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## **Preface**

This Part of the *Manual of Uniform Traffic Control Devices (Queensland)* has been based on Australian Standard AS1742.3: 2009, *Traffic control for works on roads*.

It updates the specification of traffic control devices for roadworks previously given in 2003 *Manual of Uniform Traffic Control Devices* and departmental document *Works on Roads*. It deals with the principles of signing at roadworks, describes the signs and devices used to effect traffic guidance and provides typical layout diagrams for deployment of signs and devices for various work site configurations. It is intended as both an office reference document for the planning and design of Traffic Guidance Schemes, and a field guide for the installation, operation and removal of Traffic Guidance Schemes.

Principal variations from the previous issue are as follows:

### **Ninth Issue**

1. Amended title of *Working in Proximity to Traffic Awareness* training course in Clause 1.4.3 and Appendix K
2. Updated reference to Australian Standards in Clause 2.2.3
3. Update to sheeting classification for retroreflective sheeting material in Clause 3.5.2(b)
4. Corrected clause references in the Ready Reckoner.

### **Version History: 2003 Edition**

First issue 1 August 2003

Second issue 2 April 2007

Third issue 22 February 2010 (electronic copy only)

Fourth issue 30 April 2010

Fifth issue 30 September 2013

Sixth issue 14 March 2014

Sixth issue (including Amdt. 1), 5 May 2014

Seventh issue 1 July 2016

Eighth issue 31 July 2018

Ninth issue 30 November 2018

Ninth issue (including Amdt 1), 29 March 2019

## Traffic Management Plan Preparation

Traffic Management Plan Preparation				Developing the Traffic Management Plan Clause 2.2.1, 2.2.2 Responsibility for Safety at Work Sites Clause 1.5 Risk Assessment Clause 2.2.3 Safety & Convenience Clause 2.3.2	
Hazard Elimination	Relocate traffic via detour/ side tracks Clause 4.1.2 (b)(i)(A)		Stop all traffic for short periods using traffic control signals Clause 4.1.2 (b) (i)(B)		Hazard Separation  Separation with barrier Clause 4.1.2 (b) (ii) (A) Minimum lateral separation Clause 4.1.2 (b) (ii) (B) Minimum lateral separation with shuttle control around work sites Clause 4.1.2 (b) (ii) (C)
	Traffic controller stops all traffic for short periods Clause 4.1.2 (b)(ii)(C)				
Hazard Management		Work not within travelled path traffic controlled with speed limit Clause 4.1.2(b)(iii)(A)		Work shorter than a single shift  Work in travelled path applying training, strict application of work methods Clause 4.1.2 (b)(iii)(B)	
		Work longer than single shift			
Static work sites		Traffic through the work area Clause 2.3.3		Traffic past the work area Clause 2.3.4	
Detours/Sidetacks		Temporary road closures		Workers separated from moving traffic	
TMI and TMD works involving relatively simple part-roadway closures				Clause 2.2.4(b)	
TMD works involving complex traffic arrangements or staging, or both				Clause 2.2.4(c)	
Risk management		Clause 2.2.3			
Safety of workers					
Worksite requirement		Clauses 2.3.2 (a), 3.4.4, 4.1.2, 4.7.2(a), 4.9.1 (a)		High visibility clothing Clauses 2.6.4, 3.16.4, Appendix C	
Traffic control devices – Requirements for all sites		General requirements, function, format and size of signs		Clauses 2.4.1, 3.1, 3.2, 3.3	

Traffic Management Plan

Preparing Officer

Amendment 1, March 2019



Traffic control devices for all static sites Clauses 3.4, 4.1.5, 4.1.6, 4.7, 4.8 Clauses 2.4.2, 3.9 Clause 3.8.2		Between gaps in traffic Clause 4.3.2 Short term in traffic Clause 4.3.3 Frequently changing areas Clause 4.3.4 Shoulder grading Clause 4.3.5 Mobile inspections Clause 4.3.6 Off-roadway works Clause 4.3.7 Work protected by specialist vehicles Clause 4.3.8 Survey work Clause 4.3.9 Traffic investigations Clause 4.3.10	
Worksite approaches and departures Delineation Lane and road closures	Worker Separation Clause 4.2	Short term low impact open roads Clause 4.3	Frequently changing work areas (not in traffic lanes) Clause 4.4.2 Frequently changing work areas (in traffic lanes) Clause 4.4.3 Road lighting works Clause 4.4.4 Medians, verges, footpaths Clause 4.4.5 Street sweeping and garbage collection Clause 4.4.6 Gaps in traffic Clause 4.4.7 Protected by specialist vehicles Clause 4.4.8 Survey work Clause 4.4.9 Traffic investigations Clause 4.4.10
Detour signs Clauses 3.6, 4.7.3 (b)	Barricades Clause 3.8.3	Short term low impact built-up areas Clause 4.4	Maintenance, grading and re-sheeting Clause 4.5.2 Short term partial closures Clause 4.5.3
Design of detours, sidetracks and crossovers Clauses 4.14.1, 4.14.5, 4.14.8 (c)	Method of control Temporary traffic signals Clauses 3.5.4, 4.7.2 (d), 4.7.3 (d), 4.11 Traffic Controller Clauses 3.5.2, 4.2 (d), 4.10	Works on unsealed roads Clause 4.5	Convoy works Clause 4.6.2 Operating principles Clause 4.6.3 Signs Clause 4.6.4 Speed zones Clause 4.6.5
Pedestrians, bicycles, wheelchairs, public transport, local traffic Clauses 4.14.4, 4.14.5, 4.14.8 (c)	Maintaining traffic flow Clause 4.13	Mobile works Clause 4.6	
Signing and delineation Clauses 4.14.6, 4.14.7	Vehicle size and load restrictions Clauses 2.4.6, 3.15	A site specific risk assessment (Clause 2.2.3) is required when adopting provisions of Clauses 4.3, 4.4 and 4.5.	
Freeway exit closures Clause 4.14.9	Temporary speed limits Clauses 3.5.5, 4.2 (e), 4.9		
Vehicle size restriction Clause 4.14.10	Regulatory control Existing traffic control devices Other devices Clause 3.5.3 Clause 2.4.4 Clauses 3.7, 3.11, 3.12, 3.16		
	Blasting work signs Clause 3.13		
	Safety barriers Clauses 2.4.5, 3.10, 4.2(c) (i), 4.13.4(c)		
	Excavation works Clause 4.15, Appendix E		
	Night conditions Pedestrians and cyclists Work processes/routines and records Emergency and unplanned works Clauses 2.3.6, 2.4.3, 2.5.1 (d), 3.9.3, 3.16.4 Clauses 2.3.7, 2.3.8, 3.14, 4.14.4, 4.14.8 Clauses 2.5.5, 2.5.6, 2.6.1, 2.6.7, Appendix A Clause 2.7, Appendix H		
Risk management (Clause 2.2.3 and Clause 2.2.5) - variations to mandatory requirements ("shall" provisions). Examples include traffic management arrangements in excess of the requirements in this Part of the Manual and relaxations where a risk assessment demonstrates that the requirements are excessive, complex geometric changes that require the application of engineering design principles or complex diversions that require detailed analysis (such as micro-simulation traffic modelling) to establish the network impacts. Email certification to TrafficEngineering.Support@tmr.qld.gov.au			
Amendment 1. March 2019			

## **1. Scope and general**

### **1.1 Scope**

This Part of the *Manual* specifies the traffic control measures and devices to be used to warn, instruct and guide road users in the safe negotiation of work sites on roads including unsealed roads together with footpaths, shared paths and bicycle paths adjacent to the roadway. It is applicable to Traffic Guidance Schemes for road and bridge construction and maintenance sites, works associated with other public utilities and services or any other works which cause interference or obstruction to the normal use of a road by any road user. It also provides guidance for the planning, design, installation and operation of such Traffic Guidance Schemes together with requirements for maintaining a safe workplace for workers on site. Instructions for carrying out daily routine checks of the Traffic Guidance Scheme are given in appendices.

NOTE: Detailed specifications for the design and manufacture of the signs used are given in AS 1743.

### **1.2 Objective and principles**

#### **1.2.1 Objective**

The objective of this Part of the *Manual* is to provide organisations carrying out works on roads with a set of uniform practices for the signing and delineation of construction and maintenance works which will promote the safety of both workers and road users at the work site.

#### **1.2.2 Principles**

The primary objective is to ensure the safety of road workers, while the secondary objective is to balance:

- a) the safe and convenient movement of traffic; and
- b) construction and traffic management costs.

This Part of the *Manual* sets out the optimal treatments for the management of traffic at roadworks. Traffic arrangements which provide a lesser level of protection and guidance may lead to additional safety risks to road workers and an increased risk of driver error. Arrangements which do not meet the optimal requirements of this Part of the *Manual* may be considered and approved as exceptions. Exceptions must be accompanied with a risk assessment and appropriate measures to ensure that the safety of workers and road users is not compromised, in accordance with Clause 2.2.3.

Traffic management arrangements in excess of those included in this Part of the *Manual* may potentially appear unnecessary to drivers and/or lead to increased driver frustration and reduced speed compliance. As a result, these traffic management arrangements shall be supported with a risk assessment in accordance with Clause 2.2.3 and the requirements of Clause 2.2.5.

#### **1.2.3 Innovation**

Innovative treatments that provide improved value for money outcomes are encouraged. Such treatments may include:

- a) Planning for greater network impacts through reducing the level of service for the road user typically enables works to be undertaken in a more time- and cost-efficient manner.
- b) Innovative deployment of devices.
- c) Alternative device layouts using new and/or improved devices.

New or improved devices require approval by the Department of Transport and Main Roads (see Clause 2.2.5 for guidance about variation to optimal treatments).

### 1.3 Referenced documents

The following documents are referred to in this Part:

#### 1.3.1 Australian Standards

##### AS

1743	<i>Road signs – Specifications</i>
2187	<i>Explosives – Storage and use</i>
2144	<i>Traffic signal lanterns</i>
4191	<i>Portable traffic signal systems</i>
4852.2	<i>Variable message signs: Part 2 – Portable signs</i>
5156	<i>Electronic speed limit signs</i>

##### AS/NZS

1158	<i>Lighting for roads and public spaces</i>
1158.3.1	<i>Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements</i>
1158.4	<i>Part 4: Lighting of pedestrian crossings</i>
1906	<i>Retroreflective materials and devices for road traffic control purposes</i>
1906.1	<i>Part 1: Retroreflective sheeting</i>
1906.2	<i>Part 2: Retroreflective devices (non-pavement application)</i>
1906.3	<i>Part 3: Raised pavement markers (retroreflective and non-retroreflective)</i>
3845	<i>Road safety barrier systems</i>
4192	<i>Illuminated flashing arrow signs</i>
4360	<i>Risk management</i>
4602	<i>High visibility safety garments</i>

##### Austroads

Austroads Guide AGR06-09, <i>Guide to Road Safety, Part 6 Road Safety Audit</i>
Austroads Guide AGR06-09, <i>Guide to Road Design, Part 6A Paths for Walking and Cycling</i>
Austroads Guide AGTM10-16, <i>Guide to Traffic Management, Part 10 Traffic Control and Communication Devices</i>
AP-C87-08 Austroads Glossary of Terms



### 1.3.2 International Standards

- Transportation Research Board, National Cooperative Highway Research Program
- NCHRP Report No. 350. Washington DC 1993. *Recommended Procedures for the Safety Performance Evaluation of Highway Features*
- NCHRP Report No. 358. Washington DC 1994. *Recommended Practices for Use of Traffic Barrier and Control Treatments for Restricted Work Zones and Control Treatments for Restricted Work Zones*

### 1.3.3 Department of Transport and Main Roads manuals

- Queensland *Manual of Uniform Traffic Control Devices (MUTCD) Part 2: Traffic Control Devices for General Use*
- Queensland *Manual of Uniform Traffic Control Devices (MUTCD) Part 3: Works on Roads Supplement*
- Queensland *Manual of Uniform Traffic Control Devices (MUTCD) Part 4: Speed Controls*
- Queensland *Manual of Uniform Traffic Control Devices (MUTCD) Part 14: Traffic Signals*
- Technical Specification MRTS02 *Provision for Traffic*
- Technical Specification MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*
- Technical Specification MRTS260 *Temporary Variable Speed Limit Signs*
- Technical Specification MRTS262 *Temporary Variable Message Signs*
- *Traffic and Road Use Management (TRUM) manual Volume 1 Guide to Traffic Management Part 10 Traffic Control and Communication Devices*
- *Traffic Controller Accreditation Scheme Approved Procedure*

## 1.4 Definitions

For the purpose of this *Manual*, the definitions in Austroads *Glossary of Terms* and those following apply.

### 1.4.1 Arterial road

A general term for a main road carrying mostly long-distance traffic, as distinct from local traffic.

### 1.4.2 Built-up area

Roadside development comprising property accesses at spacings averaging less than 100 m over distances of at least 500 m.

#### **1.4.3 Competent person**

A person who has, through a combination of training, qualification and experience, acquired knowledge and skills enabling that person to correctly perform a specified task, and who is appropriately authorised to perform that role.

A person is only authorised to perform the role in Queensland if he or she holds an authority that is applicable to that role (that is, where such an authority is a mandatory regulatory requirement).

NOTES:

1. Training competencies are:

- working in proximity to traffic awareness for persons who work on or adjacent to a road.
- Traffic Management Implement for persons required to implement Traffic Management Plans and Traffic Guidance Schemes
- Traffic Management Design for persons required to design, develop, review and inspect Traffic Management Plans and Traffic Guidance Schemes
- Traffic Controller (see Clause 1.4.20 of this *Manual*).

Further information about competent persons is provided in Queensland MUTCD Part 3 Supplement Section 1.4.3-1.

#### **1.4.4 Expressway-type road**

A divided highway for through traffic with full or partial control of access and generally with grade separation at intersections. The term includes expressways, freeways, tollways and motorways.

#### **1.4.5 Long-term**

The description which applies when a Traffic Guidance Scheme is required to operate both day and night and may be left unattended.

#### **1.4.6 May**

A *permissive* condition. Where the word 'may' is used, it indicates that usage of the device is conditional, or optional. Usually, no specific requirement for design or application is intended.

#### **1.4.7 Multilane**

Two or more traffic lanes in one direction.

#### **1.4.8 Open road area**

Roadside development less frequent than that specified for a built-up area (see Clause 1.4.2).

#### **1.4.9 Regulatory traffic control device**

A sign, signal, marking or installation indicating an obligation to comply with a legally enforceable instruction.

#### **1.4.10 Residential street**

A residential street is a street that serves primarily to provide for direct residential property access and/or for limited neighbourhood movement.

#### **1.4.11 Road safety barrier system**

A physical barrier separating the work area and the travelled path, designed to resist penetration by an out-of-control vehicle and, as far as reasonably practicable, to redirect out-of-control vehicles back into the travelled path (see Clause 3.10.3).

#### **1.4.12 Road user**

Any driver, rider, passenger or pedestrian using the road.

#### **1.4.13 Roadway**

That portion of the road devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes.

#### **1.4.14 Running lane**

A portion of the roadway allotted for a single line of moving vehicles.

#### **1.4.15 Shall**

A *mandatory* condition. Where certain requirements in the design or application of the device are described with the 'shall' stipulation, it is mandatory that, when an installation is made, these requirements be met.

#### **1.4.16 Should**

Indicates a *recommendation*. Where the word 'should' is used, it is considered to be recommended usage, but not mandatory. Any recommendation that is not applied must be based on sound traffic engineering judgement and documented.

#### **1.4.17 Short-term**

The description which applies when a Traffic Guidance Scheme is required only while work personnel are in attendance and is generally limited to the duration of a single work shift or lesser period where road conditions are returned to normal when the shift or lesser period ends.

#### **1.4.18 Speed of traffic (traffic speed)**

The posted speed limit or an estimate (see Note 1) of the speed of the majority of vehicles in the stream if considered to be significantly different from the speed limit (see Note 2), either above or below.

High Speed Road – Speed Limit of 80 km/h and above

Low Speed Road – Speed Limit of less than 80 km/h.

#### **NOTES:**

1. This estimate can be made by travelling in the stream when there is a sufficient volume of traffic to match and observe the speed of the majority of vehicles. Occasional vehicles clearly travelling faster than the majority are ignored.  
If the 85<sup>th</sup> percentile speed measured in accordance with Part 4 of the *Manual* is known at the location, this should be used in lieu.
2. A variation from the speed limit of  $\pm 10$  km/h or more is considered significant.

#### **1.4.19 Traffic**

All vehicles, persons or animals travelling on a road.

#### **1.4.20 Traffic Controller**

A person who holds an appointment as an accredited person under Section 21 of the *Transport Operations (Road Use Management) Act 1995* to perform the functions of a Traffic Controller as prescribed by the *Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015*.

#### **1.4.21 Traffic Guidance Scheme**

An arrangement of temporary signs and devices to warn traffic and guide it through or past a work area or temporary hazard.

Further information about Traffic Guidance Schemes is provided in Queensland MUTCD Part 3 Supplement Section 1.4.21-1.

#### **1.4.22 Traffic Management Plan**

A document describing all essential traffic management matters associated with roadworks or works on roads. This includes risk assessment, traffic demand and accommodation, traffic routing and control and provision for vulnerable road users and special vehicles such as buses, trams or over-dimensional vehicles.

#### **1.4.23 Two-way roadway**

A roadway having a single traffic lane allotted for use by traffic in opposing directions.

#### **1.4.24 Travelled path**

That part of the roadway which is made available to vehicles and which may comprise one or more traffic lanes.

#### **1.4.25 Work area**

The specific area where work is being done.

#### **1.4.26 Work site**

An area which includes the work area(s) and any additional length of road required for advance signing, tapers, side-tracks or other areas needed for associated purposes.

### **1.5 Responsibility for safety at work sites**

Organisations and individuals responsible for works in accordance with this Part of the *Manual* need to be aware of their responsibilities for any injury to road users or damage to property as a result of such operations. There is an equally important obligation to provide a safe workplace environment that minimises, as far as practicable, the likelihood of injury to workers by traffic within or adjacent to the work area. Principals and contractors need to be aware of the requirements of OHS legislation and implement them as they apply to this obligation.

Steps should be taken to warn the public of prevailing conditions and to guard, delineate, and, where necessary, illuminate work which may pose a hazard to road users. Care should also be taken to avoid, wherever possible, long delays or detours which may cause unnecessary inconvenience to road users (see Clause 2.6.6).

Supervisory personnel carrying out construction, maintenance or other works that require the use of a Traffic Guidance Scheme shall give attention to the following:

- a) Be mindful of their responsibility to provide, as far as practicable, a safe workplace for personnel and plant under their control, and safe and convenient travelling conditions for road users.
- b) Ensure that personnel under their control are, at all times, courteous to road users. Personnel should not allow themselves to become distracted by provocation from members of the public.
- c) Ensure that personnel are competent to perform the roadwork signing task (see Clause 1.4.3).
- d) Ensure that all personnel at a work site are aware of their responsibilities.
- e) Ensure that Traffic Controllers are appropriately trained and informed of their duties and that they are regularly relieved from their duty (see Clause 4.10.5).
- f) Be familiar with, and act, as far as is practicable, in accordance with the provisions of this Part of the *Manual*.

### **1.6 Legal authority**

The *Transport Operations (Road Use Management) Act 1995* provides that Official Traffic Signs shall be installed only by the authority of the Chief Executive of Transport and Main Roads or a local government. The Act also provides that any such sign shall be installed in accordance with the methods, standards and procedures prescribed in this *Manual*, or other duly approved documents.

### **1.7 Training competencies**

The *Traffic Management for Construction or Maintenance Work Code of Practice 2008*, issued by the Department of Justice and Attorney-General provides guidance on the roles and responsibilities of Traffic Controllers and associated persons together with recommendations for training in the application of this Part of the *Manual* for persons associated with construction or maintenance work on, or adjacent to, a road.

Training competencies are outlined in Clause 1.4.3 and in the Queensland MUTCD Part 3 Supplement Section 1.4.3-1, while information on training is provided on the Department of Transport and Main Roads website.

For further details see Appendices J and K.

### **1.8 Supplement to this Part of the Manual**

The Department of Transport and Main Roads issues supplements to this *Manual*.

The purpose of the supplements is to convey recent developments in traffic management at roadworks in an efficient and timely manner.

## **2 Principles for the development, installation and operation of a Traffic Guidance Scheme**

### **2.1 Principles**

Careful consideration should be given to the signing of the work site, no matter how brief the occupation of the site may be. This should include—

- a) protection of workers;
- b) provision of adequate warning of changes in surface condition and the presence of personnel or plant engaged in work on the road; and
- c) adequate instruction of road users and their guidance safely through, around or past the work site.

Important basic principles to be observed are as follows:

- i. Signs and devices shall be installed by a competent person.
- ii. Signs and devices shall be appropriate to the conditions at the work site and shall be used in accordance with this Part of the *Manual* unless a risk assessment by a competent person indicates that an alternative arrangement is satisfactory (see Clause 2.2.3).
- iii. Signs and devices shall be erected and displayed before work commences at a work site.
- iv. Signs and devices shall be regularly checked and maintained in a satisfactory condition.
- v. Signs and devices shall be removed from a work site as soon as practicable; however, appropriate signs should remain in place until all work (including loose stone removal and line marking following bituminous surfacing) has been completed.
- vi. Records shall be kept of all works signing and delineation at roadway or part-roadway closures.
- vii. Where works require the relocation of regulatory traffic control items, they shall be relocated or reinstalled promptly in positions where they are visible and can perform their regulatory function.

### **2.2 Planning**

#### **2.2.1 Traffic management planning process**

A Traffic Management Plan outlines how the works are integrated into the operation of the road network, identifies and considers all foreseeable risks, and assesses the impact on all road users.

A Traffic Guidance Scheme details the traffic control signs, devices and measures to be applied at work sites to warn traffic and guide it through, or past, a work area or temporary hazard.

For works involving complex traffic arrangements, a Traffic Management Plan and Traffic Guidance Schemes are required. Specific Traffic Guidance Schemes are required for each separate element of the works.

For simpler activities and those involving short-term and mobile works not involving road closure, and works involving relatively simple part-roadway closures, the Traffic Management Plan and Traffic Guidance Scheme may be combined into one document.

## 2.2.2 Traffic Management Plans

Preparation of a Traffic Management Plan requires a procedure to be followed whereby all essential aspects of the Plan are considered in an ordered way. The following matters should be considered in turn and incorporated into the Plan if relevant:

a) *Traffic demand*

Determination of the capacity required to accommodate traffic demand at an acceptable level of service and convenience to road users. From this is determined the amount of road space which must remain open and where applicable, the times of day during which greater amounts of road space are needed to handle higher traffic volumes; for example, peak periods in built-up areas (see Clause 4.13).

b) *Traffic routing*

Selection of the appropriate means of routing traffic at the site, that is, through, around or past the site or a combination of these (see Clause 4.13) and ensuring that all required traffic movements are provided for.

c) *Traffic control*

Determination of the need for traffic control; that is, by Traffic Controller, traffic signals (portable or permanent), police or other means.

d) *Other road users*

Determination of the need to make provisions for road users other than vehicular traffic, including:

- (i) Pedestrians, including people with disabilities where appropriate.
- (ii) Bicycles.
- (iii) School children.
- (iv) Local residents.
- (v) Emergency vehicles.

e) *Special vehicle requirements*

Determination of the need to provide for vehicles such as:

- (i) Buses, including stops and terminals.
- (ii) Over-dimensional vehicles, that is, vehicles which, together with their load, are wider or longer than a legal limit vehicle.
- (iii) Restricted vehicles; that is, vehicles which, although within legal limits, are permitted to use only specified routes.



f) *Site conditions*

Consideration of the impact of the road and roadside environment on the management of traffic and the proposed construction methodology:

- (i) Road furniture.
- (ii) Property access.
- (iii) Crash history.
- (iv) Probable weather conditions.

NOTE: Request for crash data must be made to the Transport and Main Roads Data Analysis Unit through the department's Road Safety Statistics webpage.

### **2.2.3 Risk management**

Risk management entails the identification and analysis of all safety risks likely to arise during works on road including the setting up, operating, changing and ultimate dismantling of a Traffic Guidance Scheme, followed by the determination of appropriate measures to mitigate those risks. The process is appropriate at all levels of planning and operation including the following:

- a) When preparing standardised plans and safe work method statements for the conduct of minor routine and mobile works.
- b) When preparing Traffic Guidance Schemes for more extensive or complex works where site-specific risks will assume importance.

In each case the process should be carried out by first identifying all the hazards likely to arise, evaluating them in terms of likelihood of occurrence and adverse consequences using historical data, experience or other means. The proposed procedural statement or Traffic Guidance Scheme should then be checked in detail to ensure that adequate means of controlling or reducing those risks found to be significant, are in place.

This Part of the *Manual* sets out guidance and optimal treatments (see Clause 1.2.2). Variations to these optimal treatments shall be made on the basis of a documented risk assessment undertaken in accordance with the Queensland MUTCD Part 3 Supplement and subject to Clause 2.2.5.

AS/NZS 4360 provides information on risk assessments.

### **2.2.4 Traffic Guidance Schemes**

Planning for all road works requires the preparation of Traffic Guidance Schemes by a competent person (refer to the Queensland MUTCD Part 3 Supplement Section 1.4.3-1). It will normally take place at one of three levels, as follows:

a) *Short-term and mobile works not involving road closure*

The Scheme in these cases shall comprise procedures, together with details of signs and devices needed to cover all of the routine tasks the workers will encounter. The procedures should be documented by means of safe work methods statements supported, if necessary, by standard plans showing, for example, the processional order and separation distances of items in a mobile works gang.

b) *Works involving relatively simple part-roadway closures*

The Scheme in these cases shall comprise, as a minimum, a sketch of the protective devices and delineation required on a road construction or similar plan, and a list of devices required for the job. A reference to a diagram or figure or similar standardised illustration may be substituted for the sketch or plan, provided it adequately matches the situation, all matters addressed in the Traffic Management Plan and the risk assessment.

c) *Works involving complex traffic arrangements or staging, or both*

The Scheme in these cases shall comprise a fully documented Traffic Guidance Scheme providing the following:

- (i) Plans showing temporary traffic paths, their delineation and the position of traffic control or warning devices.
- (ii) On multi-stage works, a separate set of plans for each stage.
- (iii) Details of after-hours traffic arrangements, on separate plans if they cannot be adequately incorporated into the above.
- (iv) All necessary instructions for the installation, operation, between-stage rearrangement and ultimate removal of devices at the conclusion of the job.

It is essential to prepare such plans well before the job starts or before the start of the stage to which they apply, so that there is enough time to obtain any special devices or approvals needed.

## **2.2.5 Variation to optimal treatments and Registered Professional Engineer of Queensland certification**

This Part of the *Manual* contains mandatory (*shall*) requirements and recommended (*should*) provisions and options (*may*). The application of these mandatory requirements and recommended provisions constitute optimal treatments. Variations to these optimal treatments may be undertaken as follows:

- a) Where recommendations (*should*) are not adopted in preparing a Traffic Management Plan or Traffic Guidance Scheme, a risk assessment, in accordance with Clause 2.2.3 shall be undertaken by a Competent person with at least Traffic Management Design competency.
- b) Where mandatory (*shall*) requirements are not adopted in preparing a Traffic Management Plan or Traffic Guidance Scheme, a risk assessment, in accordance with Clause 2.2.3 shall be undertaken by a Competent person with at least Traffic Management Design competency. Both the risk assessment and the Traffic Management Plan or Traffic Guidance Scheme shall be certified by a Registered Professional Engineer of Queensland (RPEQ) with at least a Traffic Management Design competency.

Notifications of variations to mandatory requirements (including all relevant information) must be e-mailed to [TrafficEngineering.Support@tmr.qld.gov.au](mailto:TrafficEngineering.Support@tmr.qld.gov.au) for monitoring purposes only – not for approval or endorsement. Transport and Main Roads will monitor these variations to identify potential future practice changes to this Part of the *Manual*.

- c) Where innovative treatments (see Clause 1.2.3) are proposed to be adopted in a Traffic Management Plan or Traffic Guidance Scheme, a risk assessment, in accordance with Clause 2.2.3 shall be undertaken by a Competent person with at least Traffic Management

Design competency. Both the risk assessment and the Traffic Management Plan or Traffic Guidance Scheme shall be certified by an RPEQ with at least a Traffic Management Design competency.

All proposed innovative treatments require approval by Transport and Main Roads prior to implementation. Requests for approval of innovative treatments (including all relevant information) must be e-mailed to [TrafficEngineering.Support@tmr.qld.gov.au](mailto:TrafficEngineering.Support@tmr.qld.gov.au). As part of an approval to use or trial an innovative treatment, Transport and Main Roads may require that the applicant provides a detailed evaluation report on the performance and effectiveness of the treatment. Transport and Main Roads may use the results of the evaluation to identify potential future practice changes to this Part of the *Manual*.

- d) The use of options (*may*), when adopted in preparing a Traffic Management Plan or Traffic Guidance Scheme, are not a variation to the optimal treatment and do not require certification by an RPEQ.

Very few work sites should fall within scope of the RPEQ requirement in addition to (b) and (c) previously. Examples include Traffic Management Plans or Traffic Guidance Schemes which involve complex geometric changes that require the application of engineering design principles or complex diversions that might require detailed analysis (such as micro-simulation traffic modelling) to establish the network impacts.

## **2.3 Traffic management**

### **2.3.1 General**

Depending on circumstances, movement of traffic may be achieved in one of the following ways:

- a) Movement through the work area under closely controlled conditions, see Clause 2.3.3.
- b) Movement past the work area by means of a delineated path alongside but clear of the work area, see Clause 2.3.4.
- c) Movement around the work area by a detour, which may be via a side-track or an existing road, see Clause 2.3.5.
- d) Closure of the road for short periods while work is carried out.

Figure 4.1 illustrates the various components of a typical work site. A summary of the requirements for signing and delineation of each component is given in Clause 4.1.4. It is essential that, at any work site, all of these components which are relevant in a particular case, are identified and the appropriate treatment applied.

### **2.3.2 Safety and convenience**

The safety of workers through adequate protection from traffic and the safety and convenience of traffic at a work site are achieved as follows:

#### **a) *Safety of workers***

Worker protection from traffic at a static work site is achieved by either the provision of a safety barrier between the work area and moving traffic or in the absence of such a barrier by maintaining a relationship between—

- (i) the lateral clearance between the edge of the work area and the nearest traffic path or lane; and
- (ii) the speed of traffic past the site, controlled either by temporary speed zoning or other effective means.

Corresponding requirements including requirements for associated signs and delineating devices are specified in detail in Clause 4.2.

Worker safety at short-term and mobile works not requiring a static work site to be set up shall be achieved by adherence to the work methods specified in Clauses 4.3, 4.4, 4.5 and 4.6 respectively.

#### **b) *Safety and convenience of road users***

In addition to providing adequate traffic control and guidance at a static work site, the safety of road users will be enhanced by ensuring that the work site is managed in such a way as to cause the minimum amount of inconvenience to traffic movement.

Works should be arranged to minimise—

- (i) disruption of established traffic movements and patterns;
- (ii) interference with traffic at peak movement periods;
- (iii) interference with public transport services; and
- (iv) the amount of road closed to traffic at any one time.

When they are not applicable during the works period, regulatory signs shall be removed or covered. Regulatory pavement markings likewise shall be either obliterated or traffic control measures employed to direct traffic along paths which might otherwise infringe the regulatory requirements of the markings.

Consideration needs also to be given to maintaining traffic flow through or past a work site, see Clause 4.13.

### **2.3.3 Traffic through the work area**

Except as provided following for short-term and low-impact works, passage of traffic through a work area shall only be permitted where both the traffic and the work can be adequately controlled. Traffic Controllers or traffic signals shall be employed as necessary to slow traffic on the immediate approach to an active work area, to stop traffic for short periods when required for the movement of plant or other operations, or to control single line shuttle working. A pilot vehicle may be required to lead traffic along the desired path and to control its speed. For short-term and low-impact works, the works methods set out in Clauses 4.3, 4.4 and 4.5, and for work in residential streets (see Clause 4.13.5),

underpinned as necessary by risk assessment in particular cases, takes the place of more positive traffic control measures.

Controllers shall also be provided if necessary to control the movement of plant within the trafficable area.

#### **2.3.4 Traffic past the work area**

This will be the normal method of traffic management at sites where complete elimination of traffic from the site is not required. Traffic paths past the work area shall be clearly delineated. At long-term works, if the travel path substantially deviates from normal, as far as practicable, original pre-works delineation including pavement markings and raised pavement markers (RPMs) shall be obliterated if they are likely to misdirect drivers negotiating the site. Single line shuttle working may be required if available trafficable roadway width is restricted.

#### **2.3.5 Traffic around the work area (side-tracks and detours)**

When it is not practicable to allow traffic through or past the work area, it may be catered for by means of either a detour using existing roads or a specially constructed side-track. Requirements and recommendations for the operation of side-tracks, detours and temporary crossovers on divided roads, are given in Clause 4.14.

#### **2.3.6 Night conditions**

Where work at a site extends for more than a single day or is to be performed at night, the following requirements and recommendations for operating or securing the site at night apply:

##### **a) General**

The following requirements and recommendations apply to all night-time road closures whether or not workers or plant are on site:

- (i) Wherever practicable, any part of the normal roadway which is closed during the day and can be opened at night, should be opened if, by so doing, either travel conditions or safety, or both for night traffic, can be improved.
- (ii) Temporary traffic route lighting through a work site may be required in open road areas if there is a substantial deviation of the travel path from normal, the posted speed limit is greater than 70 km/h and the traffic volume exceeds 10 000 vpd. Temporary lighting may also be required to supplement existing lighting on arterial roads in built-up areas where the path through the site could be difficult to follow. Lighting from other sources, especially glare sources, should be taken into account when assessing the need for temporary traffic route lighting. Lighting for pedestrians shall be provided as specified in Clause 2.3.8(d).
- (iii) Uncontrolled single lane operation shall not be permitted except for very short lengths under the conditions described in Clause 4.13.1(i), for example, in residential streets. The need for lighting should be considered. If single-lane operation is required at night, the preferred method is to use portable or temporary fixed traffic signals. Traffic Controllers should only be used as a last resort.
- (iv) Signs and devices shall be provided in accordance with Clause 2.4.3.
- (v) Illuminated flashing arrow signs and similar devices having light emitting elements should be dimmed for night use where necessary to avoid glare.

b) *Work in progress at night*

The following requirements and recommendations applicable to works being carried out at night are additional to those given in Item (a):

- (i) Lighting at a work site shall, as a minimum requirement, illuminate the following areas:
  - A. Traffic control station and locations where workers or plant might encroach on traffic lanes.
  - B. Intersections in which works are taking place.Wherever practicable, it is recommended that the entire work area and immediate approach be lit.
- (ii) Workers shall wear high visibility garments (see Clause 3.16.4).
- (iii) Floodlighting is recommended as traffic route lighting levels will not normally be adequate for an active work site.
- (iv) Steps should be taken to ensure that floodlighting does not produce glare sources for approaching drivers.
- (v) The adverse environmental effects of high lighting levels close to residential property should be considered.
- (vi) Dimming controls on illuminated flashing arrow signs and matrix-type variable message signs should be checked for correct operation.

**2.3.7 Provision for pedestrians and bicycles**

Where pedestrians, including school children and people with disabilities or visual impairment, have to move around, through or past a work site or to cross the road within a work site, they shall be provided with and directed to suitably constructed and protected temporary footpaths and crossing points, or formal pedestrian crossings, or refuges if warranted.

Pedestrian and bicycle paths should, where practicable, be provided on the same scale and to the same width as any facilities for pedestrian or bicycle traffic that were existing prior to the works (refer to Austroads *Guide to Road Design*, Part 6A, *Pedestrian and Cyclist Paths* for guidance). If this is not practicable, such facilities shall meet the requirements of Clause 2.3.8.

**2.3.8 Temporary footpaths and pedestrian crossing**

Where footpaths or pedestrian crossings have been partially closed or temporarily relocated, and it is not practicable to provide facilities on the same scale and to the same width as existed prior to the works, the minimum requirements and recommendations for the temporary facilities are as follows:

- a) The unobstructed width at local constrictions shall be not less than 1.0 m. Elsewhere, a width of at least 2.0 m should be provided.

- b) Where pedestrian traffic has been diverted onto an existing roadway the pedestrian path shall be separated from vehicular traffic. A mesh fence may be used, provided that—
  - i. the clearance to the delineated edge of the traffic lane is at least 1.2 m and the speed limit is 60 km/h or less; or
  - ii. the clearance to the delineated edge of the traffic lane is less than 1.2 m and the speed limit is 40 km/h or less.

Where traffic speeds (see Clause 1.4.18) are more than 10 km/h above the speed limits given in Items (i) and (ii), a road safety barrier system (see Clause 3.10.3) shall be provided.

NOTE: The channelling of pedestrians and bicycle traffic using lightweight modules is subject to the requirements of Clause 3.10.2.

- c) Surfacing should provide for prams, strollers and wheelchairs, and other mobility aids.
- d) Except as follows, lighting of the footpath shall not be less than the level provided on the original footpath or to AS/NZS 1158.3.1, whichever is the lesser level. Lighting of the pedestrian crossing shall not be less than the level provided on the original crossing or to AS/NZS 1158.4, whichever is the lesser level. Lighting to AS/NZS 1158.4 should be provided if the associated works reduce either the sight distance to, or the prominence of, the crossing.
- e) Crossings shall be located as near as practicable to established pedestrian routes and shall have the same level of function as the crossings they replace, including provisions for the people with a vision impairment.
- f) Crossings should be signalised if the crossings they replace were signalised.
- g) The management of pedestrians at crossings on roadways temporarily converted from one-way to two-way is given in Clause 4.14.8.

## **2.4 Device requirements**

### **2.4.1 Selection and use**

This *Manual* specifies the optimum number of signs and devices required—

- a) to provide advance warning;
- b) to guide traffic through, around or past the work area; and
- c) to minimise the possibility of confusion and misinterpretation of the intended instructions.

Advance warning signs and devices should allow adequate time for correct response under the anticipated worst conditions (see Clause 4.7). Advance warning signs shall be installed on all approaches to the work area, including any side roads.

Approval for erection or removal of regulatory traffic control devices shall be obtained from the Department of Transport and Main Roads or appropriate road authority.

Standard signs shall be used wherever a suitable sign for the purpose exists. However, there will be instances where there is no suitable standard sign. In such cases, the sign developed shall comply with the format requirements specified in Clause 3.2, and approval of the delegate of the Director-General, Transport and Main Roads, shall be obtained for such non-standard signs prior to erection.



#### **2.4.2 Delineation**

The travelled path on the approaches and past the work area shall be delineated so as to properly define which part of the roadway is available to road users, or the path that traffic is required to follow, under all reasonably expected weather and atmospheric conditions, day or night as applicable.

Delineation should be considered for both long- and short-range purposes. The former should provide drivers approaching the work site with an advance view of the site indicating the general location and direction of the trafficable path, whilst the latter should guide drivers through the works once they have entered the work area or side-track. Long-range delineation should begin to provide advance guidance at the start of the work site. Short-range delineation should indicate a continuous path for at least D (see Table 4.2) metres in front of the vehicle.

Long-range delineation will be mostly achieved by post mounted devices. Short-range will usually rely on a combination of retroreflective line marking, other pavement-based devices, and traffic cones or bollards.

#### **2.4.3 Night conditions**

Signs shall be floodlit if outside the headlight beams. Delineating devices shall comprise or incorporate retroreflectors. Flashing lamps may be used to draw attention to certain advance signs (see Clause 3.11). Flashing lamps shall not be used for delineation.

Pavement markings through the work site shall be retroreflective. This may be achieved by means such as reflectorizing paint using drop-on beads, retroreflective preformed materials or raised retroreflective pavement markers.

NOTE: The use of steady or ripple lamps has been deleted from this Part of the *Manual*.

Hazards or barriers may require floodlighting to make them more conspicuous. Care should be taken that floodlighting, undimmed illuminated flashing arrow signs, matrix-type variable message signs and other similar devices do not cause disability glare for approaching drivers. Except in an emergency, floodlighting should not be provided by use of vehicle headlights.

Signs required to be fluorescent by day and retroreflective at night, for example, the Workers (symbolic) sign, shall have a sign face background comprising combination fluorescent / retroreflective material.

Further requirements for the use of temporary delineators are given in Clause 3.9.2.

#### **2.4.4 Adjustment to existing devices**

Existing signs and traffic control devices which are inappropriate to, or conflict with, the temporary work site situation shall be fully covered or removed.

#### **2.4.5 Safety barriers**

Safety barriers may be required for situations where any of the following are cause for concern:

- a) Inadequate safe clearance between moving traffic and workers and plant on site (see Clause 4.2).
- b) Hazardous traffic conflicts (for example, head-on collisions).
- c) Collisions with hazardous fixed objects, construction works or falls into excavations close to the travelled path.

- d) Inadequate separation of temporary footpaths, shared paths or bicycle paths from vehicular traffic paths (see Clause 2.3.8).

Requirements and recommendations for the selection, positioning and end treatment of safety barriers are given in Clause 3.10.3.

#### **2.4.6 Vehicle size and load restrictions**

Where the width, height or load-carrying capacity of the roadway or structure is to be temporarily reduced during works, the appropriate authority should be informed in advance so that arrangements may be made to divert traffic which would exceed the temporary limitations. The authority should also be advised when the restriction is removed so that all traffic can resume use of the roadway or structure.

Possible ground clearance problems for long, low vehicles should also be made known.

Low-clearance warning gauges may be required in advance of false work structures (see Clause 3.15.6 and Figure 4.23).

### **2.5 Installation and removal**

#### **2.5.1 Condition of devices**

Individual signs and devices should be examined before installation to ensure that they are in good condition and their performance is not impaired. The following checks are required:

- a) *Mechanical condition*

Items that are bent, broken or have surface damage, should not be used.

- b) *Cleanliness*

Items should be free from accumulated dirt, road grime or other contamination.

- c) *Colour of fluorescent signs*

Fluorescent signs whose colour has faded to a point where they have lost their daylight impact should be replaced.

- d) *Night-time visibility*

Signs required to be effective at night shall be checked for retroreflectivity as soon as possible after installation. Those whose retroreflectivity is degraded either from long use or surface damage shall be replaced. Night-time effectiveness can best be checked by viewing the signs by vehicle headlights in dark conditions.

Functional inspections are also required, see Clause 2.5.5.

#### **2.5.2 Positioning of devices**

Signs and devices should be positioned and erected so that—

- a) they are properly displayed and securely mounted (see Clause 3.3);
- b) they are within the line of sight of the intended road user;
- c) they cannot be obscured from view (for example, by vegetation or parked cars);
- d) they do not obscure other devices from the line of sight of the intended road user;
- e) they do not become a possible hazard to workers, pedestrians, or vehicles;

- f) they do not deflect traffic into an undesirable path;
- g) they do not restrict sight distance for drivers entering from side roads or streets, or private driveways; and
- h) they are not installed using supports that could be a hazard if struck by a vehicle.

Delineating devices (for example, traffic cones, bollards, post mounted delineators) should generally be placed 1 m clear of the travelled path where practicable; however, traffic cones and bollards may also be used to define the edge of the travelled path or to separate opposing traffic.

In open road areas and on unkerbed roads in built-up areas where signs are to be mounted on posts, they should normally be placed clear of the outer edge of shoulder and at least 2 m clear of the travelled path, whichever is the greater clearance. They should be erected 1 to 1.5 m above the level of the nearest edge of the travelled path to the underside of the sign.

On kerbed roads in built-up areas where signs are mounted on posts adjacent to a footpath, or where vehicle parking may occur, they should be erected a minimum of 2.2 m above the level of the kerb or footpath to the underside of the sign, to reduce interference from parked vehicles. Where neither pedestrians nor parked vehicles have to be considered, for example, on a traffic island or median, a mounting height of 1.5 m may be more appropriate.

Signs mounted on portable supports used for short-term operation (see Clause 3.3) should generally be located and erected as follows:

(i) *In open road areas*

On the road shoulder, a minimum of 1 m clear of the travelled path.

(ii) *In built-up areas*

Behind the kerb if visible to oncoming traffic and not obstructing pedestrians; otherwise, on the pavement as near as practicable to the kerb without the sign becoming obscured and without obstructing moving traffic.

Where an instruction sign (for example, see Clauses 3.5 and 3.6) and a road condition sign (see Clause 3.7) would normally be required at the same location, the former shall take precedence and the latter should be positioned at the best alternative location.

Where practicable, signs shall be erected on both sides of the roadway on multilane divided or one-way roads where the volume is 10 000 vpd or greater. This treatment should also be considered for all other roads, especially those with curved alignments.

The visibility of a sign can be affected by deep shade, the direction of the sunlight, background conditions (including lighting) and oncoming headlights. These factors should be considered when signs and devices are erected to ensure that they can be clearly seen at all times.

### **2.5.3 Setting out and recovery of devices**

Before work commences, signs and devices at the approaches to and within the work area should be set out in accordance with the Traffic Guidance Scheme in the following sequence:

- a) Advance warning and regulatory signs (including temporary speed zone signs).
- b) All intermediate advance warning and regulatory signs and devices required in advance of the taper or start of the work area.
- c) All delineating devices required to form the taper including the illuminated flashing arrow sign at the end of the taper where required.
- d) Delineation of the work area or side track.
- e) All other required warning and regulatory signs including termination and end of temporary speed zone signs.

This operation shall be carried out, where practicable, as work off the travelled path in accordance with Clause 4.3.7, or as short-term work in traffic in accordance with Clause 4.3.3, for locations in open road areas. This operation shall be carried out in accordance with Clause 4.4.2 or 4.4.3 for locations in built-up areas. A mobile works method (see Clause 4.6) shall be used if the previous method is not practicable due to the volume or speed, or both, of approaching and passing traffic.

Recovery of devices at the conclusion of the work shall be done in the reverse order using the same work method as for setting out.

Signs and devices that are erected before they are required should be fully covered by a suitable material. The cover should be removed immediately prior to the commencement of work.

NOTE: These signs should be covered with opaque materials. Open weave materials such as hessian are not suitable as the retroreflective performance of the sign is not sufficiently inhibited when viewed at night using vehicle headlights. Covering signs with black or dark coloured plastic materials can result in excessive temperature and moisture cycling which may damage the sign. Best results are obtained by using a dense fabric that allows entrapped moisture, for example, condensation, to dissipate in a natural manner. Covered signs should be inspected at night to ensure that they are not visible and hence do not provide conflicting messages to drivers. Signs should also be checked in unusual weather conditions including high winds for loss or disturbance of the covering.

### **2.5.4 Orientation of sign**

Signs should face towards approaching traffic approximately at right angles to the line of sight from the driver to the sign.

At curved alignments, the sign should be placed approximately at right angles to the line of sight of a motorist 50 m in advance of the sign.

### **2.5.5 Inspection**

At a static work site, when the erection of the signs and devices is completed, and the condition of devices has been checked in accordance with Clause 2.5.1, supervisory personnel should carry out a functional inspection before and after opening to traffic. This inspection should be carried out along the travelled path, and past all of the signs and devices. The same inspection should be carried out at night with headlights on low beam. If the arrangement is considered confusing or unsatisfactory, it should be adjusted and reinspected. A similar functional inspection should be carried out after any change is made to the arrangement.

### **2.5.6 Publicity**

Depending on the complexity of the Traffic Guidance Scheme and the length of time it is to operate, it may be necessary to erect special signs to inform the public of the Traffic Guidance Scheme.

NOTE: It may also be advisable to implement a publicity campaign using printed material and local media, particularly the radio.

### **2.5.7 Removal**

It is most important that the relevant signs and devices be removed or concealed from view as soon as any activity is completed or a hazard ceases to exist.

When all work is complete, signs and devices should be dismantled in the reverse order to that specified in Clause 2.5.3.

## **2.6 Operation**

### **2.6.1 Daily routine and worksite records**

A daily routine for the operation of a work site, including the keeping of daily records of the sign and delineation arrangement or Traffic Guidance Scheme, and records of any incidents which might have ongoing consequences, shall be put into effect and maintained.

NOTE: Recommended procedures and guidelines are given in Appendix A.

### **2.6.2 Layout variation**

It is most important that signs and devices for which the temporary or permanent need no longer exists, be covered (see Note to Clause 2.5.3) or removed. Additional appropriate signs and devices should be introduced as changed circumstances or road conditions dictate and any changes should be noted on daily work sheets or in a diary (see Paragraph A2(a) Appendix A).

Long-term work sites shall, in addition to the signs and devices required to protect the work area on a continuing basis, have the Workers (symbolic) sign (see Clause 3.4.4) erected at each location within the site at which workers are actually on site. The latter signs shall be removed at the end of the shift (except where multiple shifts are involved) or when the workers leave the site. A change of speed limit may also be required in conjunction with the placement or removal of the Workers (symbolic) sign (see Clause 2.5.3).

### **2.6.3 Maintenance of devices**

Ineffective signs and devices shall be replaced by similar items in good condition, if they cannot be made effective by cleaning or repairing.

Signs and devices which are damaged or otherwise no longer in good condition should be either refurbished to new condition or replaced. Non-repairable signs should be destroyed so that they are not inadvertently reused.

Water in water-filled safety barrier elements shall be maintained at the required level.

### **2.6.4 Use of high visibility clothing**

All personnel shall wear high visibility clothing while on or adjacent to the travelled path, or in other potentially hazardous areas, for example, on or adjacent to construction haul roads (see Clause 3.16.4).

#### **2.6.5 Hazard avoidance**

Machinery should not be parked, materials stored, or buildings erected in positions where they may create a hazard, obscure signs, or block approaching drivers' lines of sight.

#### **2.6.6 Closures and delays**

There may be occasions when there is no alternative to the complete closure of a road. Delays to traffic should be minimised with a desirable maximum delay of about 15 min. If the delay is expected to be longer, the method of working should be altered, or a detour or side track provided.

If the delay is longer than 15 min because of an unexpected event, for example, plant breakdown, the supervisor should inform the Traffic Controllers of the delay and should give an estimated time to be relayed to the public. If traffic queues become too long, consideration should be given to either finding a suitable detour or otherwise re-routing traffic. Advice should also be given to emergency services.

#### **2.6.7 Safety audit**

The conduct of a construction phase road safety audit, as recommended in Austroads *Guide to Road Safety*, Part 6 *Road Safety Audit*, should be considered for works involving complex traffic arrangements or staged works, or both, see Clause 2.2.4(c). This is especially desirable where site-specific risks will assume importance.

#### **2.7 Emergency and unplanned works**

Traffic control requirements and recommendations for emergency and unplanned works are given in Appendix H.

### **3 Description and use of signs and devices**

#### **3.1 Functions of devices**

The functions of the various traffic control devices are as follows:

- a) To warn, guide and instruct road users, for example, signs.
- b) To draw attention to the work area, personnel and equipment.
- c) To control the speed or the passage of traffic within and adjacent to the work area, for example, the Stop / Slow bat, signals and speed limit signs.
- d) To indicate the direction and width of the available travelled path, for example, delineators.
- e) To discourage access to the whole or portion of the work area, for example, barrier boards and mesh fence.
- f) To provide physical protection for the work area and its occupants, for example, safety barriers.

#### **3.2 Format and size of signs**

##### **3.2.1 Format of signs**

The format of signs used at roadworks shall be as follows:

- a) *Signs warning of works personnel*

These shall have a black legend on a retroreflective fluorescent orange background. Such signs shall be displayed only when personnel are working at the site.

- b) *PREPARE TO STOP and REDUCE SPEED signs and signs associated with blasting operations*

These shall be rectangular with a white legend on a red background, both retroreflective.

- c) *Other roadworks signs*

All other roadworks signs shall be rectangular with a black legend on a yellow retroreflective background, except DRIVE SAFELY which is white on blue and DO NOT OVERTAKE which is black on white.

NOTE: Retroreflective fluorescent yellow may be used in lieu of retroreflective yellow for roadwork signs.

- d) *Direction signs*

Temporary direction signs shall be rectangular with a white legend on a green retroreflective background. Any patches for example, street name, service symbol, and so on shall use standard colours.

NOTE: Substrates and mounting arrangements may need to be altered to suit temporary mounting.

- e) *Regulatory and warning signs used for roadworks purposes*

Signs in the R, W and G series shall be the same format as their permanent counterparts.

##### **3.2.2 Retroreflective material**

Retroreflective material used on signs for works on roads shall meet at least the requirement for Class 400T (or 1W) sheeting as specified in AS/NZS 1906.1.



### 3.2.3 Sign sizes in the T Series

The application of the sign size designations A and B in the T Series in this Section are as follows:

a) *A size*

Applicable to all signs in T Series. This size will be suitable for—

- i. posted speed limits up to 110 km/h; or
- ii. signs directed at pedestrians.

NOTE: Signs and devices for works on roads shall be positioned in accordance with Clause 2.5.2.

b) *B size*

Applicable where an oversize sign may be required—

- i. on expressway-type roads for added emphasis of the onset of works, detours or closures; or
- ii. for other critical safety messages.

NOTE: B size signs should also be considered for all T1 Series signs where the A size signboard is less than 1 m<sup>2</sup> in area and traffic speeds exceed 70 km/h.

### 3.2.4 Multi-message sign sizes

The multi-message sign panel sizes are as follows:

- a) 600 x 600
- b) 1200 x 300
- c) 1200 x 600

The multi-message sign consists of up to three linked messages in up to three separate panels on a single 1200 x 900 mm frame. The 1200 x 900 mm multi-message sign size is used irrespective of the speed environment.

Further details on the multi-message sign system are included in Appendix D.

## 3.3 Sign mountings

### 3.3.1 General

Mountings for signs at works on roads are required to suit a variety of maintenance and construction situations.

Both signs and mountings used for short-term operations including where staging of works requires their frequent relocation, should be portable, easily erected and stored. The mountings should—

- a) be quick and easy to install;
- b) provide secure sign attachment;
- c) be stable in windy conditions and from the effects of moving traffic;
- d) provide for installation on all types of road, shoulder or verge surface;
- e) have the flexibility to handle the sizes of signs involved;
- f) be easily handled, transported and stored; and
- g) not be a hazard to road users if struck in their normal upright position or after being knocked over.

Mountings for short-term operations should be arranged so that the signs are prominently displayed to traffic and will command attention. The sign should be mounted so that is clear of the ground and free of obstruction. The minimum height from the shoulder surface to the bottom edge of the sign is 200 mm.

Signs for long-term work should be mounted on normal fixed supports so that they are not likely to be disturbed by the weather, vandals or traffic (see Clause 2.5.2).

### **3.3.2 Multiple sign displays**

In cases where this Part of the *Manual* requires two signs to be displayed together at the one position (for example, the Workers (symbolic) and Speed restriction signs), they may be displayed on the same mounting either side-by-side or one above the other. The sign sizes may be reduced to suit the mounting, provided the size of legend, size of symbol or area occupied by the legend is unchanged from the corresponding sign specified in this Part of the *Manual*.

### **3.3.3 Multi-message sign displays**

Multiple sign displays (see Clause 3.3.2) may be displayed as a multi-message sign. Multi-message signing entails the combination of multiple roadwork warning, regulatory signing and traffic instruction messages within a single sign. Appendix D sets out the requirements for the approved panel configuration, size of sign and typical arrangement diagrams.

## **3.4 Signs and devices for work site approaches and departures**

### **3.4.1 General**

Signs used for work site approaches and departures are listed in Table 3.1.





**Table 3.1 – Signs for work site approaches and departures – Size table**

Sign	Sign Number	Size mm*
ROADWORK AHEAD	T1-1A T1-1B	1800 x 600 2400 x 900
BRIDGEWORK AHEAD	T1-2	1800 x 600
ROAD PLANT AHEAD	T1-3-1	900 x 600
GRADER AHEAD	T1-4	900 x 600
Workers (symbolic)	T1-5A T1-5B	900 x 600 1200 x 900
ROADWORK X km AHEAD	T1-16A T1-16B	1800 x 600 2400 x 900
ROADWORK 500 m AHEAD	T1-16-Q01A T1-16-Q01B	1800 x 600 2400 x 900
ROADWORK NEXT X km	T1-24A T1-24B	1800 x 600 2400 x 900
ROADWORK ON SIDE ROAD	T1-25	1800 x 600
ROAD PLANT ON SIDE ROAD	T1-27	1800 x 600
NEXT X km	T1-28A T1-28B	600 x 600 900 x 900
BRIDGEWORK X km AHEAD	T1-29	1800 x 600
ROAD WORK AHEAD (narrow format)	T1-31	900 x 1200
SIDE ROAD CLOSED	T1-32	1500 x 600
END ROAD WORK	T2-16 T2-17 T2-Q03	1800 x 600 900 x 1200 900 x 600
SURVEYOR AHEAD	T2-Q06A T2-Q06B	900 x 600 1200 x 900



\* Guidance on sign size selection is given in Clause 3.2.3.

### 3.4.2 Roadwork ahead (T1-1, T1-31), Roadwork X km ahead (T1-16), Roadwork 500 m ahead (T1-16-Q01)



The sign ROADWORK AHEAD shall be used to give advance warning of all long-term work sites other than bridgeworks (see Clause 4.7.2).

	T1-1	The T1-1 sign is preferred wherever space available at the area allows it to be used. The T1-31 sign is used wherever space does not allow the T1-1 sign to be used.
	T1-31	
	T1-16	The ROADWORK X km AHEAD sign is used X km in advance of the taper at a work area, where additional advance warning on arterial roads is necessary, for example, approach speeds higher than 80 km/h and sight distance less than 150 m. Consider use of ROADWORK 1 km AHEAD and ROADWORK 500 m AHEAD signs in advance of the taper at the work site for approach speeds of 90 km/h or greater when the work site requires a reduction in speed of 40 km/h or more, see Clause 4.7.2.
	T1-16-Q01	

### 3.4.3 Bridgework ahead (T1-2), Bridgework X km ahead (T1-29)

	T1-2	The sign BRIDGEWORK AHEAD is used to give advance warning of long-term works on bridges (see Clause 4.7.2(c)).
	T1-29	The sign BRIDGEWORK X km AHEAD is used on the approach to a bridgework site under the same conditions as specified for the ROADWORKS X km AHEAD (T1-16) in Clause 3.4.2.

#### 3.4.4 Workers (symbolic) (T1-5), Surveyors ahead (T2-Q06)

	T1-5	The Workers (symbolic) sign is used to give warning of personnel engaged in works on or adjacent to the travelled path as specified in Clause 4.7.2(a). It shall comprise a black symbol on a retroreflective fluorescent orange background.
	T2-Q06	The SURVEYORS AHEAD (T2-Q06) sign shall be used for survey work, in lieu of Workers (symbolic) (T1-5) sign




Use of this sign is further dealt with in the following Clauses:

- a) Static worksites – Clause 4.2.
- b) Short-term works, open road areas – Clause 4.3.
- c) Short-term works, built-up areas – Clause 4.4.
- d) Mobile works – Clauses 3.12.3 and 4.6.4.


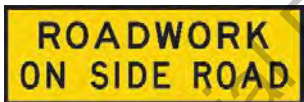


As this sign is used to warn of the presence of personnel, it shall only be displayed when they are actually working, or are visible to traffic, or both, and shall be removed or covered when workers have left the work area or are no longer visible to traffic.

The sign NEXT X km (T1-28) (see Clause 3.4.7) is used in conjunction with this sign when it is used for frequently changing work areas (see Clause 4.3.4).


### 3.4.5 Road plant ahead (T1-3, T1-3-2), Grader ahead (T1-4)

	T1-3-1	<p>The sign ROAD PLANT AHEAD is used at work sites where machinery is working on the roadway and no form of traffic control, barrier or delineation is present to separate traffic from the work area. Where a grader alone is engaged in pavement, shoulder or roadside maintenance, the alternative sign GRADER AHEAD (T1-4) may be used.</p> <p>The smaller ROAD PLANT AHEAD (T1-3-1) sign or the GRADER AHEAD sign should be used in conjunction with the NEXT 2 km (T1-28) sign at a frequently changing work area involving maintenance work carried out on the shoulder or verge by a grader or other machine (see Clause 4.3.4). At a frequently changing work area where there are workers on foot, the Workers (symbolic) (T1-5) sign is used instead of these signs.</p> <p>The sign should only be displayed when machinery is actually working.</p>
	T1-3-2	
	T1-4	




### 3.4.6 Roadwork next X km (T1-24), Roadwork on side road (T1-25), Road plant on side road (T1-27), Side road closed (T1-32)

	T1-24	The ROADWORK NEXT X km sign may be used to supplement other advance signs wherever, over a distance of 2 km or more, there are a series of two or more work areas within the one work site, separated, such that road users may not be aware that they are still within the work site. Advance signing shall be provided in advance of each individual work area.
	T1-25	<p>The ROADWORK ON SIDE ROAD and ROAD PLANT ON SIDE ROAD shall be used in advance of an intersection to warn of the relevant activities on the side road where there is insufficient distance from the through road intersection to the start of the works for turning traffic to be given adequate warning. Where practicable, all warning and delineation of the works should be confined to the side road. These signs shall not be used on a side road to warn of works on a through road about to be entered from the side road. The ROADWORK AHEAD (T1-1) or ROAD PLANT AHEAD (T1-3) may be appropriate in this case. A Speed Restriction sign shall not be used in conjunction with these signs.</p>
	T1-27	
	T1-32	The SIDE ROAD CLOSED sign shall be used in advance of an intersection where the side road is closed to all traffic.

### 3.4.7 Next X km (T1-28)

	T1-28	<p>The NEXT X km sign may be used in conjunction with either the Workers (symbolic) (T1-5), the ROAD PLANT AHEAD (T1-3-1) or the GRADER AHEAD (T1-4) signs where they are used to warn of a frequently changing work area (see Clause 4.3.4).</p> <p>For shoulder grading and verge mowing on sealed roads in open road areas (see Clause 4.3.5) and for maintenance grading on unsealed roads (see Clause 4.5.2) the distance may be increased up to 6 km.</p>
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### 3.4.8 End roadwork (T2-16, T2-17, T2-Q03)

	T2-16	<p>The END ROADWORK sign shall be used at the departure end of a work site where a temporary speed zone has been implemented. The Speed Restriction sign (R4-1) shall be installed in accordance with Clause 4.9.7. The END ROADWORK sign may not be necessary at the departure end of a work site where a temporary speed zone has not been implemented, on mobile works, progressively moving works, or where an END DETOUR sign (T2-23) is used (see Clause 3.6.3). The T2-16 sign is preferred wherever space available at the site allows it to be used. The smaller-sized T2-17 and T2-Q03 signs may be used in conjunction with ROAD PLANT AHEAD (T1-3-1), GRADER AHEAD (T1-4) and Workers (symbolic) (T1-5) signs or wherever space does not allow the T2-16 sign to be used.</p>
	T2-17	
	T2-Q03	

## 3.5 Signs and devices for regulatory control of traffic

### 3.5.1 General

Signs used for regulatory control of traffic at work sites are listed in Table 3.2. Other regulatory signs specified in Part 2 of this *Manual* may be used, where appropriate, if the usage specified in Part 2 applies.



**Table 3.2 – Signs for regulatory control of traffic – Size table**

Sign	Sign Number	Size mm*
GIVE WAY	R1-2A R1-2B	750 ht 900 ht
KEEP LEFT	R2-3-Q01	250 x 1200
Speed Restriction	R4-1A R4-1B R4-1C R4-1D	450 x 600 600 x 800 900 x 1200 1200 x 1600
ROAD WORK	R4-3A R4-3B R4-3C	450 x 300 600 x 400 900 x 600
END Speed Limit	R4-12B	600 x 800
NO OVERTAKING OR PASSING	R6-1A	750 x 900
STOP HERE ON RED SIGNAL	R6-6	450 x 750
STOP / SLOW bat:  STOP face  SLOW face	R6-8A R6-8B  T7-1A T7-1B	450 dia 600 dia  450 dia 600 dia
Next ... m	R9-6-1A R9-6-1B	750 x 150 1000 x 200
ONE LANE	R9-9A R9-9B	600 x 400 750 x 500
Signals Ahead	W3-3B W3-3C	750 x 750 900 x 900
Speed limit AHEAD	G9-79B	600 x 1000
STOP HERE WHEN DIRECTED	T1-Q12A T1-Q12B	900 x 600 1200 x 750
Traffic Controller Ahead / PREPARE TO STOP	T1-Q05A T1-Q05B	900 x 1000 1200 x 900
PREPARE TO STOP	T1-18A T1-18B	900 x 600 1200 x 900
Signals Ahead (Rectangle)	T1-30A	900 x 600
Boom Barrier AHEAD	T1-Q17	900 x 600
Supplementary Plate 'X km'	W8-5-Q01	600 x 200 750 x 250 900 x 300 1200 x 400

\* Except as noted in Clauses 3.5.5(a) and (b), guidance on sign size selection is given in Clause 3.2.3.



### 3.5.2 Manual control

The following are used for the manual control of traffic:


a) Traffic Controller ahead / Prepare to stop (T1-Q05)

		<p>The Traffic Controller Ahead / PREPARE TO STOP sign shall be used to give advance warning where traffic may be required to stop in compliance with the directions of a Traffic Controller. The sign shall be installed 2D in advance of the traffic control position where D is the greater value of the range of dimension given in Table 4.2.</p> <p>The sign shall not be displayed when the Traffic Controller is not actually in attendance controlling traffic.</p>
T1-Q05A	T1-Q05B	


b) Stop / slow bat (R6-8, T7-1)

	R6-8	<p>The STOP / SLOW bat shall be used by a Traffic Controller to control traffic at any temporary obstruction or hazard (see Clause 4.10). Retroreflective material used on the STOP / SLOW bat shall be Class 400 (1W) material. The colour of the SLOW face may be retroreflective fluorescent yellow. The bat shall have a handle a minimum of 1.8 m long to the underside of the sign. For night-time operations, an illuminated wand should be used in conjunction with the bat.</p>
	T7-1	

c) STOP HERE WHEN DIRECTED (T1-Q12)

	T1-Q12	<p>This sign may be used at roadworks during Traffic Controller operations when vehicles may be required to stop at a particular point.</p> <p>This sign is to be a stand-alone sign, additional to all other signs.</p>
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d) Boom Barrier AHEAD (T1-Q17)

	T1-Q17	This sign shall be used when a boom barrier is used to control traffic.
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### 3.5.3 Sign control

The following signs are used for controlling traffic by signs only:


a) Give way (R1-2), One lane (R9-9)

	R1-2	The GIVE WAY, ONE LANE sign assembly may be used to assign priority to one direction of travel past the work area when the travelled path is reduced to less than that required for two lanes of traffic. This technique is appropriate for road or bridgeworks when:
	R9-9	<p>a) the traffic volume is 150 vpd or less and the posted speed limit during roadworks is 70 km/h or less</p> <p>b) each entry to the work area is visible from the other</p> <p>c) the work area is less than 100 m in length, and</p> <p>d) there is sight distance to opposing traffic of desirably 200 m or more beyond the far end of the work area for traffic facing the GIVE WAY, ONE LANE sign assembly.</p> <p>If advance warning of this sign is needed, the Give Way Sign Ahead sign (W3-2) (see Part 2 of this <i>Manual</i>) may be used.</p>

b) No overtaking or passing (R6-1) and NEXT X m (R9-6-1)

	R6-1	Where traffic at a single lane section is controlled by a GIVE WAY, ONE LANE sign assembly at one end in accordance with Item (a) previously, the NO OVERTAKING OR PASSING sign should be erected at the start of the single lane for traffic in the opposite direction.
	R9-6-1	The NEXT X m sign shall be used beneath the NO OVERTAKING OR PASSING sign to indicate the length of the no overtaking or passing zone. The NEXT X m sign is not required when the NO OVERTAKING OR PASSING zone applies to a bridge.

c) KEEP LEFT (R2-3-Q01)

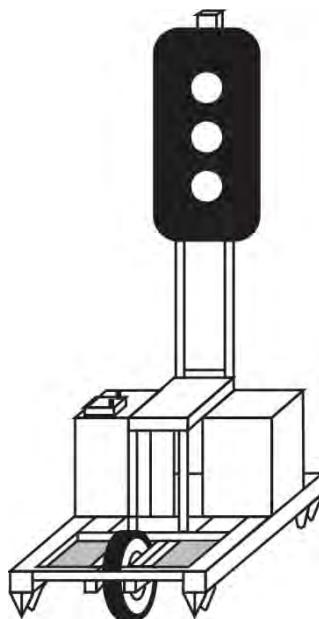
	R2-3-Q01	This sign may be used in lieu of the temporary hazard marker (T5-Q02) when installed at the start of a row of traffic cones where traffic is required to pass to the left of the cones.
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### 3.5.4 Traffic signal control

The following traffic signals and signs are used to control traffic:

- a) *Portable traffic signal* – A portable traffic signal usually consists of two signal heads each comprising a three-aspect signal face, red, yellow and green; two vehicle detectors, a signal control unit and a portable power source. The signal control unit is usually designed to permit vehicle-actuated, fixed-time or manual operation (see Note following Figure 3.1). Requirements for portable traffic signals are specified in AS 4191. Requirements for traffic signal lanterns are specified in AS 2144. A typical signal unit is shown in Figure 3.1.

**Figure 3.1 – Typical portable traffic signal**



A portable traffic signal may be used to control traffic where the direction of flow in a one-lane section of road is to be alternated or where all traffic is to be stopped, for example, at a machinery or haul road crossing.

The procedures for operating portable traffic signals are given in Clause 4.11.




NOTE: All traffic and signal control equipment shall meet the applicable standards and specifications prescribed in Part 14 of this *Manual*, the requirements of relevant statutory authorities and current Queensland Department of Transport and Main Roads or local government specifications.

- b) *Temporary fixed traffic signal* – The design and installation of a temporary fixed traffic signal shall comply with the relevant requirements of Part 14 of this *Manual*.


The use of temporary fixed traffic signals instead of portable signals should be considered on safety grounds. The additional signal lanterns provide a more reliable control indication to traffic.

It will usually be found preferable to install fixed temporary signals for service periods in excess of one to two weeks. Temporary signals will require a power supply for continuous use.


- c) Signals ahead (W3-3), Signals ahead (T1-30) and X km (W8-5-Q01)

	W3-3	<p>If portable or temporary fixed traffic signals are used to control traffic, the Signals Ahead sign (W3-3) shall be used to give advance warning. The PREPARE TO STOP (T1-18) sign shall be used in conjunction with this sign.</p> <p>For short-term use with portable signals the rectangular version of this sign (T1-30) may be substituted.</p> <p>Long distance warning of the existence of unexpected traffic signals, for example, in open road areas, may be required. The sign assembly Signals Ahead (W3-3) and 1 km (W8-5-Q01) supplementary distance plate should be used in this case.</p>
	T1-30	
	W8-5-Q01	

- d) Stop here on red signal (R6-6)

	R6-6	<p>The STOP HERE ON RED SIGNAL sign shall be used to indicate where traffic must stop when there is no stop line on the pavement. It is also recommended to supplement the stop line where one is provided.</p>
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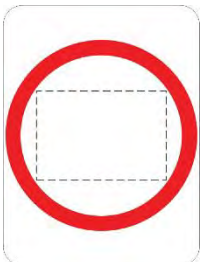
e) Prepare to stop (T1-18)

	T1-18	The PREPARE TO STOP sign shall be used in conjunction with the SIGNALS AHEAD sign (W3 3). The matching size sign should be used.
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### 3.5.5 Temporary speed limits

The following signs are used to impose temporary speed limits:

a) Speed restriction (R4-1)


	R4-1	<p>The Speed Restriction sign shall be used to create a temporary speed zone in accordance with the requirements and recommendations set out in Clause 4.9. It indicates the speed limit which applies between the sign and the next speed control sign ahead.</p> <p>A variable speed limit sign in accordance with Part 4 of the <i>Manual</i> may be used.</p> <p>Repeater Speed Restriction signs may be erected at intermediate locations within the zone. The sign R4-1B should be considered the minimum size.</p>
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The end of a temporary speed zone shall be indicated by a Speed Restriction sign (R4-1) displaying the appropriate speed limit for the road continuing beyond the works or the END Speed Limit (R4-12) sign where the conditions described in Item (c) apply. The END ROADWORK sign shall be used together with the Speed Restriction sign.


It is a legal requirement that a speed zone be terminated either by another regulatory speed control sign, or other means as specified in traffic regulations.

These signs shall not be used without other appropriate warning signs. Where workers are present at the site, the Workers (symbolic) (T1-5) sign (see Clause 3.4.4) shall be used together with the Speed Restriction sign. Speed Restriction signs continuously required for works which will be in progress for periods longer than 2 weeks shall be erected one to 1.5 m above the level of the nearest edge of the travelled path to the underside of the sign.


b) Road work (R4-3)

	R4-3	<p>The ROAD WORK supplementary plate may be used with Speed Restriction sign (R4-1) to indicate the start of a temporary speed zone.</p> <p>The A, B and C size signs are for use with the Speed Restriction sign sizes A and B respectively.</p>
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c) End speed limit (R4-12)

	R4-12	<p>Subject to Clause 3.5.5(a), this sign may be used to terminate a temporary speed zone where it is not practicable or desirable to display the speed limit applying beyond the zone by means of the R4-1 sign. This case could typically occur where although the continuing speed limit (general limit or zoned limit) is 100 km/h, road surface, alignment or other conditions will not allow traffic to travel safely at that speed.</p>
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d) Speed Limit AHEAD (G9-79)

	G9-79	<p>This sign shall be used to provide advance warning of the start of a temporary speed zone in accordance with Clause 4.9.5(a) where a speed zone of intermediate value is not proposed.</p>
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### 3.6 Detour signs

#### 3.6.1 General


Signs used for the guidance of traffic in advance of and through detours, are listed in Table 3.3.

**Table 3.3 – Signs for detours – Size table**


Sign	Sign Number	Size mm*
NO ENTRY	R2-4B R2-4C	600 x 600 750 x 750
No Left Turn	R2-6B (L) R2-6C (L)	600 x 600 750 x 750
No Right Turn	R2-6B (R) R2-6C (R)	600 x 600 750 x 750
All Traffic Turn	R2-14B (L or R)	900 x 1200
LOW BRIDGE AHEAD ... m, HIGH VEHICLES DETOUR	G9-3 (L or R)	1700 x 900
LOAD LIMIT ... t ON BRIDGE, HEAVY VEHICLES DETOUR	G9-4 (L or R)	1700 x 900
DETOUR FOR HIGH VEHICLES	G9-5-1 (L or R)	1300 x 350
DETOUR FOR HEAVY VEHICLES	G9-5-2 (L or R)	1400 x 350
Two-way traffic (Rectangular – regulatory)	R2-11A R2-11B	450 x 600 600 x 800
LOCAL TRAFFIC ONLY	G9-40-2A G9-40-2B	900 x 600 1200 x 900
Two-way traffic (Diamond)	W4-11B W4-11C W4-11D	750 x 750 900 x 900 1200 x 1200
DETOUR AHEAD	T1-6A T1-6B	1200 x 600 1800 x 900
END DETOUR	T2-23	1200 x 600
Two-way traffic (Rectangular)	T2-24A	900 x 600
DETOUR (Arrow)	T5-1A (L or R) T5-1B (L or R)	1200 x 300 1800 x 450
Detour marker	T5-6A	450 x 450

\* Application of the sign size designations in the T Series is given in Clause 3.2.3.



#### 3.6.2 Detour ahead (T1-6)

	T1-6	The DETOUR AHEAD sign shall be used to give advance warning of a detour bypassing a section of the normal roadway which is not trafficable or on which work is being carried out. The detour may be either via other roads or streets, or via a side track constructed for that purpose (see Clause 4.14).
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### 3.6.3 End detour (T2-23)

	T2-23	The END DETOUR sign should be used to indicate that a detour has ended wherever road users need to be advised that it has returned to the original route.
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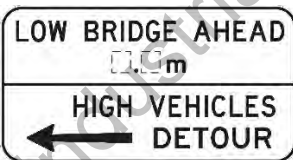

### 3.6.4 Detour (left or right) (T5-1)

	T5 1(L)	<p>The DETOUR sign (T5-1B) shall be used to indicate the direction and location for traffic to leave the normal roadway to detour via existing roads or streets or via a side-track bypassing an obstruction (see Clause 4.14). It will usually be necessary to use the advance sign DETOUR AHEAD (T1-6) in conjunction with this sign.</p> <p>DETOUR signs (T5-1A) should be used, if necessary, to reassure and guide traffic along the route of the detour.</p>
	T5-1(R)	



### 3.6.5 Detour marker (T5-6)

	T5-6	<p>The Detour Marker may be used in lieu of the DETOUR (T5-1) sign to guide and reassure road users along the route of a detour if the DETOUR sign is likely to misdirect road users other than those following the detour. It is typically used in built-up areas where traffic is detoured via side streets.</p> <p>The signboard shall be designed to be mounted with the arrow either vertically upwards, or to the left or right.</p>
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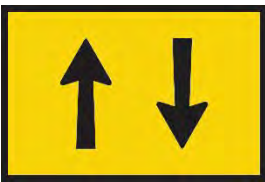
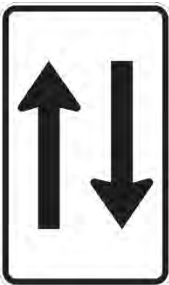
### 3.6.6 Low bridge ahead ... m, High vehicles detour (G9-3), Load limit on bridge ... t gross, Heavy vehicles detour (G9-4)

	G9-3(L)	<p>The signs LOW BRIDGE AHEAD ... m, HIGH VEHICLES DETOUR and LOAD LIMIT ON BRIDGE ... t GROSS, HEAVY VEHICLES DETOUR shall be erected at locations where it is essential that high or heavy vehicles detour to avoid structures which have a low clearance or a load limitation (see Clause 4.14.10). They shall be erected in advance of the junction with the alternative route.</p> <p>The alternative legend NARROW BRIDGE AHEAD ... m WIDE VEHICLES DETOUR may be substituted on sign G9-3.</p>
	G9-4(L)	


### 3.6.7 Detour for ... vehicles (G9-5)

	G9-5-1(L)	The DETOUR FOR .... VEHICLES sign shall be erected at the junction with an alternative route where certain classes of vehicle are unable to negotiate the work area. The words WIDE or LONG may be used in lieu of HIGH and HEAVY, where appropriate.
	G9-5-2(L)	

### 3.6.8 Two-way traffic (W4-11), Two-way traffic (T2-24), Two-way traffic (R2-11)

	W4-11	<p>The Two-way Traffic sign is used to warn road users that the roadway carries two-way traffic.</p> <p>The signs should be erected on both sides of the road at the beginning of each section over which two-way conditions temporarily apply. A second set of signs should be located between 100 m and 400 m after the start of the two-way section with additional sets of signs placed at intervals of approximately 1.5 km where the speed limit is greater than 70 km/h, or otherwise at 400 m intervals.</p>
	T2-24	<p>The signs should be used for the following situations:</p> <ul style="list-style-type: none"> <li>a) where a two-way road is the extension of a one-way road</li> <li>b) on any other road where, because of the road conditions, it is not clear whether a particular roadway carries traffic in one or both directions, or</li> <li>c) facing traffic soon after entering from a side road in either of the conditions in Items (a) and (b).</li> </ul>
	R2-11	<p>The largest sign (W4-11D) shall be used for the situation in Item (b).</p> <p>The rectangular version of this sign (T2-24) is for short-term use only.</p> <p>Where a roadway designed or normally used for one-way traffic is temporarily being used for two-way traffic, or where legislation prescribes that roadways, for example, service roads, are one-way but two-way operation is desirable or necessary, the regulatory TWO-WAY sign (R2-11) shall be used at each end of the section of road to indicate the points at which the two-way traffic regulation temporarily applies.</p>

### 3.6.9 All traffic turn (R2-14)


	R2-14 (L)	The All Traffic Turn sign may be used at situations where all approaching traffic must turn in the direction indicated by the arrow.
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### 3.6.10 No Left Turn (R2-6(L)), No Right Turn (R2-6(R)), NO ENTRY (R2-4)

These regulatory signs shall be used to control traffic movement at intersections within a detour.

		
R2-6(L)	R2-6(R)	R2-4

### 3.6.11 Local traffic only (G9-40-2)

	G9-40-2	The LOCAL TRAFFIC ONLY sign may be used at detours where local traffic is permitted to enter the work area (see Clause 4.14.5).
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## 3.7 Road condition signs

### 3.7.1 General







Signs used to warn road users of road conditions are listed in Table 3.4.

**Table 3.4 – Road condition signs – Size table**

Sign	Sign Number	Size mm*
Slippery	T3-3A T3-3B	900 x 600 1500 x 900
SOFT EDGES	T3-6A	900 x 600
ROUGH SURFACE	T3-7A T3-7B	900 x 600 1500 x 900
Loose Stones	T3-9A T3-9B	900 x 600 1500 x 900
NEW WORK, NO LINES MARKED	T3-11	1500 x 900
NO LINES, DO NOT OVERTAKE UNLESS SAFE	T3-12	1500 x 900
GRAVEL ROAD	T3-13	900 x 600
LOOSE SURFACE	T3-14A T3-14B	900 x 600 1500 x 900
X km/h (portrait format)	T3-16-1A T3-16-1B	600 x 600 900 x 900
X km/h (landscape format)	T3-16-2A T3-16-2B	900 x 400 1500 x 600



\* Application of sign size designations in the T Series is given in Clause 3.2.3.

**3.7.2 Slippery (T3-3), Soft edges (T3-6), Rough surface (T3-7), Gravel road (T3-13), Loose stones (T3-9), Loose surface (T3-14)**



	T3-3	<p>The Slippery, SOFT EDGES, ROUGH SURFACE, GRAVEL ROAD, Loose Stones and LOOSE SURFACE signs are used to warn road users of conditions which render the surface of the roadway or its edges temporarily hazardous. The signs should be erected 2D (see Table 4.2) metres before the beginning of the hazard. Road condition signs placed other than at an active work area may not require the use of other advance warning signs in conjunction, provided that the normal traffic lanes are not obstructed. If the hazardous conditions extend over a considerable length the signs may need to be repeated at regular intervals of not more than 500 m. Advisory Speed signs (T3-16) (see Clause 3.7.3) may be required in conjunction with these signs.</p> <p>The Slippery sign (T3-3) may be used to warn of a slippery condition caused by water, ice or loose material on the road surface. In the latter case, the sign LOOSE SURFACE (T3-14) may be used as an alternative to the Slippery sign.</p> <p>The Loose Stones sign (T3-9) is used for any situation where flying stones may be a hazard. It may also be used to protect the road surface against excessive loss of aggregate and to warn of the possibility of flying stones where fresh bituminous surfacing work has been carried out.</p> <p>Refer to Clause 4.9.3 for speed zones for traffic safety purposes particularly where loose material or stones are present on the road surface or for new sprayed seal works where higher speeds may damage the new seal.</p> <p>Note: Where work is carried out under MRTS 11 or other specification which require regulatory speed limits to be posted after resealing works, the requirements of those specifications regarding the installation of speed limit signs shall apply.</p>
	T3-6	
	T3-7	
	T3-9	
	T3-13	
	T3-14	



### 3.7.3 Advisory Speed signs (T3-16)

	T3-16-1	Advisory Speed signs may be used in conjunction with signs in the Road Condition Series (see Clause 3.7.2) in situations where a reduction in speed is desirable for road user comfort or protection of damaged pavement or partially completed works. They are not appropriate where a roadworks speed limit is required for either traffic safety or workplace safety.
	T3-16-2	If the T3-16-1 sign is used, it is designed to be placed beside the sign to which it refers. The T3-16-2 sign is designed to be placed under it. These signs shall not be used without another sign.

### 3.7.4 New work, no lines marked (T3-11), No lines do not overtake unless safe (T3-12)

	T3-11	These signs are used in advance of locations where pavement markings normally required for driver guidance have been removed or have not been placed on new surfacing work. The T3-11 sign should be used in locations such as multilane or one-way roadways where there is no overtaking risk from oncoming traffic.
	T3-12	The T3-12 sign shall be used at locations where barrier lines would normally be installed and should be used in any situation on two-way roadways where there will be overtaking in an oncoming traffic lane.

## 3.8 Signs and devices for lane and road closures

### 3.8.1 General

Signs used to effect lane and road closures are listed in Table 3.5.

**Table 3.5 – Signs for lane and road closures – Size table**



Sign	Sign Number	Size mm*
ROAD CLOSED	T2-4-Q01	1800 x 300
Lane Status (2 lane)	T2-6-1A T2-6-1B	1200 x 900 1800 x 1200
Lane Status (3 lane) *	T2-6-2A T2-6-2B	1800 x 900 2400 x 1200
EXIT CLOSED	T2-20-Q01	2100 x 1200
... EXIT CLOSED (arrow) ALTERNATIVE	T2-21-Q01 (L or R)	2600 x 1700
ROAD CLOSED ... km AHEAD	T2-4-Q02	1800 x 600

\* Lane Status signs for more than three lanes may be designed to be similar to this sign.

### 3.8.2 Signs

The following signs are used for lane and road closures:



#### a) Lane status (T2-6)

	T2-6-1	<p>The Lane Status sign is used where one or more lanes of a multi-lane roadway are closed and at least one lane is still open to traffic.</p> <p>The Lane Status sign is not used where a turn lane is closed. A No Right Turn sign or No Left Turn sign shall be used as appropriate.</p> <p>The Lane Status sign shall be used only to give advance warning of lane closures and not in lieu of adequate signing and delineation of the closure.</p>
	T2-6-2	<p>Variations and other options for lane status signs are shown in Appendix D <i>Multi-message sign system</i>.</p>


The 'bars' indicate the closed lanes while the arrows indicate lanes available to traffic. This sign may be made with removable and reversible symbols so that the number and location of each type can be varied to suit the particular lane closure in operation. Versions of these signs designed along the same lines to show more than three lanes may also be used.

Whenever practicable, the Lane Status sign should be placed on both sides of the road.

#### b) Road closed (T2-4-Q01), Road closed X km ahead (T2-4-Q02)


	T2-4-Q01	<p>The ROAD CLOSED sign shall be used where a roadway is closed to traffic. Barrier boards shall be erected across the roadway in conjunction with the sign and the bars should be aligned to point to the sign (see Figure 4.13).</p>
	T2-4-Q02	<p>Consideration should be given to providing traffic detours.</p> <p>The ROAD CLOSED ... km AHEAD sign may be placed in advance of the road closure. This sign should be erected at the junction with an alternative route, if practicable.</p>

#### c) ... Exit closed – alternative (T2-21-Q01)

	T2-21-Q01(L)	<p>The ... EXIT CLOSED – ALTERNATIVE sign is used on freeways at the exit in advance of the closed exit if this is an appropriate alternative route. Signs may be ordered for specific exits or bolt-on overlays may be utilised (see Clause 4.14.9).</p>
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d) Exit closed (T2-20-Q01)

	T2-20-Q01	The EXIT CLOSED sign is placed in advance of a closed freeway exit.
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### 3.8.3 Barricades

Barricades comprise either barrier boards (see Figure 3.2) or stand-alone non-interconnected lightweight modules. They shall be used to inhibit access to a work area. They should be erected approximately perpendicular to the direction of traffic flow at intervals not exceeding 100 m. Barricades shall not be used for delineation purposes.

The requirements for each type of barricade are as follows:

a) *Barrier boards*

Barrier boards shall be 150 mm to 200 mm in height and not more than 4 m in length. They should be mounted on trestles or fixed posts at about 1 m above the pavement. The colour combination used for barrier boards shall be alternate diagonal stripes of black and retroreflective yellow, terminating in yellow at each end as illustrated in Figure 3.3. Barrier board designs for use in Queensland are given in TC9215 and TC9224.

They shall not be placed parallel to the direction of traffic flow. Barrier boards so placed can become a spearing hazard if struck end on by an out-of-control vehicle.

b) *Stand-alone lightweight modules*

Stand-alone non-interconnected lightweight modules when used as barricades shall be placed behind a line of delineating devices.

Both types of device shall satisfy the requirements of Impact tests 70 and 71 of NCHRP 350 for work zone traffic control devices.

NOTE: Tests 70 and 71 of NCHRP 350 are used to assess the structural integrity of traffic control devices. Both tests use an 820 kg test vehicle which impacts the device along the central axis of the vehicle with an impact angle of 20 degrees or less. Test 70 impacts at 35 km/h (Test Level 1) and Test 71 impacts at 70 km/h (Test Level 2). Both tests determine the structural integrity of the impacted device by considering whether or not the device fragments, generating projectiles or spearing elements that could be hazardous to the occupants of errant vehicles or nearby pedestrians.

**Figure 3.2 – Typical barrier board**



Note: In this figure, vehicles pass to the left of the board. The bars should be aligned to point down to the right for vehicles to pass to that side.

### **3.9 Devices for delineating and indicating the travelled path**

#### **3.9.1 Traffic cones and temporary bollards**

Traffic cones and temporary bollards should be used on works to define the traffic path within the work site.

Requirements and recommendations for their use are as follows:

a) *Traffic cones*

Traffic cones shall comprise cones of fluorescent red or fluorescent orange material that is resilient to impact. Various sizes available should be used as follows:

i. Small cones

450 to 500 mm height – most built-up area and open road applications including footpaths, shared paths and bicycle paths where posted speed limit (prior to commencement of roadworks) is 70 km/h or less.

ii. Standard size cones

700 mm height or greater all other road applications where posted speed limits (prior to roadworks) exceed 70 km/h. Standard size cones may also be used on lower speed roads.

b) *Temporary bollards*

Temporary bollards shall comprise a vertical parallel sided or tapered tube of fluorescent orange or red material that is resilient to impact. They shall be at least 750 mm in height and a minimum of 100 mm in diameter.

For night-time use, cones and bollards shall be fitted with a white horizontal retroreflective band having a retroreflective performance at least equal to Class 400T (or Class 1W) material as specified in AS/NZS 1906.1. The size and positioning of retroreflective bands on traffic cones and bollards are given in Table 3.6.

**Table 3.6 – Size and positioning of retroreflective bands on traffic cones and bollards (millimetres)**

Item	Height	Band width	Distance from top of device to band
Cone	450 to 500	150	130 ±5
Cone	700 and over	250	220 ±5
Bollard	all heights	250	220 ±5

Cones and bollards shall be designed to be stable under reasonably expected wind conditions and air turbulence from passing traffic. However, they can be displaced by passing traffic and therefore, unless workers are there to replace them, should not be used unless they are securely fixed to the pavement or weighted to provide adequate stability from passing traffic when unattended.

Recommended spacings of cones and bollards are given in Table 3.7. Spacing of cones and bollards may need to be reduced to as little as 1 m if needed to prevent traffic taking a wrong turn or wrong opening through a line of bollards.

**Table 3.7 – Recommended maximum spacing of cones and bollards**

Purpose and usage	Speed Limit <sup>3</sup> , km/h	Recommended maximum spacing, m
All purposes	≤ 50	4
Centre-line on approach to a Traffic Controller position (Clause 4.10.2)	All cases (see Clause 4.10.4)	4
Outer edge of traffic lanes – e.g. works on shoulder or parking lane	60 to 70 > 70	18 24 <sup>1</sup>
Separating opposing traffic on a 2-lane, 2-way road – e.g. partial or complete lane closure	60 to 70 > 70	12 18
Separating opposing traffic on a multilane undivided road – e.g. as part of a lane closure	60 to 70 > 70	12 18
Separating opposing traffic on a contraflow section of a multilane divided road	60 to 70 > 70	6 9
Adjacent to a closed lane on a multilane undivided road	60 to 70 > 70	18 24
Closed lane on a two-way road under shuttle flow	60 to 70 > 70	18 24
Merge tapers (see Clause 4.8.2)	60 to 70 > 70	9 12
Lateral shift tapers (see Clause 4.8.2)	60 to 70 > 70	12 18
Taper at Traffic Control Station (see Clause 4.8.2)	All Cases	4
Close delineation at excavations (see Clause E2(b))	All Cases	4
Protecting freshly painted lines	≤ 70 > 70	24 60 <sup>2</sup>
At crossovers (see Clause 4.14.6(d))	All	2

**NOTES:**

1. This spacing may be extended to 60 m where the length of the line of cones or bollards exceeds 1 km but not adjacent to locations where there are workers on foot.
2. This spacing may need to be reduced on curves or crests, or if the row of cones is not clearly defined at night.
3. The temporary speed limit on the section of road where cones and bollards are installed.

**3.9.2 Roadworks delineators**

Roadworks delineators shall comprise red delineators on the left side and white delineators on the right (two-way roadway) or yellow on the right (one-way roadway).

Delineators used at or near works on roads shall meet the requirements of AS/NZS 1906.2 for either the sheeting or discrete device type. Delineators made from orientation-sensitive material shall be made and installed at the material manufacturer's recommended orientation for optimum performance.

NOTE: Orientation-sensitive material is generally regarded as material whose CIL at the specified measurement angles changes by more than 10% as it is progressively rotated in its plane.

Delineators should be erected 1 m minimum from the edge of the travelled path and at a uniform height of approximately 1 m above the road surface. Delineator posts should be frangible or otherwise non-hazardous.

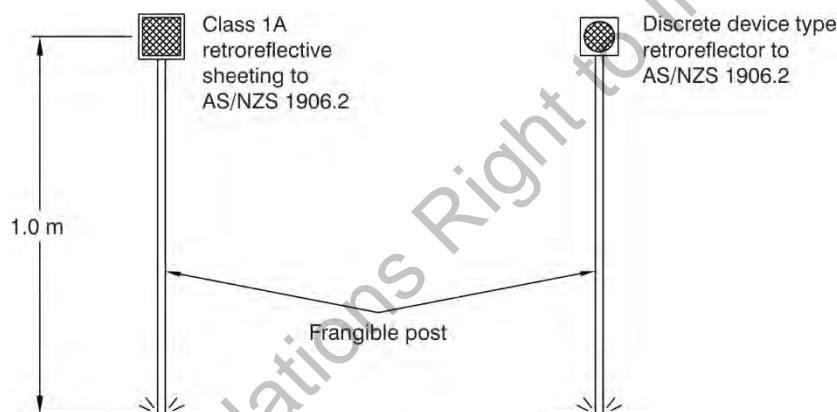
Delineators should be installed so as to provide a single continuous line defining the travelled path. The spacing of delineators should be as follows:

- (i) Immediately adjacent to or through work areas—
  - A. 24 m maximum at posted speed limits up to 70 km/h; or
  - B. 60 m maximum at higher posted speed limits.
- (ii) On side tracks and detours - as specified in Clause 4.14.6.

Temporary road safety barrier systems installed through work areas should be delineated at approximately 20 m spacings. Barriers installed to form curves or tapers may require additional delineation.




Typical post-mounted delineators are shown in Figure 3.3.

**Figure 3.3 – Examples of roadworks delineators**



Note: Delineator colour is specified in Clause 3.9.2.

### 3.9.3 Temporary hazard markers (T5-4, T5-5, T5-Q02)

	T5-4	1500 x 450	Temporary Hazard markers should be used to show any lateral change of direction of the travelled path through a work site and to delineate hazards and non-trafficable work areas adjacent to the travelled path. They should be erected with their edge about 1 m from the edge of the travelled path and at a uniform height above the road surface, and the chevrons shall always point to the side to which traffic is required to pass.
	T5-5	600 x 600	
	T5-Q02	250 x 1200* * This dimension may vary from 1140 to 1200 mm	On works extending overnight or being conducted at night where an obstruction encroaches onto the roadway, a series of T5-4 Temporary Hazard markers may be used in lieu of traffic cones or bollards to form the taper guiding traffic away from the obstruction. The T5-4 markers should be spaced so that as the taper is approached they appear as a continuous line (see Clause 4.8.3). If temporary delineation is required on both sides of the vehicle path at a taper, hazard markers should only be used on the side primarily steering traffic away from the obstruction. Since in most cases two parallel lines of hazard markers will lead to confusing visual patterns, traffic cones or bollards should be used on the other side. For daytime-only works, traffic cones or temporary bollards used in conjunction with the T5-5 Temporary Hazard marker as indicated following, will generally suffice.

The T5-5 Temporary Hazard marker may be used on works extending overnight, in lieu of the T5-4 marker, in confined areas where there is insufficient space to use the wider marker.

The T5-5 marker should also be used at short-term works to indicate the beginning of a line of traffic cones or bollards where the devices themselves may not be sufficiently visible to approaching traffic.

If other signs, such as ROAD CLOSED or DETOUR, are required at a site in conjunction with a line of Temporary Hazard markers they should be placed so as to appear above but not among the line of Temporary Hazard markers.

The Temporary Collapsible Chevron delineator T5--Q02 may be used to delineate hazards and non-trafficable work areas adjacent to the travelled path.

### 3.9.4 Pavement markings

This Clause applies to roads where there were pavement markings in existence prior to the works.

Appropriate pavement markings should be provided or maintained to guide traffic through and past a work area. The following principles apply:

- a) Where existing markings are satisfactory, they should be maintained in good condition throughout the period of the work.
- b) If existing markings are not appropriate or are potentially misleading, they should be removed and replaced by more suitable markings, taking care that markings are not obliterated by material which may become slippery.

NOTE: It is inadvisable to obliterate markings using black or grey paint as under certain light or wet weather conditions (for example, specular illumination by opposing vehicle headlights) they may appear indistinguishable from white markings.

- c) Consideration should be given to the use of retroreflective pavement marking tape for all temporary lines as the removal of road marking paint is often difficult and may leave a mark which may be mistaken for a line under certain lighting or wet weather conditions.
- d) Temporary lines used to guide traffic through substantial diversions or changes in direction, should be supplemented by raised retroreflective pavement markers.
- e) Where, during or at the conclusion of pavement-surfacing works, a section of roadway is to be left for a period of time without linemarking, temporary raised retroreflective pavement markers should be used to provide delineation of the separation or lane lines. The use of appropriate signs warning of the need to exercise caution in the absence of lines is set out in Clause 3.7.4.

### **3.9.5 Raised retroreflective pavement markers**

Raised retroreflective pavement markers (RRPMs) complying with AS 1906.3 may be used in conjunction with temporary pavement markings at long-term work sites. The spacing and application should be as specified for permanent use in Part 2 of this *Manual*.

Temporary RRPMs recommended under Clause 3.9.4(e) at freshly surfaced pavements should be sufficiently robust to survive under traffic until permanent markings are installed.

Where special emphasis of a dividing line is required, for example, where a multilane or divided road has been temporarily reduced to a two-way road, lane dividers typically comprising a larger base than the RRPM, with a vertical flexible flap attached and incorporating a retroreflector, may be placed along the dividing line, generally at the same spacing as RRPMs.

### **3.9.6 Temporary kerbing**

Temporary kerbing may be used to form temporary medians, traffic islands or pavement edges during long-term works. Such kerbing shall be not greater than 150 mm in height and should be securely fastened to the pavement. It shall be yellow, and as seen by approaching traffic shall appear as a continuous line at least 150 mm wide.

## **3.10 Containment fences and road safety barrier systems**

### **3.10.1 Containment fences**

Containment fences comprising tapes, plastic mesh fencing or longitudinal channelising devices may be used to provide visible containment as described in Items (a) and (b) following, and Clause 3.10.2 in situations where physical protection by use of a road safety barrier system (see Clause 3.10.3) is not warranted.



All types of containment fence shall have sufficient stability to resist displacement, fracture or deflection of more than 0.5 m resulting from all expected wind conditions, air turbulence from passing traffic and minor vehicular impacts.

Descriptions and use of tapes and mesh fencing used as containment fences are as follows:

a) *Tapes*

Containment tapes may be used to contain workers on foot and plant within the safe workplace boundary established at the particular work site in accordance with Clause 4.2. The tape should be a minimum of 100 mm wide with alternate of stripes contrasting colour, and should be supported approximately 1 m above ground level with supports spaced so that the minimum height of the tape above ground is not less than 800 mm. The maximum breaking strength should be low enough not to cause hazard to any vehicle or motor cycle which might run into it. Tapes shall not be used for pedestrian containment adjacent to traffic.

b) *Plastic mesh fencing*

Plastic mesh fencing may be used for pedestrian containment as well as for the containment of workers on foot and plant as in Item (a). It comprises a flexible orange mesh approximately 1 m high. It shall be supported so that the top of the fence is at least 800 mm above ground level at all times.

### **3.10.2 Longitudinal channelising devices**

Longitudinal channelising devices shall comprise interconnected lightweight modules such as plastic water ballasted modules. They may be used either as containment fences for workers or pedestrians, or as delineation devices in situations where a road safety barrier system as specified in Clause 3.10.3 is not required. Their use shall be subject to the following:

- a) They shall satisfy the requirements of Impact tests 70 and 71 of NCHRP 350 for work zone traffic control devices together with such additional tests as may be required in the revised edition of AS/NZS 3845.
- b) They shall be marked 'NOT A SAFETY BARRIER' in letters at least 100 mm high.
- c) Edge clearances to traffic shall be in accordance with Clause 4.13.4(a).

Stand-alone, non-interconnected lightweight modules shall not be used for any purpose. Their use shall be confined to inhibiting access to a work area as specified in Clause 3.8.3.

### **3.10.3 Road safety barrier systems**

Road safety barrier systems are designed to provide a physical barrier between the travelled path and the work area, which will inhibit penetration by an out-of-control vehicle (see NOTE) and will have vehicle redirecting properties. They are typically used between traffic and a severe hazard such as a deep excavation, a bridge pier or a hazardous stockpile, and for the protection of workers and non-vehicular road users in vulnerable situations where lateral clearance to moving traffic would otherwise be insufficient for safety. They may also be used to separate opposing traffic.

NOTE: The satisfactory performance of a barrier system will depend on its being struck by a vehicle no larger than the 'design' vehicle for which it is to be designed. Selection of the design vehicle should be subject to a risk assessment, taking into account traffic mix past the site and the nature and length of the works.

Vehicles can be protected from collisions with hazardous fixed objects by crash attenuators as an alternative to safety barrier systems (see Clause 3.10.4).

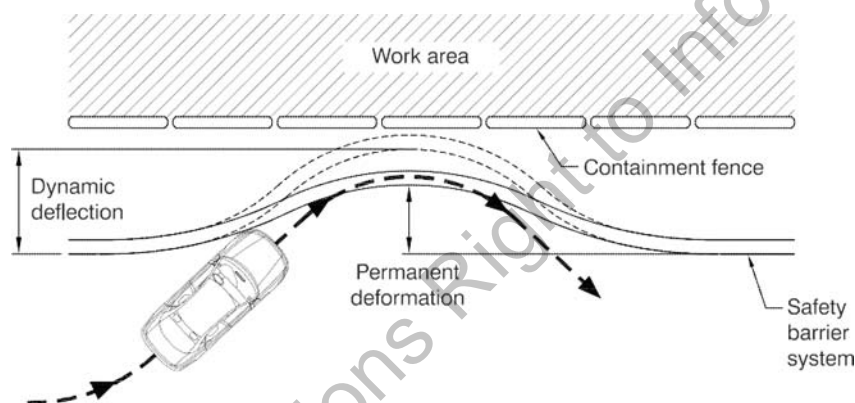
The type selection and installation of a temporary road safety barrier system including positioning and end treatments shall be in accordance with AS/NZS 3845. For the protection of workers from dynamic deflection of the barrier in a crash, if the work area is close to the rear of the barrier, a containment fence or longitudinal channelling device shall be placed behind the barrier a clear distance equal to the likely dynamic deflection. Data on the dynamic deflection of the barrier type used when impacted by the selected design vehicle will be needed to determine the positioning of the containment fence. The positioning of protective fencing behind a barrier is illustrated in Figure 3.4.

The positioning of barriers in relation to high obstructions such as power poles, bridge piers or underpass scaffolding shall take into account the likely extent of body roll of a high vehicle striking the barrier.

Fittings other than delineators shall not be attached to safety barrier systems unless they have been designed to accommodate the fitting.

Edge clearances to traffic shall be in accordance with Clause 4.13.4(c).

**Figure 3.4 – Protective fencing behind a safety barrier system**



### 3.10.4 Temporary crash attenuators

Hazardous fixed objects that have become exposed to traffic due to roadwork, such as bridge piers or safety barrier ends, may need to be equipped with purpose-designed, energy-absorbing terminal devices to reduce the severity of collision by an out-of-control vehicle.

The need should be determined from a risk assessment that takes full account of the additional risk due to works on roads.

NOTE: Reference should be made to AS/NZS 3845 for the selection, design and positioning of temporary crash attenuators.

### 3.11 Lamps

Flashing yellow lamps may be used at work sites to draw attention to advance signs. They are typically used with the ROADWORK AHEAD (T1-1) or BRIDGEWORK AHEAD (T1-2) signs in areas where road lighting is poor or absent. Flashing lamps shall not be used for delineation purposes.

NOTE: The use of steady or ripple lamps for any purpose including delineation has now been omitted from this Part of the *Manual*. Any mandatory requirements for the use of flashing lamps have also been omitted.

### **3.12 Vehicle-mounted signs and devices**

#### **3.12.1 Vehicle-mounted warning device**

A vehicle-mounted warning device shall consist of one or other of the following:

- a) A single yellow beacon lamp for use on a vehicle not normally used for any works on roads, or on a plant item with protection for workers and road users, or an inspection vehicle operating in accordance with Clause 4.3.6(a)(ii) or (b).
- b) A pair of yellow beacon lamps for use on vehicles (for example, patrol trucks) used on all roads for any work being carried out without the protection of a static work site; the lamps should be positioned on the vehicle so that at least one and preferably both lamps are visible from any direction.
- c) An illuminated flashing arrow sign as specified in Clause 3.12.2 for any work, including the situations in Items (a) and (b) and for mobile works where indicated in Clause 4.6.

The vehicle-mounted warning device shall be mounted as high as practicable on the vehicle for best visibility to other traffic, for example, on top of the cab of a truck. It may need to be placed near the rear of the vehicle if a cab-mounted sign could be obscured by a load. Supplementary signs used in conjunction with the illuminated flashing arrow sign (see Clause 3.12.3), may be mounted either in conjunction with that sign or elsewhere in a prominent position on the vehicle.

Where signs are mounted on the device or elsewhere on a vehicle, they shall be capable of being removed from view (for example, by covering, folding or turning off) when not needed.

#### **3.12.2 Illuminated flashing arrow sign**

This sign comprises a matrix of yellow lamps in the form of an arrow that is flashed in a cyclic manner to provide advance warning of a temporary diversion. It includes a backing board for the lamps together with ancillary equipment necessary for mounting and operating the sign and reducing its light output (dimming) for night-time use. Requirements for this sign are specified in AS/NZS 4192.

The following three size designations are used:

- a) *Size A*  
1260 mm x 650 mm – designed for roof mounting on a light vehicle and is typically used for short-term lane closure and mobile works on roads with a posted speed limit (prior to roadworks) of 60 km/h or less.
- b) *Size B*  
1500 mm x 770 mm – designed for cab mounting on a truck. It is typically used for short-term lane closures or mobile works, and is suitable for use on roads with a posted speed limit (prior to roadworks) of greater than 60 km/h.
- c) *Size C*  
2400 mm x 1200 mm – trailer mounted with its own power supply and suitable for medium and long-term lane closures on multilane roads with a posted speed limit (prior to roadworks) of greater than 60 km/h, freeways and elsewhere where a high level of long-distance advance warning is desirable for safety.

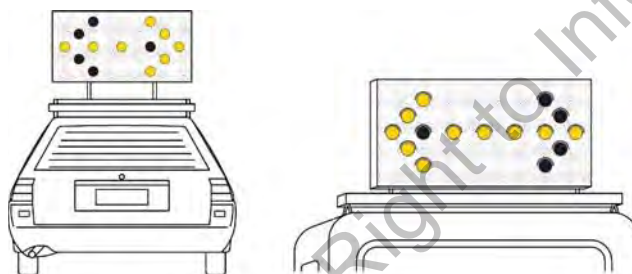
High-intensity flashing lamps may be used in conjunction with this sign, provided that the lamps are either appropriately shielded or laterally or vertically displaced from the edge of the sign to avoid visually corrupting the arrow shape or its directional effect.

Requirements for the flashing of different patterns of the lights are as follows:

- (i) When traffic is expected to pass the sign on a particular side and can do so in safety, that is, it is not required to seek a gap in oncoming traffic, the bar of the arrow and the barb directing traffic to that side shall be flashed.
- (ii) When the sign is used to give a general warning of works activity ahead, including mobile works, but either the sign is located clear of the traffic path or the display of an arrow would not be appropriate for some other reason, either the bar of the arrow only or the four corner lights at the extremities of the barbs shall be flashed. In the latter case, diagonal pairs should be flashed alternately.

A typical sign as part of a vehicle-mounted warning device is shown in Figure 3.5.

**Figure 3.5 – Illuminated flashing arrow sign**



### 3.12.3 Supplementary vehicle-mounted signs

The following lists signs appropriate for use in conjunction with the illuminated flashing arrow sign where necessary to warn road users of the presence of workers on foot or the nature of the work:

- (i) *Workers (symbolic) (similar to sign T1-5)* – This sign shall be used on all vehicles in a mobile works convoy (see Clause 4.6) whenever workers on foot are part of the operation. The colour requirements for this sign are the same as specified for the T1-5 sign in Clause 3.4.4. The symbol size shall be not less than that specified for the T1-5A or B sign, according to the requirements of Clause 3.2.3.
- (ii) *LINE MARKING (T6-Q07)* – This sign should be used on advance warning vehicles as well as on the work vehicle. It may be yellow or fluorescent yellow for daytime use only and retroreflective yellow for night use.

Where used, these signs shall be mounted either on the vehicle-mounted warning device along with the flashing arrow sign, or elsewhere in a permanent position on the body of the vehicle.

Standard signboard sizes are not specified for these signs. They shall be tailored to suit the positioning and mounting arrangements on the vehicle.

Legends shall be of sufficient size to be read by drivers at a distance of at least D (where D = 60 to 80 m).



The following signs may be used in conjunction with other signs and devices to warn traffic that work is in progress on the road ahead. The signs incorporate a panel of chevrons which is adjusted to indicate the side of the vehicle to which traffic should pass.

**Table 3.8 – Supplementary vehicle mounted signs – Size table**


Sign	Sign number	Size, mm*
KEEP CLEAR (with chevron panel)	T6-Q02A (L or R) T6-Q02B (L or R)	1200 x 600 1800 x 750
LINE MARKING (with chevron panel)	T6-Q06A (L or R) T6-Q06B (L or R)	1200 x 600 1800 x 750
LINE MARKING	T6-Q07A T6-Q07B	1200 x 300 1800 x 450

\* Guidance on size selection is given in Clause 3.2.3.

a) Line marking (T6-Q06, T6-Q07)

	T6-Q06(L)	The LINE MARKING sign T6-Q06 or T6-Q07 shall be used on linemarking vehicles while traffic lines are being painted.  The T6-Q06 sign incorporates a panel of chevrons which is adjusted to indicate whether the overtaking manoeuvre is to the left or to the right. Lamps shall be used with this sign.
	T6-Q07	The T6-Q07 sign is mounted above an illuminated flashing arrow sign (see Clauses 3.12.1 and 3.12.2 and Figure 4.3).

b) Keep clear (T6-Q02)

	T6-Q02(L)	The KEEP CLEAR (T6-Q02) sign may be used on pavement testing vehicles for pavement testing operations which are carried out at a slow speed (about 1–2 km/h).
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### 3.12.4 Painting of vehicles and machinery

Vehicles and machinery required to work in or alongside normal road traffic should be painted a distinctive bright colour. The colour should contrast with the colour of high-visibility clothing used by personnel.

### 3.12.5 Truck-mounted crash attenuator

Slow-moving or stationary work vehicles which are exposed to potential collisions by approaching traffic may be fitted with truck-mounted crash attenuators. They should be selected to have a collision speed rating appropriate to the traffic speed environment in which they are to be used. Suggested performance characteristics for these devices are given in NCHRP 350.

NOTE: Additional requirements for attenuator vehicles are outlined in the Queensland MUTCD Part 3 Supplement.

### 3.13 Blasting work signs

#### 3.13.1 General

Signs used at blasting works are listed in Table 3.9.


NOTE: The use of explosives is covered in AS 2187.2.

**Table 3.9 – Signs used at blasting works – Size table**


Sign	Sign number	Size, mm*
BLASTING AREA, SWITCH OFF RADIO TRANSMITTERS AND MOBILE PHONES	T4-7A	1200 x 900
END BLASTING AREA	T4-3AA T4-3A	1200 x 450 1800 x 600

\* Guidance on size selection is given in Clause 3.2.3.

#### 3.13.2 Blasting area switch off radio transmitters (T4-7)

	T4-7	When electric detonators are to be handled or used within 40 m of a road, the sign BLASTING AREA, SWITCH OFF RADIO TRANSMITTERS AND MOBILE PHONES shall be prominently displayed at the edge of the roadway on all road approaches at a distance of not less than 200 m from the handling or blasting site.  This sign is used in conjunction with the END BLASTING AREA sign (T4-3).
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#### 3.13.3 End blasting area (T4-3)

	T4-3	The END BLASTING AREA sign shall be placed a minimum of 200 m beyond the blasting area to indicate where radio transmitters may again be used.
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### 3.14 Signs and devices for pedestrian control

#### 3.14.1 General


Signs for pedestrian control are listed in Table 3.10. See also Clause 2.3.7.

**Table 3.10 – Signs for pedestrian control – Size table**


Sign	Sign number	Size, mm
PEDESTRIANS WATCH YOUR STEP	T8-1	900 x 600
PEDESTRIANS (arrow)	T8-2 (L or R)	1200 x 300
USE OTHER FOOTPATH	T8-3	900 x 600
FOOTPATH CLOSED	T8-4-Q01A T8-4-Q01B	900 x 600 1200 x 600
LOOK BOTH WAYS, TWO-WAY TRAFFIC	T8-5	900 x 600





### 3.14.2 Pedestrians watch your step (T8-1)

	T8-1	<p>The PEDESTRIANS WATCH YOUR STEP sign should be used where the route for pedestrians across incomplete works could be hazardous because of roughness, level differences, or loose or other surface material.</p>
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### 3.14.3 Pedestrians (arrow) (T8-2)

	T8-2	<p>The PEDESTRIANS (arrow) sign should be used at a work site where it is necessary to direct pedestrians via a particular path.</p> <p>The sign shall be installed at a location where pedestrians can be safely directed to an alternative path.</p>
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### 3.14.4 Use other footpath (T8-3), Footpath closed (T8-4-Q01)

	T8-3	<p>The USE OTHER FOOTPATH sign shall be used where works make it necessary to deny use of the footpath on one side of the road.</p> <p>PEDESTRIANS (arrow) (T8-2) signs shall be used as necessary in conjunction with this sign.</p> <p>The sign shall be installed at a location where pedestrians can be safely directed to an alternative path.</p>
	T8-4-Q01	<p>The FOOTPATH CLOSED shall be used at a footpath which is not in use. The footpath should be closed with barriers.</p>

### 3.14.5 Look both ways, two-way traffic (T8-5)

	T8-5	<p>Where one roadway of a divided road is temporarily closed, this sign shall be placed at non-signalised pedestrian crossings on both sides of the open roadway to face pedestrians about to cross, if there is a risk that pedestrians might not notice that the roadway is two-way.</p>
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### 3.14.6 Pedestrian containment

Barricades (see Clause 3.8.3) or mesh fence (see Clause 3.10.1) may be used to control pedestrian movements at a work site. Where pedestrian traffic has been diverted onto an existing roadway, a



safety barrier may be required (see Clause 3.10.3). Barrier boards or tapes shall not be used for pedestrian containment adjacent to moving traffic.

### 3.15 Signs and devices for vehicle height and mass restrictions

#### 3.15.1 General


Signs indicating vehicle height and mass restrictions are listed in Table 3.11.

**Table 3.11 – Signs for vehicle height and mass restrictions – Size table**


Sign	Sign number	Size, mm*
BRIDGE LOAD LIMIT ... t GROSS	R6-3A R6-3B	600 x 900 900 x 1350
LOW CLEARANCE ... m	R6-11	1950 x 600
CLEARANCE ... m	R6-12	1500 x 600
LOW CLEARANCE ... m	W4-8B W4-8C	750 x 750 900 x 900

\* Guidance on size selection is given in Clause 3.2.3.


#### 3.15.2 Bridge load limit ... t gross (R6-3)

	R6-3	<p>The BRIDGE LOAD LIMIT ... t GROSS sign shall be used to indicate the maximum permissible gross load in tonnes on a bridge and shall be erected at, or on, the immediate approaches to the bridge.</p> <p>The sign G9-4 (see Clause 3.6.6) should be erected at an appropriate intersection in advance of the bridge to advise road users of the limitation on load and to indicate an alternative route.</p> <p>The DETOUR FOR HEAVY VEHICLES sign (G9-5-2) (see Clause 3.6.7) should be erected at appropriate intersections to advise road users of an alternative route bypassing the load limitation.</p> <p>An alternative to this sign with the legend BRIDGE WIDTH LIMIT ... m shall be used if required to indicate the maximum permissible width of a vehicle crossing the bridge.</p>
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### 3.15.3 Low clearance ... m (R6-11)

	R6-11	<p>The LOW CLEARANCE ... m sign shall be erected on all bridges, underpasses and other structures where the safe vertical clearance above the road pavement is less than 4.6 m. The sign should be attached to or located adjacent to the structure and over the centre of the roadway to face approaching traffic. The sign shall show a clearance in metres to the nearest 0.1 m below the safe clearance (see Clause 2.4.6).</p> <p>The warning sign LOW CLEARANCE ... m (W4-8) (see Clause 3.15.5) should be located in advance of the structure.</p>
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### 3.15.4 Clearance ... m (R6-12)

	R6-12	<p>The CLEARANCE ... m sign may be erected on structures where the safe vertical clearance is greater than 4.6 m but less than 5.3 m. The sign shall show a clearance in metres to the nearest 0.1 m below the safe clearance.</p>
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### 3.15.5 Low clearance ... m (W4-8)

	W4-8	<p>The LOW CLEARANCE ... m sign shall be used in advance of all bridges, underpasses and other structures where the clearance is less than 4.6 m. The sign shall show a clearance in metres to the nearest 0.1 m below the safe clearance.</p> <p>In locating this sign, the needs of a driver of a large vehicle that may have to stop at a safe turning area in advance of the structure should be taken into account.</p> <p>The LOW CLEARANCE ... m sign (R6-11) (see Clause 3.15.3) located on or adjacent to the structure is used in conjunction with this sign.</p> <p>The LOW BRIDGE AHEAD ... m HIGH VEHICLES DETOUR sign (G9-3) (see Clause 3.6.6) should be erected at an appropriate intersection in advance of the structure to advise road users of the height limitation and to indicate an alternative route.</p> <p>A supplementary detour sign (G9-5-1) (see Clause 3.6.7) should be erected at appropriate intersections to advise road users of an alternative route bypassing the low clearance hazard.</p>
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### 3.15.6 Low clearance warning gauge

A low clearance warning gauge is a device which may be erected in advance of an overhead structure where there is a safety risk to workers or other traffic in the event of impact. It should be designed

either to physically inhibit passage under the structure, or to visually or audibly warn that a vehicle exceeds the available clearance. The gauge should be located sufficiently in advance of the structure to permit a vehicle which exceeds the available clearance and is driven at not more than the speed limit, to stop safely. The gauge should apply to the full width of the approach roadway, be mounted approximately at right angles to it and be signposted appropriately.

### 3.16 Other signs and devices

#### 3.16.1 General



Signs used at roadworks sites which do not fall into previously defined classifications, are listed in Table 3.12.

**Table 3.12 – Other roadworks signs – Size table**


Sign	Sign number	Size, mm*
NO ENTRY	R2-4A	450 x 450
	R2-4B	600 x 600
	R2-4C	750 x 750
	R2-4D	900 x 900
Trucks (Diamond)	W5-22B	750 x 750
	W5-22C	900 x 900
TRAFFIC HAZARD	T1-10	1200 x 600
Trucks (Rectangle)	T2-25	900 x 600
POWER LINE WORKS IN PROGRESS	T4-5	1800 x 900
PROBABLE DELAY 15 MINUTES	T1-Q02	900 x 600
DANGER GAS NO SMOKING	T4-Q03	1200 x 600
NEW ROUNDABOUT	T1-21	1800 x 600
CHANGED SIGNALS	T1-22	1200 x 600
CHANGED TRAFFIC CONDITIONS	T1-23	1800 x 900
CHANGED TRAFFIC CONDITIONS	T1-23-Q01	900 x 600
CHANGED INTERSECTION	T1-33	1800 x 600
CHANGED LINE MARKING	T1-Q14	1800 x 900
QUEUED TRAFFIC AHEAD	T1-Q15	1200 x 900

\* Guidance on size selection is given in Clause 3.2.3.

### 3.16.2 Trucks (T2-25), Trucks (W5-22)

	T2-25	<p>The Trucks (T2-25) sign should be used where trucks may cross, enter or leave the road from an adjoining property at a frequency and in circumstances which create a hazard. The sign should be displayed only when the need exists and removed or covered when truck activity has ceased.</p> <p>The sign should be placed on the side of the road from which trucks will be crossing or entering.</p>
	W5-22	<p>The diamond version of this sign (W5-22) is for long-term use only.</p>

### 3.16.3 Power line works in progress (T4-5)

	T4-5	<p>This sign is an example of signs which may be used to describe specialised works carried out on or near roads by public authorities which are responsible for power supply, communications, and other utilities. Such signs shall supplement and not replace the appropriate standard signs and devices required in accordance with this <i>Manual</i> for the particular work site. Typical legends would be: TELECOM, PIPELINE, LEVEL CROSSING and so on WORKS IN PROGRESS.</p>
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### 3.16.4 High-visibility clothing for work personnel

High-visibility clothing meeting the requirements of AS/NZS 4602 for Types D, N or D / N garments shall be worn by all personnel working in or adjacent to traffic, including traffic at work sites, in quarries and on construction haul roads. The clothing is designed to make personnel more conspicuous and to warn road users of their presence.

The clothing shall be used as follows:


- a) For general use by all personnel at a works site – a Type D / N (day / night) garment.

NOTE: This requirement covers the contingency that a worker may be required to work in darkness or in partial darkness at the beginning or end of a day shift or may be called out unexpectedly at night.

- b) Where the garment is to be worn during daylight hours – a Type D (day only) garment.
- c) Where the garment is to be worn during hours of darkness – a Type N (night only) garment.

Clothing shall be properly fastened when being worn at a works site so that the entire available area of high-visibility material for each direction of observation, can be seen.

### 3.16.5 Traffic hazard (T1-10)

	T1-10	The sign TRAFFIC HAZARD is for emergency use only and may be used whenever any unexpected event causes a traffic hazard. Should the hazard remain for any appreciable time, this sign shall be replaced as soon as possible, generally within 24 hours, by signs more appropriate to conditions imposed on traffic. Use of this sign at emergency and unplanned works is set out in Appendix H.
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### 3.16.6 Variable message signs

The use of variable message signs is a recommended treatment for end of queue protection (see Clause 4.7.8) and for speed zones implemented for traffic safety purposes (see Clause 4.9.3).

Variable message signs may be used at or near a roadworks site to carry warning or other messages relating to the works.

The following requirements shall apply to the use of variable message signs:

- Word legends shall comprise not more than four words or numbers on any one screen.
- Letter forms and legend height shall be adequate to be comfortably read by drivers at the posted speed limit (see also Item (d) following).
- There shall not be more than two separate screens in any alternating series of screens.
- Where there are alternating screens, the 'on' time of each screen should be  $0.6 \pm 0.1$  s per word or number and the total time required to read the message on both screens shall be taken into account when determining message length and letter height.  
  
NOTE: A procedure for determining letter sizes for signs is given in Part 2 of this *Manual*. The letter series which most nearly matches the on-screen fonts should be used in the calculations. It is recommended that the calculated letter height be doubled for this purpose.
- Symbols shall not be used unless they have been tested for comprehension in their onscreen format (that is, taking into account distortions due to pixel size limitations).
- Messages shall be relevant to the nature and phase of the work in progress and shall be changed or switched off when they are not relevant.
- Except as specified in Item (h) following, messages shall be additional to and not substituted for any sign, or warning or delineating device required by this Part of the *Manual*. The nature and positioning of the messages is not to detract from those signs or devices.
- Variable message signs may be substituted for static signs when used as part of a mobile works convoy or short-term, frequently-changing worksite.
- Yellow shall be the only colour font used on variable message signs, with the exception of red which shall only be used to display the PREPARE TO STOP or REDUCE SPEED message.
- Symbols / signs displayed on a variable message sign shall be shown in the reversed colour scheme to the appropriate static sign.

Variable message signs on roads near a work site displaying unrelated messages shall be switched off. Attempts should also be made to have such signs on adjacent property switched off.

Variable message signs used at roadworks shall comply with the requirements of AS 4852.2.

#### **3.16.7 Variable speed limit signs**


Variable speed limit signs, if used, shall be in accordance with the Queensland MUTCD Part 3 Supplement, the *Traffic and Road Use Management* (TRUM) manual Volume 1 Part 10 *Traffic control and communication devices* Supplement to Austroads *Guide to Traffic Management* Part 10 and other requirements of the *Manual* relating to temporary speed zones. Variable speed limit signs shall comply with Transport and Main Roads Technical Specifications MRTS260 *Temporary Variable Speed Limit Signs* and MRTS262 *Temporary Variable Message Signs* and shall be displayed as per the legislative requirements for the display of electronic speed limit signs.

#### **3.16.8 Antiglare screen**


An antiglare screen which reduces excessive headlight glare to an acceptable level should be considered where temporary diversions result in directly opposing traffic. Screens should also be provided where oncoming headlights could mislead drivers as to their correct travel path. The screen supports should be of sufficient strength to ensure the stability of the screen in windy conditions but frangible under vehicle impact.

### 3.16.9 Miscellaneous signs

#### a) Probable delay 15 minutes (T1-Q02)

	T1-Q02	The PROBABLE DELAY 15 MINUTES sign may be erected in advance of roadworks where delays are expected to be longer than normal.
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#### b) No entry (R2-4)

	R2-4	<p>The NO ENTRY sign is used at the termination of a one-way roadway to prohibit access from the wrong direction.</p> <p>At one-way streets, at least one NO ENTRY sign shall be erected at the intersection facing in the opposite direction to the one-way flow. It may need to be located a short distance into the one-way street if there is a possibility of drivers becoming confused as to which street is closed to entry. Sufficient signs shall be erected to ensure that at least one is clearly visible to drivers approaching from any direction, and some signs may have to be set at an angle to achieve this purpose.</p> <p>A NO ENTRY sign may also be used to temporarily close a road. Where practicable, the NO ENTRY sign should be erected in conjunction with the standard signs and barriers required to temporarily close a road.</p>
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#### c) Project information signs

Where a public authority with the necessary jurisdiction decides to erect project information signs at or near a road or bridge construction job which has commenced or is about to commence, such signs should be dignified in appearance and shall conform to the best practices for the design of highway signs. The main part of the legend shall be of sufficiently large letters, and of such brevity that the motorist travelling at the posted speed limit can read the legend without being unduly distracted from the driving task. Additional information may be given in small size legend, provided that the sign is located so that the motorist may safely stop to read the sign.


For detailed information on the use of project information signs, refer to the Queensland MUTCD Part 3 Supplement.



d) Danger gas no smoking (T4-Q03)

	T4-Q03	<p>The DANGER GAS NO SMOKING sign shall be used where there is a risk of road users causing an explosion of gas.</p> <p>This sign shall supplement, and not replace, the appropriate standard signs and devices required in accordance with this <i>Manual</i> for the particular work site.</p>
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e) Queued traffic ahead (T1-Q15)

	T1-Q15	<p>The QUEUED TRAFFIC AHEAD sign arrangement may be used as the primary advance sign where long queues are expected or experienced (see Clause 4.7.8 and Figure 4.7).</p>
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For an electronic version of this sign, refer to TC2232 and Queensland MUTCD Part 3 Supplement Section 4.7.8-1.

f) Other signs







Signs may be used to indicate the special loads being carried or the specialised nature of work being undertaken by service vehicles which could create a hazard to traffic whilst so engaged, provided that the signs are approved as Official Traffic Signs. Typical legends would include: OVERSIZE, EXPLOSIVES, VEHICLE CONSTANTLY STOPPING.

### 3.16.10 Changed traffic conditions signs

The following signs should be used to warn regular users of a route that changes to traffic conditions have been made. They shall be displayed for a limited period only, after the change has been made and generally only following completion of the roadworks in that area.

- a) NEW ROUNDABOUT (T1-21)
- b) CHANGED SIGNALS (T1-22)
- c) CHANGED TRAFFIC CONDITIONS (T1-23, T1-23-Q01)
- d) CHANGED INTERSECTION (T1-33)
- e) CHANGED LINE MARKING (T1-Q14)

The CHANGED TRAFFIC CONDITIONS sign shall be used only when none of the other signs apply.

			
T1-21		T1-22	T1-23
			
T1-23-Q01	T1-33		T1-Q14

### 3.17 Display of electronic signs

Electronic signs may be substituted for static signs. Electronic variable speed limit signs shall comply with the requirements of AS 5156. Variable message signs shall comply with the requirements of AS 4852.2. The display of electronic signs shall comply with the following principles:

- Symbols / signs shall be shown in the reversed colour scheme to the appropriate static sign.
- Legends shall also be shown in the reversed colour scheme to the appropriate static sign, with red text only used to display the PREPARE TO STOP or REDUCE SPEED message. Orange text is used to display the LINE MARKERS AHEAD message while yellow text is used to display the LINE MARKING AHEAD message.
- The annulus on a speed limit sign shall be red with the speed limit displayed in a white legend.
- Yellow shall be the only colour legend used on electronic signs to display general roadwork messages.

Examples of electronic signs are shown following.

		
TC1785	TC2206_1	TC2206_2
		
TC2206_3	TC2207	TC2210
		
TC2232_1	TC2232_2	TC2260_1
		
TC2260_2	TC2273 (L)	TC2273 (R)
		
TC2274 (L)	TC2274 (R)	TC2275
		
TC2276		

		
TC2272	TC2277	TC2278
		
TC2283	TC2284_1	TC2284_2
		
TC2288	TC2297	

## **4 Procedures for the installation and operation of traffic control devices**

### **4.1 General**

#### **4.1.1 Scope of section**

This Section sets out the procedures for installing and operating traffic control devices to ensure that they are used consistently to provide the highest practicable level of protection to roadworks personnel and road users.

#### **4.1.2 Maintaining a safe workplace**

In maintaining a safe workplace, the following shall be taken into account in the first instance:

a) *General obligation*

As indicated in Clause 1.5, there is an obligation on both organisations and contractors carrying out works on roads, together with supervisory personnel at all levels, to maintain a safe workplace. This entails the prevention of injury to workers due to hazards within the work site, the protection of workers from oncoming or passing traffic, and the protection of road users from hazards within the work site.

b) *Hierarchy of control*

In the planning and conduct of works it needs to be recognised that there is a hierarchy of control which can be used to assess whether the highest practicable level of protection or separation from traffic is being applied in a particular case. The hierarchy of control has the following elements in descending order of safety reliability:

(i) Hazard elimination by eliminating the interaction between all road workers (including Traffic Controllers) and traffic by—

- A. relocating traffic movement via a remote detour or side-track; or
- B. stopping all traffic movements for short periods when workers need to occupy the roadway through the use of traffic control signals. During periods when traffic is not stopped, the hazard is addressed either through separation of the work area (refer Item (ii) following) or management of the risk (refer Item (iii) following)

(ii) Separation of the work area from moving traffic by means of engineering controls or isolation, that is—

- A. placing a substantially impenetrable barrier at the boundary of the work area, that is, a road safety barrier system as specified in this *Manual*;
- B. maintaining an acceptable minimum lateral separation, risk assessed as requiring no physical barrier protection or traffic control other than signs advising of the presence of workers or plant; or
- C. maintaining an acceptable minimum lateral separation or stopping all traffic for short periods. Risk assessed as requiring no physical barrier protection. Traffic Controllers using STOP / SLOW control of traffic in either one or both directions.

(iii) Management of the risk using administrative and behavioural controls, that is—

- A. in cases where the work area is close to but not within the travelled path by controlling the behaviour of traffic (for example, traffic speed) according to the lateral separation. Works lasting longer than a single shift should be set up as a static work site; or
- B. in cases where the work area is within the traffic stream, by training in and strict observance of appropriate work methods and safety requirements.

#### 4.1.3 Works protection methods

A summary of the works protection methods specified in this Section is given in Table 4.1.

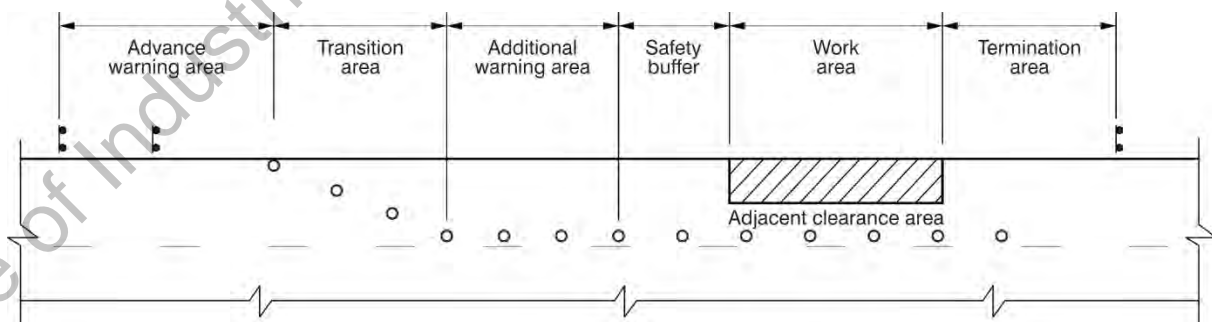
**Table 4.1 – Works protection methods**

Works method	Applicable tasks	Reference
Static work site	All works which are greater in scope and duration than can be handled by the short term, low impact provisions listed below or by mobile works.	Clause 4.2
Short-term, low-impact works – open road areas	Isolated work on pavements of up to 5 min duration, traffic volumes permitting. Shoulder grading and verge mowing.	Clause 4.3
Short term, low impact works – built-up areas	Work adjacent to or in a traffic lane of duration 5 min to 1 hour depending on traffic volume. Median and verge mowing, footpath works.	Clause 4.4
Works on unsealed roads	Maintenance grading. Short-term partial road closures.	Clause 4.5
Mobile works	Linemarking, pavement marker laying or removal, pavement testing where all signs and other protective devices are carried on vehicles.	Clause 4.6

#### 4.1.4 Components of a typical work site

The components of a typical work site are illustrated in Figure 4.1.

**Figure 4.1 – Components of a typical work site**



Requirements and recommendations for signs and devices in each of the areas are as follows:

a) *Advance warning area*

Advance warning signs are dealt with in Clause 4.7.



b) *Transition area*

The provision of devices to form tapers and associated signs and other devices is dealt with in Clause 4.8.

c) *Additional warning area*

The additional warning area is a designated area that allows for the installation of additional traffic control devices, keeping them out of the safety buffer.

d) *Safety buffer*

A safety buffer immediately in advance of the work area shall be provided wherever the posted speed limit is 60 km/h or more. A length of 20 to 30 metres is normally sufficient; however, if the works are hidden from approaching traffic, for example, by a crest or curve, the safety buffer should extend back to a point which can be adequately seen by approaching traffic. On multilane roads, the safety buffer may be increased up to a suggested maximum of 100 m. Primary positional signs or devices such as temporary hazard markers or trailer mounted illuminated flashing arrow signs should be located at the beginning of the safety buffer. Vehicular access to the work area can be permitted through the safety buffer. The safety buffer shall be kept clear of work vehicles, plant, stockpiled material or other activity including specialist vehicles.

e) *Work area*

The work area comprises the area where works are physically being carried out and includes the area required for work vehicles or other specialist vehicles.

f) *Termination area*

Signs indicating the end of the works where normal traffic conditions resume, and, where appropriate, the end of a roadworks speed zone should be placed at the end of the termination area.

Where possible, signs which end the temporary speed limit past the work area, are erected at the end of the termination area (D min from the end of the Work Area). Typically (on one-way or divided roads), the END ROADWORKS and full speed reinstatement sign is installed. However, on two-way roads, these signs are installed opposite the speed restriction sign for traffic travelling in the opposite direction to avoid creating an offset speed zone (see Clause 4.9.9).

#### **4.1.5 Dimension D**

Dimension D as shown on illustrations and diagrams in this Part of the *Manual* for the positioning of advance signs and related purposes shall be determined as shown in Table 4.2. The speed limit shown in Table 4.2 is the permanent posted speed of the road before the worksite is established.



**Table 4.2 – Value of dimension D**

Speed limit <sup>1</sup> (km/h)	Dimension D (m)
40 or less	5 to 10
50	10 to 15
60	15 to 45
70, 80	60 to 80
90, 100	80 to 100
110	100 to 120

NOTE:

1. The permanent Posted Speed Limit on the section of road subject to roadwork before commencement of roadworks.

#### **4.1.6 Tolerances on positioning**

Tolerances shall not apply where a distance, length or spacing is already given in the text or a figure as a maximum or a minimum. They may need to be exceeded where road features such as intersections or median openings intervene.

Where this *Manual* gives a specific distance for the longitudinal positioning of signs or devices with respect to other items or features, for the spacing of delineating devices or for the length of tapers or markings, the following tolerances may be applied:

- a) Positioning of signs, length of tapers or markings:
  - i. Minimum, 10% less than the distances or lengths given.
  - ii. Maximum, 25% more than the distances or lengths given.
- b) Spacing of delineating devices:
  - i. Maximum, 10% more than the spacing shown.
  - ii. No minimum.

#### **4.2 Static work sites**

This Clause sets out requirements and recommendations for protecting workers from oncoming or passing traffic, and road users from hazards within the site at a static work site. Short-term and low-impact works permitted under Clauses 4.3, 4.4 and where indicated in Clause 4.5.2, and mobile works permitted under Clause 4.6 are exempted from these requirements and recommendations provided that the requirements of those Clauses are observed.

The clearances to edge of work area in the following Items shall be measured from the traffic-side edge of the line of delineating devices or barriers as specified in Clause 4.13.4.

- a) *Work area 6 m or more clear of traffic*

If the entire work area including all vehicles and plant is located a minimum of 6 m from the nearest edge of a lane carrying traffic, no traffic delineation of the work area or temporary speed limit will be required but a Worker (symbolic) (T1-5) sign should be placed on the left side of the roadway in advance of the work area if workers or plant are visible to passing traffic.

b) *Work area 3 m to 6 m clear of traffic (Option 1)*

If the entire work area including all vehicles and plant is located a minimum of 3 m from the nearest edge of a lane carrying traffic, no traffic delineation of the work area will be required but the following shall be provided:

- (i) A Worker (symbolic) (T1-5) sign in advance of the work area when workers or small items of plant are present on the site.
- (ii) A vehicle-mounted warning device (see Clause 3.12.1).
- (iii) In speed zones higher than 80 km/h, a temporary speed limit of 80 km/h where the traffic volume exceeds 10 000 vpd.

This situation is illustrated as Option 1 on Figure 4.2.

The minimum length of an 80 km/h temporary speed zone should be 500 m.

A containment fence (see Clause 3.10.1) should be used to delineate the clearance line for workers if the work area clearance is close to the 3 m minimum.

c) *Work area closer than 3 m to traffic*

If the clearance between the work area and the nearest edge of a lane carrying traffic is less than 3 m, one or other of the following options shall be used:

- (i) Protection by road safety barrier system (Option 2)

If the work area is protected by a road safety barrier system (see Clause 3.10.3), there will be no requirement to reduce traffic speeds for the protection of workers. Advance signing and delineation, including Worker (symbolic) (T1-5) signs when workers are on site, are required, and temporary speed zoning depending on the clearance between the edge of the traffic lane and the road safety barrier system and in accordance with Clause 4.13.4, may be required for the safety of traffic negotiating the site outside the barrier. Steps should be taken to ensure that workers and plant will remain within the protection of the barrier. A containment fence behind the barrier as recommended in Clause 3.10.3 and temporary crash attenuators as recommended in Clause 3.10.4 should also be used. This situation illustrated as Option 2 on Figure 4.2.

(ii) Clearance to traffic between 1.2 m and 3 m (Option 3)

If there is no road safety barrier system between the edge of the work area and the nearest edge of a lane carrying traffic, but the clearance between the two is from 1.2 m to less than 3 m, the following are required when workers or small items of plant are on site, in addition to the requirements for other work site management devices specified in this Part of the *Manual*:

- A. A Workers (symbolic) (T1-5) sign in advance of the work area.
- B. Delineation of the edge of the traffic lane by cones, bollards or similar means, see Clause 4.13.4.
- C. Separate delineation of the edge of the work area by means of a containment fence (see Clause 3.10.1) if there is a risk of workers or small items of plant infringing the clearance area.
- D. The speed of passing traffic shall be reduced to 60 km/h through—
  - 1) the use of appropriate traffic control devices such as signs, flashing lights, Traffic Controllers and tapers
  - 2) imposing a temporary road work speed zone; or
  - 3) a combination of Items c)(ii)D1) and c)(ii)D2).

This action is not required if the posted speed during roadworks past the site is already 60 km/h or less.

This situation is illustrated as Option 3 on Figure 4.2.

A temporary 60 km/h speed zone shall be at least 150 m long.

(iii) Clearance to traffic less than 1.2 m (Option 4)

If the clearance requirement of 1.2 m in Item c)(ii) previously cannot be achieved, all of the requirements of Item c)(ii) shall apply except as follows:

- A. For workers on foot and small items of plant, the posted speed during roadworks shall be reduced to 40 km/h using the methods specified in Item c)(ii) D.
- B. For large items of plant only, the posted speed during roadworks shall only be reduced to 60 km/h as per options in item c)(ii) D.
- C. Use of a containment fence may be omitted if there is insufficient space to place it.

This situation is illustrated as Option 4 on Figure 4.2.

A temporary 40 km/h speed zone shall be no longer than 1 km and workers shall be visible. See also Item (e) where further speed reduction may be warranted at a hazardous site.

d) *Protection of Traffic Controller*

Traffic Controllers are not subject to the requirements of Item (c) previously, but shall be allowed to operate only in an area where the posted speed during roadworks has been reduced to 60 km/h or less as set out in Item c)(ii) D.

e) *Speed control at hazardous sites*

Where any one of the following conditions apply at a static site, the posted speed during roadworks shall be reduced to a value less than 40 km/h using the methods specified in Item c)(ii) D together with Traffic Controllers or pilot vehicles (see Clause 4.12) as needed:

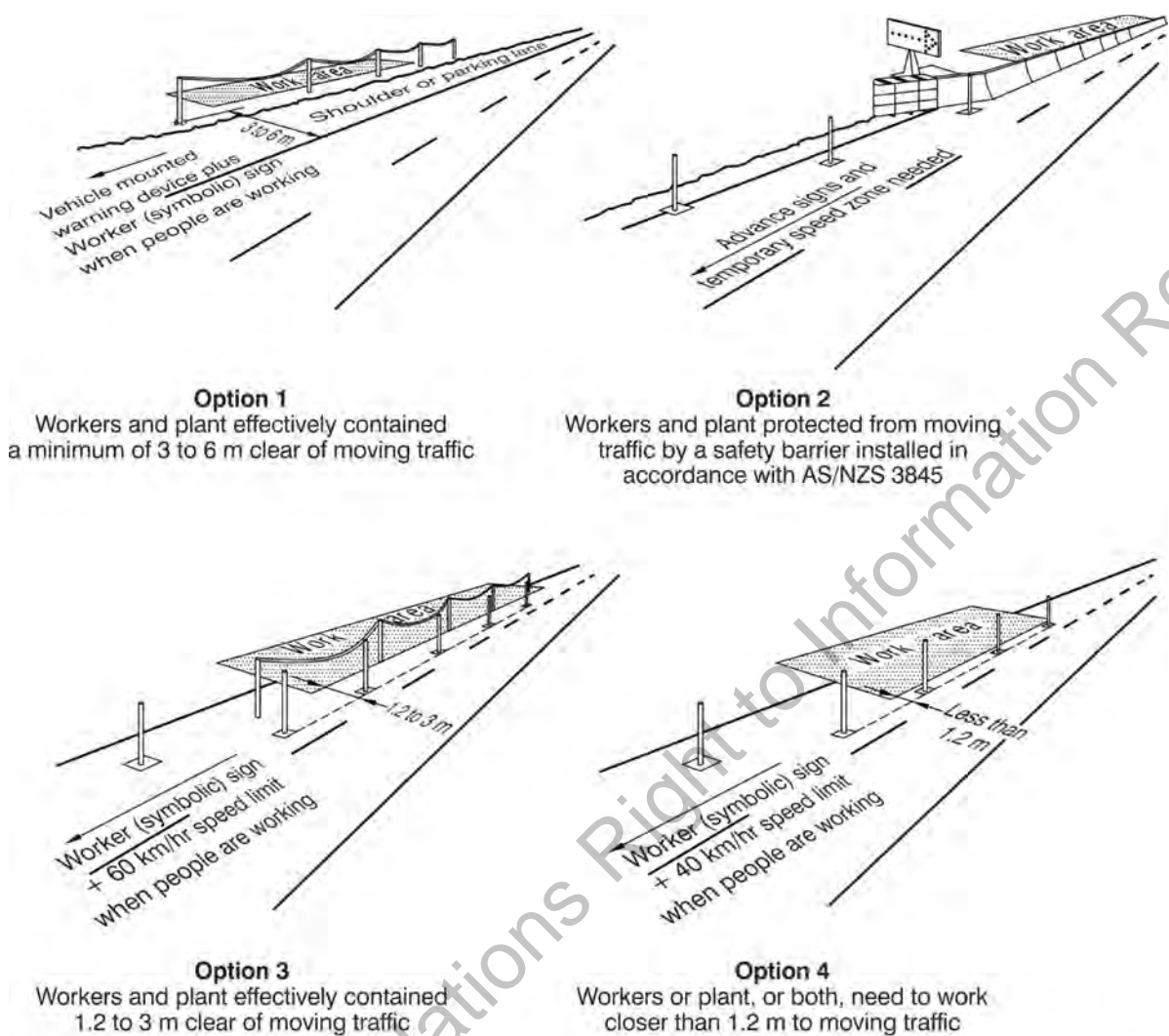
- (i) An unusually high level of hazard for workers on foot within 1.2 m of moving traffic or other road users as a consequence of the work area.
- (ii) It is impracticable to separate pedestrians or cyclists from vehicular traffic in the work area.

If traffic speeds are to be reduced by means of a temporary speed zone less than 40 km/h, the length of the zone shall not exceed 200 m. It should not be less than 100 m.

Speed limit less than 40 km/h should not be installed where:

- i. Works are being undertaken using large item of plant exclusively.
- ii. Workers and road work delineation are separated from moving traffic by at least 1.2 m.
- iii. Grading or mowing on a median or verge does not encroach onto a moving traffic lane.
- iv. Works are undertaken on a residential street where the speed limit is 40 km/h or less.

**Figure 4.2 – Static work sites**



NOTE: This Figure does not show all of the advance signs or approach delineation which may be required.

### 4.3 Short-term low impact works – Open road areas

#### 4.3.1 General

The treatments in Clause 4.3 are permitted in recognition of the need to allow certain short-term low-impact works to be carried out without the use of a static work site with protection for workers and road users or mobile works convoys. It is vital that a risk assessment (see Clause 2.2.3) be made of the proposed adoption of these treatments in particular environments, taking particular account of factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users. If the risk cannot be tolerated, a static work site with protection for workers and road users (Clause 4.2) or mobile works convoy (Clause 4.6) will be required.

Where traffic volumes have been specified as vehicles per day in this section, the traffic volume may be converted to vehicles per hour by dividing the vehicles per day by a factor of 10.

#### **4.3.2 Work between gaps in traffic**

Work that is of such short duration that it can be carried out within gaps in traffic may be done without advance signs or delineation provided that—

- a) a lookout person who can see approaching traffic in time to warn workers to vacate the roadway before its arrival, is posted; and
- b) work vehicles and equipment are parked clear of moving traffic lanes. A vehicle-mounted warning device shall be displayed on the work vehicle.

The lookout person may be dispensed with if the work will not take longer than 10 seconds and approaching traffic can be seen for a distance away equal to 20 seconds of travel time.

#### **4.3.3 Short-term work in traffic**

Workers with a vehicle or item of plant equipped with a vehicle-mounted warning device may work on the roadway or within 1.2 m of moving traffic without the use of advance signs, provided the roadway at any one work site is not occupied for more than five minutes and the conditions following are observed.

Sight distance to the vehicle-mounted warning device for approaching drivers shall be—

- a) greater than 150 m in a 60 km/h or lower speed zone; or
- b) greater than 250 m elsewhere.

The vehicle-mounted warning device shall not be obscured, for example, by overhanging vegetation or a raised truck body.

The work shall not reduce—

- i. the overall width to less than that required for safe passage for two-way traffic (or one-way traffic if the volume is less than 50 vpd); or
- ii. the running lane width adjacent to a barrier line to less than that needed to allow vehicles to proceed without crossing the line.

A lookout person shall be posted to warn workers on foot on the roadway of the approach of any vehicles whose speed or size might constitute a safety threat. If two or more locations within a space of 2 km or less are to be worked as previously stated, the site shall be treated as a frequently changing work area (see Clause 4.3.4). The lookout person is not required if the works are more than 1.2 m clear of moving traffic.

The lookout person may be dispensed with if the work will not take longer than 10 seconds and approaching traffic can be seen for a distance away equal to 20 seconds of travel time.

#### 4.3.4 Frequently-changing work area

For activities such as minor maintenance on the pavement or shoulder, including road furniture maintenance and longitudinal survey work at successive locations less than 2 km apart, the frequently-changing work area treatment may be applied. If it is applied, the treatment shall be subject to the following requirements.

- a) In all cases, the following requirements of Clause 4.3.3 shall be observed:
  - i. Work vehicle positioning and length of occupation of any one site (maximum of five minutes).
  - ii. Display of the vehicle-mounted warning device.
  - iii. Sight distance to the work vehicle for approaching traffic.
  - iv. Running lane width reduction.
  - v. The need for a lookout person to warn workers on foot on the roadway of approaching traffic.
- b) Advance signs up to 2 km in advance of each work position or item of moving plant shall be displayed. The distance between advance signs for opposing directions of travel shall not exceed 2 km at any time and the location of such signs shall be progressively changed to ensure the maximum separation is not exceeded as the work progresses along the road.
- c) At each advance sign location, the following signs shall be used:
  - i. Workers (symbolic) (T1-5) where there are workers on foot.
  - ii. ROAD PLANT AHEAD (T1-3-1) where moving road plant only will be encountered; the sign NEXT 2 km (T1-28) shall be placed with whichever of these signs is used.
- d) If any of the requirements of Item 4.3.4(a) cannot be met at a particular location, for example, sight distance is substandard, that site shall be set up as a fully-protected short-term work site with advance signs at the standard distances.

#### 4.3.5 Shoulder grading on sealed roads in open road areas

Shoulder grading on sealed roads with traffic volumes less than 1 500 vpd may be undertaken in bounds of up to 10 km in length under the following conditions:

- a) If sight distance to the vehicle-mounted warning device on the grader is at least 250 m throughout the section of road being worked on, advance signs ROAD WORK NEXT X km (T1-24) shall be placed at each end of the section. Loose stones (symbolic) (T3-9) or similar signs may be needed at the beginning and along the section.
- b) If the sight distance falls to less than 250 m at some locations, GRADER AHEAD (T1-4) or ROAD PLANT AHEAD (T1-3-1) together with NEXT 2 km (T1-28) shall be used on each approach to the section covering the location of diminished sight distance. A 60 km/h temporary speed zone (see Clause 4.9) will be required if the posted speed limit is 80 km/h or more.
- c) Subsections of 2 km or less in length created as in Item 4.3.5(b) shall be completed and signs, including, if used, speed zone signs, shall be relocated before proceeding with the next



section. If there is difficulty turning a grader around at the end of a 2 km section, it may be extended to the next available turning point but not to more than 6 km in total length.

Where traffic volumes are greater than 1 500 vpd, the works shall be undertaken either as a mobile works (see Clause 4.6) or as a static work site (see Clause 4.2).

#### **4.3.6 Mobile inspections**

Mobile road inspections are carried out according to one of the following requirements or recommendations:

- a) If the inspection vehicle maintains speed that—
  - i. is less than 20 km/h below the speed limit; or
  - ii. on a road with less than 200 vpd, is at least 25 km/h,it may travel in the traffic stream, but in the case of Item 4.3.6a)ii, shall display at least one yellow beacon lamp.
- b) If the inspection vehicle can operate by travelling along a shoulder or verge clear of moving traffic, using gaps in traffic to pass any obstructions in the shoulder or verge, it may operate as a single vehicle but shall display at least one yellow beacon lamp.
- c) If the inspection vehicle is required to block or partially block a traffic lane continuously at speeds lower than in Item (4.3.6a), it shall operate within a mobile works convoy as specified in Clause 4.6.

#### **4.3.7 Work off the travelled path**

For activities involving a vehicle or item of plant running off the road such as mowing and sign / road edge guide post maintenance where the machine is running on the shoulder or work vehicle is parked clear of the road so that traffic does not have to deviate from the normal travelled path, the work may proceed without the use of advance signs under the following conditions.

Sight distance to the vehicle-mounted warning device for approaching drivers shall be—

- a) greater than 150 m in a 60 km/h or lower speed zone; or
- b) greater than 250 m elsewhere; and
- c) the vehicle-mounted device is displayed and not obscured either by overhanging vegetation or a raised truck body.

The following activities may proceed with the work vehicle parked clear of the travelled path:

- i. Mowing and litter activities.
- ii. Graffiti removal.
- iii. Minor tree clearing.
- iv. Minor cleaning of culverts, pipes and pits.
- v. Herbicide spraying.
- vi. Road edge guide post repairs.

#### **4.3.8 Work protected by specialist vehicles**

This work involves the use of a vehicle fitted with a truck-mounted attenuator. The vehicle shall be fitted with an illuminated flashing arrow sign. The activities may include:

- a) Placement and recovery of temporary signing and barriers.
- b) Mobile lane closures.
- c) Progressively moving operations on multilane roadways (see Queensland MUTCD Part 3 Supplement).
- d) Slow-moving or stationary vehicles operating on the roadway for example, maintenance of traffic signals, street lighting and emergency phones.

A temporary speed zone may be created and, if applicable, terminated by the use of a vehicle-mounted speed restriction sign.

If determined acceptable by a risk assessment, the specialist vehicle may be replaced by a shadow vehicle fitted with an illuminated flashing arrow.

#### **4.3.9 Survey work**

The occupation of the roadway for survey work may be in accordance with one of the previous treatments. The SURVEYORS AHEAD (T2-Q06) sign shall be used in lieu of Workers (symbolic) (T1-5) sign. A risk assessment will determine the treatment adopted in a particular environment.

#### **4.3.10 Traffic investigations**

For activities associated with traffic engineering investigations or inspecting, viewing or measuring a section of roadway or road feature (for example, for maintenance or planning purposes), no controls are needed where—

- a) the activity is clear of the roadway. The exception to this would be where the activity is carried out while crossing the road, for example, measuring the lane width;
- b) the vehicle used for the investigation is parked well clear of the traffic lanes;
- c) personnel use existing footpaths or verges; and
- d) inspecting personnel may cross the road safely within gaps in traffic. In this case, sight distance to personnel for approaching drivers is—
  - i. greater than 150 m in a 60 km/h or lower speed zone; or
  - ii. greater than 250 m elsewhere.

Personnel carrying out investigations should wear high-visibility clothing at all times when they are not in their vehicle.

### **4.4 Short-term low-impact works – built-up areas**

#### **4.4.1 General**

The treatments in Clause 4.4 are permitted in recognition of the need to allow certain short-term low-impact works to be carried out without the use of a static work site with protection for workers and road users or mobile works convoys which could otherwise lead to significant work inefficiencies. Since they could be seen as a partial relaxation of safety standards, it is vital that a risk

assessment (see Clause 2.2.3) be made of the proposed adoption of these treatments in particular environments, taking particular account of factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users. If the risk cannot be tolerated, a static work site with protection for workers and road users (Clause 4.2) or mobile works (Clause 4.6) convoy will be required.

Regardless of any risk assessment, where the speed limit, traffic volume, traffic separation or occupation time constraints specified following cannot be met, a static or mobile work site shall be used.

The speed limits specified are existing permanent speed limits. Temporary speed limits shall not be used unless a static or mobile work site as specified in this Part of the *Manual* is to be set up.

Where traffic volumes have been specified as vehicles per day in this section, the traffic volume may be converted to vehicles per hour by dividing the vehicles per day by a factor of 10.

#### **4.4.2 Frequently-changing work area – Work not within traffic lane**

The work shall be carried out with a vehicle equipped with a vehicle-mounted warning device parked on a shoulder or parking lane or elsewhere where parking is permitted adjacent to moving traffic. The vehicle shall shadow the work area at all times, either to the front or back of it. The limitations that shall apply are—

- a) speed limit – 70 km/h or less;
- b) minimum sight distance to oncoming traffic – 50 m; and
- c) maximum work period at any one location—
  - i. 20 min at any traffic volume;
  - ii. 40 min at traffic volumes 150 vph or less; or
  - iii. 1 hour at traffic volumes 40 vph or less.

The work area may move frequently between successive locations.

The following are examples of short-term works appropriate for this treatment when they do not require encroachment onto a moving traffic lane:

- A. Pit cleaning or repair.
- B. Litter collection.
- C. Tree pruning or planting.
- D. Road signs or street furniture maintenance.
- E. Street light maintenance.
- F. Mowing and litter activities.
- G. Graffiti removal.
- H. Minor tree clearing.
- I. Minor cleaning of culverts, pipes and pits.
- J. Herbicide spraying.
- K. Road edge guide post repairs.

NOTE: A static work site will be required if these conditions cannot be met, see Clause 4.4.1.

#### **4.4.3 Frequently-changing work area – Work within a traffic lane**

The work shall be carried out using a work vehicle or large plant item, and a shadow vehicle, both equipped with a vehicle-mounted warning device.

NOTE: A large plant item should generally be considered to be the equivalent of a medium-size farm or industrial tractor or larger.

If work is being carried out by a large plant item and there are no workers on foot or small plant items present, the shadow vehicle shall follow the plant item 15 m to 30 m behind it, either in the lane or shoulder to the left of the work lane if free, or otherwise, within the work lane.

If the work is being carried out by workers on foot or small items of plant, even though large plant items may also be present, the shadow vehicle shall travel in the same lane as the work area, 20 m to 40 m behind the work vehicle.

The following limitations apply:

- a) Speed limit – 60 km/h or less.
- b) Maximum work period at any one location, large item of plant, no workers on foot–
  - i. 20 min at any traffic volume; and
  - ii. 1 hour at traffic volumes up to 40 vph.
- c) Maximum work period at any one location, workers on foot – 1 hour at traffic volumes up to 40 vph.

The shadow vehicle may be dispensed with at volumes less than 60 vph provided sight distance to oncoming traffic is at least 50 m or 2D, whichever is the greater.

The work may be moved frequently between successive locations.

Examples of work appropriate for this treatment are:

- A. Pavement marker laying (other than on dividing lines).
- B. Pavement testing.
- C. Any of the items listed in Clause 4.4.2 where encroachment onto a traffic lane is likely to occur.

NOTE: A static or mobile work site will be required if these conditions cannot be met, see Clause 4.4.1.

#### **4.4.4 Road lighting works**

Road lighting works may be undertaken in built-up area by workers on foot with a vehicle equipped with a vehicle-mounted warning device and an illuminated directional arrow sign without the use of advance warning signs under the following conditions:

- a) Where the vehicle is positioned where parking would normally be permitted and does not obstruct the traffic flow:
  - (i) The maximum work period at any one location shall be 1 hour.
  - (ii) A minimum clearance of 5.5 m must be maintained above the road surface to any part of the maintenance vehicle that encroaches upon the open traffic lane.
- b) Where the vehicle is positioned other than outlined in Item 4.4.4a)–
  - (i) the maximum work period at any one location shall be–
    - A. 5 minutes if on the roadway or within 1.2 m of moving traffic; or
    - B. 20 minutes if within 3 m of moving traffic but more than 1.2 m from moving traffic.
  - (ii) the following sight distance to the vehicle-mounted warning device for approaching drivers shall be–
    - A. in a residential street 75 m or to the end of the street;
    - B. greater than 150 m in a 60 km/h or lower speed zone (non-residential); or
    - C. greater than 250 m elsewhere.
  - (iii) the vehicle-mounted warning device shall not be obscured by either overhanging vegetation or a raised truck body; and
  - (iv) the work shall not reduce–
    - A. The overall width to less than required for safe passage for two-way traffic (or one-way traffic in the volume is less than 50 vehicles per day); or
    - B. The running lane width adjacent to a barrier line to less than that needed to allow vehicles to proceed without crossing the line.
- c) A lookout person shall be posted to warn workers on foot of the approach of any vehicle whose size or speed may constitute a safety threat. The lookout person is not required if the works are more than 1.2 m clear of moving traffic.

Where the requirements of this clause or another suitable clause of Section 4.4 cannot be met, a static or mobile work site shall be used.

Examples of work appropriate for this treatment includes but is not limited to:

- a) Maintenance.
- b) Installation.
- c) Maintenance and installation of power poles.

#### **4.4.5 Works on medians, verges and footpaths**

The following works may be carried out without any support vehicle on the roadway, subject to the work duration being limited to a single shift and to the conditions listed in Items 4.4.5(i) and (ii).

Items 4.4.5(i) and (ii) are not applicable if the work area is protected by a shadow (support) vehicle and a risk assessment, as required, has been undertaken:

- a) Median and verge mowing, and related activities such as tilling, seeding and weed spraying.
- b) Works on a footpath.
- c) Garden maintenance.
- d) Mowing and litter activities.
- e) Graffiti removal.
- f) Minor tree clearing.
- g) Minor cleaning of culverts, pipes and pits.
- h) Herbicide spraying.
- i) Road edge guide post repairs.

The following conditions shall be met:

- (i) *Large plant items only* (see Note to Clause 4.4.3)

Where there are no workers on foot, the relationship between speed limit and clearance to edge of traffic lane shall be as follows:

- A. Speed limit 90 km/h or more – clearance shall be greater than 1.2 m.
- B. Speed limit 80 km/h or less – clearance may be less than 1.2 m, but plant items shall not encroach onto the traffic lane.

- (ii) *Workers on foot or small items of plant*

Where there are workers on foot or small items of plant, or both, the work method shall be restricted to one of the following:

- A. The speed limit is 60 km/h or less and the work area does not encroach onto a moving traffic lane.
- B. The speed limit is 80 km/h or less and the clearance to edge of traffic lane is at least 1.2 m.
- C. The entire work area is at least 3 m clear of a moving traffic lane.

The Worker (symbolic) (T1-5) sign or ROAD PLANT AHEAD (T1-3) shall be displayed respectively, when either workers on foot or plant items alone are present and working closer than 3 m to a moving traffic lane.

NOTE: A static or mobile work site will be required if these conditions cannot be met (see Clause 4.4.1).

#### **4.4.6 Street sweeping and garbage collection**

Street sweeping and garbage collection operations which do not involve workers on foot working closer than 1.2 m to the edge of a moving traffic lane may be carried out under the following conditions:

- a) Vehicle to be equipped with a vehicle mounted warning device.
- b) Speed limit 70 km/h or less generally, or 80 km/h or less if the work vehicle can operate at least 1.2 m clear of the edge of nearest running lane.
- c) The minimum sight distance for following traffic is—
  - i. greater than 150 m in a 60 km/h or lower speed zone; or
  - ii. greater than 250 m elsewhere.

#### **4.4.7 Work between gaps in traffic**

Work which is of such short duration that it can be carried out within gaps in traffic may be done without advance signs or delineation, provided that—

- a) a lookout person who can see approaching traffic in time to warn workers to vacate the roadway before its arrival is posted; and
- b) work vehicles and equipment are parked clear of moving traffic lanes.

A vehicle-mounted warning device shall be displayed on the work vehicle.

The lookout person may be dispensed with if the work will not take longer than 10 seconds and approaching traffic can be seen for a distance away equal to 20 seconds of travel time.

NOTE: This activity is not recommended where traffic lane volumes exceed 100 vehicles per hour unless significant gaps are being created by upstream traffic control such as intersection traffic signals.

#### **4.4.8 Work protected by specialist vehicles**

This work involves the use of a vehicle fitted with a truck-mounted attenuator. The vehicle shall be fitted with an illuminated flashing arrow sign. The activities may include:

- a) Placement and recovery of temporary signing and barriers.
- b) Mobile lane closures.
- c) Progressively moving operations on multilane roadways (see Queensland MUTCD Part 3 Supplement).
- d) Slow-moving or stationary vehicles operating on the roadway for example, maintenance of traffic signals, street lighting and emergency phones.

A temporary speed zone may be created and, if applicable, terminated by the use of a vehicle-mounted speed restriction sign.



If determined acceptable by a risk assessment, the specialist vehicle may be replaced by a shadow vehicle fitted with an illuminated flashing arrow.

#### **4.4.9 Survey work**

The occupation of the roadway for survey work may be in accordance with one of the previous treatments. The SURVEYORS AHEAD (T2-Q06) sign shall be used in lieu of Workers (symbolic) (T1-5) sign. A risk assessment will determine the treatment adopted in a particular environment.

#### **4.4.10 Traffic investigations**

For activities associated with traffic engineering investigations or inspecting, viewing or measuring a section of roadway or road feature (for example, for maintenance or planning purposes), no controls are needed where—

- a) the activity is clear of the roadway. The exception to this would be where the activity is carried out while crossing the road, for example, measuring the lane width;
- b) the vehicle used for the investigation is parked well clear of the traffic lanes;
- c) personnel use existing footpaths or verges; and
- d) inspecting personnel may cross the road safely within gaps in traffic. In this case, sight distance to personnel for approaching drivers is—
  - i. greater than 150 m in a 60 km/h or lower speed zone; or
  - ii. greater than 250 m elsewhere.

Personnel carrying out investigations should wear high-visibility clothing at all times when they are not in their vehicles.

### **4.5 Works on unsealed roads**

#### **4.5.1 General**

The following treatments are permitted on unsealed roads in recognition of the generally lower volumes and traffic speeds encountered on those roads than on sealed roads and the need to be economical in the expenditure of resources on these low-usage facilities. Since they could be seen as a partial relaxation of safety standards, it is vital that a risk assessment (see Clause 2.2.3) be made of the proposed adoption of these treatments in particular environments, taking particular account of factors such as traffic volume and speed, road geometry, width and surface condition, and the general behaviour of road users.

The treatments shall not be applied to any road which would normally be sealed but has been left unsealed either temporarily or permanently due to, for example, economic or climatic factors or is in the process of construction or reconstruction as a sealed road.

Where traffic volumes have been specified as vehicles per day in this section, the traffic volume may be converted to vehicles per hour by dividing the vehicles per day by a factor of 10.

#### **4.5.2 Maintenance grading and resheeting**

Maintenance grading and resheeting shall be undertaken as set out following. They may be carried out either with or without leaving a windrow as indicated following. Work done without leaving a

windrow normally involves use of either a windrow eliminator or a second grader in tandem. Wherever practicable, grading on the right side of the road against oncoming traffic should be avoided.

a) *Maintenance grading*

Maintenance grading shall be undertaken as follows:

- (i) If the grader is always to operate leaving room for opposing traffic to pass it without driving off the roadway and the sight distance to the grader's vehicle-mounted warning device is at least 250 m throughout the entire section of road being worked on, no advance warning signs for either direction of travel are required.
- (ii) If the operating conditions in Item 4.5.2a)(i) cannot be met, the work shall be carried out as follows:
  - A. The work shall be undertaken in bounds of not more than 10 km in length. The sign ROADWORK NEXT X km (T1-24) shall be placed at each end of the section being worked on.
  - B. At locations where the sight distance falls to less than 250 m, the sign GRADER AHEAD (T1-4) or ROAD PLANT AHEAD (T1-3-1), together with NEXT 2 km (T1-28), shall be used at each end of each subsection with reduced sight distance of up to 2 km in length. The signs shall be placed at least 100 m in advance of the start of any windrow.
  - C. Subsections of 2 km or less in length created as in Item 4.5.2a)(ii) B shall be completed and signs including (if used) speed zone and end of zone signs, shall be relocated before proceeding with the next section, which may be a further sight distance-deficient subsection or the remaining whole section. If there is difficulty turning a grader around at the end of a 2 km section, it may be extended to the next available turning point but not to more than 6 km in total length.
- (iii) Road condition signs shall be placed at various locations if the freshly-graded surface has loose material that may be a hazard. One or more of the following may be required, depending on the nature and degree of hazard:
  - A. Slippery (symbolic) (T3-3).
  - B. Loose Stones (symbolic) (T3-9).
  - C. LOOSE SURFACE (T3-14).

NOTE: Where graded or resheeting material cannot be traversed by traffic, in order to allow traffic to overtake the grader, the grader driver should be instructed to raise the blade from time to time and move forward a short distance to allow that traffic to pass.

b) *Maintenance resheeting*

Maintenance resheeting shall be undertaken in accordance with Items 4.5.2a)(ii) to 4.5.2a)(a)(iii).

#### **4.5.3 Short-term partial road closures**

The following apply to the treatment of short-term partial road closures:

a) *Omission of advance signs*

Advance signs may be omitted where the vehicle-mounted warning device on the work vehicle can be seen by approaching traffic for at least 250 m; and where Traffic Controllers are not required.

Traffic Controllers may not be required—

- (i) in accordance with Clauses 4.13.1(i) or (ii);
- (ii) where traffic volumes are 20 vpd or less; or
- (iii) where there is room for two-way traffic past the work area.

b) *Using a single Traffic Controller*

Traffic control may be performed by a single Traffic Controller when all the following conditions are met—

- (i) the Traffic Controller has a good view of traffic approaching from both directions when stationed at one end of the job;
- (ii) there is a single lane section not exceeding 50 m in length; and
- (iii) traffic volumes are not more than 20 vph.

c) *Other cases*

Situations not meeting the conditions set out in Items 4.5.3a) or b) shall be treated in the same way as sealed roads.

#### **4.6 Mobile works**

##### **4.6.1 General**

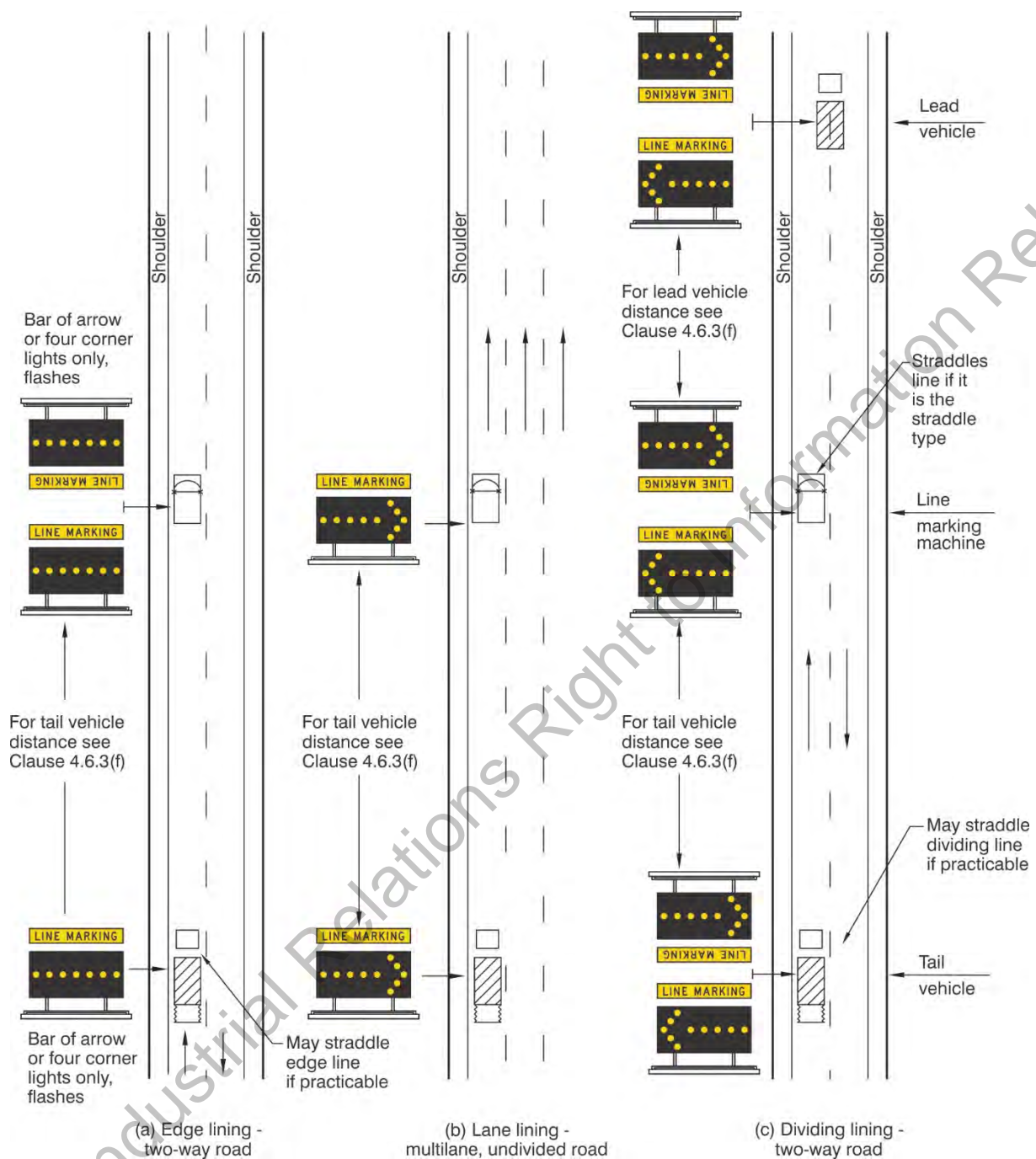
Mobile works are works which entail vehicles moving along the roadway continually at a speed significantly lower than other traffic and obstructing or partially obstructing traffic lanes. All signs and warning devices shall be displayed on moving vehicles in the convoy.

Mobile works include the following:

- a) Linemarking using ride-on-plant, self-propelled, towed or pushed; examples are shown in Figure 4.3.
- b) Pedestrian-type linemarking and pavement marker laying or removal where a shadow vehicle (Clause 4.6.2(c)) is used; examples are shown in Figure 4.4.
- c) Operation of pavement test vehicles.

Activities such as shoulder grading, pavement and edge patching, and other works involving workers on foot may be suitable for a mobile works convoy but, when undertaken without a shadow vehicle, shall be regarded as frequently-changing work areas and dealt with in accordance with Clause 4.3.4.

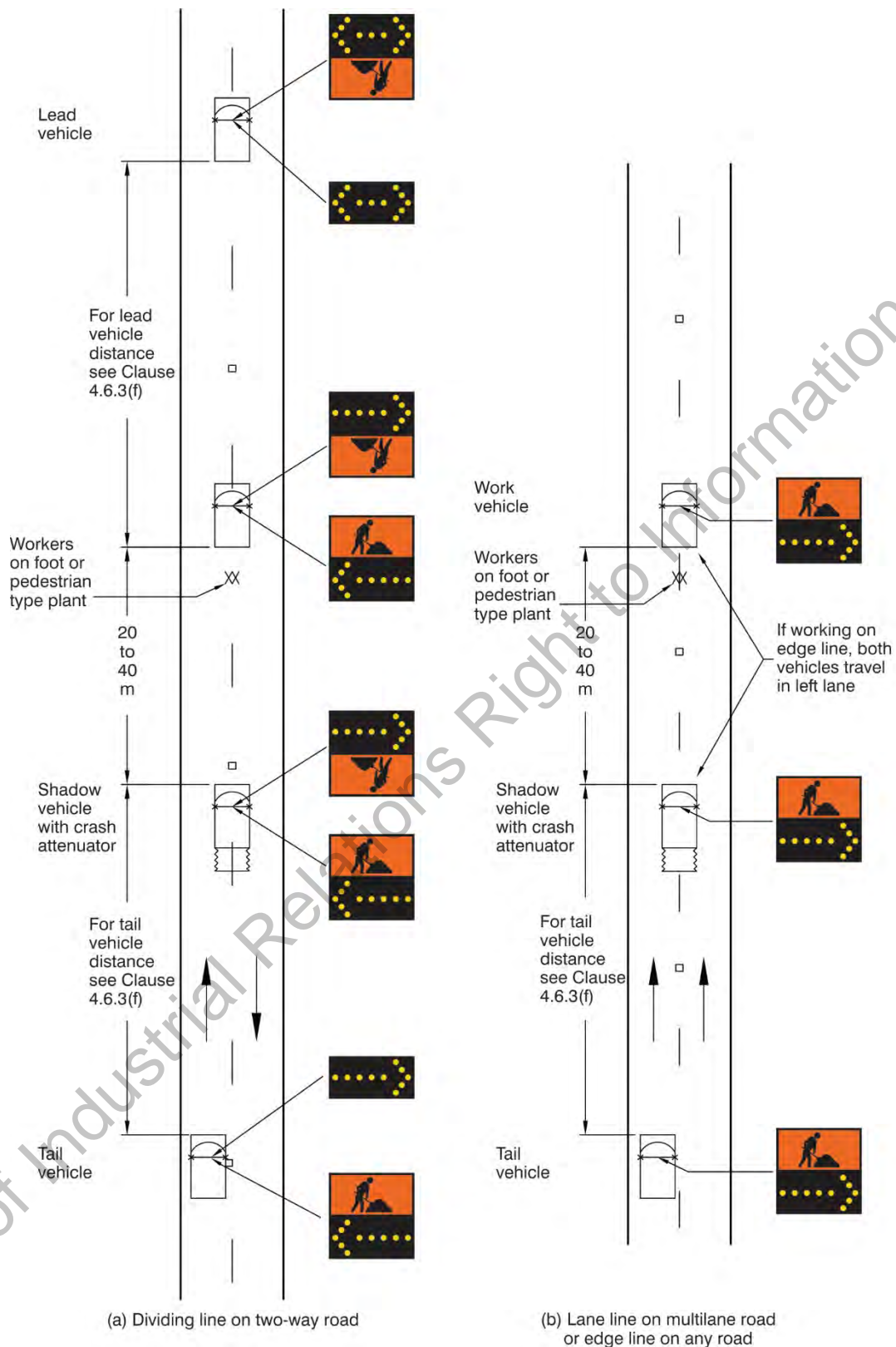
**Figure 4.3 – Examples of mobile works protection – Ride-on line marking**



**NOTES:**

1. See Clause 3.12.2 regarding optional use of flashing lights on the vehicle-mounted warning devices.
2. A second tail vehicle should be provided (see Clause 4.6.3(i)).
3. See Figure 4.5 for mobile temporary speed zone signs.

**Figure 4.4 – Examples of mobile works protection – Pavement marker laying**



**NOTES:**

1. A mobile temporary speed zone may be required for these works (see Clause 4.6.5).
2. See Clause 3.12.2 regarding option use of flashing lights on the vehicle-mounted warning devices.
3. See Figure 4.5 for mobile temporary speed zone signs.

#### **4.6.2 Work convoy arrangements**

A mobile works convoy shall be made up of the following vehicles as required for the relevant road situation:

a) *Lead vehicle*

A lead vehicle is required on two-way roadways when working on the dividing line to give advance warning of the works to traffic approaching from the opposite direction and also to enable the lead vehicle driver to alert the following workers to any impending hazard.

b) *Work vehicle*

This is the vehicle or plant item undertaking the work (for example, a linemarking machine) or supporting workers on foot immediately behind it. Some operations (for example, pavement marker removal on a divided road) may not need a work vehicle.

c) *Shadow vehicle*

A shadow vehicle is required to provide close-up protection to the rear of workers on foot (for example, laying pavement markers, operating a pedestrian-type linemarking machine). The shadow vehicle shall travel a clear distance of 20 m to 40 m behind the work vehicle and shall be equipped with a truck-mounted crash attenuator whenever it is protecting workers on multilane roads.

d) *Tail vehicle*

A tail vehicle is required to provide advance warning of the works to following traffic, to divert traffic around the works and to enable the driver to alert workers ahead of any impending hazard.

#### **4.6.3 Operating principles**

The following are requirements and recommendations for the operation of a mobile works convoy:

a) *Carrying signs and devices*

All signs and warning or delineation devices shall be carried on vehicles. This includes mobile temporary speed zone signs, see Clause 4.6.5.

b) *Advance warning vehicle*

Advance warning of the works vehicle shall be provided by a tail vehicle and if required, a lead vehicle (see Clause 4.6.2(a)).

c) *Plant and vehicle positioning*

Recommendations for the lateral positioning of plant items and vehicles on a mobile works convoy are given in Tables 4.3, 4.4 and 4.5 for work on two-way roads, multilane undivided roads and divided roads respectively.



**Table 4.3 – Mobile works on a two-way road – Plant and vehicle positioning**

Lateral work position	Work type	Lateral plant / vehicle position			
		Work vehicle	Shadow vehicle	Tail vehicle	Lead vehicle
Dividing line	Ride-on linemarking	Works in the left lane (see Note 1) or straddles the line if line marker is the straddle type	Not used	If following work vehicle, may straddle line if practicable, otherwise moves in left lane (see Note 1). If stopped, stops on shoulder. If closing up at traffic speed, moves in lane.	Straddles line when sight distance allows this to be done safely, otherwise travels in left lane
	Workers on foot or pedestrian-type line marking (see Note 2)	Straddles line	Straddles line	As above	As above
Edge line	Ride-on linemarking (see Note 2)	Works in left lane (see Note 3)	Not used	Travels in left lane or straddles line	Not required
	Workers on foot or pedestrian-type linemarking (see Note 2)	Works in left lane (see Note 3)	Travels in left lane	Travels in left lane or straddles line	Not required
Work within a lane (see Note 3)	Plant or vehicle only or vehicle plus workers on foot (see Note 2)	Works in lane (see Note 3)	If workers on foot present, works in lane	Travels in lane	Travels in lane

**NOTES:**

1. Requirements where traffic cannot pass safely to the left of the work vehicle are specified in Clause 4.6.3(e)(ii).
2. A mobile temporary speed limit, see Clause 4.6.5, is required when there are workers on foot (including pedestrian operated plant) within 1.2 m lateral clearance from moving traffic.
3. Requirements where following traffic may be partially deflected into the path of oncoming traffic, are specified in Clause 4.6.3(e)(iii).



**Table 4.4 – Mobile works on a multilane undivided road – Plant and vehicle positioning**

Lateral work position	Work type	Lateral plant / vehicle position			
		Work vehicle	Shadow vehicle	Tail vehicle	Lead vehicle
Dividing line	Ride-on linemarking	Works in lane to left of line	Not used	Travels in lane to left of line	Straddles line when sight distance allows this to be done safely, otherwise travels in lane to left of line
	Workers on foot or pedestrian-type line marking (see Note 1)	Straddles line	Straddles line	Travels in lane to left of line	As above
Lane line – 4-lane road; or right-hand lane line – 6-lane road	Ride-on linemarking (see Note 1)	Works in right lane (see Note 2)	Not used	Travels in right lane (see Note 2)	Not required
	Workers on foot or pedestrian-type linemarking (see Note 1)	Straddles line (see Note 2)	Straddles line	Travels in right lane	Not required
Left-hand lane line - 6-lane road - no kerbside parking	Ride-on linemarking (see Note 1)	Works in left lane	Not used	Travels in left lane	Not required
	Workers on foot or pedestrian-type linemarking (see Note 1)	Straddles the line	Straddles the line	Travels in left lane	Not required
Left-hand lane line - 6-lane road - cars parked in Lane 1	Ride-on linemarking (see Note 1)	Works in Lane 2	Not used	Travels in Lane 2	Not required
	Workers on foot or pedestrian-type linemarking (see Note 1)	Straddles the line	Straddles the line	Travels in Lane 2	Not required

Lateral work position	Work type	Lateral plant / vehicle position			
		Work vehicle	Shadow vehicle	Tail vehicle	Lead vehicle
Edge line	Ride-on linemarking (see Note 1)	Works in left lane	Not used	Travels in left lane	Not required
	Workers on foot or pedestrian-type linemarking (see Note 1)	Works in left lane	Travels in left lane	Travels in left lane	Not required
Work within a lane	Plant or vehicle only, or vehicle plus workers on foot (see Note 1)	Works in lane (see Note 2)	A shadow vehicle is required to protect workers on foot. Travels in lane	Travels in lane	Not required

**NOTES:**

1. A mobile temporary speed limit (see Clause 4.6.5) is required when there are workers on foot (including pedestrian operated plant) within 1.2 m lateral clearance from moving traffic.
2. Requirements where traffic cannot pass safely to the left of the work vehicle are specified in Clause 4.6.3(e)(iii).

**Table 4.5 – Mobile works on a divided road plant and vehicle positioning**

Lateral work position	Work type	Lateral plant / vehicle position		
		Work vehicle	Shadow vehicle	Tail vehicle
Left-hand edge line Lane line Work in lane	All work types	The same as the corresponding cases for multilane undivided road in Table 4.4		
Right-hand edge line	Ride-on linemarking	Works in the right-hand lane	Not used	Same lateral position as the work vehicle
	Workers on foot or pedestrian-type linemarking	All vehicles travel in the right-hand lane (see also Note 2 to Table 4.3)		

**d) Mobile temporary speed zones**

Mobile temporary speed zones shall be used at all works involving workers on foot or pedestrian-type linemarking machines working under the conditions described in Clause 4.6.5.

e) *Work on two-way roadway*

Requirements for the control and direction of traffic during work on two-way roadways are as follows:

- (i) Wherever practicable, following traffic shall be directed to pass to the left of the work vehicle and, where used, the shadow vehicle.
- (ii) When working on the dividing line or in some instances, a lane line, if at times traffic is unable to pass to the left of the work vehicle, opportunities to pass shall be provided periodically by means such as stopping the work vehicle temporarily at a localised widening of the roadway and shoulder, or temporarily pulling off the moving traffic lane. Traffic shall not be directed to completely cross a dividing line into the path of oncoming traffic.
- (iii) When working on lane or edge lines, or within a lane, and following traffic cannot be safely directed to pass to the left of the work vehicle, it may be permitted to overtake partially into the path of oncoming traffic. In this case, 'partially' means that there is sufficient remaining width for an overtaking vehicle to pass an oncoming vehicle in an emergency. Only the bar or four corner lights of the illuminated flashing arrow shall be displayed in this case (see Clause 3.12.2).
- (iv) Traffic shall not be directed to cross a freshly-marked line if that would result in the marking being damaged.

f) *Advance warning*

Vehicles providing advance warning shall travel at the following convoy spacings:

- (i) In locations where sight distance is good:
  - A. The lead vehicle shall travel 200 m to 400 m in advance of the work vehicle in open road areas or 30 m to 100 m in built-up areas.
  - B. The tail vehicle shall travel 300 m to 500 m behind the work vehicle, or behind the shadow vehicle if one is being used in open road areas or 200 m to 300 m in built-up areas. The tail vehicle may be dispensed with if the speed limit is 50 km/h or less.
- (ii) In locations where sight distance is poor:
  - A. The lead vehicle shall move as necessary beyond the distances given in Item 4.6.3f)(i) to a point where good sight distance is regained and remain there until the work vehicle catches up.
  - B. The tail vehicle shall hold at a position of good sight distance until the work vehicle has progressed to a point where the tail vehicle can move through the section with restricted sight to a point where good sight distance is regained.

g) *Shadow vehicles*

A shadow vehicle is required wherever the operation involves workers on foot regardless of location or speed environment.

h) *Safety of workers on foot*

Workers on foot in a mobile convoy shall be provided with means of communication with the tail vehicle and work vehicle (for example, short-range radio) to receive warning of any likely approaching danger.

i) *Work on multilane roads*

A second tail vehicle shall be provided for works on freeways. The two vehicles should be arranged to form a 'mobile taper', the first vehicle travelling to the left or right of the occupied lane and the second vehicle (closest to the work vehicle) travelling in the occupied lane. The spacing between the two tail vehicles forming the taper shall be determined from Table 4.6.

j) *Traffic Controllers*

Traffic Controllers shall not direct traffic from a moving vehicle during mobile works. If a situation necessitates the use of a Traffic Controller, a static work position shall be established.

k) *Sign deactivation*

All vehicle-mounted warning signs and devices shall be removed from display or deactivated when the vehicle is no longer working and becomes part of the normal traffic stream.

l) *Traffic cone retrieval*

Where traffic cones are used to protect a freshly-marked line, a separate work convoy shall be used to retrieve the cones.

#### **4.6.4 Signs**

All signs used in mobile convoys shall be carried on vehicles or plant.

All vehicles and items of plant in the mobile works convoy, other than minor items of plant protected by a works vehicle and a shadow vehicle shall carry a vehicle-mounted warning device to which is fitted an illuminated flashing arrow sign (see Clause 3.12.2(b)).

Requirements for flashing the arrow or other displays (that is, bar only or four corner lights) are specified in Clause 3.12.2(i) and (ii).

Supplementary vehicle-mounted signs as specified in Clause 3.12.3, mounted either with the flashing arrow sign or elsewhere in a permanent position on the body of the vehicle, shall be used where necessary to indicate the type of work being done, or to provide essential additional warnings of the presence of workers on foot or driving instructions.

#### **4.6.5 Mobile temporary speed zones**

A 40 km/h mobile temporary speed zone shall be used at a mobile work site if there are workers on foot or using small items of plant on the roadway or shoulder / parking lane, and the workers are working closer than 1.2 m to moving traffic.

The zone shall be set up between the work vehicle or plant item, and the shadow vehicle by means of a 40 Speed Restriction sign (R4-1) and if required, the ROAD WORK supplementary plate (R4-3), displayed towards oncoming traffic as shown in Figure 4.5. In all situations, Tables 4.3, 4.4 and 4.5 requiring use of a lead vehicle, the zone shall be established for both directions of travel and the

advance sign 40 AHEAD (G9-79) shall be displayed to approaching traffic on both the lead and tail vehicles. In other cases, the zone need only be established for one direction of travel.

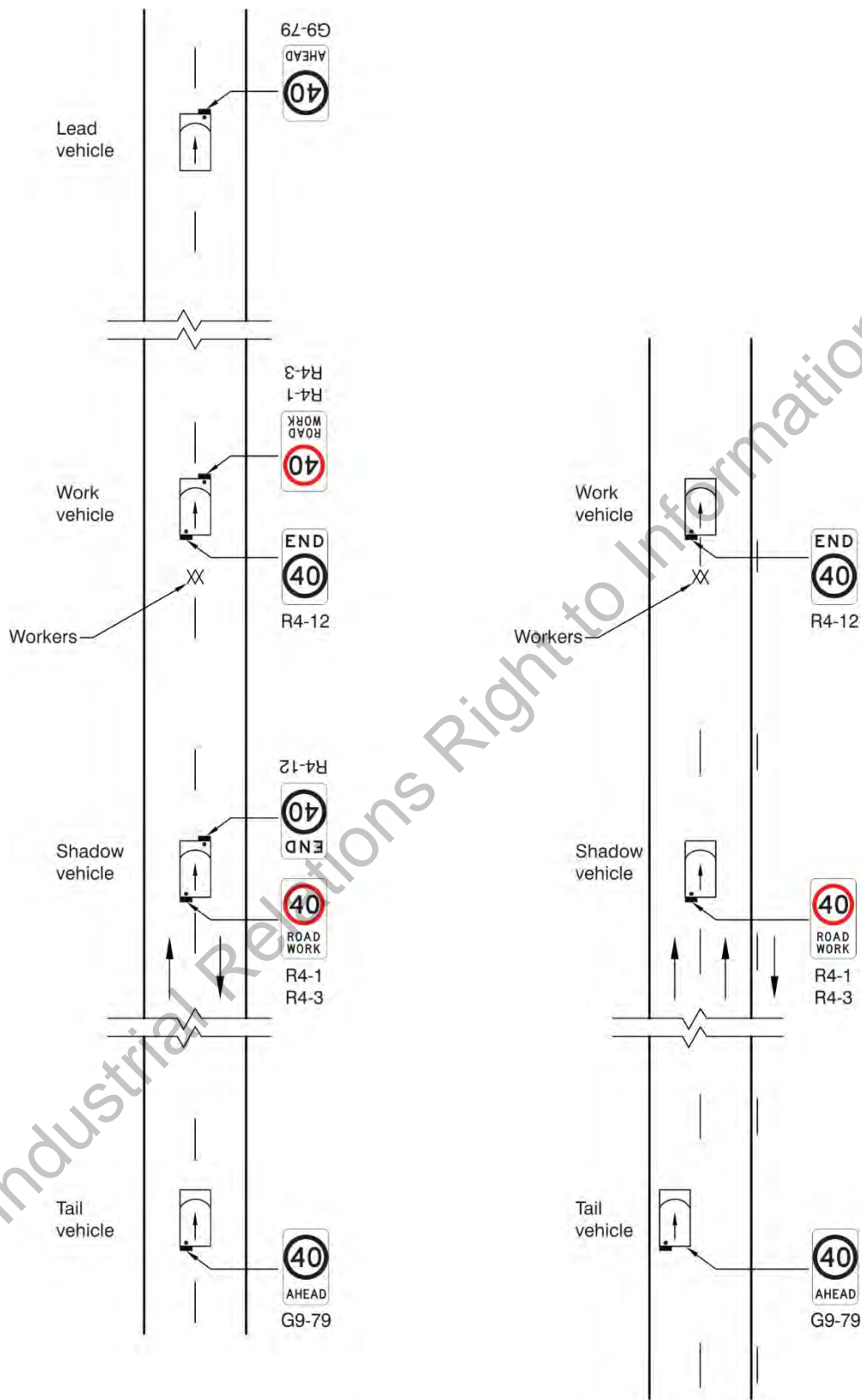
If a risk assessment indicates an unusually high risk to workers in a particular location, a lower speed limit may be required.

The end of the zone shall be signed as specified in Clause 4.9.7 by means of a sign on the work vehicle facing rearwards. It is recommended that the sign END Speed Limit (R4-12) be used for this purpose, except where the work is entirely on a length of road with a single speed limit throughout which can be shown on the end of zone sign.

NOTES:

1. The minimum number of vehicles needed to establish a zone to ensure that it is correctly started and terminated, and that advance warning is given, is three for one direction of travel and four for both directions.
2. The R4-1 and R4-3 signs may be mounted on the one signboard.
3. The END Speed Limit (R4-12) sign returns the speed limit applying beyond the sign to the default limit (50 km/h urban, or 100 km/h rural), including in locations where the road is zoned at a speed different from the default limit. This is usually considered to be of no significant practical effect.

**Figure 4.5 – Mobile temporary speed zones for workers on foot or small items of plant**



(a) Work on dividing line - 2-way road

(b) Work on lane line - multilane road, undivided or divided

NOTE: Other signs and devices required on vehicles are shown in Figures 4.3 and 4.4.

## **4.7 Advance and termination warning signs**

### **4.7.1 General**

Requirements for the display of advance warning signs and devices will vary according to factors such as the speed of approaching traffic, the degree to which the hazard requires modification of speed or diversion of travel path, or extra vigilance for other reasons, and the sight distance available to the hazard, including sight obstruction caused by other traffic. Termination signs are required at long-term work sites.

Typical advance sign layouts are illustrated in Figure 4.6.

Advance warning signs are not required in the following situations:

- a) When the roadway is occupied for less than five minutes on an isolated occasion as provided for in Clause 4.3.2, 4.3.3 and 4.4.7.
- b) On unsealed roads as specified in Clause 4.5.3(a).

### **4.7.2 Advance sign selection**

The following signs shall be placed in advance of work areas:

- a) *Workers (symbolic) (T1-5)*

As follows:

- (i) At short-term works not involving the diversion of traffic along a detour or side track.
- (ii) At long-term works during all periods and at all locations where workers are actually working on or adjacent to the traffic path or are visible to oncoming traffic, or both.

- b) *ROADWORK AHEAD (T1-1)*

At works on road involving either a closure or part-closure at long-term works, a diversion of traffic along a side track or detour, or a changed condition road users would not necessarily expect, for example, loose stones or the absence of linemarking.

NOTE: The sign may also be used at short-term works where additional advance warning is considered necessary.

- c) *BRIDGEWORK AHEAD (T1-2)*

At long-term bridgeworks involving either a closure, part-closure or diversion of traffic along a side track or detour.

Except for special cases given following, advance signs shall be limited to the signs listed previously, that is, they do not indicate the type of work being done or any more detailed nature of the hazard unless it is vital for a road user to have that information, for example, existence of wet paint on the road. In instances such as work on overhead services, sufficient area of the roadway should be closed to ensure the safety of both workers and road users.

Exceptions to the previous sign usages are as follows:

- a) *Long distance advance signs*

On freeways and other roads where the posted speed limit is 90 km/h or greater, additional signs of the type ROADWORK X km AHEAD (T1-16) may be required, especially when the



work site requires a substantial reduction in speed, that is, 40 km/h or more. Distances of 500 m or 1 km would usually be considered.

b) *Frequently changing work areas*

Under appropriate conditions (see Clause 4.3.4), advance signs may be displayed up to 2 km in advance of the work vehicle.

c) *Mobile works*

Advance signs for mobile works are carried on vehicles (see Clause 4.6).

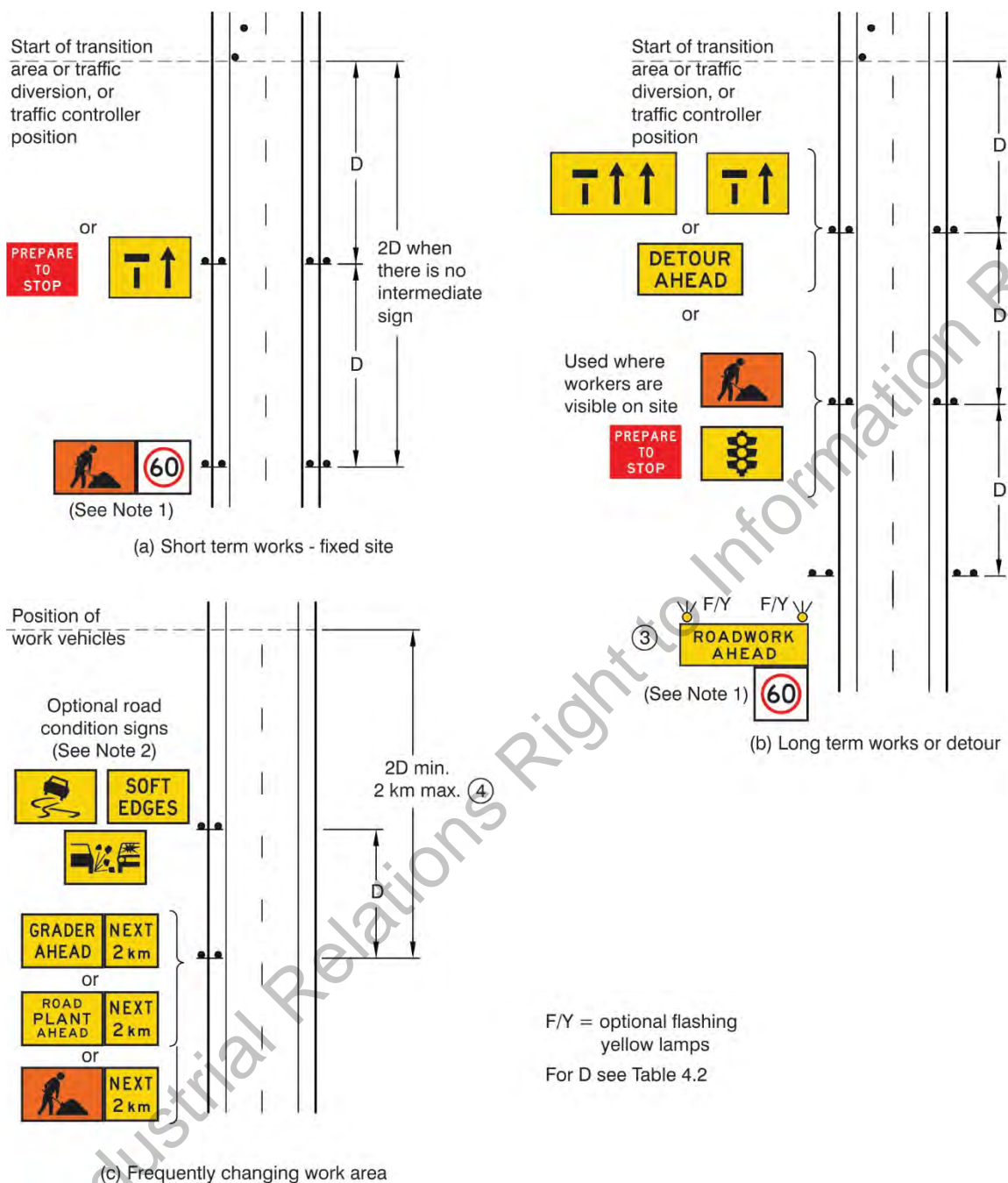
d) *Temporary or portable traffic signals*

Long-distance warning of the existence of unexpected traffic signals, for example, in open road areas, may be required. The sign assembly Signals Ahead (W3-3) and 1 km (W8-5-Q01) supplementary distance plate should be used in this case.

e) *Advance warning of temporary speed zones*

See Clause 4.9.5.

**Figure 4.6 – Typical advance sign layouts**



**NOTES:**

1. For the need for and implementation of temporary speed zones, see Clauses 4.2 and 4.9.
2. Other optional road condition signs are ROUGH SURFACE, GRAVEL ROAD, LOOSE SURFACE (see Clause 3.7.2).
3. Flashing lamps are optional on these signs, see Clause 3.11.
4. Distance may be increased in accordance with Clause 4.3.5 or Clause 4.5.2.

#### **4.7.3 Intermediate advance signs**

Intermediate advance signs shall be used where, in addition to a general warning of the onset of works on road, warning is needed either of specific action a driver may be required to take, or of the condition of the road. The signs used are as follows:

- a) Lane Status (T2-6) – shall be used to indicate closure of a lane on a roadway with two or more lanes in one direction.
- b) DETOUR AHEAD (T1-6) – shall be used to indicate existence of a detour or side-track ahead.
- c) Road condition signs as described in Clause 3.7.2 – shall be used to indicate road surface conditions which may be temporarily hazardous.
- d) PREPARE TO STOP (T1-18), Signals Ahead (W3-3) – shall be used to indicate the existence of active traffic control and the possible need to stop.

Intermediate signs, where used, are installed D in advance of the work area with the exception where a Lane Status (T2-6) sign is required to warn motorists of the closure of two or more traffic lanes, the Lane Status (T2-6) sign shall be placed a minimum distance of 2D in advance of the work area.

#### **4.7.4 Advance warning distances**

Where there is only one advance sign, it shall be placed at 2D (see Table 4.2) metres from the work area for approach posted speed of 60 km/h or more, or D for approach posted speed less than 60 km/h.

This distance shall be measured from the sign position to the beginning of the taper area (see Clause 4.1.4) or beginning of a diversion associated with the work site.

Where there is more than one advance sign position (for example, see Figure 4.6(b)), the advance signs nearest the work area shall be placed D from the beginning of the taper area or diversion and other advance sign positions at successive spacings of D further in advance of the work area.

Advance sign distances for mobile works are specified in Clause 4.6.3.

#### **4.7.5 Sign display**

Advance signs shall be displayed as prominently as possible by selecting the longitudinal location of the sign for best sight distance for approaching traffic. Signs continuously required for works which will be in progress for periods longer than two weeks should be erected in a permanent manner, for example, on posts sunk into the ground, and duplicated on the right side of the road.

Flashing lamps may be used to draw attention to advance signs (see Clause 3.11).

#### **4.7.6 Frequently changing work area**

Requirements for advance signs are given in Clause 4.3.4 for open road areas and Clauses 4.4.2 and 4.4.3 for built-up areas.

#### **4.7.7 Mobile works**

Requirements for mobile works, including advance signing are set out in Clause 4.6.

#### 4.7.8 Avoiding end-of-queue collisions

At an active traffic control position, under conditions of heavy traffic or lengthy delays, or a combination of the two, long queues may form. Depending on speed of traffic and sight distance to the end of a queue, additional advance warning may be required to avoid end-of-queue collisions.

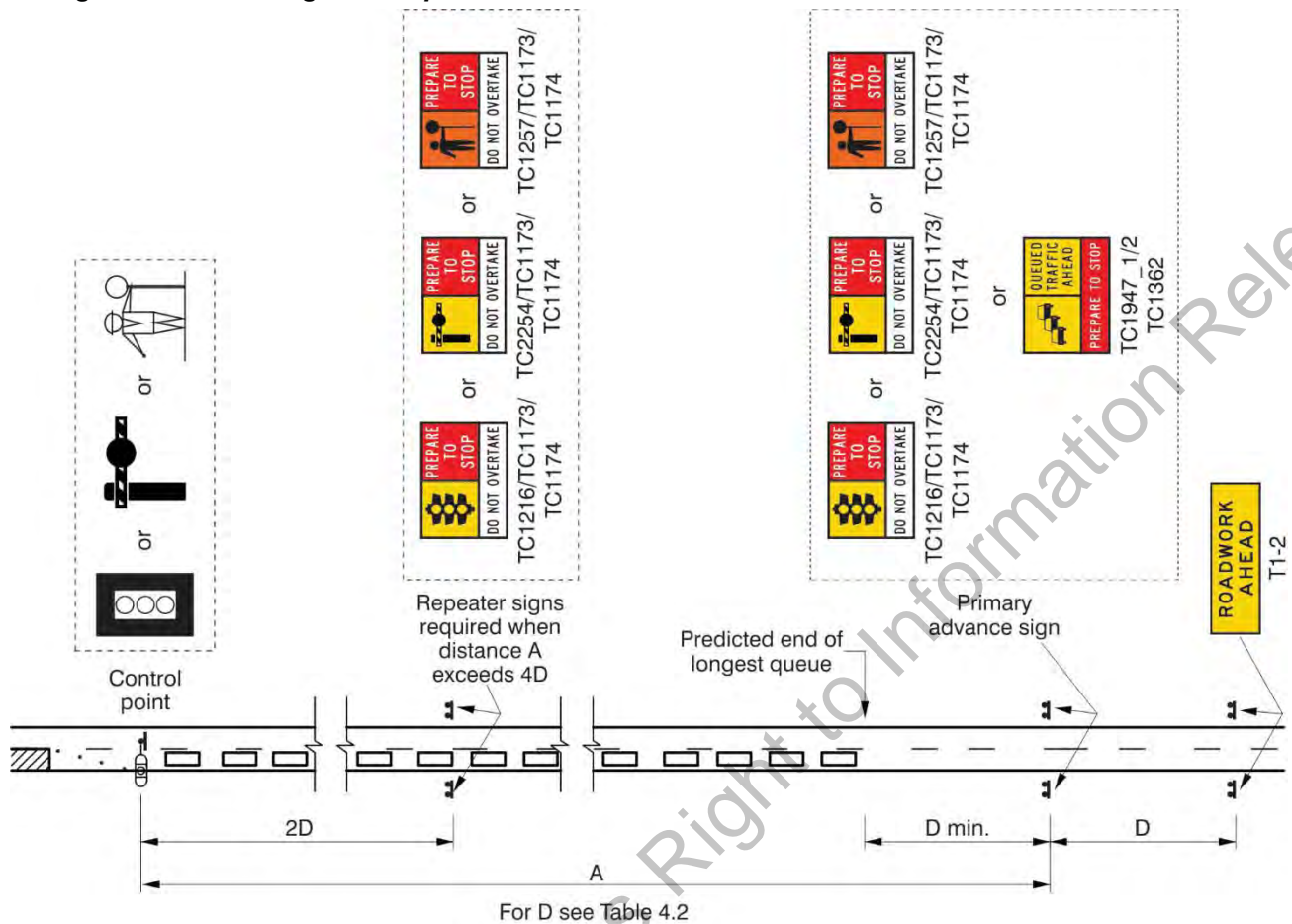
End-of-queue protection shall be provided whenever a stationary queue is likely to extend to a point less than D (see Table 4.2) metres beyond the PREPARE TO STOP sign associated with the active control and either or both of the following apply:

- a) Posted speed during roadworks is greater than 70 km/h.
- b) Sight distance to the end of the queue for approaching traffic is likely to be less than 2D (open road areas) or D (built-up areas).

The following requirements and recommendations apply to the provision of end-of-queue protection where significant queues will form:

- i. Where the maximum queue length can be predicted in advance, the primary PREPARE TO STOP sign shall be located so that the distance from this sign to the end of the queue is never likely to be less than D (see Figure 4.7). The distance may need to be adjusted if the queue length proves to have been underestimated. If the primary PREPARE TO STOP sign needs to be placed more than 4D (approximately 15 seconds of travel time) from the control point, repeater PREPARE TO STOP signs at intervals of not more than 4D should be provided between that point and the control point to provide for conditions after the queue has dispersed. In any relocation of the primary PREPARE TO STOP sign, the distance D to the ROADWORK AHEAD sign shall be maintained. A queued traffic ahead (T1-Q15) multi-message sign assembly may be used as the primary advance sign.
- ii. A second Traffic Controller can be employed to shift the PREPARE TO STOP sign and the ROADWORK AHEAD sign as necessary to maintain its minimum required distance in advance of the end of queue. The Traffic Controller may also display the SLOW bat at each location in which case a 60 km/h temporary speed zone shall be extended to cover that position.
- iii. Distant advance warning using variable message signs should also be used where practicable.
- iv. All other advance and position signs required for the work site shall be located at the distances otherwise specified from the start of the work area.

**Figure 4.7 – Avoiding end-of-queue collisions**



NOTE: Not all signs are shown in Figure 4.7, such as speed limits and workmen signs. Also refer to the Queensland MUTCD Part 3 Supplement Section 4.7.8-1 for other signing options.

#### 4.7.9 Termination signs

Termination signs END ROADWORK (T2-16, T2-17) (see Clause 3.4.8) shall be used at the departure end of long-term work sites and work sites where a speed reduction was implemented. They shall be placed, if possible, at the end of termination area which is D min metres past the work area downstream from the last point on the roadway or verge affected by the works (see Figure 4.1 and Table 4.2).

### 4.8 Approach tapers

#### 4.8.1 General

If a roadway has to be partially closed, an appropriate taper should be marked in the taper area (see Clause 4.1.4) and, wherever possible, should be located so that its full length is visible to approaching traffic. Typical applications of tapers are illustrated in Figure 4.8.

#### 4.8.2 Lane closures

Recommended taper lengths for two-way roads and multilane roads are shown in Table 4.6. The distances in the columns in Table 4.6 are applied as follows:

a) *Traffic control at beginning of taper*

Applicable at a location where there is a Traffic Controller, or temporary or portable traffic signals just prior to a single lane.

b) *Lateral shift taper*

Applicable where traffic is simply required to shift laterally without conflict with another traffic stream.

c) *Merge taper*

Applicable where one lane of traffic is required to merge into another.

These three taper types are illustrated in Figure 4.9.

**Table 4.6 – Recommended taper length**

Permanent posted speed, km/h	Recommended taper length, m		
	Traffic control at beginning of taper	Lateral shift taper	Merge taper
40 or less	15	5	15
50	15	15	30
60	30	30	60
70	30	60–80	120–160
80	30	60–80	120–160
90	30	60–80	120–160
100	30	60–80	120–160
Greater than 100	30	60–80	120–160

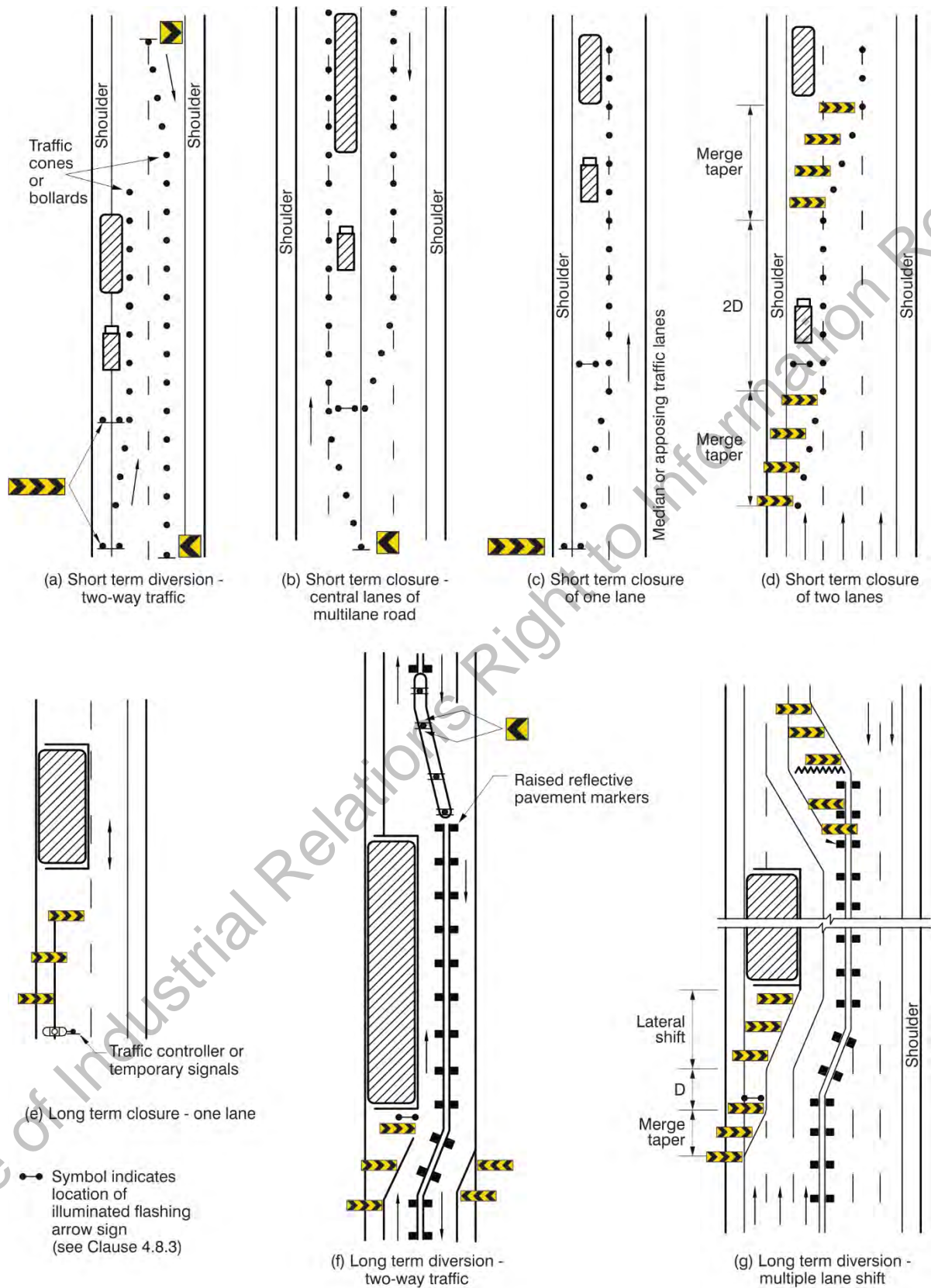
The speed of traffic in Table 4.6 is the permanent posted speed of the road before the work site is established.

The minimum separation distance for successive tapers should be D; however, the closure of more than one lane on multilane roadways should be effected one lane at a time, with the distance between successive merge tapers at least 2D (see Table 4.2) metres.

At a merge taper, a manoeuvre requiring the left-hand stream to shift laterally into the right-hand stream is to be preferred.



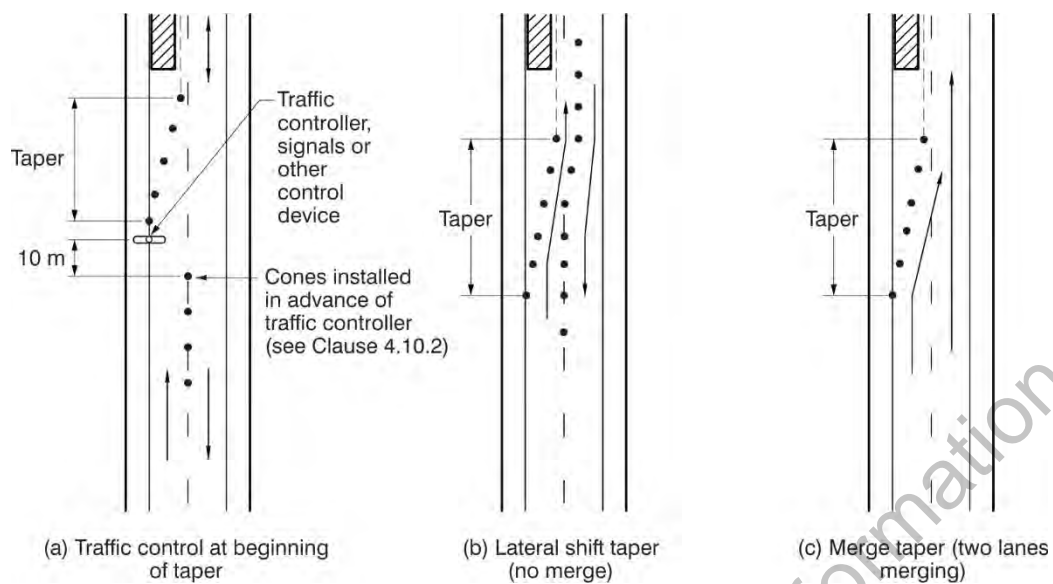
**Figure 4.8 – Typical application of tapers in advance of partial road closures**



For D see Table 4.2



**Figure 4.9 – Types of taper**



#### 4.8.3 Devices

Devices used for forming the taper may be temporary hazard markers, traffic cones or bollards with retroreflective bands if required for night use (see Clause 3.9) and these may be augmented by temporary line-marking.

A taper needed for a short-term daytime-only work site may be formed with traffic cones or temporary bollards. For night work the leading edge of a taper shall be formed with temporary hazard markers at approximately twice the spacing specified for cones or bollards.

For periods of longer duration, it is recommended, as an alternative to the devices listed previously, roadworks delineators as specified in Clause 3.9.2 be used to form the taper. These should be spaced so that, to an approaching driver, they appear as a continuous line.

Where temporary hazard markers are used to delineate the edge of a traffic path, they shall be used on one side only, for example, the leading edge of a taper. Use on both sides of a traffic path can create confusing patterns of delineation.

Devices used to form tapers should be spaced so that traffic is discouraged from weaving through them (see Clause 3.9.1).

A vehicle- or trailer-mounted illuminated flashing arrow sign shall be used where the traffic volume is 1500 vpd or greater and the temporary speed limit during roadworks on approach to the taper is 70 km/h or greater, to assist traffic in negotiating the taper. Typical locations are shown in Figure 4.8.

## **4.9 Creating a temporary speed zone at works on roads**

### **4.9.1 General**

Requirements and recommendations for the use of temporary speed zones at works on roads are as follows:

a) *Workplace safety*

Appropriate action to reduce traffic speeds at a work site to either 80 km/h, 60 km/h or 40 km/h to meet certain specified safe workplace requirements in Clause 4.2, which includes the protection of Traffic Controllers (see Clause 4.2(d)), is a requirement of this Part of the *Manual*.

NOTE: Clause 4.2(e) specifies certain conditions of extra hazard where a speed limit less than 40 km/h may be appropriate.

b) *Traffic safety*

Clause 4.9.3 only gives guidance on the application of temporary speed zones for traffic safety purposes; however, where a decision has been made to create a temporary speed zone, requirements may be specified for its implementation. Workplace safety requirements (see Item (a)) shall take precedence over traffic safety guidelines wherever the former requires a lower speed limit to be imposed.

### **4.9.2 Speed zones for workplace safety purposes**

The use of speed zones for workplace safety purposes is given in Clause 4.2.

### **4.9.3 Speed zones for traffic safety purposes**

Temporary speed zones to be implemented for traffic safety purposes are appropriate where the consequences of excessive speed are not apparent, and motorists are therefore unlikely to reduce speed voluntarily. A speed zone should not be introduced unless it is either self-enforcing or will be enforced. Roadwork speed limit signs shall not be used without other appropriate warning signs required by prevailing site conditions. Variable message signs should be used to carry the warning or other messages relating to the site conditions. Such messages could include ROAD NARROWS, SHOULDER CLOSED, and so on.

Speed zones for traffic safety purpose should not be used where alternative means of traffic control such as warning signs with Advisory Speed supplementary plate, see Clause 3.7.3, would be adequate, nor should they be used to avoid the necessity for some other more appropriate action such as the use of a Traffic Controller to slow traffic at a critical location.

Temporary speed zones may be used where one or more of the following conditions exist:

a) Loose material or stones are present on the road surface.

NOTE: Speed limits should be removed after loose stone has been removed.

b) Sprayed seal works where higher speed may damage the new seal.

c) Dust or smoke may reduce visibility and cannot be controlled.

d) The standard of the pavement surface or the vertical or horizontal road geometry at a work site is reduced below that of the adjacent sections of road.

e) The unobstructed clear width of the roadway is substantially reduced.

The following principles should be applied in the selection of an appropriate speed limit:

- i. The speed limit applied to a zone should not exceed the maximum safe speed of travel which depends on the degree of vehicular and pedestrian activity, and the type and extent of the work in progress, as well as the characteristics of the road. The more frequent the incidence of conflicts or hazards on the road, the lower the maximum safe speed of travel.
- ii. The speed limit should not be so low that a significant number of drivers will disregard it. Prevailing conditions vary over a length of road, so any speed limit imposed is a compromise.
- iii. Speed limits should encourage uniform speed of travel but be low enough to allow drivers time to react to unusual events or to directions by Traffic Controllers.

A guide to the selection of roadworks speed limits is given in Table 4.7.

For roadwork purposes a speed limit of 70 km/h or less is considered low speed. A speed limit of 80 km/h or greater is considered high speed.

**Table 4.7 – Guide to the selection of roadworks speed limits**

Speed limit km/h	Selection criteria	Notes on application
< 40	<b>Workers' safety:</b> <ul style="list-style-type: none"> <li>Unusually high level of hazard for workers on foot within 1.2 m of moving traffic.</li> </ul> <b>Traffic safety:</b> <ul style="list-style-type: none"> <li>It is impracticable to separate pedestrians or cyclists from vehicular traffic in the work area.</li> </ul>	See Clause 4.2(e).
40	<b>Workers' safety:</b> <ul style="list-style-type: none"> <li>Workers on foot or small items of plant are working within 1.2 m of traffic with no intervening physical protection (see Clause 4.2(c)(iii))*.</li> </ul> <b>Traffic safety:</b> <ul style="list-style-type: none"> <li>There would be structural danger to bridges at higher speeds.</li> </ul>	<p>This limit is specified as an option for meeting workplace safety requirements set out in Clause 4.2. It will not be observed if conditions do not appear to drivers to warrant it. Steps should always be taken in the first instance to avoid conditions requiring this limit.</p> <p>For worker safety, zone length is specified as 1 km maximum. There is a requirement for workers to be visible.*</p>

Speed limit km/h	Selection criteria	Notes on application
60	<p><b>Workers' safety:</b></p> <p>Workers on foot or small items of plant between 1.2 and 3 m of traffic, or large plant are within 3 m of the trafficable area with no intervening physical barrier (see Clause 4.2(c)(ii))*.</p> <ul style="list-style-type: none"> <li>• A Traffic Controller is being used (see Clause 4.2(d))*.</li> <li>• In advance of portable or temporary traffic signals (see Clause 4.11.3)*.</li> <li>• In advance of a boom barrier.</li> <li>• Dust or smoke may reduce visibility.</li> </ul> <p><b>Traffic safety:</b></p> <ul style="list-style-type: none"> <li>• Traffic is subjected to a reduced standard alignment due to the works.</li> <li>• The pavement surface has been degraded.</li> <li>• A bituminous seal has just been laid.</li> </ul>	<p>This limit is specified as an option for meeting workplace safety requirements set out in Clause 4.2. It is also relevant within higher speed zones where there is significant temporary reduction in pavement surface condition, traffic path alignment or other travel conditions caused by the works.</p> <p>The 60 km/h zone length is specified as 150 m minimum.* No maximum length is specified.</p>
60 buffer (if required)	Used on approach to 40 km/h zone where approach speeds would otherwise be 80 km/h or greater (see Clause 4.9.5).	A buffer zone in advance of a 40 km/h road work zone should be 150 m minimum length. If required, due to site constraints, the length of this advance warning (buffer zone) may be increased up to 300 m maximum.
80	<p><b>Workers' safety:</b></p> <ul style="list-style-type: none"> <li>• Workers on foot or operating plant are between 3 m and 6 m of the trafficable area with no intervening physical barrier (see Clause 4.2(b))*.</li> </ul> <p><b>Traffic safety:</b></p> <ul style="list-style-type: none"> <li>• The need for a lower limit does not exist, but there is some disturbance to alignment or pavement surface which makes unrestricted speeds undesirable on traffic safety grounds.</li> </ul>	<p>This limit should not be imposed on traffic safety grounds if unrestricted speeds through the work site can be tolerated at the prevailing level of driver behaviour.</p> <p>Long lengths of 80 km/h temporary speed zone on roads or freeways in open road areas will not be observed if there are no workers or plant in evidence, or they are behind a physical barrier, and there is relatively little reduction in travelling conditions evident as a result of the works.</p> <p>The 80 km/h zone length is recommended as 500 m minimum.</p>
80 buffer (if required)	May be used to give advance warning of a 60 km/h zone where the posted speed is 100 km/h or greater (see Clause 4.9.5).	<p>A buffer zone in advance of a 60 km/h roadwork zone should be 300 m minimum length.*</p> <p>If required, due to site constraints, the length of this advance warning (buffer zone) may be increased up to 500 m maximum.</p>

\* Mandatory requirements are specified for or relate to these items in the Clauses referenced.

#### 4.9.4 Duration

The temporary speed zone shall apply only while the relevant conditions exist. It shall be removed as soon as practicable after the need for its imposition passes. This requirement applies to either of the purposes in Clause 4.9.1 for which the speed zone is used.

Temporary speed zone signs used under Clause 4.2 for workplace safety shall be displayed only when workers, plant or Traffic Controllers are on site. At long-term works, the signs shall be removed or covered up at other times unless they are deemed necessary for any of the other purposes listed in Table 4.7.

NOTE: These signs will normally be placed in conjunction with the Workers (symbolic) (T1-5) sign which is subject to the same requirements for display and removal.

A record shall be kept of the dates and times temporary speed zones are in operation, including any changes made and the names of personnel erecting, changing or removing signs (see Appendix A). It is also desirable to advise police of the speed limit so that enforcement action may be taken.

#### 4.9.5 Advance warning of temporary speed zones (buffer zones)

Advance warning shall be provided where the speed limit at a roadwork site is reduced by more than 30 km/h, except where variable speed limit signs are used. While advance warning is not required if the speed limit at a roadwork site is reduced by up to 30 km/h, the speed limit AHEAD sign may be used in these instances if desired and may be installed on a multi-message sign.

Advance warning shall be provided by means of a buffer zone comprising either—

- a) the Speed Limit AHEAD (G9-79) sign located 2D (see Table 4.2) metres in advance of the start of the lower speed zone; or
- b) a speed zone of intermediate value (for example, 80 km/h where the reduction is from 100 km/h to 60 km/h) (see also Clause 4.9.9). The length of buffer zone is specified in Table 4.7.

A speed limit reduction of 60 km/h or more may be effected in two steps if needed for safety or other reasons. The steps may comprise either two successive speed zone steps in accordance with Item 4.9.5b), or a speed zone step and a step using the Speed Limit AHEAD sign in accordance with Item 4.9.5a).

NOTE: A typical change from 100 km/h to 40 km/h may comprise an 80 km/h buffer zone within which is placed a 40 km/h AHEAD sign. A change from 70 km/h to 40 km/h may use a 40 km/h AHEAD sign.

#### 4.9.6 Start of zone

Typical applications of speed zoning at roadworks sites are illustrated in Figure 4.10 for short-term work sites and Figure 4.11 for long-term work sites. These Figures illustrate the use of Speed Restriction signs at the start of a zone and show their relationship to ROADWORK AHEAD (T1-1), Workers (symbolic) (T1-5) and supplementary ROAD WORK (R4-3) signs.

NOTE: These Figures do NOT show all of the signs that may be required at a work site.

Where the need for a temporary speed zone occurs partway into a roadworks site, the zone may be started at that point rather than at the beginning of the site. A typical case would be a short-term localised lowering of the limit to accommodate workers on foot closer than 1.2 m to moving traffic.

Two or more such localised zones may be permitted within the one work site, noting that the distance between them should meet the minimum length of zone recommendation for the higher speed limit.

#### **4.9.7 End of zone**

To terminate a temporary speed zone, except as indicated following, Speed Restriction (R4-1) signs indicating the speed limit existing beyond the temporary zone shall be used. ROAD WORK Supplementary (R4-3) signs are not used with these signs. See also Clause 4.9.9b) where a buffer zone has been provided for the opposite direction of travel. The END ROADWORK (T2-16, T2-17) sign shall be used together with the Speed Restriction sign (see Clause 3.4.8).

Subject to Clause 3.5.5a), if it is not practicable or desirable to indicate the speed limit beyond the temporary zone by means of Speed Restriction signs, the END Speed Limit (R4-12) sign (see Clause 3.5.5c)) shall be used in lieu. This case could typically occur where although the continuing speed limit (default rural limit or zoned limit) is 100 km/h, road surface, alignment or other conditions will not allow traffic to travel safely at that speed.

It is a legal requirement that a speed zone be terminated either by another regulatory speed control sign, or other means as specified in traffic regulations.

#### **4.9.8 Repeater signs**

Repeater Speed Restriction signs should be provided as follows:

- a) To confirm and remind road users of the speed limit where it is imposed over a considerable length and there are locations where it may appear that the limit no longer applies, for example, between work areas in an extended work site.
- b) Where traffic enters from a side road and it is necessary to advise drivers of the speed limit on the road they have entered.

Where used, they should be placed on the left side of the roadway at the following maximum spacing:

- a) Where the speed limit is 60 km/h or less, repeater signs within the work zone shall be installed at a maximum spacing of 500 m.
- b) Where the speed limit is greater than 60 km/h, repeater signs within the work zone shall be installed at a maximum spacing of 1 km.

Where works are being carried out on multi-lane one-way or divided roads, repeater speed restriction signs should be duplicated on the right side of the roadway.

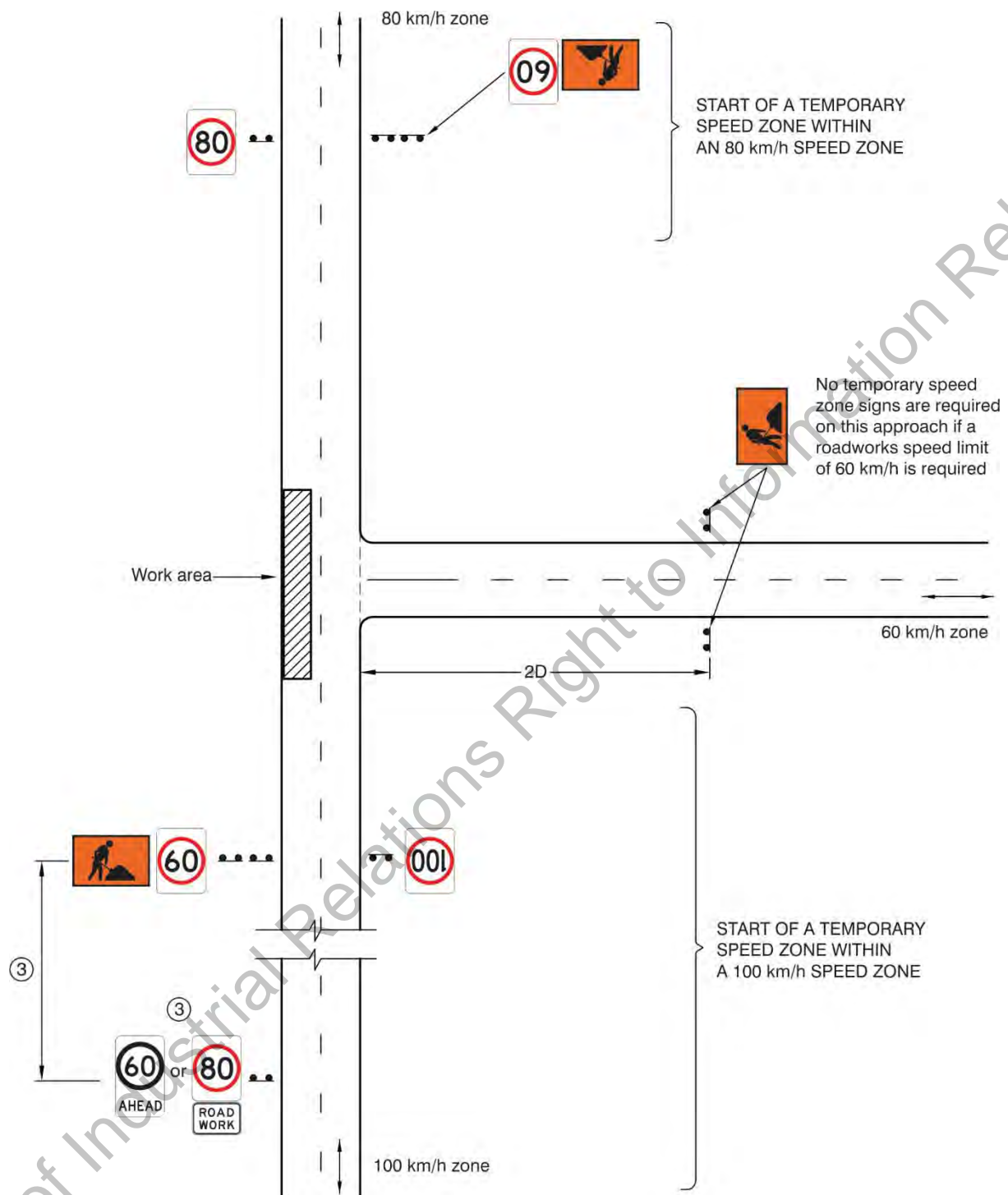
#### **4.9.9 Offset speed zones**

Temporary speed zoning which results in speed limits which are different for each direction of travel at a particular location shall be permitted under the following conditions:

- a) On a divided road where works affect traffic conditions on one side of the median only.
- b) On a divided or undivided road where a buffer zone in accordance with Clause 4.9.5b) has been provided.

NOTE: Wide Centre Line Treatments are not considered medians.

**Figure 4.10 – Typical speed zoning at short-term work sites**



**NOTES:**

1. This illustration does not show all of the signs and devices that may be required at the work site.
2. The requirement for and speed value of the temporary speed zone past the work area is as specified in Clause 4.2 (the case shown would apply to Case 3 (see Clause 4.2(c)(ii)).
3. Buffer zone of length as specified in Table 4.7.



This diagram illustrates the placement of traffic signs for a temporary speed zone within an 80 km/h speed zone. The diagram shows a road layout with a work area and a temporary speed zone.

**Signs and their placement:**

- 80 km/h zone:** A speed limit sign (80) is placed at the start of the zone. A distance 'D' is indicated between the sign and the work area.
- Temporary speed zone:** A yellow 'ROADWORK AHEAD' sign is placed at the start of the zone. A speed limit sign (60) is placed at the start of the zone. A distance 'D' is indicated between the sign and the work area.
- Work area:** A hatched area representing the work zone.
- 60 km/h zone:** A speed limit sign (60) is placed at the end of the temporary speed zone. A distance 'D' is indicated between the sign and the work area.
- 100 km/h zone:** A speed limit sign (100) is placed at the end of the temporary speed zone. A distance 'D' is indicated between the sign and the work area.

**Annotations:**

- START OF A TEMPORARY SPEED ZONE WITHIN AN 80 km/h SPEED ZONE:** This annotation points to the yellow 'ROADWORK AHEAD' sign and the speed limit sign (60).
- START OF A TEMPORARY SPEED ZONE WITHIN A 100 km/h SPEED ZONE:** This annotation points to the yellow 'ROADWORK AHEAD' sign and the speed limit sign (100).
- Buffer zone signs:** This annotation points to the yellow 'ROADWORK AHEAD' sign and the speed limit sign (80).
- Advance speed limit sign:** This annotation points to the speed limit sign (60).

**Additional text:**

- This illustration does not show all of the signs and devices that may be required at the work site.
- No temporary speed zone signs are required on this approach but permanent speed zone signs indicating a speed higher than the temporary speed limit need to be removed or covered.

NOTES:

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## 4.10 Traffic Controllers

### 4.10.1 Application

Situations requiring control of traffic by Traffic Controllers are listed in Table 4.8.

**Table 4.8 – Use of Traffic Controllers**

Situation	Purpose of control
Bituminous surfacing under traffic	To slow down, stop or direct traffic, as appropriate
Single-lane operation	To restrict traffic flow to a single direction at any time and to alternate the direction of flow as necessary
Low-speed operation	To warn and slow down traffic at locations where a temporary speed limit would be required but has not been installed
Temporary total closures, for example, blasting works	To stop traffic to inform drivers of the likely delay, and to hold traffic until it is safe to proceed
Plant crossings	To stop traffic as needed to avoid conflict with plant crossing or entering the roadway at an established plant crossing point
Limited sight distance within work site	To slow down and warn motorists of a hidden or partially hidden hazard ahead
Emergency situations	To stop and direct traffic as necessary

### 4.10.2 Equipment

A STOP / SLOW hand bat (R6-8 / T7-1) (see Clause 3.5.2) shall be used, except when a boom barrier or portable traffic signals are used. For night-time operations, an illuminated wand should be used in conjunction with the bat. If a boom barrier is used, the STOP sign, R6-8, may be mounted on the boom.

The Traffic Controller / PREPARE TO STOP sign shall be placed at least 2D (where value of D is the greater value of the range of dimensions shown in Table 4.2) in advance of the Traffic Controller.

The Signals AHEAD or Boom Barrier sign together with PREPARE TO STOP sign shall be placed when these devices are used in lieu of the Traffic Controller to control traffic. These signs shall be placed at least 2D (where value of D is the greater value of the range of dimensions shown in Table 4.2) in advance of the traffic control device.

The Traffic Controller sign shall not be used with either the Signals AHEAD or Boom Barrier signs, even if these devices are manually operated by the Traffic Controller.

The STOP HERE WHEN DIRECTED sign (T1-Q12) may be installed during Traffic Controller operations (excluding traffic signals) when vehicles are required to stop at a particular point (see

Clause 3.5.2(c)). For traffic signals, the STOP HERE ON RED SIGNAL (R6-6) sign shall be used where there is no stop line on the pavement (see Clause 3.5.4(d)).

A temporary hazard marker (T5-5) (see Clause 3.9.3), a temporary barrier or a boom barrier may be used to assist the Traffic Controller.

Portable two-way radios or similar means shall be used for communication between Traffic Controllers (except in the vicinity of blasting works) if they are unable to communicate by sight.

Traffic Controllers shall wear high-visibility clothing as specified in the *Traffic Controller Accreditation Scheme Approved Procedure*.

Four cones, spaced 4 m apart, should be installed on the centreline starting 10 m in advance of the Traffic Controller position during single-lane reversible flow operation (see Figure 4.9(a)) and may be used in other circumstances. Traffic cones are used to highlight the Traffic Controller / traffic control device position, the location vehicles are to stop and for delineation / traffic management purposes. The temporary hazard marker (T5-Q02) or KEEP LEFT DELINEATOR (R2-3-Q01) sign may be installed at the start of the row of the four cones in each direction to direct traffic to the correct travel path (see Clause 3.9.3).

#### **4.10.3 Sight distance**

Traffic Controllers shall not be located in positions where the sight distance is less than 2D (where the value of D is the greater value of the range of dimensions shown in Table 4.2) metres between the Controller and oncoming traffic.

See Clause 4.10.2 for positioning of the Traffic Controller / PREPARE TO STOP sign.

#### **4.10.4 Control of approach speed**

Approach speeds to locations where Traffic Controllers or boom barriers are operating shall be controlled to 60 km/h or less by means of appropriate devices and advance signs including a temporary speed zone.

#### **4.10.5 Period of duty**

Traffic Controllers shall be relieved from their duty after not more than two hours for a period of rest or other duties of at least 15 minutes (see *Traffic Controller Accreditation Scheme Approved Procedure*).

#### **4.10.6 Traffic Controller competency**

Refer to Clause 1.4.3 and Appendix J.

### **4.11 Portable traffic signals**

#### **4.11.1 General**

Portable signals (see Clause 3.5.4(a)) are intended only for traffic control applications of a relatively short duration. For sites where work will continue for a longer period without the location of the work area changing, consideration should be given to the installation of temporary, rather than portable, traffic signals (see Clause 3.5.4(b)).

Portable traffic signals are intended to be applied primarily to shuttle control, that is, where a portion of the roadway is closed so that a single lane has to be used alternately by traffic from opposite directions. Traffic capacities for single-lane sections of various lengths under shuttle control are given in Clause 4.13.1.

Signals may also be adapted for machinery crossing application. Typical use of portable traffic signals is shown in Figure 4.12.

#### **4.11.2 Operation**

The following gives guidelines for the three modes of operation of portable traffic signals:

a) *Vehicle-actuated operation*

Vehicle-actuated operation allows the signals to operate automatically in response to vehicle demands.

Vehicle-actuated operation is the preferred mode and should be used wherever possible under the following conditions:

- (i) Traffic flow is not hindered by operations at the work area.
- (ii) Traffic control is required to operate after working hours.

b) *Fixed-time operation*

Fixed-time operation does not respond to vehicle demand. Cycle times are a fixed length. Fixed-time operation is applicable to the following conditions:

- (i) Vehicle-actuated control is not possible.
- (ii) The flow of traffic on all approaches is relatively constant and is not hindered by operations at the work area.
- (iii) Traffic control is required to operate after working hours.

Failure of vehicle detectors in a vehicle-actuated system will usually cause the system to default to fixed-time operation.

c) *Manual operation*

Manual operation allows operation of the signals by one or more Traffic Controllers and is applicable to the following conditions:

- (i) Flow of traffic on each approach is variable and may be hindered from time to time by operations in the work area.
- (ii) A detector fails during the use of the vehicle-actuated mode and the fixed-time mode is not appropriate.
- (iii) Traffic must be kept out of the work area for an extended period, for example, during blasting, priming or full width sealing.

#### **4.11.3 Approach conditions and speed**

A roadworks speed limit no higher than 60 km/h shall be imposed if the signals would otherwise be in a higher speed limit zone.

Sight distance on the approach to traffic signals shall be:

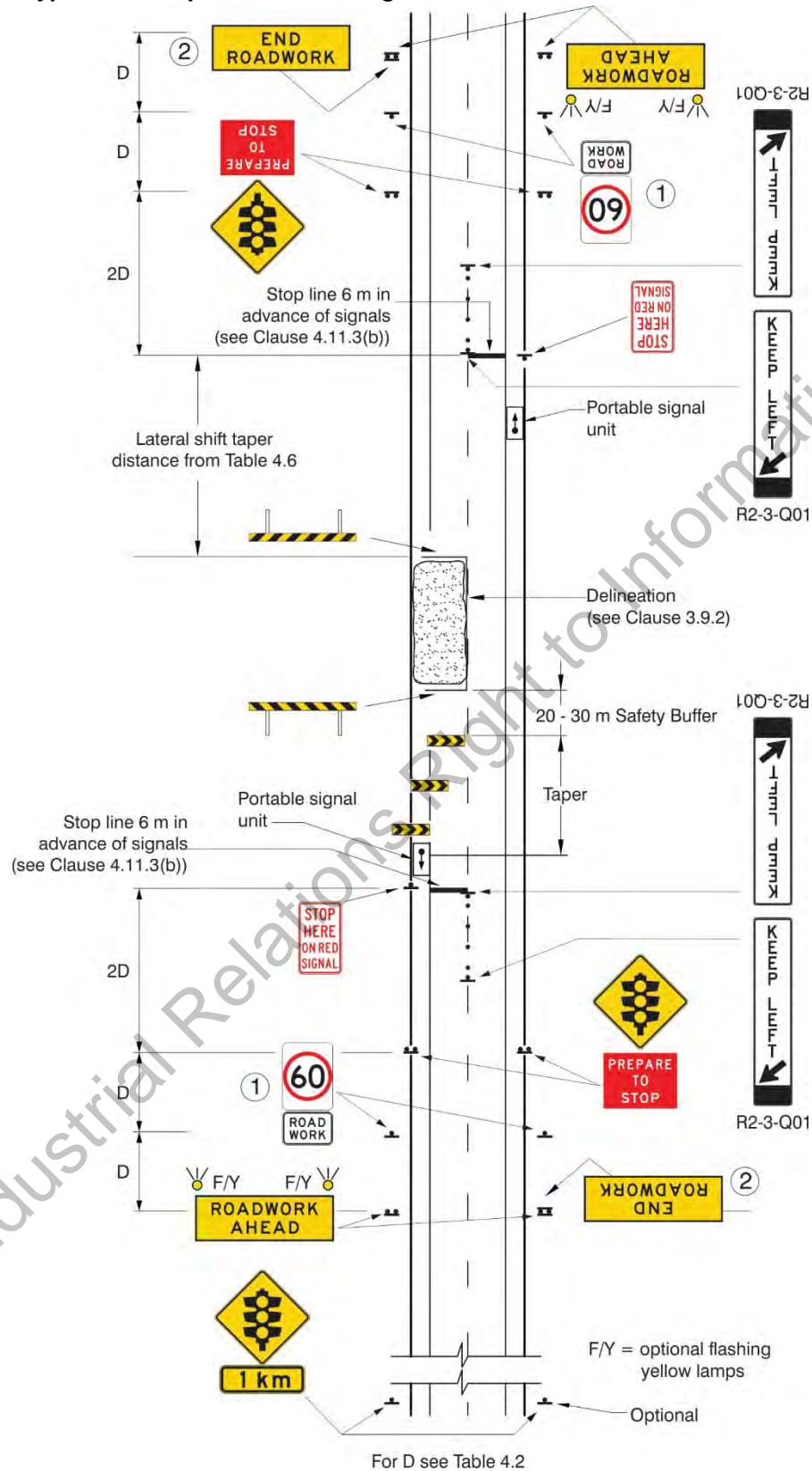
- a) A minimum of 150 m to the primary signal face where a temporary traffic signal or portable traffic signal (under vehicle-actuated or fixed-time operation) is installed.
- b) A minimum of  $2D$  (with the maximum value of  $D$ ) for portable traffic signals under manual operation by a Traffic Controller

A stop line, when used, shall be located 6 m in advance of a temporary traffic signal or portable traffic signal.

#### **4.11.4 Performance monitoring**

Irrespective of the form of operation, signals shall be monitored to ensure that they are operating safely and effectively and do not cause unnecessary delays to traffic.

Figure 4.12 – Typical use of portable traffic signals



NOTES:

1. A speed zone may be required, see Clause 4.9.3.
2. End-of-zone signs would also be required at the departure end of the work site.

#### **4.12 Pilot vehicle**

A pilot vehicle may be used to guide traffic through a work site. This form of assistance to traffic management may be required where—

- a) part of the length of the work site is out of view of the supervisor, work gang and the Traffic Controller;
- b) the hazard to workers described in Clause 4.2(e) requires the traffic speed to be reduced to less than 40 km/h;
- c) the traffic speed is required to be kept low to minimise damage to the works; or
- d) traffic needs to follow a particular path through the site which may not be obvious unless a pilot vehicle is used.

The minimum identification of a pilot vehicle shall be a vehicle-mounted warning device (see Clause 3.12.1) together with T6-Q09, which is attached to the rear of the vehicle. Traffic should be instructed to follow and not to pass the pilot vehicle. The PILOT VEHICLE IN USE (T1-Q13) sign shall be installed a minimum of D in advance of the location where the pilot vehicle operates (see Appendix I).

#### **4.13 Maintaining traffic flow**

##### **4.13.1 Length of single-lane operation under reversible (shuttle) flow**

On two-way roads, two-way flow should be maintained wherever possible. This may necessitate the construction of a side-track or detour; however, where this is not possible, traffic may be restricted to one lane over short lengths, preferably not longer than indicated in Table 4.9, for short periods of time. Additional guidance on maintaining suitable traffic operations is provided in the Queensland MUTCD Part 3 Supplement.

In general, where traffic flows are within the recommended limits shown in Table 4.9, single-lane operation requires active control by Traffic Controllers or by portable or temporary fixed traffic signals. The selection of the appropriate method of control requires consideration of—

- a) traffic volumes;
- b) duration of work;
- c) site conditions and layout; and
- d) personnel available.



**Table 4.9 – Desirable maximum length of single-lane operation under reversible (shuttle) flow**

<b>Traffic volume (total for both directions) Vehicles per hour</b>	<b>Length of single lane section m</b>
701 – 800	70
601 – 700	100
501 – 600	150
401 – 500	250
351 – 400	400
301 – 350	600
≤ 300	800

**NOTES:**

1. This length is to be taken as the distance between the Traffic Controller or traffic signal positions for each traffic direction.
2. These desirable maximum lengths for single lane operation may be increased on Transport and Main Roads projects in accordance with the contractual requirements of MRTS02.

Where drivers have a clear view of the work area and the opposing approach for a distance greater than 150 m in a 60 km/h or lower speed zone; or greater than 250 m elsewhere, beyond the work area, controls may be modified as follows:

- i. For traffic volumes 40 vph or less and posted speed limit during roadworks of 70 km/h or less, where the length of a single lane does not exceed 60 m – traffic control may not be required (see also Clause 4.13.5).
- ii. Where the length of a single lane is less than 100 m and other requirements of Clause 3.5.3(a) are met – control may be exercised by the use of a GIVE WAY and ONE LANE sign assembly. This is not recommended where the posted speed limit during roadworks exceeds 80 km/h. Active single lane control is preferred.

**4.13.2 Number of lanes for each direction of flow**

On multi-lane roadways in peak periods, the normal number of traffic lanes in the direction of major flow should be available. Table 4.10 gives guidance on the number of lanes required at short-term works and long-term works of up to seven days' duration. For longer-term works, precise calculation of capacity may be necessary to ensure that traffic demand can be met. Additional guidance on maintaining suitable traffic operations is provided in the Queensland MUTCD Part 3 Supplement.

**Table 4.10 – Desirable number of lanes for each direction**

<b>Mid-block Vehicles per hour, one direction</b>	<b>Within 200 m of an intersection<sup>^</sup> (upstream or downstream) Vehicles per hour, one direction</b>	<b>Desirable number of lanes for direction considered</b>
Up to 1000	Up to 500*	1
1001 to 2000	501 to 1000	2
2001 to 3000	1001 to 1500	3
3001 to 4000	1501 to 2000	4

\* Right turns out of the single lane may need to be prohibited, depending on the proportion of heavy vehicles and the volume of opposing traffic.

<sup>^</sup> This is a controlled intersection where traffic in the directions being considered is controlled (by traffic signals, roundabout, GIVE WAY or STOP signs).

NOTE: Volumes shown in the Table may need to be reduced by the amount shown if the following apply:

- a) pavement surface is rough or unsealed – reduce traffic volume by 30%.
- b) horizontal geometry through the restriction is reduced to a speed value of less than 40 km/h – reduce volume by 50%.
- c) volume of heavy vehicles exceeds 10 percent–
  - i. downward, level or easy upgrade – reduce traffic volume by 20%; and
  - ii. sustained upgrades >5% – reduce traffic volume by 40%.

Where the requirements of Table 4.10 cannot be complied with, parking bans or lane reversal or both may be necessary. If, in extreme circumstances, one direction of travel must be detoured, safety arrangements should be planned in advance so that conditions can be improved on the detour route prior to opening. In congested built-up areas, many works, especially mobile and maintenance works, are necessarily confined to nights and weekends.

Right turns may need to be banned at appropriate locations in the work site to maintain traffic flow. Allowance might also be required for the effects on traffic flow of rough or unsealed surfaces or altered geometry which markedly reduces speed.

Lane reversal requires special consideration of, and provision for pedestrians where the traffic flow is opposite to normal expectations, especially where traffic is diverted to the opposite side of a median. This should be avoided if at all possible but, failing that, every effort should be made to redirect pedestrian movements to locations beyond the work area or at least to marked crossings at signalised intersections (see Clause 4.14.8).

#### 4.13.3 Lane widths

The minimum lane width to be provided through or past a work site shall be as per Table 4.11, with the following exceptions:

- a) Curve widening of 0.5 m per lane shall be applied to curves of radius between 100 m and 250 m.
- b) Curve widening on curves of less than 100 m radius shall, in addition to Item 4.13.3a), take into account the swept path of long vehicles.
- c) Where lanes on the approach to the work site are less than 3.0 m in width, the approach lane width may be adopted. This shall not, however, apply to curves of radius 250 m or less, nor to locations where there are fixed vertical obstructions such as fences or safety barriers within 300 mm of the edge of the lane on one or both sides.
- d) Two-way roadway width on residential streets may be reduced to 5.5 m, see Clause 4.13.5(a).

**Table 4.11 – Minimum lane widths**

Posted speed limit during roadworks, km/h	Minimum lane width, m
60 or less	3.0
70 to 90	3.2
greater than 90	3.4

Note: Temporary lane widths are not to be greater than existing lane widths.

#### 4.13.4 Edge clearances

Clearance between edge of traffic lane and delineating devices or road safety barrier system should be as follows. This clearance shall be measured to the traffic-side edge of delineating devices or barrier. This edge shall also be the line from which clearances to the work area are measured for the purpose of determining treatments in Clause 4.2.

- a) Edge of traffic lane to line of traffic cones, bollards or longitudinal channelising devices:
  - i. Posted speed limit during roadworks up to 60 km/h – 0.5 m.
  - ii. Posted speed limit during roadworks above 60 km/h – 1.0 m.
- b) Edge of traffic lane to roadworks delineators or temporary hazard markers – 1.0 m.
- c) Edge of traffic lane to road safety barrier system:
  - i. Posted speed limit during roadworks 40 km/h or less – 0.3 m.
  - ii. Posted speed limit during roadworks 50 to 80 km/h – 0.5 m.
  - iii. Posted speed limit during roadworks greater than 80 km/h – 1.0 m.

In the absence of marked lines on the pavement, these clearances shall be added to the nominal lane widths provided according to Clause 4.13.3.

If the edge of the traffic lane is kerbed, delineation devices shall be placed 0.3 to 0.5 m clear behind the face of kerb.

NOTE: Road safety barriers should not be placed behind kerbs on roads with a speed limit of 80 km/h and above.

Containment fences marking the limit of work area shall be placed as specified in Clause 4.2. Clearances adjacent to excavations are given in Appendix E.

#### **4.13.5 Work in residential streets**

Where work is in residential streets, the following should be observed:

- a) If the remaining clear roadway width is 5.5 m or more, two-way operation should be maintained. If 5.5 m cannot be maintained, the width should be reduced to a maximum of 3.5 m to ensure vehicles operate in single file under shuttle working conditions. The need to accommodate the swept path of large vehicles negotiating a work site should also be considered.
- b) The normal method of traffic operation for shuttle working will be a natural 'give and take', provided that there is clear visibility past the work area and beyond it for at least 75 m or to the end of the roadway if less than 75 m away and the length of shuttle lane does not exceed 60 m.

If these conditions cannot be maintained, active traffic control will be required that is, Traffic Controllers, or temporary or portable traffic signals.

- c) The length of the approach taper should be approximately 15 m where two-way operation is maintained. Where shuttle working under natural give and take is in operation, the taper should be at 45 degrees on both the approach and departure sides of the works.
- d) The need for advance warning should be determined in accordance with Clause 4.7.1.

#### **4.14 Detours, side-tracks and crossovers**

##### **4.14.1 General**

In situations where it becomes impracticable to accommodate traffic within the existing roadway, one of the following forms of traffic detour should be considered:

- a) *Side-tracks*

A temporary roadway may be constructed beside or near the existing roadway, usually within the same road reserve. It may cater for one or both directions of travel.

- b) *Detours via existing roads*

Traffic in one or both directions may be detoured via existing roads suitably located to carry traffic around the work area.

- c) *Crossovers*

Part of a divided road is converted to a two-way roadway by closing one roadway and constructing temporary crossovers to transfer traffic in that direction to the other roadway.

- d) *Detours for heavy or over-dimensional vehicles*

See Clause 4.14.10.

Where used, these forms of detour shall be provided in accordance with the requirements and recommendations in the clauses following. Typical signing arrangements are illustrated in Figures 4.13, 4.14 and 4.15.

#### **4.14.2 Surface condition**

Pavement and pavement surface condition shall be appropriate to, and adequate for, the type and volume of traffic using the facility and its location. The following requirements shall be observed:

- a) Temporary pavements shall have sufficient structural strength to carry the anticipated heavy vehicle traffic.
- b) Pavements on detours via existing roads shall be checked to ensure that they are structurally adequate to carry the increased volumes and loads.
- c) Pavements on detours and side-tracks shall be monitored to ensure that any indications of impending pavement failure are dealt with promptly.

#### **4.14.3 Alignment, width and capacity**

For detours which will be in use for periods in excess of 14 days, the lane width and design speed should match, as nearly as practicable, those of the approach road.

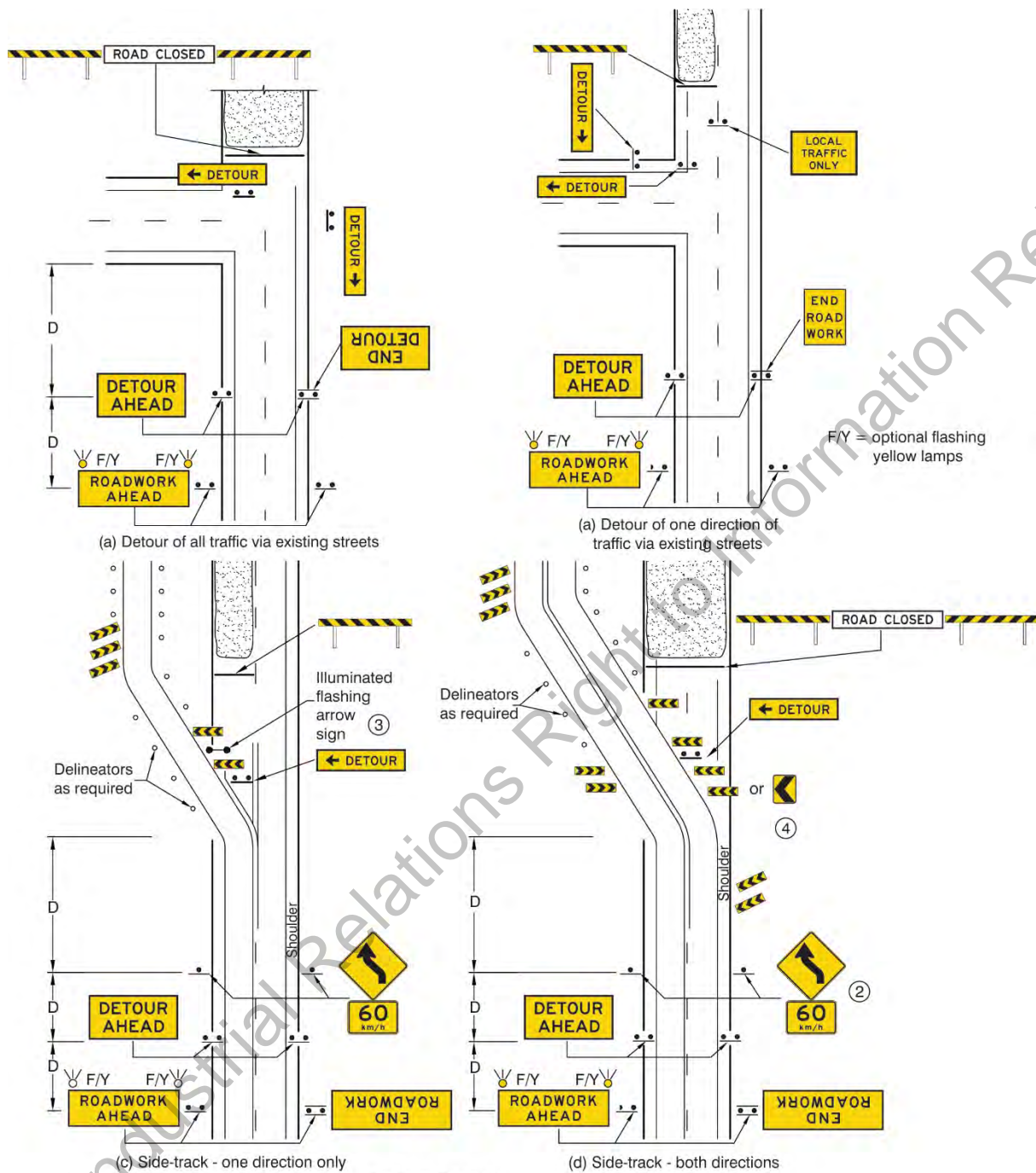
Every attempt should be made to maintain capacity on roads which normally run close to their capacity, particularly during peak hours in built-up areas. In addition to maintaining the required number of lanes in accordance with Clause 4.13.2, note should be taken of the effect on capacity of—

- a) traffic lanes less than 3.0 m in width; and
- b) unsealed or rough surfaces.

Either condition could lead to lane capacity being reduced by as much as 50 per cent.

Works may need to be scheduled so that peak hour capacities are maintained.

**Figure 4.13 – Approaches to detours and side-tracks**



**NOTES:**

1. Roadworks speed zoning is not shown but may be required, see Clause 4.9.3.
2. Advisory Speed signs should not be used if the side-track is unsealed.
3. Optional use of illuminated flashing arrow sign, Clause 3.12.2, where the visual background of the work area is such that extra delineation of the diverge is required.
4. For semi-permanent side-tracks at major works, permanently mounted Chevron Alignment markers, D4-6, (see Part 2 of the *Manual*) should be used instead of temporary hazard markers.



[illegible]

1. A temporary speed zone for traffic safety purposes may be required (see Clause 4.9.3).
2. For semi-permanent side-tracks at major works, permanently mounted Chevron Alignment markers, D4-6, (see Part 2 of the *Manual*) should be used instead of temporary hazard markers.



#### 4.14.4 Provision for pedestrians, bicycles, wheelchairs and public transport

Where there is a demand for use of the detour by pedestrians, cyclists or wheelchairs, facilities such as footpaths, cycle tracks and sealed shoulders as appropriate to the demand and the safety requirements should be provided. Use of the signs and devices specified in Clause 3.14 may be necessary to guide pedestrians and to ensure their safety.

Where public transport stops need to be temporarily relocated on a detour, provision shall be made for safe pedestrian access to the stop. Provision should also be made for the public transport vehicle to stop clear of moving traffic.

#### 4.14.5 Access for local traffic

Provision shall be made for local traffic to bypass barriers to gain access to properties within the closed-off section of road. Gaps should be left in barriers in locations which will not encourage through traffic to use them either by mistake or intentionally, for example, locating the gap to the far side of the roadway and making it as small as practicable. The sign LOCAL TRAFFIC ONLY (G9-40-2) should be placed beside the gap.

#### 4.14.6 Delineation

The following are requirements and recommendations for delineation at side-tracks and detours:

- a) A side-track having the same standard of alignment, width and pavement surface as the approach route, shall be delineated as for a permanent roadway in accordance with Part 2 of the *Manual*.

NOTE: Such a side-track represents the ideal and should be sought after for long-term side-tracks. It will rarely require roadworks signing.

- b) Side-tracks where any of the factors in Item 4.14.6a) are below the standard of the approach road, shall have the following delineation:
  - i. Delineators, red on the left side and white on the right, at the following spacing:
    - A. Straights and curves greater than 200 m radius – 20 m spacing, in pairs.
    - B. Curves up to 200 m radius – 6 m on outside of curve, 12 m on inside.
    - C. On roads with volumes of 1500 vpd or less, spacings increased up to the following:
      - 1) Long flat straights – up to 100 m.
      - 2) Short and undulating straights – up to 50 m.
      - 3) Curves greater than 200 m radius – up to 25 m.
  - ii. On sealed pavements, the following linemarking:
    - A. Dividing line, marking in accordance with Part 2 of the *Manual*, including barrier line where warranted.
    - B. Edge lines at traffic volumes greater than 1500 vpd.
  - iii. Temporary hazard markers at the beginning of the side-track if either it begins with a small radius curve, or it could appear in some visibility conditions that the road does not diverge.

- c) At detours using existing roads or streets, upgrading of linemarking to that consistent with the volume using the detour should be undertaken whenever the detour is likely to be in use for more than three days.
- d) At crossovers, the temporary diversion through the median shall be delineated with traffic cones or bollards at 2 m spacing.

The temporary dividing line on the single open roadway shall be treated with extra delineation as appropriate. Depending on traffic volumes and speeds the following additional delineation should be considered:

- (i) Conversion of the dividing line to double unbroken.
- (ii) Reducing spacing of RRPMS to one half or one quarter of normal spacing.
- (iii) Use of lane dividers (see Clause 3.9.5).

#### **4.14.7 Continuity of signing at a detour**

Where a detour via existing roads is provided, signing of the detour at all changes of direction and at other locations where reassurance is needed shall be applied consistently throughout for each direction of travel. Signing arrangements should be checked to ensure that all detour signs are prominently displayed.

#### **4.14.8 Reversed traffic direction**

Where, at a detour or crossover, traffic is required to travel temporarily in the wrong direction, the following safety measures should be considered:

##### **a) *Intersections***

Intersections should be checked and temporarily modified as necessary to ensure that crossing and turning movements can be made safely. Any movements needing to be temporarily banned should be adequately catered from elsewhere.

##### **b) *Roadside hazards***

Potential hazards resulting from the reversal of direction such as fixed roadside objects protected in one direction only, and safety barrier and bridge parapet trailing ends which will become leading ends, should be risk assessed and remedial action taken accordingly.

##### **c) *Pedestrian management***

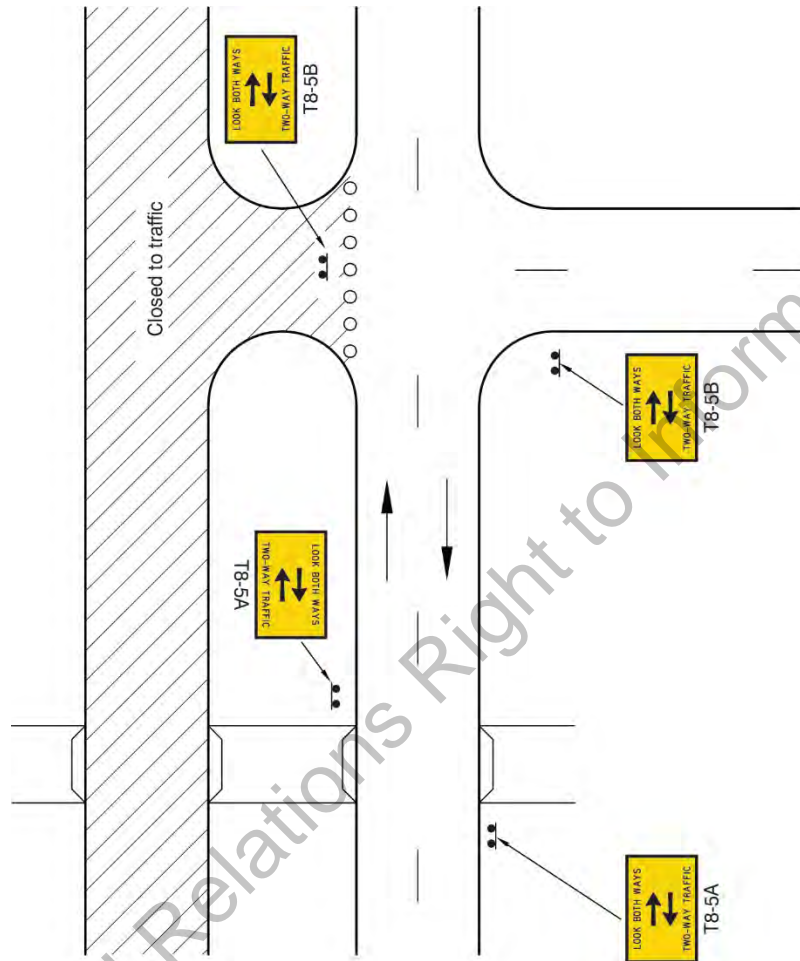
Where it is necessary to cater for pedestrians crossing a temporary two-way roadway at zebra crossings, uncontrolled mid-block crossing points or at intersections where there is traffic turning through a pedestrian crossing point, the following steps should be considered:

- i. Control of the point at which pedestrians cross by means of containment fences, and, if appropriate, pedestrian mazes.
- ii. People to patrol the site to assist pedestrians crossing the road.
- iii. Use of signs LOOK BOTH WAYS, TWO-WAY TRAFFIC (T8-5) (see Clause 3.14.5) to face pedestrians about to cross the road, as shown in Figure 4.15.

d) *Entering traffic*

Use of signs LOOK BOTH WAYS, TWO-WAY TRAFFIC (T8-5) should also be considered at side road approaches to a temporary two-way roadway as shown in Figure 4.15 to warn entering traffic.

**Figure 4.15 – 'LOOK BOTH WAYS' signs**



**4.14.9 Freeway exit closures**

Where a freeway exit is to be closed advice shall be provided—

- a) in advance of the previous exit if traffic is to be detoured by that exit; or
- b) in advance of the closed exit if traffic is to be detoured by the succeeding exit.

Advice shall take the form of black on yellow temporary signs mounted in conjunction with each advance and position sign for the relevant exit in Items 4.14.9a) or 4.14.9b), indicating the exit which is closed, and which alternative exit should be taken. The legend should, as far as practicable, be equal in legibility to the legends on the associated permanent direction signs.

All necessary direction signs and detour signs shall be provided on the adjacent street system for diverted traffic.

#### 4.14.10 Detours for high and heavy vehicles

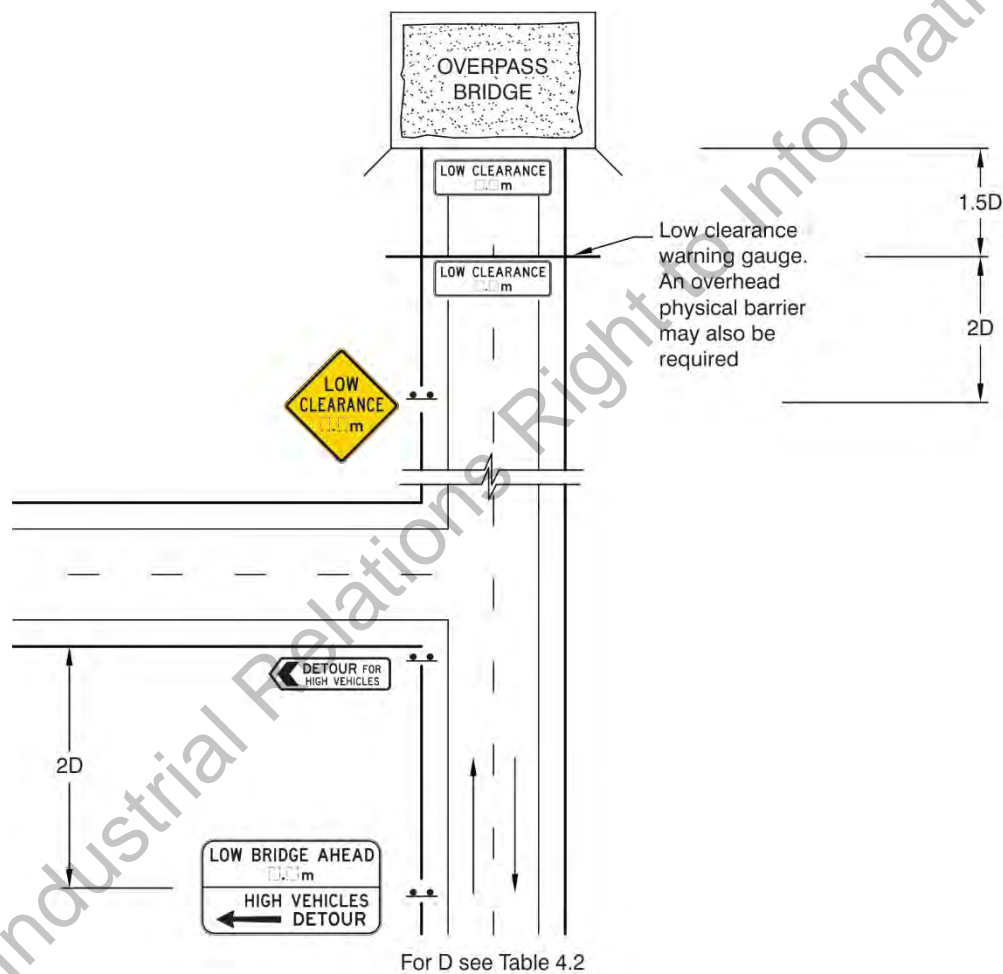
Detours for high or heavy vehicles will usually be required—

- if works on road or other factors have temporarily reduced the height clearance or load carrying capacity of the original road; or
- if the route is a designated over-dimensional load route on which over-dimensional clearances have been temporarily reduced.

Signposting of a typical high vehicle detour is illustrated in Figure 4.16.

NOTE: A second physical over-height barrier may be required in the case shown in Figure 4.16, if the risk of collision is high or the consequences especially severe, or both.

**Figure 4.16 – Detour for high vehicles**



#### 4.15 Excavation works

Requirements for traffic protection or delineation at longitudinal excavations adjacent to traffic lanes are given in Appendix E.

## **5 Example Diagrams**

### **5.1 General**

The contents of this Section have been removed from this document. Example diagrams can be found in the Queensland MUTCD Part 3 Supplement.

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## **Appendices**

### **Appendix A – Daily routine tasks and record keeping**

#### **A1 Scope**

This Appendix sets out example procedures and guidelines for the daily routine tasks, inspections and record keeping required for the overall safety and smooth operation of a Traffic Guidance Scheme.

#### **A2 Record keeping**

Supervisory personnel engaged on works which require the use of a Traffic Guidance Scheme shall keep the following records:

##### **a) Daily records**

Daily records of the sign arrangement or Traffic Guidance Scheme, should be kept in a diary or in work sheets.

As a minimum, the diary or work sheets should include the following:

- i. Date.
- ii. Location.
- iii. Identification of job (including reference numbers, if applicable).
- iv. Time of inspection.
- v. Detail of changes made and by whom.
- vi. Name of person authorising the changes.
- vii. Comments.
- viii. Reference number of Traffic Management Plan or Traffic Guidance Scheme.

Special attention should be given to recording the installation, alteration and removal of all regulatory signs and devices, including Speed Restriction signs. For short-term works, reference to a Traffic Guidance Scheme which applies to the layout used or to a documented procedure will usually be sufficient. The records should include the hours of operation and the surface condition of the road. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should also be noted.

##### **b) Incidents**

In the case of incidents (for example, crashes, collisions), either witnessed or reported, involving the public or from which legal proceedings might arise, the actual type, size and location of signs and devices in use at the time of the accident should be recorded and the sign arrangement photographed for subsequent reporting. Details of the actual width and condition of the travelled path and weather conditions should also be recorded.

NOTE: This information may be critical should legal proceedings result from an accident. In such cases, the organisation is often requested to provide details of signs and devices erected at works carried out in the distant past and which cannot be accurately answered unless detailed records are kept.

### **A3 Daily routine tasks**

#### **A3.1 General**

Supervisory personnel should establish a daily routine which allots specific tasks to personnel, including supervisors, so that–

- a) signs and devices are, at all times, adequate for the safety of personnel and traffic;
- b) the surface of the travelled path is maintained in a satisfactory condition;
- c) plant operations are not disrupted; and
- d) loss of production time is minimised.

The supervisor's role in this routine procedure is coordination, inspection and correction.

#### **A3.2 Before work starts**

The following routine should be undertaken before work starts each day:

- a) An inspection of all traffic signs and devices should be made and a note made of signs out of place or damaged during the night for subsequent rectification.
- b) All lamps should be checked and cleaned, if necessary.
- c) An inspection should be made of all water ballasted safety barrier or containment fence modules and a note taken of any out of position modules, low water levels and damaged modules for subsequent rectification.
- d) After adjustments have been made to the traffic management provisions for the day, they should be checked for safety and effectiveness by an inspection drive through the job, and a record made of the signs erected and their locations (see Section A2).

#### **A3.3 During hours of work**

The following routine should be followed while work is in progress:

- a) Periodically drive through the work site to check that all signs, markings and delineating devices as seen by other road users are satisfactory and in their correct position.
- b) Attend to minor problems as they occur.
- c) During work breaks, for example, tea breaks, move personnel clear of the work area; park plant clear of traffic lanes and remove from view or cover inappropriate signs such as Traffic Controller Ahead / PREPARE TO STOP or Workers (symbolic) if workers leave the site or cannot be seen.
- d) Where there are traffic hazards or where only one lane is open to traffic, instruct Traffic Controllers to remain on the job and relieve them as necessary.
- e) Reposition barriers, signs and tapers as necessary, for example, adjust the length of single lane traffic operation as necessary to keep it to a minimum, and keep records of changes made and the time these occurred.
- f) Coordinate maintenance of the travelled path with other job operations.



### **A3.4 Closing down at the end of the day**

Special provisions are required if less than one lane in each direction is available after working hours, during weekends or holidays, or if the traffic flow in one direction on a multilane highway exceeds the figures shown in Table 4.4, for the number of lanes available. Special provisions can only be determined with a full knowledge of the situation. These could include Traffic Controllers working in shifts for the full period of the obstruction, illumination of the site or the installation of portable or temporary traffic signals.

In general, the following action is required at the end of a day's work:

- a) Carry out a pre-closedown inspection, allowing time for urgent maintenance to the travelled path.
- b) Remove Traffic Controller Ahead / PREPARE TO STOP, Workers (symbolic) and other inappropriate signs.
- c) Drive through the work site to confirm that signs and devices are in position and operating before leaving the site.
- d) Finally, record any changes that have been made to the previously recorded sign arrangement or Traffic Guidance Scheme.

### **A3.5 After hours**

During the hours when work is suspended:

- a) Carry out periodic after-dark inspections on low headlight beam to ensure that all devices are visible and performing their correct function.
- b) Provide after-hours' contact so that arrangements can be made to replace damaged signs, delineators or barriers.
- c) Ensure that a record is kept of signs found damaged, missing or out of place (and their location) at night, weekend or holiday inspections (see Section A2).

Information regarding the frequency of after-hours inspections is included in Section 2.6.1-1 in the Queensland MUTCD Part 3 Supplement.

Information on record keeping using video recording is provided in Technical Note TN109 *Video record keeping of traffic management at roadworks*.

## **Appendix B – Erection and removal of regulatory traffic control devices for works on roads**

### **B1 General**

An essential adjunct to the erection or removal of any regulatory sign / device, is the recording and filing of the circumstances for use in connection with any prosecutions or litigation resulting from traffic offences, or traffic accidents, in the area of the particular sign / device. This procedure particularly applies when regulatory signs / devices are used as a traffic control aid at, or adjacent to, road construction and maintenance work sites.

This Appendix outlines example procedures for long-term and short-term traffic arrangement plans. Variations to these procedures can be implemented to address quality management and administration practices.

### **B2 Example procedures**

#### **B2.1 Implementation of Traffic Management Plans**

For the implementation of a Traffic Management Plan requiring the temporary use of regulatory signs / devices, the following should be considered:

- a) Prior to the implementation of each plan, a fully documented Traffic Guidance Scheme is to be prepared, providing the following information—
  - the types, sizes and numbers of regulatory signs / devices to be used;
  - a sketch or description of the exact location of the regulatory signs / devices giving details of the extremities of the roadworks;
  - the date on which each regulatory sign / device is first required; and
  - the anticipated date when each regulatory sign / device will no longer be required.
- b) If considered necessary:
  - Advise the public via the media, of the presence, nature, and duration of the proposed roadworks and, in particular, the temporary use of any regulatory signs / devices.
  - Advise the local Police accordingly, and, in certain situations, include the Police in discussions on proposed traffic control measures.

#### **B2.2 Use of safe work method statements**

For short-term works and works involving relatively simple part-roadway closures, requiring the temporary use of regulatory signs / devices—

- a) a safe work method statement is to be prepared, supported, if necessary, by a standard plan; or
- b) a sketch of the protective devices and delineation required, on a road construction or similar plan is to be prepared.

### **B2.3 Roadwork signing records**

Recording of all work site signing and delineation:

- a) May use—
  - a Form M994;
  - Traffic Management Plans, suitably annotated; or
  - daily records as per Appendix A2(a), for short-term works.
- b) Should be retained to ensure the required evidentiary standard may be established by the police in prosecuting offenders.

## **Appendix C – Protective equipment and clothing**

### **C1     *Introduction***

Because of the potential hazards associated with working on or adjacent to road and bridge work sites, all persons working on or authorised to enter such work sites shall be supplied by their employer with the relevant high-visibility protective equipment and clothing and shall be instructed to wear same at all times when required.

This equipment and clothing shall comprise the following items:

- Safety helmets (hat or cap type).
- High-visibility cloth hats.
- High-visibility garments.
- Approved skin protection (sunscreens).

Details on the selection and use of such equipment and clothing are outlined following.

### **C2     *Safety helmets***

High-visibility (bright coloured or white) safety helmets which comply with the requirements of the current Australian Standard shall be worn by personnel working on or entering work sites where there is a danger of the wearer receiving head injuries as a result of striking or being struck by objects.

### **C3     *High-visibility cloth hats***

Where safety policy permits, high-visibility cloth hats may be worn by field personnel as an alternative to the standard safety helmets, provided they are not on a work site where there is any danger of the wearer receiving head injuries as a result of striking or being struck by objects.

### **C4     *High-visibility garments***

Recommendations for the selection and use of high-visibility garments are listed in Table C1.

### **C5     *Skin protection***

Broad spectrum protective sunscreens, lotions and creams for skin protection should be worn by all personnel required to work regularly in the sun. With respect to their use, reference should be made to the manufacturer's instructions.

**Table C1 – Selection of high visibility safety garments**

Work site	Safety garment used <sup>1</sup>	Headwear	Worn by
Traffic control	Refer to approved procedure for controlling traffic		Traffic Controller
On or adjacent to all road / bridge work exposed to traffic and / or plant (day use only)	High-visibility vest or shirt	Safety helmet where necessary	All personnel
		Cloth hat may be used elsewhere <sup>2</sup>	
On or adjacent to road / bridge work exposed to traffic and / or plant (night use only)	Retroreflective vests	Safety helmet where necessary	All personnel
		Cloth hat may be used elsewhere <sup>2</sup>	
On or adjacent to blasting sites (day use only)	High-visibility vest or shirt	Safety helmet must be worn	All personnel

NOTES:

1. High-Visibility Safety Garments must be the outer garment worn.
2. Subject to risk assessment.

## **Appendix D – Multi-message sign system**

### **D1 Scope**

This Appendix sets out the requirements for the approved panel configuration, size of sign and typical arrangement diagrams.

### **D2 Panel configuration**

Multi-message signs can convey up to three messages in the one sign. These will include, as required:

- Warning of works activity, road condition, works personnel.
- Regulatory restriction (for example, restrict speed).
- Provision of advice to motorists or advising motorists of recommended actions.

Multi-message panel configuration guidelines are as follows:

- At least one of the 600 x 600 mm panels in a three-panel arrangement should be symbolic.
- Conflicting messages shall not be used.
- Messages shall be linked logically.
- Speed signs, where used, are to be closest to traffic and reflect conditions.
- Letters and symbols are to be in accordance with the MUTCD provisions for minimum readability in the order of 75 metres.
- Colour combinations for sign legend and background are to:
  - a) Match existing practice including colour and reflectivity;
  - b) Have high contrast between panels when used as a multi-message sign (that is, close colouring should be avoided, where practicable, on adjacent panels).

NOTE: The use of Speed Restriction or Speed Limit AHEAD panels with "ON SIDE ROAD" panel is not permitted.

### **D3 Physical arrangement**

The multi-message sign consists of up to three linked messages in up to three separate panels on a single 1200 x 900 mm frame. The 1200 x 900 mm multi-message sign size is used irrespective of the speed environment. See Clause 3.2.4 for panel sizes.

Multi-message signs shall have relevant messages consisting a minimum of–

- (i) two 600 x 600 panels;
- (ii) one 600 x 600 panel and one 1200 x 300 panel; or
- (iii) one 1200 x 600 panel.

Sign mountings shall comply with Clauses 2.5.2 and 3.3 of this Part of the *Manual*.















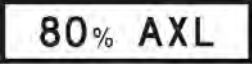



Sign panels for use in a multi-message sign are shown in Tables D1 to D8, and typical arrangement diagrams are shown in Figure D1. These may be appropriately extended to suit other short-term and long-term roadwork situations.


When duplicating multi-message signs on the right-hand side of a road, the multi-message panels are typically mirror reversed in terms of their position relative to the driver. Refer to Figure D2 for examples.

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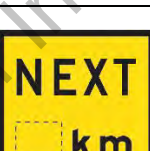



**Table D1 – Multi-message sign plates – regulatory signs**















Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Regulatory Series</b>					
	Black & Red on White	TC1818 (L)		Red on White	T1-Q16
	Black on White	TC1475_1		Red on White	R6-6-Q01
	Black & Red on White	TC1217		Black on White	TC1475_2
	Black on White	TC1475_3		Black on White	TC1419
	Black on White	TC1807_1		Black on White	TC1808_1
	Black on White	TC1807_2		Black on White	TC1805
	Black on White	TC1807_3		White & Red on White	TC1884
	Black on White	TC1807_4		Black on White	TC1928
	Black on White	TC1946		Black on White	TC2074_2















Legend	Colour	Remarks	Legend	Colour	Remarks
Regulatory Series					
	Black on White	TC2005			



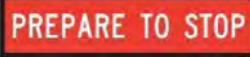
















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**Table D2 – Multi-message sign plates – advance signs**

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Advance Series</b>					
	Black on Yellow	TC1821_1		Black on Yellow	TC1216
	Black on Yellow	TC1169		Black, Red & White on Yellow	TC1452
	Black on Yellow	TC1270		Black on Yellow	TC2299_1
	Black on Yellow	TC2299_2		Black on Yellow	TC1465_2
	Black on Yellow	TC1214		Black on Fluorescent Orange	TC1465_1
	Black on Yellow	TC1215		Black on Fluorescent Orange	TC1332
	Black on Yellow	T1-Q03		Black on Fluorescent Orange	TC1257
	White on Red	TC1173		Black on Fluorescent Orange	TC1312















Legend	Colour	Remarks	Legend	Colour	Remarks
Advance Series					
	White on Red	TC1712		Black on Yellow	TC1803_1
	Black on Yellow	TC1803_2		Black on Yellow	TC1819
	Black & Red on Yellow	TC1311_1		Black on Yellow	TC1398
	Black on Yellow	TC1311_3		Black on Yellow	TC1526
	Black on Yellow	TC1828		Black on Yellow	TC1668
	Black on Yellow	TC1991_2		Black on White	TC1930
	Black on White	TC1817		Black on Yellow	TC1947_1

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Advance Series</b>					
	Black on Yellow	TC1820		Black & Red on Yellow	TC1947_2
	Black on Yellow	TC1527		Black on Yellow	TC1950_1
	Black on Yellow	TC1950_2		Black on White	TC2074_1
	Black on White	TC1954		Black on Yellow	TC2016(L)
	Black on Yellow	TC2065		Black on Yellow	TC2016(R)
	Black on Yellow	T1-1-Q01		Black on Yellow	TC2035
	Black on White	TC1174		Black on Yellow	TC2047_2




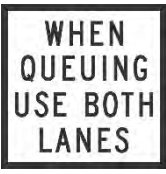


Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Advance Series</b>					
	White on Red	TC1220		Black on Yellow	TC2036
	White on Red	TC1362		Black on Yellow	TC2254
	Black on Yellow	TC1221		White on Red	T4-Q04_2
	Black on Yellow	TC1325		Black on Yellow	TC1529
	Black on Yellow	TC1425		Black on Yellow	TC1403
	Black on Yellow	TC1821_2		Black on Yellow	TC1178
	Black on Yellow	TC1869		Black on Yellow	TC2037
	Black on Yellow	TC1952		Black on Yellow	TC1311_3
	Black on Yellow	TC1533		Black on Yellow	TC1910(R)
	Black on Yellow	TC1822			










**Table D3 – Multi-message sign plates – position signs**

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Position Series</b>					
	Black on Yellow	TC1359_1		Black on Yellow	TC1359_6
	Black on Yellow	TC1359_2		Black on Yellow	TC1359_7
	Black on Yellow	TC1359_3		Black on Yellow	TC1359_8
	Black on Yellow	TC1359_4		Black on Yellow	TC1359_9
	Black on Yellow	TC1359_5		Black on Yellow	TC1359_10
	Black on Yellow	TC1359_11		Black on Yellow	TC1359_12
	Black on Yellow	TC1359_13		Black on Yellow	TC1844_1

















Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Position Series</b>					
	Black on Yellow	TC1844_2		Black on Yellow	TC1843_1
	Black on Yellow	TC1843_2		Black on White	TC2285
	Black on White	TC2286		Black on Yellow	TC2287

**Table D4 – Multi-message sign plates – traffic diversion signs**









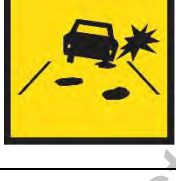
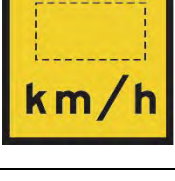

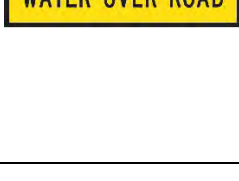


Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Traffic Diversion Series</b>					
	Black on Yellow	TC1901		Black on Yellow	TC1902
	Black on Yellow	TC1903		Black on Yellow	TC2001
	Black on Yellow	TC2291_1		Black on Yellow	TC2291_2
	Black on Yellow	TC2291_3			




**Table D5 – Multi-message sign plates –pedestrians and cyclists signs**

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Pedestrians and Cyclists Series</b>					
	Black on Yellow	TC1414(L)		Black on Yellow	TC2216
	Black on Yellow	TC2213		Black on White	TC2217
	Black on Yellow	TC2214		Black on Yellow	TC2215(L)
	Black on Yellow	TC1397		Black on White	TC2279
	Black on Yellow	TC2292_1		Black on Yellow	TC2292_2
	Black on Yellow	TC2293_1		Black on Yellow	TC2293_2






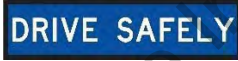
Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Pedestrians and Cyclists Series</b>					
	Black on Yellow	TC2294_1		Black on Yellow	TC2294_2

**Table D6 – Multi-message sign plates – road condition signs**

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Road Condition Series</b>					
	Black on Yellow	TC1218		Black on Yellow	TC1172
	Black on Yellow	TC1219		Black on Yellow	TC1667
	Black on Yellow	TC1467		Black on Yellow	TC1804
	Black on Yellow	TC1466_1		Black on Yellow	TC1501
	Black on Yellow	TC1665		Black on Yellow	TC2253
	Black on Yellow	TC1926		Black on Yellow	TC1466_2
	Black on Yellow	TC1400		Black on Yellow	TC1951













Legend	Colour	Remarks	Legend	Colour	Remarks
Road Condition Series					
	Black on Yellow	TC1953		Black on Yellow	TC2282
	Black on Yellow	TC1991_3			

**Table D7 – Multi-message sign plates – termination signs**














Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Termination Series</b>					
	Black on Yellow	TC1170		Black on Yellow	TC2001
	Black on Yellow	TC1801		Black on Yellow	T2-16-Q01
	Black on White	TC1808_2		White on Blue	TC1177



**Table D8 – Multi-message sign plates – other signs**

Legend	Colour	Remarks	Legend	Colour	Remarks
Incident, Fire and Emergency Series					
	Black on Fluorescent Yellow	TC1396_1		Black on Fluorescent Yellow	TC1396_2
	Black on Fluorescent Yellow	TC9914_2			
Miscellaneous Series					
	Black on Yellow	TC2064		Black on Yellow	TC1510
	Blue on White	TC1311_2		Black on Yellow	TC2083_1
	Blue on White	TC1849_1		Black on Yellow	TC2083_2
	Blue on White	TC1849_2		Black on Yellow	TC2083_3
	Black on Yellow	TC2051_2			

**Table D9 – Multi-message sign plates – event signage**

Legend	Colour	Remarks	Legend	Colour	Remarks
<b>Event Series</b>					
	Black on Fluorescent Yellow / Green	ETM01_1		Black on Fluorescent Yellow / Green	ETM01_2
	Black on Fluorescent Yellow / Green	ETM02_1		Black on Fluorescent Yellow / Green	ETM02_2
	Black on Fluorescent Yellow / Green	ETM02_3			
	Black on Fluorescent Yellow / Green	ETM03_1		Black on Fluorescent Yellow / Green	ETM03_2
	Black on Fluorescent Yellow / Green	ETM04_1		Black on Fluorescent Yellow / Green	ETM04_2
	Black on Fluorescent Yellow / Green	ETM05_1		Black on Fluorescent Yellow / Green	ETM05_2
	Black on Fluorescent Yellow / Green	ETM06_1		Black on Fluorescent Yellow / Green	ETM06_2





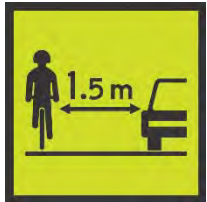









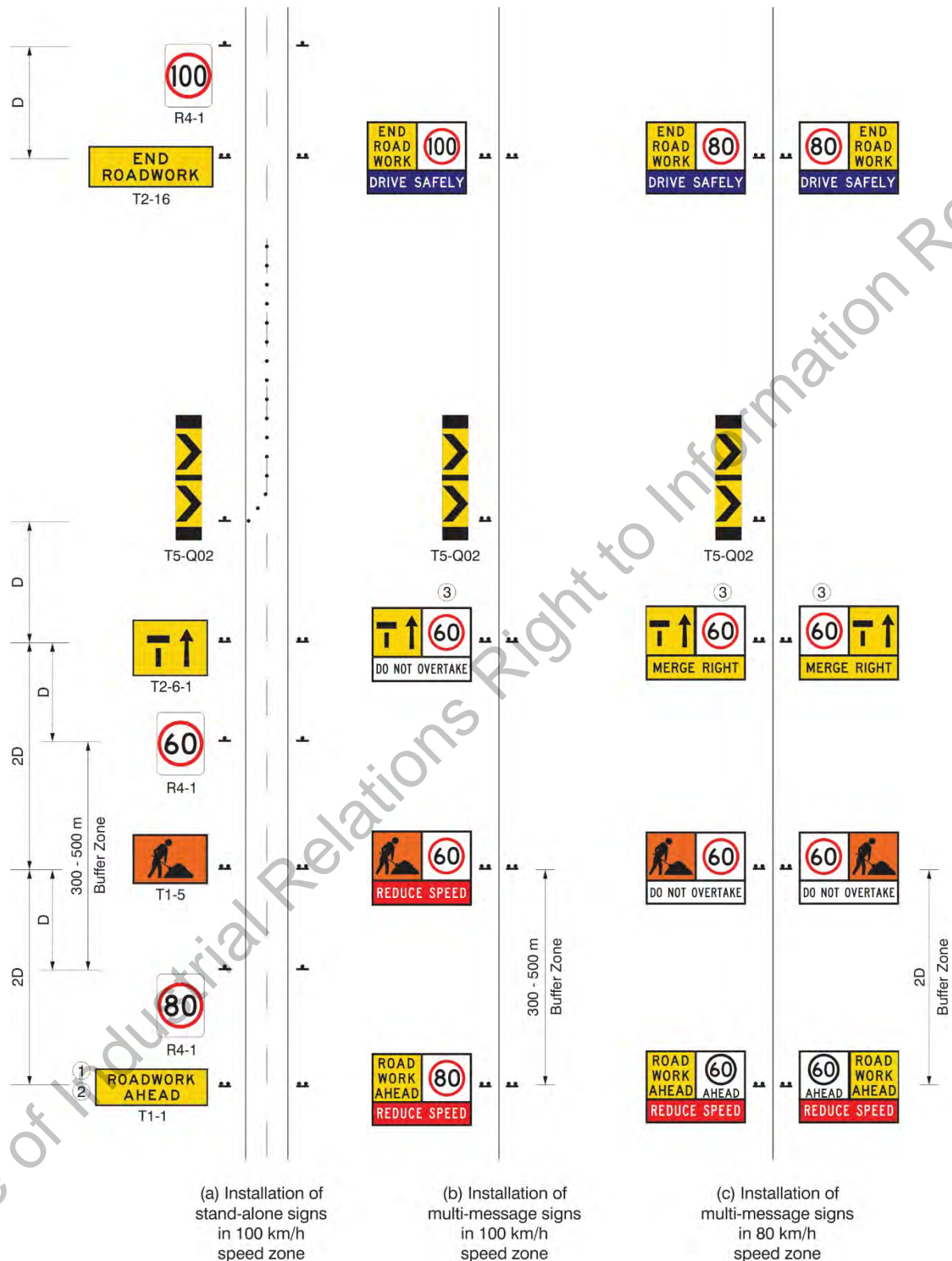
Legend	Colour	Remarks	Legend	Colour	Remarks
	Black on Fluorescent Yellow / Green	ETM07_1		Black on Fluorescent Yellow / Green	ETM07_2
	Black on Fluorescent Yellow / Green	ETM08_1		Black on Fluorescent Yellow / Green	ETM08_2
	Black on Fluorescent Yellow / Green	ETM09_1		Black on Fluorescent Yellow / Green	ETM09_2
	Black on Fluorescent Yellow / Green	ETM10_1		Black on Fluorescent Yellow / Green	ETM10_2
	Black on Fluorescent Yellow / Green	ETM11_1		Black on Fluorescent Yellow / Green	ETM11_2
	Black on Fluorescent Yellow / Green	ETM12_1		Black on Fluorescent Yellow / Green	ETM12_2
	Black on Fluorescent Yellow / Green	ETM13_1		Black on Fluorescent Yellow / Green	ETM13_2

Figure D1 – Left lane closure – Multilane, divided road



NOTES:

1. Sign needed if presence of next advance sign would be unexpected.
2. The Speed Restriction sign may be mounted together with the Roadwork Ahead sign, where desirable. Signing shown for one approach only.
3. Speed limit as required for road worker safety or road user safety.



Figure D2 – Duplication of multi-message sign example



NOTE: When duplicating multi-message signs on the right-hand side of a road the multi-message panels are typically mirror reversed in terms of their position relative to the driver.

## Appendix E – Protection and delineation at excavation works

### E1 General

For the purposes of this Appendix, an excavation shall be regarded as a longitudinal depression with the slope of the side adjacent to traffic 1.5 vertical to 1 horizontal or steeper.

### E2 Means of protection or delineation

The means of protection or delineation specified in Table E1 shall be provided as follows:

- a) Standard delineation – traffic cones or temporary bollards provided in accordance with Clause 3.9.1 and Table 3.7.
- b) Close delineation – traffic cones or temporary bollards as for Item E2a) but spaced at 4 m maximum in all cases.
- c) Safety barrier – Barriers in accordance with Clause 3.10.3.

**Table E1 – Protection / delineation adjacent to excavations**

Speed of traffic <sup>1</sup> km/h	Traffic volume <sup>2</sup> vpd	Clearance to excavation <sup>3</sup> m	Depth of excavation, mm		
			50 to 250	260 to 500	> 500
< 70	All	< 2.5	Standard delineation	Close delineation	Safety barrier
		2.5 to 5.0	Standard delineation	Standard delineation	Close delineation
		> 5.0	None	None	None
≥ 70	≤1500	≤ 5.0	Standard delineation	Close delineation	Safety barrier
		> 5.0	None	None	None
	> 1500	≤ 6.0	Standard delineation	Close delineation	Safety barrier
		> 6.0	None	None	None

#### NOTES:

- 1. Posted speed limit during roadworks.
- 2. For multilane roads, one-way volume. For 2-lane, 2-way roads, sum of both directions.
- 3. Clearance to nearest edge of traffic lane or nominal edge if the edge is not marked.

### E3 Risk assessment

A site-specific risk assessment (Clause 2.2.3) shall be undertaken for all excavations. The risk assessment shall be based on the consideration of the following–

- a) length of excavation parallel to the roadway;
- b) duration of exposure; and
- c) road alignment.

Where determined through the risk assessment, the recommended treatment in Table E1 may be varied accordingly.

**E4      *Lateral clearance***

Table E1 shows clearances below which protection or delineation is required.

Clearances to delineating devices and safety barriers are specified in Clause 4.13.4

**E5      *Lateral excavations***

A site-specific risk assessment (Clause 2.2.3) shall be completed for all instances involving lateral excavations in proximity to traffic. Where there is a need to delineate or protect traffic, the requirements in Clause E2 for longitudinal excavations may be considered or modified as required.

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## **Appendix F – Roadworks at intersections**

### ***F1 General***

Whenever it is necessary to undertake roadworks within an intersection, advance warning signs should be erected on each of the approaches to the intersection. Signs are required also, depending upon the situation and the extent of works affecting each approach to the intersection. It is necessary to investigate each approach in turn and select an appropriate method of signing.

Traffic should be guided through the intersection by traffic cones and, if necessary, by temporary hazard markers (see Clause 3.9.3) located so that the trafficable area of pavement retains the form of an intersection, although reduced in size. If the obstruction is long-term, barriers, delineators and other devices should be used as necessary for this purpose. Adequate tapers in advance of closed areas of roadway are essential.

At intersections with minor roads or streets, consideration should be given to closing the minor street entrance temporarily and detouring traffic by other routes. At intersections with major routes, it may be necessary to ban some turning movements if there is insufficient space to accommodate them adequately or if they would be difficult to provide for at times of high traffic volumes.


On approaches to intersections carrying mainly through traffic, and where the obstruction occurs on the far-left side of the intersection, it is desirable to create a taper on the approach side of the intersection so that merging manoeuvres take place in advance of, rather than within, the intersection.

A central obstruction within the intersection should have signs to indicate the path by which both through and right-turning traffic, if any, may negotiate it. Traffic Controllers or police may be needed in such locations. Small median or channelising islands formed with traffic cones or temporary kerbs may be required on one or more of the approaches.


## Appendix G – Supplementary list of temporary roadworks signs

This Appendix describes the use of signs for special situations at temporary roadworks. Further details of the design of the signs may be obtained from the Department of Transport and Main Roads, Brisbane.


### a) Roadwork Ahead

	T1-Q06	This is used only on narrow medians and shoulders where the standard T1-1 or T1-31 Roadwork Ahead signs would be an obstruction to traffic. The sign size is 600 x 900.
---	--------	---


### b) Roadwork on side road (arrow)

	T1-Q07	This sign may be used in advance of a 4-way intersection where work is being carried out on a side road, there is insufficient distance to provide appropriate signing of the work on the side road and it is desired to indicate which side road is subject to roadworks. The sign is used in lieu of the ROADWORK ON SIDE ROAD (T1-25) sign in this case. The sign size is 900 x 600.
--	--------	---


### c) Linemarkers on road

	T1-Q08	This sign may be used in lieu of the Workers (symbolic) (T1-5) sign to warn approaching traffic that line markers are working on the road ahead. This sign is used in addition to, not to replace, other temporary signs. The A size sign is 1500 x 600; B size is 1800 x 600.
---	--------	--


### d) Mobile linemarking ahead

	T1-Q09	This sign may be used to warn approaching traffic that line marking machines are working on the road ahead. It may be mounted on a job support vehicle travelling behind or ahead of the line marking machine in which case a panel of chevrons is incorporated into the sign, or an illuminated flashing arrow sign used with the sign, to indicate the side of the vehicle to which traffic should pass. The sign size is 900 x 600.
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e) Tractor / Slasher mowing

	T1-Q10	This sign may be used in lieu of the ROAD PLANT AHEAD (T1-3) sign at frequently changing work areas where grass mowing is being carried out. The sign size is 900 x 600.
---	--------	--


f) Lane status

	T2-Q07	This sign is used where one or more lanes are closed on a four-lane roadway. It gives only advance warning of the lane closure and is used in conjunction with appropriate roadwork signing for the work site. The sign size is 2230 x 900.
---	--------	---


g) Wet paint (left, right)

	T6-Q08	<p>This sign is used as required to protect freshly painted pavement markings while paint is drying. It may be used on intermediate vehicles in a mobile line marking convoy. LINEMARKING (T6-Q06) sign is required on leading and trailing vehicles.</p> <p>When the vehicle is equipped with an illuminated flashing arrow sign, the chevron panel is not required.</p> <p>The A size sign is 1200 x 600; the B size is 1800 x 750.</p>
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h) Traffic signal not in use

	T3-Q02	This sign is erected over lanterns at a new traffic signal installation prior to commencement of normal operation. The sign size is 300 x 900.
---	--------	--

i) Signals under repair

	T3-Q03	This sign is erected where it is desired to advise approaching traffic that the signals are not operating and are under repair. The sign size is 1200 x 700.
---	--------	--

j) ROADWORKS NEXT ... km ... TO ... EXPECT DELAYS

	TC9862	This sign is erected prior to the commencement of roadworks to inform road users of impending works and expected delays.
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## **Appendix H – Emergency and unplanned works**

### **H1     *General***

This Appendix specifies procedures for the safe control of traffic and the safety of road authority workers attending emergency and unplanned work sites.

Whilst as indicated following, initial and short-term measures will, in many cases, be taken by police, the primary security of the site and the follow-up control and protection measures for longer-term situations will often be provided by the road authority. Because of the speed at which it will usually be necessary to deploy road authority resources, frequently outside working hours, specific work methods and procedures for attending emergency closures or part-closures should be developed, and work units likely to be allocated to these tasks trained in their use. The procedures should include the following:

- a) Duties of workers attending the site.
- b) Modified duties where there are initially, insufficient workers available for optimum control of the site, for example, the need for a single Traffic Controller to control traffic in two directions.
- c) Procedures for contacting police, emergency services, back-up assistance from the road authority and any other needed help, including when usual communication (mobile telephone) is not available or not working.
- d) Equipment that is to be ready at all times on potential callout vehicles.

### **H2     *Initial response***

Initial attendance at an incident site will often be by police, fire or emergency services personnel trained and equipped for incident management. They will not necessarily remain on site for the entire length of the closure.

The initial response will typically be achieved using whatever equipment / devices are available to the first responders. This treatment should be increased to those recommended in Clause H3 and Figure H1 as further equipment and resources are available at the site.

### **H3     *Interim response***

Where a road authority work unit assists with traffic management or takes over from police or other emergency service units, the following shall apply:

- a) *Minor partial road closure*

For closures where traffic can continue to flow in both directions (two-way road), or at least one lane in each direction is open (divided road), a vehicle with a vehicle-mounted warning device in accordance with Clause 3.12.1 shall be placed to shadow the closure at one or both ends of the incident site as necessary.

b) *Major partial road closure*

For closures where traffic is restricted to one-way movement past the incident site, the vehicle as in Item H3a) and Traffic Controllers in accordance with Clause 4.10 shall be provided at both ends of the site. Where the posted speed limit is more than 60 km/h, high priority shall be given to the provision of advance signs—

- i. TRAFFIC HAZARD; and
- ii. Traffic Controller Ahead / PREPARE TO STOP.

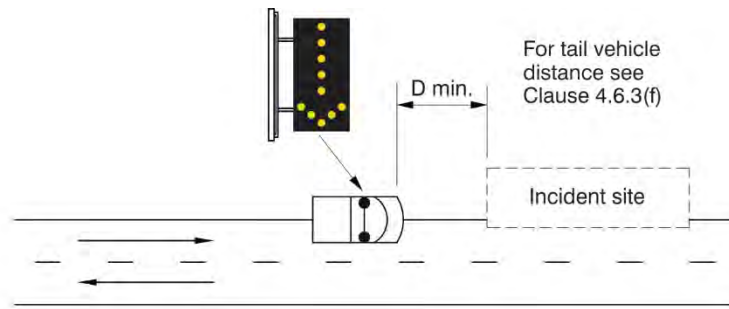
c) *Complete road closure*

The requirements of Item H3b), together with barricades, in accordance with Clause 3.8.3, across the entire roadway shall be provided.

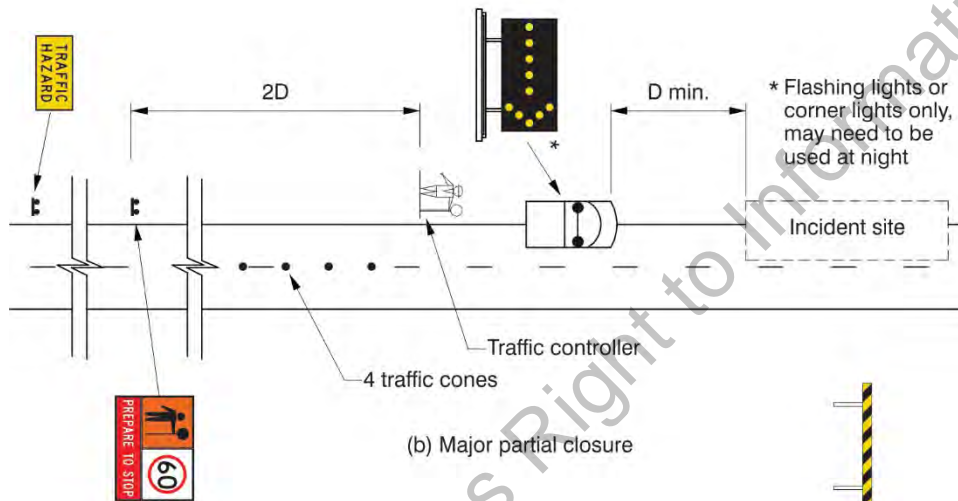
As far as practicable, the positioning of the closure point in Item H3b) and the barricade position in Item H3c) should be at least distance D from the incident site, and Traffic Controller positions placed so as to be visible to approaching traffic for a distance of at least 2D.

Typical location of devices for initial response protection purposes is shown in Figure H1.

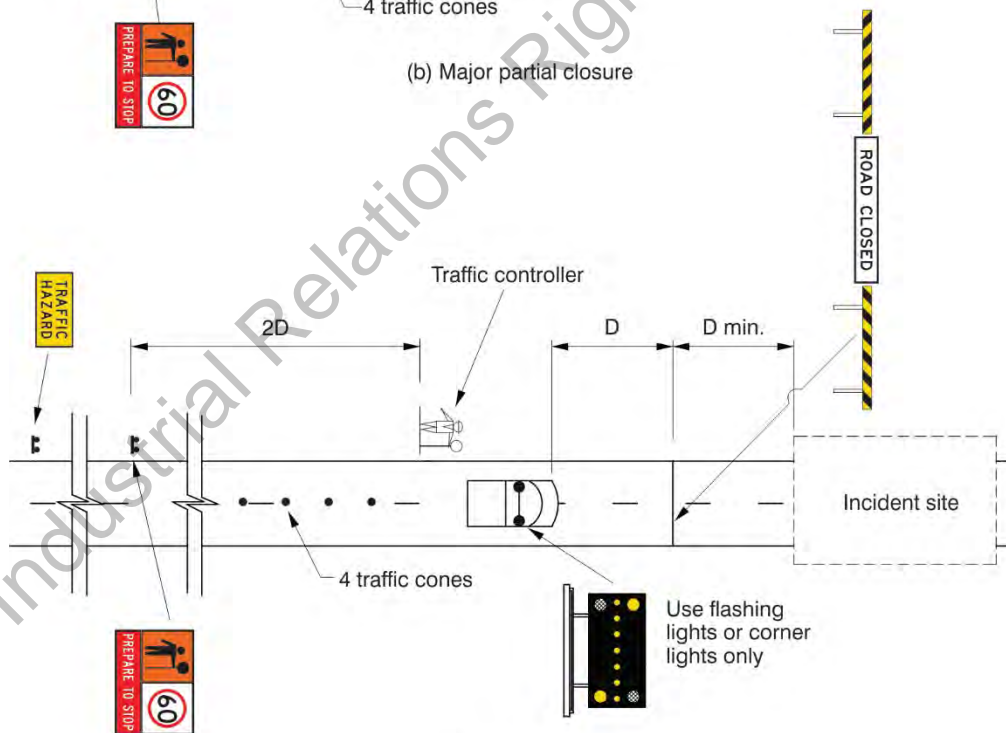
**Figure H1 – Interim response at an incident site**



(a) Minor partial closure



(b) Major partial closure



(c) Complete closure



#### **H4 Follow-up protection**

Follow-up protection shall comprise the setting up of a static work site in accordance with Clause 4.2.

Follow-up protection for sites where it is clear that the closure or part-closure will be required for a period longer than four hours shall be effected as quickly as practicable and not delayed longer than two hours with the following exceptions:

- a) On roads in remote areas with traffic volumes less than 1500 vpd, follow-up measures may be delayed until support resources can reach the site but not for periods in excess of 12 hours.
- b) Where the closure is likely to be re-opened within four hours, subject to advance signs as specified in Item H3b) being in position at all sites and at all times where Traffic Controllers are in use, follow-up measures may not be required.

The development of a Traffic Management Plan is likely to be impractical; however, responders on site should apply a checklist of typical issues and risks contained within a Traffic Management Plan and be able to address these issues as they become evident with input from a Traffic Management Design professional.

## Appendix I – The use of pilot vehicles at roadworks

### I1 General



Pilot vehicles may be used at roadwork sites in accordance with Clause 4.12 of this Part of the *Manual*.

### I2 Legislation

Traffic control devices at roadworks are installed under the Traffic Operations (Road Use Management – Road Rules) Regulation 2009.

### I3 Pilot vehicle sign

The minimum identification of a pilot vehicle shall be a vehicle-mounted warning device (see Clause 3.12.1), together with T6-Q09, which is attached to the rear of the vehicle. The PILOT VEHICLE IN USE (T1-Q13) sign shall be installed a minimum of D in advance of the location where the pilot vehicle operates.

	
T6-Q09	T1-Q13

## **Appendix J – Traffic Controllers**

### **J1 Authority to perform role**

A person must not perform the role of a Traffic Controller in Queensland on a road unless the person holds a current Traffic Controller accreditation issued by the Department of Transport and Main Roads (see Clause 1.4.20), and the person holds a current Occupational Health and Safety Construction Induction card issued under the authority of the Queensland Department of Justice and Attorney-General.

An accredited Traffic Controller is authorised to control traffic:

- a) At road worksites where a road closure or part road closure is necessary.
- b) At other events on the road where a road closure or part road closure is necessary.
- c) In other circumstances where traffic control is required on a roadway.

The Traffic Controller Accreditation Scheme is administered by the Department of Transport and Main Roads.

Accreditation is issued to a person who meets relevant training, suitability and medical fitness requirements. Training course completion is a pre-requisite for initial accreditation and for the renewal of accreditation.

Accreditation is issued and remains current for a period of three years before expiring, at which time a refresher course or other training is required to be completed.

An accredited Traffic Controller must comply with statutory conditions for appointment and must not contravene the *Traffic Controller Accreditation Scheme Approved Procedure*.

### **J2 Traffic Controllers operating on Queensland roads**

An accredited Traffic Controller must direct traffic in a way stated in both the *Traffic Controller Accreditation Scheme Approved Procedure* and this *Manual*.

A person must not perform traffic control duties at any time unless they are medically fit to perform the role; and are not fatigued. Whilst controlling traffic, Traffic Controllers must have a 'zero percent' blood / alcohol concentration level and must not be adversely affected by any drug or other medication causing impairment or loss of concentration.

In addition to holding an accreditation authority, a Traffic Controller must comply with strict operational and safety requirements at all times whilst controlling traffic. These requirements are set out in the *Traffic Controller Accreditation Scheme Approved Procedure* and this Part of the *Manual*.

Managers and supervisors of Traffic Controllers have a responsibility for checking and monitoring traffic control operations closely and ensuring that all Traffic Controllers are properly briefed and supported.

Managers and supervisors of Traffic Controllers should be aware of their obligations under this *Manual*, the *Traffic Controller Accreditation Scheme Approved Procedure*, and Workplace Health and Safety legislation.

The *Traffic Management for Construction or Maintenance Work Code of Practice 2008* is a practical guide for achieving the standards of health, safety and welfare required under Workplace Health and

Safety legislation. The code should be familiar to all persons who have responsibility for managing risks posed by traffic to road construction and road maintenance workers.

**J3      *Approved Traffic Controller course***

The Department of Transport and Main Roads has developed a training course to provide knowledge and skills suitable to perform the function of a Traffic Controller in Queensland. The approved Traffic Controller course:

- i. Is a fully contextualised course including the national competency unit *Control traffic with Stop-slow bat*. The course encompasses all Traffic Controller Accreditation Scheme requirements.
- ii. Is a prerequisite for accreditation as a Traffic Controller in Queensland.
- iii. Is delivered by registered training organisations under licence with the Department of Transport and Main Roads.

## **Appendix K – Courses in traffic management**

### **K1 General**

The following traffic management courses are being delivered by the Department of Transport and Main Roads or by formal agreement between the Department of Transport and Main Roads and approved registered training organisations. These courses have been designed to provide participants with information and knowledge about this *Manual* and traffic management at road works (see Clause 1.4.3).

a) **Working in Proximity to Traffic awareness courses**

A basic roadwork signage awareness course and application courses primarily for new entrants to industry.

b) **Traffic Management Implement course**

- i. A course for persons required to implement Traffic Guidance Schemes and set out roadwork signage in accordance with this *Manual*.
- ii. This course is delivered by registered training organisations under licence with the Department of Transport and Main Roads.

c) **Traffic Management Design course**

A course for persons required to design, develop, review and inspect Traffic Management Plans and Traffic Guidance Schemes in accordance with this *Manual*.

Clauses K2 and K3 have been removed from this document and have been issued as Section 1.4.31 in the Queensland MUTCD Part 3 Supplement.

## **Appendix L – Quick reference guides**

The contents of Appendix L have been removed from this document and have now been issued as Section 4.7.2-1 in the Queensland MUTCD Part 3 Supplement.

Office of Industrial Relations Right to Information Release

Office of Industrial Relations Right to Information Release



# Traffic management for construction or maintenance work

Code of Practice 2008

Office of Industrial Relations Right to Information Release

This Queensland code of practice was preserved as a code of practice under section 284 of the *Work Health and Safety Act 2011*.

This code was varied by the Minister for Education and Industrial Relations on 27 November 2011 and published in the Queensland Government Gazette on 2 December 2011.

This preserved code commenced on 1 January 2012.

This code was varied by the Minister for Education and Industrial Relations on 1 July 2018.

Office of Industrial Relations Right to Information Release

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# 1. Introduction

The *Traffic management for construction or maintenance work Code of Practice* is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the *Work Health and Safety Regulation 2011* (the WHS Regulation).

From 1 July 2018 duty holders are required to comply either with an approved code of practice under the WHS Act or follow another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety to the standard required in the code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks which may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

## How the code is organised

In providing guidance, the word 'should' is used in this Code to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

This code also includes various references to provisions of the WHS Act and WHS Regulation which set out the legal requirements. These references are not exhaustive. The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

## Who has duties?

A **person conducting a business or undertaking** (PCBU) has the primary duty under the WHS Act to ensure, as far as reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking.

**Officers**, such as company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the WHS Act and WHS Regulation. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to provide and maintain a safe work environment.

**Workers** have a duty to take reasonable care for their own health and safety and that they do not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace.

### Consulting workers

Consultation involves sharing of information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

The WHS Act requires that you consult, so far as is reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health and safety matter.

If the workers are represented by a health and safety representative, the consultation must involve that representative.

You must consult your workers when proposing any changes to the work that may affect their health and safety.

### Consulting, cooperating and coordinating activities with other duty holders

The WHS Act requires that you consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

Sometimes you may share responsibility for a health and safety matter with other business operators who are involved in the same activities or who share the same workplace. In these situations, you should exchange information to find out who is doing what and work together in a cooperative and coordinated way so that all risks are eliminated or minimised as far as reasonably practicable.

Further guidance on consultation is available in the *Work health and safety consultation, co-ordination and co-operation Code of Practice*.

## 1.1 Purpose

The purpose of this code is to assist persons to manage workplace health and safety risks posed by **traffic** to workers and other persons while construction or maintenance work is occurring on, or adjacent to, roads.

## 1.2 What is this code of practice about?

This code of practice:

- provides information about some of the hazards and risks associated with traffic management for construction or maintenance work
- provides information on traffic control measures
- clarifies the roles and responsibilities of traffic controllers and **associated persons**, and
- provides recommendations for training in the application of the *Manual of Uniform Traffic Control Devices Part 3* (MUTCD Part 3) for persons associated with construction or maintenance work on, or adjacent to, a road.

## 1.3 Scope of application

This code applies to traffic management for construction or maintenance work on, or adjacent to, a road.

The following examples are provided as a guide, and should not be considered as an exhaustive list.

**Construction work** includes:

- building a new road
- repairing a road
- resealing or resurfacing a road

- resheeting a gravel road
- laying drainage pipes
- repairing footpaths
- excavation and landscaping associated with the previous activities.

**Maintenance work** includes:

- mowing the median strip of a road
- trimming trees on a median strip or footpath
- undertaking work on underground or overhead services or utilities.

The code does not apply to activities performed by persons that do not relate to construction or maintenance work, such as:

- police officers performing rostered duty, overtime or special duties
- the driver of a tow truck retrieving a broken down vehicle
- a garbage truck driver picking up rubbish
- or a taxi carrying passengers.

## 1.4 Legislation

In order to understand relevant workplace health and safety requirements for work associated with construction or maintenance work on roads, a person must consider and understand the following legislation:

- *Work Health and Safety Act 2011* (the WHS Act)
- *Work Health and Safety Regulation 2011* (the WHS Regulation)
- *Electrical Safety Act 2002*
- *Electrical Safety Regulation 2013*
- *Transport Operations (Road Use Management) Act 1995*
  - s 72a Way to install official traffic sign
  - s 166(2) Official traffic sign approvals
- *Transport Operations (Road Use Management-Accreditation and Other Provisions) Regulation 2015*
- How to manage work health and safety risks Code of Practice
- Hazardous manual tasks Code of Practice
- Plant Code of Practice
- Managing noise and preventing hearing loss at work Code of Practice
- Concrete pumping Code of Practice
- Mobile crane Code of Practice
- Tower crane Code of Practice
- Tilt-up and pre-cast construction Code of Practice
- Formwork Code of Practice

## 2. Construction and maintenance work

### 2.1 Introduction

The WHS Regulation defines construction work on, or adjacent to, a road, as **high risk construction work**. A project that involves construction work where the cost is more than \$250 000 is a construction project. A person conducting a business or undertaking (PCBU) that commissions a construction project is the **principal contractor** for the project. However, this person may choose to appoint another PCBU as principal contractor for the construction project and authorise that person to have management or control of the workplace and to discharge the duties of a principal contractor. The principal contractor has additional requirements under the WHS Regulation to those of a PCBU conducting high risk construction work. The information contained in this section will assist principal contractors and PCBUs to identify these requirements.



## 2.2 Principal contractors for construction projects

The following list of requirements is not exhaustive, and reference should be made to the WHS Act and the WHS Regulation for all the duties of principal contractors. As a principal contractor is also a PCBU, the principal contractor must also comply with the duties of a PCBU.

Principal contractors performing construction work on roads or road-related areas must:

- prepare a written WHS management plan, in accordance with the WHS Regulation before work on the project starts
- ensure that each person who is to carry out construction work in connection with the project is informed about the WHS management plan
- keep a copy of the WHS plan for the project in accordance with the WHS Regulation
- take all reasonable steps to obtain a copy of the safe work method statement relating to high risk construction work before the high risk construction work starts.

The preparation of a traffic management plan or traffic guidance scheme, in accordance with the requirements and recommendations of the MUTCD Part 3, should form part of, or an attachment to, the WHS management plan.

## 2.3 PCBUs for construction work

A PCBU for high risk construction work must ensure a safe work method statement is prepared for the work. The safe work method statement is a written statement prepared by, or under the direction of, the PCBU, that in part:

- identifies work that is high risk construction work
- specifies hazards relating to high risk construction work and risks to health and safety associated with those hazards
- describes the measures to be implemented to control the risks  
(*Example of a control measure to be used* - the relevant person will, when working on or near a road, comply with the MUTCD Part 3)
- describes how the control measures will be implemented, monitored and reviewed.

A safe work method statement for high risk construction work may be a generic safe work method statement prepared for workplaces, where the activity is to be performed in the same way, in the same or similar circumstances. As traffic controllers are performing high risk construction work, a safe work method statement must also be prepared for that work. Reference should also be made to the WHS Regulation that outlines the requirements for safe work method statements. A sample safe work method statement for work on, or adjacent to, a road, is contained in Appendix 2.

## 2.4 PCBUs for maintenance work

The PCBU is not required to complete safe work method statements for work other than construction work on roads or road-related areas, but is still required to manage the health and safety of their workers.

A PCBU has a duty to ensure the health and safety of workers, so far as is reasonably practicable. PCBUs also have the same duty of care to any other people who may be at risk from work carried out by the business.

The *How to manage work health and safety risks Code of Practice* provides practical guidance for persons who have duties under the WHS Act to manage risks to health and safety.

## 2.5 Workers and other persons

Workers and other persons at a workplace also have the following duties at work under the WHS Act:

- to take reasonable care for their own health and safety and that of others who may be affected by their actions or omissions
- to comply and cooperate with any reasonable instructions given by the PCBU and any reasonable policy or procedure of the PCBU to comply with the WHS Act or WHS Regulation.

## 3. Risk management

### 3.1 Introduction

The most obvious hazard to persons undertaking construction work or maintenance activities on, or adjacent to, a road, is the risk of death or injury resulting from coming into contact with vehicular traffic or moving plant. Appropriate control measures for these risks are outlined in sections 4-7 of this code. In addition, there are other hazards and risks identified in section 8 of this code that may be relevant to the work.

Nonetheless, the risk management process outlined in the WHS Regulation and the *How to manage work health and safety risks Code of Practice* must be followed in order to identify all hazards and risks.

### 3.2 Risk management

Risk management involves the identification and analysis of all hazards likely to arise during work on roads, including the setting up, operating, changing and ultimate dismantling of a traffic guidance scheme, followed by the determination of appropriate measures to manage exposure to the risks. The process is appropriate at all levels of planning and operation, including when preparing:

- standardised plans and procedures for the conduct of minor routine and mobile work, and
- traffic guidance schemes for more extensive or complex work, where site-specific risks will assume importance.

In each case, the process should be carried out by first identifying all the hazards likely to arise, and evaluating them for the likelihood of occurrence and adverse consequences, using historical data, experience or other means. The proposed procedural statement or traffic guidance scheme should then be checked in detail to ensure that adequate means of controlling or reducing those risks found to be significant, are in place.

## 4. Traffic management

### 4.1 Introduction

In busy built-up areas, speeding motorists, cyclists, pedestrians and workers all interact with construction vehicles, heavy equipment, attenuator trucks and road pavers within the road construction site. In more remote areas, it is not uncommon for a road worker to be working alone, often not visible, protected only by traffic cones and speed signs.

There are numerous ways to control the risks associated with working on roads or road-related areas. Following are some examples of a number of traffic control measures that may be considered:

- road closures
- footpath closures
- detours
- signing
- traffic controllers.

When considering control measures such as road or footpath closures, advice and approvals should be obtained from relevant authorities, including the local council, where the work is to be conducted, or the Queensland Police Service.

## 4.2 Manual of Uniform Traffic Control Devices Part 3 (MUTCD Part 3)

The MUTCD Part 3 provides the technical background and guidance for the placement of temporary traffic control signs and devices used at road works. The MUTCD Part 3 also provides standard diagrams for traffic guidance schemes across a range of work activities and worksites. Selection processes are provided that use tables of key site information including:

- lane configuration
- traffic volume
- approach speed
- type of work.

These selection processes are used to guide a principal contractor or relevant person to select the most appropriate traffic guidance scheme for a particular situation. However, it should be noted that the traffic guidance schemes provided in the MUTCD Part 3 may not be appropriate for every situation, and it may be necessary to design a scheme that is suitable for the individual worksite in question.

## 4.3 Responsibilities

There is a primary duty to provide a safe workplace environment that minimises the risk of injury to workers within, or adjacent to, the work area. Principal contractors or PCBU's responsible for construction or maintenance work, in accordance with the MUTCD Part 3, need to be aware of their responsibilities for the potential for injury to road users, or damage to property, as a result of this work.

It is the responsibility of a principal contractor or PCBU's, in accordance with the MUTCD Part 3, to ensure that:

- all signs and traffic control devices for construction work or maintenance activities are erected, and
- the placement of speed restriction signing and protective barriers are erected.

Steps should be taken to warn the public of adverse conditions, and to guard, delineate, and, where necessary, illuminate work, which may pose a hazard to road users. Care should also be taken to avoid, wherever possible, long delays or detours which may cause unnecessary inconvenience to road users. Principal contractors and PCBU's carrying out construction or maintenance work on roads that require the use of a traffic guidance scheme should:

- be mindful of their responsibility to provide a safe workplace for personnel and plant under their control, and safe and convenient travelling conditions for road users
- ensure that all personnel at a worksite are aware of their responsibilities, and that traffic controllers are appropriately trained and informed of their duties, and
- be familiar with, and act in accordance with, the provisions of the MUTCD Part 3.

## 4.4 Planning

Careful consideration should be given to the signing of the worksite, no matter how brief the occupation of the site may be. This should include:

- protection of workers
- provision of adequate warning of changes in surface condition, and the presence of personnel or plant engaged in work on the road
- adequate instruction of road users and their safe guidance through, around or past the worksite, and

- safe access and egress to and from the worksite.

Five important basic principles, to be observed, are as follows:

- (i) Signs and devices shall be appropriate to the conditions at the worksite, and shall be used in accordance with the MUTCD Part 3, unless a risk assessment by a competent person indicates that an alternative arrangement is satisfactory.
- (ii) Signs and devices shall be erected and displayed before work commences at a worksite.
- (iii) Signs and devices shall be regularly checked and maintained in a satisfactory condition.
- (iv) Signs and devices shall be removed from a worksite as soon as practicable. However, appropriate signs should remain in place until all work (including loose stone removal and line marking following bituminous surfacing) has been completed.
- (v) Records shall be kept of all work's signing and delineation at roadway or part-roadway closures.

An example of a road signing checklist is outlined in Appendix 3.

## 4.5 Traffic plans

A variety of standard plans/diagrams are provided for selection in the MUTCD Part 3, designed to illustrate the application of traffic control devices as they apply to various worksite situations and circumstances.

These diagrams indicate the appropriate positions of the signs and devices required to guide traffic safely around, through or past the worksite. Worksite situations should be designed according to the principles outlined in the MUTCD Part 3.

Plans should be prepared for:

- **Short-term and mobile work.** Planning in these cases should comprise the development of procedures and the provision of appropriate sets of signs and devices to cover all of the routine tasks the workers will encounter.
- **Work involving relatively simple part-roadway closures.** Planning in these cases should comprise a minimum requirement to sketch the protective devices and delineation required on a road construction or similar plan, and to prepare a list of devices required for the job.
- **Complex traffic arrangements.** Planning in these cases should comprise:
  - plans showing temporary traffic paths, their delineation and the position of traffic control or warning devices, or on multi-stage works, a separate set of plans for each stage
  - details of after hours traffic arrangements, on separate plans, if required, and
  - all necessary instructions for the installation, operation, between-stage rearrangement and ultimate removal of devices at the conclusion of the job, planned well before the job starts, or before the start of the stage to which they apply, so that there is enough time to obtain any special devices or approvals needed.

All essential aspects of traffic plans are to be considered in the following order, and incorporated into the plan, if relevant.

### 4.5.1 Traffic demand

Determine the capacity required to accommodate traffic demand at an acceptable level of service and convenience to road users and to decide on the amount of road space which must remain open, and where applicable, the times of day when greater amounts of road space are needed to handle higher traffic volumes (e.g. urban peak periods).

### 4.5.2 Traffic routing

Select the appropriate means of routing traffic at the site, i.e. through, around or past the site, or a combination of these, and ensuring that all required traffic movements are provided for.

### 4.5.3 Traffic control

Determine the need for traffic control by:

- traffic controller
- traffic signals (portable or permanent)
- police
- other means.

### 4.5.4 Other road users

Determine the need to make provisions for road users, other than vehicular traffic, including:

- pedestrians, including people with disabilities, where appropriate
- bicycles
- school children
- local residents
- emergency vehicles.

### 4.5.5 Special vehicle requirements

Determine the need to provide for vehicles, such as:

- buses, including stops and terminals
- over-dimensional vehicles (e.g. vehicles which, together with their load, are wider or longer than standard)
- restricted vehicles (e.g. vehicles which, although within legal limits, are permitted to use only specified routes).

Depending on circumstances, movement of traffic may be achieved in one of the following ways:

- through the work area, by intermingling with workers or plant
- past the work area by means of a delineated path alongside, but clear of the work area, and
- around the work area by a detour, which may be via a side track, or an existing road.

## 5. Roles and responsibilities of traffic controllers and associated persons

### 5.1 Function of a traffic controller

The function of a traffic controller is to direct traffic in a way stated in the following:

- *Manual of Uniform Traffic Control Devices Part 3* (MUTCD Part 3)
- *Traffic Controller Accreditation Scheme – Approved Procedure* (TCASAP)
- *Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015* (TORUM Regulation).

A traffic controller shall direct traffic at and/or through a worksite, or other event in a manner specified in the approved operating procedure for the safety of all road users and road workers.

### 5.2 Responsibilities of a traffic controller

Accredited traffic controllers are required to operate at the highest standards and to comply with the statutory conditions of their appointment.

A traffic controller must:

- maintain a zero percent blood/alcohol concentration while performing traffic control functions



- not perform traffic control functions while adversely affected by a drug or other medication causing functional impairment
- not direct traffic through a worksite, unless the worksite has an approach speed of 60 km/hr or less, as specified in the MUTCD Part 3
- ensure that the *Traffic Controller Ahead/PREPARE TO STOP* sign is erected correctly, at the beginning of the shift, and direct traffic at and/or through a worksite, or other event as specified in the approved operating procedure for traffic
- only use equipment specified in the MUTCD Part 3 to direct or divert traffic through a worksite, and
- ensure that the *Traffic Controller Ahead/PREPARE TO STOP* sign is removed when work is suspended throughout a shift, or completed for the day.

Mobile phones should not be used in any circumstances while directing traffic control operations.

To remain a traffic controller, a person must:

- carry out the functions of a traffic controller as specified in this code of practice and the TCASAP
- comply with the conditions and responsibilities outlined in this code of practice and the TCASAP
- carry their Queensland Transport and Main Roads issued Traffic Controller Accreditation Scheme accreditation identity card at all times while working as a traffic controller
- present their accreditation identity card, upon request, to any:
  - Police Officer
  - Transport Inspector
  - Workplace Health and Safety Queensland Inspector
  - Department of Transport and Main Roads Safety Officer/Coordinator
  - supervisor
  - person in control of the workplace where the traffic controller is working.
- comply with the dress code provisions outlined in the TCASAP
- be polite and courteous at all times when interacting with other road users as part of their duties
- renew their accreditation by the expiry date after having completed an approved traffic controller refresher training course delivered by an approved traffic controller training provider.

### 5.3 Responsibilities of PCBUs who employ traffic controllers

PCBUs who employ traffic controllers must use only accredited traffic controllers to perform traffic control duties.

PCBUs who employ traffic controllers must not ask a traffic controller to do anything that may cause the person to:

- breach the statutory conditions of their appointment/accreditation
- breach the conditions of appointment stated in the person's instrument of appointment
- breach the terms and conditions of the TCASAP
- breach the requirements of this code of practice, and
- operate in unsafe conditions.

PCBUs who employ traffic controllers should ensure that workers not only have the required accreditation to perform traffic control duties, but they also have sufficient experience to operate safely and efficiently in the traffic control area in which they are allocated.

## 5.4 Responsibilities of approved traffic controller training providers

Traffic controller training providers are approved by the Department of Transport and Main Roads to deliver traffic controller training.

Approved traffic controller training providers are responsible for:

- delivering the Department of Transport and Main Roads approved traffic controller training course
- assessing traffic control competencies of course attendants
- certifying that training requirements have been met
- maintaining a register of course attendees
- maintaining the original course assessments for auditing purposes.

The Department of Transport and Main Roads may conduct random and triggered desktop and onsite audits of approved traffic controller training providers, to ensure that contracted traffic controller training is delivered to an acceptable standard.

If, as a result of a Department of Transport and Main Roads audit or investigation, it is considered that the standard of training and/or delivery methods fail to meet accepted industry standards, the Department of Transport and Main Roads may initiate proceedings against the approved traffic controller training provider, to show cause why their contract to deliver traffic control training should not be terminated.

Where it is proven that the standard of training and/or delivery methods fail to meet accepted industry standards, the Department of Transport and Main Roads may terminate an approved traffic controller training provider's contract to deliver traffic controller training courses.

## 6. Training and accreditation

### 6.1 Introduction

Where legislative requirements dictate that a licence or accreditation is required to perform a specific activity, a person **must** comply with those requirements. All other people who are required to perform duties associated with road works should have suitable training to perform those duties.

### 6.2 General construction safety induction training

All PCBU's and workers doing construction work in Queensland **must** have successfully completed a general construction safety induction training course, recognised by Queensland law. All workers should be also be provided with site-specific induction for the workplace before they start construction work.

### 6.3 Level of MUTCD Part 3 training

Workers working on, or adjacent to, a road should be provided with training in the basic application of the MUTCD Part 3. . The training package that provides this information in Queensland is the online Working in Proximity to Traffic course Parts 1 and Part 2 available from the Department of Transport and Main Roads.

Persons required to implement a traffic management plan should be trained in the application of the MUTCD Part 3, provided by approved training providers. The training package that provides this information in Queensland is Traffic Management Implement course.



Persons required to design a traffic management plan and associated traffic guidance schemes should be trained in temporary traffic management planning and the application of the MUTCD Part 3, provided by approved training providers. The training package that provides this information in Queensland is the Traffic Management Design course.

## 7. Record keeping

### 7.1 Records

Supervisory personnel engaged in construction or maintenance work which requires the use of a traffic guidance scheme, should keep the following records:

- Daily records of the sign arrangement, or traffic guidance scheme should be kept in a diary or in work sheets. Special attention should be given to recording the installation, alteration and removal of all regulatory signs and devices, including speed restriction signs. For short-term construction or maintenance work, reference to a traffic guidance scheme which applies to the layout used, or to a documented procedure, will usually be sufficient. The records should include the hours of operation and surface condition of the road. Any significant changes or additions to, the signs and devices included in the relevant diagram(s) should also be noted.
- In the case of accidents, either witnessed or reported, involving the public or from which legal proceedings might arise, the actual type, size and location of signs and devices in use at the time of the accident should be recorded, and the sign arrangement photographed for subsequent reporting. Details of the actual width and condition of the travelled path and weather conditions should also be recorded.

### 7.2 Daily routine tasks

The following sets out recommended procedures and guidelines for the daily routine tasks and inspections required for the overall safety and smooth operation of a traffic guidance scheme.

### 7.3 General

Supervisory personnel should establish a daily routine, allocating specific tasks to workers and supervisors, so that:

- loss of production time is minimised
- plant operations are not disrupted
- signing at all times is adequate for the safety of workers and traffic, and
- the surface of the travelled path is maintained in a satisfactory condition.

A supervisor's role in this routine procedure is coordination, inspection and correction.

### 7.4 Before work starts

The following routine should be undertaken before work starts each day:

- inspect all traffic signs and devices and make a note of signs out of place or damaged during the night, for subsequent rectification
- inspect all water-ballasted safety barrier or containment fence modules and make a note of any out of position modules, low water levels and damaged modules, for subsequent rectification
- check for safety and effectiveness by an inspection drive through job after adjustments have been made to the traffic management provisions for the day, and make a record of the signs erected and their locations.

### 7.5 During work hours

The following routine should be followed while work is in progress:

- periodically drive through the worksite to check that all signs, markings and delineation devices, as seen by other road users, are satisfactory and in their correct position
- attend to any minor problems, as they occur
- move personnel clear of the work area during work breaks (e.g. tea breaks); park plant clear of traffic lanes, and remove from view or cover inappropriate signs such as *Traffic Controller Ahead/PREPARE TO STOP* or *Workers* (symbolic), if workers leave the site or cannot be seen
- instruct traffic controllers to remain on the job and relieve them as necessary, where there are traffic hazards, or where only one lane is open to traffic
- reposition barriers, signs and tapers as necessary (e.g. adjust the length of single lane traffic operation, as necessary, to keep it to a minimum), keep records of changes made, and the time these occurred
- coordinate maintenance of the travelled path with other job operations.

## 7.6 Closing down at the end of the day

The following action is required at the end of the day's work:

- carry out pre-closedown inspection, allowing time for urgent maintenance to the travelled path
- remove *Traffic Controller Ahead/PREPARE TO STOP*, *Workers* (symbolic) and other inappropriate signs
- affix and light lamps on advance signs, if appropriate
- drive through the worksite to confirm that signs and devices are in position and operating before leaving the site
- record any changes that have been made to the previously recorded sign arrangement or traffic guidance scheme.

## 7.7 After hours

During the hours when work is suspended:

- make arrangements for workers to check lamps after dark and to maintain the lamp system during weekends and holidays
- provide after hours contact so that arrangements can be made to replace damaged signs, delineators or barriers
- ensure that a record is kept of signs found damaged, missing or out of place (and their location) at night, weekend or holiday inspections
- carry out periodic after dark inspections on low headlight beam to ensure that all devices are visible and working properly.

# 8. General hazards and risks

## 8.1 Introduction

This section illustrates some of the general hazards and risks that may be encountered while performing construction or maintenance work on, or adjacent to, a road.

## 8.2 Working in low light or at night time

Workers required to work at night, or in low light, may be exposed to a number of risks including:

- being struck by moving vehicles
- slipping, tripping and falling.

Examples of controlling the hazards and risks when working at night or in low light include:

- having at least two workers working at any time
- providing additional lighting
- wearing fluorescent and/or retroreflective clothing including vests and gaiters.

## 8.3 Sun and heat

People who spend a lot of time in the sun risk developing:

- skin cancer
- other skin disorders
- eye injuries
- heat stress
- heat-related illnesses.

Every workplace should carry out its own assessment of sun exposure, identify tasks that place workers at risk, and control workers' sun exposure.

Heat stress occurs when heat is absorbed from the environment faster than the body can get rid of it. Several factors may contribute to heat stress, such as the:

- type of work activity
- surrounding air temperature/humidity level
- physical condition of the individual.

Some examples of controlling exposure to sun and heat are:

- wearing personal protection (e.g. sunscreen, sunglasses, and suitable clothing)
- taking precautions and setting time limits spent working in the sun during summer's highest risk time – between 9 am and 3 pm
- reorganising work schedules so that outdoor tasks are done early in the morning or late in the day
- rotating or job-share tasks that involve direct sun exposure
- implementing easy 'sun smart' policies, such as a directive that workers drive with their vehicle windows up between 9 am and 3 pm
- planning the work around the movement of the sun, (e.g. do outdoor work on the western and northern side of a building in the morning, and work on the eastern and southern sides in the afternoon)
- taking rest or meal breaks in shady areas
- drinking plenty of cool water
- adjusting the workload gradually when starting or returning to work in hot conditions; generally, the process takes about a week
- wearing specialised liquid or air-cooled clothing in extreme conditions
- screening workers for heat tolerance
- following a doctor's advice before working in hot conditions if you are on any medication such as:
  - sedatives
  - tranquilisers
  - antidepressants
  - amphetamines
  - antispasmodics
  - diuretics
  - medication affecting blood pressure
- having a plan in place for treating heat affected workers.

Information on sun safety and heat stress is available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).

## 8.4 Fatigue

Fatigue is mental or physical exhaustion that prevents a person functioning normally. However, fatigue is more than just feeling tired or drowsy.

Fatigue is caused by prolonged periods of physical and/or mental exertion without enough time to rest and recover. The level of fatigue varies and depends on factors such as:

- workload
- length of shift
- previous hours and days worked
- time of day or night worked.

The effects of fatigue include:

- a decrease in performance and productivity
- an increase in the potential for incidents and injuries to occur.

Examples of controlling risks associated with fatigue include:

- limiting shift work to core duties that must be completed at night
- redesigning work practices so routine administrative tasks are minimised for night shift workers
- scheduling later start times, so that the worker has a maximum nights sleep before starting work, but without affecting the night shift workers
- scheduling low risk work during periods of high fatigue
- scheduling complex tasks to be performed only during the day
- providing sufficient supervision, particularly during periods of high fatigue, and especially for hazardous work
- having contingency plans to remove fatigued workers from work activities, where there is a considerable risk to workplace health and safety
- having effective emergency responses in place
- implementing strict controls and procedures for workers performing hazardous work during high fatigue periods
- rotating jobs particularly for repetitive tasks, or work that involves heavy physical demands
- providing workers with information on the symptoms of fatigue
- encouraging all workers to identify the early signs of fatigue in workmates.

Information on fatigue is available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).

## 8.5 Slips, trips and falls

There are a number of factors that can contribute to the risk of slips, trips and falls, including:

- contaminants
- floor surfaces
- cleaning
- obstacles and other trip hazards
- environment
- people and activity
- footwear.

It is usually a combination of these factors that create the risk of a slip or trip. Slips usually occur when there is a loss of grip between the shoe and the ground surface. This commonly occurs when there is a contaminant between the shoe and the surface.

Trips occur when a person's foot hits a low obstacle in the person's path, causing a loss of balance. Often the obstacle is not easily visible or noticed.

Examples of controlling risks associated with slips, trips and falls include:

- removing slip and trip hazards at the design stage
- limiting access to high risk areas
- marking clearly any changes in ground surface
- implementing good housekeeping practices, such as clear access ways and prompt spills management
- wearing suitable footwear
- providing adequate control measures for people working on steep batters
- providing adequate lighting for the task.

Information on slips, trips and falls can be found in the Workplace Health and Safety Queensland *Guide to preventing slips, trips and falls* available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).

## 8.6 Noise

Excessive noise is unwanted sound which may damage a person's hearing. Excessive noise is made up of two parts – the period of time you are exposed to the noise and the loudness of the noise. Continuous noise exposure above 85 decibels during an eight-hour day is considered to be excessive noise.

A noise assessment should be carried out when workers and others may be exposed to excessive noise levels. The general aim of a noise assessment is to:

- identify all people likely to be exposed to excessive noise
- obtain information on noise sources and associated work practices
- check the effectiveness of measures taken to reduce noise exposure
- choose appropriate personal hearing protectors for persons exposed to risks from excessive noise, and
- define hearing protection areas at work.

Examples of controlling noise in the workplace are:

- obtaining specifications relating to noise level emissions from the suppliers of plant so appropriate levels of noise protection can be provided
- redesigning machinery power sources to give quiet speed regulation
- repairing loose and rotating parts, replacing worn bearings and gears, and regular maintenance
- reducing noise at the source, where appropriate, by adding:
  - noise barriers
  - noise enclosures
  - vibration isolation mountings
  - laggings
  - mufflers
  - silencers
- organising schedules, so noisy work is done during a particular part of the shift, or when as few people as possible are present
- notifying people in advance when noisy work is to be carried out to limit their exposure to it, and
- providing hearing protection for workers.

Information on noise can be found in the *Managing noise and preventing hearing loss at work Code of Practice* available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).

## 8.7 Recycled water

Water is used on roads and road-related areas for various purposes, including dust control and filling plastic traffic barriers during construction work and maintenance activities.

Workplaces usually obtain water for various processes from the drinking water (potable water) supply mains. However, workplaces may also obtain water from a variety of non-potable water sources including:

- recycled water from sewage and waste water treatment plants
- stormwater storages, including from dams, creeks, and rainwater tanks
- greywater from showers and laundries
- industrial processes, and
- agricultural irrigation (e.g. run-off water).

The quality of non-potable water will vary, depending on its source and the level of treatment applied and may contain biological hazards, such as:

- bacteria
- viruses
- protozoa
- helminths (e.g. worms)
- chemical and metal residues.

Non-potable water, including recycled water, is considered to be a **substance** under the *WHS Act*. Under the *WHS Act*, manufacturers, suppliers and users of non-potable water in a workplace have a duty to prevent death, injury or illness being caused by the substance (i.e. non-potable water).

Information on recycled water can be found in the *Guide to the workplace use of non-potable water* including recycled waters available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).

## 8.8 Inclement weather

Provided work is arranged to minimise hazards associated with wet weather, and safe systems of work are followed, work at construction workplaces can continue safely. The main factors which affect safe construction work in wet weather are:

- slippery, wet floor surfaces, steps and footholds
- excavations caving in
- electrical hazards - wet electrical cords, cables, sockets, power points and power equipment
- slippery tools, handles and other hand grip surfaces
- reduced manual dexterity in some tasks
- lightning strikes during thunderstorms, and
- contamination from flooded sewerage systems.

If the weather is excessively cold, workers may be affected by reduced feeling and function in the hands or feet, which could lead to inattentiveness and distraction, increasing the risk of unsafe practices.

Wet, windy or cold weather does not necessarily make construction work unsafe, provided safe systems of work can be implemented. These can include:

- monitoring weather forecasts, so alternative tasks can be planned a day or more ahead, and
- ensuring all electric cables are raised to a safe height above the ground.

When planning long-term jobs, consider programming work, which could be affected by rain, for drier months.

Special note should be made of the consequences that can result from lightning strikes during thunderstorms. These lightning strikes have the ability to cause death or serious injury to workers caught out in the open, especially to those workers interacting with metal objects. A prime example is the traffic controller holding a metal stop/go sign that can act as a lightning conductor.

Information on lightning protection can be found in AS/NZS 1768:2007.

## 8.9 Hazardous manual tasks

The *Hazardous Manual Tasks Code of Practice* provides practical guidance to PCBU's on how to manage the risk of musculoskeletal disorders arising from hazardous manual tasks in the workplace. It applies to all types of work and all workplaces where manual tasks are carried out.

Manual tasks include activities requiring a person to:

- grasp
- manipulate



- strike
- throw
- carry
- move (lift, lower, push, pull)
- hold or restrain an object, load or body part.

Examples of controlling risks associated with hazardous manual tasks include:

- bending at the knees when lifting objects
- obtaining the assistance of another worker
- modifying the handling task.

Information on hazardous manual tasks can be found in the *Hazardous manual tasks Code of Practice* available on [www.worksafe.qld.gov.au](http://www.worksafe.qld.gov.au).



# Appendix 1: Dictionary

**Associated persons** means a PCBU or approved traffic controller training provider of a traffic controller.

**Authorised officer** means a person who holds an appointment as an authorised officer under Part 2 Section 20 of the *Transport Operations (Road Use Management) Act 1995*, i.e. police officer, officers and employees of the public service as appointed by the Chief Executive, other persons prescribed under a regulation.

**Competent person** means, for performing an inspection or other task for a control measure, a person who has acquired, through training, qualifications or experience, the knowledge and skills to do the task in a safe way including knowledge of:

- (a) relevant Australian Standards; and
- (b) relevant codes of practice; and
- (c) other relevant legislation.

**Construction work** is defined in the *Work Health and Safety Regulation 2011*.

**Daytime** means any time between sunrise and sunset on the same day, providing there is sufficient daylight to see a person or vehicle clearly at a distance of 150 metres.

**During hours of darkness** means the period between sunset on a day and sunrise on the next day, or when a person or vehicle in natural light cannot be seen clearly at a distance of 150 metres.

**Duty holder** means a person who has a duty under Part 2 of the *Work Health and Safety Act 2011*.

**High risk construction work** is defined in the *Work Health and Safety Regulation 2011*.

**Must** means a mandatory condition.

**MUTCD Part 3** means the *Manual of Uniform Traffic Control Devices Part 3*. This is the document administered by the Department of Main Roads outlining principles of signing at road works, describing signs and devices used to effect traffic guidance, planning and designing traffic guidance schemes, including the installation, operation and removal of traffic guidance schemes.

**Night time** means during hours of darkness.

**Principal contractor** for construction work is defined in the *Work Health and Safety Regulation 2011*.

**Road includes:**

- (a) a bus way under the *Transport Infrastructure Act 1994*; and
- (b) an area that is:
  - (i) open to or used by the public and is developed for or has as one of its uses, the driving or riding of motor vehicles, whether on the payment of a fee or otherwise; or
  - (ii) dedicated to public use as a road; and
- (c) a road-related area; but
- (d) does not include an area declared under regulation not to be a road.

**Road-related area** means:

- (a) an area that divides a road; and
- (b) a footpath or nature strip adjacent to a road; and
- (c) an area that is not a road and that is open to the public and designated for use by cyclists or animals; and

(d) an area that is not a road and that is open to or used by the public for driving, riding or parking vehicles.

**Safe work method statement** is defined in the *Work Health and Safety Regulation 2011*.

**Should** means an advisory, recommended, but not mandatory condition.

**TCASAP** means the *Traffic Controller Accreditation Scheme Approved Procedure*.

**Traffic** means all vehicles, persons or animals travelling on a road.

**WHS management plan** is defined in the *Work Health and Safety Regulation 2011*.

**Work area** means an area where construction work is being done.

**Worksite** means an area which includes the work area(s) and any additional length of road required for advance signing, tapers, side-tracks or other areas needed for associated purposes.

Office of Industrial Relations Right to Information Release

## Appendix 2: Sample safe work method statement

<b>Safe work method statement</b>	ABN
<b>High risk construction work</b>	Working on, or adjacent to, a road

If your work procedure or activity identifies the need to work on, or adjacent to, a road, then it is high risk construction work, and you will need to develop a safe work method statement.

The following is a generic safe work method statement. It cannot be used as a safe work method statement onsite, unless the project specific section has been completed.

It must be reviewed prior to undertaking the activity, and all site-specific details must be documented.

Control measures	How to use control measures	Monitor and review	Responsible officer
1. Road work signs will be erected prior to work commencing.	A road works signing layout will be developed.  All signs will be in accordance with the MUTCD Part 3.	Daily inspections to be carried out and documented in project records.  Signing layout to be approved before work commences.	Sup  PM
2. All workers will have general safety induction training and a site-specific induction before starting work.	General safety induction cards will be sighted and recorded for all workers.  All workers, including sub-contractors, will be given a site-specific induction.  Site-specific induction records will be kept for all inductions.	All training records to be checked.  Safety audits to include check on training and induction records.	Sup  Safety Coordinator
3. Traffic controllers to be used as required.	All traffic controllers will be accredited by Queensland Transport.  Traffic control will be conducted in accordance with the approved procedure.	All traffic controller tickets are to be checked and recorded.	Sup
4. Work zone and separation distances to be delineated.	Work zones will be delineated in accordance with the Traffic Management Plan.	Traffic Management Plan to be reviewed and approved before work commences.	PM

Control measures	How to use control measures	Monitor and review	Responsible officer
	<p>All workers will remain within the work zone, unless traffic has been stopped by traffic controllers.</p> <p><b>Note:</b> In the site-specific section, detail traffic control devices such as barriers.</p>	Supervisor to constantly check on workers and take appropriate action.	Sup
5. All workers will wear appropriate personal protective clothing and equipment.	All workers will wear high visibility clothing, safety footwear, wide brim hat and any other equipment identified in the risk assessment.	Supervisor to constantly check and take appropriate action for breaches.	PM/Sup
6. All control measures detailed above will be monitored and reviewed regularly during the work.		<p>Signs will be checked before work starts each day and at regular intervals during the day.</p> <p>These inspections are to be recorded.</p> <p>Daily pre-start meetings will be held to ensure all workers are informed of control measures.</p> <p>Any failure of a control measure will be reported to the supervisor immediately for action.</p>	<p>Sup</p> <p>Sup</p> <p>Sup</p> <p>All</p>

Tick relevant boxes to indicate all occupational licences and certificates employed for this activity on this project.

**Cranes or hoists** ☐

**Loadshifting equipment**

Backhoe ☐ Excavator ☐ Roller ☐ Grader ☐ Dozer ☐  
 Forklift ☐ Skid steer loader ☐ Front end loader ☐ Scraper ☐

**Riggers**

Advanced ☐ Intermediate ☐ Basic ☐

**Dogger** ☐

**Scaffolder**

Advanced ☐ Intermediate ☐ Basic ☐

Approved by **manager:**  
 (Safety and Risk Management)

Signature

Date \_\_\_\_/\_\_\_\_/\_\_\_\_

<b>Project:</b>		<b>Project manager:</b>	
<b>Control measures</b>	<b>How to use control measures</b>	<b>Monitor and review</b>	<b>Resp. officer</b>
Describe the work activity where working on, or adjacent to, a road is required.	Either use a control measure from the generic section above or develop a project specific control measure.	If using a project specific control measure, the method of monitor and review must be documented, as well as the responsible officer.	

### Project specific details

The following instructions are in addition to the standard safe work method statement instructions above and are specific to this project only. This section **must** be developed after a project specific risk assessment has been conducted and must take into account all hazards associated with the activity.

For further assistance/information contact your local Safety Coordinator/Officer.

For generic safe work method statements, the only section that can be edited is the project specific details. If instructions in the generic section are not being followed, this should be outlined in the project specific details and an alternative method must be documented.

Approved by **Project manager:** \_\_\_\_\_

**Signature**

**Date** \_\_\_\_/\_\_\_\_/\_\_\_\_

# Appendix 3: Example of a road signing checklist

## Site signing record

<b>Date:</b>	<b>Road:</b>	<b>Suburb:</b>
<b>Time installed:</b> am/pm	<b>Time removed:</b> am/pm	<b>Chainage:</b>
<b>Lane closed:</b> Left / Centre / Right	<b>Direction:</b> In bound / Out bound	
<b>Lane closure changes required:</b> Yes / No	<b>Lane changed to:</b> Left / Centre / Right	<b>Time:</b> am/pm
<b>Visibility:</b> Good / Poor	<b>Weather conditions:</b> Fine / Dry / Wet / Cloudy / Fog / Night / Ice / Smoke	

**Note: For night conditions traffic cones must have retroreflective bands fitted.**

Signs and devices not listed below may be added to page 2

Position no	Sign description	Number installed	Distance from previous sign	Time checked			
				1	2	3	4
	ROADWORK 1 km AHEAD						
	ROADWORK AHEAD						
	NIGHT - Supplementary plate for night work						
	80 kph - Speed reduction sign						
	ROAD PLANT AHEAD						
	WORKERS AHEAD						
	60 kph - Speed reduction sign (1.2 m to 3.0 m)						
	REDUCE SPEED						
	40 kph - Speed reduction sign (less than 1.2 m)						
	TWO LANE STATUS						
	THREE LANE STATUS						
	FOUR LANE STATUS						
	LATERAL SHIFT MARKERS						
	TRAFFIC CONTROLLER AHEAD						
	STOP/SLOW BAT						
	PREPARE TO STOP						
	TRAFFIC SIGNALS AHEAD						
	STOP HERE ON RED SIGNAL						
	PORTABLE TRAFFIC SIGNALS						
	TRAFFIC CONES - 700 mm						
	TRAFFIC CONES - 450 mm						
	TRAFFIC CONES - 300 mm (linemarking only)						
	END ROADWORK						
	SPEED SIGN - restored to appropriate limit						
	TRACTOR/SLASHER AHEAD - (symbolic)						
	PROBABLE DELAY 15 MINUTES						
	SIGNALS UNDER REPAIR						
	POLICE CONTROL AHEAD						
	VARIABLE MESSAGE SIGN						
	ARROW BOARD						
	BARRIER BOARD						

Signature: \_\_\_\_\_  
(Person in control of the worksite)

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

## Appendix 4: Standards

AS/NZS 1158.4 - Lighting for roads and public spaces – Part 4: Lighting of pedestrian crossings  
AS1743 - Road signs – Specifications  
AS/NZS 1768 - Lightning protection  
AS/NZS 1906 - Retroreflective materials and devices for road traffic control purposes  
AS/NZS 1906.1 - Retroreflective materials and devices for road traffic control purposes – Part 1:  
Retroreflective sheeting  
AS/NZS 1906.2 - Retroreflective materials and devices for road traffic control purposes – Part 2:  
Retroreflective devices (non-pavement application)  
AS/NZS 1906.3 - Retroreflective materials and devices for road traffic control purposes – Part 3:  
Raised pavement markers (retroreflective and non-retroreflective)  
AS 2601 – The demolition of structures  
AS/NZS 3845 - Road safety barrier systems and devices  
AS 4191 - Portable traffic signal systems  
AS 4192 - Illuminated flashing arrow signs  
AS/NZS 4602 - High visibility safety garments