An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

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Traffic Signs Manual
Chapter 8

An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
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TEMPORARY TRAFFIC MEASURES AND SIGNS FOR ROADWORKS

CHAPTER 8

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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 is used and rules for positioning them.

8.1.1.2 This Chapter outlines the temporary traffic management (TTM) to be used at work sites on public roads to warn, instruct and guide road users in a safe progression through or around a work site. It also describes the signs to be used at roadworks.

8.1.1.3 A 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 potential hazards and negotiating a safe passage through or around the works.

8.1.1.4 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.

8.1.1.5 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

Entities

Contractor	Any party undertaking works on or affecting a public road
TTM Designer	Person or party designing, contributing to and having overall responsibility for the Temporary Traffic Management Plan

Organisations

DTTAS	Department of Transport, Tourism and Sport
TII	Transport Infrastructure Ireland (formerly the National Roads Authority)
Road Authority	Any Local Authority in charge of a public road

Terms

Reasonably Practicable	For the purpose of the relevant statutory provisions, "reasonably practicable," in relation to the duties of the Employer, means that an Employer has exercised all due care by putting in place the necessary protective and preventative measures, having identified the hazards and assessed the risks to safety and health likely to result in accidents or injury to health at the place of work concerned and where the putting in place of any further measures would be grossly disproportionate having regard to the unusual, unforeseeable and exceptional nature of any circumstance or occurrence that may result in an accident at work or injury to health at that place of work
TTMP	The Temporary Traffic Management Plan prepared by the TTM Designer for inclusion in the Safety and Health Plan and for use during roadworks.
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.
Lane 1	This is the left-hand lane on a carriageway with two or more lanes but does not include the hard shoulder if present.
Lane 2	This is the 2nd lane from left on a carriageway with two or more lanes but does not include the hard shoulder or hard strip if present.
Roadworks	As per the meanings assigned to it 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.
Working width	The distance required behind a safety barrier, free from obstruction, to enable the barrier to deflect when hit by a vehicle. See TII Publication on Safety Barriers (DN-REQ-03034) and IS EN 1317 Road Restraint System.
Works Area	The works area is the actual area required to carry out the works.
Vulnerable Road Users	This term includes all pedestrians, cyclists, mobility impaired pedestrians, pushchairs and wheelchair users.
Competent Person	For the purpose of the relevant statutory provision, a person is deemed to be a competent person where, having regard to the task he or she is required to perform and taking account of the size or hazards (or both of them) of the undertaking or establishment in which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken

Abbreviations

HGV	Heavy Goods Vehicle
VMS	Variable Message Sign
RUS	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.

8.1.3 Scope and Objectives

8.1.3.1 This document is intended to cover the Temporary Traffic Management Measures (TTM) for all road levels. By using the general principles and design parameters described in this document, a consistency will be achieved at all roadworks sites nationwide and road users will become accustomed to TTM and understand the instructions given.

8.1.3.2 In the context of the Traffic Signs Manual, roadworks may be defined as occurring where the normal function of a public road used by a road user, is affected or interrupted at any time to facilitate the construction or maintenance of a public road, public or private utilities or adjoining or overhead sites.

8.1.3.3 The objective of this Chapter is to provide any party carrying out construction and / or maintenance work on a public road with a set of uniform guidelines for signing and delineation that will promote the safety of both the road user and road worker.

8.1.3.4 Low exposure activities are not covered in this document as they do not require the worker to work on foot from or on the roadway and as such are not subject to TTM. Following appropriate hazard identification and risk assessment, if TTM signs are required then the roadworks signs in this document should be used appropriately.

8.1.3.5 From planning through to completion, priority should be given to the safety of the road user and the road workers. All reasonable steps should be taken to ensure that the disruption due to the works is minimised. No one set of TTM 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.

8.1.3.6 This document does not define who should undertake the work associated with TTM: instead, it 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 construction and maintenance of a public road. An Garda Síochána is the traffic authority, with responsibilities for matters relating to the control of traffic. Therefore, they should be consulted before TTM is deployed.

Consent of the Road Authority

8.1.3.8 In order to carry out works on 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. Section 13(10) (b) of the Roads Act, 1993 provides powers whereby a Road Authority may consent to allow works to be carried out on a road; such permission constitutes a Road Opening Licence. This document is to be used as guidance when undertaking a TTM Plan for such Road Opening Licences.

8.1.4 Health and Safety

8.1.4.1 This document is not 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 2013 (or any legislation which amends or replaces either), including the obligations to carry out site specific hazard identifications and risk assessments.

8.1.4.2 All those involved in the design, installation, removal and use of TTM at roadworks shall have regard to current legislation concerning health and safety and construction and must also comply with any contractual obligations or specific requirements relating to the particular site.

8.1.4.3 Health and Safety requirements which must be adhered to throughout the duration of TTM installation, maintenance, modification and removal are outlined within the Temporary Traffic Management Design Guidance document and the Temporary Traffic Management Operations Guidance document and are not repeated here.

8.1.5 Training and Competence

8.1.5.1 Only appropriately trained and competent operatives, supervisors, managers or other competent persons should be engaged in the assessment, design, installation, maintenance and removal of TTM.

8.1.5.2 Training requirements are outlined in the Temporary Traffic Management Design Guidance and Temporary Traffic Management Operations Guidance documents. Employers shall ensure that employees are competent to undertake their assigned role in relation to the mix of training, experience and knowledge that the employee possesses. The Employer shall determine the necessary training, experience and knowledge requirements having regard to the size or hazards (or both of them) of the tasks to be undertaken.

8.1.6 TTM Documentation

8.1.6.1 TTM documentation consists of the following:

- Chapter 8 of the Traffic Signs Manual;
- Temporary Traffic Management Design Guidance; and
- Temporary Traffic Management Operations Guidance.

These three documents must be read and understood as a complete set.

8.1.6.2 This document sets out the requirements that TTM must comply with, the Temporary Traffic Management Design Guidance document provides guidance that should be followed in the design of TTM and the Temporary Traffic Management Operations Guidance document provides guidance that should be followed for TTM operations. TTM must be designed in a way that installation, maintenance and removal can be undertaken in a suitably safe method.

Other Guidance

8.1.6.3 This Chapter should be read in conjunction with other relevant chapters of the Traffic Signs Manual; these are listed in the Preface.

8.1.6.4 Regulatory traffic signs are prescribed by the Minister for Transport, Tourism and Sport. The principal regulations are the Road Traffic (Signs) Regulations 1997 to 2015 and S.I. No. 150/2017 - Road Traffic (Signs) Regulations 2017. A range of new and amending regulations have been made since 1997, a full listing is on the following websites:

- www.dttas.gov.ie; and
- www.trafficsigns.ie.

Included on www.trafficsigns.ie are working drawings for the signage to be used for TTM layouts. All Chapter 8 signage produced shall accord to these working drawings.

8.1.6.5 The Department of Transport, Tourism and Sport from time to time may issue advice notes on Temporary Traffic Management and they shall be adhered to.

8.1.6.6 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. A full and comprehensive guide to legislation relating to road traffic signs and TTM at roadworks is outside the scope of this Manual.

8.1.6.7 The provisions of Section 101D of the Road Traffic Act 1961 (as inserted by Section 9 of the Dublin Transport Authority (Dissolution) Act 1987) and S.I. No.139/2015 – Road Traffic (Co-ordination of Roadworks) Regulations 2015 in relation to roadworks are of particular importance. This section empowers all 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.

8.1.6.8 Other documents of relevance to TTM measures and signs for roadworks include:

- Guidelines for Setting and Managing Speed Limits in Ireland – DTTAS;
- Design Manual for Urban Roads and Streets – DTTAS;

- Guidelines for Managing Openings in Public Roads – DTTAS;
- Introduction to the TII Publications System (GE-INT-01029) which includes;
  - Road Link Design - DN-GEO-03031;
  - Safety Barriers - DN-REQ-03034;
- TII Publication on Specification for Roadworks Series 1200 (CC-SPW-01200) Traffic Signs and Road Markings.

8.1.7 Design of TTM

8.1.7.1 It is the responsibility of the TTM Designer to comply with the requirements described in this Chapter, and to use relevant road design principles, where appropriate, to provide a safe working area, and provide a safe and efficient flow of traffic through or around the works. Only signs complying with the Traffic Signs Manual shall be used, to maintain consistency for road users when encountering TTM. The principles outlined apply to all roadworks which affect a public road, and are applicable regardless of who carries out the works.

8.1.7.2 It is recognised that in certain circumstances (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 TTM Designer to deviate from the exact detail provided in this Chapter. However, in such circumstances, the TTM Designer, bearing in mind the Designer's obligations pursuant to Health and Safety legislation, must consider carefully the characteristics of the site, and devise a TTM Plan which best addresses the site constraints in a safe manner, in so far as is reasonably practicable by the application of the following:

- Chapter 8 of the Traffic Signs Manual;
- Temporary Traffic Management Design Guidance document; and
- Temporary Traffic Management Operations Guidance document.

8.1.7.3 A TTM Designer must take cognisance that access for emergency vehicles through the roadworks should be maintained at all times whenever practicable. Proposals for emergency access should be discussed with the emergency services early in the design process. Also, the emergency services need to be aware of roadworks along their preferred routes.

8.1.7.4 The TTM Designer should consider the following aspects where applicable:

- 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 road worker to alter the TTM and hence affect and possibly endanger the road worker and the road user.
- Ensure a detailed understanding of the works being undertaken to adequately cater for the number of required TTM phases within the design. Consider how the implementation and removal of TTM will be carried out. Some major TTM will require a road or lane closure to actually implement the final TTM.
- Identify any particular hazards to the road worker or road user, during the installation, operation and removal of the TTM and, by using these guidelines, minimise the risks.
- Consult with all relevant parties such as the Road Authority, An Garda Síochána, etc. Ensure sufficient timeframes are allowed to comply with the statutory requirements of obtaining a road opening licence and / or a road closure order from the Road Authority. If the works are on or affecting a National Road, then consultation with TII shall be required. This will require

forward planning as these agencies require notification and time to consider the design.

- Liaise with bus operators. Inform bus operators and consult with An Garda Síochána if moving or suspending a bus stop.

- When considering the closing of cycle tracks, footways, lay-bys, parking areas and loading bays, alternatives may need to be provided, with associated signage.

- Consider whether a roadworks speed limit would be appropriate. If so, consult with the Road Authority and arrange to follow the procedures for seeking a Roadworks Speed Limit Order.

8.1.8 Installation of TTM

8.1.8.1 TTM must be installed in accordance with the approved design.

8.1.8.2 For complex TTM schemes, a road safety audit may be required by the Road Authority.

8.1.8.3 Installation of TTM should be carried out in a manner so as to ensure the safety of the road workers and road users. Plan the order of site establishment to ensure a safe method of work and continued use by the road users. Personnel supervising TTM shall comply with all obligations required by Health and Safety Regulations.

8.1.8.4 Existing signs or markings that conflict with the temporary situation should be covered or taken down during the works and the appropriate signs reinstated once the TTM has been removed.

8.1.8.5 Undertake a drive through/visual check prior to the use of the TTM by the road users, or as soon as possible thereafter. This check should confirm that the site is safe, and installed in accordance with the agreed TTMP ensuring the signs, cones and barriers give a clear message to the road users and road workers.

8.1.8.6 Hazards to the road user or road worker should be minimised while installing TTM.

8.1.8.7 Ensure the correct use, installation and positioning of signs, cones, lamps, reflectors and barriers in accordance with the agreed proposals and manufacturers' specifications. Signs and barriers should be secured with consideration given to expected weather conditions.

8.1.8.8 Queuing should be monitored while TTM is in place, and appropriate action taken to alleviate or minimise the queuing if possible. The positioning of warning signs on the approach to the queue should be checked and, if necessary, adjusted.

8.1.9 Maintenance of TTM

8.1.9.1 TTM should be regularly maintained and defective items replaced as required. The following procedures should be adopted:

- Regular inspection and maintenance of the TTM 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 good condition, and that the measures are to be working satisfactorily. Any defects should be rectified without delay. It is good practice to maintain records of such inspections.

- 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. Reflectors on temporary safety barriers should be cleaned. Also signs and cones get knocked over or displaced and should be checked regularly and rectified.

- In general, TTM should not be altered to facilitate the works, as this may have a detrimental effect. If a change is considered necessary, this may be subject to a redesign and possible re-submission for approval.

- For unattended sites, the actual size of the works area should be minimised as much as possible and made safe and secure. A separate set of proposals that details the revised site layout while unattended should be prepared.

- Some examples of maintenance include, but are not limited to:
  - Cleaning of signs and devices;
  - Replacing of defective TTM elements;
  - Ensuring that signs and devices are located as per TTM Plan;
  - Ensuring signs and devices are secured for adverse conditions; and
  - Cleanliness and operation of flashing lights for night use.

8.1.10 Removal of TTM

8.1.10.1 TTM should be removed once the works are completed. In order to encourage the road users to take notice of TTM 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 or restrictions required, they may disregard the signs and cones when operations are underway.

8.1.10.2 The removal of TTM should be in the reverse order of installation. 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.

8.1.10.3 Permanent signs or signals which were affected by the works must be reinstated. When the TTM is removed and the road reverts to the permanent layout, 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 all the TTM is complete.

8.1.11 Diagrams

8.1.11.1 Throughout the suite of TTM documentation; this document, Temporary Traffic Management Design Guidance and Temporary Traffic Management Operations Guidance, typical layout diagrams for a wide range of activities are provided.

8.1.11.2 The diagrams provided are for illustration purposes only a TTM operative should not use them for installation of TTM.

8.1.11.3 If conflict appears to occur between layout diagrams and the text or tables, then the text or table should take precedence.

8.2 Parameters for TTM

8.2.1 Road Classifications

8.2.1.1 For the purpose of TTM, roads are divided into three classifications:

- Level 1 Roads – Urban and Low Speed Roads;
- Level 2 Roads – Rural Single Carriageway Roads; and
- Level 3 Roads – Dual Carriageways and Motorways.

8.2.1.2 Table 8.2.1.1 below outlines these three road classifications along with the sub levels which are applicable to different carriageway types and speeds.

Level		Carriageway Type	Speed / Speed Limit (km/h)
Main	Sub		
Level 1	i	Single	≤ 30
	ii	Single	40
	iii	Single	50
	iv	Single	60
		Multi-Lane / Dual	≤ 60
Level 2	i	Single	80
	ii	Single	100
Level 3	i	Dual and Motorway	80
	ii	Dual and Motorway	≥ 100

Table 8.2.1.1: Road Classifications

8.2.1.3 There are five roadworks types defined for the purpose of TTM design. Three of these types are used for static TTM. In addition, two roadwork types may be used for mobile works. (See Table 8.2.1.2)

TTM Type	Description	Traffic Flow Conditions	Visibility Conditions	Planned Duration
Static Type A	Works requiring full time Temporary Traffic Management (TTM)	All	All	Permitted for any duration but required for durations in excess of 12 hours
Static Type B	Works that normally involve the use of one or two vehicles in the operation. This type of work is typically maintenance and repair type operations, including maintenance of utilities or street furniture.	Unrestricted by either traffic volume or weather conditions	All	Permitted for a duration of up to 12 hours
Static Type C	Works at a discrete location that are of a short duration (excluding signage setup/removal).	Unrestricted by either traffic volume or weather conditions	Good	Permitted for a duration of up to 15 minutes
Semi Static Operation (SSO)	Works where the operations are mobile or making short duration stops continuously along a road where static warning signs are used. SSO is only suitable on Level 1 and 2 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes
Mobile Lane Closure (MLC)	Works where the operations are mobile or making short duration stops continuously along a road where mobile warning signs and Impact Protection Vehicles (IPV) are used. MLC is only suitable on Level 3 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes*

Note:
- Particular works may have several phases of TTM which may fall under different TTM types. For example, footway works may require different phases.
- * For MLC the permitted duration may be extended by agreement with the overseeing organisation.

Table 8.2.1.2: TTM Roadworks Types

8.2.1.4 The design parameters in Section 8.2.2 refer to these road classifications and roadworks types. Dimensions or guidelines for TTM are tabulated accordingly.

8.2.1.5 It is envisaged that these road classifications and roadworks types will cover most TTM scenarios but, if a situation arises that falls between the classifications or types, the design parameters for the higher road classification or roadworks type should be applied.

8.2.2 Design Parameters for Road Level Classification

8.2.2.1 TTM should be designed in accordance with the design parameters in Table 8.2.2.2 to Table 8.2.2.9 for the three road classifications. The following is an explanation of each of the parameters:

Parameter	Explanation
Sign Size	The minimum size of the roadworks signs which shall be provided.
Sign Visibility	The uninterrupted sight distance of an approaching vehicle to the first sign (WK 001)
Number of Signs	This is the number of signs required in advance of the start of the taper. The first sign shall be the WK 001.
Cumulative Distance	Distance from the first sign (Roadworks Ahead) to the start of the taper. Where centre line cones are used in advance of the taper the cumulative distance may be measured from the start of the centre line coning.
Distance between Advance Warning Signs	The distance between signs is measured from the first (Roadworks Ahead) sign 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 reduction width, including lateral safety zone, and rounded up to the nearest cone spacing.
Cone Height	This is the minimum height of cone permitted.
Cone Spacing (Taper / Longitudinal Spacing)	The recommended maximum cone spacing required at tapers and longitudinally. Closer spacing may be needed at some locations, e.g. at short lengths of roadworks in urban areas.
Lamps	Lamps to be used along lines of cones or barriers are to be battery operated steady state lamps with amber light. On Level 3 roads steady state lamps or sequential lamps shall be provided for lead-in tapers but not both.
Safety Zone	Lateral and Longitudinal 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 closure 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 area. It provides a clear area for an errant vehicle to come to a stop before reaching the works area.

Parameter	Explanation
Set Back	The minimum clearance, required on Level 3 roads, from the edge of the traffic lane to the front face of a temporary barrier. 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.
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.

Table 8.2.2.1: Explanation of Parameters

Table 8.2.2.2
Minimum Design Parameters for Level 1(i) Roads
(Single Carriageway ≤ 30km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	450	450	-
Sign Visibility (m)	25	25	25
Number of Signs	2	1	-
Cumulative Distance (m)	20	10	-
Distance between Advance Warning Signs (m)	10	10	-
Taper			
Lane Taper Rate	1 in 1	1 in 1	-
Cones			
Cone Height (mm)	750	750	
Taper Spacing (m) [A]	1	1	-
Longitudinal Spacing (m) [A]	3	3	-
Lamps (unlit areas only)			
Taper Spacing (m)	3	3	-
Longitudinal Spacing (m)	6	6	-
Safety Zones			
Longitudinal (m)	0.5	0.5	-
Lateral (m)	0.5	0.5	-
Lanes			
Lane Width (m) [B]	2.5	2.5	-
Two-way Roadway Width (m)	5	5	-

Notes:

A. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates, the spacing shall be reduced accordingly.

B. The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.3
Minimum Design Parameters for Level 1(ii) Roads
(Single Carriageway of 40km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	450	450	-
Sign Visibility (m)	35	35	35
Number of Signs	2	2	-
Cumulative Distance (m)	30	30	-
Distance between Advance Warning Signs (m)	15	15	-
Taper			
Lane Taper Rate	1 in 1	1 in 1	-
Hard Shoulder Taper Rate			-
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) [A]	1	1	-
Longitudinal Spacing (m) [A]	3	3	-
Lamps (unlit areas only)			
Taper Spacing (m)	3	3	-
Longitudinal Spacing (m)	6	6	-
Safety Zones			
Longitudinal (m)	0.5	0.5	-
Lateral (m)	0.5	0.5	-
Lanes			
Lane Width (m) [B]	3 (2.5)	3 (2.5)	-
Two-way Roadway Width (m)	5	5	-

Notes:

A. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

B The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.4
Minimum Design Parameters for Level 1(iii) Roads
(Single Carriageway of 50km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	600	600	-
Sign Visibility (m)	50	50	50
Number of Signs	2	2	-
Cumulative Distance (m)	40	40	-
Distance between Advance Warning Signs (m)	20	20	-
Taper			
Lane Taper Rate [A]	1 in 5	1 in 5	-
Hard Shoulder Taper Rate [A]			-
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) [B]	3	3	-
Longitudinal Spacing (m) [B]	3	3	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	6	6	-
Safety Zones			
Longitudinal (m)	5	5	-
Lateral (m)	0.5	0.5	-
Lanes			
Lane Width (m) [C]	3 (2.5)	3 (2.5)	-
Two-way Roadway Width (m)	5	5	-

Notes:

A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.

B. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

C The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.5
Minimum Design Parameters for Level 1(iv) Roads
(Single Carriageway of 60km/h & Multi-lane / Dual ≤ 60km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	600	600	-
Sign Visibility (m)	60	60	60
Number of Signs	3	2	-
Cumulative Distance (m)	60	40	-
Distance between Advance Warning Signs (m)	20	20	-
Taper			
Lane Taper Rate [A]	1 in 10	1 in 10	-
Hard Shoulder Taper Rate [A]			-
Transition Length (m)	2 x Taper Length	2 x Taper Length	
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) [B]	3	3	-
Longitudinal Spacing (m) [B]	6	6	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	12	12	-
Safety Zones			
Longitudinal (m)	15	15	-
Lateral (m)	0.5	0.5	-
Lanes			
Lane Width (m) [C]	3 (2.5)	3 (2.5)	-
Two-way Roadway Width (m)	5	5	-

Notes:

A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.

B. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

C The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.6
Minimum Design Parameters for Level 2(i) Roads
(Single Carriageway of 80km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	600	600	-
Sign Visibility (m)	90	90	90
Number of Signs	4	3	-
Cumulative Distance (m)	480	360	-
Distance between Advance Warning Signs (m)	120	120	-
Taper			
Lane Taper Rate [A]	1 in 40	1 in 40	-
Hard Shoulder Taper Rate [A]			-
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) [B]	3	3	-
Longitudinal Spacing (m) [B]	12	12	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
Safety Zones			
Longitudinal (m)	45	45	-
Lateral (m)	1.2	1.2	-
Lanes			
Lane Width (m) [C]	3	3	-

Notes:

A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.

B. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

C. The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.7
Minimum Design Parameters for Level 2(ii) Roads
(Single Carriageway of 100km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	750	750	-
Sign Visibility (m)	120	120	120
Number of Signs	4	3	-
Cumulative Distance (m)	800	600	-
Distance between Advance Warning Signs (m)	200	200	-
Taper			
Lane Taper Rate [A]	1 in 60	1 in 60	-
Hard Shoulder Taper Rate [A]	1 in 30	1 in 30	-
Cones			
Cone Height (mm)	1,000	1,000	-
Taper Spacing (m) [B]	3	3	-
Longitudinal Spacing (m) [B]	12	12	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
Safety Zones			
Longitudinal (m)	60	60	-
Lateral (m)	1.2	1.2	-
Lanes			
Lane Width (m) [C]	3	3	-

Notes:

A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.

B. Cone spacing is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

C. The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. 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 8.4.3.1 to 8.4.3.3.

Table 8.2.2.8
Minimum Design Parameters for Level 3(i) Roads
(Dual Carriageways and Motorways of 80km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm)	750	750	-
Sign Visibility (m)	90	90	90
Number of Signs	4 (both sides)	3 (both sides [D]) 4 (left side only [C])	-
Cumulative Distance (m)	480	360 [D] 480 [C]	-
Distance between Advance Warning Signs (m)	120	120	-
Taper			
Lane Taper Length (m)	180	180	-
Hard Shoulder Taper Rate	1 in 20	1 in 20	-
Transition Length (m)	360	360	-
Cones			
Cone Height (mm)	750	750	-
Taper Spacing (m) [A]	3	3	-
Longitudinal Spacing (m) [A]	12	12	-
Lamps (unlit areas only)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
Safety Zones			
Longitudinal (m)	45	45	-
Lateral (m)	1.2	1.2	-
Set Back (m) [E]	0.4	0.4	-
Lanes			
Lane Width (m) [B]	3.3	3.3	-

Notes:

A. Cone spacing shown is the maximum permitted. Where geometry or any other site-specific reason dictates the spacing shall be reduced accordingly.

B. Where two lanes are being maintained, the minimum width for lane 1 should be 3.3m and 3m for lane 2 (or subsequent lane on multi-lane carriageways). Where one lane is to be maintained the minimum lane width for all classes of vehicles is 3.3m.

C. Where TTM is being placed, or works are taking place, on lane 1 of a ≥ 3 lane carriageway only. Refer also to Section 3.5.7.5 within the Temporary Traffic Management Design Guidance document regarding direct lane 1 closures and associated restrictions.

D. Where TTM is being placed, or works are taking place, on lane 2 or subsequent lane.

E. See definition of Set Back on page 15.

Table 8.2.2.9
Minimum Design Parameters for Level 3(ii) Roads
(Dual Carriageways and Motorways ≥ 100km/h)

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
Advance Warning Signage			
Sign Size (mm) [C]	1,200	1,200	-
Sign Visibility (m)	160	160	160
Number of Signs	5 (both sides)	4 (both sides [E]) 5 (left side only [D])	-
Cumulative Distance (m)	1,000	800 [E] 1,000 [D]	-
Distance between Advance Warning Signs (m)	200	200	-
Taper			
Lane Taper Length (m)	180	180	-
Hard Shoulder Taper Rate	1 in 30	1 in 30	-
Transition Length (m)	360	360	-
Cones			
Cone Height (mm)	1,000	1,000	-
Max Taper Spacing (m) [A]	3	3	-
Max Longitudinal Spacing (m) [A]	12	12	-
Lamps (lit or unlit areas)			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
Safety Zones			
Longitudinal (m)	60	60	-
Lateral (m)	1.2	1.2	-
Set Back (m) [F]	0.6	0.6	-
Lanes			
Lane Width (m) [B]	3.3	3.3	-

Notes:

A. Where geometry or any other site-specific reason dictates, the spacing shall be reduced accordingly. 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.
B. Where two lanes are being maintained, the minimum width for lane 1 should be 3.3m and 3m for lane 2 (or subsequent lane on multi-lane carriageways). Where one lane is to be maintained, the minimum lane width for all classes of vehicles is 3.3m.
C. Where there is a narrow central median, 900mm signs may be used in the central median.
D. Where TTM is being placed, or works are taking place, on lane 1 of a ≥ 3 lane carriageway only. Refer also to Section 3.5.7.5 within the Temporary Traffic Management Design Guidance document regarding direct lane 1 closures and associated restrictions.
E. Where TTM is being placed, or works are taking place, on lane 2 or subsequent lane.
F. See definition of Set Back on page 15.

8.2.2.2 Design parameters should be applied, as indicated on the diagrammatic Drawing No. 1 - 000 in Appendix B.

8.2.2.3 For Level 2 roads when the specified lateral safety zone cannot be achieved by application of the minimum design parameters in the tables above the TTM Designer should, in the first instance, consider revising the works method to reduce the working area. Thereafter, **Refer to Section 8.1.7.2** and the principles set out in the Temporary Traffic Management Design Guidance document.

8.2.2.4 Typical layout examples based on the design parameters in Tables 8.2.2.2 to 8.2.2.9 are provided in the Temporary Traffic Management Design Guidance and Temporary Traffic Management Operations Guidance documents.

8.2.3 Speed Limits

8.2.3.1 The speeds stated in Tables 8.2.2.2 to 8.2.2.9 are the speed limits on the approaches to the roadworks. These will typically be the limits posted on the road prior to the TTM 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 classification and associated design parameters of the road may be based on the roadworks speed limit.

8.2.3.2 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.

8.2.3.3 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 Roadworks Speed Limit Order;
- Cautionary Speed using Supplementary Plate P 011; and
- Advance warnings of the speed limit may also be provided by using Sign F 401. These alternatives are discussed below.

Roadworks Speed Limit Order

8.2.3.4 If the TTM Designer 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.

8.2.3.5 Local Authority Chief Executives have powers under the Road Traffic Act 2004 to make a Roadworks Speed Limit Order for the purpose of applying a speed limit to a part of a road where roadworks are being carried out. It is necessary to follow the prescribed process to implement a Roadworks Speed Limit Order. The order requires a predefined extent and duration (not exceeding 12 months) and therefore, the need for a Roadworks Speed Limit Order be considered well in advance.

8.2.3.6 On national roads, the prior consent of Transport Infrastructure Ireland (TII) is required for the making of a Roadworks Speed Limit Order.

8.2.3.7 Where a Roadworks 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.

8.2.3.8 Advice on the use of Roadworks Speed Limit Orders and the procedure for making the orders, is given in the DTTAS publication "Guidelines for Setting and Managing Speed Limits in Ireland". That advice is not repeated here.

8.2.3.9 A roadworks speed limit must be one from the range of speed limits set out in the Road Traffic Act 2004. (30, 40, 50, 60, 80 or 100km/h) No other speed limit shall be used.

8.2.3.10 The speed limit chosen typically should not be 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.

8.2.3.11 It should preferably be the design speed adopted for the geometric layout of the traffic route through the works. However, on Level 3 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 maybe reduced further at a specific location such as a crossover if necessary.

8.2.3.12 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 Table 8.3.1.5.

8.2.3.13 The speed limit signs to depict the start and end of the Roadworks 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.

8.2.3.14 Where the signs 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.

8.2.3.15 The first temporary sign to be placed at the start of the roadworks is Sign WK 001 Roadworks Ahead. Therefore, where a Roadworks Speed Limit Order is to be implemented, the first Sign WK 001 shall be positioned before the sign displaying the roadworks speed limit. Sign WK 001 should have a supplementary plate stating the distance to the start of the roadworks taper. Similarly, WK 001 with an End plate shall be positioned before the permanent speed limit.

8.2.3.16 The roadworks speed limit must be displayed at any side roads entering the TTM measures. Adequate visibility should be provided to these signs.

8.2.3.17 Speed restrictions shall extend to a minimum of 45m beyond the end of the TTM. Sign WK 001 with a supplementary plate END shall be positioned before the permanent speed limit.

8.2.3.18 Where a roadworks speed limit is applied, that speed limit should be displayed at regular intervals on all roads. The spacing of repeater signs is detailed in the "Guidelines for Setting and Managing Speed Limits in Ireland ". 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

8.2.3.19 Where it is not appropriate or practicable to impose a mandatory roadworks speed limit, a Cautionary Speed may be signed. Examples are where the works are of short duration or 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 Level 3 roads it may not be practicable or appropriate to install a layout with a low geometric design speed.

P 011

8.2.3.20 A Cautionary Speed sign does not require an Order, but the TTM Designer should consult with the Road Authority before implementing a cautionary speed.

8.2.3.21 The speed chosen shall be one from the following list: 25, 35, 45, 55, 65, 75 or 85km/h. These speeds are deliberately different from the regulatory speed limits. Very slow speeds should not be used unless absolutely necessary.

8.2.3.22 A Cautionary Speed shall be signed by erecting Sign WK 001 with Supplementary Plate P 011 depicting the recommended maximum speed. Subject to 8.2.3.23, 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.

8.2.3.23 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 Slippery Road or WK 073 Loose Chippings as appropriate and be preceded by the first Sign WK 001, which should have a supplementary plate stating the distance to the roadworks.

Speed Limit Ahead

8.2.3.24 Sign F 401 Speed Limit Ahead, may be used to inform road users that they are approaching a regulatory roadworks speed limit. Its use is recommended on Level 3 roads, but it may be used on other roads where the roadworks speed limit is considerably lower than the approach speed of traffic. Sign F 401 shall only be used where a statutory speed limit is in force.

F 401

8.2.3.25 On high speed roads, Sign F 401 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 Surfaces

8.2.3.26 Where traffic is to travel on an unfinished surface during phases of roadworks, Signs WK 072 Slippery Road, with Supplementary Plate P 085 Unfinished 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**.**

WK 072

8.2.3.27 In some cases, however, it will be necessary to leave the unfinished surface carrying traffic. The unfinished surface may not meet the surface texture and aggregate requirements of the TII Publication on Surfacing Materials (DN-PAV-03023). Such unfinished surface 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.

8.2.3.28 In such circumstances, the rest of the roadworks may have been finished and most of the TTM 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 road users to the temporary nature of the road surface. If appropriate, a regulatory roadworks speed limit may remain in force, or additional Signs WK 072 may be erected with Supplementary Plate P 011 indicating a Cautionary Speed.

P 085

8.2.3.29 The first sign visible to the road user on any TTM layout at roadworks shall always be sign WK 001 Roadworks Ahead. At the end of the roadworks the last temporary sign presented to the road user shall be Sign WK 001 together with Supplementary Plate P 010 End.

8.2.3.30 If road markings are required on an unfinished road refer to Section 8.3.5.

8.2.4 Road Closures and Detours

Road Closures

8.2.4.1 When a road closure is required, the procedure set out in Section 75 of the Roads Act 1993 shall be followed and can only be implemented by the Road Authority. Sign WK 094 Road Closed should be used in conjunction with Sign WK 001 Roadworks Ahead when a road is closed to facilitate roadworks.

WK 094

8.2.4.2 The proposed diversion route must be approved by the relevant Road Authority. If this diversion route crosses a county or city boundary, the Road Authority in the adjoining area will need to be included in the approval and implementation procedure.

8.2.4.3 Adequate time should be allowed to comply with the prescribed Road Closure process.

8.2.4.4 When a closure is required, a diversion route suitable of accommodating the types and volumes of traffic should 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 typically be necessary to sign the diversion route. Such signage should be clear and consistent, guiding the traffic through each decision point until it rejoins the route from which it was diverted.

8.2.4.5 If a temporary road is constructed, consideration should to be given to the possible presence of utilities or street furniture that may need relocating, protecting or diverting. Height restrictions should be clearly signed and protected.

Detours

8.2.4.6 For a diversion route using an existing road network, the following guidelines should be considered when choosing an alternative route:

(a) Characteristics of the roads on the diversion route should be similar to the road to be closed. 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.

(b) 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.

(c) The shortest suitable route possible should be used.

(d) For short uncomplicated diversion routes Signs WK 090 Detour and WK 091 Diverted Traffic should be used to direct traffic. For longer more complicated diversion routes a destination or route number may be shown in addition to the text and arrow.

(e) Diversions routes should be maintained in a satisfactory condition throughout the period of the diversion.

WK 090

WK 091

8.2.4.7 Not all diversion routes will satisfy the above guidelines. Therefore, engineering methods, such as junction improvement, signal alteration, road markings, temporary portable traffic signals or flagmen with Stop & Go discs or convoy methods may be an option to improve the route and flow of traffic.

8.2.5 Works Access

8.2.5.1 Clearly defined access points to the works are required. Access to and from the works area should be considered at the design stage and the following should be considered:

- Slowing down and acceleration space;
- Conflict with other movements;
- Location;
- Width;
- Signing; and
- Swept paths.

8.2.5.2 Vehicles must only enter a works access in the direction of traffic flow. Vehicles are not permitted to stop in a live lane and reverse into a works access.

8.2.5.3 The site access shall be identified by Sign WK 052 Site Access. On roads with a speed limit of >80km/h, an additional WK 052 sign should be positioned 100m in advance of the entrance, with a Supplementary Plate P 001 stating the distance.

WK 052

8.2.6 Night-Time Working

8.2.6.1 Where possible, short-term works on high volume roads should be carried out at off-peak times including night-time working. TTM layouts shall be well lit during the hours of darkness.

8.2.6.2 For works during night-time, additional factors over and above day-time criteria need to be considered, such as:

(a) Visibility and awareness is reduced both for road users and road workers due to tiredness, poor visibility and lighting.

(b) 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.

(c) 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 TTM Designer should determine if additional lighting is required.

8.2.7 Weather Conditions

8.2.7.1 TTM personnel should be aware of the effects of adverse weather, such as decreased visibility in fog or heavy rain, increased stopping distances required, and the reflective glare of sunlight on a wet road surface. It may be appropriate to improve the advance warning by the addition of high intensity flashing warning lights on the approach to the site. It is essential that a risk assessment identifies clearly the hazards associated with adverse weather and that adequate controls are in place.

8.2.8 Vulnerable Road Users

8.2.8.1 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.

8.2.8.2 At roadworks sites, where there is existing provision for pedestrians/cyclists, consideration should be given to providing or maintaining facilities or access.

8.2.8.3 Where footways or off-road cycle tracks are affected by construction or maintenance work, a safe route should be provided for vulnerable road users, 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.

8.2.8.4 Where a footway is closed, pedestrians should be notified at the closest existing crossing point and directed to cross at this point.

8.2.8.5 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.

8.2.8.6 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 vulnerable road users to travel upon.

8.2.8.7 Consideration should be given to the needs of disabled or visually impaired pedestrians. Road workers 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.

8.2.8.8 The desirable 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 minimum width for a temporary footway or a one-way cycle track should be 1.2m. If a shared facility is to be provided then a minimum width of 3.0m should be provided.

8.2.8.9 Where the existing footway is less than the minimum width then the temporary footway should match the existing.

8.2.8.10 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 present a trip hazard or become a hazard if displaced or vandalised.

8.2.8.11 If pedestrian/cyclist demand is high then there may be a requirement to maintain existing signalised crossings or provide additional temporary signalised crossing points or flagmen with Stop and Go discs.

8.2.8.12 Crossing points or site access points should be highlighted to vulnerable road users, and exiting site traffic made aware of the possible presence of vulnerable road users.

8.2.8.13 Where site conditions do not allow for temporary footways 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.

8.2.8.14 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.

8.2.8.15 Where cyclists are to be accommodated on the roadway, the TTM Designer should ensure that the lane widths are adequate to accommodate cyclists as well as vehicular traffic. Further guidance is provided on lane widths in the Temporary Traffic Management Design Guidance document and Temporary Traffic Management Operations Guidance document and shall be adhered to.

8.2.8.16 If it is not possible to maintain an off-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. Sign RUS 009 Pedal Cycles Only with a Supplementary Plate P 010 End should be placed in advance of the roadworks to warn cyclists.

8.2.8.17 Temporary traffic control signals should give cyclists sufficient opportunity to pass safely through roadworks, particularly in shuttle systems where oncoming traffic cannot pass without conflict.

8.2.8.18 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.

8.2.8.19 Further Guidance on Vulnerable Road Users is provided in Temporary Traffic Management Design Guidance and Temporary Traffic Management Operations Guidance documents and shall be adhered to.

8.3 Elements of TTM

8.3.1 Static Signs

8.3.1.1 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 road workers, and for enforcement of traffic regulations.

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

Regulatory – signs which give instructions or apply prohibitions or restrictions which road users must obey;

Warning – signs which warn of hazards, danger or restrictions on the road ahead or advise persons of the precautions to be taken against such danger, or both; 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.

8.3.1.3 A unique 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 8.3.1.1 and 8.3.1.2. These signs have been authorised by a Direction of 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 Direction. Details of the designs of these signs are available from the Department of Transport, Tourism and Sport websites www.dttas.gov.ie and www.trafficsigns.ie

8.3.1.4 Table 8.3.1.1 contains a list of Warning Signs that are used in TTM and Table 8.3.1.2 contains a list of Supplementary Plates which are used in conjunction with them. Their use is shown in layouts in this document along with the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations Guidance documents.

8.3.1.5 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 design may be obtained from www.dttas.gov.ie

8.3.1.6 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 www.dttas.gov.ie

8.3.1.7 The first sign visible to the road user on any TTM layout at roadworks shall always be sign WK 001 Roadworks Ahead. WK 001 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.

8.3.1.8 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 sign WK 093 Detour Destination.

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

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

8.3.1.11 Some other types of signs are used frequently at roadworks. These are chevrons, barrier boards, and Stop and Go discs, as shown in Table 8.3.1.4. The regulatory signs contained in Chapter 5 may also be used at roadworks, where appropriate.

8.3.1.12 Where the distance to the hazard is shown on advance warning signage using Supplementary Plates, the distance displayed shall be rounded to the nearest figures outlined in Table 8.3.1.3.

8.3.1.13 Sign faces shall be of retro-reflective material and the retro-reflectivity, colours, chromaticity and luminance factors shall be as specified in the TII Publication on Specification for Roadworks Series 1200 (CC-SPW-01200) or any further amendments or replacement.

8.3.1.14 Logos, company names and other trademarks shall not be displayed on the front of Regulatory, Warning, Roadworks or Information traffic signs.

Sign No.	Sign Face	Description
WK 001		**Roadworks Ahead:** 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. 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. **End of Roadworks**: 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. **Cautionary Speed:** The Roadworks Ahead sign may also be used at intervals through the roadworks together with Supplementary Plate P 011, Cautionary Speed (see Section 8.2.3).
WK 010		**One-lane Crossover (Out):** 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.
WK 011		**One-lane Crossover (Back):** 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 contra flow.
WK 012		**Move to Left (One Lane):** 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. When this sign is used to direct traffic onto the hard shoulder, it should be used in conjunction with Supplementary Plate P 083, Use Shoulder.
WK 013		**Move to Right (One Lane):** this sign should be used to depict traffic being diverted to the right by approximately one lane width. It is generally used to direct traffic back from the hard shoulder into lane 1 of the main carriageway.
WK 014		**Move to Left (Two Lanes):** 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. When this sign is used to direct traffic onto the hard shoulder, it should be used together with Supplementary Plate P 083, Use Shoulder.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 014A		**Move to Left (Three Lanes):** this sign should be used on a three lane carriageway to depict three lanes of traffic being diverted to the left by approximately one lane width.
WK 015		**Move to Right (Two Lanes):** 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.
WK 015A		**Move to Right (Three Lanes):** this sign should be used on a three or more lane carriageway to depict traffic deviating to the right from the hard shoulder, lane 1 and lane 2 back onto the normal lanes.
WK 016		**Obstruction Between Lanes:** 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		**End of Obstruction Between Lanes:** 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		**Start of Central Reserve or Obstruction:** 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		**End of Central Reserve or Obstruction:** this sign should be used to depict the end of a central reserve or obstruction separating traffic travelling in opposing directions.
WK 020		**Lanes Diverge at Crossover:** this sign should be used on a dual carriageway to depict traffic in lane 1 carrying straight on by deviating to the left and traffic in lane 2 crossing the central reserve to the opposite carriageway at the start of a contra-flow.
WK 021		**Lanes Rejoin at Crossover:** this sign should be used on a dual carriageway to depict traffic in lane 1 carrying straight on by deviating back to the right and traffic in lane 2 crossing back over the central reserve at the end of a contra-flow.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 022		**Two-lane Crossover (Out):** 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		**Two-lane Crossover (Back):** this sign should be used on a dual carriageway to depict two lanes of traffic crossing back over the central reserve to the left-hand carriageway side by side at the end of a contra-flow.
WK 024		**Merge to the Right:** this sign should be used to inform the road user they will be required to merge to the right ahead. This sign should have a Supplementary Plate P 001 stating the distance to the merge point.
WK 030		**Single Lane (for Shuttle Working):** 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 road users that they will not encounter oncoming traffic.
WK 031		**Two-way Traffic:** 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		**Road Narrows on Left:** this sign should be used to depict roadworks on the left side of the carriageway on Level 1 or Level 2 roads 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		**Road Narrows on Right:** this sign should be used to depict roadworks on the right side of the carriageway on Level 1 or Level 2 roads 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		**Road Narrows on Both Sides:** this sign should be used to depict roadworks on both sides of the carriageway on Level 1 or Level 2 roads 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.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 035		**Merging Traffic from Left:** this sign should be used where two physically separated streams of traffic proceeding in the same direction join the same undivided section of the carriageway. This sign should be used on the main carriageway where a stream of traffic merges from the left.
WK 040		**Lane 2 of 2 Closed:** this sign shall be used on a two-lane Level 3 road to depict a lane 2 closure.
WK 040A		**Lane 2 of 2 Closed:** this sign should be used on a two-lane Level 1 road to depict a lane 2 closure.
WK 041		**Lane 1 of 2 Closed:** this sign shall be used on a two-lane Level 3 road to depict a lane 1 closure.
WK 041A		**Lane 1 of 2 Closed:** this sign should be used on a two-lane Level 1 road to depict a lane 1 closure.
WK 042		**Lane 3 of 3 Closed:** this sign shall be used on a three-lane Level 3 road to depict a lane 3 closure.
WK 042A		**Lane 3 of 3 Closed:** this sign should be used on a three-lane Level 1 road to depict a lane 3 closure.
WK 043		**Lane 1 of 3 Closed:** this sign shall be used on a three-lane Level 3 road to depict a lane 1 closure.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 043A		**Lane 1 of 3 Closed:** this sign should be used on a three-lane Level 1 road to depict a lane 1 closure.
WK 044		**Lane 2 & 3 of 3 Closed:** this sign shall be used on a three-lane level 3 roads to depict closure of lanes 2 and 3.
WK 044A		**Lane 2 & 3 of 3 Closed:** this sign should be used on a three-lane Level 1 road to depict closure of lanes 2 and 3.
WK 045		**Lane 1 & 2 of 3 Closed:** this sign shall be used on a three-lane Level 3 road to depict closure of lanes 1 and 2.
WK 045A		**Lane 1 & 2 of 3 Closed:** this sign should be used on a three-lane Level 1 road to depict closure of lanes 1 and 2.
WK 046		**Lane 4 of 4 Closed:** this sign shall be used on a four-lane Level 3 road to depict a lane 4 closure.
WK 047		**Lane 1 of 4 Closed:** this sign shall be used on a four-lane Level 3 road to depict a lane 1 closure.
WK 048		**Lane 3 & 4 of 4 Closed:** this sign shall be used on a four-lane Level 3 road to depict closure of lanes 3 and 4.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 049		**Lanes 1 & 2 of 4 Closed:** this sign shall be used on a four-lane Level 3 road to depict closure of lanes 1 and 2.
WK 050		**Side Road on Left:** this sign should be used to indicate the presence of a road junction ahead to the left created by the roadworks.
WK 051		**Side Road on Right:** this sign should be used to indicate the presence of a road junction ahead to the right created by the roadworks.
WK 052		**Site Access:** this sign should be used to indicate the position of a site entrance and/or exit. On roads with a speed limit of >80km/h, an additional sign WK 052 should be positioned 100m in advance of the entrance, with a Supplementary Plate P 001 stating the distance. At sites with several entrances, a supplementary colour code or numbering system may be used with this sign.
WK 060		**Temporary Traffic Signals:** this sign should be used to indicate the presence ahead of traffic control by means of temporary traffic signals. 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 >80km/h.
WK 061		**Flagman Ahead:** this sign should be used to indicate the presence ahead of manual or automated traffic control by means of Stop and Go discs. 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 >80km/h.
WK 062		**Queues Likely:** 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. This sign shall be preceded by a Roadworks Ahead Sign WK 001 with a Supplementary Plate P 001 stating the distance to the start of the roadworks.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 070		**Hump or Ramp:** this sign should be used to indicate the presence of a hump in the road either due to roadworks or a traffic calming measure.
WK 071		**Uneven Surface:** this sign may be used to indicate that there is an uneven surface for vehicles, usually associated with the different layers of surfacing or planning of the road surface. At the start of the relevant section of road, this sign should be erected with Supplementary Plate P 080 Slow.
WK 072		**Slippery Road:** 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 is typically used where traffic is running on a temporary surface or the final surfacing has not yet been laid. Supplementary Plate P 085 Unfinished Surface, and Plate P 011 Cautionary Speed, may be used in conjunction with Sign WK 072. 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 TTM is removed.
WK 073		**Loose Chippings:** this sign should be used to indicate that there is a risk of airborne chippings or stones due to a surfacing operation being undertaken. 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.
WK 074		**Soft Verge:** Where it is considered necessary to warn road users of soft verges, Sign WK 074 Soft Verge, may be erected.
WK 080		**Pedestrians Cross to Left:** this sign shall be used to indicate that a footway is closed ahead and pedestrians should cross to the left at this point. This sign may also be used to direct pedestrians.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 081		**Pedestrians Cross to Right:** this sign shall be used to indicate that a footway is closed ahead and pedestrians should cross to the right at this point. This sign may also be used to direct pedestrians.
WK 082		**Temporary Pedestrian Crossing:** this sign should be used to indicate the location of a temporary crossing point where the road user would not typically expect to encounter pedestrian movement at such a location.
WK 084		**Cyclists Keep Left:** this sign should be used to direct cyclists to the left.
WK 085		**Cyclists Keep Right:** this sign should be used to direct cyclists to the right.
WK 086		**Cyclists:** is available for use where it is considered necessary to warn traffic of the likely presence of a significant number of cyclists. A supplementary plate P 002 Length may be used where the length of the lane width restriction is greater than 250m.
WK 087		**Slippery for Cyclists:** may be provided where roadworks may, due to a slippery surface, cause problems for cyclists.
WK 090		**Detour:** 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 8.3.1.3.
WK 091	 	**Diverted Traffic:** 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. On diversions with long distances between decision points, the straight ahead variant should be repeated at intervals, to reassure road users that they are still on the correct route.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 092		**End of Detour:** this sign should be placed at the end of a diversion route, to advise road users that they are back on the original route.
WK 093	 Typical sign	**Detour Destination:** for complicated diversion routes, Signs WK 093, are to be used in place of the Diverted Traffic signs. (along the diversion route) 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 may only be used for diversion routes. Existing Direction Signs that do not contradict the roadworks signs, shall remain in place for the duration of the works.
WK 094		**Road Closed:** this sign should only be used in conjunction with WK 001 when a road has been closed to facilitate roadworks.
WK 095		**Stop Here On Red:** this sign may be used to indicate to road users where to stop when temporary traffic controls are in place.
WK 096		**Free Recovery:** this sign should be used to indicate to road users that there is a free recovery service in operation within the works. The sign should be repeated at 500m intervals. The telephone number must be varied to suit.
WK 097		**Free Recovery End:** this sign should be used to indicate to road users where the end of the free recovery service takes effect beyond the works.
WK 098		**Convoy System in Operation:** this sign should be used, in conjunction with either sign WK 060 or WK 061, to indicate to road users that a convoy system is in operation through the works.
WK 099		**Follow Me:** this sign should be displayed on the back of a convoy vehicle.
WK 100		**Lane 2 of 2 Narrow**: this advance Warning Sign shall be used where a narrow lane system is being implemented on lane 2 of a 2-lane carriageway.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 101		**Lane 3 of 3 Narrow:** this advance Warning Sign shall be used where a narrow lane system is being implemented on lane 3 of a 3-lane carriageway.
WK 102		**Lanes 2 & 3 of 3 Narrow:** this advance Warning Sign shall be used where a narrow lane system is being implemented on lanes 2 and 3 of a 3-lane carriageway.
WK 105		**Lane 2 of 2 Narrow:** this Regulatory Sign shall be installed on both sides of the carriageway at the start of the narrow lane system on lane 2 of a 2-lane carriageway.
WK 106		**Lane 3 of 3 Narrow:** this Regulatory Sign shall be installed on both sides of the carriageway at the start of the narrow lane system on lane 3 of a 3-lane carriageway.
WK 107		**Lanes 2 & 3 of 3 Narrow:** this Regulatory Sign shall be installed on both sides of the carriageway at the start of the narrow lane system on lanes 2 and 3 of a 3-lane carriageway.
WK 110		**Lane 2 of 2 Closed MLC:** this sign shall be used on the advance warning vehicles in a Mobile Lane Closure when closing lane 2 of 2.
WK 111		**Lane 1 of 2 Closed MLC:** this sign shall be used on the advance warning vehicles in a Mobile Lane Closure when closing lane 1 of 2.
WK 112		**Lane 3 of 3 Closed MLC:** this sign shall be used on the advance warning vehicles in a Mobile Lane Closure when closing lane 3 of 3.

Table 8.3.1.1: Warning Signs for Use at Roadworks

Sign No.	Sign Face	Description
WK 113		**Lane 1 of 3 Closed MLC:** this sign shall be used on the advance warning vehicles in a Mobile Lane Closure when closing lane 1 of 3.
WK 114		**Lanes 1 & 2 of 3 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lanes 1 & 2 of 3.
WK 115		**Lanes 2 & 3 of 3 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lanes 2 & 3 of 3.
WK 116		**Lane 4 of 4 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lane 4 of 4.
WK 117		**Lane 1 of 4 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lane 1 of 4.
WK 118		**Lanes 1 & 2 of 4 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lane 1 & 2 of 4.
WK 119		**Lanes 3 & 4 of 4 Closed MLC:** this sign shall be used on advance warning vehicles in a Mobile Lane Closure when closing lanes 3 & 4 of 4.

Table 8.3.1.1: Warning Signs for Use at Roadworks

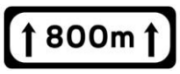
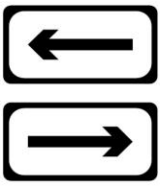
Plate No.	Sign Face	Description
P 001		**Distance:** this plate may be used in conjunction with any roadworks sign to indicate the distance to a hazard. The distance shown on the plate shall be in accordance with Table 8.3.1.3.
P 002		**Length:** this plate may be used in conjunction with any roadworks sign to indicate the extent of the hazard. The distance shown on the plate shall be in accordance with Table 8.3.1.3.
P 003L **P 003R**		**Direction:** these plates may be used in conjunction with any roadworks sign to indicate the direction to a hazard.
P 004L **P 004R**		**Direction and Distance:** 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 8.3.1.3.
P 010		**End:** 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		**Cautionary Speed**: 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, 75 or 85km/h. See Section 8.2.3.
P 067		**Safe Height for Overhead Electric Cables:** this plate may 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		**Slow:** 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 8.3.1.2: Supplementary Plates for Use at Roadworks

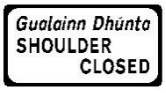
Plate No.	Sign Face	Description
P 081		**Concealed Entrance:** this plate may be used in conjunction with Signs WK 050, WK 051 or WK 052 to indicate the presence of a concealed site entrance or existing entrance within the works.
P 082	 Typical sign	**Type of Works:** these plates may be used in conjunction 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: Ahead — Romhat Bridge Inspection — Iniúchadh Droichid Bridge Repairs — Deisiú Droichid Drainage Work — Obair Draenála Grass Cutting — Bearradh Féir Gritting — Grean á Leagan Gully Emptying — Folmhú Clasán Hedge Cutting — Bearradh Fál Line Painting — Línphéinteáil Litter Picking — Bailiú Bruscair Mobile Roadworks — Oibreacha Bóthair Soghluaiste No Road Markings — Níl Aon Mharcanna Bóthair Road Marking — Marcáil Bóthair Road Repairs — Deisiú Bóthair Road Resurfacing — Athdhromchlú Salting — Sailleadh Stud Fitting — Feistiú Stodaí Surveying — Suirbhéireacht Sweeping — Scuabadh Tree Cutting — Bearradh Crann Weed Spraying — Spraeáil Fiailí
P 083		**Use Shoulder:** this plate should 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		**Shoulder Closed:** this plate should be used in conjunction with Sign WK 001 to indicate that the hard shoulder, but not the traffic lanes, is closed temporarily.
P 085		**Unfinished Surface**: this plate should be used in conjunction with Sign WK 072 Slippery Road, to indicate that the final surfacing has not yet been laid.
P 086		**On Slip Road**: this plate should be used in conjunction with Sign WK 001 and all other advance Warning Signs on the mainline or side roads to indicate that the works are being carried out on the diverge or merge slips.

Table 8.3.1.2: Supplementary Plates for Use at Roadworks

Measured Distance to Hazard	Distance on Plate to be Rounded to Nearest
< 100m	10m
≥ 100m < 500m	50m
≥ 500m < 900m	100m
≥ 900m < 4,000m	0.5km
≥ 4,000m	1km

Note:

- For Level 3 (i) roads the distance plates on the advance warning signs shall be as per the Design Parameter Tables at 120m spacing.

Table 8.3.1.3: Distances for Supplementary Plates

Sign No.	Sign Face	Description
W 062L **W 062R** **W 063L** **W 063R**	 	**Chevron Boards:** Chevron boards are used to direct traffic at a change of direction. At roadworks, they are typically situated behind a line of cones or other barrier in the line of sight of approaching road users. Standard chevron boards have two or three chevrons, but longer boards may be used (see Chapter 6).
W 110		**Restricted Headroom:** Where a Warning Sign is appropriate, Sign W 110 should be used, with the available headroom indicated in meters to one decimal place.
W 111	 	**Overhead Electrical Cables:** 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). Sign W 111 may 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.
W 183 **W 184** **W185**	 	**Barrier Boards:** Barrier boards indicate that a lane is closed. At roadworks, they are typically 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 a closed lane. Standard barrier boards have three, four or five red bars. They shall always start and finish with a red bar (see Chapter 6).
RUS 039 to RUS 044 and RUS 064	 **RUS 043** **RUS 042**	**Speed Limit:** Speed limit signs (RUS 039 to RUS 044 and RUS 064) 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 particular works. Speed Limit signs may show a speed of 120, 100, 80, 60, 50, 40 or 30km/h. No other speed limit value shall be used. A speed limit sign should be erected on both sides of the carriageway. Table 8.3.1.5 outlines the size and spacing of Roadworks Speed Limit Signs. Repeater signs should be provided at a maximum of 500m intervals and after a junction. See Section 8.2.3 and Chapter 5 for further details.

Table 8.3.1.4: Other Signs for Use at Roadworks

Sign No.	Sign Face	Description
RUS 014		**No Overtaking:** No Overtaking sign prohibits overtaking at locations where it is considered dangerous to do so (see Chapter 5). The overtaking restriction ends at WK 001 with a Supplementary Plate P 010, End.
RUS 026		**Yield:** 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).
RUS 027		**Stop:** 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).
RUS 001		**Keep Left:** Traffic must pass to the left of the sign. Used at a nosing or similar, where all traffic must pass to the left (see Chapter 5).
RUS 002		**Keep Right:** Traffic must pass to the right of the sign. Used at a nosing or similar, where all traffic must pass to the right (see Chapter 5).
RUS 003		**Pass Either Side:** 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).
RUS 009		**Pedal Cycles Only:** Indicates the presence of a cycle track, and prohibits all vehicles except non-mechanically propelled pedal cycles and mechanically propelled wheelchairs. To end a cycle track, this sign should be erected with Supplementary Plate P 010, End, beneath it.
RUS 060 **RUS 061**	 	**Stop and Go:** Stop and Go discs shall display STOP with a red background on one side and GO with a green background on the reverse. These signs are used for controlling traffic by manual or automated methods. See Sections 8.3.7. These signs must be either 450mm, 600mm or 750mm in diameter. 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.
RUS …	**Various**	**Other Regulatory Signs:** Where a need arises, any of the regulatory signs in Chapter 5 may be used at roadworks.
F 401		**Speed Limit Ahead:** 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 8.3.1.3. The speed limit displayed shall match the regulatory speed limit for which this sign is advance notification. See Section 8.2.3 and Chapter 4.

Table 8.3.1.4: Other Signs for Use at Roadworks

Speed/Speed Limit (km/h)	Sign Size (diameter)		Approximate Repeater Spacing (*where used*) (m)
	Normal Sign (mm)	Repeater Sign [1] (mm)	
30	450 (600)	300 (450)	200 to 500
40	600	450	200 to 500
50	600 (750) [2]	450 (600) [2]	500
60	600 (750) [2]	450 (600) [2]	500
80 [3]	600 (750) [2]	450 (600) [2]	500
100	750 (900) [2]	600 (750) [2]	500
120	900 (1200) [2]	-	-
Motorways and Dual Carriageways Slip roads	750 (900) [2]	-	500

Notes:

1. Repeater Speed Limit signs shall be at least one step in size below the normal Speed Limit Sign used.
2. The larger bracketed size may be used on multi-lane single carriageways, dual carriageways and motorways, or where it is considered that greater prominence of the sign is necessary.
3. Sign RUS 041A (Rural Speed Limit Sign) is not permitted for use at roadworks.

Table 8.3.1.5: Size and Spacing of Roadworks Speed Limit Signs

8.3.2 Size, Positioning and Layout of Signs

8.3.2.1 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 the following shall be permitted:

- Level 1 Roads, a minimum of 100mm clearance to the underside of the supplementary plate, or sign whichever is applicable;
- Level 2 Roads, a minimum of 300mm clearance to the underside of the sign, if a supplementary plate is used it shall be visible to the motorists; and
- Level 3 Roads, a minimum of 500mm clearance to the underside of the supplementary plate, or sign whichever is applicable.

8.3.2.2 It should be noted that lower mounted signs will require more frequent cleaning. The positioning and number of signs recommended are tabulated in Section 8.2.2 for each road classification level and roadworks type.

8.3.2.3 Signage for work vehicles within the site should be positioned to ensure clarity to the road user.

8.3.2.4 The size of signs at roadworks and text required on these signs is directly related to the road type and the speed limit of the road. Table 8.3.2.1 shows the recommended sizes for Warning Signs and 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, Tourism and Sport website www.trafficsigns.ie, for the exact "x" height, dimensions of signs and supplementary plates containing text.

8.3.2.5 For Level 3 roads a horizontal clearance of 1200mm should be provided between the edge of signs and live traffic lane. However, where space is limited or where there are obstructions or constraints, an minimum of 600mm should apply.

8.3.2.6 The approaching road user must have adequate visibility to TTM. Table 8.3.2.2 outlines the minimum required visibility which must be provided when using Stop and Go and Traffic Signals.

Level		Carriageway Type	Speed Limit / Speed (km/h)	Diamond Warning Sign Length of Side (mm)	Circular Regulatory Sign Diameter (mm)
Main	Sub				
Level 1	i	Single	≤ 30	450	450
	ii	Single	40	450	450
	iii	Single	50	600	600
	iv	Single	60	600	600
		Multi-Lane / Dual	≤ 60	600	600
Level 2	i	Single	80	600	(600) 750
	ii	Single	100	750	(750) 900
Level 3	i	Dual and Motorway	80	750	(750) 900
	ii	Dual and Motorway	≥ 100	1200	1200 (1500)

Notes:
1. The dimension for a diamond shaped sign is measured along an edge.
2. The dimension for a square 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 the working drawings on www.trafficsigns.ie for details of sign design and required dimensions.
4. For Level 3 roads when using WK 040 to WK 049 these signs shall be 1200mm square.
5. For Level 3 roads with narrow medians (<2.6m), the size of diamond sign in the central reserve may be reduced from 1200mm to 900mm.
6. For Sizes of Roadworks Speed Limit Signs see Table 8.3.1.5.
7. Setting out Roadworks Ahead sign on Level 3 roads uses VMS, trailer boards or static signs that incorporate two advance Warning Signs, Roadworks Ahead and Lane closures. The Roadworks Ahead sign on the trailer board should have a length of side of minimum 600mm.
8. Where given, the larger bracketed size may be used if greater prominence of the sign is considered necessary.
9. Where given, the smaller bracketed size should be used where site conditions make the provision of the recommended size impracticable or where special considerations apply.

Table 8.3.2.1: Roadworks Sign Dimensions

Level		Carriageway Type	Speed / Speed Limit / (km/h)	Visibility to Stop and Go & Traffic Signals (m)
Main	Sub			
Level 1	i	Single	≤ 30	25
	ii	Single	40	35
	iii	Single	50	50
	iv	Single	60	60
		Multi-Lane / Dual	≤ 60	60
Level 2	i	Single	80	90
	ii	Single	100	120
Level 3	i	Dual and Motorway	80	120[1]
	ii	Dual and Motorway	≥ 100	N/A[2]

Notes:
1. Use of Stop and Go or Traffic Signals on Level 3(i) require a site specific TTM Plan by a TTM Designer.
2. Stop and Go and Traffic Signals are not applicable on Level 3(ii)

Table 8.3.2.2: Visibility to Stop and Go / Traffic Signals

8.3.3 Static Sign Supports and Stands

8.3.3.1 Temporary sign supports or stands should be designed in accordance with the TII Publication for Specification for Roadworks Series 1200 (CC-SPW-01200).

8.3.3.2 Sandbagging is an effective method of securing sign frames. Ballast used to stabilise sign frames shall be in the form of fine, granular material contained in a sack. Where ballast is used on a sign frame, or stand it must be no higher than 300mm above ground level.

Signs with Large Diameter Poles and Foundations

8.3.3.3 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 ≥100km/h, posts with a diameter greater than 90mm require a safety barrier. See TII Publication on Safety Barriers (DN-REQ-03034) for specific requirements.

8.3.3.4 As an alternative, passively safe signposts to IS EN 12767 Passive Safety of Support Structure for Road Equipment, 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 incident, a post or sign face may cause a secondary incident by being displaced into the adjacent carriageway.

8.3.3.5 On roads with speeds of >100km/h, Variable Message Signs shall be regarded as a hazard and treated in the same way as described for large static signs. They should be located behind a vehicle restraint barrier.

8.3.4 Variable Message Signs

8.3.4.1 The design and specification of Variable Message Signs (VMS) at roadworks should be in accordance with Chapter 3, Guidelines for the Use of Variable Message Signs on National Roads and TII Guidelines for the Use of Variable Message Signs on All-Purpose & Motorway Roads.

8.3.4.2 VMS may be used at roadworks to depict a Regulatory Sign such as a RUS 001 Keep Left, RUS 002 Keep Right arrow or a Warning Sign such as a chevron. Recommendations for the use of VMS are contained in Chapter 3 and the Temporary Traffic Management Design Guidance document.

8.3.4.3 Mobile VMS are an additional form of TTM and must not be used to replace the normal signs or devices used for TTM.

8.3.4.4 Permanent VMS may be used as part of TTM arrangements subject to a site specific risk assessment and the approval of the overseeing organisation.

8.3.4.5 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 road users 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.

8.3.4.6 If a VMS is used to show text, the message should consist of preferably one frame, and at most two frames. Table 8.3.4.1 shows the recommended minimum text sizes for the various speed limits.

8.3.4.7 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. Included in Table 8.3.4.1 is the minimum visibility distance to the VMS to ensure the road user has sufficient time to read the message.

Speed Limit (km/h)	Minimum character Size (mm)	Minimum Visibility (m)
50 - 80	250	90
100	400	160
120	450	215

Table 8.3.4.1: VMS Character Size and Visibility

8.3.4.8 A light emitting VMS 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 road users;
- **Phantom Messages** – characters or messages appear to be visible to the road user even if the sign is switched off.

8.3.4.9 If these problems occur, then mitigating measures such as a canopy, hood or louvre may be required to avoid miscommunication and confusion to the road user.

8.3.4.10 VMS should be accompanied by suitable delineation devices. The guidance given in the Temporary Traffic Management Design Guidance document should be adhered to when locating VMS.

8.3.4.11 A VMS must be used in accordance with the manufactures' instructions.

8.3.5 Delineation Devices

8.3.5.1 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 Vertical Roads Signs and manufactured specifically for use in TTM.

8.3.5.2 The retro-reflective material used on delineation devices should be to IS EN13422 and have a smooth, sealed outer surface that will display approximately the same colour day or night.

8.3.5.3 The recommended positioning, spacing, size and tapers for delineation devices are tabulated in Section 8.2.2 for each road classification and roadwork type.

Cones and Cylinders

8.3.5.4 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 8.3.5.1 shows the sizes of cones to be used for the different road levels.

Level		Carriageway Type	Speed Limit / Speed (km/h)	Minimum Height of Cone (mm)
Main	Sub			
Level 1	i	Single	≤ 30	750*
	ii	Single	40	750*
	iii	Single	50	750*
	iv	Single	60	750*
		Multi-Lane / Dual	≤ 60	750
Level 2	i	Single	80	750*
	ii	Single	100	1000
Level 3	i	Dual and Motorway	80	750
	ii	Dual and Motorway	≥ 100	1000

Note:
* 450mm high cones are permitted for works such as road surveying, inspection stops and Type C works on single carriageway roads only.

Table 8.3.5.1: Cone Size and Spacing

8.3.5.5 Cylinder type delineators should be designed to allow them to be 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.

Road Markings

8.3.5.6 Temporary road markings should conform to IS EN 1436 Road Marking Materials and be as per the road markings defined in Chapter 7.

8.3.5.7 Existing road markings should be removed or obscured prior to the application of temporary road markings.

8.3.5.8 Permanent road markings should not be altered for short-term works.

8.3.5.9 Temporary road markings must be removed and replaced to represent a change in the TTM layout or when the permanent layout is completed.

8.3.5.10 Where temporary road markings are being provided on a roadworks site, the markings may be orange coloured. These orange markings may be for centre line, edge lines, traffic lane lines, hatching and direction arrows with dimensions and use as defined in Chapter 7.

8.3.5.11 Road markings which are in conflict with temporary traffic requirements should be removed. For example, when vehicles would otherwise have to pass over raised rib lines at changeover and crossover positions or chevron markings at junctions, or when two or more parallel lanes of traffic are changing lanes. However, raised rib and other lane markings may be left in-situ, where they match with the temporary lane markings.

Road Studs

8.3.5.12 If a section of an existing road with road studs or markings is altered for an extended period of time, then temporary road studs may be used to define the temporary traffic lanes.

8.3.5.13 Temporary road studs should be to IS EN 1463 Road Marking Materials, be luminous orange and fixed to the road surface in a way that permits removal without damaging the surface.

8.3.5.14 Consideration should be given to the use of temporary road studs in place of temporary road markings at sites with TTM arrangements.

8.3.5.15 On an existing road with road studs, if TTM is required during the hours of darkness or in poor visibility, then temporary road studs should be provided, if the permanent studs have been removed.

8.3.5.16 Where there are two or more lanes of traffic in one direction through the works, temporary road studs should be used to provided appropriate delineation between the lanes. Conflicting road studs or markings should be removed or obscured.

8.3.6 Impact Protection Vehicle (IPV)

8.3.6.1 An Impact Protection Vehicle (IPV) has a crash cushion mounted on the rear of the vehicle. They may be used to mitigate the effects of errant vehicles colliding with a stationary obstacle, works vehicle or works site. Their main use is in mobile lane closures for Level 3 roads. However, they may be used as part of static TTM.

8.3.6.2 The main function of an IPV is to decelerate the errant vehicle to a stop with minimum damage or injury. They are used to alert road users to the presence of roadworks vehicles on the hard shoulder or on a live lane and, by association, road workers.

8.3.6.3 If the longitudinal safety zone specified in the design parameters cannot be achieved, then consideration should be given to the use of an IPV to mitigate the effects of the reduced zone length.

8.3.6.4 An IPV should, as a minimum, conform to the performance specification described in IS EN 1317-3 rated to TB32 under IS EN 1317-2.

8.3.6.5 An IPV 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 brakes when any contact is made with the rear of the IPV. This will reduce the risk of the IPV vehicle being shunted forward and possibly causing a secondary incident.

8.3.6.6 Vehicles fitted with crash cushions 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.

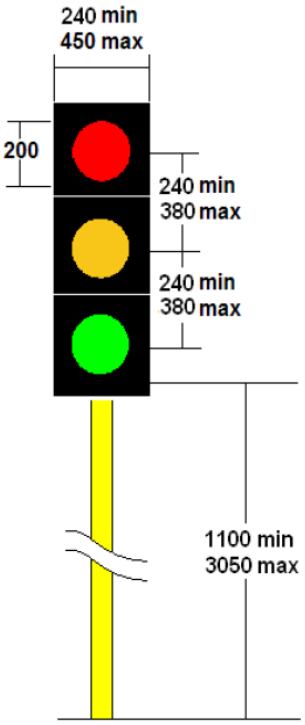
8.3.6.7 Vehicles fitted with crash cushions shall provide, for all occupants, seat belts with a minimum of three points of anchorage and head restraints correctly positioned.

8.3.7 Temporary Traffic Control

8.3.7.1 Temporary portable traffic signals are frequently required to control traffic at roadworks, either as part of a revised junction layout, or to control alternate shuttle working. Traffic signals for TTM differ from permanent signals in that they have:

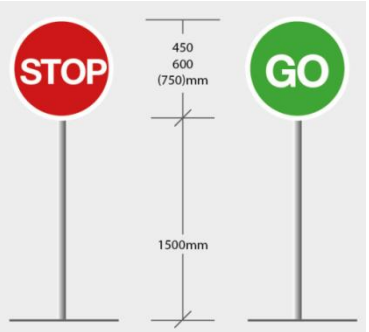
- Only one primary signal;
- No secondary signal; and
- No associated road markings (stop line).

Additionally, the minimum mounting height is reduced to 1100mm, although the requirements for visibility by approaching traffic shall still be observed.



8.3.7.2 Temporary traffic signals should be vehicle actuated, where warranted by 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 volumes are low, the system should ensure that red aspects are not excessive.

8.3.7.3 Where simple traffic control is adequate, such as at plant crossings or short lengths of shuttle working, Stop and Go 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, on the other (see Table 8.3.1.4). 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.



8.3.7.4 When using Stop and Go discs the dimension from the lowest edge of the RUS 060 and 061 to the paved surface should not be less than 1.5m.

8.3.7.5 Stop and Go discs may also be used where traffic flow in one direction might be significantly higher and the maximum timing for vehicle actuated traffic signals may not be appropriate.

8.3.8 Temporary Lighting

8.3.8.1 The layout of temporary overhead lighting should be designed to ensure that a continuous level of light is achieved and road users are not dazzled or shadows cast on the carriageway.

8.3.8.2 If high masts are used then temporary safety barriers should be provided in accordance with IS EN 1317 Road Restraint Systems and TII Publication on Safety Barriers (DN-REQ-03034). Other low-level lighting apparatus should be positioned within the works area and protected by cones.

8.3.8.3 The TTM Designer should indicate in the TTMP the type of lighting to be used.

8.3.8.4 For complex TTM arrangements or to enhance the visibility of the works boundary, a steady state 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.

8.3.8.5 At night, lines of cones in un-lit areas should be fitted with steady state lamps with amber light or a combination of steady state amber lamps and rotating amber reflectors at regular intervals.

8.3.8.6 Rotating reflectors may be used in place of steady state lamps on the longitudinal sections of cones or barriers adjacent to the trafficked edge. Rotating reflectors are not permitted on lead-in tapers.

8.3.8.7 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, obscure the cone, affect its stability or protrude into the carriageway.

8.3.8.8 On Level 3 roads, the lead-in taper may be lit with steady state lamps or sequential lamps from the start to the end of the taper but not both. Where sequential lamps are used, lamp spacing can be increased to a maximum of 12m and must be installed in accordance with the manufactures' requirements.

8.3.8.9 A drive through of the works site from all approaches immediately after the lighting is installed to check for glare should be undertaken.

8.3.9 Temporary Safety Barriers

8.3.9.1 There are four principal temporary safety barrier types that may be used to provide varying degrees of protection as part of TTM, depending on the risk presented and the item to be protected. The different types are:

(1) Pedestrian Barriers;
(2) Workforce Barriers;
(3) Vehicle Barriers; and
(4) Vehicle Restraint Systems.

8.3.9.2 Pedestrian Barriers

- These barriers are required to prevent vulnerable road users from entering a works area.
- They provide visual guidance to delineate the areas where pedestrians or road users are expected to take through or around the works area.
- They should be a minimum height of 1.2m from the ground.
- Pedestrian barriers adjacent to excavations should be subject to a risk based assessment.
- Where high pedestrian volumes are present, a pedestrian barrier may be used as an increased safety measure.

8.3.9.3 Workforce Barriers

- These are lightweight barriers used to delineate the inner edge of safety zones for the workforce. These barriers should only be used where there is no risk of pedestrians encountering the works.
- These barriers should be of a stable design that will accommodate the use of sand bags.

8.3.9.4 Vehicle Barriers

- These provide visual guidance to delineate areas where the road users are expected to take through or around the works area.
- Vehicle barriers shall be installed as per the manufacturers' guidelines. They are not designed to physically prevent errant vehicles from encroaching into the area of the roadworks.
- These barriers are usually water filled barriers. They are generally justified on roads with speed limits greater than 60km/h; however barrier protection may be justified at lower speeds.

8.3.9.5 Vehicle Restraint Systems

- A Vehicle Restraint System is designed to restrain errant vehicles by redirecting them along the line of the barrier. Their design shall be in accordance with IS EN 1317 and TII Publication on Safety Barriers (DN-REQ-03034). These specifications outline the performance parameters and testing regime required for barriers for use on public roads.
- These barriers may be used where:
    - a works area must be physically protected from adjacent traffic;
    - where the road user must be protected from works area hazards (e.g. a deep excavation); and

- where there is no other option to safely channel vehicle movements.

- A Vehicle Restraint System should only be used for physical protection and to reduce the severity of potential crashes as they are significant hazards themselves. They should only be used, where the benefits outweigh the risks involved in their installation and use.

- They help lower the risk of vehicles entering a works area while minimising injuries to the vehicle occupants and also protecting the road worker and road user.

- The choice of vehicle restraint system 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.

- The design of vehicle restraint barriers must comply with the manufacturers' requirements to ensure the vehicle restraint 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.

- Concrete barriers may also be provided but a minimum length of barrier must be installed for the system to perform adequately.

- Where a set back is required on Level 3 roads, an additional line of temporary road studs or road markings should be provided to highlight the lateral clearance from the live traffic to the front edge of the safety barrier.

- Vehicle Restraint barriers should only be moved on the basis of the agreed TTM Plan.

- 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 or 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 safety zones.

- Barriers should be visible by day and night. For lengths of temporary vehicle restraint barriers in excess of 50m, a reflective disc or strip 50cm^2 to 100cm^2 in area or a steady state lamp should be used at regular intervals along the line of the barrier. The reflective strips shall be red on the left side of the lane and white on the right side of the lane when viewed in the direction of travel. They shall be kept clean.

- If lamps are used then batteries shall be maintained in order to maintain conspicuity during the hours of darkness or poor visibility.

8.3.9.6 Further guidance is provided on all four safety barrier types in the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations Guidance documents.

8.3.9.7 The layouts shown in Appendix B in this document are based on directing traffic through roadworks using delineation and safety zones. They do not illustrate the use of Vehicle Restraint Systems.

8.4 Static Operations

8.4.1 General

8.4.1.1 Static Operations are those carried out within a fixed works site. The length of a fixed site should be kept to the minimum required to carry out the operation safely.

8.4.1.2 Advance Warning Signs are used to alert a road user to a revised road layout or hazard ahead. To achieve the desired effect, the use of signs must be standardised and appropriate.

8.4.1.3 The layout of the Advance Warning Signage, the lead-in taper and associated operation should be based on the permanent speed limit.

8.4.1.4 Sight distance to the first Advance Warning Sign is determined by the speed limit. The higher the permanent speed limit, the greater the sign visibility distance required.

8.4.1.5 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 TTM.

8.4.1.6 The design parameters for static operations are contained in Table 8.2.2.2 to Table 8.2.2.9.

8.4.2 Vehicles and Equipment

8.4.2.1 The requirements for vehicles and equipment are provided in the Temporary Traffic Management Operations Guidance document.

8.4.2.2 The TTM Designer should provide designated areas for loading and unloading within the TTM layout for the works related equipment and materials.

8.4.2.3 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 for relevant personnel entering the site:

(a) If there is insufficient room for plant to slew within the works area, the TTM and method of working need to be redesigned to suit.

(b) Works vehicles using public roads should be conspicuous in colour and fitted with appropriate signs and flashing beacons.

(c) If works vehicles are to be used on a public road, they must be licensed to do so and be roadworthy.

(d) Vehicles, materials and equipment should be stored within the works area.

(e) Safety zones should be kept clear at all times.

8.4.3 Planning Static Works

8.4.3.1 On Level 1 and 2 roads the optimum lane width for all classes of vehicles should be 3.3m. Where space is restricted this may be reduced to an minimum of 3.0m. Below this, HGVs and buses must be marshalled past the works. The minimum lane width, if only cars and light vehicles are present, is 2.5m. For two-way traffic the minimum road width should be 5.0m for Level 1 roads and 6.0m for Level 2 roads.

8.4.3.2 The unobstructed road width which forms the traffic lane for one-way traffic should be an optimum width of 3.3m and maximum lane width of 4.3m. Refer to the Temporary Traffic Management Design Guidance document for further guidance on lane widths.

8.4.3.3 For Level 3 roads where there are two lanes of traffic travelling in the same direction, at least one lane shall be a minimum width of 3.3m.

8.4.3.4 Where a TTM arrangement is likely to have a significant impact on the capacity of a road, the anticipated queue lengths and delays should be estimated by the TTM Designer. TTM should be designed to minimise delays. WK 001 Roadworks Ahead sign, and the subsequent warning sign WK 062 Queues Likely, should be positioned to ensure that, regardless of queue length, approaching traffic is forewarned of queues ahead.

8.4.3.5 When putting in place temporary traffic signals or Stop and Go discs, the works length should be kept as short as practicable with a recommended maximum length of 500m, including the length of the tapers. In urban areas it will be necessary to limit the works site to shorter lengths.

8.4.3.6 The maximum work site length should not exceed 5km. Where the carriageway capacity is not significantly reduced and the permanent number of lanes is maintained, the works site length can be increased but only to facilitate continuous operations.

8.4.3.7 The distance to the next section of roadworks on the same route should be a minimum 10km, or as agreed with the Road Authority. When designing TTM close to a Road Authority boundary the TTM Designer should consult with the Road Authority in the adjoining area in order to plan and co-ordinate roadworks.

8.4.3.8 Multiple phases of TTM may be required as the works progress. Each phase will be governed by the same design parameters, but could present an additional risk to the workforce and road users as the layout of the road may differ from what they had become used to. Each phase shall be designed to manage the traffic as necessary and to be marked and signed clearly to avoid confusion.

8.4.3.9 On roadworks sites with a speed limit of 60km/h or less, where the traffic lanes are shifting daily due to the nature of the works, cones or temporary barriers with steady-state lamps can be used to channel traffic. The TTM must clearly define, over and above any existing markings, the route through the works, especially on unlit roads during hours of darkness, or poor visibility.

8.4.3.10 On roadworks sites with a speed limit in excess of 60km/h, where the use of cones may not impart a clear layout, temporary road markings or road studs will typically be required.

8.4.3.11 During the programme of the works, consideration should be given to removing the TTM 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.

8.4.3.12 During the installation or removal of the Advance Warning Signs where operatives are required to cross the carriageway on foot, an setting out roadworks ahead sign shall be used on the verge.

8.4.3.13 The minimum sign visibility requirements provided in Tables 8.2.2.2 to 8.2.2.9 shall be complied with for the installation of the TTM.

8.4.3.14 Once the works are completed, the removal of TTM should only be carried out if the road is safe and free from obstructions, road surfacing is satisfactory for the passage of traffic and permanent signs, road markings, safety barriers and other items are in place.

8.4.4 TTM on Level 1 and Level 2 Roads

8.4.4.1 Further guidance is provided in the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations document on all TTM for Level 1 and 2 Roads.

Traffic Control Methods

The following Traffic Control Methods are used for Static operations:

- Two-Way Traffic;
- Give and Take;
- Priority;
- Stop and Go;
- Temporary Traffic Signals;
- All Stop; and
- Convoy.

Two-Way Traffic

8.4.4.2 All options to maintain two-way traffic should be considered by the TTM Designer.

8.4.4.3 If vehicles are required to traverse the existing centreline, then centreline coning should be provided.

8.4.4.4 The minimum lane width as described in Section 8.4.3 and in the design parameter tables in Section 8.2.2 must be provided.

8.4.4.5 The lead-in taper shall be as per the lane taper rate outlined in the design parameter tables for the road sub level.

8.4.4.6 Advance warning signage is given to road users using signs WK 032 Road Narrows on Left, WK 033 Road Narrows on Right or WK 034 Road Narrows on Both Sides as appropriate.

8.4.4.7 Figure 8.4.4.1 shows Two-Way traffic for Type A works on a Level 2(ii) road.

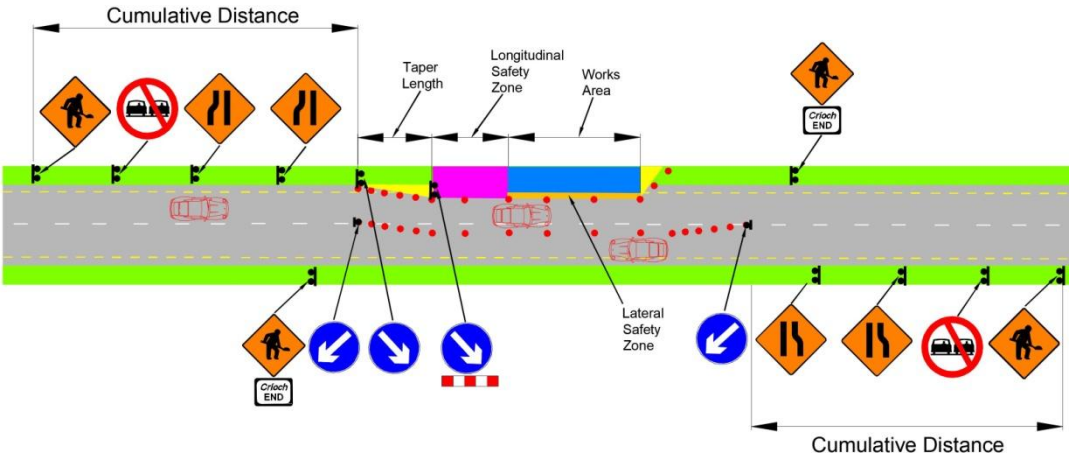


Figure 8.4.4.1: Two-Way Traffic Type A works

Give and Take

8.4.4.8 Give and Take traffic control is used for shuttle working in daylight hours and good visibility provided that:

- There is clear visibility of and through the site for road users approaching the works from either end;
- The speed is limited to 50km/h;
- 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 the start of the entry taper to the end of the exit taper.

8.4.4.9 During the hours of darkness, an alternative traffic control method shall be adopted.

8.4.4.10 Advance warning is given to road users by means of signs WK 032 Road Narrows on Left, WK 033 Road Narrows on Right or WK 034 Road Narrows on Both Sides as appropriate.

8.4.4.11 Figure 8.4.4.2 shows Give and Take traffic control for a Level 1(iii) road.

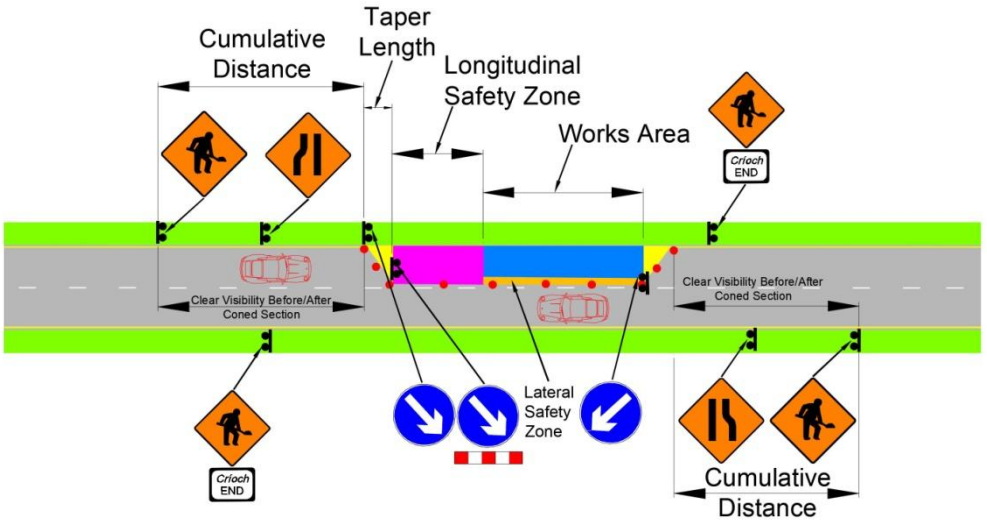


Figure 8.4.4.2: Give and Take Traffic Control.

Priority

8.4.4.12 Priority traffic control is used where one flow of traffic is required to yield to oncoming traffic. The RUS 026 Yield sign, shall be used facing one direction of traffic. This method should only be implemented when the following apply:

- The maximum coned area length is 80m from the start of the entry taper to the end of the exit taper;
- There must be clear visibility for the yielding traffic to the oncoming traffic (see Table 8.4.4.1); and
- Expected traffic volumes should be less than 850veh/h.

Speed (km/h)	Clear Visibility Before and After Coned Area (m)
≤ 50	60
60	70
80	80
100	100

Table 8.4.4.1: Priority Visibility Requirements

8.4.4.13 Advance warning is given to road users using signs WK 032 Road Narrows on Left, WK 033 Road Narrows on Right or WK 034 Road Narrows on Both Sides as appropriate.

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

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

8.4.4.16 Figure 8.4.4.3 shows Priority traffic control for Type B works on a Level 2(ii) road.

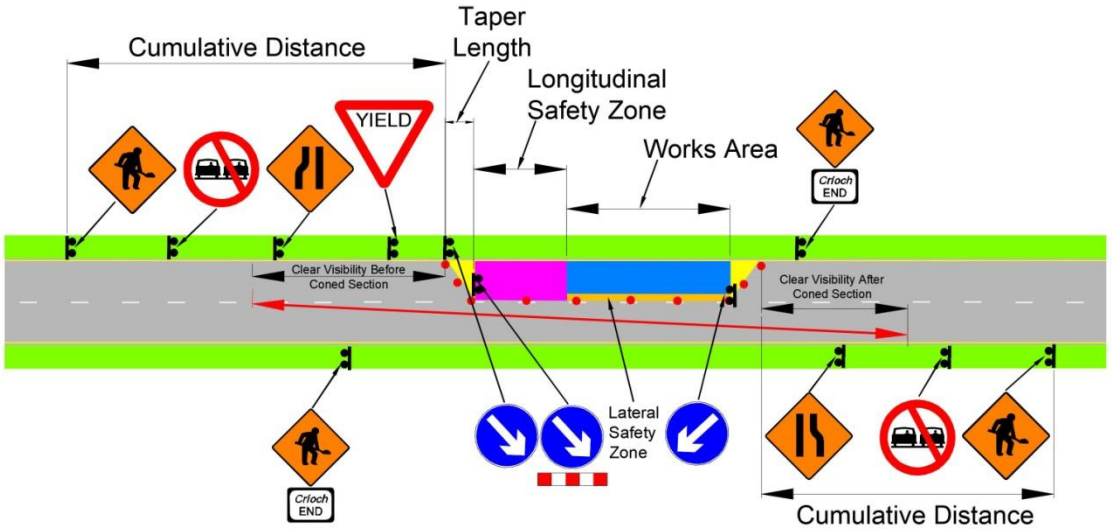


Figure 8.4.4.3: Priority Traffic Control.

Stop and Go

8.4.4.17 An Garda Síochána must be consulted prior to the implementation of Stop and Go traffic control.

8.4.4.18 RUS 060 Stop and RUS 061 Go discs using manual or mechanical methods can be used at plant crossing points, site access points 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 and Go discs and wearing high visibility PPE.

8.4.4.19 The flow of traffic should be based on the actual demand on the route. 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.

8.4.4.20 The number and spacing of advance Warning Signs required to implement a Stop and Go operation varies depending on the Road Level classification. The requirements are provided in the design parameter tables in Section 8.2.2.

8.4.4.21 Sign WK 061 Flagman Ahead shall be used within the advance warning signage. Sign WK 095 Stop Here on Red may be placed in advance of the Stop and Go disc locations.

8.4.4.22 A 45° lead-in taper shall be provided with cones at 1m centres.

8.4.4.23 If there is a junction within the length being controlled by Stop and Go discs, a third operator may be required to control traffic on the side road.

8.4.4.24 Remotely operated Stop and Go 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.

8.4.4.25 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, will clearly define where the vehicles should stop.

8.4.4.26 For 20m in advance of the Stop and Go disc position, cones should be placed along the centreline if space permits, to highlight to the road user that they are close to the manually controlled stopping point. If necessary an additional sign WK 061 may be positioned 15m to 20m from this point.

8.4.4.27 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, 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 used if both directions of traffic have clear visibility of the operator and disc at all times. If the length of the site is greater than 20m then a two-disc operation is required.

8.4.4.28 The gap provided for road users to deviate around the works and then back on line should be a minimum of 20m and increased if necessary to ensure vehicles can manoeuvre through the works reasonably freely.

8.4.4.29 Further guidance is provided in the Temporary Traffic Management Design Guidance document for the maximum shuttle length along with the maximum traffic flow permitted for the use of Stop and Go at various speeds. This information shall be adhered to by the TTM Designer.

8.4.4.30 Figure 8.4.4.4 shows Stop and Go traffic control method for Type A works on a Level 2(ii) road.

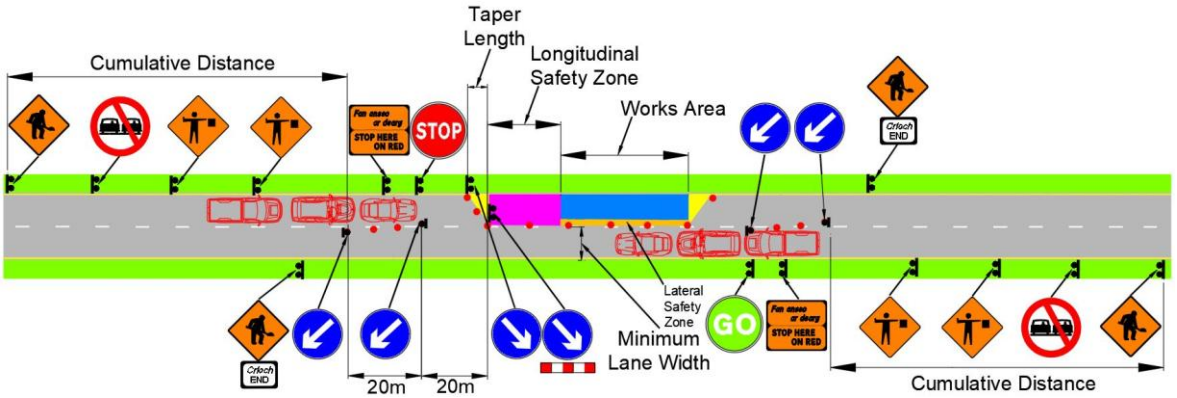


Figure 8.4.4.4: Stop and Go Traffic Control

Temporary Traffic Signals

8.4.4.31 An Garda Síochána must be consulted prior to the implementation of temporary traffic signals.

8.4.4.32 Portable temporary traffic signals may be used at plant crossing points or site accesses. 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.

8.4.4.33 Temporary traffic signals should be vehicle-actuated except in urban centres. 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.

8.4.4.34 The Road Authority decides when and where temporary traffic signals are allowed. At peak times flagmen with Stop and Go discs may be required to react manually to actual traffic demands.

8.4.4.35 Temporary traffic signals should be positioned with the required 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, vehicle-actuated temporary signals should operate in this mode at all times unless otherwise agreed with the Road Authority.

8.4.4.36 Sign WK 060 Temporary Traffic Signals shall be used within the advance warning signage.

8.4.4.37 A 45° lead-in taper shall be provided with cones at 1m centres.

8.4.4.38 Where shuttle working is in operation, 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, may be erected to clearly define where the vehicles should stop.

8.4.4.39 For 20m in advance of the stop position, cones should be placed along the centreline if space permits, to highlight to the road user that they are close to the signal controlled stopping point. If necessary, an additional sign, WK 060 may be positioned 15 to 20m from this point.

8.4.4.40 The gap provided for road users to deviate around the works and then back on line should be a minimum of 20m and increased if necessary to ensure vehicles can manoeuvre through the works reasonably freely.

8.4.4.41 The design and calculation of the cycle timings should be consistent with the permanent traffic signal design. The design should include fixed or variable timings where applicable and allow for the length of the restriction. The length of each cycle should be calculated to achieve the optimum cycle time, maintain flow and minimise queues.

8.4.4.42 Queues should be monitored so that the TTM layout can cater for the demand.

8.4.4.43 Figure 8.4.4.5 shows Temporary Traffic Signals control for Type A works on a Level 2(ii) road.

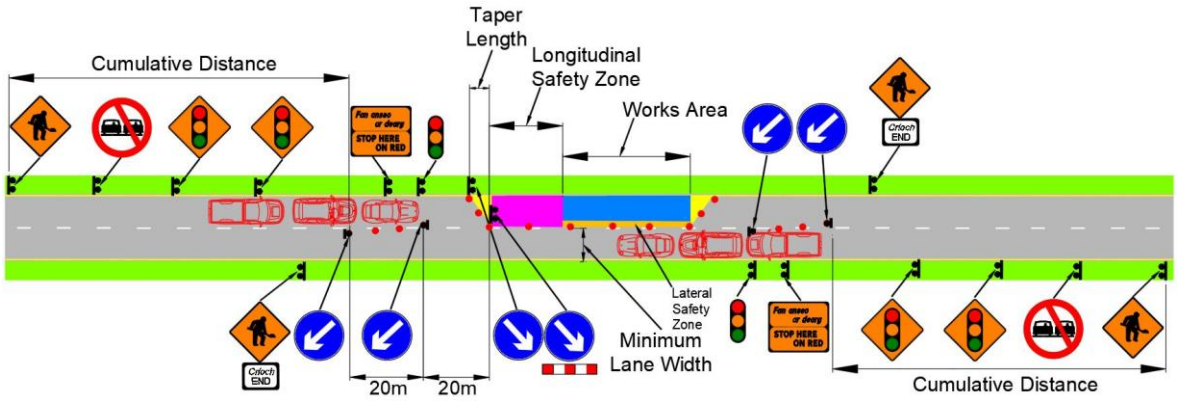


Figure 8.4.4.5: Temporary Traffic Signals Control

All Stop

8.4.4.44 An All Stop should only be used for short duration stops, maximum 10 minutes, where traffic flows are less than 300veh/h and a diversion route would be inappropriate by virtue of length and characteristics of the route.

8.4.4.45 Stop and Go discs are all displayed on STOP, controlling the traffic whilst work is being carried out.

8.4.4.46 A Stop and Go procedure can lead to an All Stop so the advance warning signage should be as per the Stop and Go traffic control method.

8.4.4.47 All Stop can be used for short duration works that can be quickly and easily suspended.

8.4.4.48 An All Stop can be used to suspend alternative TTM to allow emergency vehicles through the works or the final completion of a task previously carried out under an alternative TTM layout. It may also be appropriate at plant crossings of minor roads or to accommodate deliveries.

Convoy

8.4.4.49 Where the design parameters defined in Section 8.2.2 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 Operation may be used.

8.4.4.50 This method uses Stop and Go discs to stop all the traffic. A convoy vehicle or vehicles, appropriately signed with sign WK 099 Follow Me, conspicuous in colour 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.

8.4.4.51 Sign WK 098, Convoy System in Operation is used in advance of the stop position, in conjunction with WK 060 Temporary Traffic Signals or WK 061 Flagman Ahead signs to inform road users of the system in operation. The number of signs used is as per the Road Level classification outlined in Section 8.2.2. The advance Warning Signs include WK 061 Flagman Ahead, WK 098 Convoy System in Operation and WK 095 Stop Here on Red. Sign WK 095, is positioned at the stop location to clearly define where the vehicles should stop.

8.4.4.52 Using this method, a lateral safety zone is not required. See Section 8.4.3 for minimum lane widths.

8.4.4.53 Convoy Operation should only be used when the reduced capacity of the road (reduced due to convoy operation) is capable of accommodating actual traffic demand. It may be necessary to restrict peak time working or make provisions to withdraw convoy TTM in order to periodically disperse queues.

8.4.4.54 Convoy Operation should be used on Level 1 and Level 2 Roads only. Where traffic volumes are ≥ 900 veh/h (two way), then 3 convoy vehicles should be provided.

8.4.4.55 A roadworks speed limit or cautionary speed matching the speed at which the convoy vehicle will be travelling may be posted. RUS 014 No Overtaking signs may be placed at the start of the running lane and repeated on long lengths.

8.4.4.56 Consideration should be given to emergency vehicles and how they can be escorted through the works if required. One method is to undertake an All Stop and for the operatives to ensure the running lane is clear of vehicles and then allow the emergency vehicle through.

8.4.4.57 Figure 8.4.4.6 shows a Convoy Operation for works on a Level 2(ii) road.

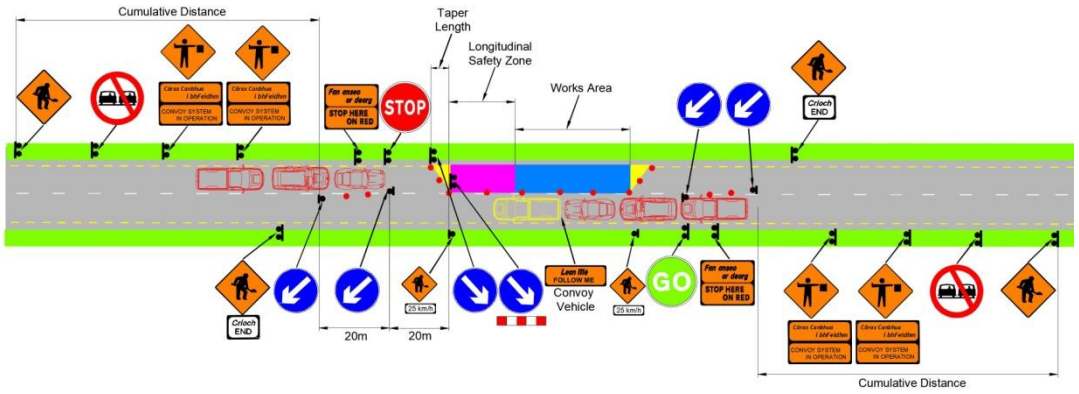


Figure 8.4.4.6: Convoy Operation

8.4.5 Junctions & Roundabouts

8.4.5.1 Where works are on a side road and affect the mainline road user, the presence of the works shall be signed on the mainline using WK 001 Roadworks Ahead sign, along with the relevant TTM sign. Each advance warning sign on the mainline should have P 003 Direction supplementary plate.

8.4.5.2 For works on or near roundabouts, all entry points to the roundabout should have advance warning signage as part of a TTM layout. WK 001 with supplementary plate P 010 End shall be placed on all exit points. Further guidance is provided in the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations Guidance documents.

8.4.6 Multi-lane Streets

8.4.6.1 Multi-lane streets are where there are two or more lanes in one direction. Advance warning signage for lane closures on a one-way street with multiple lanes should contain sign WK 040A Lane 2 of 2 Closed to WK 045A Lane 1 & 2 of 3 Closed to depict the TTM scenario required.

8.4.6.2 The advance warning signage should be placed on both sides of the carriageway where there are two or more lanes. Figure 8.4.6.1 provides an example of a lane 2 closure on a one-way street.

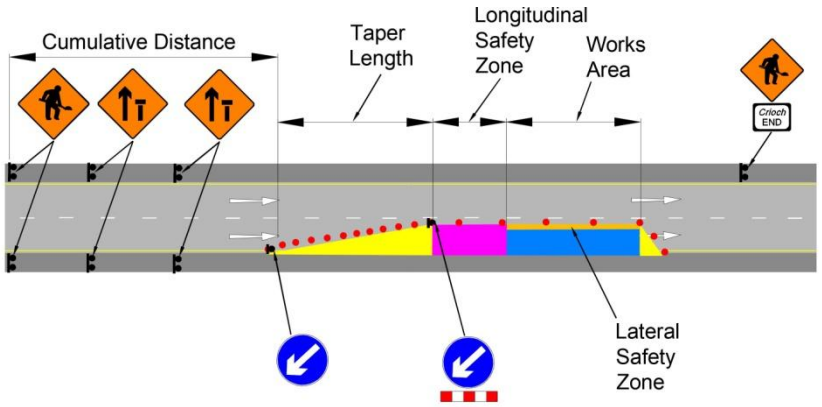


Figure 8.4.6.1: Lane 2 Closure on a One-Way Multi-Lane Street.

8.4.6.3 For two-way multi-lane streets, the advance warning signage for lane closures shall contain WK 032 Road Narrows on Left to WK 034 Road Narrows on Both Sides to depict the TTM scenario required.

8.4.6.4 Advance warning signage should be placed on both sides of the carriageway for each multi-lane approach. Figure 8.4.6.2 provides an example of a two-lane closure on a two-way multi-lane street.

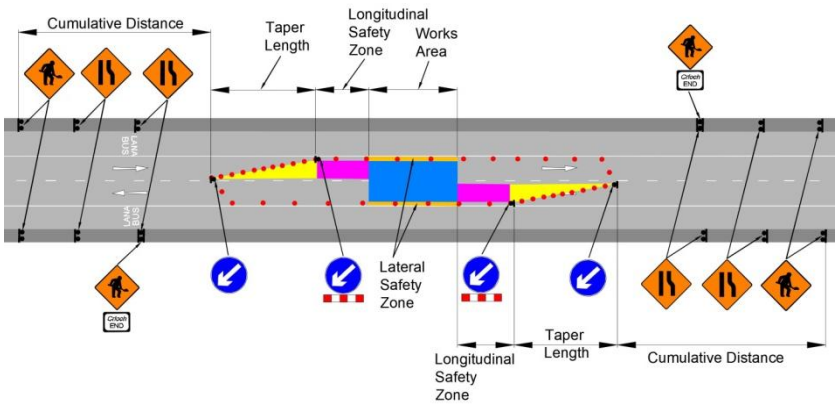


Figure 8.4.6.2: Two Lane Closure on a Two-Way Multi-Lane Street.

8.4.7 Urban Dual Carriageways

8.4.7.1 The advance warning signage for a lane closure on a urban dual carriageway shall be WK 001 Roadworks Ahead along with WK 040A Lane 2 of 2 Closed to WK 045A Lane 1 & 2 of 3 Closed as appropriate.

8.4.7.2 The number of advance Warning Signs shall be consistent with the design parameter tables in Section 8.2.2.

8.4.7.3 Advance warning signage shall be provided on both sides of the carriageway. Figure 8.4.7.1 provides an example of lane 2 and lane 3 closure of a 3-lane urban dual carriageway.

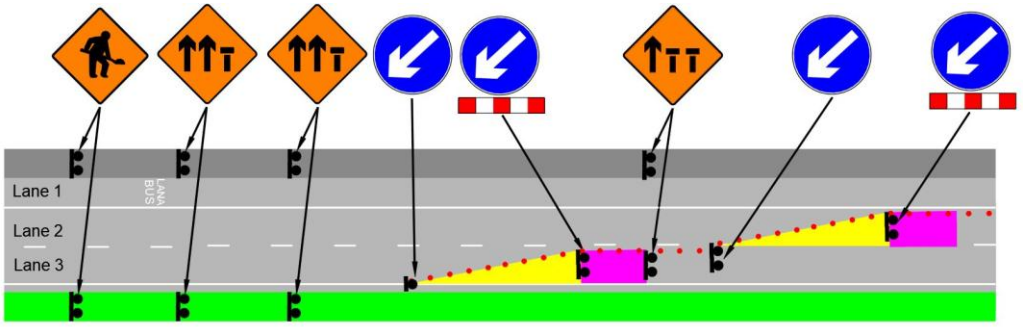


Figure 8.4.7.1: Lane 2 & 3 Closure of a 3-Lane Urban Dual Carriageway

8.4.8 Climbing/Overtaking Lanes

8.4.8.1 When working on climbing lanes, the TTM Designer should close the complete climbing lane section of the carriageway, if practicable. Advance warning signage for a complete closure should be WK 001 Roadworks Ahead, RUS 014 No Overtaking sign and WK 032 Road Narrows on Left sign.

8.4.8.2 The number of advance Warning Signs shall be consistent with the design parameter tables in Section 8.2.2. The advance warning signage shall be provided on the verge side of the carriageway only on the approach to the lane closure.

8.4.9 Traffic Queues

8.4.9.1 Whenever there are lane closures or restrictions on traffic, queues may occur at peak times. The actual queue lengths should be checked when the TTM is in operation.

8.4.9.2 Sufficient warning of the roadworks and likely queues should be given to approaching road users. The advance Warning Sign numbers indicated in design parameters tables in Section 8.2.2 are the minimum required.

8.4.9.3 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 shall always be WK 001 Roadworks Ahead.

WK 062

8.4.9.4 When excessive traffic queues are caused by roadworks, the layout of the TTM should be reviewed to determine if alterations can be made to reduce the queue lengths and delays. In some cases, minor adjustments may eliminate pinch points.

8.4.10 Level 3 TTM

8.4.10.1 Further guidance is provided in the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations documents on all Level 3 TTM.

Traffic Flow Conditions for Static Traffic Management Operations

8.4.10.2 For Level 3 roads there are maximum traffic flows permitted while installing, modifying and removing static TTM. Table 8.4.10.1 specifies permitted maximum allowable traffic flows dependant on the lane closure. TTM installation, modification or removal shall not commence when these traffic flow values are exceeded.

Lane Closure	Maximum Allowable Traffic Flow per Carriageway	
	Veh / hr	Veh / 3 min
Dual Two-Lane Carriageway		
Lane 1 [3]	1200	60
Lane 2	1200	60
Dual Three Lane Carriageway[3]		
Lane 3	2700	135
Lane 2 + 3	1200	60
Dual Four Lane Carriageway[3]		
Lane 4	3900	195
Lane 3 + 4	2700	135

Table 8.4.10.1: Traffic Flow Levels for Static Traffic Management

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) during the TTM operation whether it is a single or multi-lane slip.
3. The traffic flow figures are not applicable to Direct Lane 1 Closures – See Section 3.5.7.5 of Temporary Traffic Management Design Guidance document.
4. A maximum traffic count of 65 veh / 3 mins per lane applies to hard shoulder works.

Hard Shoulder Closure

8.4.10.3 For a hard shoulder closure on a Level 3 road, the advance notification of the roadworks is given using WK 001 Roadworks Ahead sign at 1km in advance of the taper, followed by another WK 001 with a supplementary plate P 084 Shoulder Closed placed 400m in advance of the taper. The hard shoulder closure length should be kept to a minimum, as it is an area for road users to use in an emergency.

8.4.10.4 Hard shoulder closure tapers are different for dual carriageway and motorways.

Dual Carriageway

8.4.10.4.1 A taper, as specified in the design parameter tables in Section 8.2.2, is applied to close the hard shoulder. RUS 002 Keep Right sign shall be provided at the beginning and at the end of the taper. Figure 8.4.10.1 provides an example of a dual carriageway hard shoulder closure taper.

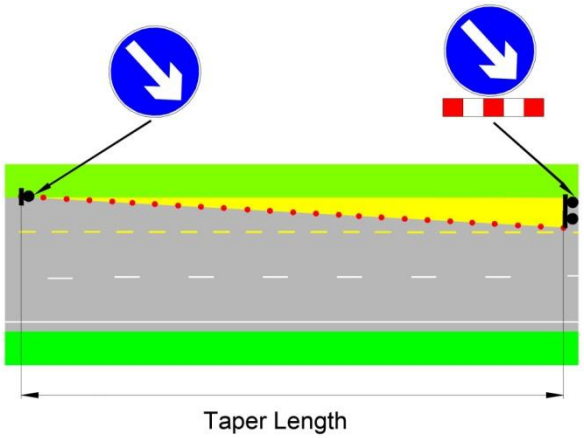


Figure 8.4.10.1: Dual Carriageway Hard Shoulder Closure Taper

Motorway

8.4.10.4.2 To close a hard shoulder on a motorway, three block lines of cones are provided in advance of the closure. The block cones are at intervals of 48m, 36m and 24m approaching the closure. RUS 002 Keep Right sign shall be provided at the end of the closure and RUS 002 may be provided on each block line of cones. Figure 8.4.10.2 provides an example of a motorway hard shoulder closure taper.

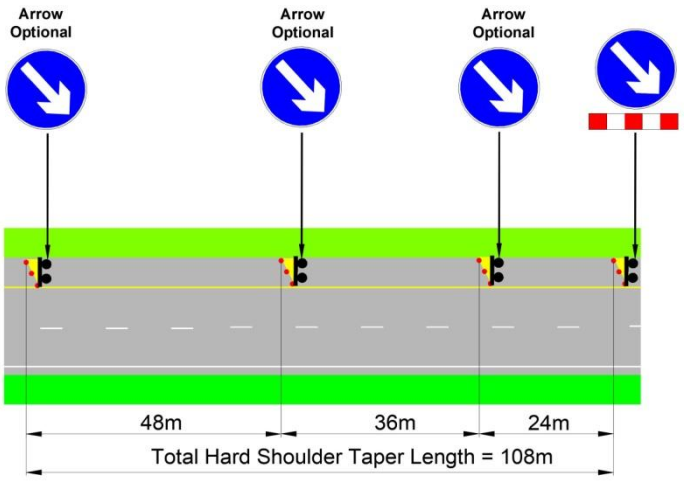


Figure 8.4.10.2: Motorway Hard Shoulder Closure Taper

Lane Closures

8.4.10.5 The number and spacing of advance Warning Signs required for each roadwork type are outlined in the design parameter tables in Section 8.2.2. For Level 3 roads signs WK 040 to WK 049 shall be 1200mm square when used.

8.4.10.6 To close a live lane a taper shall be provided. The taper shall be a minimum length of 180m with a maximum cone spacing of 3m. Block lines of cones shall be provided at 36m intervals. Further guidance is provided in the Temporary Traffic Management Design Guidance document and shall be adhered to. Figure 8.4.10.3 provides an example of a typical lane taper.

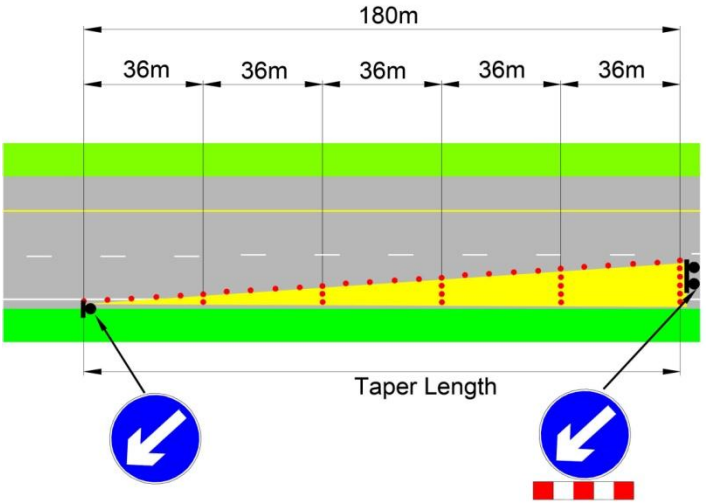


Figure 8.4.10.3: Lane Taper

Lane 1 Closure

8.4.10.7 The hard shoulder shall be closed as part of a lane 1 closure.

8.4.10.8 For works on a two-lane carriageway, lane 2 should be closed first. This allows traffic in lane 2 to be deflected and merge into lane 1, using a merge taper from the right. A transition length is then provided in lane 1 before the single lane of traffic is deflected back into lane 2 and past the works.

8.4.10.9 On two-lane carriageway a direct lane 1 closure shall only be undertaken subject to the requirements of Section 3.5.7.5 of the Temporary Traffic Management Design Guidance document.

8.4.10.10 For the closure of lane 1 on a three-lane carriageway, lane 1 is closed by providing a hard shoulder taper closure and a lane 1 taper as per the design parameter tables.

8.4.10.11 The advance warning signage for a Type B lane 1 closure on a 3 or more lane carriageway may be provided on the verge only.

8.4.10.12 The advance warning signage is WK 001 and the required number of WK 043 Lane 1 of 3 Closed or WK 047 Lane 1 of 4 Closed signs as applicable.

Lane 2 and Subsequent Lane Closures

8.4.10.13 A lane 2 closure for Type A or Type B works may be provided by undertaking a direct taper on lane 2 or subsequent lane.

8.4.10.14 The advance warning signage is WK 001 and the required number of signs WK 040 Lane 2 of 2 Closed, WK 042 Lane 3 of 3 Closed or WK 046 Lane 4 of 4 Closed as applicable.

8.4.10.15 For a lane 2 closure reducing the number of lanes, lane 2 is closed using a taper from the right and the traffic directed past the works in lane 1.

8.4.10.16 If more than one lane is to be merged then a transition length should be provided between the merges to allow a sufficient settling in distance. If traffic is to be diverted onto the hard shoulder, a further merge is required to move traffic from lane 1. See Section on Hard Shoulder Running.

8.4.10.17 The advance Warning Signs required for a lane 3 closure shall be WK 001, and the required number of WK 042 Lane 3 of 3 Closed placed on both sides of the carriageway. The number of signs will depend on whether the works are Type A or Type B.

8.4.10.18 The advance Warning Signs required for a lane 4 closure shall be WK 001, and the required number of WK 046 Lane 4 of 4 Closed placed on both sides of the carriageway. The number of signs will depend on whether the works are Type A or Type B.

Multi-Lane Closure

8.4.10.19 Multi-lane closure requirements depend on the roadworks type being undertaken.

8.4.10.20 For Type A roadworks, if lane 1 and lane 2 on a 3-lane carriageway are to be closed, then the same principle of closing lane 1 on a 2-lane carriageway is applied. Lane 3 is merged into lane 2 and a transition length applied before the traffic is merged again into lane 1. The single lane of traffic is then directed across to the right, using the appropriate taper, before the traffic passes the works. Figure 8.4.10.4 provides an example of a transition length between the tapers.

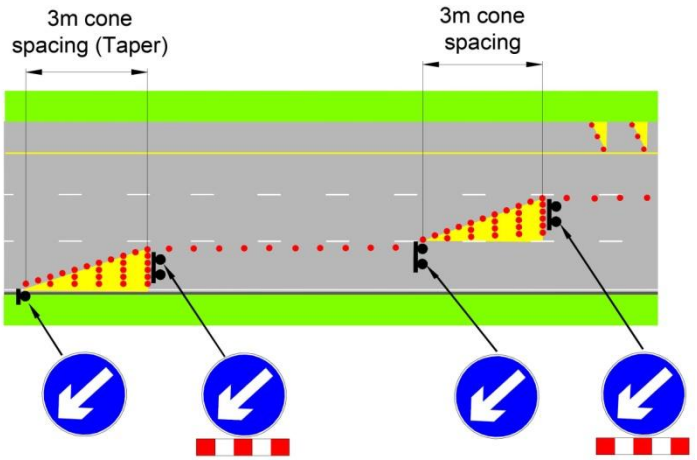


Figure 8.4.10.4: Type A Roadworks Transition Required between Lane Closures

8.4.10.21 For Type A roadworks, undertaking the closure of lane 3 and lane 2, the hard shoulder is closed and lane 3 is merged into lane 2. A transition length is then applied before the traffic is merged into lane 1 and past the works.

8.4.10.22 These principles can be applied to other multi-lane configurations, or if lane 2 and lane 1 are being merged into one lane and then deflected into the hard shoulder. A transition length should be provided following each merge and before the works area.

8.4.10.23 For Type B roadworks, multi-lane closures can be undertaken without the use of a transition between the tapers. A direct taper can be installed subject to the traffic flow conditions for the lanes being closed as outlined in Table 8.4.10.1. Figure 8.4.10.5 provides an example of a direct taper layout.

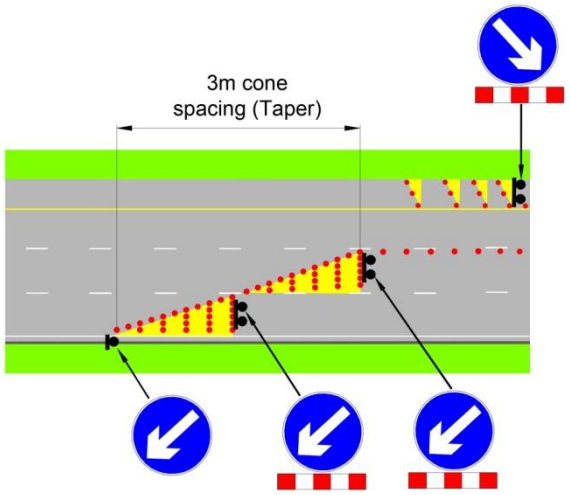


Figure 8.4.10.5: Type B Works Direct Taper.

Merges and Diverges

Merges

8.4.10.24 Sign WK 024 shall be used to direct traffic to merge to the right.

8.4.10.25 The number of WK 024 signs used depends on the length of the merge. The merge dimension should be 300m if practicable. Where the merge length is <200m due to constraints, then RUS 026 Yield Sign should be provided.

8.4.10.26 A settling in distance of 200m should be provided on the mainline ahead and after any merge.

Diverges

8.4.10.27 RUS 003 Pass Either Side shall be used at the diverge.

8.4.10.28 A settling in distance of 200m should be provided on the mainline ahead and after any diverge.

8.4.10.29 The opening dimension for the diverge should be between 140m and 280m.

Up and Over

8.4.10.30 Up and Over is when works are required at a junction overbridge and traffic is diverted from the mainline up onto the diverge and then merged back onto the mainline.

8.4.10.31 This TTM arrangement is the complete diversion of the road user from the mainline by providing a suitable detour. The TTM arrangement to install the single lane traffic prior to the Up and Over is as per the section on Lane 2 and Subsequent Lane Closures.

8.4.10.32 The TTM arrangement shall provide for sufficient settling in distance prior to directing the road user off the mainline. Sign WK 012 Move to the Left One Lane and supplementary plate P 001 Distance should be used to inform the road user to divert. WK 090 Detour sign should be used in advance of the diversion.

8.4.10.33 WK 091 Diverted Traffic signs should be used to direct the road user along the diversion route.

8.4.10.34 Entering the merge slip to rejoin the mainline WK 001 Roadworks Ahead shall be used. WK 040 Lane 2 of 2 Closed is provided at a minimum 200m and at most 300m in advance of joining the mainline. WK 092 End of Detour sign shall be provided to end the detour route. WK 001 with supplementary plate P 010 shall be used to end the roadworks.

Hard Shoulder Running

8.4.10.35 A Roadworks Speed Limit order may be required depending on the duration of the works. If a Roadworks Speed Limit order is not provided then a cautionary speed plate should be used.

8.4.10.36 The road surface in the hard shoulder shall be suitable to allow for its use as a running lane. Delineation devices should be provided between the edge of the hard shoulder and the verge, while maintaining the minimum lane widths.

8.4.10.37 When traffic has been channelled into lane 1 in advance of the hard shoulder running, then WK 012 Move to the Left 1 Lane sign shall be used.
WK 012 should be used in conjunction with supplementary plate P 083 Use Shoulder.

8.4.10.38 Where a hard shoulder is wide enough to be used as a temporary traffic lane, a lane 2 closure may be effected by diverting all traffic one lane to the left, lane 2 diverted into lane 1 and lane 1 diverted onto the hard shoulder. Such a layout has the advantage that there is no reduction in the number of traffic lanes.

8.4.10.39 The hard shoulder is first closed as described in Section 8.4.10.3 and then carriageway tapers, as specified in the tables and in Section 8.4.10.5 and 8.4.10.6 are applied to direct traffic one lane to the left.

8.4.10.40 When the hard shoulder is being used as the only lane of traffic left open, the road user shall be in single lane traffic for a settling in distance prior to the move over into the hard shoulder.

8.4.10.41 Sign WK 013 Move to the Right shall be used in advance of the end of the hard shoulder running. The hard shoulder closure length should be kept to a minimum, as it is an area for traffic to use in an emergency.

Narrow Lane System

8.4.10.42 Advance warning of a Narrow Lane System must be given to the road user. For a Narrow Lane System, the TTM Designer should apply for a Roadworks Speed Limit order.

8.4.10.43 With a Roadworks Speed Limit order the set back dimension to the central median barrier can be reduced from the permanent dimension. The following table shows the allowable set back for the Level 3(i) and (ii) with a Roadworks Speed Limit order in place.

Road Level	Set Back (mm)
3(i)	400
3(ii)	600

Table 8.4.10.2: Set back Dimension with a Roadwork Speed Limit.

8.4.10.44 A narrow lanes system will generally reduce the carriageway capacity by 10% to 15% per lane.

8.4.10.45 The carriageway width displayed on the narrow lane signage should be at least 0.15m less than the actual lane width provided as part of the works. However, this dimension may need to be greater where the road is not straight, to allow for HGVs.

8.4.10.46 WK 001 Roadworks Ahead sign is the initial sign to be placed in a narrow lane system. The subsequent advance warning signage required will depend on the number of lanes impacted by the narrow lane system.

8.4.10.47 Sign WK 100 Lane 2 of 2 Narrow, WK 101 Lane 3 of 3 Narrow, and WK 102 Lane 2 & 3 of 3 Narrow are the advance warning signage for the narrow lane system. These advance warning signs are placed as per the parameter tables in Section 8.2.2.

WK 100 **WK 101** **WK 102**

8.4.10.48 The signs for a narrow lane system are placed at the point where the narrow lanes begin. These signs have the regulatory red circle included within the sign. The signs should be installed on both sides of the carriageway. The signs should be repeated throughout the works at intervals of 500m.

8.4.10.49 Signs for a narrow lane system are WK 105 Lane 2 of 2 Narrow, WK 106 Lane 3 of 3 Narrow, WK 107 Lane 2 & 3 of 3 Narrow as appropriate.

WK 105 **WK 106** **WK 107**

8.4.10.50 In most situations, it will be necessary to re-mark the carriageway showing the new lanes. To avoid road user confusion, before the carriageway is re-marked to the new temporary layout, the original road markings which don't form part of the temporary lane markings should be thoroughly removed.

8.4.10.51 Where two shorter lengths of narrow lanes are included in a longer length of works it is recommended that the minimum separation should be at least equal to the length of the first section of narrow lanes.

Type 2 and Type 3 Dual Carriageway

8.4.10.52 Advance warning signage shall not be placed over a wire rope separation barrier between carriageways. Signage shall only be provided on the side of carriageway where the works are to be undertaken.

8.4.10.53 The advance warning signage to be used when working on a Type 2 or Type 3 is WK 001 Roadworks Ahead sign and WK 040 Lane 2 of 2 Closed or WK 041 Lane 1 of 2 Closed as appropriate.

8.4.10.54 Where the advance warning signage is in the transition zone approaching the dual carriageway the advance warning signage shall be WK 001 and WK 032 Road Narrows on Left or WK 033 Road Narrows on Right as appropriate.

Rolling Block

8.4.10.55 A rolling block may be used on Level 3 roads to allow the installation of elements of the overall TTM layout.

8.4.10.56 The TTM Designer must ensure that the TTM layout provides a sufficient length of transition to utilise a rolling block in advance of the works area to cater for the required working window. The transition length (or single lane length in advance of the operation) should be installed in accordance with the following table. This allows a rolling block to be used to provide a working window in which to perform the tasks.

Working Window (minutes)	Transition Length (km)	
	Rolling Block Speed	
	30km/h	50km/h
1	0.75	2
2	1.5	4
3	2.25	N/A
4	3	N/A

Table 8.4.10.3: Transition (or single lane) lengths to establish a working window

8.4.10.57 The maximum traffic flow to undertake a rolling block for the installation of TTM is 40veh/3 min.

8.4.11 Crossover and Contra-Flow Works

Definitions

Crossover: - the location where one or more 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.

Buffer Zone: - a longitudinal strip of carriageway which provides physical separation between lanes carrying opposing flows of traffic.

General

8.4.11.1 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.

8.4.11.2 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.

Crossover and Contra-Flow Design Requirements

8.4.11.3 The TTM Designer should apply for a Roadworks Speed Limit order to undertake crossover and contra-flow works.

8.4.11.4 Transitions, crossovers and contra-flows should be designed to the geometric standard required for the road classification in accordance with the TII Publications on Road Geometry. They should be designed and constructed so that the design speed is consistent with the proposed Roadworks Speed Limit order.

8.4.11.5 Where reduced horizontal curve radii are adopted, care should be taken to ensure all vehicles can operate within the lane widths and alignment. Tight radii will need increased lane widths to allow for swept paths of HGVs.

8.4.11.6 In the contra-flow, a buffer zone should be provided between two opposing lanes of traffic travelling on the same carriageway at the start and the end of the contra-flow operation. This buffer zone should be a lane width of 3.3m but can be reduced to 1.2m depending on the available space.

8.4.11.7 Adequate warning signing including spacing of signs and cones should highlight to the road user the extent of TTM in place. The signage required to inform the road user of the presence of a crossover is complex. The advance warning signage shall be consistent with the Design parameters tables in Section 8.2. The advance warning signage will be applicable to a specified lane being closed.

Roadworks Speed Limit signage shall be included within the advance warning signage and repeater signage as appropriate. Within the transition approaching the crossover signage WK 010 One-lane Crossover (Out) or WK 011 One-lane Crossover (Back) shall be used as appropriate. Signs WK 020 Lanes Diverge at Crossover to WK 023 Two-lane Crossover (Back) shall be used as appropriate for the layout of the TTM.

8.4.11.8 The TTM Designer shall determine the extent of the use of barriers. Barriers should not be used to delineate the buffer zone within the contra-flow section. The TTM Designer shall ensure the required minimum barrier length is provided for the entry and exit points of the crossover.

8.4.11.9 Where crossover and contra-flow TTM arrangements are required on unlit roads, the crossover location should have temporary lighting towers provided to increase the visibility for the road user. The location of the towers should not provide a hazard to the road user. The delineation devices used in the TTM arrangements should have steady state lamps only.

8.4.11.10 The final surfacing for the crossover shall be in accordance with the TII Publication on Bituminous Materials (CC-SPW-00900).

8.4.11.11 Adequate drainage shall be provided to cater for surface water on the crossover section of carriageway.

8.4.11.12 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 be necessary to apply a lower Roadworks Speed Limit over the length of the crossover to accommodate the achievable design speed.

8.4.11.13 The TTM Designer shall ensure that compliance with Section 8.3.5 Temporary Road Markings is achieved. Temporary road studs shall be provided at 3m centres on either side of the delineation device along the buffer zone.

8.4.11.14 Further guidance on Crossover and Contra-flows requirements is provided in the Temporary Traffic Management Design Guidance and the Temporary Traffic Management Operations documents.

8.5 Semi-Static Operations (SSO)

8.5.1 General

8.5.1.1 SSO are where the workforce and plant are required to either move continuously along a road or make frequent short duration stops to carry out work. For works of this type, where the operation affects the movement of vehicles and/or VRU it is often impracticable to provide the signs and cones required for static roadworks. Instead, warning signs are placed at intervals on the verge. Such works are referred to as a SSO.

8.5.1.2 SSO shall be undertaken on Level 1 and Level 2 roads only.

8.5.1.3 SSO shall only be used where the traffic flow is unrestricted by either, traffic volume or weather conditions. SSO shall only be used in good visibility conditions.

8.5.1.4 SSO are permitted for stops in the region of 15 minutes. The 15 minute timeframe applies only to the planned working period and does not include the time required to install and remove the TTM on the road. SSO is described in Table 8.2.2.1.

8.5.2 Vehicles and Equipment

8.5.2.1 Requirements for vehicles and equipment to be used in SSO are provided in the Temporary Traffic Management Operations Guidance document.

8.5.2.2 All TTM vehicles shall have functioning amber warning beacons visible from 360°.

8.5.2.3 Vehicles involved in SSO should face and move in the same direction as the traffic flow.

8.5.2.4 Vehicle mounted SSO signs may be used as an alternative to static signs. Vehicles used in place of static SSO signs must be of a conspicuous colour, either yellow or white and must be maintained so that they are roadworthy and fit for purpose. They should have reflective markings and include warning beacons visible 360°. The minimum sign size displayed on the vehicle shall be in accordance with the design parameters table for the road level on which the works take place.

8.5.3 Planning Semi-Static Operations

8.5.3.1 Level 1 and Level 2 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 SSO is in operation. The design of the SSO should, where appropriate, take the following matters into account:

(a) Maximum allowable traffic flow – Guidance is provided in Section 1.6 and Section 2.3 of the Temporary Traffic Management Design Guidance and Section 2.6 of the Temporary Traffic Management Operations Guidance document of the maximum allowable traffic flow;

(b) Stopping Sight Distance;

(c) Road Geometry;

(d) Weather Conditions; and

(e) Working through junctions and roundabouts – All traffic approaches to junctions and roundabouts should be warned of the SSO. Additional advance warning signage should be placed.

8.5.4 TTM for Semi-Static Operations

8.5.4.1 An SSO is implemented by erecting advance 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 Length over which the roadworks may be encountered, and the second with supplementary plate P 082 Type of Works. These signs should be within 1km of the works, but never more than 2km. Additional signs may be placed on the verge at 500m intervals.

8.5.4.2 Vehicle mounted signs should be mounted on a non-reflective yellow backing board with flashing amber beacons.

8.5.4.3 SSO for a road lining operation may require works lengths greater than 2km. If static signage is being used for a road lining operation, the maximum length of the works site shall be 10km. WK 001 Roadworks Ahead sign with supplementary plate P 002 giving remaining distance to the end of the works shall be placed every 2km. Along with this a WK 001 with supplementary plate P 082 shall also be placed. Additional signage may be repeated at 500m intervals.

8.5.4.4 Further guidance on SSO is provided in Section 2.3 of Temporary Traffic Management Design Guidance document which shall be adhered to.

8.6 Mobile Lane Closures

8.6.1 General

8.6.1.1 Mobile Lane Closures (MLC) may be used as a TTM measure to protect roadworks operations which allow the workforce and plant either to move continuously along a carriageway or to make frequent short duration stops for a maximum of 15 minutes to carry out maintenance or other work.

8.6.1.2 MLC shall be undertaken on Level 3 roads only. Minimum visibility distances must be achieved, traffic flow must be unrestricted by weather conditions, and maximum traffic flows must be in accordance with Table 8.6.4.1. If any of these items is not achieved then the MLC shall not be implemented.

8.6.1.3 The minimum visibility requirement for a MLC is 500m. If visibility is reduced below this level due to road alignment or adverse weather conditions, the MLC should not be implemented.

8.6.1.4 If a longer stop time of >15 minutes is required to complete the work, a request can be sought from the Road Authority for approval. Alternatively, a static TTM arrangement should be provided.

8.6.1.5 MLC should be used at off-peak times or at night. Maximum permissible traffic flows for a MLC are provided in Table 8.6.4.1.

8.6.1.6 The emphasis at all times must be on safety. All vehicles and equipment should be in full working order. All operatives involved in a MLC must receive training appropriate to the specific task and the specific risks involved.

8.6.1.7 MLC 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.

8.6.2 Vehicles and Equipment

8.6.2.1 Requirements for vehicles and equipment are provided in the Temporary Traffic Management Operations Guidance Document.

8.6.2.2 The Impact Protection Vehicle (IPV) used for MLC are likely to be abnormal, in which case they need a special permit issued by Local Authority.

8.6.2.3 All vehicles involved in MLC shall be conspicuous in colour and shall have seatbelts with a minimum of three anchorage points and head restraints correctly positioned.

8.6.2.4 The number of vehicles involved in the MLC 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 road users of the roadworks and lane restrictions ahead.

(b) IPV – travelling behind the works area as trailing vehicles. They carry sign RUS 001 Keep Left or RUS 002 Keep Right, mounted on a non-reflective yellow backing board at the rear, warning and instructing road users which side to pass, and provide protection to the workforce with the aid of an attenuation device (crash cushion).

(c) Works Vehicle – the vehicle carrying out the work or supporting operatives on foot at the works area. This vehicle(s) are positioned at the start of the works area and carries sign RUS 001 or RUS 002 at the rear. A works vehicle is not an IPV and should not be used in place of an IPV for protection of workers.

(d) Lead Pilot Vehicle – must have a minimum 1200mm RUS sign on the rear. It shall be used where the workers are on foot in a live lane. It shall also be used where any of the work vehicles do not have the required 1200m diameter RUS sign on the rear.

8.6.2.5 All vehicles and trailers should be fitted with at least one 360° visibility beacon, whether the signboard is displayed or in the transport position. The rotating beacons are visible to oncoming road users when the signboards are being erected or folded. The rotating beacons shall not be used when the four amber flashing lanterns are in use.

8.6.2.6 All advance warning vehicles shall be a minimum kerb weight of 1.5 tonnes.

8.6.2.7 The advance warning, IPV and lead pilot vehicles should be yellow or white but not reflective. Works vehicles should be of a conspicuous colour, kept clean and maintained regularly.

8.6.2.8 IPVs shall have a minimum on the road weight of 10 tonne. See Section 8.3.6 on IPVs.

8.6.2.9 A separation distance of 50-100m should be kept between the IPV and works vehicle.

8.6.2.10 If multiple work vehicles are used ahead of the IPV then the maximum distance between works vehicles should not exceed 100m.

8.6.2.11 The lead pilot vehicle shall be a maximum of 100m from the IPV.

8.6.2.12 When workers are on foot an additional works vehicle shall be provided between the workers and the IPV and at a minimum 50m in front of the IPV.

8.6.2.13 A reliable communication system shall be provided between vehicles, linking all drivers, to maintain control and positioning of all elements of a MLC.

8.6.2.14 Three advance warning vehicles shall be provided for a MLC, the advance warning vehicles shall be provided at 300m, 600m and 1km in advance of the IPV. The number and positioning of the vehicles required for a MLC is detailed in layouts in Appendix B.

8.6.3 Signs for Mobile Lane Closures

8.6.3.1 Regulatory signs used for a MLC shall accord with the relevant requirements of the Road Traffic (Signs) Regulations, and Warning Signs shall comply with the requirements of this Chapter.

8.6.3.2 Advance warning vehicle No.3 shall display sign WK 110 Lane 2 of 2 Closed MLC to WK 119 Lane 3 & 4 of 4 Closed MLC as appropriate and Supplementary Plate P 001 Distance to outline the distance to the closure. Advance warning vehicles No.2 and No.1 should display the same appropriate lane closure sign and Supplementary Plate showing the remaining distance to the closure.

8.6.3.3 The IPV should display sign RUS 001 Keep Left or RUS 002 Keep Right, at the rear, warning and instructing road users which side to pass.

8.6.3.4 Sign RUS 001 or RUS 002 with a minimum diameter of 1200mm should be placed on the rear of all the works vehicle(s) and the lead pilot vehicle in one of the following methods:

1. Mounted on a non-reflective yellow backing board;

2. Trailer mounted and towed by the works vehicle; or,

3. Fitted onto the rear of the vehicle.

8.6.3.5 If a RUS 001 or RUS 002 sign on a works vehicle or on a lead pilot vehicle is not provided then an LED arrow compliant with IS EN 12352 Traffic control equipment (Class L8H) with a minimum of 15 number amber lamps must be provided.

8.6.3.6 The rear-facing vehicle (or trailer) mounted signs shall be mounted on yellow backing boards with flashing amber lanterns. The backing boards shall be non-reflective, while the signs shall be retro-reflective in accordance with the TII Publication on Traffic Signs and Road Markings (CC-SPW-01200). 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 approx. 5°. The lower edge of the backing board should be at least 0.75m above the road surface.

8.6.3.7 On vehicles with RUS 001 and RUS 002 signs, 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.

8.6.3.8 Signs on the carriageway or the hard shoulder shall be vehicle or trailer mounted and attended at all times. Signs on the verge may be vehicle or trailer mounted, or static.

8.6.3.9 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.

8.6.3.10 The light intensity of the lanterns on the principal axis shall be measured when the lamps are continuously energised and shall be:

Day-time: 2,000 candelas minimum; and

Night-time: 400 to 800 candelas maximum.

8.6.3.11 The light intensity at night must not exceed 800 candelas, as 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 a 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. This shall be kept clean to ensure satisfactory operation.

8.6.3.12 Signs should be covered or removed from view to ensure they are not visible when not in use. 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.

8.6.3.13 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.

8.6.3.14 A high visibility supplement to sign RUS 001 and RUS 002 shall be used on the IPV and be fully operational. This sign consists of a flashing light arrow to supplement the message given by the Keep Left/Right signs. The light arrow shall 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.

8.6.3.15 The use of static Variable Message Signs and matrix signs to give road users advance notification of the operation ahead can be valuable and should be used where possible. A Variable Message Sign displaying a message should not be towed as part of a MLC operation.

8.6.4 Planning Mobile Lane Closures

8.6.4.1 Careful planning is required for MLC due to the high traffic volumes and speeds on Level 3 roads. Advance warning sign requirements and placement positions need to be planned, allowing for any particular site constraints. 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. The design of an MLC should, where appropriate, take the following matters into account:

(a) Maximum allowable traffic flows as shown in Table 8.6.4.1. The operation should only proceed once the supervisor is satisfied the traffic flows are in accordance with the agreed proposals;

(b) Stopping Sight Distance;

(c) Road Geometry;

(d) Weather Conditions;

(e) Inter-visibility;

(f) Communications;

(g) Method for maintaining station;

(h) Minimum disruption;

(i) Working through merge/diverge lanes at grade-separated junctions;

(j) Working through junctions and roundabouts; and

(k) Roads without a hard shoulder.

8.6.4.2 The supervisor should arrange for a three-minute traffic count to be carried out, to check that flows do not exceed those permitted in Table 8.6.4.1. In the event of an incident that may affect traffic volumes and the safety of the works personnel, vehicles or road users the supervisor will need to decide what course of action to take.

8.6.4.3 Table 8.6.4.1 gives the absolute maximum flows that relate to well aligned dual carriageways with hard shoulders. These figures may need to be reduced for sites on roads with higher gradients, inadequate horizontal alignments (in particular left hand curves) or roads lacking an adequate hard shoulder. These maximum flows apply equally to day and night MLC. However, a site-specific risk assessment may reduce the flow limit whether the carriageway is lit or unlit. At higher flows, an MLC should not be implemented or, if in operation, should be removed.

8.6.4.4 MLC on carriageways with no hard shoulder for a maximum distance of 400m requires planning by a TTM Designer and should be undertaken as follows:

- IPV(s) and works vehicle should proceed in convoy along the carriageway, inform the advance warning vehicles of the obstruction and their position.
- When advance warning vehicle No.1 reaches the obstruction, all advance warning vehicles should be informed to maintain station.
- When the IPV has past the obstruction by approx. 100m, advance warning vehicle No.1 should proceed to regain the hard shoulder after the obstruction.

- The two remaining advance warning vehicles should then negotiate the obstruction in turn, while maintaining station.

8.6.4.5 If the IPV and the works vehicle are slow-moving, the 100m distance will have to be increased to ensure advance warning vehicle No.1 does not reduce the actual distance between itself and the IPV to less than 300m as the plate will be displaying this figure.

8.6.4.6 Work on carriageway sections exceeding 400m in length without hard shoulders should either be carried out using static TTM or by a MLC specifically designed for that length of road.

8.6.4.7 Merges and diverges at grade-separated junctions should be taken into account as they can have a significant effect on the procedures to be followed. In certain situations, the assistance of An Garda Síochána may be required.

8.6.4.8 Consultation will be required with the Road Authority and An Garda Síochána at the planning stage of an MLC.

Lane Closure	HGV Level	If HGV Count ≤ HGV Level then Max Traffic Count (Veh / 3 Min)	If HGV Count ≥ HGV Level then Max Traffic Count (Veh / 3 Min)	Max HGV Count Permitted (Veh / 3 Min)
Dual Two-Lane Carriageway				
Lane 1	10	40	35	15
Lane 2	15	60	55	20
Dual Three Lane Carriageway				
Lane 1	20	100	90	30
Lane 3	25	135	120	40
Lane 1 + 2	15	60	55	20
Lane 2 + 3	15	60	55	20
Dual Four Lane Carriageway				
Lane 1	30	160	145	50
Lane 4	40	195	175	60
Lane 1 + 2	25	120	110	35
Lane 3 + 4	25	135	120	40

Table 8.6.4.1: Mobile Lane Closures – Maximum Permissible 3 Minute Counts

Notes:

1. As HGV content increases, the permitted traffic count decreases. If the HGV count exceeds the permitted level, the closure should be removed.
2. When performing mobile lane closures past slip roads, the maximum flow on the slip road should not exceed 25 veh / 3 mins whether it is a single or multi-lane slip.
3. A maximum traffic count of 65 veh / 3 mins per lane applies to hard shoulder works.

Working on Hard Shoulders

8.6.4.9 An IPV should be used to provide protection to workers and works vehicles on the hard shoulder.

8.6.4.10 When an IPV is used in the hard shoulder, the RUS 002 Keep Right sign and the light arrow shall be operating.

8.6.4.11 WK 001 Roadworks Ahead sign of minimum dimension 600mm shall be provided on the rear facing panel of the IPV or Initial advance warning vehicle. If WK 001 sign is not provided then static WK 001 signs shall be provided at 2km intervals. Static signing can be pre-placed over a maximum distance of 10km.

Working Through Junctions Without a Hard Shoulder

8.6.4.12 As an MLC approaches a slip road or junction without a hard shoulder, the supervisor should instruct the TTM crew on the procedure to be followed. A WK 001 Roadworks Ahead with supplementary plate P 010 may be placed on the verge of the diverge slip for road users exiting the carriageway.

8.6.4.13 A static sign WK 001 Roadworks Ahead, with supplementary plate P 082 Mobile Roadworks, should be displayed on the merge slip for 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 may be displayed.

Working Through Junctions With a Hard Shoulder

8.6.4.14 As an MLC approaches a junction with a hard shoulder static or mobile signs described in Section 8.6.4.12 should be provided on the diverge. The signs should be displayed prior to the diverge being reached by the first vehicle in the convoy and removed just after the last sign-bearing vehicle has passed.

8.6.4.15 When work is to be carried out on the mainline and then on a diverge road, as the works vehicle reaches the start of the taper for the diverge slip 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.

8.6.4.16 The works vehicle should then work its way along the diverge with a IPV showing the RUS 001 Keep Left or RUS 002 Keep Right sign as appropriate. The remaining mobile signs should remain in position on the hard shoulder of the mainline. When the working vehicle reaches the end of the diverge road the closure should be removed.

8.6.4.17 When it is necessary to work on a merge slip and then on the mainline, static or mobile signs as described in section 8.6.4.12 should be displayed at the start of the slip road. The works vehicle, escorted by a IPV displaying the RUS 001 or RUS 002 sign as appropriate, should work along the slip road while the remainder of the sign-bearing vehicles wait on the hard shoulder of the mainline with their beacons switched off. As the works vehicle reaches the mainline, 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.

Removing a MLC

8.6.4.18 If a MLC convoy 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.

8.6.4.19 Further guidance is provided for a MLC in Section 3.8 of The Temporary Traffic Management Design Guidance document and Section 3.4 of The Temporary Traffic Management Operations Guidance document which shall be adhered to.

8.6.5 Rolling Road Block

8.6.5.1 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 IPV displaying sign RUS 014 No Overtaking, in each lane at the head of the queue.

8.6.5.2 Sign WK 001 Roadworks Ahead should be positioned on the advance warning vehicle 1km in advance of the start of the RRB. Sign WK 001 with supplementary plate P 010 End, shall be provided 50 to 100m beyond the works area.

8.6.5.3 RRBs shall only be implemented by trained personnel and may require the presence of An Gardaí Síochána. They should be implemented when conditions suit the parameters set out for the establishment and operation of a MLC.

8.6.5.4 The vehicles used for a RRB are the same as those used in a MLC. A RRB is implemented by positioning the advance warning vehicles 500m and 1km from the line of IPV which move from lane 1 into position, one in each running lane and adjacent with each other. The hard shoulder is closed using a works vehicle and appropriate flashing amber lights and signage which move in line with the IPVs thus forming a full carriageway closure.

8.6.5.5 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 for vehicles joining the back of the queue. See Table 3.8.3.1 of the Temporary Traffic Management Design Guidance for details.

8.6.5.6 Once the carriageway length required is determined, the number of junctions encountered by the RRB can be obtained. Slip lanes should be closed using advance signage, Stop and Go discs. Vehicles accessing the mainline will be held before the Monitoring Vehicle passes through and allowed access once the IPVs have passed through the junction.

8.6.5.7 During the procedure, the length of the queuing traffic should be monitored and if deemed necessary, the works suspended to clear the backlog.

8.6.5.8 Further guidance is provided for RRB in the following locations and shall be adhered to:

- Section 3.8.3 of Temporary Traffic Management Design Guidance document; and
- Section 3.4.3.6 of Temporary Traffic Management Operations Guidance document.

Appendix A: Summary of Signs for Roadworks

Warning Signs for Roadworks

WK 001

WK 010

WK 011

WK 012

WK 013

WK 014

WK 014A

WK 015

WK 015A

WK 016

WK 017

WK 018

WK 019

WK 020

WK 021

WK 022

WK 023

WK 024

WK 030

WK 031

WK 032

WK 033

WK 034

WK 035

WK 040

WK 040A

WK 041

WK 041A

WK 042

WK 042A

WK 043

WK 043A

WK 044

WK 044A

WK 045

WK 045A

WK 046

WK 047

WK 048

WK 049

WK 050

WK 051

WK 052

WK 060

WK 061

WK 062

WK 070

WK 071

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WK 084

WK 085

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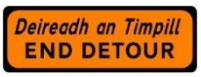
WK 087

WK 090

WK 091



WK 092

WK 093

WK 094

WK 095

WK 096

WK 097

WK 098

WK 099

WK 100

WK 101

WK 102

WK 105

WK 106

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WK 111

WK 112

WK 113

WK 114

WK 115

WK 116

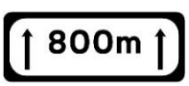
WK 117

WK 118

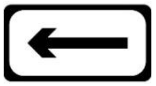
WK 119

Supplementary Plates

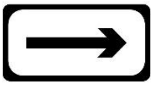
P 001



P 002

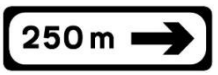


P 003L



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 062L

W 062R

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 009

RUS 014

RUS 026

RUS 027

RUS 039

RUS 040

RUS 041

RUS 042

RUS 043

RUS 064

RUS 044

RUS 060

RUS 061

RUS 061

Information Signs (See Chapter 4)

F 401

Appendix B: Layout Diagrams

- The following layout diagrams are examples of TTM layouts in a number of typical situations for the various levels of road. These are examples only, other layouts may also be suitable as developed by a TTM Designer. The layout diagrams are listed below.

- Diagrammatic

  1 - 000 Representation of Design Parameters

- Level 1(i) to Level 1(iii) Roads (Single Carriageway of ≤ 30km/h, 40km/h & 50km/h)

  1 - 001 TTM Signage Layouts

- Level 1(iv) Roads (Single Carriageway of 60km/h & Multi-lane / Dual ≤ 60km/h)

  1 - 002 TTM Signage Layouts
  1 - 003 TTM for Multi-Lane One-Way Streets or Dual Carriageway
  1 - 004 TTM for Multi-Lane Two-Way Street
  1 - 005 TTM for Cyclist and Pedestrians

- Level 2(i) and Level 2(ii) Roads (Single Carriageway of 80km/h and 100km/h)

  2 - 001 TTM Traffic Control Methods
  2 - 002 TTM for Semi Static Operations
  2 - 003 TTM for a Climbing Lane Incorporating a Roadworks Speed Limit

- Level 3 Roads (Dual Carriageways and Motorways of 80km/h and ≥ 100km/h)

  3 - 001 Advance Warning Signage
  3 - 002 Tapers
  3 - 003 Lane Closures – Type A
  3 - 004 Lane Closure in a 3 Lane Section
  3 - 005 Mobile Lane Closure Trailers and IPV Signage
  3 - 006 Mobile Lane Closures
  3 - 007 Mobile Lane Closure (No Hard Shoulder)
  3 - 008 Rolling Road Block Vehicles Signage
  3 - 009 Rolling Road Block

The following notes should be read in conjunction with the layout diagrams.

General Notes

- Refer to the Design Parameter tables for the required dimensions and information on Level 1, Level 2 and Level 3 roads.
- Refer to Table 8.3.1.1 for definition of roadworks signs.
- TTM signs should be placed in a verge or at the back of the footway so as not to cause an obstruction.
- TTM signs should always be placed in a location so as not to cause any unnecessary obstruction.
- WK 001 Roadworks End sign shall be placed 20 to 50m from the end of the works area.
- 45° taper required at the end of the works to deflect the road user back to original lane configuration.
- The appropriate sign should be displayed to match the type of TTM installed.
- Site Access signs to be positioned with clear visibility for both the traffic and the exiting site vehicles.
- Lane widths should be determined by the type and volume of vehicles expected.

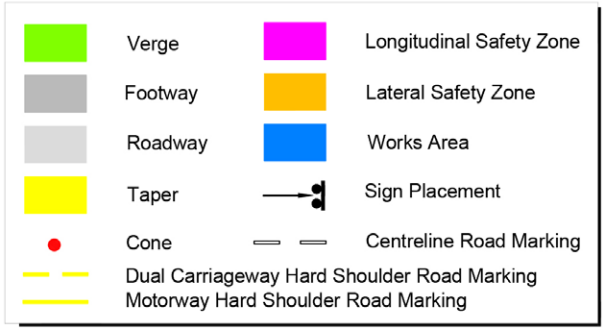
Level 1 Notes

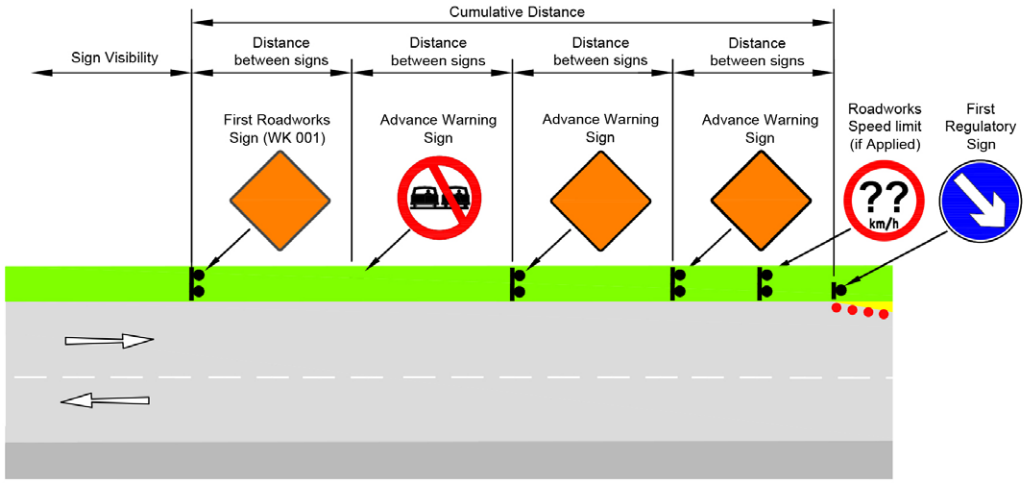
- Vulnerable Road Users should be instructed to cross at an existing crossing point, if present, in advance of the works.
- Vulnerable Road Users are to be guided safely through or around the works.

Level 3 Notes

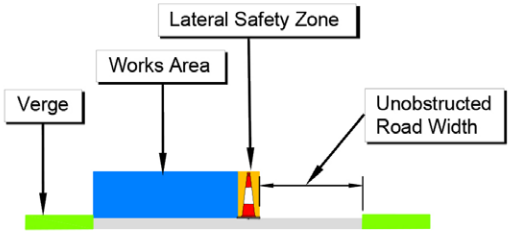
- Signs should be placed in the verge and central reserve in positions so as not to cause an obstruction.
- Transition Length is equal to twice the taper length applied to lane closures.
- Advanced warning signs to be placed on merges if within 1km of works.
- Warning or regulatory signs within the taper and works areas to be positioned 50 to 100m apart to ensure visibility.
- Barrier boards on the layouts are optional.

Example Only

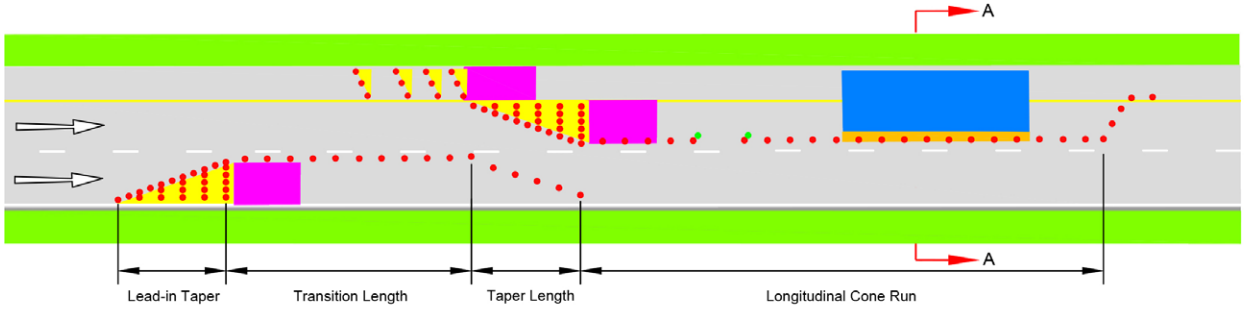




Single Carriageway



Section A - A



Motorway Lane Closure Detail

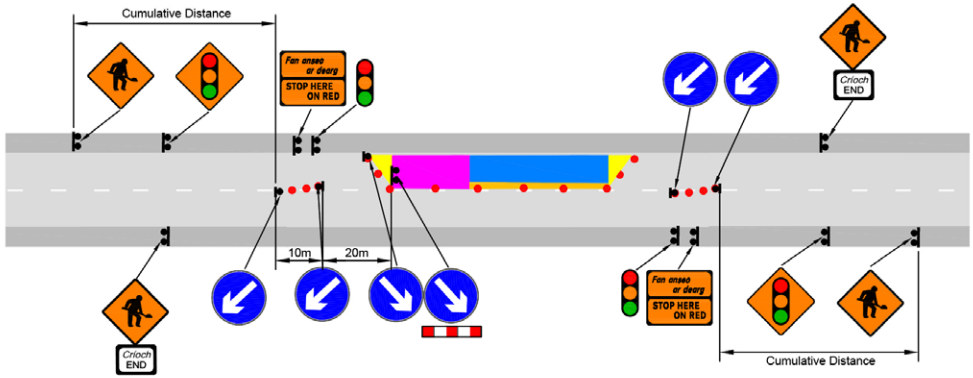
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Representation of Design Parameters

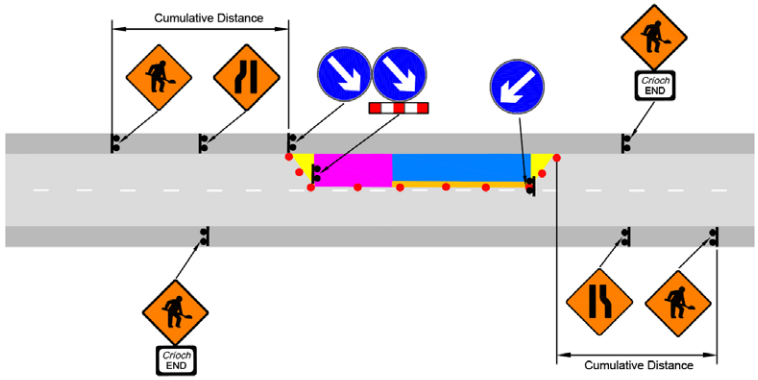
Road Type : Level 1 to Level 3

Drawing No. : 1 - 000

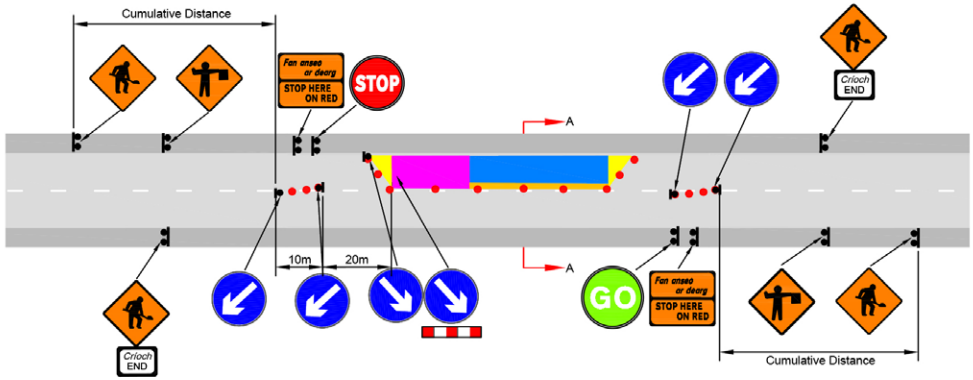
Example Only



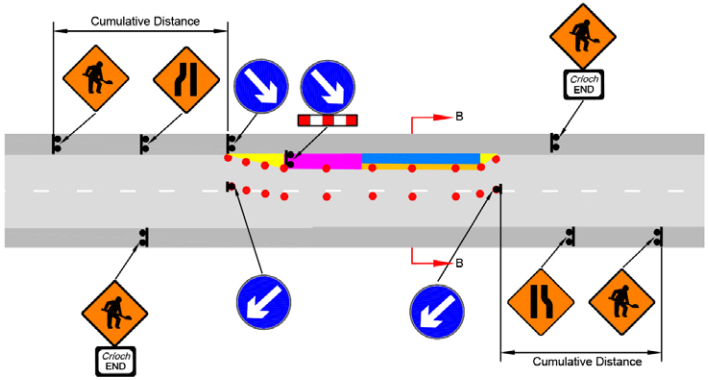
Traffic Signals



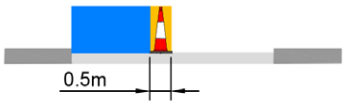
Give and Take



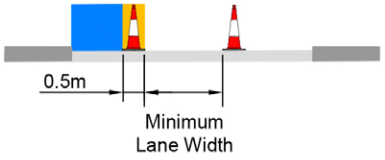
Stop and Go



Two - Way Traffic Operation



Section A - A



Section B - B

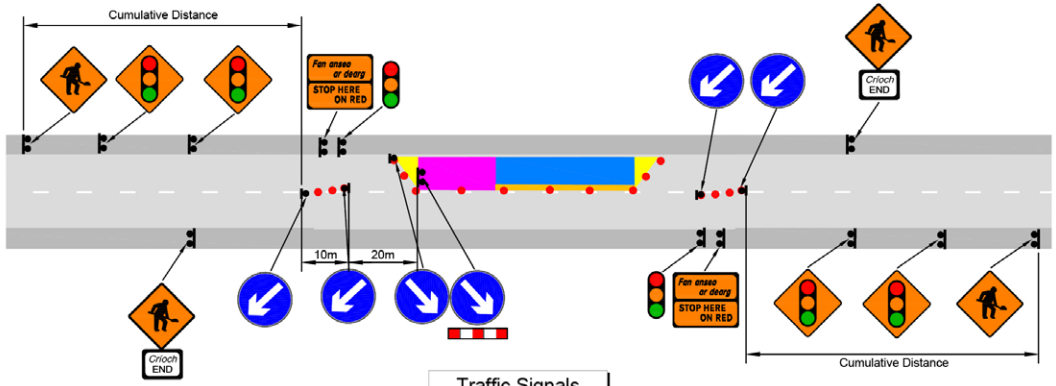
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : TTM Signage Layouts

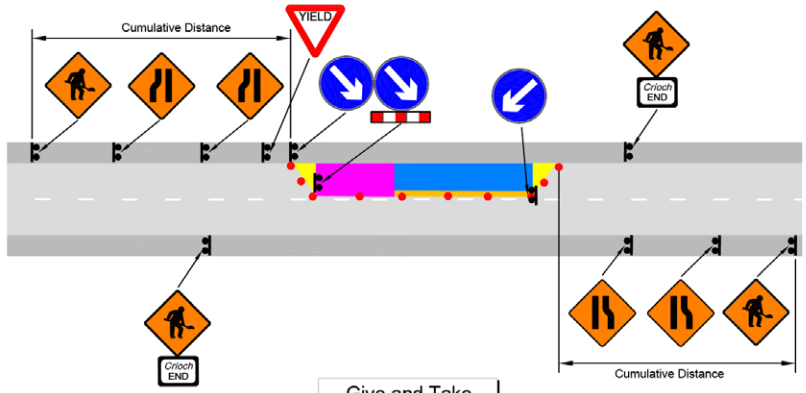
Road Type : Level 1 (i) to Level 1 (iii)

Drawing No. : 1 - 001

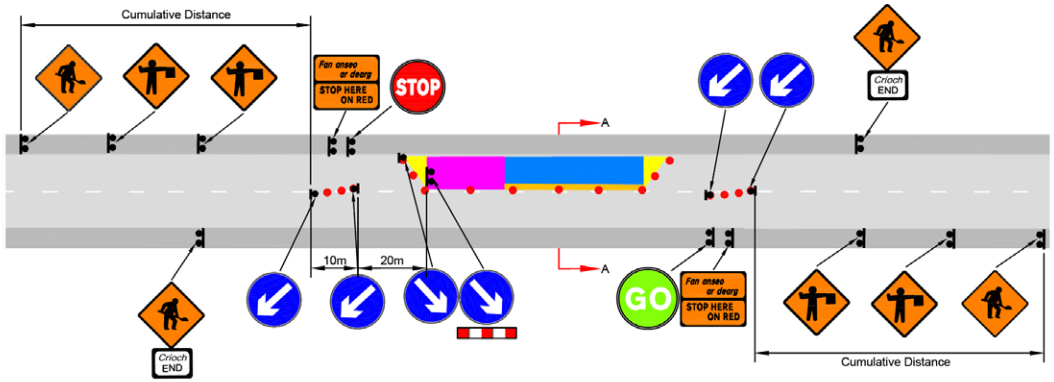
Example Only



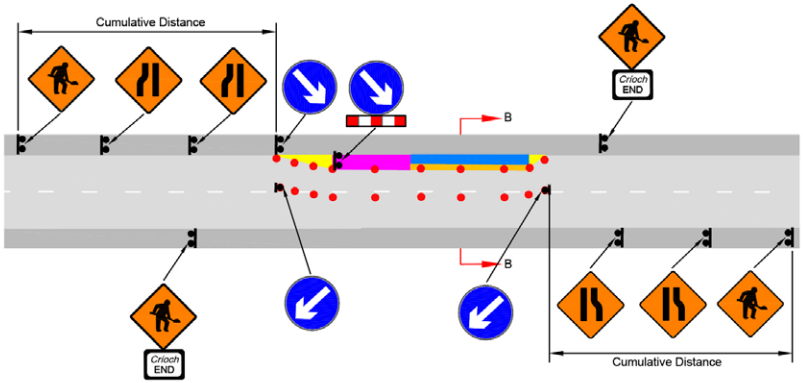
Traffic Signals



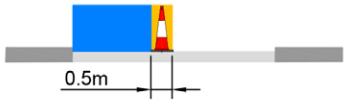
Give and Take



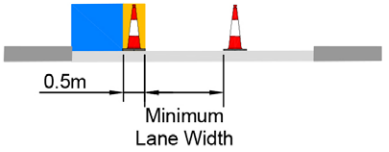
Stop and Go



Two - Way Traffic Operation



Section A - A



Section B - B

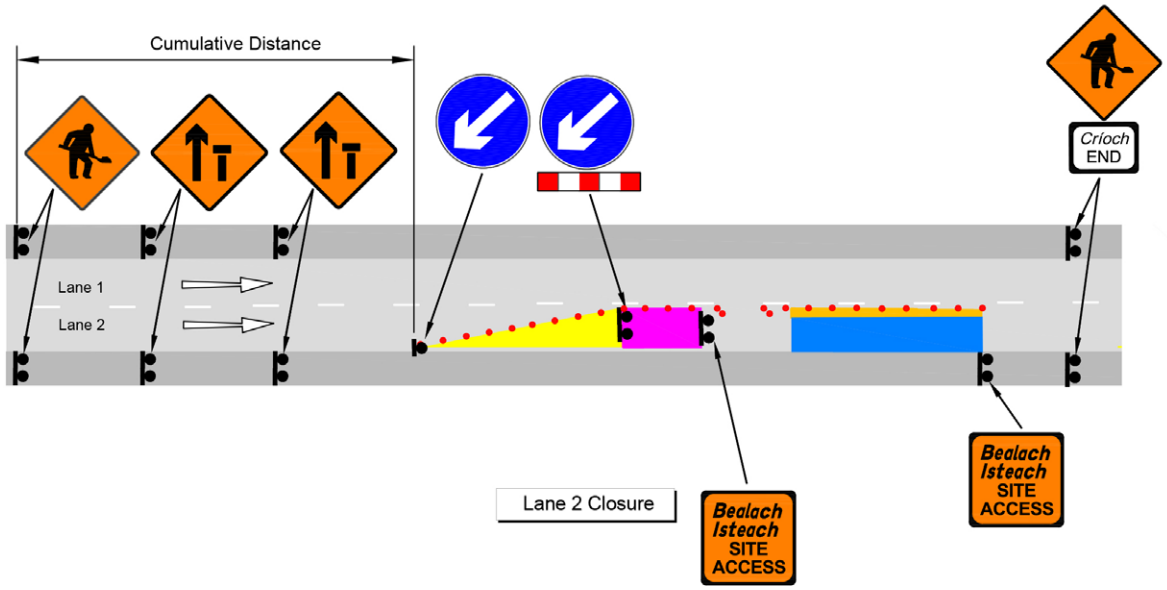
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

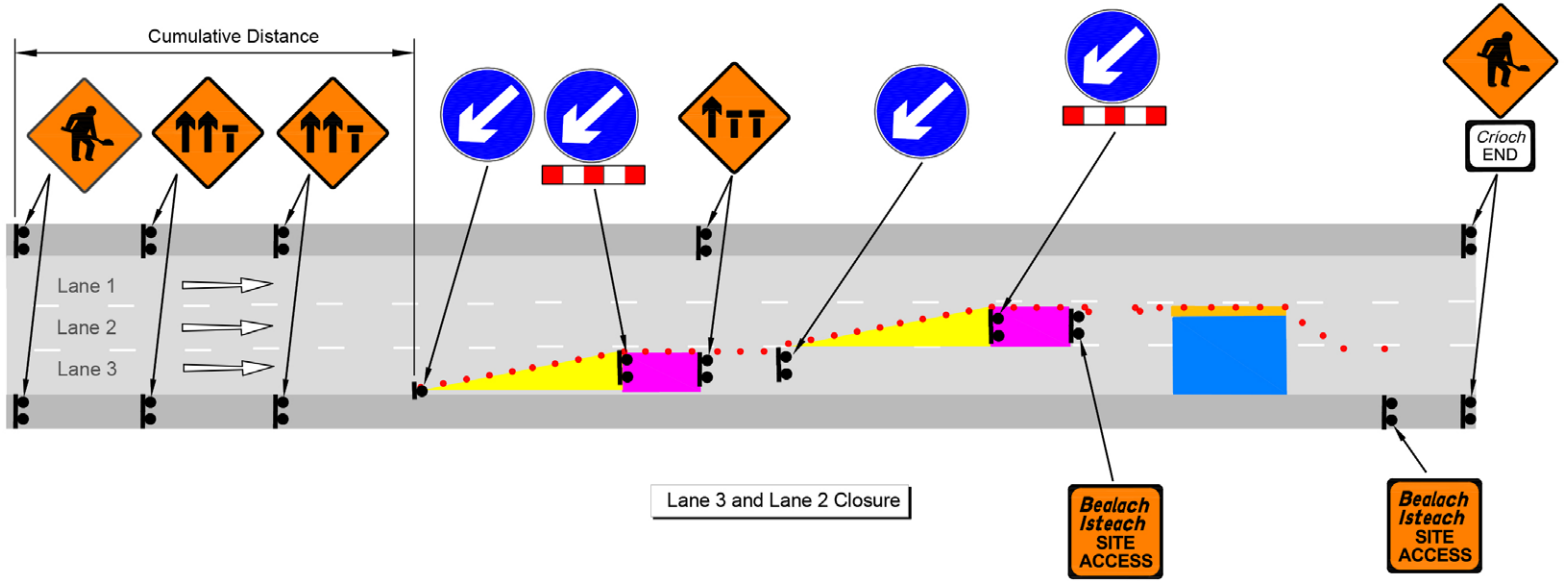
Description : TTM Signage Layouts

Road Type : Level 1 (iv) Type A

Drawing No. : 1 - 002

Example Only





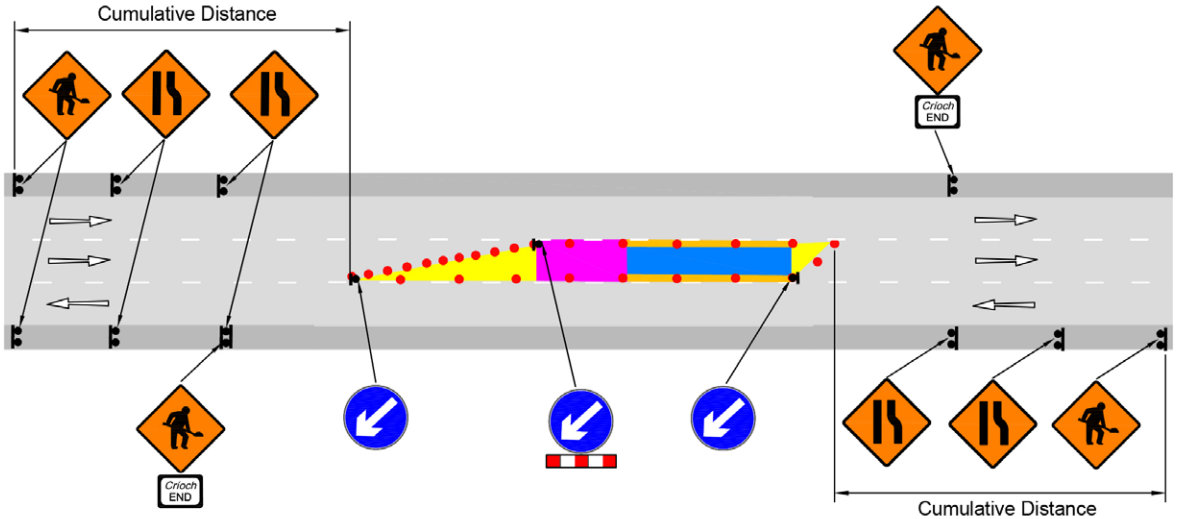
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : TTM for Multi-lane One-Way Streets or Dual Carriageway

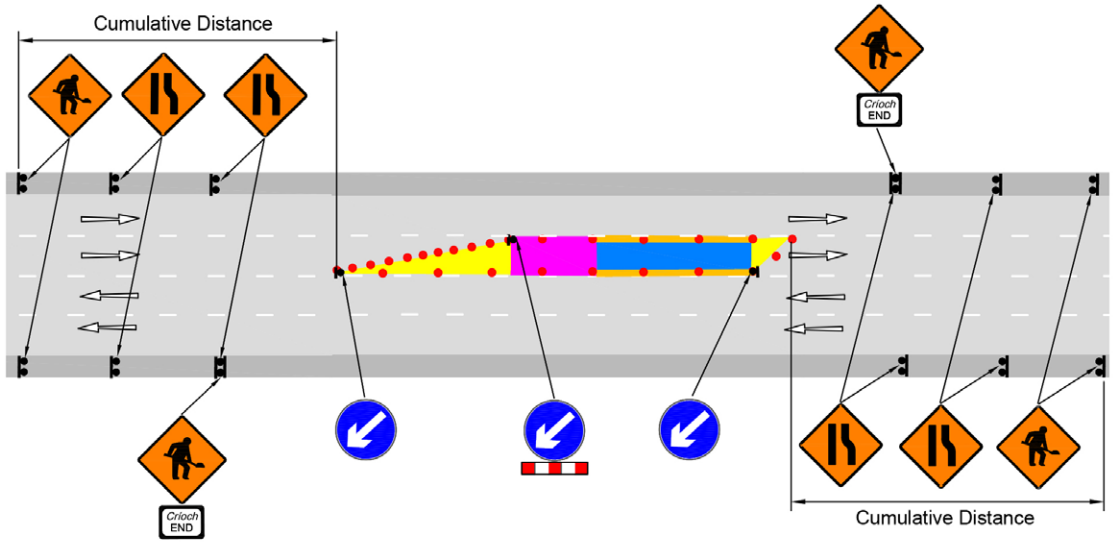
Road Type : Level 1 (iv) Type A

Drawing No. : 1 - 003

Example Only



Lane 2 Closure on a 3 Lane



Lane 2 Closure on a 4 Lane

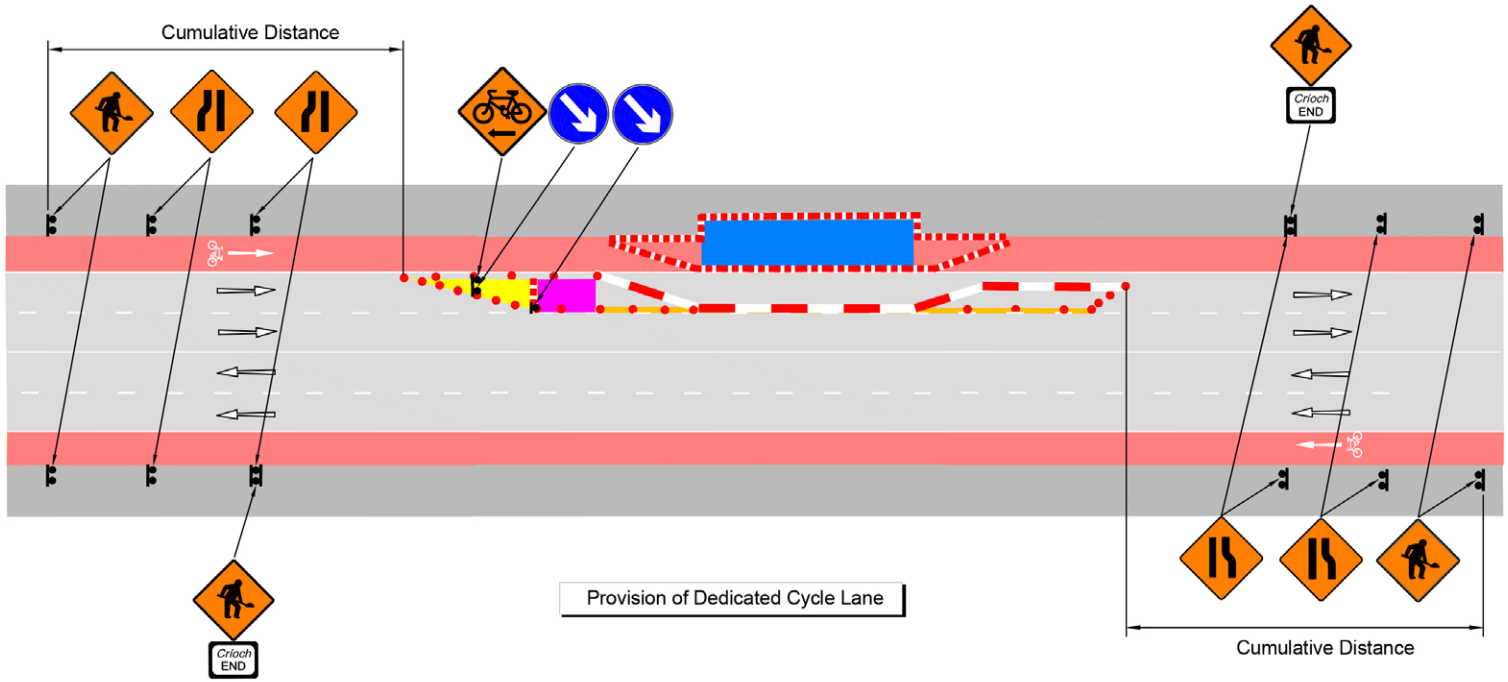
An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

Description : TTM for Multi-lane Two-Way Street

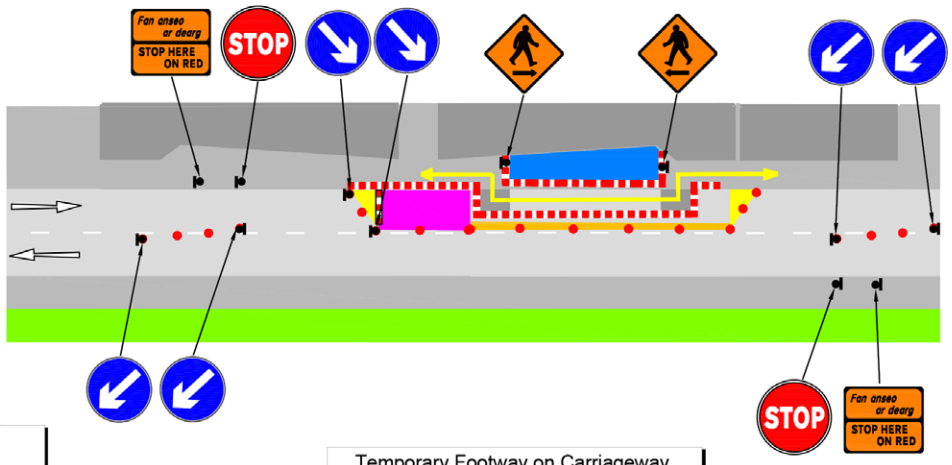
Road Type : Level 1 (iv) Type A

Drawing No. : 1 - 004

Example Only



Provision of Dedicated Cycle Lane



Temporary Footway on Carriageway

Note

- Advance warning signs for the temporary footway have been omitted for clarity

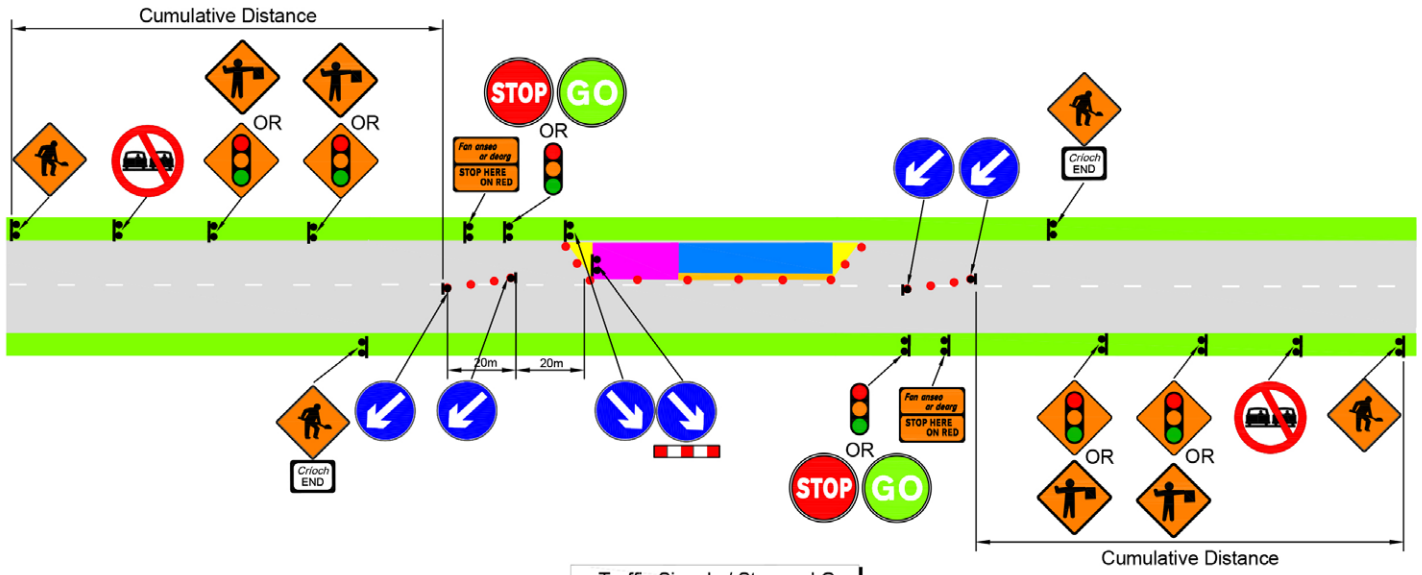
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : TTM for Cyclist and Pedestrians

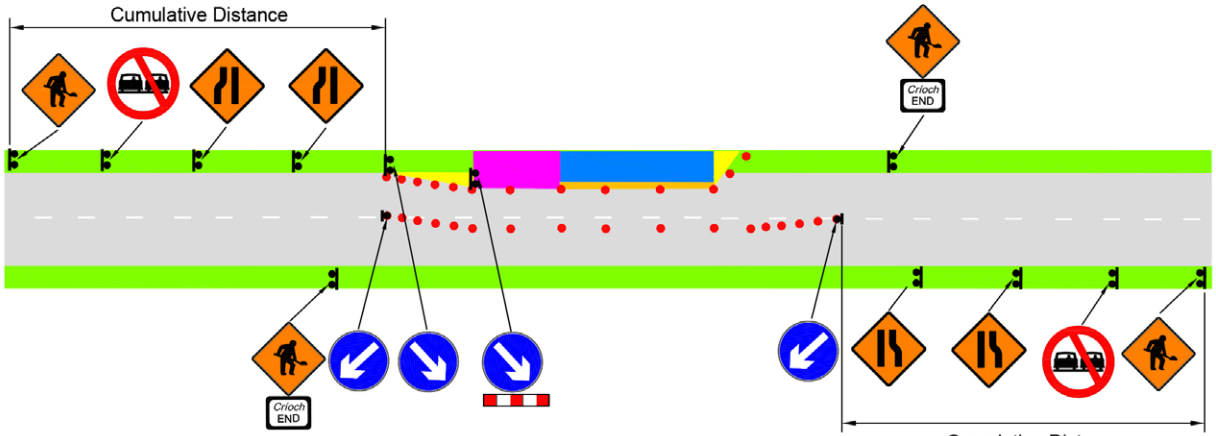
Road Type : Level 1 (iv)

Drawing No. : 1 - 005

Example Only



Traffic Signals / Stop and Go



Two - Way Traffic Operation

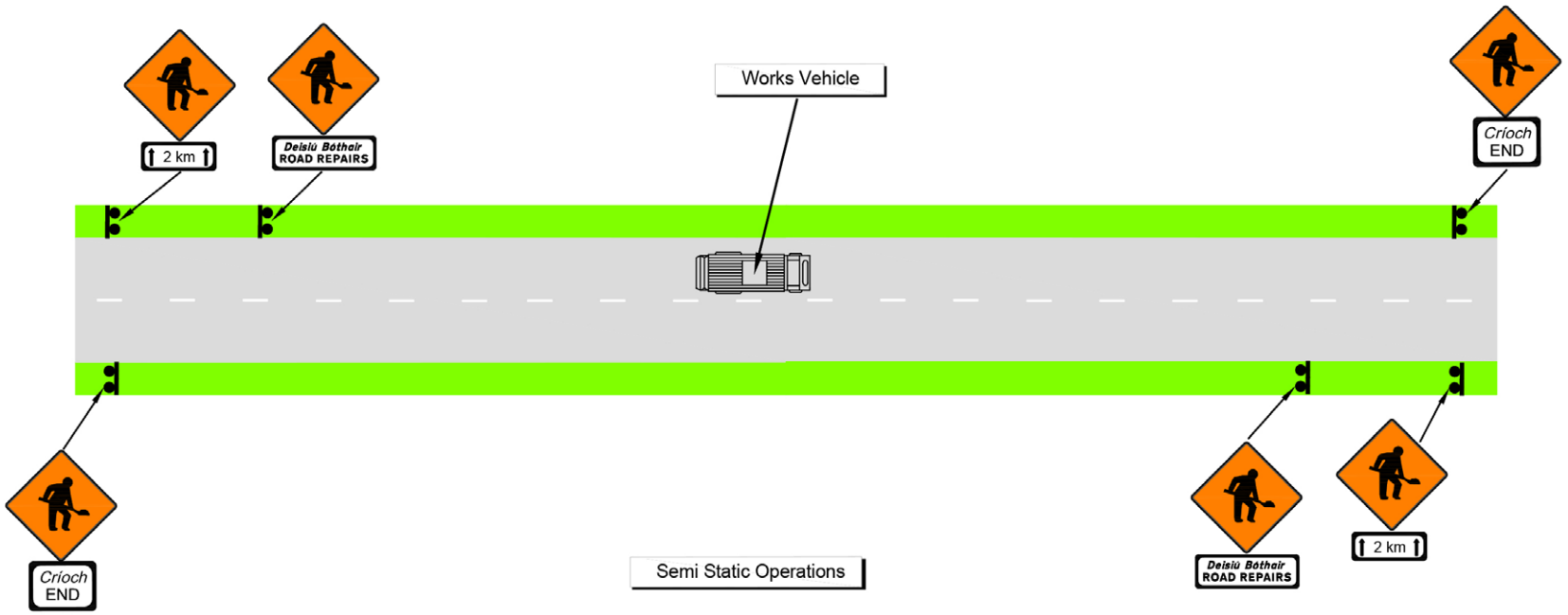
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : TTM Traffic Control Methods

Road Type : Level 2 (i) and (ii)

Drawing No. : 2 - 001

Example Only



Notes

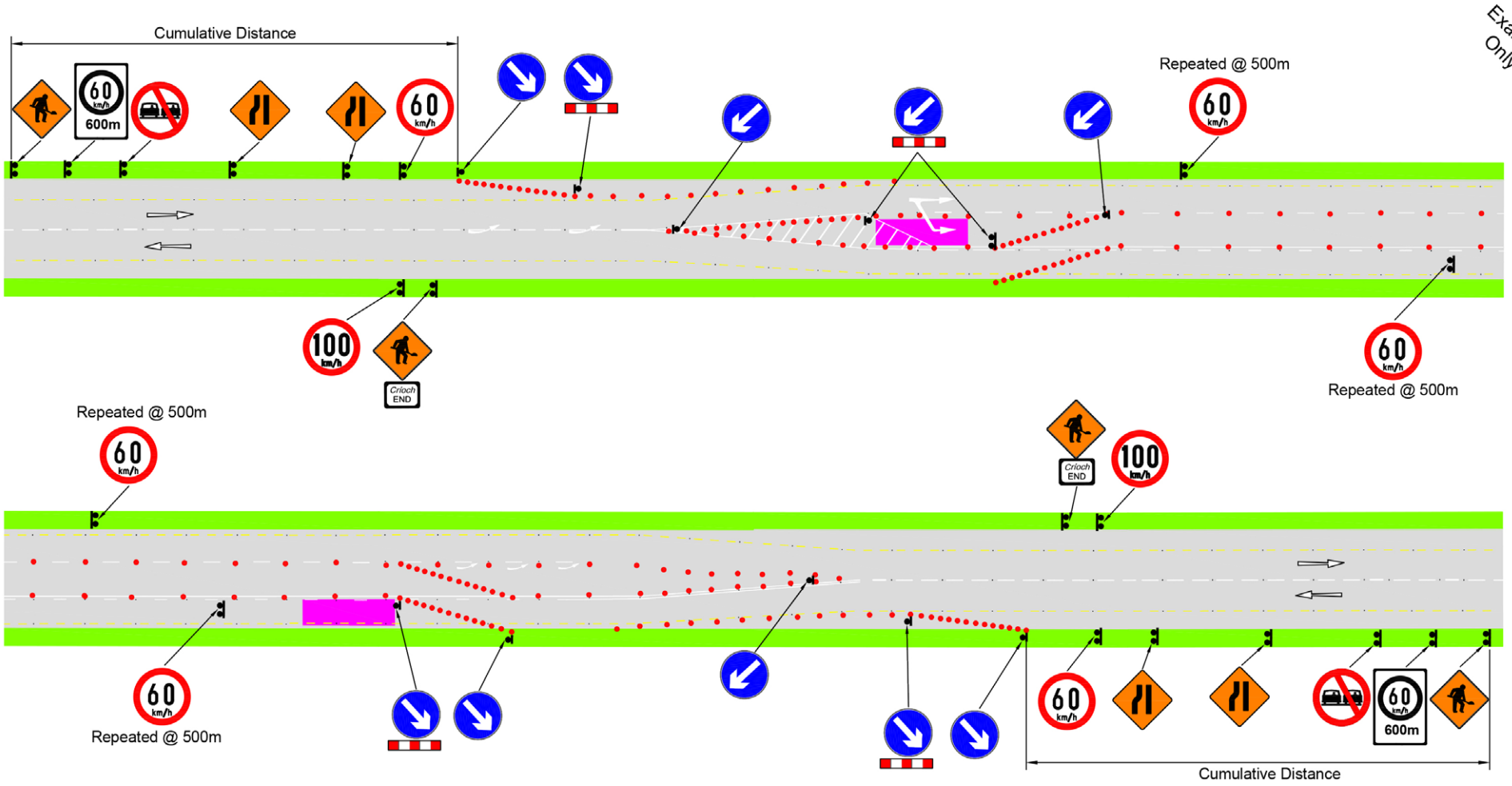
- Advance warning signs positioned in the verge at 20m - 50m apart.
- Signs to be moved every 2km as the works progress.
- Additional signs required at junctions.

An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : TTM for Semi Static Operations

Road Type : Level 2

Drawing No. : 2 - 002



Roadworks Speed Limit Signage for a Climbing Lane

Notes

- The location for a statutory roadworks speed limit signage is shown.
- An indicative location for a repeater statutory roadworks limit is shown where it might apply.
- Permanent speed limit to be posted at end of roadworks to denote end of roadworks speed limit.

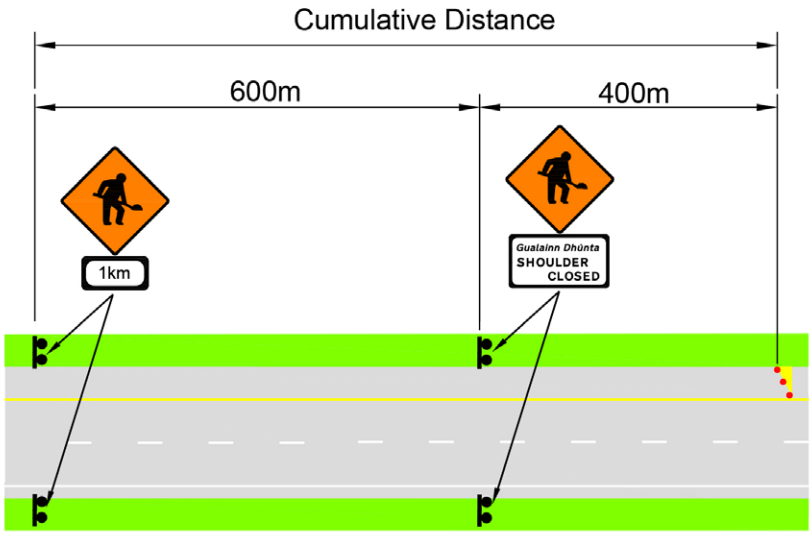
An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

Description : A Climbing Lane incorporating a Roadworks Speed Limit

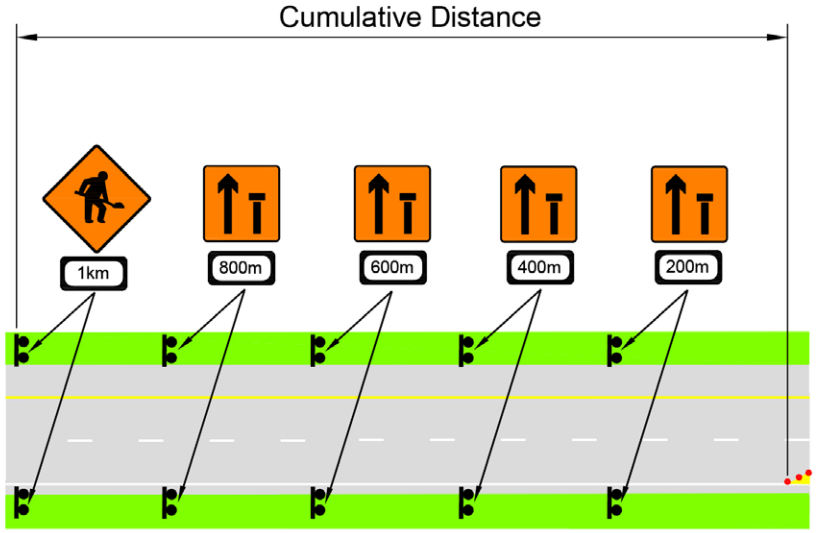
Road Type : Level 2 (ii) - Type A

Drawing No. : 2 - 003

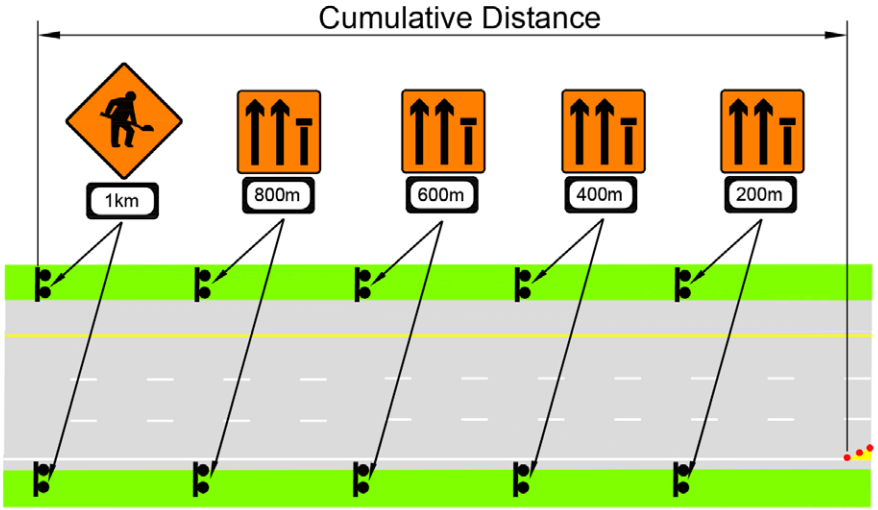
Example Only



Hard Shoulder Closure



Lane 2 Closure



Lane 3 Closure

Notes

- The advance warning signage layouts are indicative for various TTM Set-ups

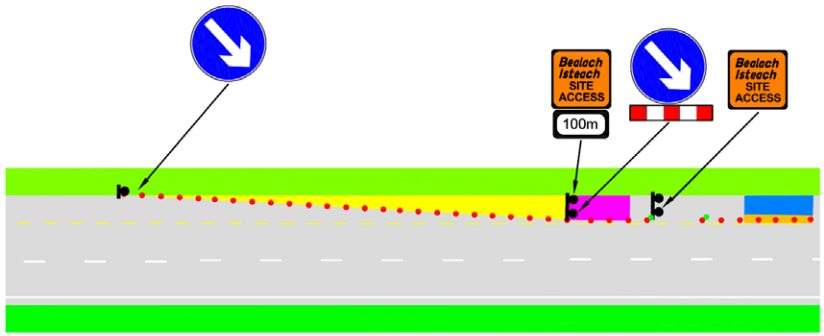
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Advance Warning Signage

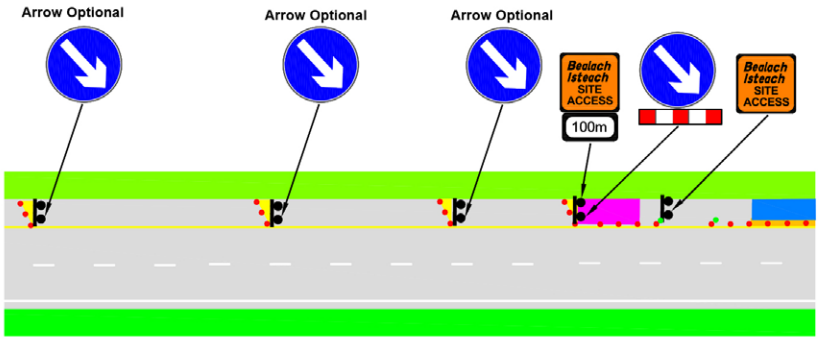
Road Type : Level 3

Drawing No. : 3 - 001

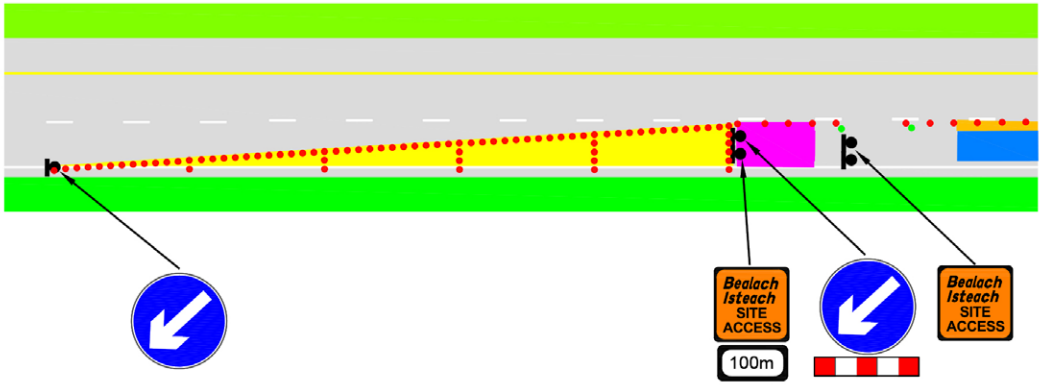
Example Only



Dual Carriageway Hard Shoulder



Motorway Hard Shoulder



Lane Taper

Notes

- Examples of the advance warning signage for these tapers are provided in Layout 3 - 001

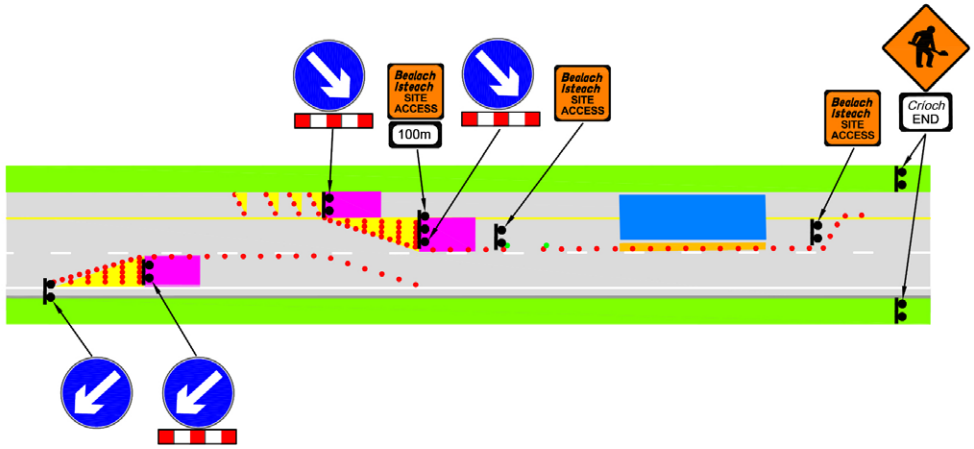
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Tapers

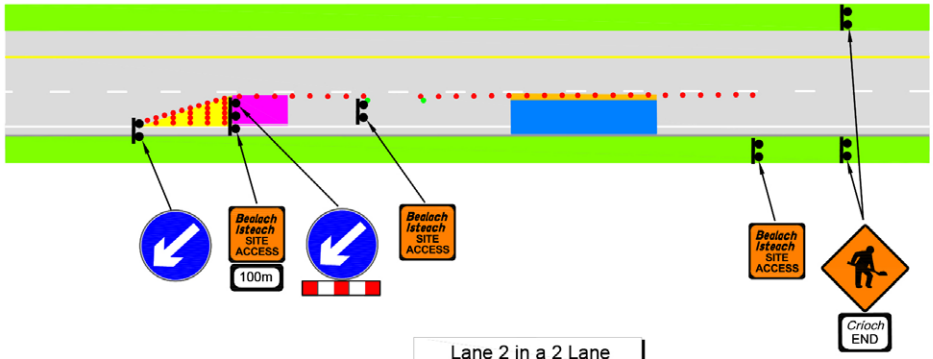
Road Type : Level 3

Drawing No. : 3 - 002

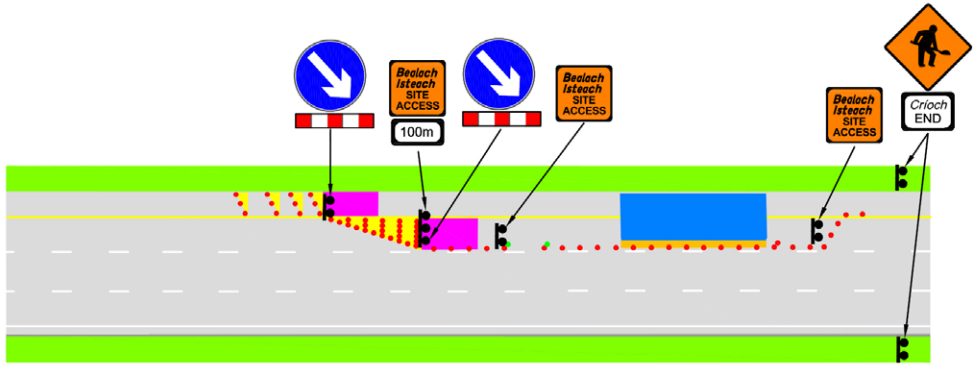
Example Only



Lane 1 in a 2 Lane



Lane 2 in a 2 Lane



Lane 1 in a 3 Lane

Notes

- Examples of the advance warning signage for these lane closures are provided in Layout 3 - 001

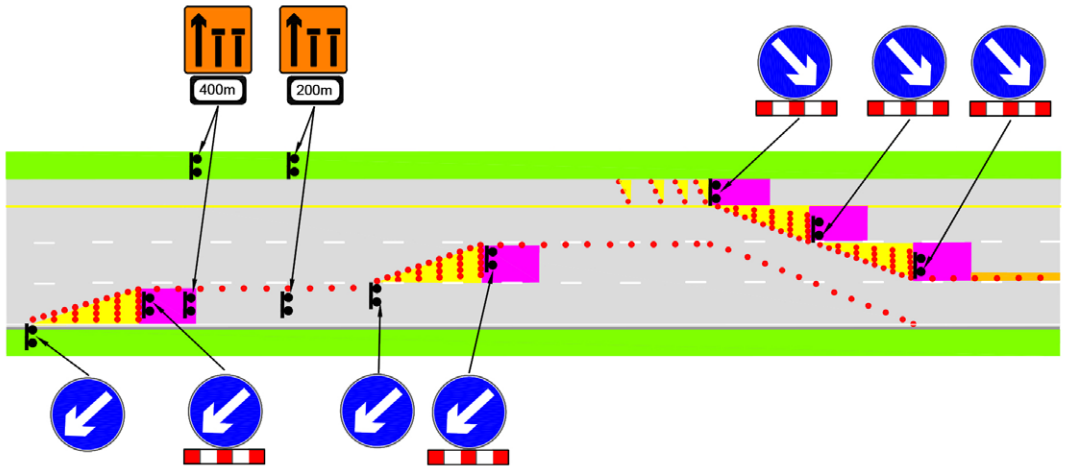
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Lane Closures - Type A

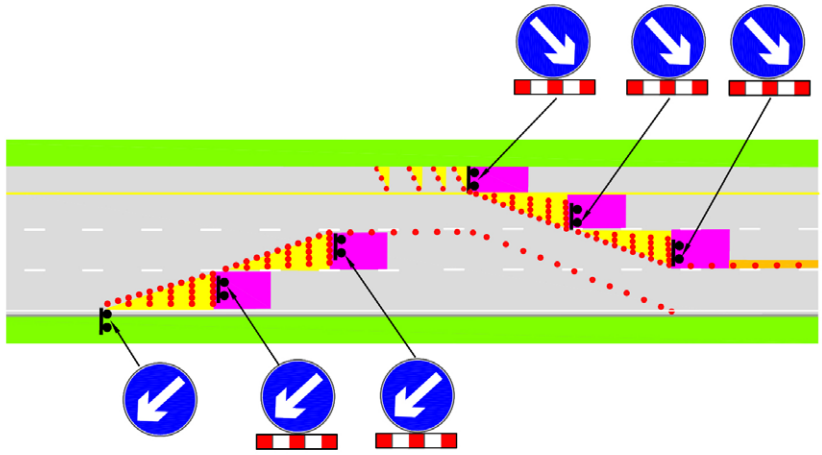
Road Type : Level 3

Drawing No. : 3 - 003

Example Only



Lane 1 and 2 Closure - Type A



Lane 1 and 2 Closure - Type B

Notes

- Examples of the advance warning signage for these tapers are provided in Layout 3 - 001

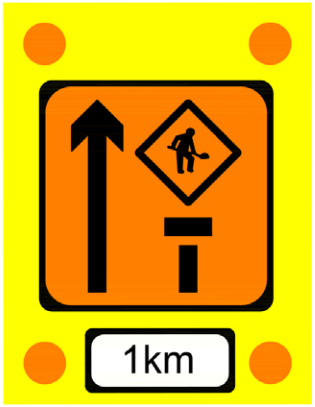
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Lane Closure in a 3 Lane Section

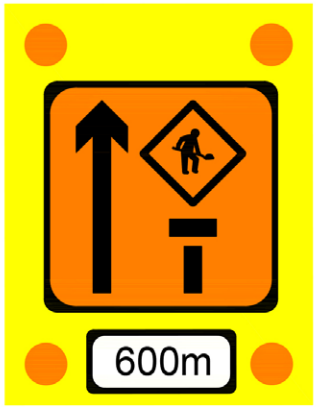
Road Type : Level 3

Drawing No. : 3 - 004

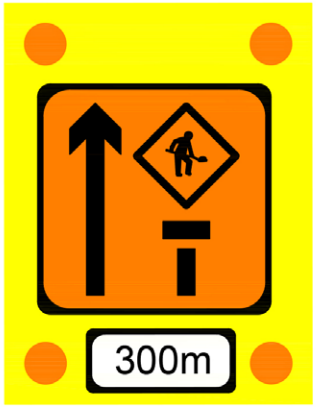
Example Only



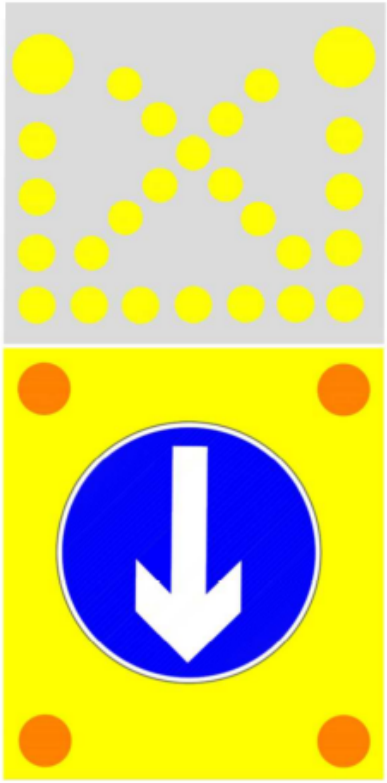
Trailer 3



Trailer 2



Trailer 1



Impact Protection Vehicle

Notes

Colours:

- Backing Board.....Yellow (ISEN 12899)
- Flashing Lanterns.....Amber (Signal Yellow)

Sign Sizes:

- WK 001 Roadworks Ahead sign must be a minimum of 600mm
- P 001 Supplementary Plate must be a minimum size of 1275mm x 565mm
- Four no. flashing lanterns not activated when using the IPV as an IPV.
- The working drawings provide detailed information for the signs

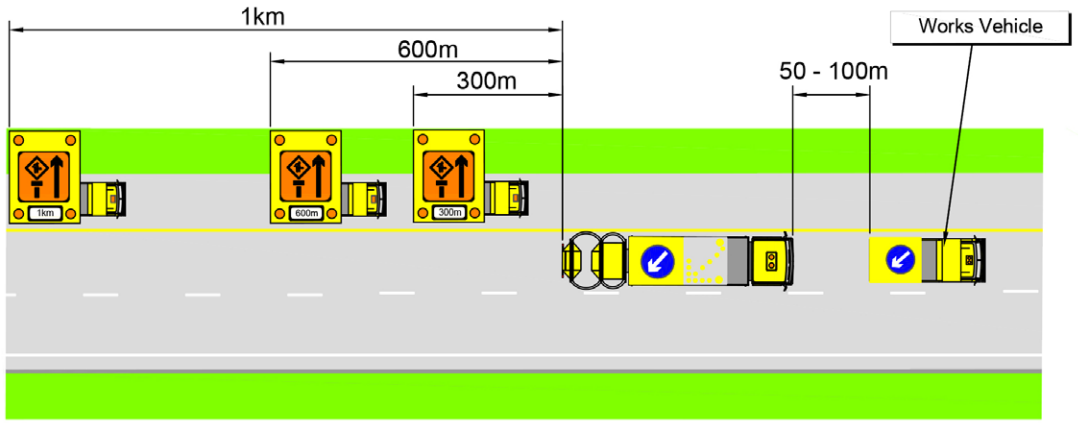
An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

Description : Mobile Lane Closure Trailers and IPV Signage

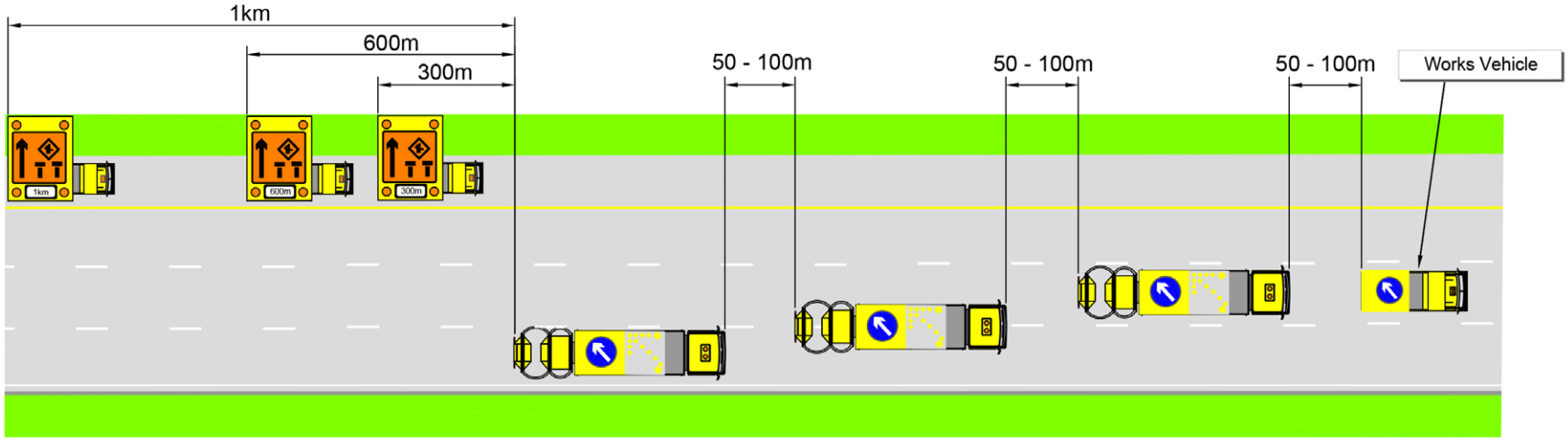
Road Type : Level 3

Drawing No. : 3 - 005

Example Only



Lane 1 in 2 Lane



Lane 3 and 2 in 3 Lane

Note

- Advance warning vehicles shall be positioned in the hard shoulder.

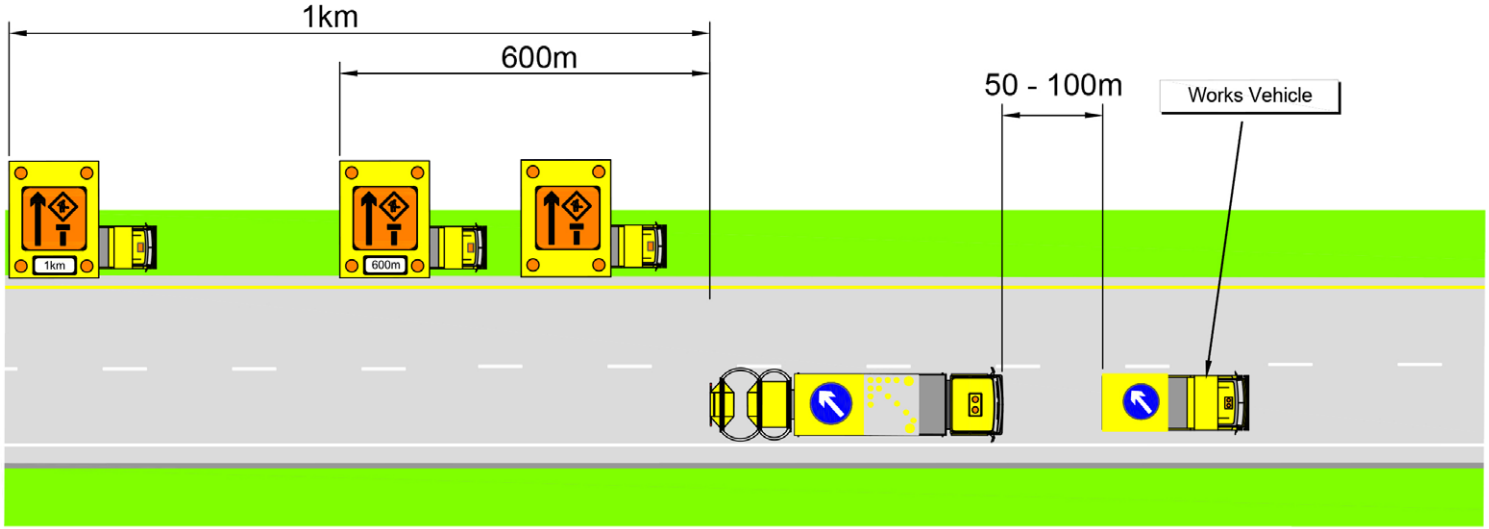
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Mobile Lane Closures

Road Type : Level 3

Drawing No. : 3 - 006

Example Only



Lane 2 in 2 Lane

Notes

- Advance warning vehicles shall be positioned in the verge.
- Care should be taken not to damage verges or cause debris when moving vehicles.

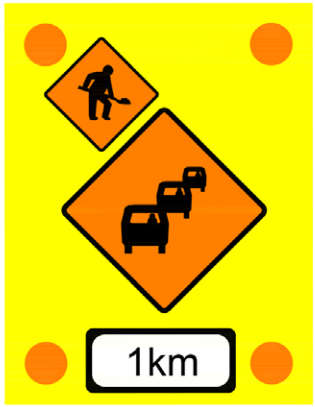
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

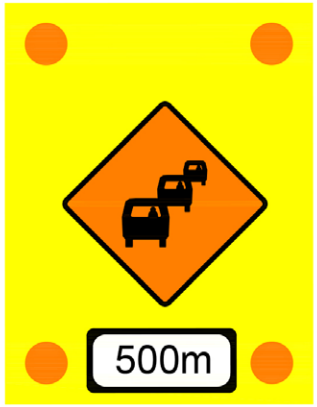
Description : Mobile Lane Closure (No Hard Shoulder)

Road Type : Level 3

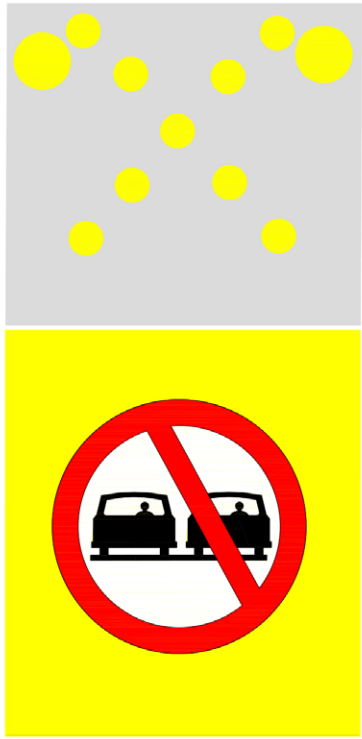
Drawing No. : 3 - 007

Example Only





Queues Likely Advance Warning Trailers



Impact Protection Block Vehicle

Notes

Colours:

- Backing Board.....Yellow (ISEN 12899)
- Flashing Lanterns.....Amber (Signal Yellow)

Sign Sizes:

- WK 001 - Roadworks Ahead 600mm side
- WK 062 - Queues Likely 1200mm side
- P 001 - Supplementary Plate 1275mm x 565mm

Advance warning vehicles shall always be positioned in the hard shoulder

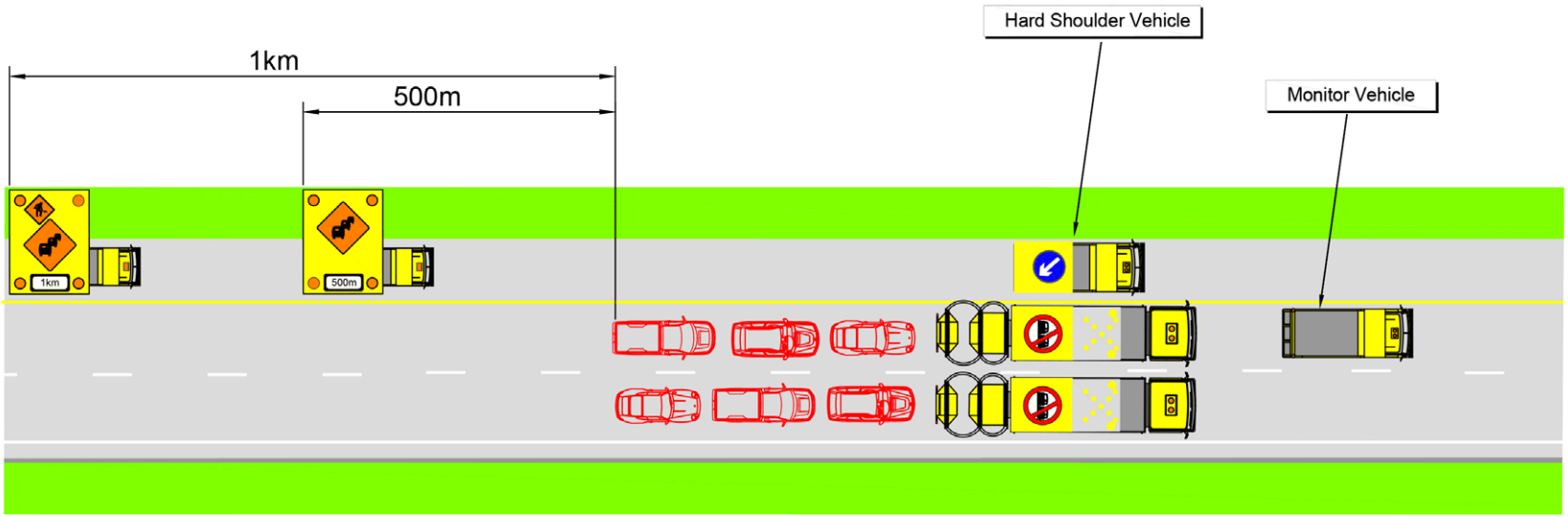
An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Rolling Road Block Vehicles Signage

Road Type : Level 3

Drawing No. : 3 - 008

Example Only



2 Lane Rolling Road Block

An Roinn Iompair, Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Description : Rolling Road Block

Road Type : Level 3

Drawing No. : 3 - 009