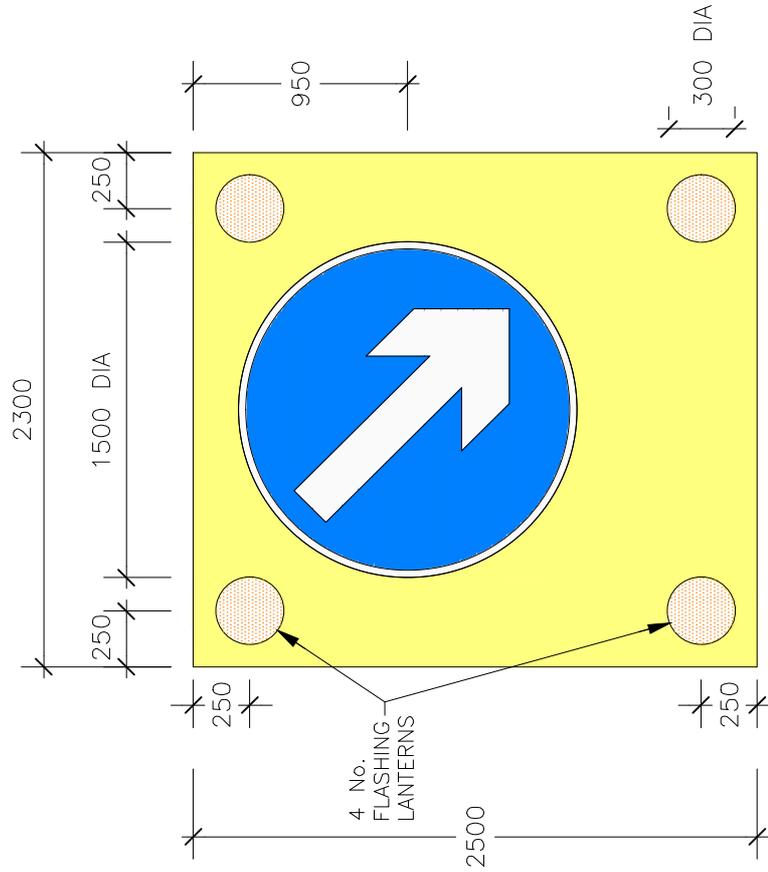
NOT TO BE REUSED

NOT TO BE REUSED

FIGURE 8.8.4.7

EXAMPLE  
ONLY

MANDATORY SIGN FOR USE AT MOBILE LANE  
CLOSURES



KEEP RIGHT ARROW FOR USE AT MOBILE  
OPERATIONS

NOT TO  
SCALE

- Notes :-
1. Sign to be RUS 001/ RUS 002 in accordance with the Road Traffic (Signs) Regulations.
  2. Colours:  
Backing Board ..... Yellow (ISEN 12899)  
Flashing Lanterns ..... Amber (Signal Yellow)

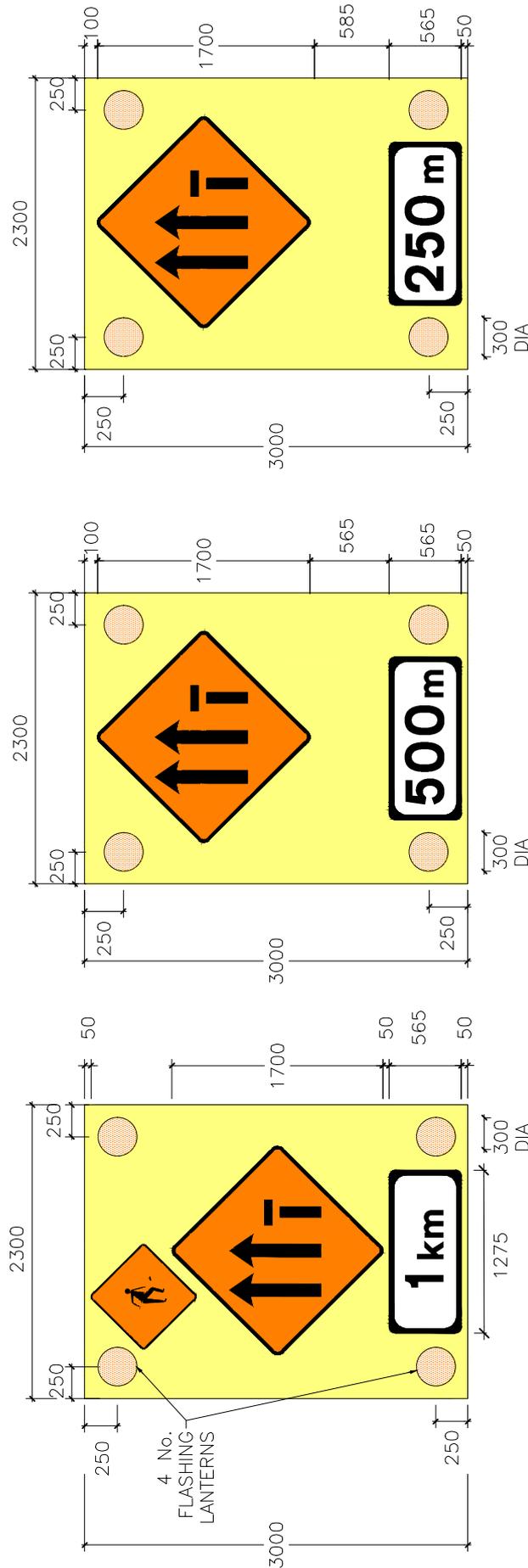
NOT TO  
SCALE

NOT TO BE  
REUSED

FIGURE 8.8.5.1

EXAMPLE  
ONLY

ROAD WORKS AND LANE CLOSURE SIGNS FOR  
USE AT MOBILE LANE CLOSURES



NOT TO  
SCALE

NOT TO BE  
REUSED

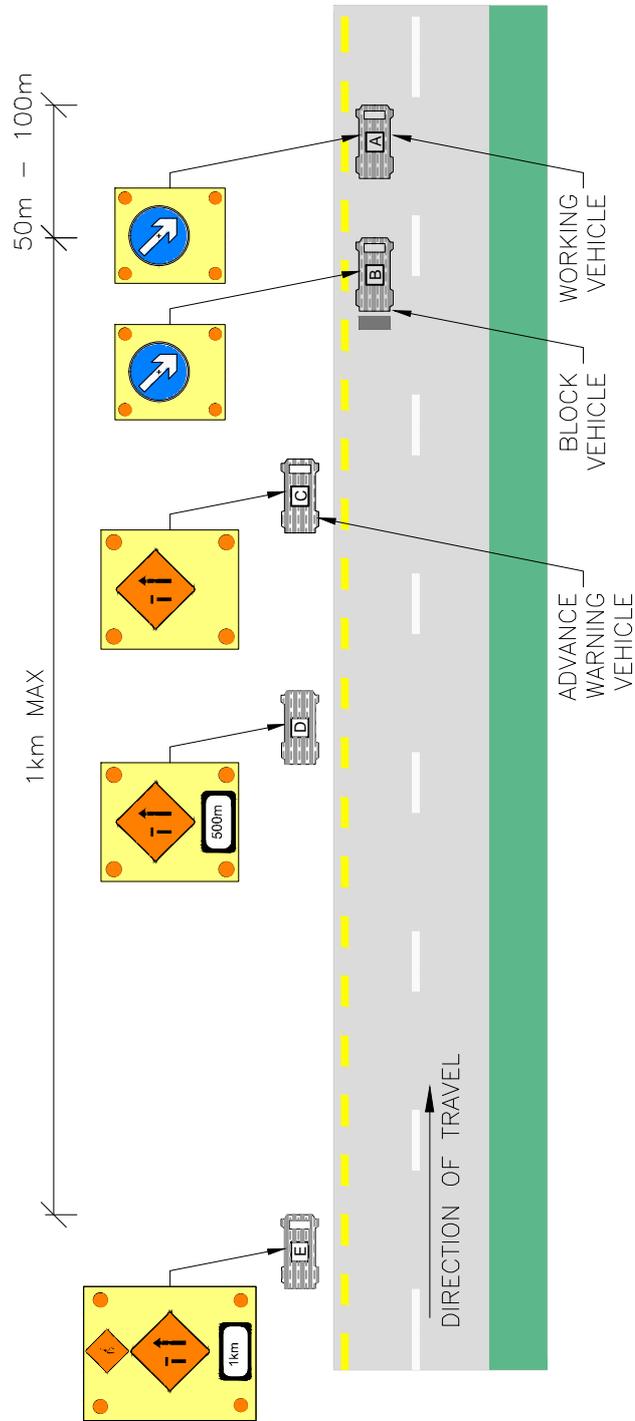
- Notes :-
1. Sign sizes:  
Roadworks ahead 600mm side  
Lane closure 1200mm side  
Supplementary plate 1275mm x 565mm
  2. For Details of individual signs and text, see the Traffic Signs Manual. For text, the 'x' height is 150mm.
  3. Colours:  
Backing Board ..... Yellow (ISEN 12899)  
Flashing Lanterns ..... Amber (Signal Yellow)
  4. Refer to working drawings for rectangular alternative sign permitted for use at mobile lane closures only.

FIGURE 8.8.5.2

EXAMPLE ONLY

NOT TO SCALE

LAYOUT A: CASE 1  
LAYOUT FOR LEFT LANE CLOSURE  
DUAL 2 LANE ROAD WITHOUT HARD SHOULDER



- NOTES:
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE

NOT TO SCALE

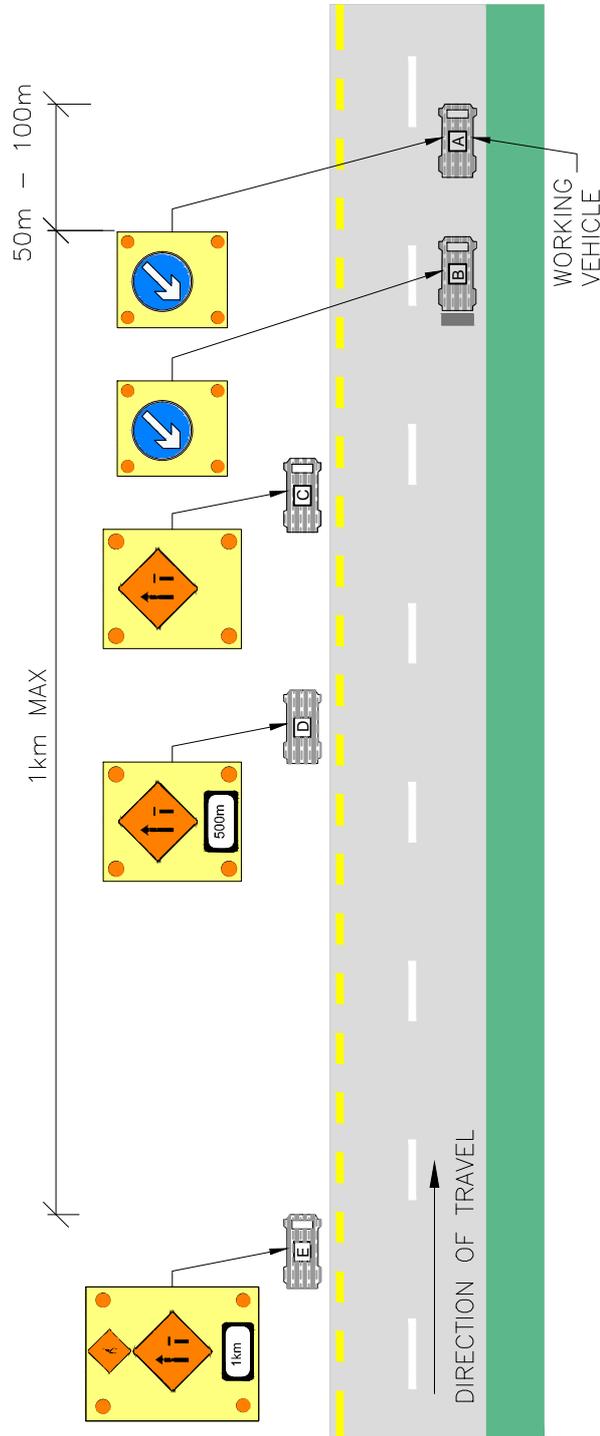
NOT TO BE REUSED

FIGURE 8.8.5.3

EXAMPLE ONLY

NOT TO SCALE

LAYOUT A: CASE 2  
LAYOUT FOR RIGHT LANE CLOSURE  
DUAL 2 LANE ROAD WITHOUT HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE

NOT TO BE REUSED

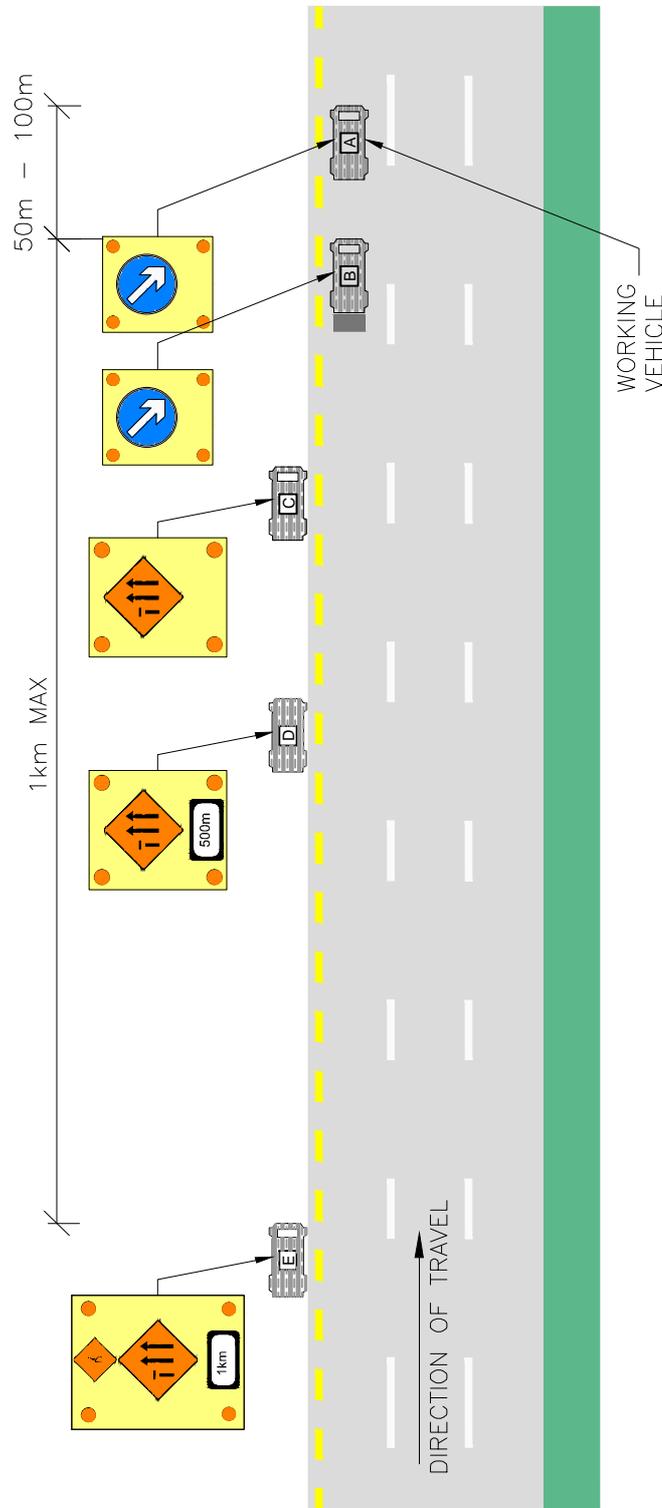
FIGURE 8.8.5.4

NOT TO SCALE

EXAMPLE ONLY

NOT TO SCALE

LAYOUT A: CASE 3  
LAYOUT FOR LEFT LANE CLOSURE  
DUAL 3 LANE ROAD WITHOUT HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE.

NOT TO SCALE

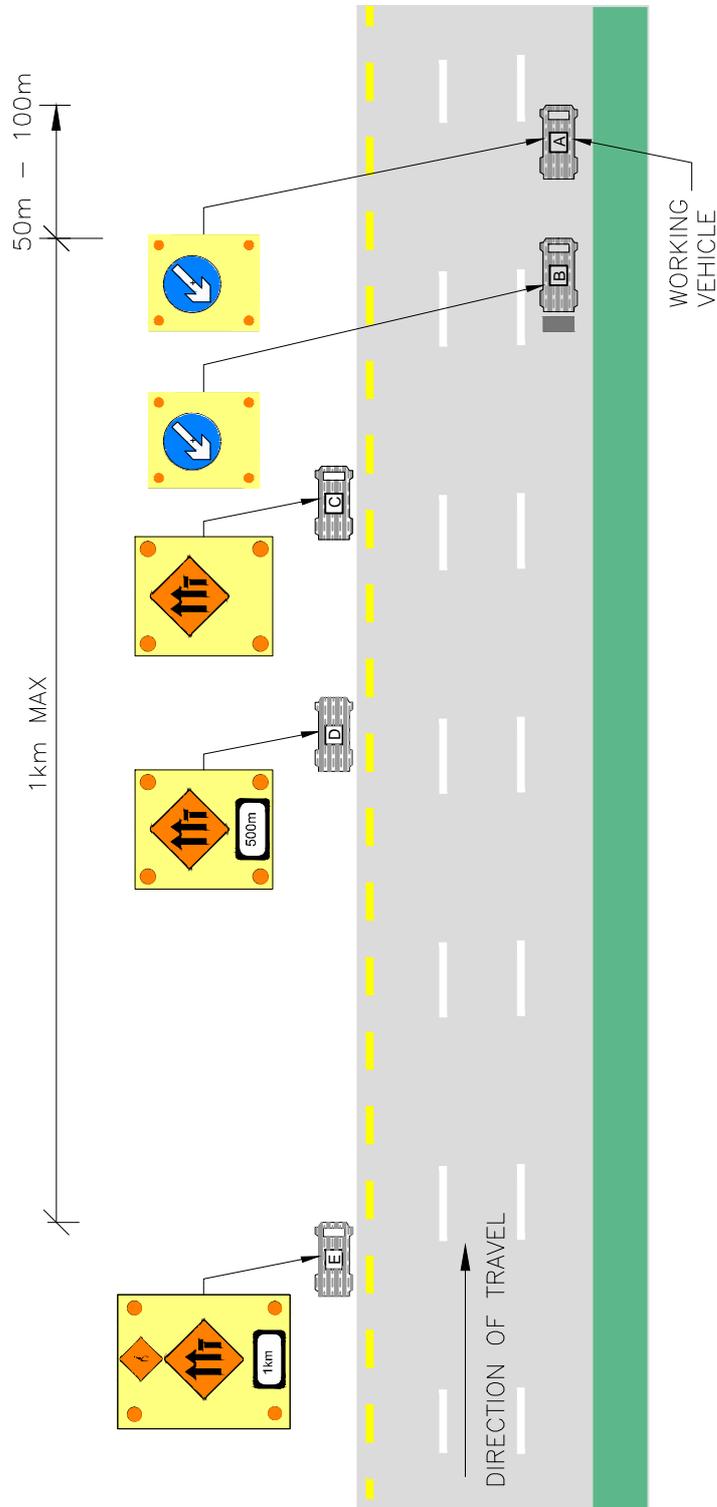
NOT TO BE REUSED

FIGURE 8.8.5.5

EXAMPLE ONLY

NOT TO SCALE

LAYOUT A: CASE 4  
LAYOUT FOR RIGHT LANE CLOSURE  
DUAL 3 LANE ROAD WITHOUT HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE.

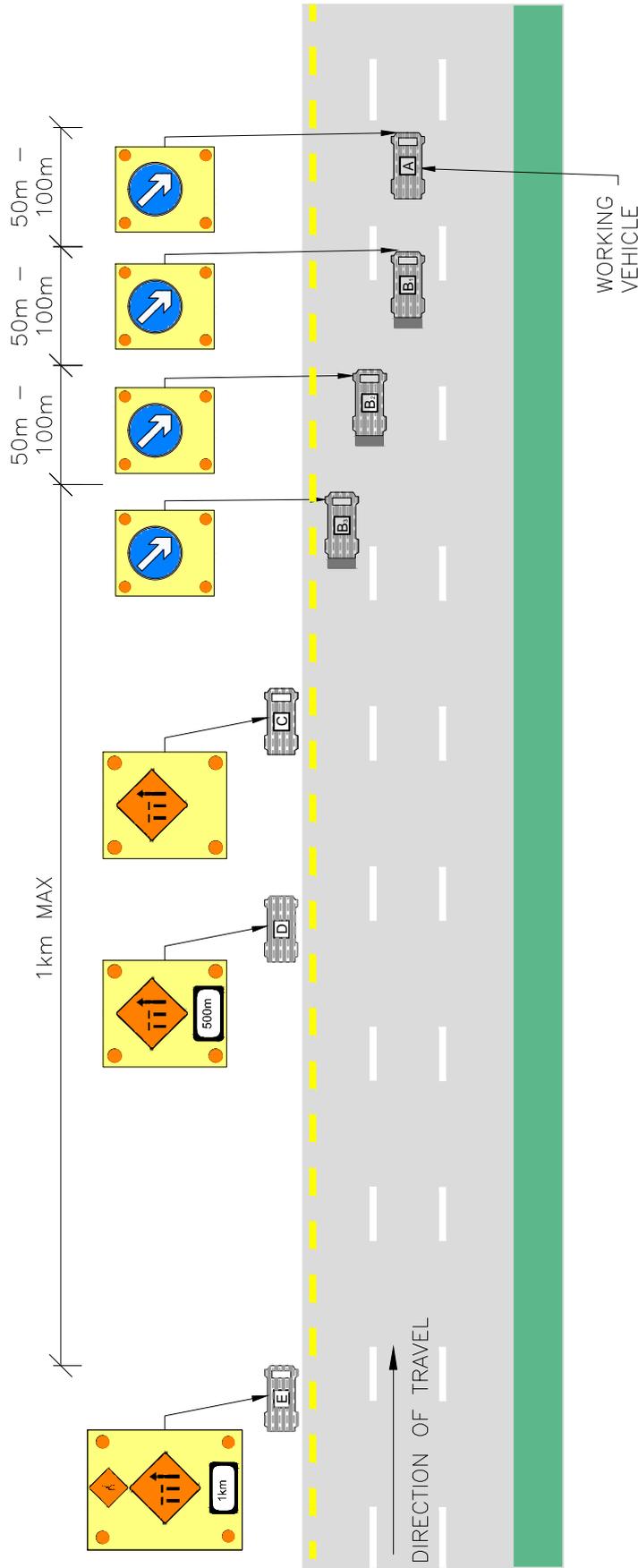
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.6

EXAMPLE ONLY

LAYOUT A: CASE 5  
LAYOUT FOR CENTRE AND LEFT LANE CLOSURE  
DUAL 3 LANE ROAD WITHOUT HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE.

NOT TO SCALE

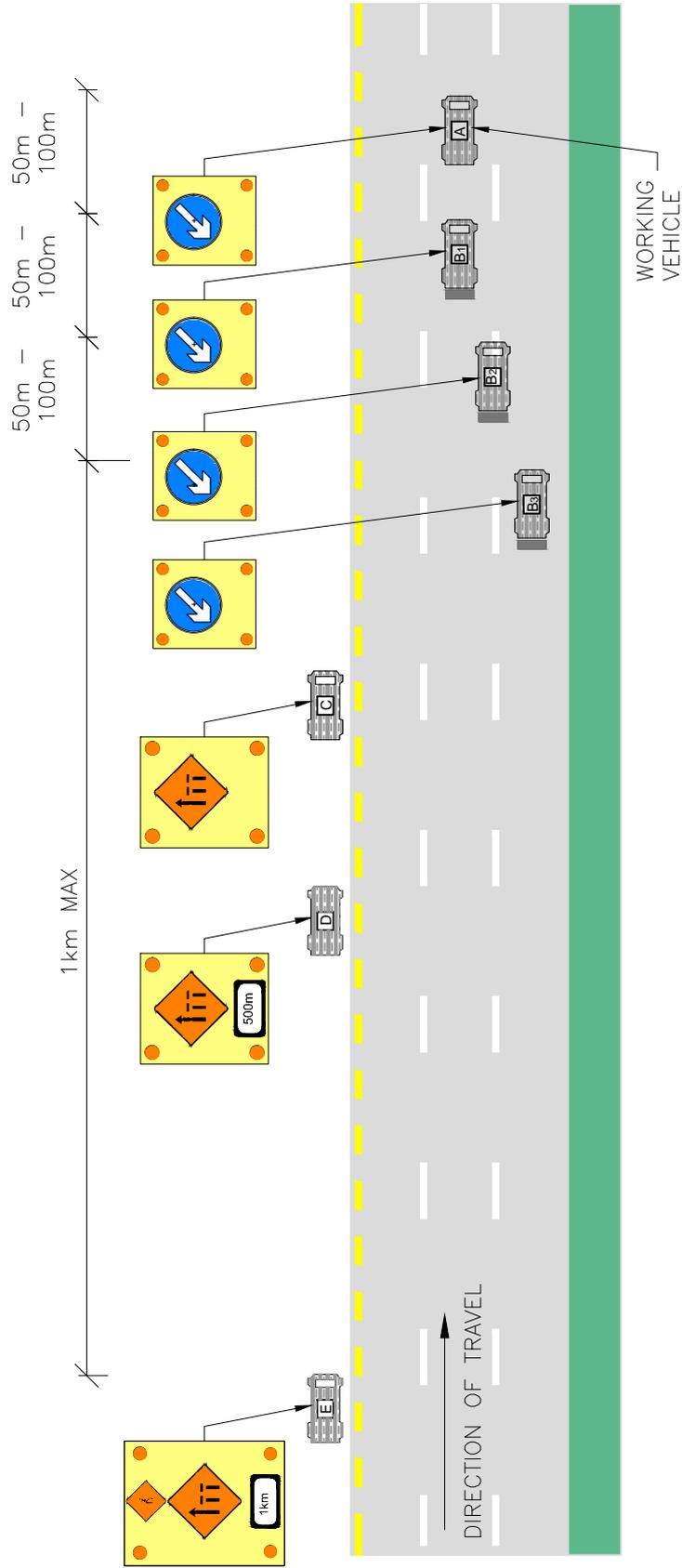
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.7

EXAMPLE ONLY

LAYOUT A: CASE 6  
LAYOUT FOR CENTRE AND RIGHT LANE CLOSURE  
DUAL 3 LANE ROAD WITHOUT HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPH 8.5.6.17.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE VERGE.

NOT TO SCALE

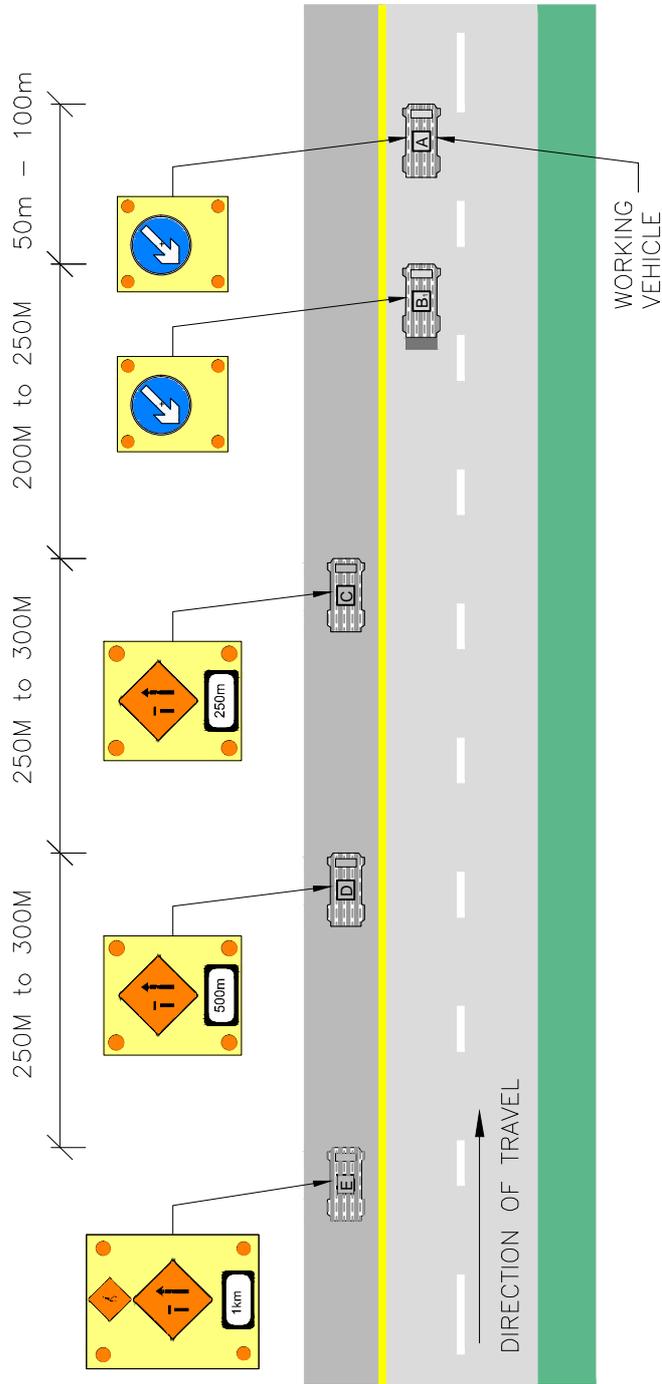
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.8

EXAMPLE ONLY

LAYOUT B: CASE 1  
LAYOUT FOR LEFT LANE CLOSURE  
DUAL 2 LANE MOTORWAY AND ALL PURPOSE ROAD WITH  
HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER.

NOT TO SCALE

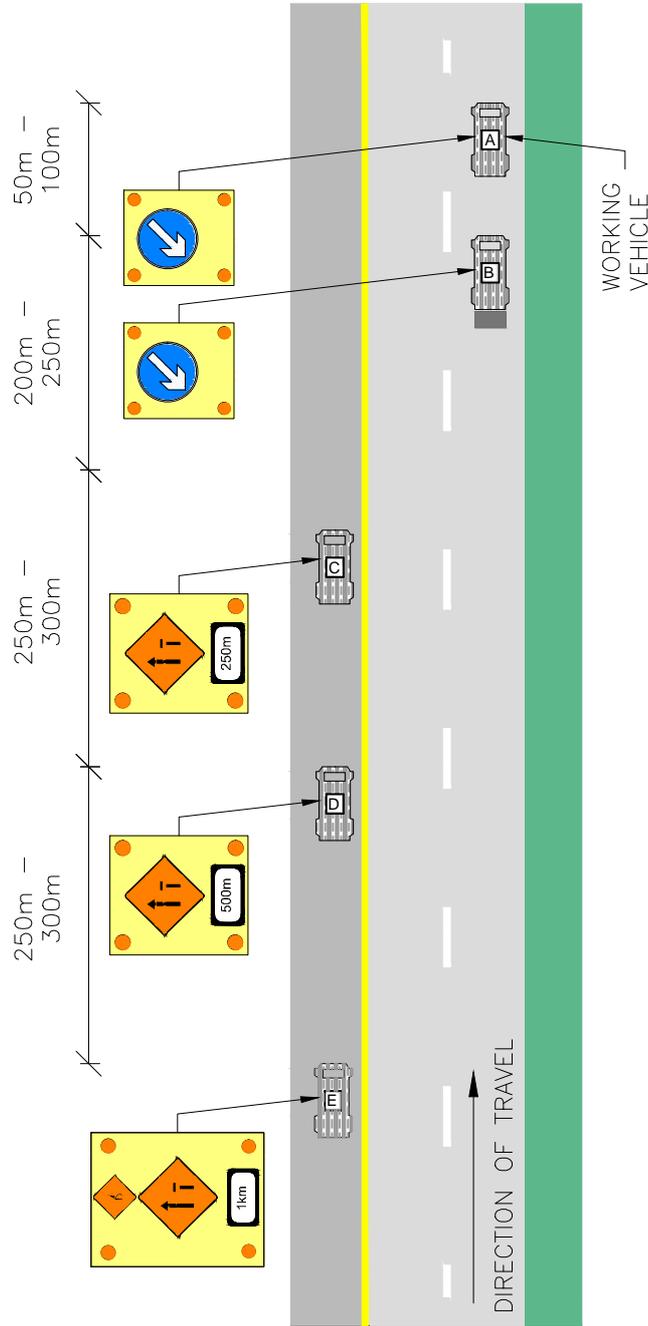
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.9

EXAMPLE ONLY

LAYOUT B: CASE 2  
LAYOUT FOR RIGHT LANE CLOSURE  
DUAL 2 LANE MOTORWAY AND ALL PURPOSE ROAD  
WITH HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER.

NOT TO SCALE

NOT TO SCALE

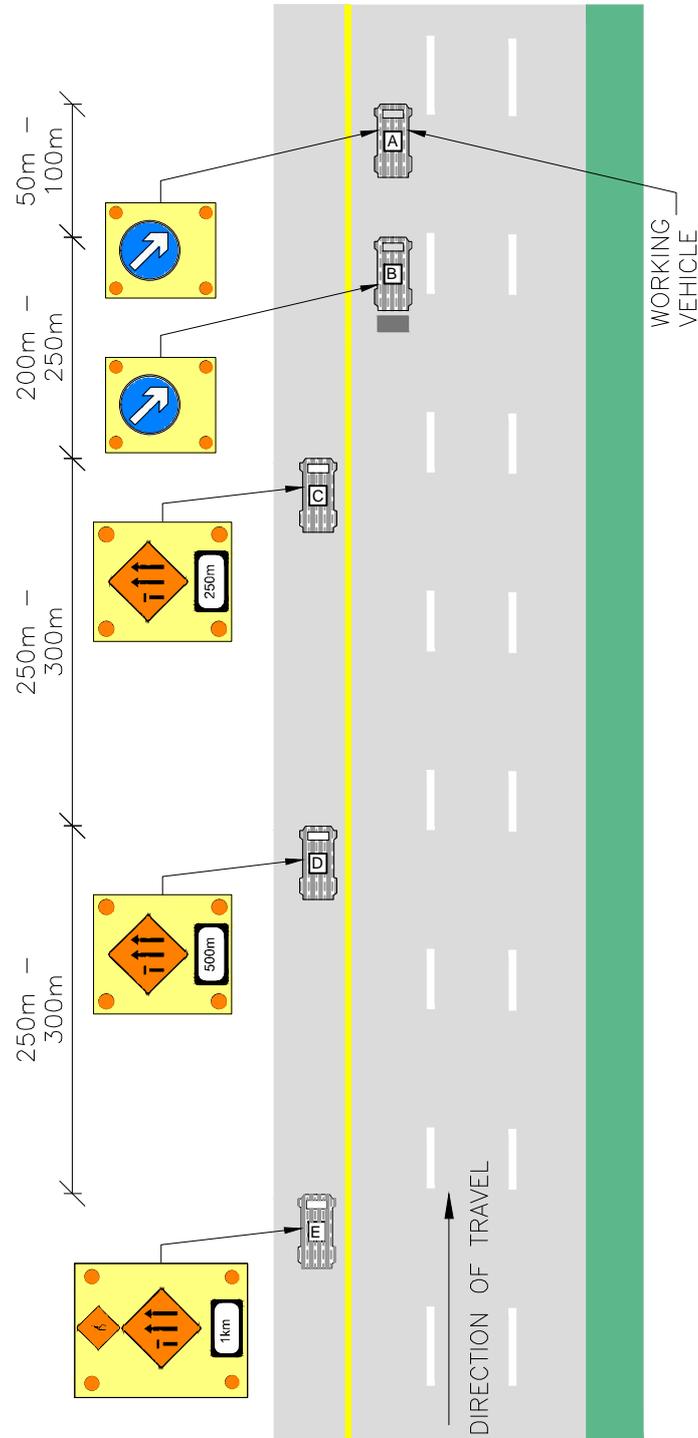
NOT TO BE REUSED

FIGURE 8.8.5.10

EXAMPLE ONLY

NOT TO SCALE

LAYOUT B: CASE 3  
LAYOUT FOR LEFT LANE CLOSURE  
DUAL 3 LANE MOTORWAY AND ALL PURPOSE ROAD  
WITH HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER.

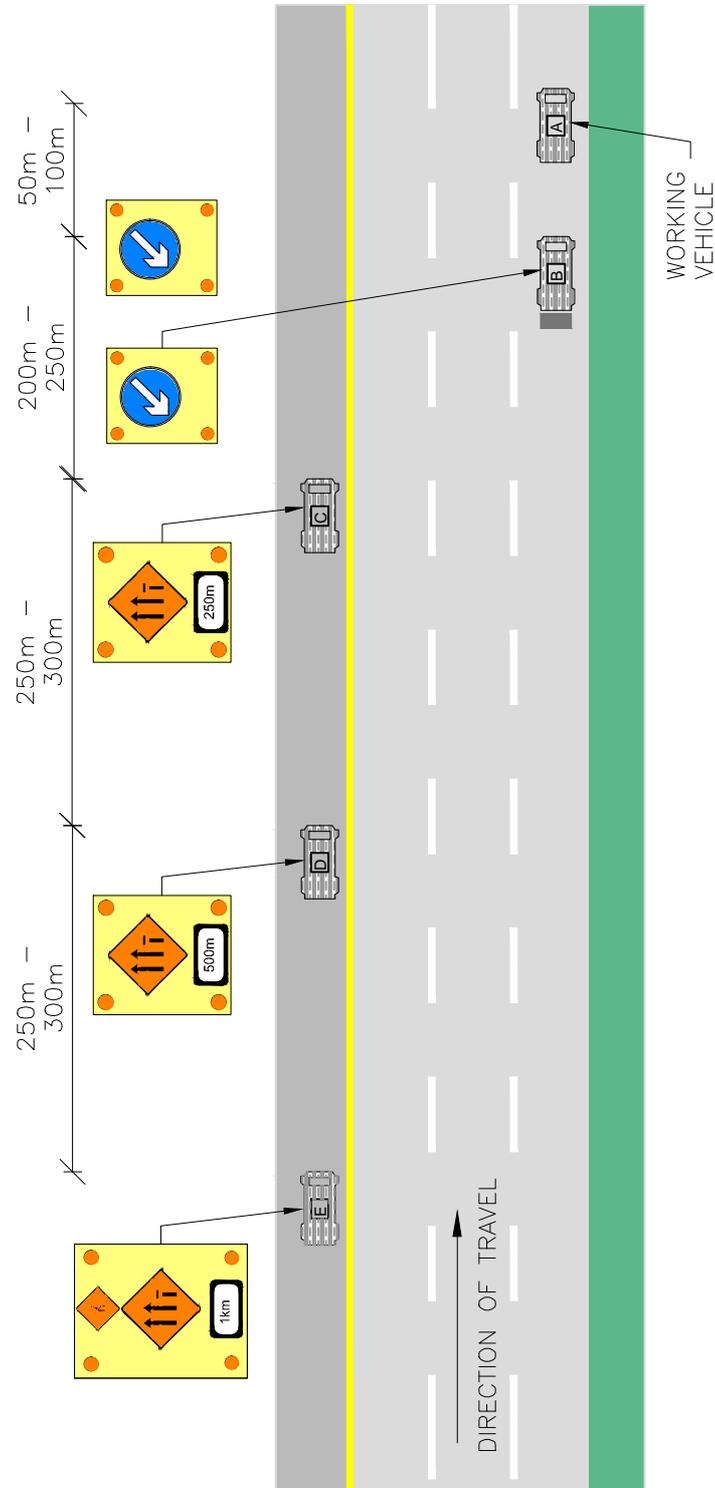
NOT TO BE REUSED

FIGURE 8.8.5.11

EXAMPLE ONLY

NOT TO SCALE

LAYOUT B: CASE 4  
LAYOUT FOR RIGHT LANE CLOSURE  
DUAL 3 LANE MOTORWAY AND ALL PURPOSE ROAD  
WITH HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER

NOT TO SCALE

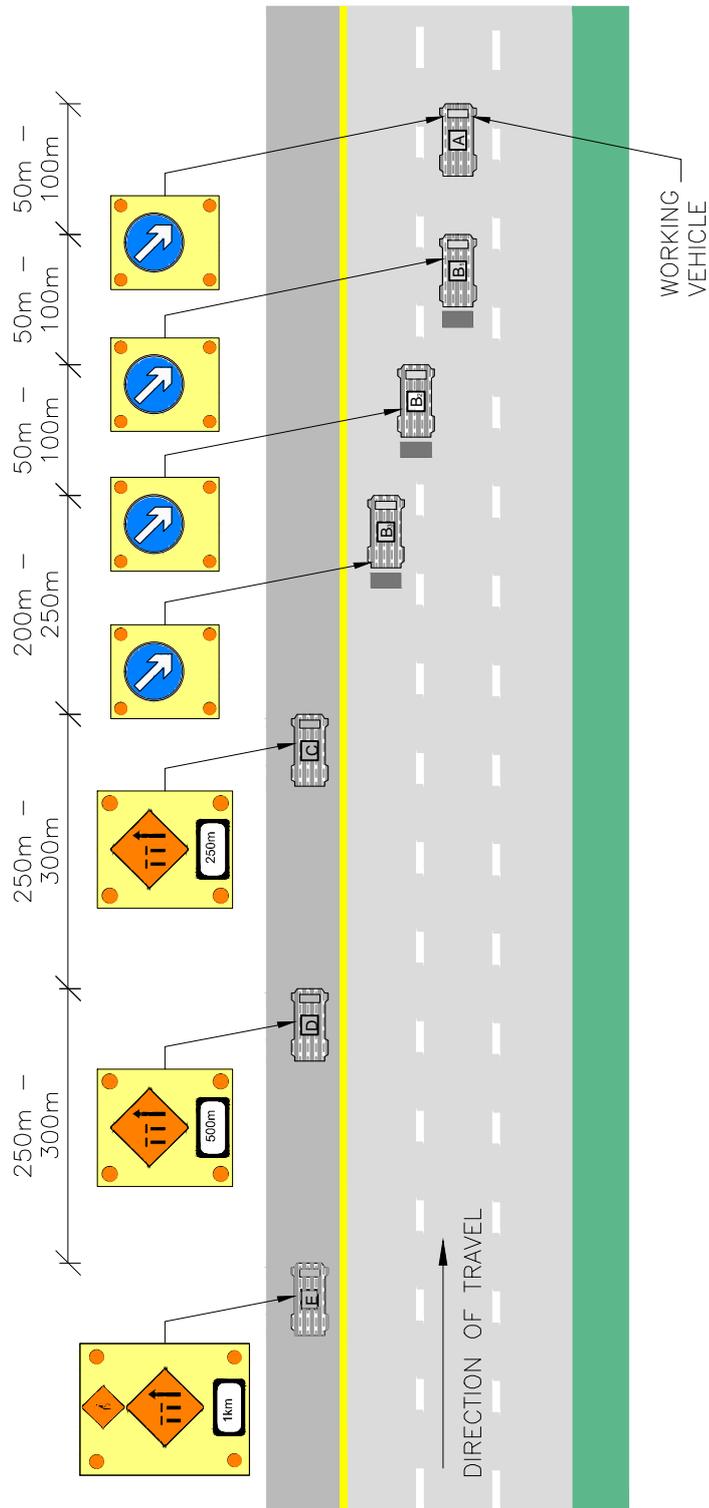
NOT TO BE REUSED

FIGURE 8.8.5.12

EXAMPLE ONLY

NOT TO SCALE

LAYOUT B: CASE 5  
LAYOUT FOR LEFT AND CENTRE LANE CLOSURE  
DUAL 3 LANE MOTORWAY AND ALL PURPOSE ROAD  
WITH HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER

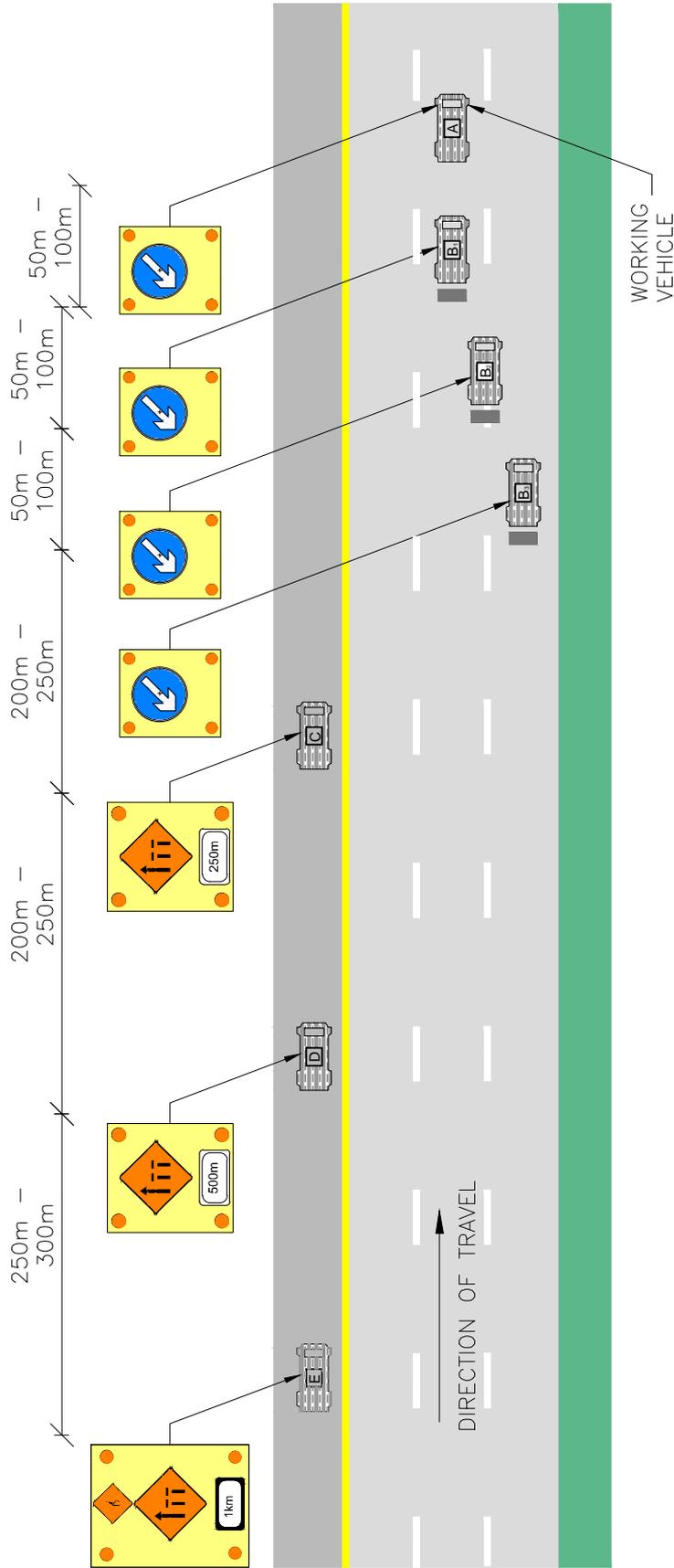
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.13

EXAMPLE ONLY

LAYOUT B: CASE 6  
LAYOUT FOR RIGHT AND CENTRE LANE CLOSURE  
DUAL 3 LANE MOTORWAY AND ALL PURPOSE ROAD  
WITH HARD SHOULDER



- NOTES
1. VEHICLE D SHOULD ALWAYS BE USED UNLESS THERE ARE VERY SOUND REASONS NOT TO DO SO.
  2. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  3. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER

NOT TO SCALE

NOT TO SCALE

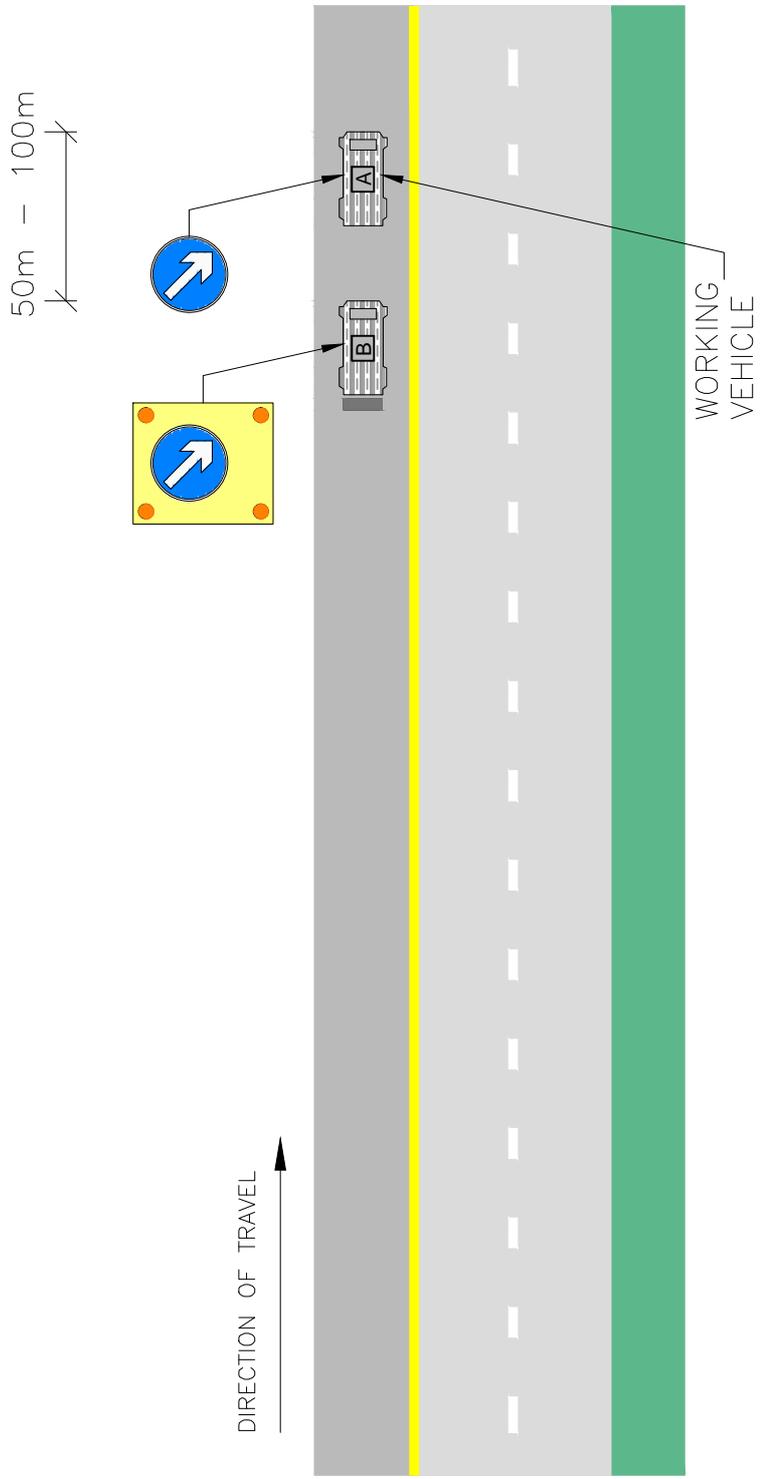
NOT TO BE REUSED

FIGURE 8.8.5.14

EXAMPLE ONLY

NOT TO SCALE

LAYOUT C  
LAYOUT FOR HARD SHOULDER CLOSURE  
DUAL CARRIAGEWAY OR MOTORWAY



- NOTES
1. DETAILS OF THE ADDITIONAL SIGNING REQUIRED ON AN ENTRY SLIP ROAD ARE GIVEN IN PARAGRAPHS 8.5.6.18 TO 8.5.6.22.
  2. ADVANCE WARNING VEHICLES SHALL BE POSITIONED IN THE HARD SHOULDER.

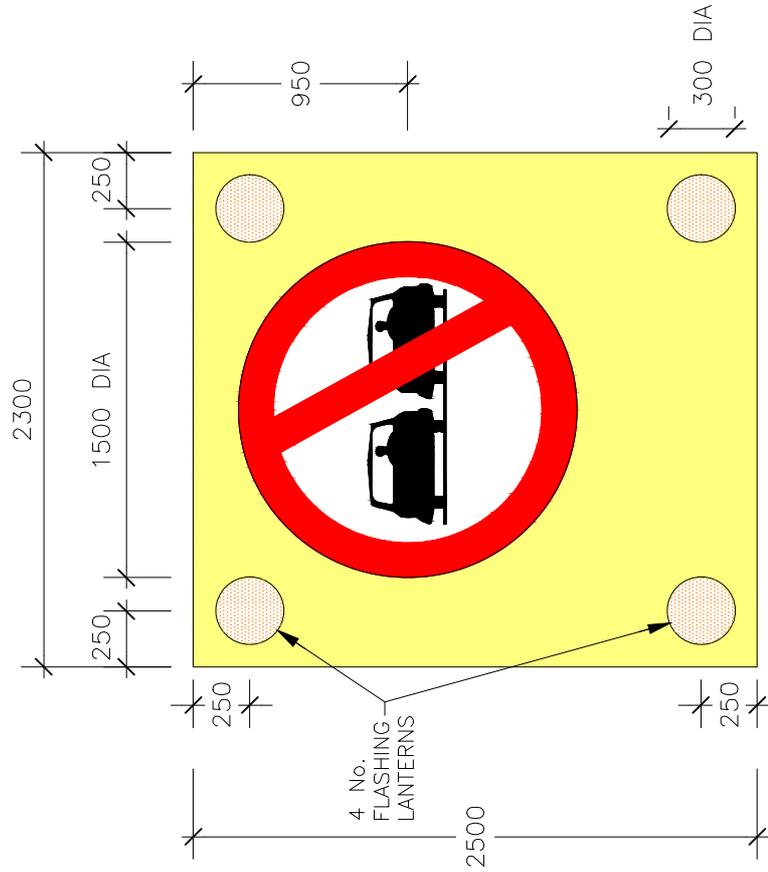
NOT TO SCALE

NOT TO BE REUSED

FIGURE 8.8.5.15

EXAMPLE  
ONLY

MANDATORY SIGN FOR USE AT REGULATORY  
ROLLING ROAD BLOCKS



NO OVERTAKING FOR USE AT  
MOBILE OPERATIONS

- Notes :-
1. Sign to be RUS 014 in accordance with the Road Traffic (Signs) Regulations.
  2. Colours:  
Backing Board ..... Yellow (ISEN 12899)  
Flashing Lanterns ..... Amber (Signal Yellow)

NOT TO  
SCALE

NOT TO  
SCALE

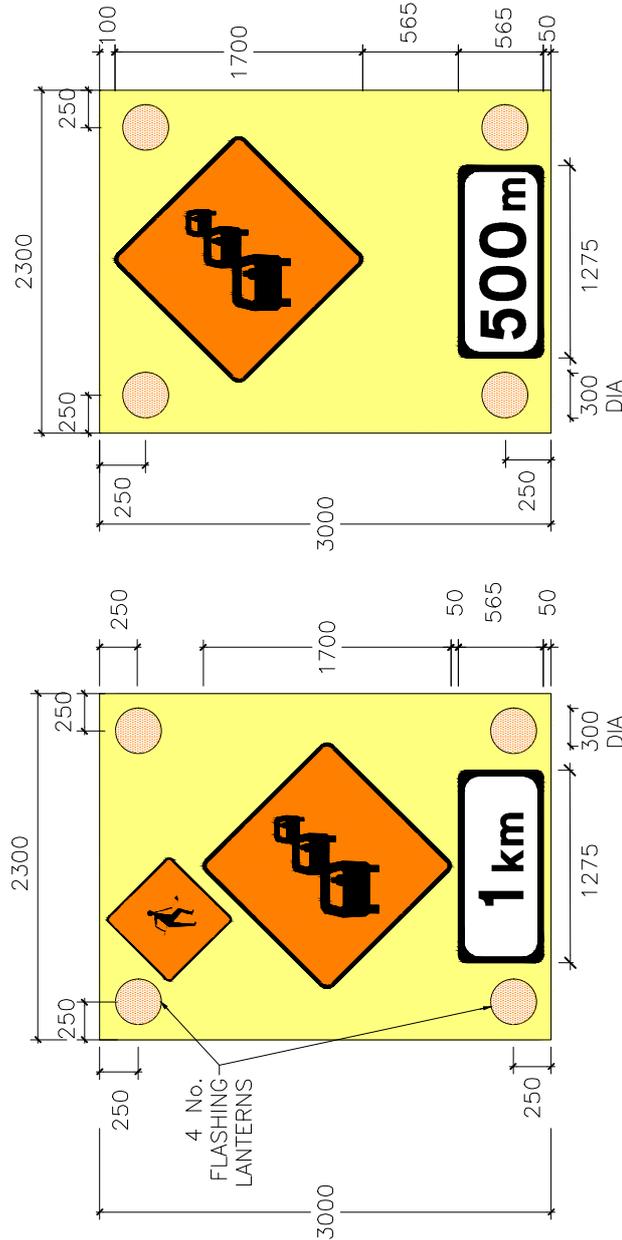
NOT TO BE  
REUSED

FIGURE 8.8.5.16

EXAMPLE  
ONLY

NOT TO  
SCALE

ROADWORKS AHEAD AND QUEUES LIKELY SIGNS  
FOR USE AT ROLLING ROAD BLOCKS



- Notes :-
1. Sign sizes:  
 WK001 - Roadworks ahead 600mm side  
 WK002 - Queues Likely 1200mm side  
 P001 - Supplementary plate 1275mm x 365mm
  2. For Details of individual signs and text, see the Traffic Signs Manual. For text, the 'x' height is 150mm.
  3. Colours:  
 Backing Board ..... Yellow (ISEN12899)  
 Flashing Lanterns ..... Amber (Signal Yellow)

NOT TO  
SCALE

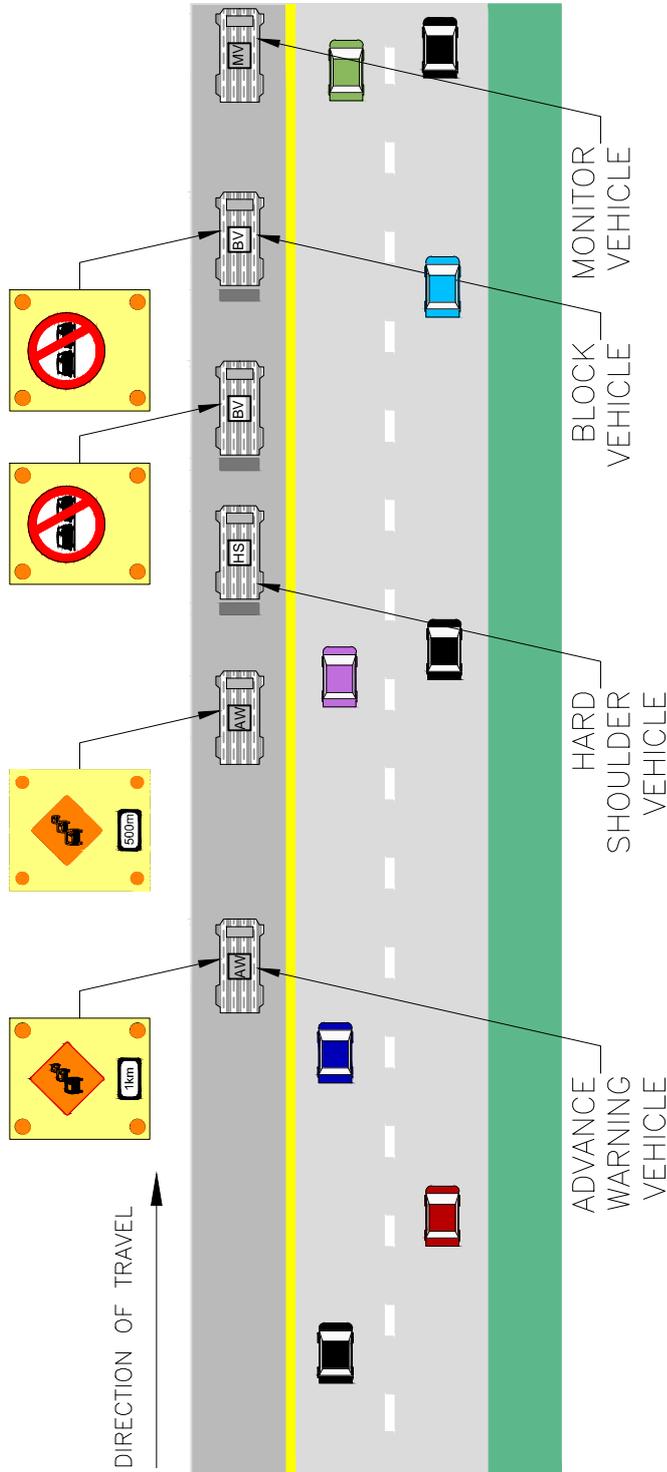
NOT TO BE  
REUSED

FIGURE 8.8.5.17

EXAMPLE ONLY

NOT TO SCALE

VEHICLES REQUIRED FOR ROLLING ROAD BLOCK  
DUAL CARRIAGEWAY OR MOTORWAY



- NOTES
1. DETAILS OF SIGNING/BARRIER REQUIRED FOR ENTRY RAMP ARE SHOWN IN DRAWING 5.20
  2. ADVANCE WARNING VEHICLES SHALL ALWAYS BE POSITIONED IN THE HARD SHOULDER

NOT TO SCALE

NOT TO BE REUSED

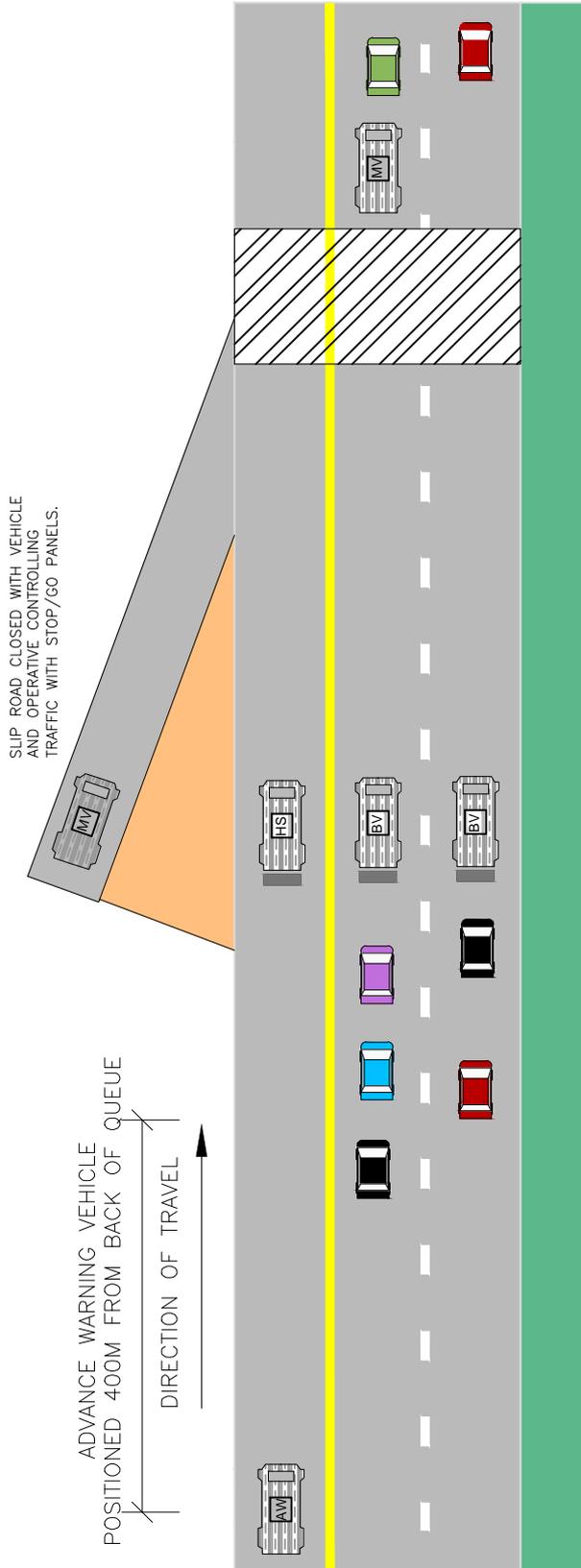
FIGURE 8.8.5.18



EXAMPLE ONLY

NOT TO SCALE

ROLLING ROAD BLOCK IN OPERATION PASSING A MERGE  
DUAL CARRIAGEWAY OR MOTORWAY



- NOTES
1. ADVANCE WARNING VEHICLES SHALL ALWAYS BE POSITIONED IN THE HARD SHOULDER.

NOT TO SCALE

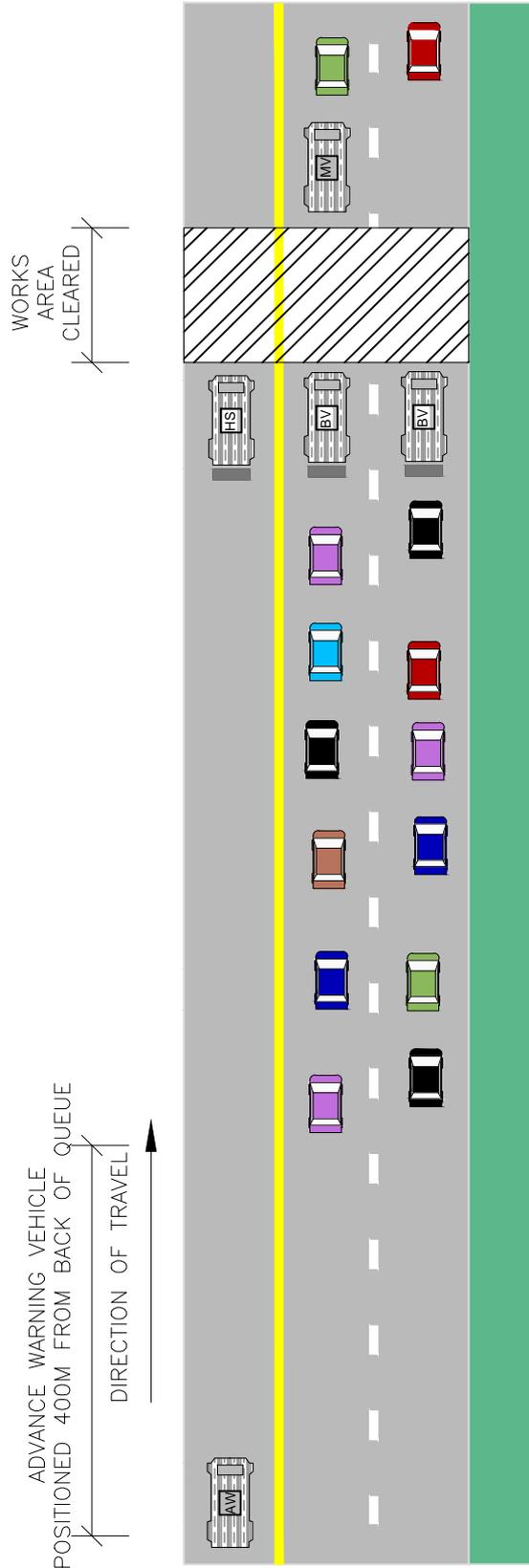
NOT TO BE REUSED

FIGURE 8.8.5.20

EXAMPLE ONLY

NOT TO SCALE

ROLLING ROAD BLOCK REACHES WORKS AREA  
DUAL CARRIAGEWAY OR MOTORWAY



- NOTES
1. DETAILS OF SIGNING/BARRIER REQUIRED FOR ENTRY RAMP ARE SHOWN IN DRAWING 5.20.
  2. ADVANCE WARNING VEHICLES SHALL ALWAYS BE POSITIONED IN THE HARD SHOULDER.

NOT TO SCALE

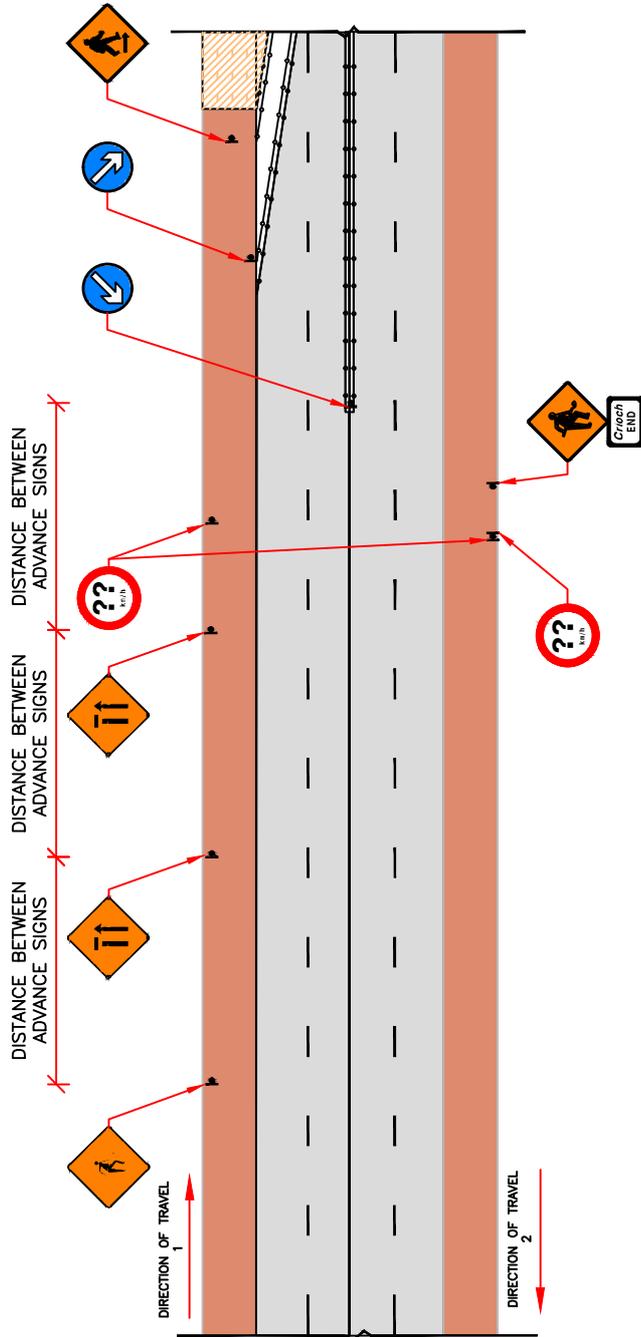
NOT TO BE REUSED

FIGURE 8.8.5.21

EXAMPLE  
ONLY

NOT TO  
SCALE

# ADVANCE / END SIGNS FOR A TIDAL FLOW LAYOUT - (PHASE 1) DIRECTION OF TRAVEL 2 LEVELS 2 & 4



URBAN DUAL CARRIAGEWAY

NOTES:

1. REFER TO TABLE 8.3.2 AND 8.3.4 FOR DIMENSIONS.
2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
9. "END OF ROADWORKS" SIGN PLACED 20 TO 50M FROM END OF WORKS AREA
10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
11. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
12. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.

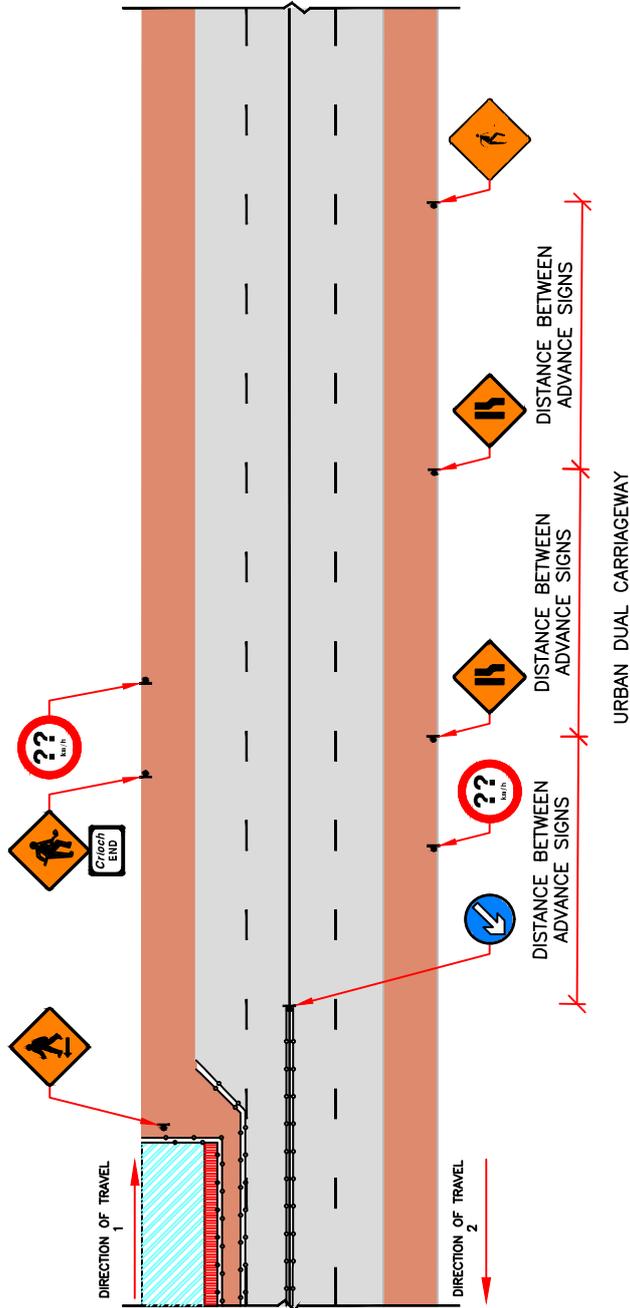
NOT TO  
SCALE

NOT TO BE  
REUSED

FIGURE 8.8.6.1

EXAMPLE  
ONLY

# ADVANCE / END SIGNS FOR A TIDAL FLOW OPERATION - (PHASE 1) DIRECTION OF TRAVEL 2 & 1 LEVELS 2 & 4



- NOTES:
1. REFER TO TABLE 8.3.2 AND 8.3.3 FOR DIMENSIONS.
  2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
  6. FOOTPATH CLOSED SIGN PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, THIS CROSSING SHOULD HAVE DISHED KERBS AND BE CONTROLLED OR UNCONTROLLED DEPENDING ON THE EXISTING SCENARIO, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50M FROM END OF WORKS AREA
  10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
  11. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  12. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.

NOT TO  
SCALE

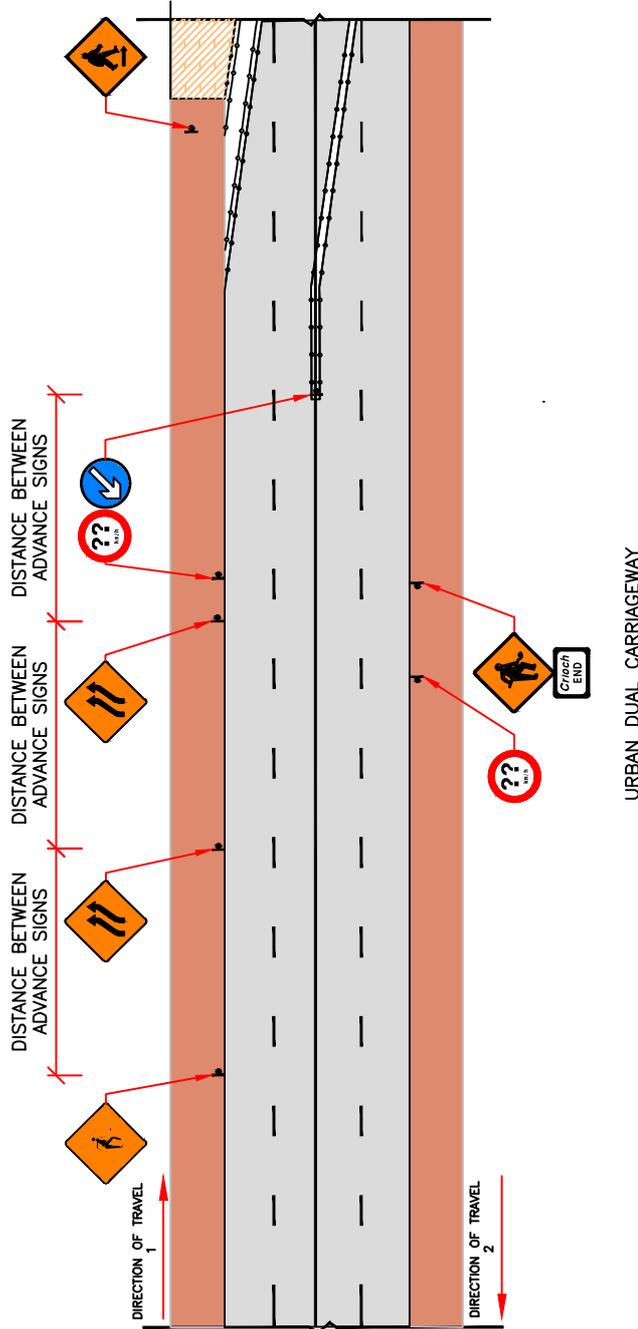
NOT TO  
SCALE

NOT TO BE  
REUSED

FIGURE 8.8.6.2

EXAMPLE  
ONLY

## ADVANCE / END SIGNS FOR A TIDAL FLOW OPERATION - (PHASE 2) DIRECTION OF TRAVEL 1 & 2 LEVEL 5



NOTES:

1. REFER TO TABLE 8.3.2 AND 8.3.3 FOR DIMENSIONS.
2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
5. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
6. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
7. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
8. "END OF ROADWORKS" SIGN PLACED 20 TO 50M FROM END OF WORKS AREA
9. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
10. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
11. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.

NOT TO  
SCALE

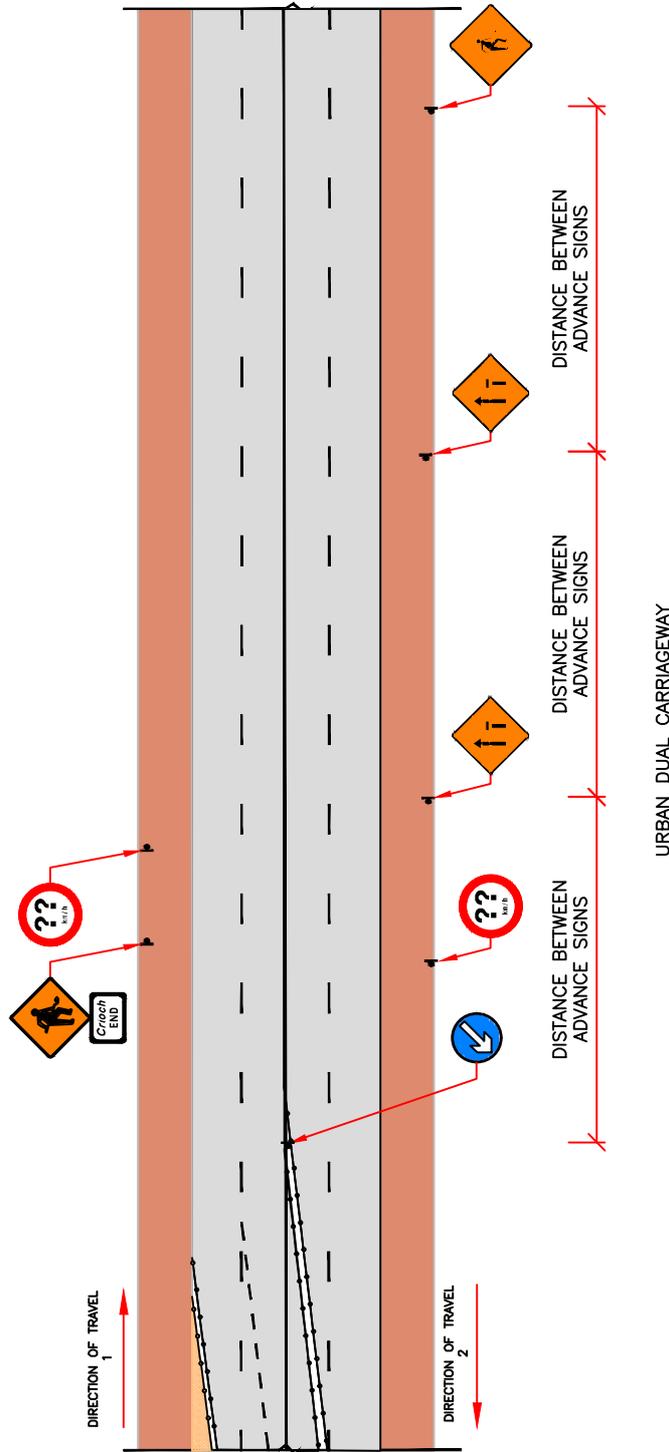
NOT TO  
SCALE

NOT TO BE  
REUSED

FIGURE 8.8.6.3

EXAMPLE  
ONLY

# ADVANCE / END SIGNS FOR A TIDAL FLOW OPERATION - (PHASE 2) DIRECTION OF TRAVEL 2 & 1 LEVELS 2 & 4



NOTES:

1. REFER TO TABLE 8.3.5 AND 8.3.6 FOR DIMENSIONS.
2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION
6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY CONES OR BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD
9. 'END OF ROADWORKS' SIGN PLACED 20 TO 50M FROM END OF WORKS AREA
10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
11. AN INDICATIVE LOCATION FOR A STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
12. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.

NOT TO  
SCALE

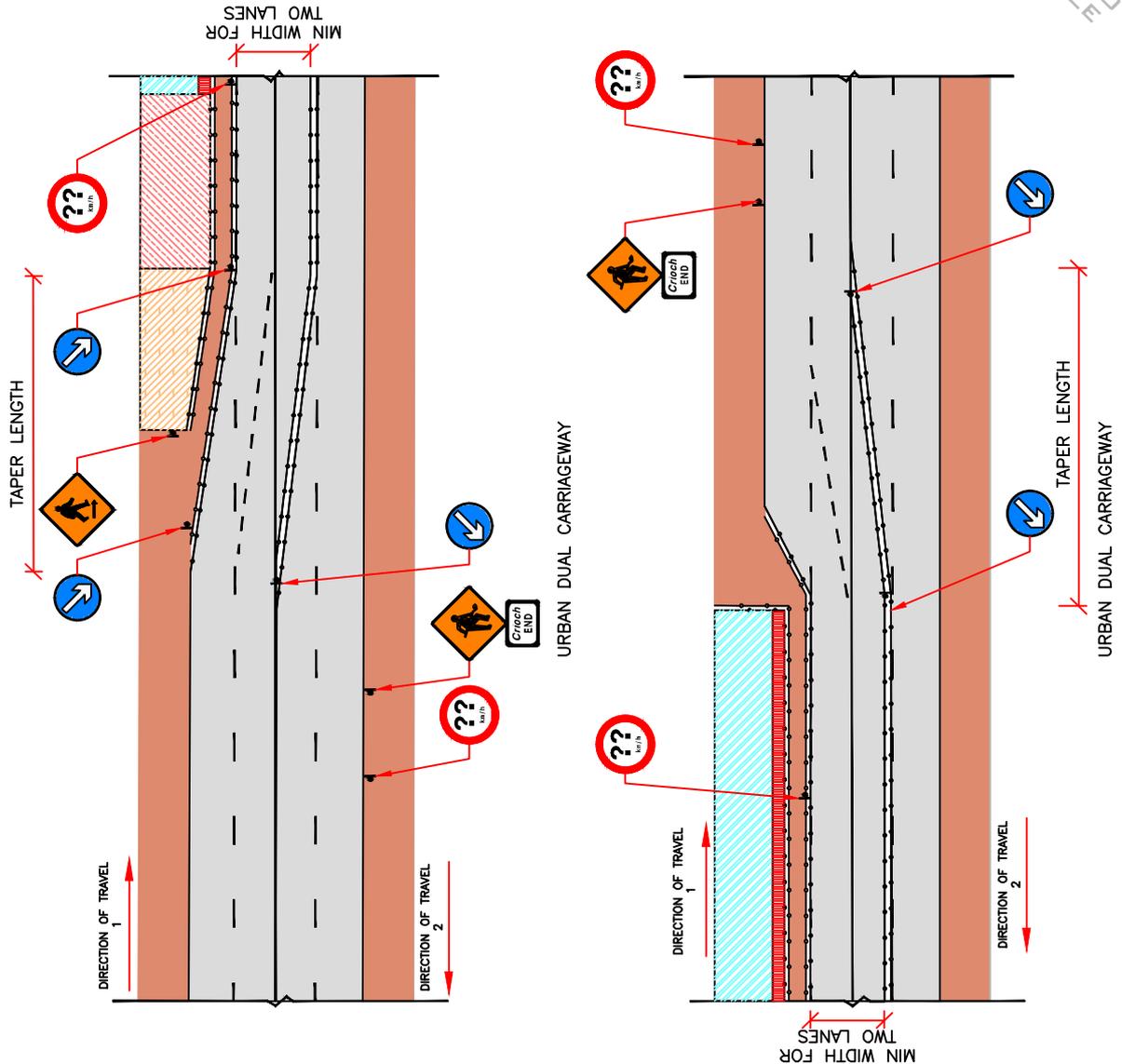
NOT TO  
SCALE

NOT TO BE  
REUSED

FIGURE 8.8.6.4



# LAYOUT OF TAPERS FOR TIDAL FLOW OPERATION - (PHASE 2) DIRECTION OF TRAVEL 1 & 2 LEVELS 2 & 4



NOT TO SCALE

NOT TO SCALE

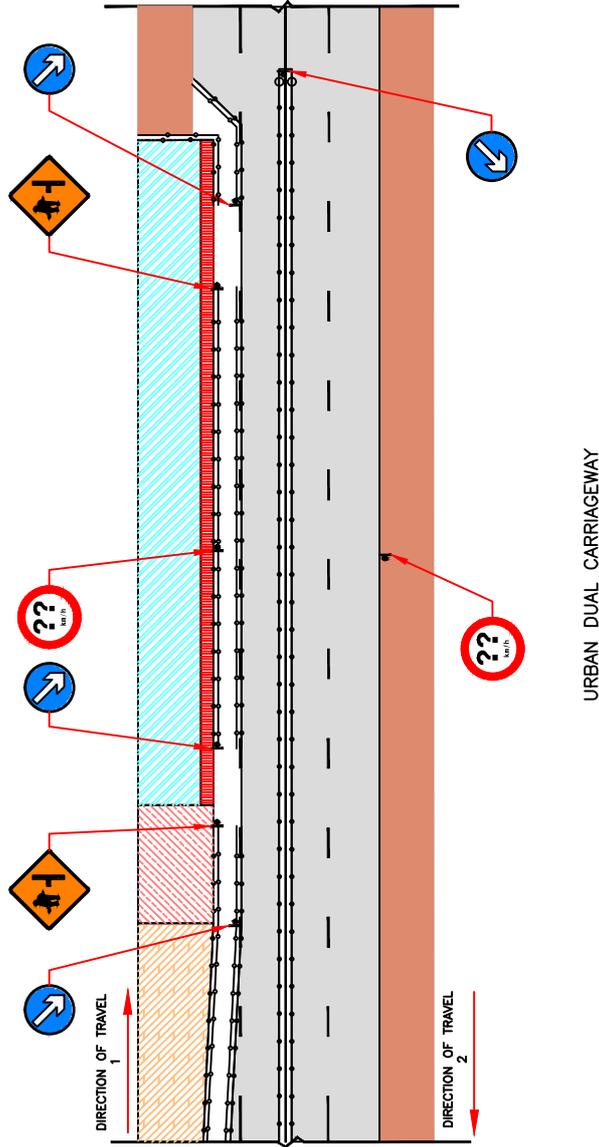
- NOTES:
1. REFER TO TABLE 8.3.2 AND 8.3.4 FOR DIMENSIONS.
  2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS, ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS
  4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION.
  6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.
  10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON ALL SPEED ROADS.
  11. AN INDICATIVE LOCATION FOR A REPEATER STATUARY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  12. OPERATING SPEED LIMIT TO BE POSTED AT END OF ROADWORKS TO DENOTE END OF THE ROADWORKS SPEED LIMIT.
  13. 45° TAPER AT END OF WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION.

NOT TO BE REUSED

FIGURE 8.8.6.6

EXAMPLE  
ONLY

# SIGNS FOR WORK SITE AREA FOR TIDAL FLOW OPERATION - (PHASE 1) DIRECTION OF TRAVEL 1 & 2 LEVELS 2 & 4



- NOTES:
1. REFER TO TABLE 8.3.2 AND 8.3.2 FOR DIMENSIONS.
  2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
  3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
  4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
  5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION.
  6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
  7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
  8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
  9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.
  10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
  11. AN INDICATIVE LOCATION FOR A REPEATER STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
  12. 45° TAPER AT END OF WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION.

NOT TO  
SCALE

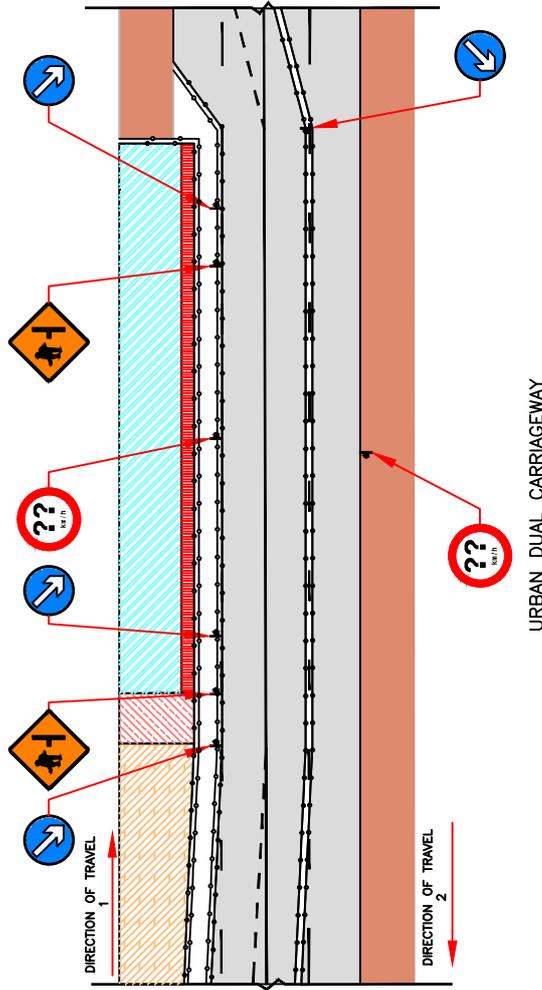
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FIGURE 8.8.6.7

EXAMPLE  
ONLY

# SIGNS FOR WORK SITE AREA FOR TIDAL FLOW OPERATION - (PHASE 2) DIRECTION OF TRAVEL 1 & 2 LEVELS 2 & 4



NOTES:

1. REFER TO TABLE 8.3.2 AND 8.3.3 FOR DIMENSIONS.
2. MIN WIDTH FOR TRAFFIC WILL DEPEND ON THE % OF HGV'S EXPECTED AND VOLUME OF CYCLISTS ETC.
3. REFER TO TABLE 8.2.1 FOR DEFINITION OF ROADWORK SIGNS.
4. WIDTH OF SITE EXIT/ENTRY TO ACCOMMODATE DIFFERENT TYPES OF VEHICLES ENTERING AND EXITING THE SITE.
5. SIGNS SHOULD BE PLACED IN THE VERGE OR AT THE BACK OF THE FOOTWAY SO AS NOT TO CAUSE AN OBSTRUCTION.
6. FOOTPATH CLOSED SIGN SHOULD BE PLACED AT BARRIERS TO DIRECT PEDESTRIANS ACROSS TO THE OTHER SIDE OF THE ROAD, OR ELSE DIVERTED INTO A TEMPORARY WALKWAY PROTECTED BY BARRIERS.
7. PEDESTRIANS SHOULD BE INSTRUCTED TO CROSS AT AN EXISTING CROSSING POINT, IF PRESENT, IN ADVANCE OF THE WORKS.
8. SAME NUMBER OF ADVANCED SIGNS PLACED AT THE SAME DISTANCES ON ANY APPROACH ROAD.
9. "END OF ROADWORKS" SIGN PLACED 20 TO 50m FROM END OF WORKS AREA.
10. THE USE OF VMS SIGNS DISPLAYING THE FIRST REGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ON HIGH SPEED ROADS.
11. AN INDICATIVE LOCATION FOR A REPEATER STATUTORY ROADWORKS SPEED LIMIT IS SHOWN FOR SITUATIONS WHERE IT MIGHT APPLY.
12. 45° TAPER AT END OF WORKS TO DEFLECT TRAFFIC BACK TO ORIGINAL LANE CONFIGURATION.

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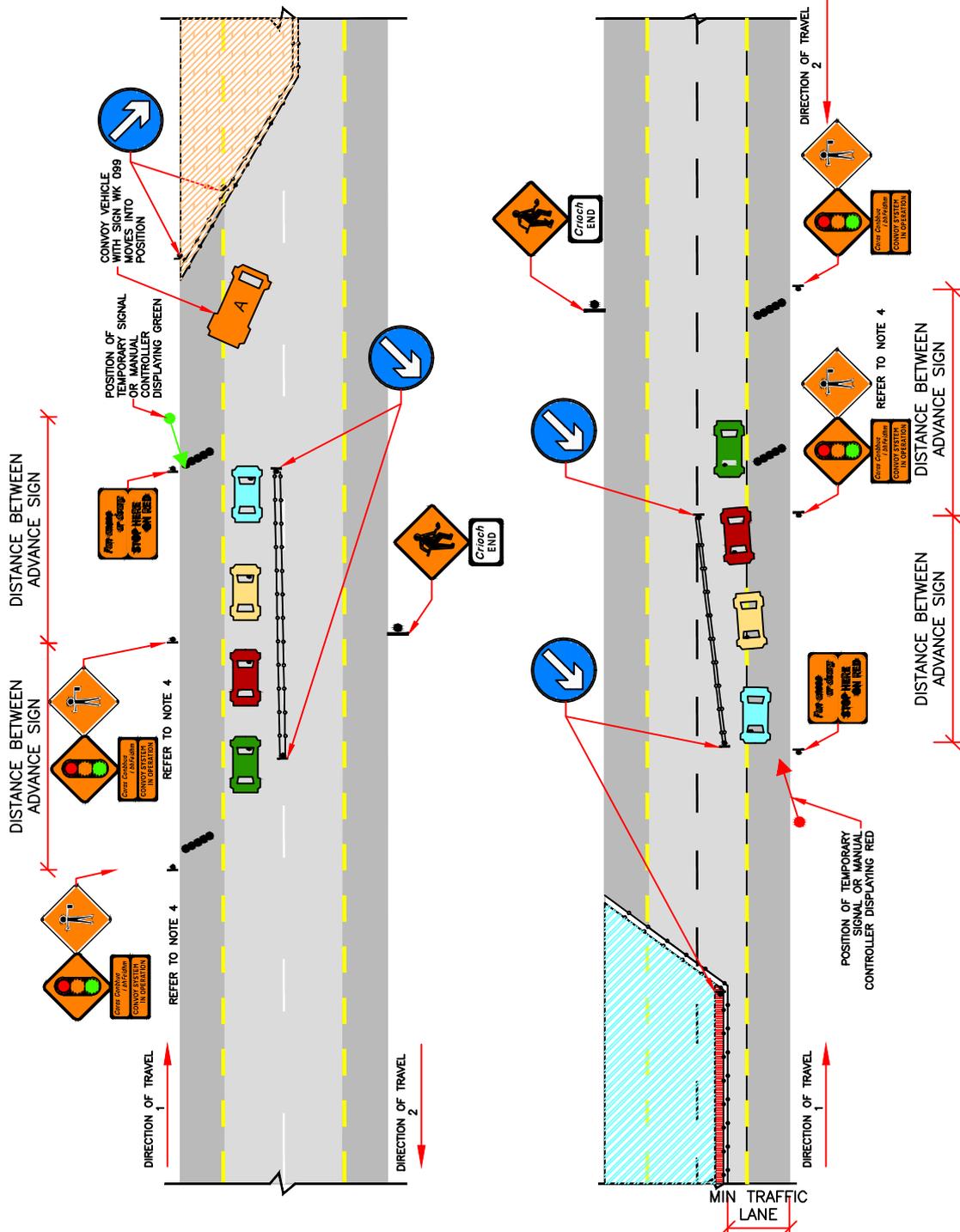
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REUSED

FIGURE 8.8.6.8

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING ONE VEHICLE  
PHASE 1a



- NOTES
1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3
  2. CONVOY VEHICLE MOVES INTO PLACE AND SIGNAL TURNS TO GREEN BEHIND IT FOR TRAFFIC IN DIRECTION OF TRAVEL 1.
  3. TRAFFIC IN DIRECTION OF TRAVEL 2 HELD ON RED.
  4. SIGN WK 098 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT SHOULD, BE USED AND COUNTED AS ONE SIGN.
  5. SIGN WK 099 TO BE FASTENED TO THE BACK OF THE CONVOY VEHICLE.
  6. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.

REFER TO NOTE 4

FIGURE 8.8.7.1

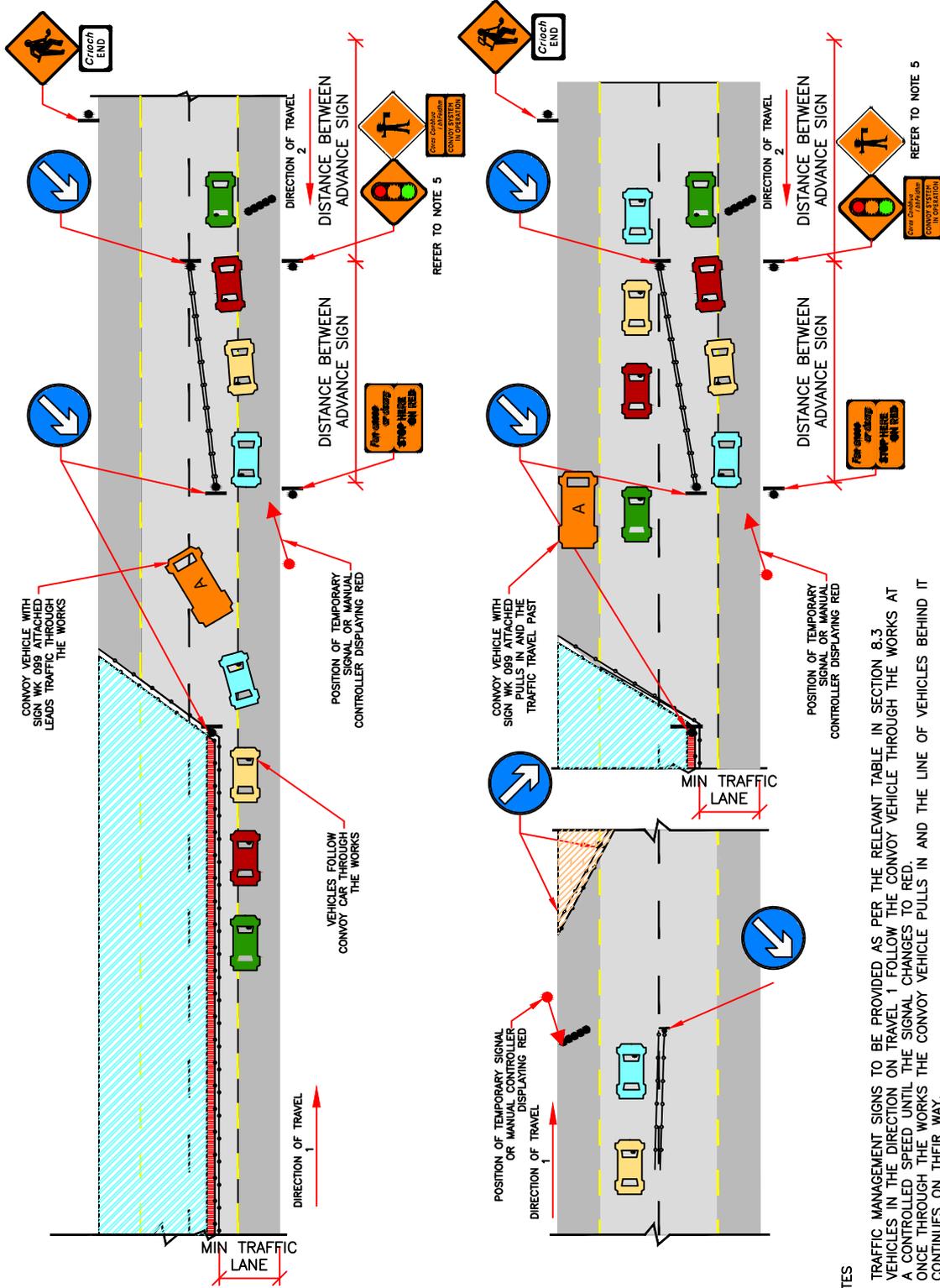
NOT TO SCALE

NOT TO BE REUSED

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING ONE VEHICLE  
PHASE 2



NOTES

1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3
2. VEHICLES IN THE DIRECTION ON TRAVEL 1 FOLLOW THE CONVOY VEHICLE THROUGH THE WORKS AT A CONTROLLED SPEED UNTIL THE SIGNAL CHANGES TO RED.
3. ONCE THROUGH THE WORKS THE CONVOY VEHICLE PULLS IN AND THE LINE OF VEHICLES BEHIND IT CONTINUES ON THEIR WAY.
4. VEHICLES TRAVELLING IN DIRECTION OF TRAVEL 2 ARE HELD ON RED.
5. SIGN WK 088 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT, SHOULD BE USED AND COUNTED AS ONE SIGN.
6. SIGN WK 099 SHOULD BE ATTACHED TO THE BACK OF THE CONVOY VEHICLE.
7. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEPED PATHS OF DIFFERENT TYPES OF VEHICLES.

NOT TO BE REUSED

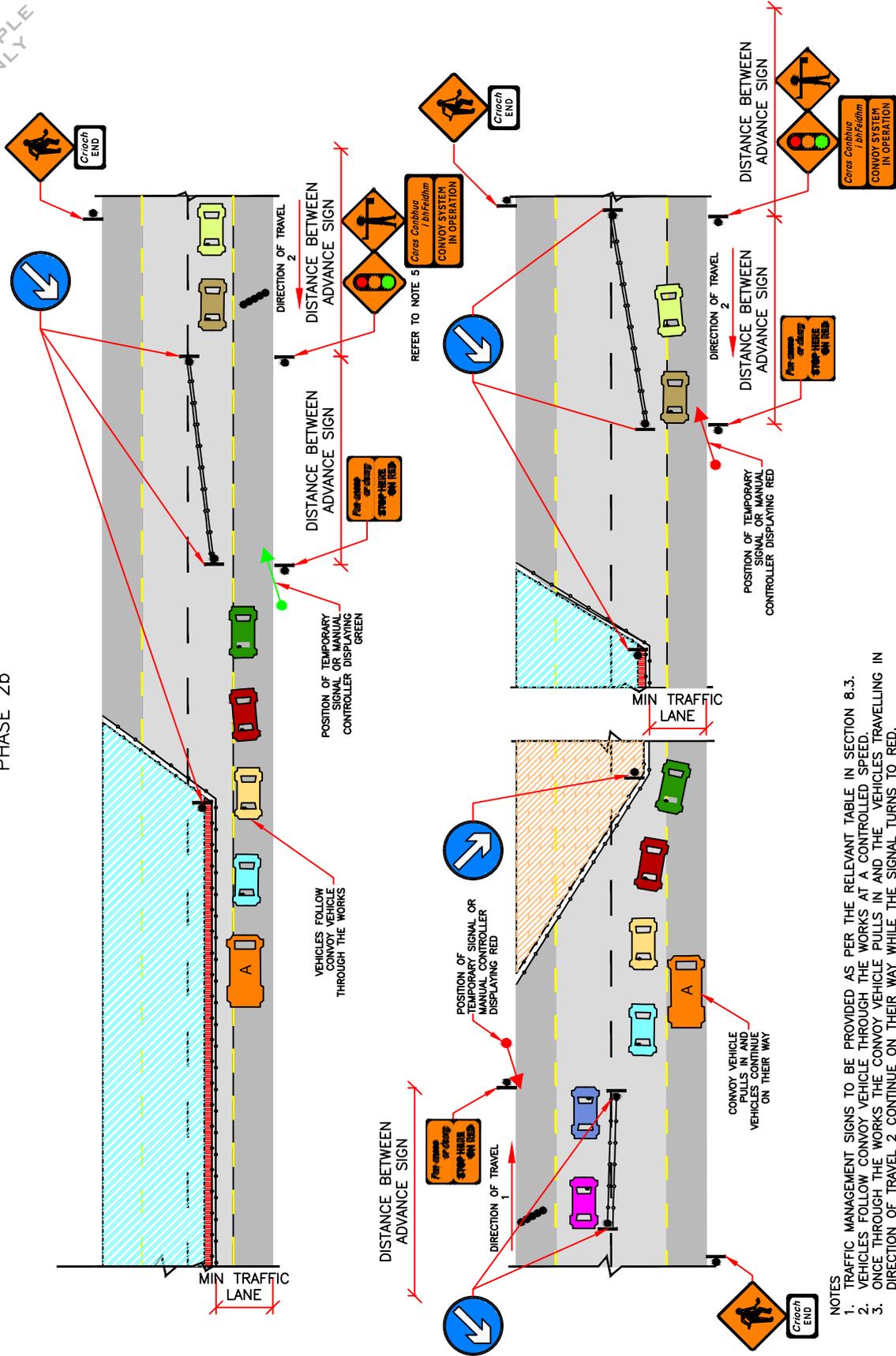
NOT TO SCALE

FIGURE 8.8.7.2



EXAMPLE ONLY

LAYOUT FOR CONVOY WORKING USING ONE VEHICLE  
PHASE 2b



NOT TO SCALE

NOT TO SCALE

NOT TO BE REUSED

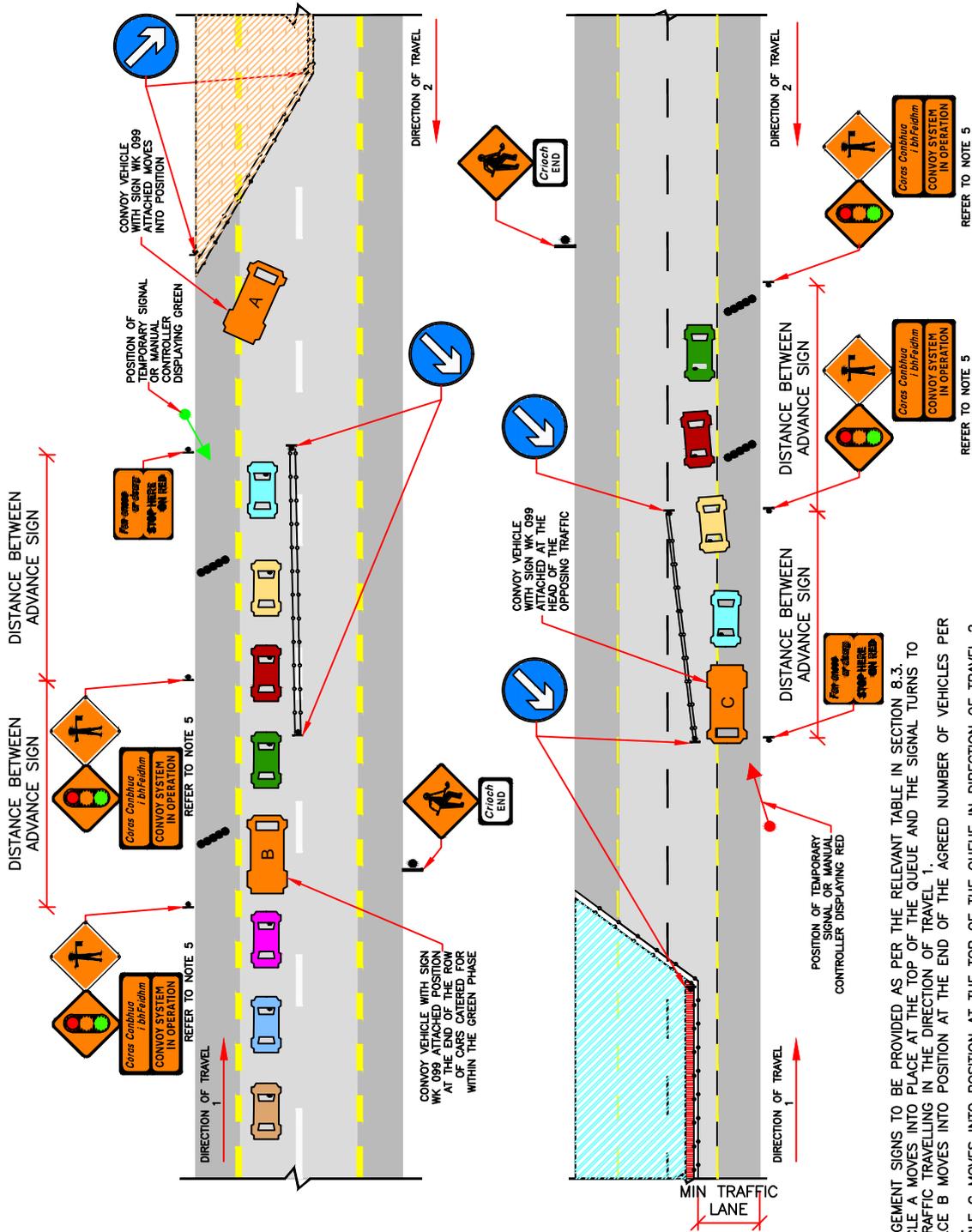
- NOTES
1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3.
  2. VEHICLES FOLLOW CONVOY VEHICLE THROUGH THE WORKS AT A CONTROLLED SPEED.
  3. ONCE THROUGH THE WORKS THE CONVOY VEHICLE PULLS IN AND THE VEHICLES TRAVELLING IN DIRECTION OF TRAVEL 2 CONTINUE ON THEIR WAY WHILE THE SIGNAL TURNS TO RED.
  4. VEHICLES TRAVELLING IN DIRECTION OF TRAVEL 1 ARE HELD ON RED.
  5. SIGN WK 098 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT, SHOULD BE USED AND COUNTED AS ONE SIGN.
  6. SIGN WK 099 'FOLLOW CONVOY VEHICLE' TO BE ATTACHED TO THE CONVOY VEHICLE.
  7. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.

FIGURE 8.8.7.4

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING THREE VEHICLES  
PHASE 1a



- NOTES
1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3.
  2. CONVOY VEHICLE A MOVES INTO PLACE AT THE TOP OF THE QUEUE AND THE SIGNAL TURNS TO GREEN FOR TRAFFIC TRAVELLING IN THE DIRECTION OF TRAVEL 1.
  3. CONVOY VEHICLE B MOVES INTO POSITION AT THE END OF THE AGREED NUMBER OF VEHICLES PER GREEN PHASE.
  4. CONVOY VEHICLE C MOVES INTO POSITION AT THE TOP OF THE QUEUE IN DIRECTION OF TRAVEL 2 WHO ARE HELD ON RED.
  5. SIGN WK 098 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT, SHOULD BE USED AND COUNTED AS ONE SIGN.
  6. SIGN WK 099 'FOLLOW CONVOY VEHICLE' TO BE ATTACHED TO THE CONVOY VEHICLES.
  7. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.

NOT TO SCALE

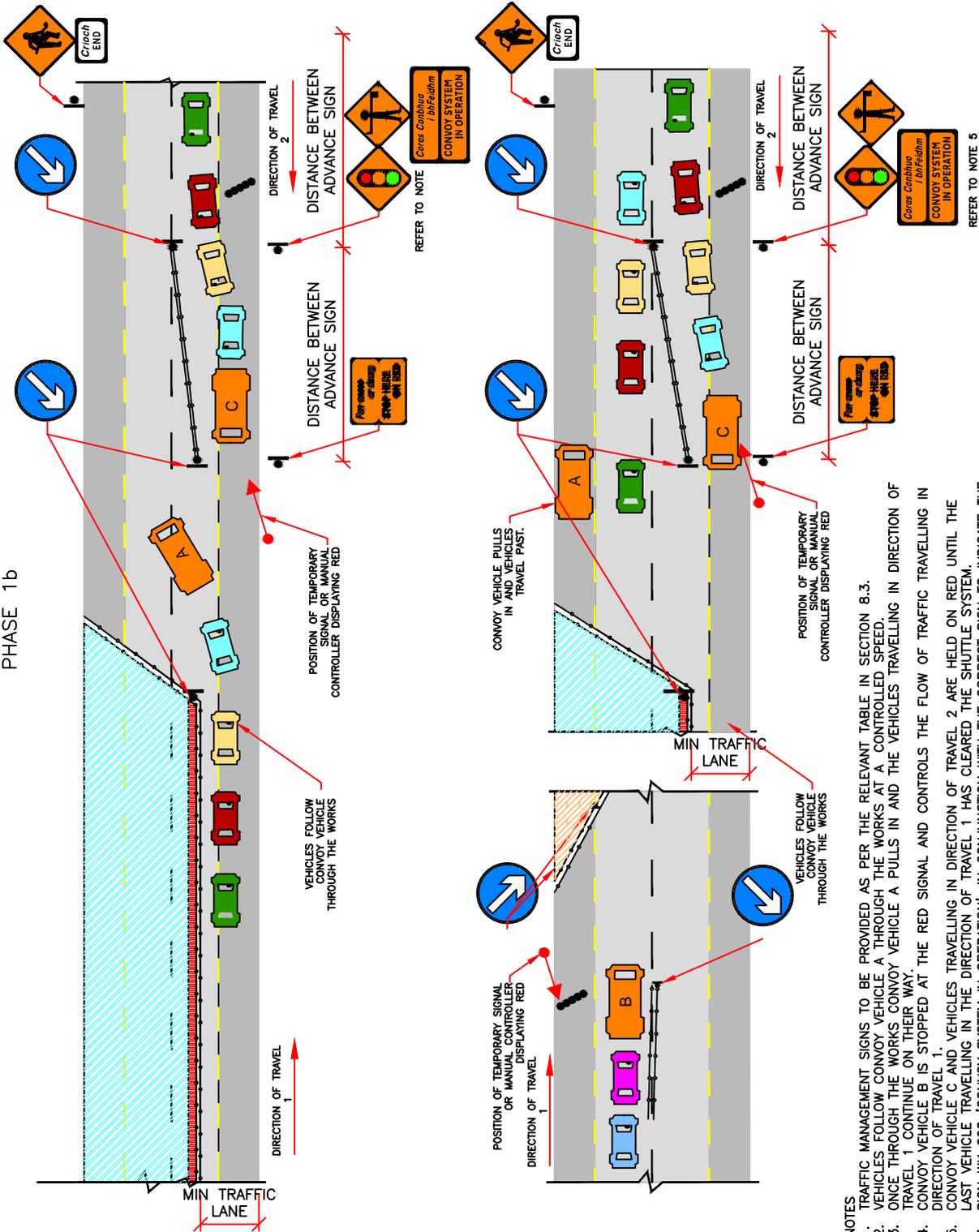
NOT TO BE REUSED

FIGURE 8.8.7.5

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING THREE VEHICLES  
PHASE 1b



NOT TO SCALE

NOT TO BE REUSED

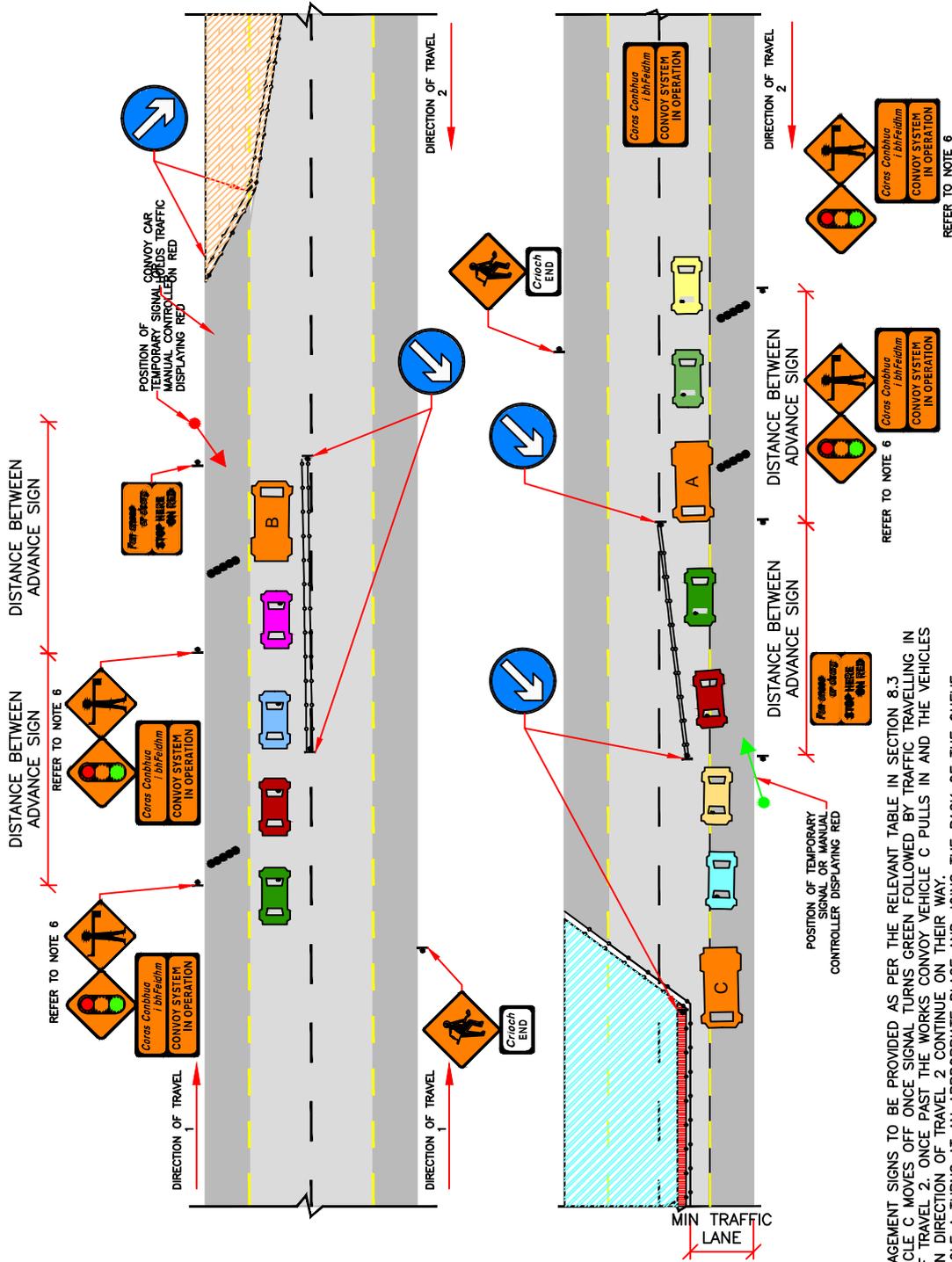
FIGURE 8.8.7.6

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING THREE VEHICLES

PHASE 2a



- NOTES
1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3
  2. CONVOY VEHICLE C MOVES OFF ONCE SIGNAL TURNS GREEN FOLLOWED BY TRAFFIC TRAVELLING IN DIRECTION OF TRAVEL 2. ONCE PAST THE WORKS CONVOY VEHICLE C PULLS IN AND THE VEHICLES TRAVELLING IN DIRECTION OF TRAVEL 2 CONTINUE ON THEIR WAY.
  3. CONVOY VEHICLE A TURNS AT AN APPROPRIATE PLACE AND JOINS THE BACK OF THE QUEUE TRAVELLING IN DIRECTION OF TRAVEL 2. ONCE VEHICLE A REACHES THE SIGNAL IT CHANGES TO RED.
  4. CONVOY VEHICLE B HOLDS TRAFFIC TRAVELLING IN DIRECTION OF TRAVEL 1 ON RED.
  5. CONVOY VEHICLE C JOINS THE QUEUE TRAVELLING IN DIRECTION OF TRAVEL 1 AT THE END OF THE QUEUE OR AT A SET NUMBER OF VEHICLES BACK FROM THE SIGNAL.
  6. SIGN WK 098 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT, SHOULD BE USED AND COUNTED AS ONE SIGN.
  7. SIGN WK 099 'FOLLOW CONVOY VEHICLE' SHOULD BE ATTACHED TO THE CONVOY VEHICLES.
  8. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10M. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.

NOT TO SCALE

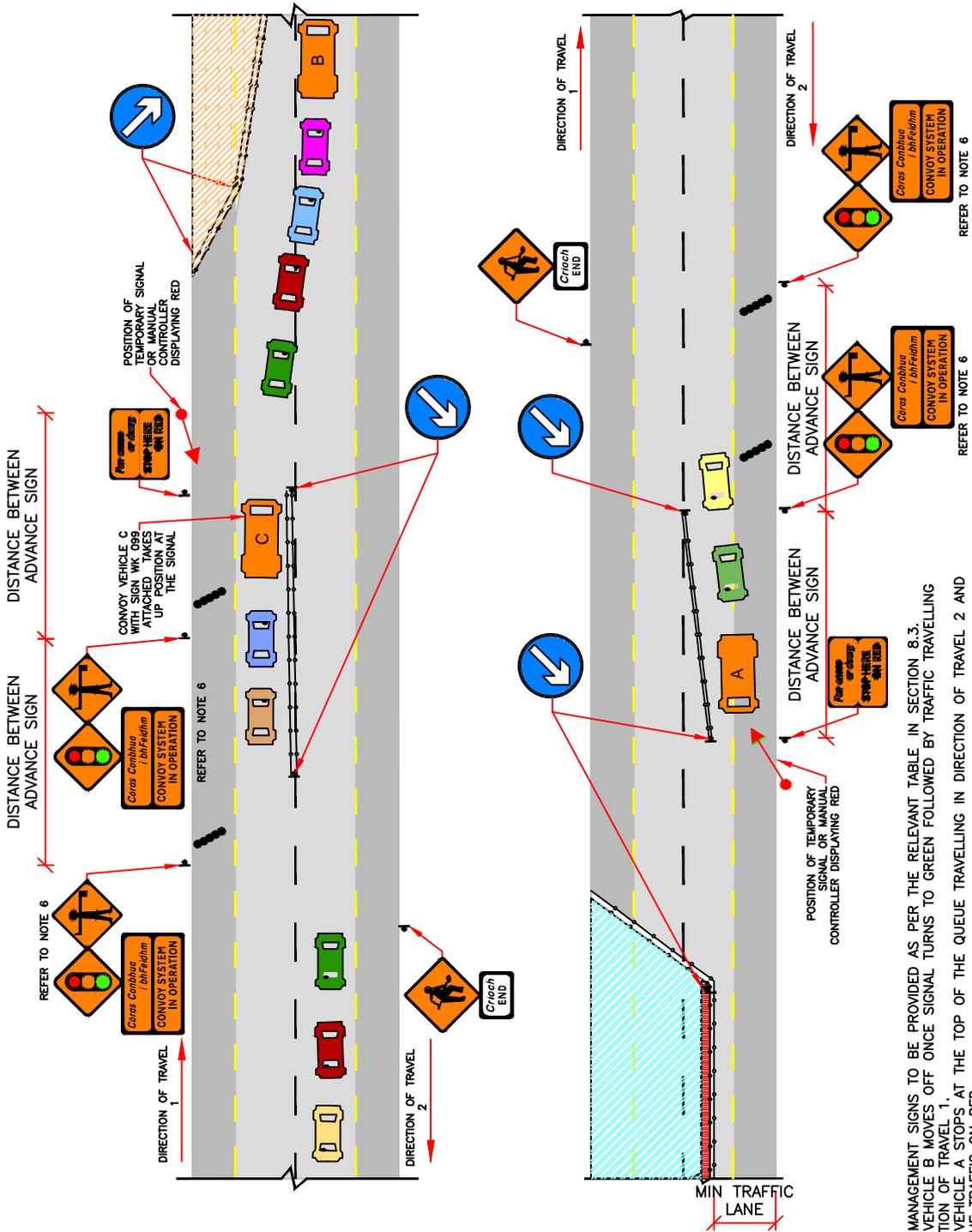
NOT TO BE REUSED

FIGURE 8.8.7.7

EXAMPLE ONLY

NOT TO SCALE

LAYOUT FOR CONVOY WORKING USING THREE VEHICLES  
PHASE 2b



- NOTES
1. TRAFFIC MANAGEMENT SIGNS TO BE PROVIDED AS PER THE RELEVANT TABLE IN SECTION 8.3.
  2. CONVOY VEHICLE B MOVES OFF ONCE SIGNAL TURNS TO GREEN FOLLOWED BY TRAFFIC TRAVELLING IN DIRECTION OF TRAVEL 1.
  3. CONVOY VEHICLE A STOPS AT THE TOP OF THE QUEUE TRAVELLING IN DIRECTION OF TRAVEL 2 AND HOLDS THE TRAFFIC ON RED.
  4. CONVOY VEHICLE C HOLDS TRAFFIC TRAVELLING IN DIRECTION OF TRAVEL 1 ON RED.
  5. SIGN WK 098 'CONVOY SYSTEM IN OPERATION', IN CONJUNCTION WITH THE CORRECT SIGN TO INDICATE THE TYPE OF ACTIVE TRAFFIC MANAGEMENT, SHOULD BE USED AND COUNTED AS ONE SIGN.
  6. SIGN WK 099 'FOLLOW CONVOY VEHICLE' TO BE ATTACHED TO THE CONVOY VEHICLES.
  7. MIN LENGTH FROM STOPPING POINT TO START OF TAPER TO BE 10m. ACTUAL LENGTH TO BE DESIGNED TO ACCOMMODATE SWEEP PATHS OF DIFFERENT TYPES OF VEHICLES.

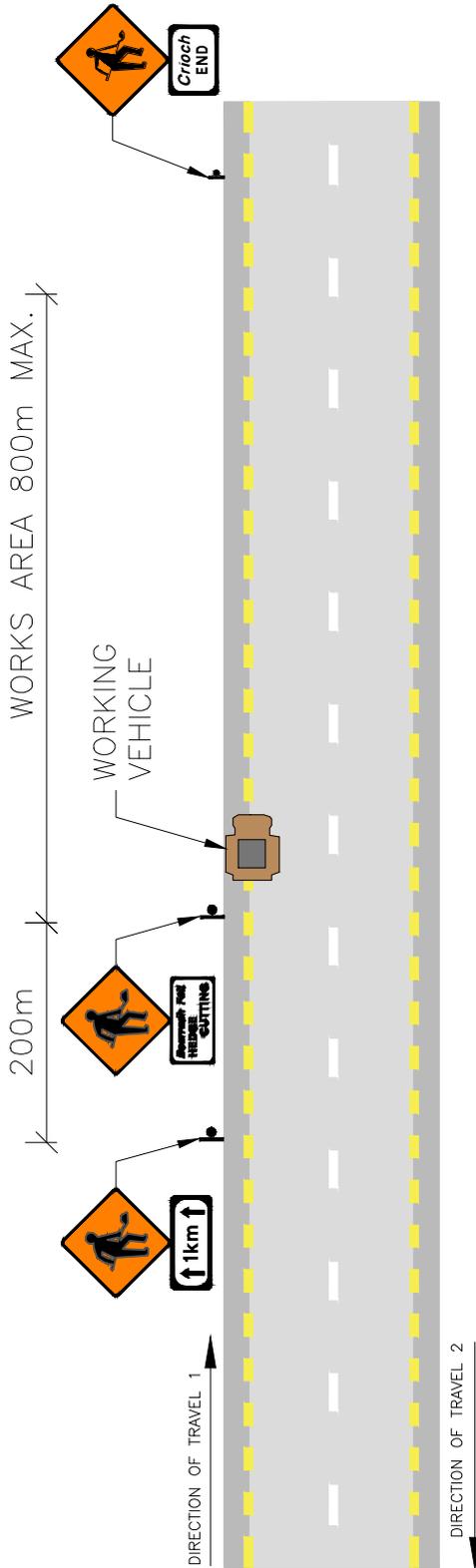
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NOT TO BE REUSED

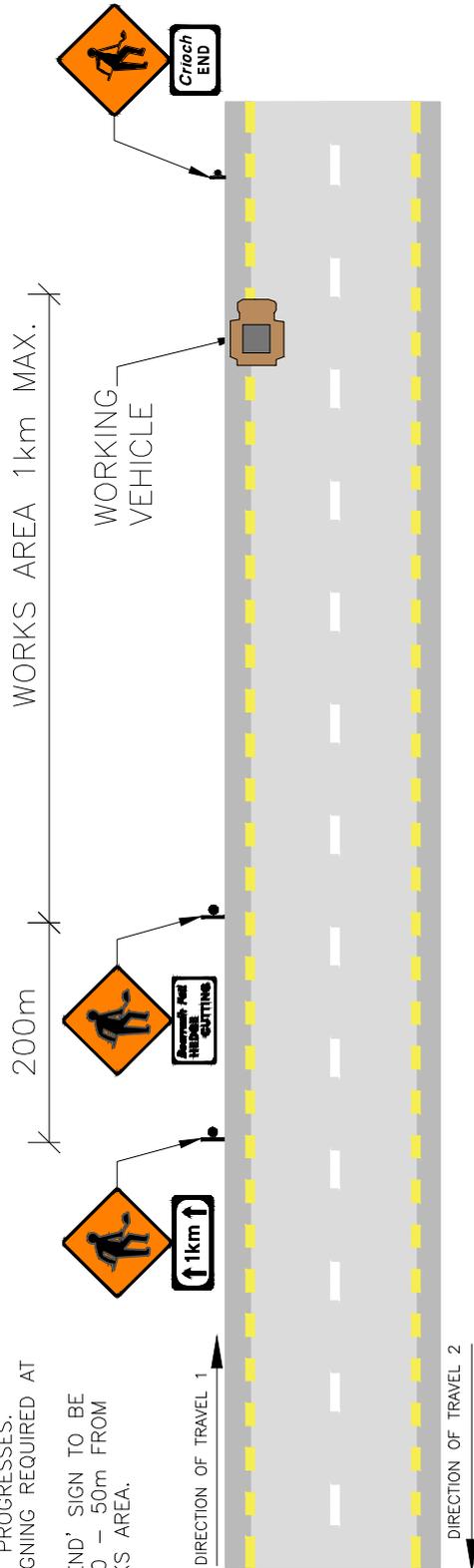
FIGURE 8.8.7.8

EXAMPLE ONLY

LAYOUT FOR SEMI-STATIC CLOSURE SINGLE CARRIAGEWAY



LAYOUT A - WORKS VEHICLE IS AT START OF THE WORKS AREA



- NOTES
1. ADVANCE WARNING SIGNS POSITIONED IN THE VERGE.
  2. SIGNS TO BE MOVED EVERY 1km AS THE WORK PROGRESSES.
  3. ADDITIONAL SIGNING REQUIRED AT JUNCTIONS.
  4. ROADWORKS END' SIGN TO BE POSITIONED 20 - 50m FROM END OF WORKS AREA.

LAYOUT B - WORKS VEHICLE AT END OF THE WORKS AREA

NOT TO BE REUSED

NOT TO SCALE

FIGURE 8.8.8.1