Guide to Temporary Traffic Management Part 5

Short Term Low Impact Worksites

Austroads

Guide to Temporary Traffic Management
Part 5: Short Term Low Impact Worksites

Sydney 2021

Guide to Temporary Traffic Management Part 5: Short Term Low Impact Worksites

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Abstract

Austroads' Guide to Temporary Traffic Management (AGTTM) details contemporary temporary traffic management practice for application in Australia and New Zealand. It provides guidance for the planning, design and implementation of safe, economical and efficient temporary traffic management designs. This Guide recognises the level of variability of the road environments for which guidance is provided. The guidance provided in AGTTM is intended to encourage a consistent level of planning that supports the streamlined safe progress of work. It applies to all works on roads and near roads, in addition to off road development and other activities that interact with and impact on the road environment.

AGTTM has been developed based on best practice temporary traffic management practice in Australia and New Zealand, to assist road authorities to meet their existing legislative responsibilities for workplace and public safety.

Part 5 identifies and details preferred temporary traffic management design and operational practices to be applied for short term low impact works on or near roads.

Keywords

Temporary traffic management, worksite traffic control, risk assessment, road safety

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Edition 1.1 contains additional information regarding working between gaps in traffic, sight distance to signs mounted on vehicles and correction to errors in some diagrams and figures.

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About Austroads

Austroads is the peak organisation of Australasian road transport and traffic agencies.

Austroads' purpose is to support our member organisations to deliver an improved Australasian road transport network. To succeed in this task, we undertake leading-edge road and transport research which underpins our input to policy development and published guidance on the design, construction and management of the road network and its associated infrastructure.

Austroads provides a collective approach that delivers value for money, encourages shared knowledge and drives consistency for road users.

Austroads is governed by a Board consisting of senior executive representatives from each of its eleven member organisations:

- Transport for NSW
- Department of Transport Victoria
- Queensland Department of Transport and Main Roads
- Main Roads Western Australia
- Department for Infrastructure and Transport South Australia
- Department of State Growth Tasmania
- Department of Infrastructure, Planning and Logistics Northern Territory
- Transport Canberra and City Services Directorate, Australian Capital Territory
- The Department of Infrastructure, Transport, Cities and Regional Development
- Australian Local Government Association
- New Zealand Transport Agency.

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1. Introduction

1.1 Purpose

Managing the risks associated with providing an optimal level of safety for persons working in or near traffic and the impact of road work on road users, road congestion and the general community, is a significant issue for road agencies and industry. Road agencies and industry have a legislative requirement as an employer of construction, operational and maintenance services to provide a safe work environment and to manage the risks of working in or near traffic through current jurisdictional Work Health and Safety (WHS) requirements, regulation, training and roadwork planning.

The Austroads Guide to Temporary Traffic Management (AGTTM) details the contemporary temporary traffic management practice of member organisations. In doing so, it provides guidance to designers in the production of safe, economical and efficient temporary traffic management designs. This Guide recognises the level of variability of the road environments for which guidance is provided. The guidance provided in AGTTM is intended to encourage the consistent planning, design and implementation of temporary traffic management across Australia and New Zealand while also supporting the streamlined safe progress of work. It applies to all works on roads and near roads, in addition to off road development and other activities that interact with and impact on the road environment.

The purpose of the AGTTM is to provide guidance and supporting material that:

- supports the ability of road agencies and industry to meet their WHS requirements and lead to improved safety outcomes at road worksites
- improves the standard of temporary traffic management in Australia and New Zealand through consistency of application which assists road users to recognise and understand temporary traffic management, thereby improving their behaviour and safety
- aims to reduce the rate of incidents occurring at worksites
- improves the ability of road authorities and industry to manage the increasing frequency and variety of activities that are being undertaken on and near the road
- allows continuous industry review to maintain best practice.

This purpose is achieved through:

- providing direction for all matters relating to the planning, design and implementation of temporary traffic management
- facilitating improved adaptation to changes in technology and practices through being reactive to changes and being able to readily include new innovations
- providing guidance focused on the users of this Guide
- providing road agencies and industry with uniform practices whilst carrying out works on or near roads.

The benefits associated with uniform guidance broadly accepted by jurisdictions and industry include:

- guidance and training that appropriately develop designers with the skills necessary to develop and deliver safe traffic management at road worksites
- reduced impost on industry working across jurisdictional borders
- improved harmonisation of road worksites across jurisdictions providing improved consistency for road users, including vulnerable road users such as pedestrians and cyclists. This is targeted at improving road user behaviour, safety of road worksites and reducing impact on road congestion and the general community.

1.2 Structure of AGTTM

The structure and content of the Austroads Guide to Temporary Traffic Management is discussed in AGTTM Part 1: Introduction to Temporary Traffic Management Practice. Within the AGTTM, the terminology that applies is detailed in Table 1.1.

Table 1.1: Guidance terminology

Guide	The description for the complete Austroads Guide to Temporary Traffic Management including all 10 Parts.
Part	The description for the individual documents within the Guide. This document is Part 5 of the Austroads Guide to Temporary Traffic Management.
Section	The description for a numbered section within each Part of the Guide. This is Table 1.1 placed within Section 1.2 of Part 5 of the Austroads Guide to Temporary Traffic Management.

Within this Guide, reference may be made to other parts of the Austroads range of publications such as the *Guide to Road Design* and the *Guide to Traffic Management*.

In the context of the other guides within the Austroads range of publications, this Guide is restricted to matters relating to temporary traffic management practice and refers only briefly to issues more appropriately addressed in other Austroads Guides. It is recognised it is difficult, if not impossible, to discuss many aspects of temporary traffic management practice without reference to traffic management, road design and/or safety issues. The view is taken that within the AGTTM, any such advice should be brief and be supported by references to other Guides for the appropriate guidance as required.

The scope of the AGTTM is broad, addressing requirements and recommendations for protecting road workers and all road users, including vulnerable road users, from hazards, road traffic and other impacts of road works across a range of situations that may include:

- urban and rural environments
- motorways, major arterial roads, local roads, roads in built-up areas, roads in open road areas and unsealed roads
- all variations of road use by cars, heavy vehicles, public transport, motorcycles, cyclists and pedestrians
- day and night works
- changing road and weather conditions.

The structure of the AGTTM is described in Figure 1.1 and in Table 1.2

Figure 1.1: Structure of the Austroads Guide to Temporary Traffic Management

Overview	**Part 1: Introduction**		
Planning	**Part 2: Traffic Management Planning**		
Design	**Part 3: Static Worksites**	**Part 4: Mobile Works**	**Part 5: Short Term Low Impact Worksites**
Field	**Part 6: Field Staff – Implementation and Operation**	**Part 7: Traffic Controllers**	
Support	**Part 8: Processes and Procedures**	**Part 9: Sample Layouts**	**Part 10: Supporting Guidance**

Table 1.2: Parts of the Austroads Guide to Temporary Traffic Management

Part	Title	Content
Part 1	Introduction	• Introduction to the discipline of TTM practices • Breadth of the subject and the relationship between the various Parts of the Guide • Legislative relationships • Links to related jurisdictional documentation • Definitions
Part 2	Traffic Management Planning	• Broad strategies and objectives to provide effective TTM to ensure the safety for all road users is maintained • Guidance on the safety of workers and other road users • Examples and key considerations for planning of TTM at road worksites • Process for planning and documenting TTM
Part 3	Static Worksites	• Guidance on the design of temporary traffic guidance schemes at static worksites • Process to decide what static worksite set up is appropriate to implement (including devices used)
Part 4	Mobile Works	• Guidance on the design of temporary traffic guidance schemes at mobile works • Process to decide what mobile works set up is appropriate to implement (including devices used)
Part 5	**Short Term Low Impact Worksites**	• Guidance on the design of temporary traffic guidance schemes at short term low impact worksites • Process to decide what short term low impact worksite set up is appropriate to implement (including devices used)
Part 6	Field Staff – Implementation and Operation	• On site risk assessment • Installation and removal of TTM schemes • Operation and monitoring of TTM schemes • Record keeping
Part 7	Traffic Controllers	• Training competencies • Instructions on practices • Control devices that can be used
Part 8	Processes and Procedures	• Road network classification • Powers, roles and responsibilities • Training competencies • Forms and procedures • Model contract specification
Part 9	Sample Layouts	• Example layouts of static worksite conditions • Example layouts of mobile works conditions • Example layouts of short term, low impact conditions • Example layouts for staging plans • Worked example for a multi-stage project
Part 10	Supporting Guidance	• Risk management processes • Review, inspection and road safety audit of worksites • Events • Emergency works

1.3 Scope of Part 5

AGTTM Part 5 provides guidance to designers on TTM at road worksites. This design is typically prepared in the form of a traffic guidance scheme (TGS) which is subsequently applied by field staff when installing these schemes at road worksites.

This part of AGTTM deals specifically with those worksites which are of such a short nature and have sufficiently low impact that a site specific risk assessment has determined that the work can be undertaken without the use of a Static Worksite (AGTTM Part 3) or a Mobile Works Convoy (AGTTM Part 4).

AGTTM Part 5, together with the Part 3: Static Worksites and Part 4: Mobile Works of AGTTM, provides comprehensive guidance for the design of TGS at all worksites.

Aspects covered in AGTTM Part 5 for the design of TTM include:

- general design considerations for short term low impact worksites
- selection of appropriate short term low impact work practices
- the design process to be followed for the design of short term low impact worksites
- detailed design guidance for each step in the design of short term low impact worksites
- supporting information to be included with the TGS.

The central purpose of TTM is the selection and application of practices that manage public and occupational safety and network performance risks associated with work activities undertaken in a traffic environment. Risk management and the elements of the risk management process form the basis of this document.

1.4 Application of Part 5 to New Zealand

Readers in New Zealand should note the following in application of Part 5 of this Guide:

- The Traffic Management Designer roles described in Section 2.4.2 of this document are based on the roles in the TTM industry in Australia. New Zealand readers should refer to the New Zealand CoPTTM for description of the responsibilities for roles in New Zealand.
- Signs depicted in a number of the figures reflect Australian signage. Readers in New Zealand should refer to the NZ CoPTTM for the appropriate signs to be applied.

1.5 Definitions

Refer to AGTTM Part 1 for a full list of definitions which apply to this Part.

2. Design Process

2.1 General

A Traffic Management Plan (TMP) outlines how works on roads are integrated into the operation of the road network, identifies and considers all foreseeable risks and assesses the impact on all road users. Detailed guidance on TMP processes are outlined in AGTTM Part 2. It is important that the TMP is completed before further considerations and design of TTM outlined in this Part of the Guide are implemented. This design involves the preparation of a Traffic Guidance Scheme (TGS), in some cases more than one, detailing traffic control signs, devices and measures to be applied at worksites to warn road users and guide them past a work area or temporary hazard. The work area is defined as an area where workers (including workers on foot) may be located.

For short term low impact works, an overall TMP is required for the activity to describe how and where the various short term, low impact clauses can be applied. For example, the overall TMP may identify those roads on which the “Gaps in Traffic” provision may be applied and those roads on which it cannot be applied. The “Gaps in Traffic” provision may be suitable on Category 2 roads outside peak hours but not suitable in peak hours or on Category 3 roads. In many cases the preparation of a site specific TGS may not be required for short term, low impact works but the use of generic TGS diagrams to develop a site suitable TGS may be appropriate.

This guidance is for those responsible for designing and implementing a TGS and the successful application of this document is dependent on the provision of appropriate training to all those involved in the design and operation of traffic management arrangements at road works (see AGTTM Part 8).

Although the optimal option for design parameters should be used as often as possible, it is recognised that this guidance cannot cover all situations. It is the designer’s responsibility to adapt or develop the traffic management required to suit site conditions and the scope of works.

Before proceeding with the design steps required for TGS, the following essential considerations must be undertaken:

- determine whether a short term low impact worksite is an appropriate traffic management measure
  For example, if the works are to protect major construction or a deep excavation that will take hours or days, then a static worksite with barriers may be appropriate (see AGTTM Part 3). However, if the works are minor in nature (e.g. pot hole repairs, vegetation trimming) or can be performed quickly along multiple sites (within 20 minutes) then a mobile (see AGTTM Part 4) or a short term, low impact worksite may be more appropriate.
- risk assessment (see Section 2.2)
- determine the method of traffic control
- determine road work impacts and method of management.

2.2 Risk Assessment

Risk assessment involves the identification and analysis of all safety risks likely to arise during works on or near the road including design, set up, operation, change and final dismantling of TTM devices. The identification of each risk must be followed by defining the appropriate measures to mitigate those risks.

Risk assessment is appropriate at all levels of planning and operation and must be undertaken when:

- preparing generic plans and safe work method statements for the conduct of short term, low impact or mobile works
- preparing TGS for more extensive or complex works where site specific risks are of importance
- justification of design exceptions and departure from published standards and this AGTTM.

In each case the process starts by identifying all the hazards likely to arise, evaluating them in terms of likelihood of occurrence and their adverse consequences using experience, historical data, consulting with other designers or other means. The proposed TGS must then be checked in detail to ensure that adequate means of controlling or reducing those risks are in place. It is important to note that a Design Exceptions Report needs to be approved by the relevant road infrastructure management (RIM) and road authority if design exceptions are made or published standards or the AGTTM are not adhered to.

Note that safety is influenced by the interaction of various factors and strictly following standards or this AGTTM may not always result in the safest possible design. A designer must consider how the road corridor is being used by all road users to identify an appropriate strategy for managing risks to all road users, giving special attention to the needs of vulnerable road users, motorcyclists and over-dimensional vehicles.

2.2.1 Risk considerations

The best practice to achieving optimal safety levels is achieved by constant referencing to the basics and working through each category of risk. When identifying risks, open questions such as how, why, when and where should be asked to find the source of the problem and how to mitigate it. Example factors to be considered and questions to be asked when considering risks involved in the design of TTM are shown in Table 2.1. This is not an exhaustive list and other site-specific risk considerations may be applicable.

Table 2.1: Risk considerations

Risk Category	Considerations
Road worker safety	There is an obligation on both organisations and road workers, including supervisory personnel, to maintain a safe worksite when carrying out works on and near roads. This involves the prevention of injury to road workers due to hazards within the worksite or from oncoming or passing traffic. Considerations relating to worksite safety should include: • maintenance of an acceptable clearance from traffic • appropriate training for all road workers and compliance of appropriate work methods and safety requirements. Risks for road workers include: • complacency as a result of frequency of activities • level of training provided • maintaining appropriate separation of tasks, including to lookout persons, such as being requested to undertake additional tasks • higher risk exposure when undertaking short term low impact works • time constraints associated with the short-term nature of works • night work considerations • work pressures. All road workers must: • sign the SWMS prepared for that site and contribute to the risk assessment • immediately report any unsafe conditions • take reasonable care for his or her own personal safety and the safety of all road users • consider any requirements specific to night time works • take reasonable care that his or her acts or omissions do not adversely affect the health and safety of others • comply with any reasonable instruction that is given in relation to health and safety • cooperate with any reasonable policy or procedure relating to health and safety that they have been notified of. Personal protective equipment (PPE) is essential for the safety of road workers and must be put on before entering the worksite. Wearing a high visibility garment is a critical element of personal safety and must always be done up with sleeves down and in acceptable condition. Other PPE may include: • head protection • eye protection • hearing protection • sun protection • reinforced toe cap boots.

Risk Category	Considerations
Road users	Road users (including vulnerable road users) need to perceive and process information, make decisions, act and monitor conditions within time constraints. Safe driving and riding occurs when road users are operating well below a stressful processing and decision-making rate. These are critical in the development and maintenance of a safe road environment. Risks associated with road users include: • unsafe reactions as a result of surprise • response to stationary vehicles or plant parked near the road • restricted sight lines • hazards created by work equipment or debris. Safe traffic management should: • alert all type of road users of works being undertaken • consider driver behaviour and make allowance for human error and errant vehicles. Questions to ask include: • where are the hazards that impact all road users? • is there adequate visibility or are there obstructions to vision? • are requirements needed for special vehicles (e.g. over-dimensional vehicles, buses, emergency services)? • could the intention of traffic control devices be misunderstood? Will it cause confusion? • do proposed traffic control devices provide enough information?
Vulnerable road users	Vulnerable road users have different and special considerations compared to those of general road users. Consider pedestrians, including school children and road users with impaired vision, mobility or cognitive limitations. See *road users* (above) and Section 3.3 for further information associated with vulnerable road users.
Site conditions	Consideration relating to the impact of the road and roadside environment should include: • road category and traffic volumes relative to the time of day and day of the week (see *traffic volume* (below) and AGTTM Part 8) • allowance for unexpected changes to traffic volumes • traffic profile (e.g. the proportion of over-dimensional vehicles in the traffic stream) • traffic speed • sight distances (see AGTTM Part 3) • road features (e.g. sealed, condition of seal, unsealed, available lanes, shoulder widths, intersections, railway crossings, bridges etc.) • access control. At each point on the road system where vehicles have access to adjacent property, there is the potential for conflict and crashes. • lighting • where possible, source current site information including thorough on-site inspection, photos or videos • drainage management.
Parked vehicles	Vehicles parked adjacent to the road, including the work vehicle, affect safety in several ways: • as physical obstructions that can be collided with • as obstructions that cause sudden braking and nose-to-tail crashes • as obstructions that deflect vehicles into adjacent vehicle paths • as hazards to passing vehicles (including bicycles) from opening doors • as obstructions that hide pedestrians • as obstructions that block visibility at intersections and access points • vehicles parked on the road shoulder are likely to force on road cyclists into traffic lanes.

Risk Category	Considerations
Work vehicles	The work vehicle is one of the primary alert methods for approaching traffic. Considerations include: • placement of the vehicle • ensuring it does not impact visibility for road users (including vulnerable road users). There are considerations associated with work vehicles to minimise risks posed to road workers and road users. These include: • does it block pedestrian or cycle paths? • night time considerations • sight distance to the lookout person and workers • access to and departure from the worksite, indicated by use of flashing lights.
Adverse weather conditions	Issues associated with adverse weather conditions should be identified in the TGS and include appropriate contingency plans. For example, when adverse weather conditions affect visibility of traffic control devices or the worksite it may be necessary to stop work and clear the worksite of all road workers in the interest of safety. In some cases, it may also be necessary to clear the road of all obstructions caused by the works if this can be done safely. A decision on the need to clear the road will be based on the consideration of all prevailing circumstances, which may include: • type of adverse weather condition (snow, frost, fog, rain, wind) • the complexity of worksite • traffic volumes • road surface • time of day • appropriate lighting • sun glare or areas of shade.

2.2.2 Specific considerations for short-term low impact works

The safety and protection of road workers and road users is the primary concern for Short Term Low Impact works although there are expected to be minimal impacts on road users due to the nature of the works.

Static Works (AGTTM Part 3) practices have been developed and provide an accepted level of worksite protection, being based on well documented and understood practices over a long period of time. However, it is recognised that for Short Term Low Impact works, the measures required for the implementation of static worksite can often lead to a higher risk exposure to staff implementing the TTM than the risk to road workers undertaking the works using the processes outlined in this Part.

As the Short-Term Low Impact works practices represent a reduction in the extent of TTM from those accepted for static worksite design, the level of risk assessment is critical to the successful implementation of requirements at a Short Term Low Impact worksite.

Pre-planning is essential to ensure the works can be safely completed within the constraints (criteria) identified in each of the clauses.

2.3 Design Balance

Design involves developing a TGS that finds the right balance for road users, including vulnerable road users, road workers, the traffic management team, contractor and end client.

The application of Short-Term Low Impact practices involves an appropriate adaption and/or modification of the requirements set out to static worksite treatments, for certain activities. The safety and protection of road workers and road users is the primary concern. This can be achieved through adequate risk assessment (see Section 2.2) and awareness of road users including motor vehicles, heavy or over-dimensional vehicles, motorcyclists, pedestrians, cyclists, public transport or any other road user. When undertaking Short Term Low Impact works, the aim is to enhance the safety of road workers and road users whilst providing the least amount of inconvenience to traffic flow. This will minimise:

- risk of incidents
- disruption of established traffic movements and patterns
- interference with traffic at peak periods
- interference with public transport services
- the amount of road closed to traffic at any one time.

It is desirable for a worksite to be under the coordination of one contractor at a time however traffic management of two different projects might be in close proximity to each other. If this is the case, the person accountable for the traffic management at a site must ensure regular coordination between all relevant persons (e.g. contractors, road workers and/or road authority) regarding effective and efficient TTM that is appropriate for each project during the design phase.

2.4 Essential Design Principles

2.4.1 Sight distance

Consideration of suitable sight distances will enable road users to perceive and react to a hazardous situation on the road ahead resulting in safe and efficient traffic management. Sight distance is best when designed to be as long as practicable, but is often restricted by the following:

- horizontal and vertical curves in road
- obstructions (e.g. safety fences, boundary fences, barriers, parked cars, street furniture, landscaping, signs)
- railway crossings
- bridges
- traffic queues
- weather (e.g. linemarking visibility in the rain and fog)
- time of day (e.g. night visibility, glare)
- sealed or unsealed roads
- type of road users at the site (e.g. over-dimensional vehicles, motorcyclists)
- vehicles closely following each other
- other local site features.

Sight distance must be considered to access points in or out of the worksite to pedestrian or cyclist paths to prevent conflict.

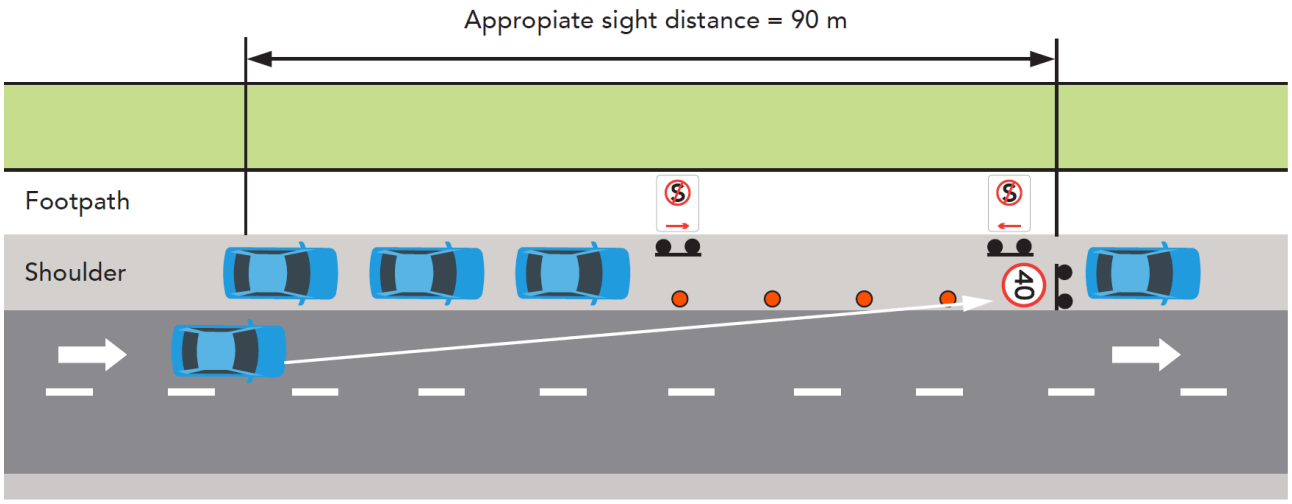
Recommended sight distances measured to a traffic control device from the driver of an approaching vehicle, in relation to speed is shown in Table 2.2. These distances are based on the required sight distance for a driver to be able to react appropriately to the hazard. Detailed steps and calculations associated with assigning appropriate sight distances are described in detail in Austroads Guide to Road Design Part 3 and Part 4a.

Table 2.2: Recommended sight distances to a traffic control device

Speed (km/h)	Sight Distance (m) to a sign
< 45	50
46 - 55	70
56 - 65	90
> 66	Two times the speed (km/h)

Figure 2.1 is an example of sign placement when considering sign visibility and recommended sight distance. The arrow represents the sight distance required for a road user to perceive and react to the message being communicated by the sign ahead for a traffic speed of 60 km/h. In this case, parking has been restricted for a portion of the roadside to ensure that sight distance to the sign is maintained.

Figure 2.1: Appropriate sight distance



Note: This is an example for a 60 km/h scenario.

2.4.2 Signs

Signs indicate the nature of the hazard or work. For details on choosing an appropriate sign (see AS 1742.3). Once an appropriate sign is chosen, the location needs to be incorporated into the TGS. Questions to consider include:

- Are signs appropriate for their location?
- Are signs located so that drivers' sight distance to the sign is maintained? Where they can be seen and read in adequate time by the intended road user? Sight distance for road users entering from side roads or private driveways must also be considered. The aim is to give road users sufficient warning when approaching a hazard (see Section 2.4.1)
- Are the signs placed at an appropriate height to ensure the drivers vision is maintained?
- Will signs be easily understood?
- Are repeater signs required?
- Have the risks associated with road users striking sign posts been considered?

If signs are required at a position that does not meet sight distance requirements, the sign position may be:

- Adjusted (by a competent person)
  - firstly, within the defined tolerances
  - secondly where only a single sign is normally required under the short-term low impact requirements, and if the adjustment in tolerances does not achieve the required sight distance requirements the sign may be advanced up to one sign spacing.
  - finally, if it still does not meet sight distance requirements, a sign must be erected in the original specified position and an additional sign placed one sign spacing in advance.
- Modified (by a competent person) - relocation of a sign outside of these specified limits will require a risk assessment and appropriate sign off by a Traffic Management Designer.

Where site restrictions prevent the placing of required signs (e.g. local topography, median barriers, bridges), a Traffic Management Designer may consider:

- moving signs away from the site restriction and installing additional signs
- using smaller or narrower signs, subject to approval of the relevant authority
- using median barrier brackets to support signs, subject to approval of the relevant authority.

Sign placement should not make the sign itself, or its supports, a hazard to road workers, road users or local infrastructure (e.g. public transport). To reduce the risk of signs becoming hazards, the following treatments apply:

- signs must be securely mounted. Mounting on vehicles is also acceptable.
- signs must be placed on the left-hand side of the road for the direction of travel where the safety of road users is not affected
- signs must be placed on both sides of multilane roads to effectively communicate relevant messages to road users
- sign support structures should be placed away from the edge of the roadway, see AS 1742.3
- avoid or protect sign supports on the outside of curves and other vulnerable places where vehicles may be more likely to hit the sign
- signs must not encroach on footpaths or bicycle lanes unless the path is wide enough to accommodate them. Consider vulnerable road users with impaired vision, mobility or cognitive limitations. A delineation device (e.g. cone) should be placed at the base of signs on a footpath or bicycle lane if width permits.
- avoid placement that could direct road users into incorrect or dangerous situations
- ensure that signs or their supports do not obstruct visibility of other devices (signals, other signs, etc.), do not obstruct the view between different road users or create a hazard for pedestrians or cyclists. This includes road users turning from or into side roads or driveways. Signs on narrow medians along the roadway might have reduced visibility. Increase the height of signs or consider using a VMS to improve visibility due to obstructions (e.g. parked cars).
- signs must be kept clean, especially in dusty or muddy conditions
- signs that are not relevant during works must be removed or covered as it is essential that all signs at the worksite accurately represent the prevailing conditions at all times. Covering, altering or replacing signs may need to be approved by a road authority. Ensure that permanent signs are not damaged when doing so. Restore these signs when works are completed.
- sign support structures must not be left in place without signs attached.

Signs must be positioned a distance equal to that shown in Table 2.3 from the worksite or hazard. Subsequent signs (after the sign closest to the worksite) must be placed a distance equal to the distances listed in Table 2.3.

There is a tolerance on all distances which is 10% less or 25% more than the distances listed.

Table 2.3: Sign spacing

Speed (km/h)	Distance (m)
≤ 55	15
56 - 65	45
≥ 66	Equal to the speed (km/h)

2.4.3 Road categories

These are the designations given to roads for application of guidance material in AGTTM. TTM practices may vary according to the road category to ensure the objectives of this guidance can be met. Consider the requirements of specific jurisdictions for each road category when designing appropriate TTM. For details see AGTTM Part 8.

2.4.4 Lane width

The minimum width for lanes carrying traffic is shown in Table 2.4.

Table 2.4: Minimum lane width

Criteria	Lane width (m)*
≤ 65 km/h	3
≥ 66 km/h	3.5
Approach lane is < 3 m wide	Equal to approach lane
Two-way residential street	5.5 (sum both ways)

Note:
**This does not apply to curves of radius 250 m or less, or locations where there are fixed vertical obstructions such as fences or safety barriers within 30 cm of the edge of the lane on one or both sides. Consider that on curves, widths larger than those listed above may be required to accommodate large vehicles.*

Consideration is to be given to cyclists and pedestrians. Where a road narrows or pit covers are not flush with existing road, the separation between motor vehicles and cyclists may be reduced.

2.4.5 Traffic volumes

Traffic volumes form a key input to the design of a TGS, aiding an understanding of how much road capacity reduction is feasible, and at what times. They change relative to the time of day and day of week, impacting effective and efficient traffic management. For example, the afternoon school peak period often creates a spike in traffic volumes and can be an undesirable time to close traffic lanes due to the loss of road capacity creating excessive disruption such as queuing. This in turn, may necessitate the need for nightworks which then requires consideration of the impact of works-related activities at night such as noise and temporary lighting.

When higher than anticipated traffic volumes occur at a site, the TGS should be re-evaluated and an alternative plan created to avoid queues and delays. Extensive queueing creates a risk to road users who are not expecting a queue under normal circumstances whilst travelling. A decision on the need to produce alternative traffic control is based on consideration of all prevailing circumstances such as:

- the time of day (e.g. do works need to be confined to nights or weekends due to road capacity and traffic demand?)
- road condition (e.g. is the road rough or unsealed?)
- specific weather conditions
- traffic volumes on alternative routes
- signalled intersections at locations close to the works
- unplanned events affecting the adjacent road network, for example traffic incidents
- planned events such as festivals and their duration.

2.4.6 Speed

All references to speed are the posted speed (temporary or permanent) unless the speed of traffic is substantially higher or lower (greater than 10 km/h difference), in which case the speed of traffic must be used (Refer to Part 1 of the AGTTM for definition of the speed of traffic).

Prior to undertaking any works, the speed limit selected must correspond to the working environment and be verified by appropriate personnel prior to starting. Traffic speeds must be monitored throughout the completion of works to ensure compliance with AGTTM.

2.5 Variations to Design

Having reviewed the potential risks, design steps and traffic management options available within this guidance document, where particular site conditions prevent their application, consider the following:

- variations (e.g. distances) to the TMP or TGS must undergo a risk assessment tailored to the worksite by a competent person in accordance with the relevant jurisdiction
- the use and reason for changes (e.g. additional or reduced number of traffic control devices) must be recorded within the Daily Diary as a variation
- trials or innovative treatments proposed. This could include new or improved devices or innovative installations and layout of devices and new innovative devices which are encouraged to be used where possible.

3. General Considerations

3.1 Restrictions on Use

Short term, low impact works are carried out without the use of a fully protected static worksite (see AGTTM Part 3) or a mobile works convoy (see AGTTM Part 4).

Short term, low impact works comprise of the following activities:

- works that involve minimal plant, equipment and road workers
- works involving a frequently changing work area (e.g. grass cutting, shoulder grading, minor pavement maintenance and survey work)
- works that are of a short duration (less than a single shift but generally much shorter)
- works located sufficiently clear of traffic that only minimal warning is required to advise road users of the presence of workers.

Low impact works must not involve the following:

- speed limit changes, except when the work is protected by specialist vehicles (see Section 4.1)
- tapers
- traffic controllers
- aftercare signs or unattended worksites
- redirecting pedestrians off their normal path of travel, including the following:
  - if the footpath is closed and pedestrians need to be redirected onto the road past the site or across the road (or elsewhere e.g. detour)
  - if pedestrians are directed off the footpath and onto another area (on the same footpath) which is still clear of the road but not the same type of surface (e.g. off a concrete path onto a grass or other type of surface next to the concrete path).

Low impact works may involve redirecting pedestrians off their normal path of travel, with consideration to the following:

- if pedestrians are not impacted (can still use the footpath) but delineation (e.g. traffic cones and fencing) is required to ensure that pedestrians stay out of harm's way
- if the pedestrians are directed off the footpath onto another area (on the same footpath) which is still clear of the road and has the same type of surface.

All road workers, materials and plant should be able to be quickly moved onto or off the roadway in a short period without the need for extensive signage, traffic control devices or traffic controllers.

Road workers and plant are generally positioned close to live traffic with minimal protection so a site-specific risk assessment (see Section 2.2) must be undertaken prior to commencement of works to determine if a short term low impact worksite is suitable.

Subject to a risk assessment not indicating otherwise, treatments for short term low impact works may be applied to works on unsealed roads.

Regardless of any risk assessment, if the speed limit, traffic volume, traffic clearance or occupation time constraints specified in this Part cannot be met, treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied. For many Category 3 roads, jurisdictions have determined that requirements of Part 5 are not applicable, instead choosing to undertake certain maintenance activities using static worksite practices, covered under Part 3 or Mobile work practices covered under Part 4.

3.2 Short Term Low Impact Options

Table 3.1 lists the documented types of short term low impact works (and examples) that are included in this Part.

Table 3.1: Types of short term low impact works

Type of works	Examples, not limited to	Duration*	See Section
Works protected by a specialist vehicle	• placement and recovery of temporary signs and barriers • mobile lane closures • progressively moving operations on multilane roadways • verge maintenance including grass mowing • slow moving or stationary vehicles operating on the roadway	• < one working shift	4.1
Works between gaps in traffic	• removal of obstructions or debris • retrieving tools/equipment from a work vehicle parked at the roadside • traffic investigation • visual inspections, photos and video carried out by workers on foot • pavement spotting and marking for repairs • minor pothole repairs • survey works • setup and removal of temporary signage/devices	• No restrictions but dependant on tasks and available gaps in traffic	4.2
Short term works in traffic	• drainage pit inspections • minor pavement repairs • pavement investigation.	• ≤ 5 min if in lane or within 1.2m of traffic • > 5 min and ≤ 20 min if 1.2 to 3.0m of traffic	4.3
Frequently changing work area within traffic lane	• stormwater pit maintenance • traffic signals and roadside sign maintenance • street lighting maintenance • pavement maintenance, testing and repairs.	• Workers on foot • ≤ 5 min if within 1.2m • ≤ 20 min if 1.2 to 3.0m • ≤ 1 hr if traffic less than 40vph • No workers on foot • ≤ 20 min • ≤ 1 hr if traffic less than 40vph	4.4
Constantly moving works within traffic lane	• mobile inspections • grading	• Not applicable	4.5
Works on medians, verges and footpaths	• mowing, tilling, seeding, weed spraying • litter or graffiti removal • garden maintenance • minor tree clearing • herbicide spraying • minor cleaning of culverts, pipes and pits • road edge guide post repairs • street light maintenance • footpath repairs.	• < one working shift	5.1 and 5.2

Type of works	Examples, not limited to	Duration*	See Section
Frequently changing work area outside of traffic lane	• minor cleaning of culverts, pipes and pits • tree pruning, planting or clearing • road signs or street furniture maintenance • street light maintenance • mowing and litter activities • graffiti removal • herbicide spraying • road edge guide post repairs • guard rail repair and maintenance.	• Up to 1 hour maximum at each location dependant on traffic speed and clearance from traffic	5.3

*Note: *Refer to listed clauses for specific requirements regarding the duration. If they are greater than described see AGTTM Part 3 / Part 4.*

3.3 Vulnerable Road Users

Vulnerable road users can include pedestrians, on road cyclists, off road cyclists and motorcyclists. Works that impact the road, road shoulder, bike lanes, crossings or pathways are likely to impact on these users. Where works affect vulnerable road users, TTM measures should consider the following:

- road features that are hazardous for motorcyclists and on road cyclists, including: transverse and longitudinal changes in the pavement level, changes in surface condition and hazards on the road
- pedestrian and cyclists are not led into direct conflict with the worksite or traffic moving around the worksite
- pedestrians with impaired vision, mobility, hearing or cognitive limitations will be considered as part of the design, preparation, approval and implementation of TTM.

3.4 Vehicle Mounted Warning Device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working wholly within a static work area (see AGTTM Part 3).
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction
3. An illuminated flashing arrow sign
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. They must be capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

4. Works on Road – Within Traffic Lane

4.1 Work Protected by Specialist Vehicles

4.1.1 General

This practice only applies on multi-lane roads where at least one lane in the direction of the works remains open to traffic or where the works are on the shoulder pavement and the TMA is clear of the traffic lanes.

This involves the use of a vehicle fitted with a TMA (see Section 4.1.2) and an illuminated flashing arrow sign, and is typically used for the following activities, particularly on Category 3 roads:

- placement and recovery of temporary signs and barriers
- mobile lane closures
- progressively moving operations on multilane roadways
- verge maintenance including grass mowing
- slow moving or stationary vehicles operating on the roadway (e.g. maintenance of traffic signals, street lighting or emergency phone locations).

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

Where fitted, illuminated flashing arrow signs must be used to direct traffic to one side of the vehicle if it is safe to do so. In situations where it is not safe to pass or overtake the work vehicle, only the warning mode of the arrow must be flashed.

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

4.1.2 Truck mounted attenuators

TMAs should be considered for the use on Category 3 roads, and a risk assessment will determine if they are required on Category 2 or 1 roads. TMAs must be used on Category 3 roads when the work is within 3 m of a lane for longer than 20 minutes or within a frequently changing work area. TMAs are used at the worksite to provide physical protection to road workers from errant vehicles. They are mostly used for mobile works (see AGTTM Part 4) with shadow vehicles but may also be used for short term works to shield road workers from passing traffic. Prior to operation, the TMA must comply with relative jurisdictional requirements.

Short term low impact works on Category 3 roads may include, but are not limited to, the pick-up of debris, road inspections, short term ITS inspections, graffiti removal, fixed speed camera inspections, and data collection.

If a TMA is impacted it is possible that the vehicle will roll forward and could be shunted up to 80 m (when stationary). This roll ahead distance is dependent on many factors including, but not limited to:

- angle of impact
- impact speed
- weight of the vehicle impacting the TMA
- weight of the vehicle mounted with the TMA
- pavement conditions
- brake engagement.

It is therefore recommended that a clear distance of 40 m in front of the TMA be allowed for the vehicle to safely roll forward if impacted without obstructing the work area. No road workers or plant are permitted in this exclusion zone.

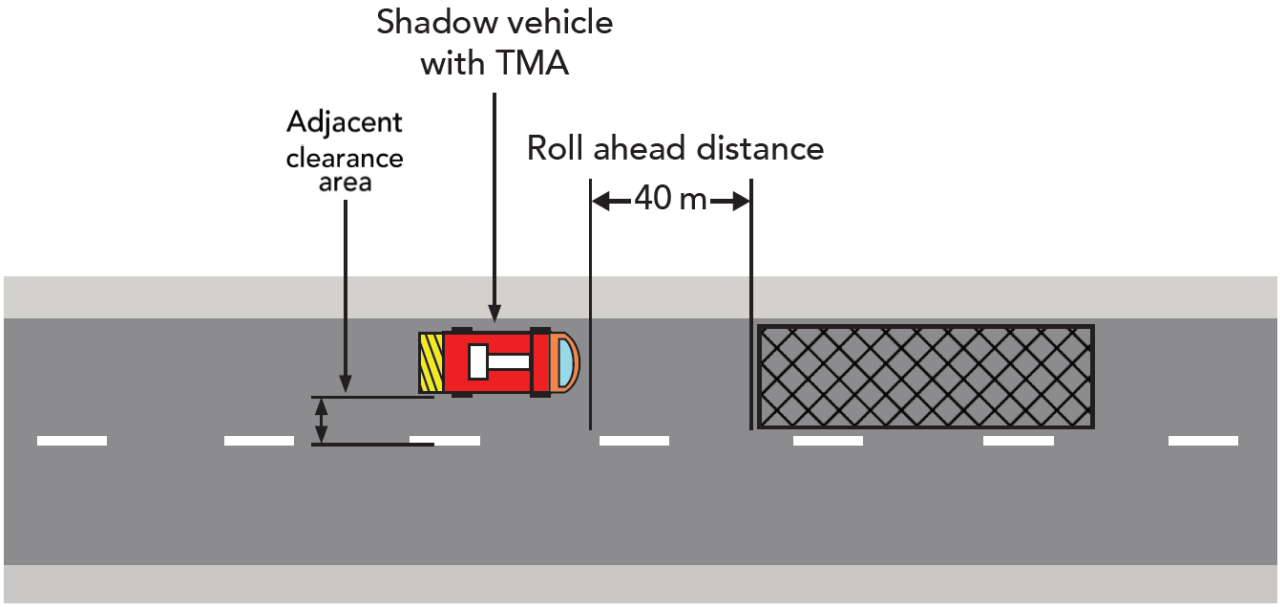
Key principles for the use of a TMA are:

- the TMA should not be positioned too close to worksite, to avoid interaction with the worksite if impacted
- if the TMA is located too far from the work vehicle, there is increased opportunity for road users to enter the work area and impact the workers
- the optimum location of a TMA is based on a balance between these previous two competing principles and requires a risk assessment
- TMA drivers need to have an ongoing awareness of the conditions in which they are operating and ensure an appropriate roll ahead distance is maintained.

Consider also an adjacent clearance area between the TMA and closest traffic lane to ensure the TMA is not shunted into the lane. This needs to be a balance between ensuring that incidental side swipe collisions with the TMA do not occur where there would have been no danger to workers. This needs to be determined on site based on observations of vehicle paths as they pass the TMA.

Figure 4.1 illustrates an example of a TMA mounted vehicle with roll-ahead clearance.

Figure 4.1: TMA set up on static worksites



4.2 Work Between Gaps in Traffic

4.2.1 Description

This clause covers works that are undertaken in short durations such that the work can be carried out within gaps in traffic, without advance warning signs or delineation. Typically, this work is carried out by a single worker with basic tools and materials accompanied by a lookout person. Examples of this type of work include (but are not limited to):

- removal of obstructions or debris
- retrieving tools/equipment from the traffic side of a work vehicle parked at the roadside
- traffic investigation

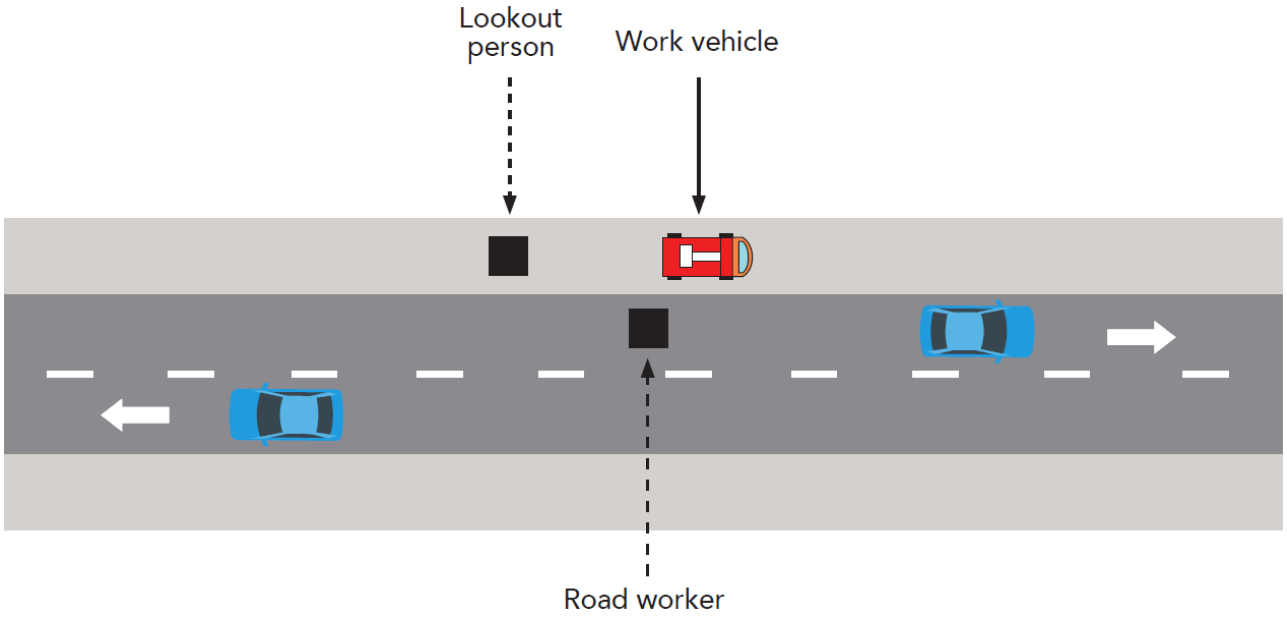
- visual inspections, photos and video carried out by workers on foot
- pavement spotting and marking for repairs
- minor pothole repairs
- survey works
- setup or removal of temporary signs / devices

Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1.

The typical TTM features of working in gaps in traffic is illustrated in Figure 4.2 and include:

- a lookout person as per Section 4.2.5
- a works vehicle
  - positioned as per Section 4.2.5
  - with a vehicle mounted warning device as per Section 3.4.

Figure 4.2: Works between gaps in traffic



Note: The works vehicles placement should consider the impact on vulnerable road users including cyclists.

Note: The road worker should always have a clear exit path from the road and ensure that this is not blocked by the placement of the work vehicle.

4.2.2 Criteria

This type of traffic management arrangement may only be used when all the criteria outlined in Table 4.1 have been answered “Yes”.

Table 4.1: Work between gaps in traffic criteria

Criteria		Yes/No
1	The work area is within a traffic lane	
2	The works can be undertaken safely with road workers entering and exiting the road in gaps in traffic	
3	Traffic is not impeded in any way	
4	The road surface can remain trafficable without hazard to traffic	
5*	A lookout person is available to warn workers on foot to vacate the roadway before the arrival of approaching traffic. If the requirements of Table 4.2 are met answer “Yes”	
6	A vehicle mounted warning device is displayed on the work vehicle and not obscured when the vehicle can be parked adjacent to the worker location	
7	Work vehicles and equipment are parked clear of moving traffic lanes	

*Note: *The lookout person may be dispensed with if the work task takes 10 seconds or less to complete and the sight distance of approaching traffic to the vehicle mounted warning device is a minimum distance as shown in Table 4.2. The worker must be required to be aware of the approaching vehicles within the distance if no lookout person is required.*

Work between gaps in traffic is not recommended on multi-lane roads where traffic volumes exceeds 100 vph per lane, unless significant gaps are being created by upstream traffic control devices such as intersection traffic signals.

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied.

Table 4.2: Sight distance to the vehicle mounted warning device – lookout person not required

Speed (km/h)	Distance (m)
≤ 45	225
46 - 55	275
56 - 65	335
66 – 75	390
76 – 85	445
86 – 95	500
96 – 110	555
> 110	A lookout person is required

Note: Distances are based on the distance covered by a vehicle in 20 seconds.

4.2.3 Traffic control devices

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

4.2.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- occupational health and safety (OHS) paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

4.2.5 Installation (TGS instruction)

Work between gaps in traffic does not require an approved TGS diagram when the works are completed in accordance with this clause.

Operation

Equipment or materials which are brought to the work area should be unloaded from the non-traffic side of a stationary work vehicle, or the rear of a stationary work vehicle with a lookout person or shadow vehicle in place.

The preferred location of the work vehicle is adjacent to or on approach to the worksite in the primary direction of travel to the works if undertaking works in a single location. If this is not possible, for example due to inability to find an appropriate area to park the vehicle, the vehicle should be located as close as possible to the work site.

The vehicle mounted warning device must be on at all times while working in accordance with this clause. The exception is that they will not provide a meaningful alert to road users and are not required in the following situations:

- if the work vehicle cannot be placed adjacent or close to the work site due to siting constraints (e.g. around a corner)
- if the worker is not visible by the work vehicle

The lookout person must be positioned adjacent to the worker so that they can view approaching traffic in time to warn workers to vacate the roadway before arrival of traffic. The recommended sight distance at which the lookout person should be able to see approaching traffic are as per Table 4.3. This distance allows for the worker to respond to a warning and vacate the roadway.

Table 4.3: Sight distance for lookout person – gaps in traffic

Speed (km/h)	Distance (m)*
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
≥ 106	220

*Note: *These distances are based on a maximum distance of 3.5 m between road workers' location and their escape to a shoulder or median. For longer escape routes seek specialist design guidance as additional sight distance will be required.*

Variable message signs may be used for short term works in traffic as a means of secondary protection to workers. The use of variable message signs should be within 40 m of workers. A distance of greater than 40 m between the variable message sign and the workers may be misleading to approaching road users about the location of works.

4.2.6 Close out process

Daily records

Daily records of the site layout including devices and signs used, sight distances, and risk assessments must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to a figure or diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) must be noted and approved.

Incidents

In the case of incidents (e.g. 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 incident must be recorded and the site layout and sign arrangement photographed for subsequent reporting. Details of the actual width and condition of the travelled path and weather conditions must also be recorded.

4.3 Short Term Works in Traffic

4.3.1 Description

Workers may work on the road without the use of advance warning signs provided that the criteria listed in Section 4.3.2 are met. Examples of this type of work include (but are not limited to):

- drainage pit inspections
- minor pavement repairs
- pavement investigation.

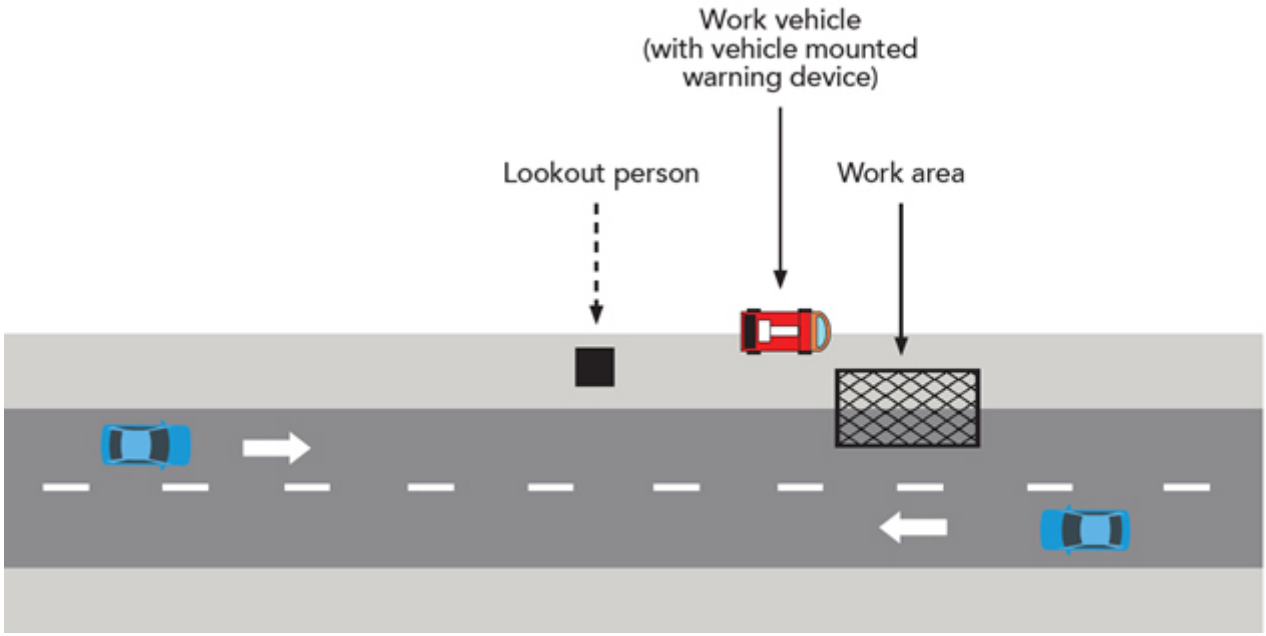
Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1.

The typical TTM features of short term working in traffic include:

- a lookout person as per Section 4.3.5
- a works vehicle
  - positioned as per Section 4.3.5
  - with a vehicle mounted warning device as per Section 4.3.3.

Figure 4.3 illustrates an example of short term works in traffic.

Figure 4.3: Short term works in traffic



Note: The works vehicles placement and location of workers should consider the impact on vulnerable road users including cyclists

4.3.2 Criteria

This type of traffic management arrangement must only be used when the criteria outlined in Table 4.4 or Table 4.5 (as relevant) have been met. The criteria in Table 4.5 apply when:

- works are in one lane of a multi-lane road but the remaining lane(s) remain open to traffic
- where the lane width is greater than 4.5m and the work area is in the lane but is more than 1.2m from the remaining traffic flow
- where the works are on a road with parked vehicles adjacent to the kerb and the worker is effectively more than 1.2m from the nearest line of moving vehicles.

Table 4.4: Short term works in traffic criteria – within 1.2 m or partially within a lane

Criteria		Yes/No
1	The work area is within 1.2 m of a traffic lane or partially within a traffic lane.	
2	Works take 5 minutes or less.	
3	A lookout person is available to warn workers on foot to vacate the roadway before the arrival of approaching traffic which is not altering path to pass the worksite	
4	A vehicle mounted warning device is displayed on the work vehicles and not obscured.	
5	There is a minimum sight distance from approaching road users to the vehicle mounted warning device of: 150 m if the speed is 60 km/h or less 250 m if the speed is more than 60 km/h.	
6	Works do not reduce the overall lane width to a centreline to less than 3.5 m or if the volume is less than 50 vpd, less than 3.3 m.	
7	Works do not reduce any traffic lane width adjacent to a barrier line to less than that needed to allow vehicles to proceed without crossing the line.	

Table 4.5: Short term works in traffic criteria – between 1.2 m and 3 m of traffic

Criteria		Yes/No
1	The work area is between 1.2 m and 3 m of moving traffic.	
2	Works take 20 minutes or less.	
3	A lookout person is available to warn workers on foot to vacate the roadway before the arrival of approaching traffic.	
4	A vehicle mounted warning device is displayed on the work vehicles and not obscured.	
5	There is a minimum sight distance from approaching road users to the vehicle mounted warning device of: • 150 m if the speed is 60 km/h or less • 250 m if the speed is more than 60 km/h.	

If two or more locations within a space of 2 km or less require work to be undertaken, the methods of a frequently changing work area (see Section 4.4) must apply.

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied.

4.3.3 Traffic control devices

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

4.3.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

4.3.5 Installation (TGS instruction)

Short term works in traffic do not require an approved TGS diagram when the works are completed in accordance with this section.

Operation

Equipment or materials which are brought onto the work area should be unloaded from the non-traffic side of a stationary work vehicle, or the rear of a stationary work vehicle with a lookout person or shadow vehicle in place.

The work vehicle must be located adjacent to, or on approach (within 40m), to the worksite in the primary direction of travel to the works if undertaking works in a single location. The works vehicle is the primary traffic management warning device for short term works in traffic. If it is not possible to locate the work vehicle as described, for example due to inability to find an appropriate area to park the vehicle, then this works practice must not be used.

The vehicle mounted warning device must be on at all times while work is in progress.

The lookout person must be positioned adjacent to the worker so that they can view approaching traffic in time to warn workers to vacate the roadway before arrival of traffic. The recommended sight distance at which the lookout person should be able to see approaching traffic are as per Table 4.6. This distance allows for the worker to respond to a warning and vacate the roadway.

At all times when conducting these activities, the lookout person and worker must be within a reasonable proximity (no more than 40m) of the vehicle with a vehicle mounted warning device, which is parked clear of traffic lanes.

Table 4.6: Sight distance for lookout person – short term work in traffic

Speed (km/h)	Distance (m)
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
> 105	220

Note: These distances are based on a maximum distance of 3.5 m between road workers' location and their escape to a shoulder or median. For longer escape routes seek specialist design guidance as additional sight distance will be required.

The use of variable message signs may be used for short term works in traffic as a means of secondary protection to workers. The use of variable message signs must be within 40 m of workers. A distance of greater than 40 m between the variable message sign and workers may be misleading to approaching road users about the location of works.

4.3.6 Close out process

Daily records

Daily records of the site layout including devices, risk assessments, sight distances, signs or TGS (if required), must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout and sign arrangement photographed for subsequent reporting. Details of the actual width and condition of the travelled path and weather conditions should also be recorded.

4.4 Frequently Changing Work Area – In Lane

4.4.1 Description

These are works that move frequently between successive locations within the work area on a traffic lane and satisfy the criteria listed in Section 4.4.2 below. Examples of this type of work include (but are not limited to):

- stormwater pit maintenance
- traffic signals and roadside sign maintenance
- street light maintenance
- pavement maintenance, testing and repairs.

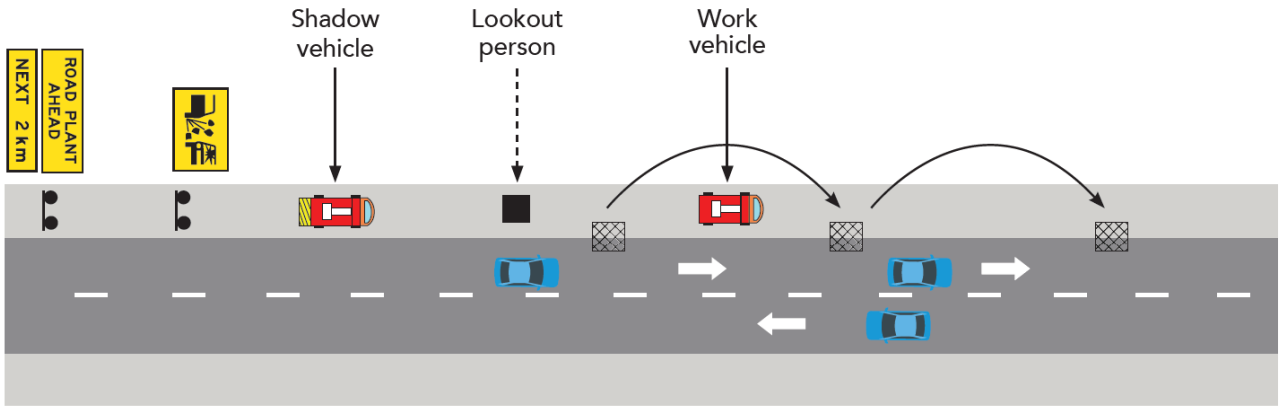
Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1. Where works of this nature are carried out on category 3 roads, a TMA must be used and is an option subject to a risk assessment on category 1 or 2 roads as detailed in Section 4.1.2.

The typical TTM features of frequently changing work area include:

- advance and intermediate warning signs as per Section 4.4.3
- a shadow vehicle as per Section 4.4.3
- when workers are on foot
  - a lookout person as per Section 4.4.5
  - a works vehicle positioned as per Section 4.4.5
- vehicle mounted warning device on the works and shadow vehicles as per Section 4.4.3

Figure 4.4 illustrates an example of a frequently changing work area within a traffic lane. It is important to note that as the work areas progressively move so does the shadow vehicle, work vehicle and lookout person.

Figure 4.4: Frequently changing work area



Note: The works and shadow vehicle placement and location of workers should consider the impact on vulnerable road users including cyclists.

4.4.2 Criteria

This type of traffic management arrangement can only be used when all the criteria outlined in Table 4.7 have been met. In Table 4.7, scenario (b) may be selected when:

- works are in one lane of a multi-lane road but the remaining lane(s) remain open to traffic
- where the lane is wide and the work area is in the lane but is more than 1.2m from the remaining traffic flow
- where the works are in a low volume road and the presence of the work vehicle and workers results in traffic operating similar to shuttle flow.

Table 4.7: Frequently changing work area criteria – in lane

Criteria			Yes/No
1	The work area is (pick column that applies)		
	a) in traffic or within 1.2 m of traffic	b) 1.2 m – 3 m of traffic	
2	Works move frequently between successive locations.		
3	The maximum work period at any one location is (pick the same column as for Criteria number 1)		
	a) – 5 min when there are workers on foot and traffic volume is above 40 vph – 20 min when there are no workers on foot and traffic volume is above 40 vph – 1 hour at traffic volumes of 40 vph or less with or without workers on foot.	b) – 20 min when there are workers on foot and traffic volume is above 40 vph – 20 min when there are no workers on foot and traffic volume is above 40 vph – 1 hour at traffic volumes of 40 vph or less with or without workers on foot.	
4	A lookout person is available to warn workers on foot to vacate the roadway before the arrival of approaching traffic. If there are no workers on foot answer "Yes"		
5	A shadow vehicle is available (Note a TMA must be provided on Category 3 roads).		
6	A vehicle mounted warning device is displayed on both the work and shadow vehicle and the warning device is not obscured.		
7	There is a minimum sight distance from approaching road users to the shadow and the work vehicle mounted warning device of: • 150 m if the speed is 60 km/h or less • 250 m if the speed is more than 60 km/h.		
8	Works do not reduce the overall width to less than the requirements for safe passage of two way traffic flow, or one way traffic if the volume is less than 50 vpd. Refer to Table 2.4 for minimum lane widths.		
9	Works do not reduce any traffic lane width adjacent to a barrier line to less than that needed to allow vehicles to proceed without crossing the line. Refer to Table 2.4 for minimum lane widths.		

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied. If circumstances exist where visibility is reduced, the above does not restrict the ability to undertake a risk assessment and implement additional measures if considered necessary.

4.4.3 Traffic control devices

Advance warning signs

Advance warning signs must be displayed up to 2 km in advance of each work location or item of moving plant. The first work area must be at least a distance equal to the sign spacing in Table 2.3 from the advance warning sign. A maximum distance of 2 km between advance warning signs for opposing directions of travel must not be exceeded at any time by progressively changing their location as the work location changes.

At each advance warning sign location, the following signs must be used:

- workers (symbolic) where there are workers on foot, or ROAD PLANT AHEAD where there is moving road plant only
- NEXT 2km sign.

Intermediate advance warning signs

Intermediate advance warning signs should be used to indicate road surface conditions which may be temporarily hazardous. These signs must be shown a minimum distance in advance of the hazard as outlined in Table 2.3. Examples include:

- Slippery (symbolic)
- ROUGH SURFACE
- Loose Stones (symbolic)
- LOOSE SURFACE
- GRAVEL ROAD
- SOFT EDGES.

Termination signs

Termination signs are not required for frequently changing work area.

Shadow vehicle

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 must follow the large plant item 40 m behind it, either in the work lane or the shoulder to the left of the work lane if space is available on the shoulder or if the works are not in the lane.

If the work is being carried out by workers on foot or small items of plant with, or without large plant items, the shadow vehicle must follow in the same lane as the works, 40 m behind the work vehicle or workers.

Vehicle mounted warning device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   – for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   – for an inspection vehicle
   – for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   – for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   – positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   – for any situation where option 1 or 2 is not appropriate
   – for any type of work
   – mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

4.4.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- confirm TGS has been signed off by relevant personnel, with a copy of the TGS onsite at all times during the works
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

4.4.5 Installation (TGS instruction)

Set-out

All signs and devices must be placed as shown on the TGS. The preferred order to erect signs and devices is as follows:

1. Advance Warning Signs
2. Intermediate Advance Warning Signs

Vehicles used to install signage and equipment must have a vehicle mounted warning device that is visible to all approaching road users.

Before any equipment or materials are brought onto the work area, a drive through check of the work site traffic management set up should be made in all directions, including all side roads if required. This is to confirm that the work area is safe for all workers and road users, and signs and devices are placed as indicated on the TGS.

Operation

Equipment or materials which are brought onto the work area should be unloaded from the non-traffic side of a stationary work vehicle, or the rear of a stationary work vehicle with a lookout person or shadow vehicle in place.

If there are workers on foot, the work vehicle must travel immediately in front of the workers in the direction of travel.

The vehicle mounted warning devices on the shadow vehicle and work vehicle must be on at all times while work is in progress.

If there are workers on foot, the lookout person must be positioned adjacent to the worker so that they can view approaching traffic in time to warn workers to vacate the roadway before arrival of traffic. The recommended sight distance at which the lookout person should be able to see approaching traffic are as in Table 4.8 to allow for the worker to respond to a warning and vacate the roadway. The lookout person should ensure there is no impact on the sight distance requirements for the lookout person arising from the position of the shadow vehicle. In a frequently changing work area, the lookout person is to move along with the workers and the works being undertaken.

Table 4.8: Sight distance for lookout person – frequently changing work area in lane

Speed (km/h)	Distance (m)
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
> 105	220

Note: These distances are based on a maximum distance of 3.5 m between road workers' location and their escape to a shoulder or median. For longer escape routes seek specialist design guidance as additional sight distance will be required.

At all times when conducting these activities, the lookout person and worker must be within a reasonable proximity (no more than 40m) of the shadow vehicle and the works vehicle, both with a vehicle mounted warning device.

It is recommended signs are to be erected by workers in a manner that ensures workers are not exposed to oncoming traffic.

Install signs so that the nearest edge is clear of the travelled path of vehicles. Ensure signs are clearly visible to oncoming road users and well ballasted and stable in reasonably expected weather and traffic conditions. See AS 1742.3 for more information.

Removal

The removal of TTM measures must be in the direction of the traffic flow. Remove all redundant equipment from the worksite.

4.4.6 Close out processes

Daily records

Daily records of the site layout including devices, sight distances, risk assessments, signs or TGS, must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout and sign arrangement photographed for subsequent reporting. Details of the actual width and condition of the travelled path and weather conditions should also be recorded.

4.5 Constantly Moving Work Area – In Lane

4.5.1 Description

These are works that constantly moving between successive locations within the work area on a traffic lane and satisfy the criteria listed in Section 4.5.2 below. Examples of this type of work include (but are not limited to):

- mobile inspections
- grading.

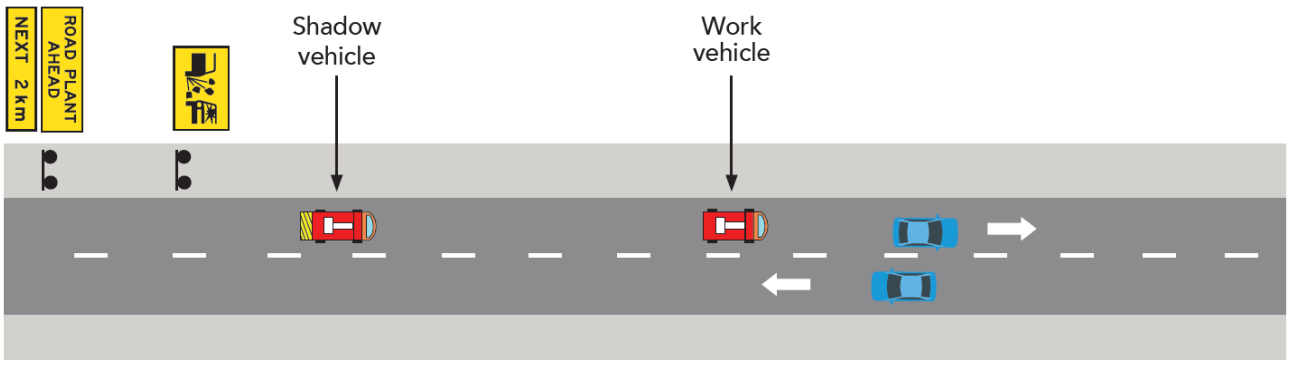
Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1. Where works of this nature are carried out on category 3 roads, a TMA must be used and is an option subject to a risk assessment on category 1 or 2 roads as detailed in Section 4.1.2.

The typical TTM features of constantly moving work area include the following as per Section 4.5.3:

- advance and intermediate warning signs
- a shadow vehicle
- vehicle mounted warning device on the works and shadow vehicles.

Figure 4.5 illustrates an example of a constantly moving work area within a traffic lane. It is important to note that as the work areas progressively move so does the shadow vehicle.

Figure 4.5: Constantly moving work area



Note: The works and shadow vehicle placement and location of signs should consider the impact on vulnerable road users including cyclists.

4.5.2 Criteria

This type of traffic management arrangement can only be used when all the criteria outlined in Table 4.9 or Table 4.10 have been met.

Table 4.9: Constantly moving work area – mobile inspections within a traffic lane

Criteria		Yes/No
1	The inspection vehicle is either fully or partially within a traffic lane.	
2	The works area is continually moving.	
3	A vehicle mounted warning device is displayed and not obscured.	
4	The mobile road inspection is carried out providing the vehicle maintains speed: • less than 20 km/h below the speed limit or • on a road with less than 200 vpd is at least 25 km/h.	

Table 4.10: Constantly moving work area – grading

Criteria		Yes/No
1	The grader and other work vehicles are within the traffic lane or partially within a traffic lane	
2	The works area is continually moving.	
3	A vehicle mounted warning device is displayed and not obscured.	
4	Traffic volumes are 3 000 vpd or less for any speed environment	
5	Works may be undertaken in bounds of up to 10 km.	
6	The signs listed in Section 4.5.3 are available	

If any of the above criteria defined in Table 4.9 or Table 4.10 cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied. If circumstances exist where visibility is reduced, the above does not restrict the ability to undertake a risk assessment and implement additional measures if considered necessary.

4.5.3 Traffic control devices

Advance warning signs

Advance warning signs must be displayed up to 2 km in advance of each work location or item of moving plant. The first work area must be at least a distance equal to the sign spacing in Table 2.3 from the advance warning sign. A maximum distance of 2 km between advance warning signs for opposing directions of travel must not be exceeded at any time by progressively changing their location as the work location changes.

For the conditions in Table 4.9 and Table 4.10:

- Advance warning signs may be omitted for a section when:
  - the sight distance for the entire section exceeds 150 m when the speed is 60 km/h or less and a vehicle mounted warning device is displayed
  - the sight distance for the entire section exceeds 250 m when the speed is more than 60 km/h and a vehicle mounted warning device is displayed.
- If the sight distance falls to less than 250 m at some locations,
  - The work must be undertaken in bounds of not more than 10 km in length. The sign ROADWORK AHEAD and NEXT X km, where the X is the length of the section but is no longer than the maximum of 10km, must be placed at each end of the section being worked on.
  - GRADER AHEAD or ROAD PLANT AHEAD together with NEXT 2 km signs must be displayed on approach to cover the sub-section with diminished sight distance. If there is difficulty turning a grader around at the end of a 2 km section, the section may be extended to the next available turning point but not more than 6 km in total length. Within this extended distance, advance warning signs must be repeated at 2 km intervals.

Intermediate advance warning signs

Intermediate advance warning signs should be used to indicate road surface conditions which may be temporarily hazardous. These signs must be shown a minimum distance in advance of the hazard as outlined in Table 2.3. Examples include:

- Slippery (symbolic)
- ROUGH SURFACE
- Loose Stones (symbolic)
- LOOSE SURFACE
- GRAVEL ROAD
- SOFT EDGES.

Termination signs

Termination signs are not required for constantly moving work area.

Shadow vehicle

Based on a risk assessment, a shadow vehicle may not be required for activities such as mobile inspections or grading.

Vehicle mounted warning device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

4.5.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- confirm TGS has been signed off by relevant personnel, with a copy of the TGS onsite at all times during the works
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

4.5.5 Installation (TGS instruction)

Set-out

All signs and devices must be placed as shown on the TGS. The preferred order to erect signs and devices is as follows:

1. Advance Warning Signs
2. Intermediate Advance Warning Signs

Vehicles used to install signage and equipment must have a yellow flashing lamp(s) that is visible to all approaching road users.

Before any equipment or materials are brought onto the work area, a drive through check of the work site traffic management set up should be made in all directions, including all side roads if required. This is to confirm that the work area is safe for all workers and road users, and signs and devices are placed as indicated on the TGS.

Operation

It is recommended signs are to be erected by workers in a manner that ensures workers are not exposed to oncoming traffic.

Install signs so that the nearest edge is clear of the travelled path of vehicles. Ensure signs are clearly visible to oncoming road users and well ballasted and stable in reasonably expected weather and traffic conditions. See AS 1742.3 for more information.

During the installation of signs and where there are workers on foot, position a lookout person adjacent to the worker so that they can view approaching traffic in time to warn workers to vacate the roadway before the arrival of traffic. The recommended distance from the lookout person to approaching traffic is shown in Table 4.11. The lookout person is not required where the person installing the sign does not enter the roadway and so long as they are facing the direction of approaching traffic and are aware of approaching traffic

Table 4.11: Sight distance for lookout person – constantly moving work area

Speed (km/h)	Distance (m)
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
> 105	220

Note: These distances are based on a maximum distance of 3.5 m between road workers' location and their escape to a shoulder or median. For longer escape routes seek specialist design guidance as additional sight distance will be required.

Removal

The removal of TTM measures must be in the reverse order of installation as described in this Section. Remove all redundant equipment from the worksite.

4.5.6 Close out processes

Daily records

Daily records of the site layout including devices, sight distances, risk assessments, signs or TGS, must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout 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.

5. Works Outside of Traffic Lane

5.1 Shoulders, Medians, Verges and Footpaths with Workers on Foot or Small Plant Items Only

5.1.1 Description

These works may be carried out without any support vehicle on the roadway provided that the criteria listed in Section 5.1.2 are met. Examples of this type of work include (but are not limited to):

- mowing, tilling, seeding, weed spraying
- litter or graffiti removal
- garden maintenance
- minor tree clearing
- herbicide spraying
- minor cleaning of culverts, pipes and pits
- road edge guide post repairs
- street light maintenance
- footpath repairs.

Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1. When undertaking any works on medians, the median must be a minimum width of 1.2 m for this clause to apply.

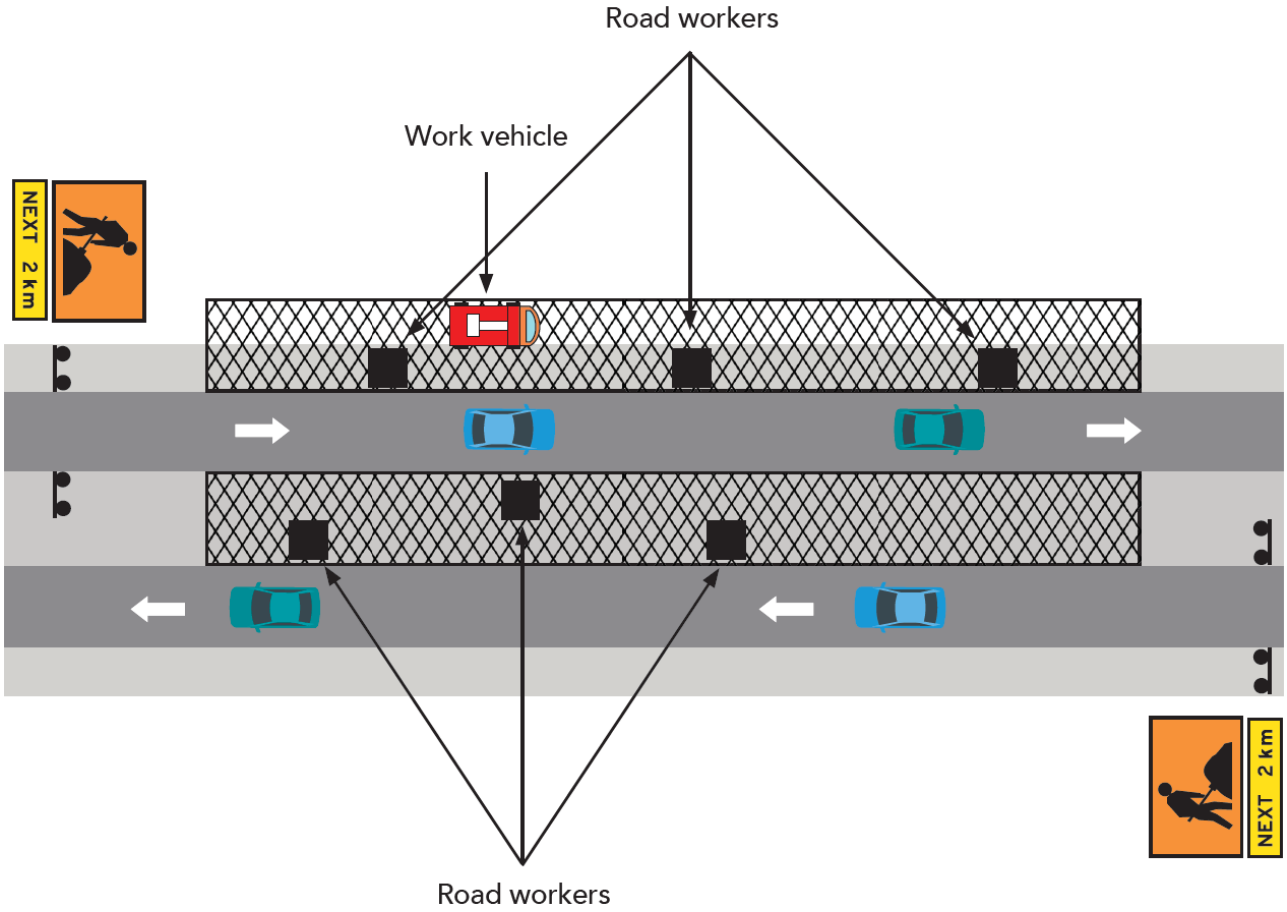
If all workers are exclusively behind a safety barrier, are clear of the deflection zone for the safety barrier system and not visible to traffic, temporary traffic management may not be required.

The typical TTM features of works on shoulders, medians, verges and footpaths include the following as per Section 5.1.3:

- advance signs
- vehicle mounted warning device on the works vehicle.

Figure 5.1 illustrates an example of works outside of a traffic lane that involve workers on foot.

Figure 5.1: Works on medians, verges or footpaths with workers on foot or with small items of plant



Note: The works vehicle placement and location of signs and plant should consider the impact on vulnerable road users including cyclists

5.1.2 Criteria

This type of traffic management arrangement may only be used when all the criteria outlined in Table 5.1 have been met.

Table 5.1: Works on shoulders, medians, verges and footpaths - workers on foot / small plant criteria

Criteria		Yes/No
1	The work area is outside of traffic lanes.	
2	Clearance from the work area is one of the following: • if the speed is 60 km/h or less, the work area does not encroach into the live traffic lane • if the speed is more than 60 km/h but equal to or less than 80 km/h, the work area is at least 1.2 m clear to the edge of the traffic lane • if the speed is more than 80 km/h, the work area is at least 3 m clear to the edge of the traffic lane.	
3	A vehicle mounted warning device is displayed on the work vehicles, is not obscured and meets recommended sight distance requirements for approaching vehicles as shown in Table 5.2.	

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied.

The recommended sight distance of approaching traffic to the vehicle mounted warning device is a minimum distance as shown in Table 5.2.

Table 5.2: Sight distance to the vehicle mounted warning device

Speed (km/h)	Distance (m)
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
> 105	220

5.1.3 Traffic control devices

Advance warning signs

Advance warning signs may be displayed up to 2 km in advance of each work location or item of moving plant. The first work area must be at least a distance equal to the sign spacing in Table 2.3 from the advance warning sign. A maximum distance of 2 km between advance warning signs for opposing directions of travel must not be exceeded at any time by progressively changing their location as the work location changes.

If works are frequently changing or progressively moving, at each advance warning sign location, the following signs must be used:

- Workers (symbolic) sign
- NEXT 2km sign, NEXT 1 km, NEXT 500 m sign (sign as appropriate to length of work area).

Termination signs

No termination signs are required for this clause.

Vehicle mounted warning device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   – for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   – for an inspection vehicle
   – for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   – for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   – positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   – for any situation where option 1 or 2 is not appropriate
   – for any type of work
   – mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

5.1.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- confirm TGS has been signed off by relevant personnel, with a copy of the TGS onsite at all times during the works
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

5.1.5 Installation (TGS instruction)

Set-out

All signs and devices must be placed as shown on the TGS. Advance signs are to be located a distance as per Table 2.3 from the start of the worksite or hazard.

Vehicles used to install signage and equipment must have a yellow flashing lamp(s) that is visible to all approaching traffic.

Before any equipment or materials are brought onto the work area, a drive through check of the work site traffic management set up should be made in all directions, including all side roads if required. This is to confirm that the work area is safe for all workers and road users, and signs and devices are placed as indicated on the TGS.

Operation

Equipment or materials which are brought onto the work area should be unloaded from the non-traffic side of a stationary work vehicle.

It is recommended signs are to be erected by workers in a manner that ensures workers are not exposed to oncoming traffic.

Install signs so that the nearest edge clear of the travelled path of vehicles. Ensure signs are clearly visible to oncoming road users and well ballasted and stable in reasonably expected weather and traffic conditions. See AS 1742.3 for more information.

The preferred location of the work vehicle is parked adjacent to the works with the vehicle mounted warning device activated and parked clear of traffic lanes.

Removal

All redundant equipment must be removed from the worksite.

5.1.6 Close out processes

Daily records

Daily records of the site layout including devices, sight distances, risk assessments, signs or TGS, must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout 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.

5.2 Shoulders, Medians, Verges and Footpaths with Large Plant Items Only

5.2.1 Description

These works may be carried out without any support vehicle on the roadway provided that the criteria listed in Section 5.2.2 are met. Examples of this type of work includes (but are not limited to):

- mowing, tilling, seeding, weed spraying
- minor tree clearing
- herbicide spraying
- road edge guide post installation/repairs.

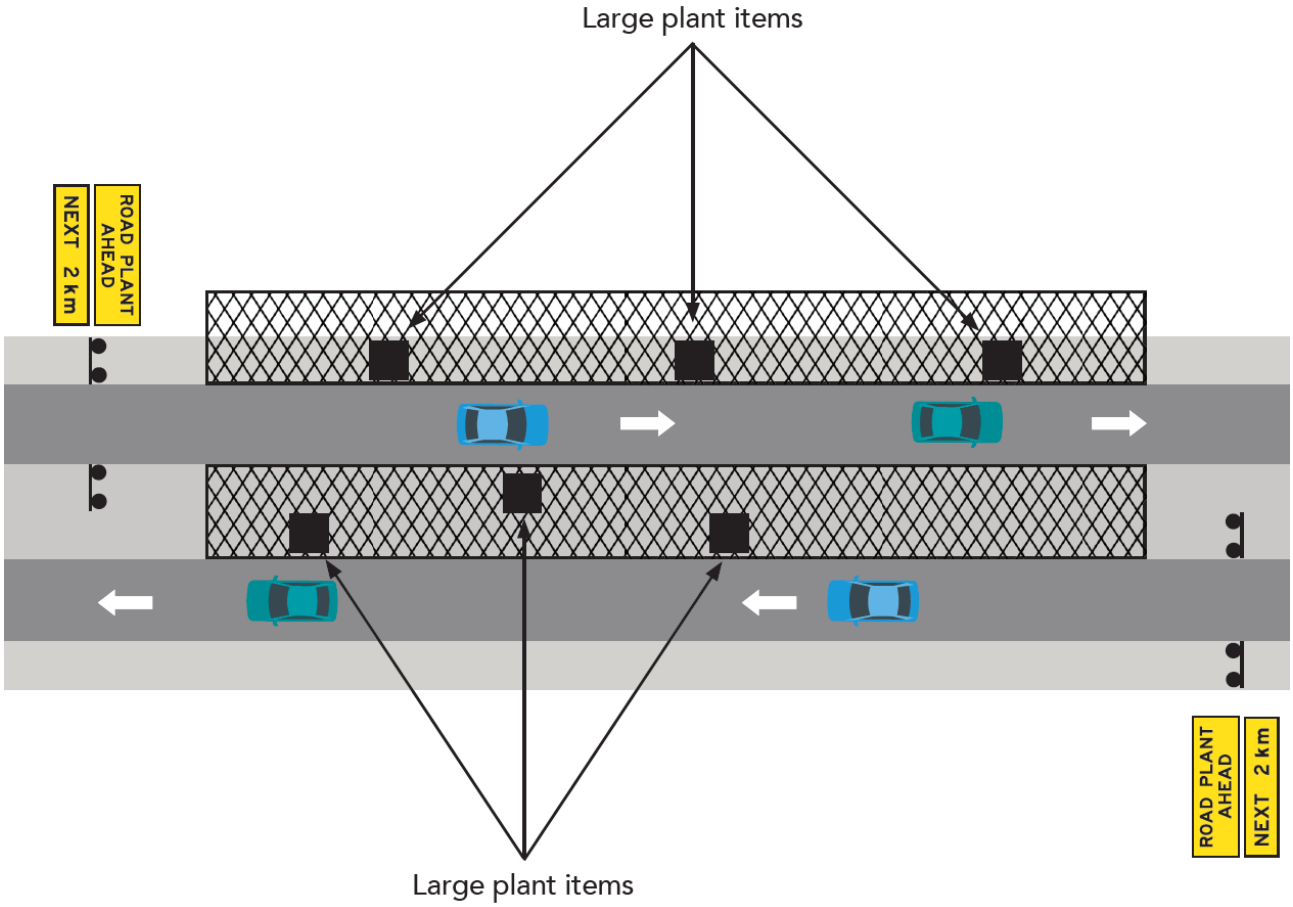
Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1.

The typical TTM features of works on shoulders, medians, verges and footpaths include the following as per Section 5.2.3:

- advance signs
- vehicle mounted warning device on the plant vehicles

Figure 5.2 illustrates an example of works outside of a traffic lane that involve large plant only.

Figure 5.2: Works on shoulders, medians, verges or footpaths with large plant items



Note: The works vehicle placement and location of signs and plant should consider the impact on vulnerable road users including cyclists

5.2.2 Criteria

This type of traffic management arrangement may only be used when all the criteria outlined in Table 5.3 have been met.

Table 5.3: Works on shoulders, medians, verges and footpaths – large plant criteria

Criteria		Yes/No
1	The work area is outside of traffic lanes	
2	No workers on foot are required	
3	Clearance from the work area to the edge of the traffic lane is: • greater than 1.2 m where the speed limit is more than 80 km/h • may be less than 1.2 m where speed limit is 80 km/h or less (plant items must not encroach onto the traffic lane)	
4	A vehicle mounted warning device is displayed on each large plant item, is not obscured and meets recommended sight distance requirements for approaching vehicles as shown in Table 5.4.	

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied.

The sight distance of approaching traffic to the vehicle mounted warning device must be a minimum distance as shown in Table 5.4.

Table 5.4: Recommended sight distance to the vehicle mounted warning device

Speed (km/h)	Distance (m)
≤ 45	80
46 - 55	100
56 - 65	120
66 – 75	140
76 – 85	160
86 – 95	180
96 – 105	200
> 105	220

5.2.3 Traffic control devices

Advance warning signs

Advance warning signs must be displayed up to 2 km in advance of each work location or item of moving plant. The first work area must be at least a distance equal to the sign spacing in Table 2.3 from the advance warning sign. A maximum distance of 2 km between advance warning signs for opposing directions of travel must not be exceeded at any time by progressively changing their location as the work location changes.

If works are frequently changing or progressively moving, at each advance warning sign location, the following signs must be used:

- ROAD PLANT AHEAD
- NEXT 2 km sign, NEXT 1 km, NEXT 500 m sign (sign as appropriate to length of work area).

Termination Signs

No termination signs are required for this clause.

Vehicle mounted warning device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.

3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

5.2.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the supervisor or relevant person
- confirm TGS has been signed off by relevant personnel, with a copy of the TGS onsite at all times during the works
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

5.2.5 Installation (TGS instruction)

Set-out

All signs and devices must be placed as shown on the TGS. Advance signs are to be located a distance as per Table 2.3 from the start of the worksite or hazard.

Vehicles used to install signage and equipment must have a yellow flashing lamp(s) that is visible to all approaching traffic.

Before any equipment or materials are brought onto the work area, it is recommended that a drive through check of the work site traffic management set up be made in all directions, including all side roads if required. This is to confirm that the work area is safe for all workers and road users, and signs and devices are placed as indicated on the TGS.

Operation

Equipment or materials which are brought onto the work area should be unloaded from the non-traffic side of a stationary work vehicle.

It is recommended signs are to be erected by workers in a manner that ensures workers are exposed not to oncoming traffic.

Install signs so that the nearest edge is clear of the travelled path of vehicles. Ensure signs are clearly visible to oncoming road users and well ballasted and stable in reasonably expected weather and traffic conditions. See AS 1742.3 for more information.

Removal

Remove all redundant equipment from the worksite.

5.2.6 Close out processes

Daily records

Daily records of the site layout including devices, sight distances, risk assessments, signs or TGS, must be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout 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.

5.3 Frequently Changing Work Area Outside of a Traffic Lane

5.3.1 Description

These are works that move frequently between successive locations within the work area, which do not encroach onto a moving traffic lane and satisfy the criteria listed in Section 5.3.2 below. Examples of this type of work includes (but are not limited to):

- minor cleaning of culverts, pipes and pits
- tree pruning, planting or clearing
- road signs or street furniture maintenance
- street light maintenance
- mowing and litter activities
- graffiti removal
- herbicide spraying
- road edge guide post repairs
- guard rail repair and maintenance.

Prior to undertaking these work activities, a risk assessment must be undertaken to ensure the works can be safely completed. Risk considerations are outlined in Section 2.2.1.

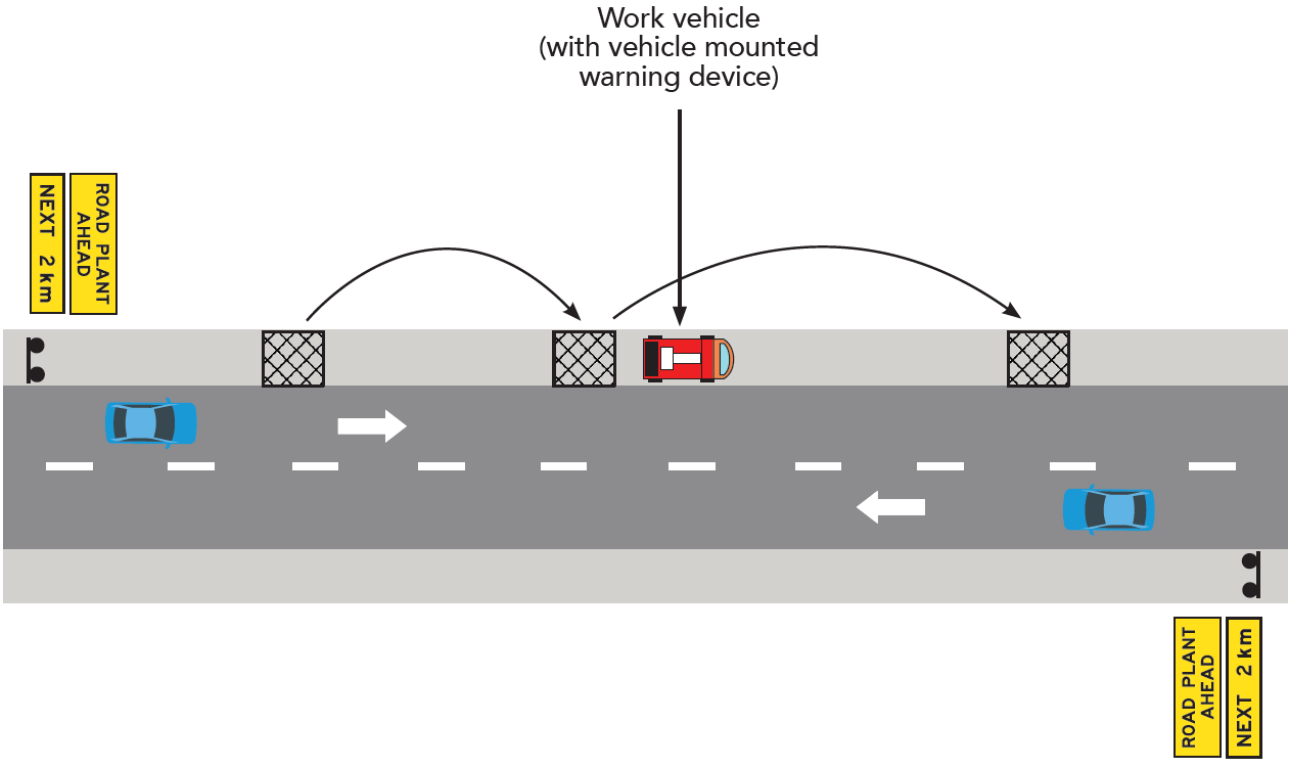
The preferred location of the work vehicle is adjacent to the work area with the vehicle mounted warning devices activated and parked clear of the traffic lane.

The typical TTM features of frequently changing work area include:

- advance and intermediate warning signs as per Section 5.3.3
- a works vehicle positioned as per Section 5.3.5
- vehicle mounted warning device on the works and shadow vehicles as per Section 5.3.3

Figure 5.3 illustrates a frequently changing work area outside of a traffic lane. It is important to note that as the work areas progressively move so must the work vehicle. When undertaking works of this nature, consider the impact on vulnerable road users and the impact the works have on their manoeuvrability around the frequently changing work area.

Figure 5.3: Frequently changing work area (outside of traffic lane)



Note: The works vehicle placement and location of signs and plant should consider the impact on vulnerable road users including cyclists.

5.3.2 Criteria

This type of traffic management arrangement must only be used when all the criteria outlined in Table 5.5 have been met.

Table 5.5: Frequently changing work area criteria

Criteria		Yes/No
1	The work area is outside of traffic lanes.	
2	Works move frequently between successive locations.	
3	The maximum work period at any one location is: • for traffic speeds 70 km/h or less: – 20 min at any traffic volume – 40 min at traffic volumes of 150 vph or less – 1 hour at traffic volumes of 40 vph or less • for traffic speeds greater than 70 km/h: – Within 1.2m of traffic - 5 min if there are workers on foot - 20 minutes if there are large plant items only – 20 min if outside 1.2 m of moving traffic.	
4	A vehicle mounted warning device is displayed on the work vehicle and not obscured.	
5	There is a minimum sight distance from approaching road users to the vehicle mounted warning device of: • 150 m if the speed is 60 km/h or less • 250 m if the speed is more than 60 km/h	

If any of the above criteria cannot be achieved, alternative treatments detailed in this Part, the treatments of a fully protected static worksite (see AGTTM Part 3) or mobile works convoy (see AGTTM Part 4) must be applied.

5.3.3 Traffic control devices

Advance warning signs

Advance warning signs must be displayed up to 2 km in advance of each work location or item of moving plant. A maximum distance of 2 km between advance warning signs for opposing directions of travel must not be exceeded at any time by progressively changing their location as the work location changes.

At each advance warning sign location, the following signs must be used:

- Workers (symbolic) where there are workers on foot, or ROAD PLANT AHEAD where there is moving road plant only
- NEXT 2 km sign, NEXT 1 km, NEXT 500 m sign (sign as appropriate to length of work area).

Intermediate advance warning signs

No intermediate advance warning signs are required for this clause.

Termination signs

No termination signs are required for this clause.

Vehicle mounted warning device

A vehicle mounted warning device provides advance warning and information to road users regarding works being carried out and any hazard.

A vehicle mounted warning device must consist of one of the following options:

1. A single flashing yellow lamp
   - for emergency or other infrequent use on a vehicle not normally used for roadworks purposes
   - for an inspection vehicle
   - for use on a plant item working within a work area.
2. A pair of flashing yellow lamps
   - for use on vehicles (e.g. patrol trucks) working on roads with traffic volumes up to 1500 vpd
   - positioned on the vehicle so that at least one (preferably both) lamps are visible from any direction.
3. An illuminated flashing arrow sign on a vehicle parked clear of traffic lanes
   - for any situation where option 1 or 2 is not appropriate
   - for any type of work
   - mount supplementary signs (static or variable message signs) in conjunction or elsewhere in a prominent position on the vehicle. Ensure they are capable of being removed from view (e.g. covering, folding or turning off) when not needed.

The vehicle mounted warning device should be mounted as high as practicable on the vehicle for best visibility to all road users (e.g. on the roof (cab) of the truck). This helps to ensure the device is not obscured (e.g. overhanging vegetation, raised truck body, permanent signs). It may be moved near the rear of the vehicle if a roof-mounted sign could be obscured by a load.

5.3.4 Pre-installation processes

Prior to works being conducted on site, the following checks must be undertaken:

- risk assessment must be conducted, to confirm that factors such as traffic volume and speed, road geometry and width, and the general behaviour of road users are considered when determining the appropriate traffic management arrangement
- OHS paperwork, such as job safety awareness forms, must be completed and signed off by the construction supervisor or relevant person
- confirm TGS has been signed off by relevant personnel, with a copy of the TGS onsite at all times during the works
- appropriate personal protective equipment must be used
- all required devices/equipment must be checked and accounted for prior to leaving for site
- appropriate record keeping methods are in place.

5.3.5 Installation (TGS instruction)

Set-out

All signs and devices must be placed as shown on the TGS. Advance signs are to be located a distance as per Table 2.3 from the start of the worksite or hazard.

Vehicles used to install signage and equipment must have a yellow flashing lamp(s) that is visible to all approaching road users.

Before any equipment or materials are brought onto the work area it is recommended that a drive through check of the worksite traffic management set up be made in all directions, including all side roads if required. This is to confirm that the work area is safe for all workers and road users, and signs and devices are placed as indicated on the TGS.

Operation

Equipment or materials which are brought onto the work area should be unloaded from the non-traffic side of a stationary work vehicle.

It is recommended signs are to be erected by workers in a manner that ensures workers are not exposed to oncoming traffic.

Install signs so that the nearest edge is clear of the travelled path of vehicles. Ensure signs are clearly visible to oncoming road users and well ballasted and stable in reasonably expected weather and traffic conditions. See AS 1742.3 for more information.

Removal

Remove all redundant equipment from the worksite.

5.3.6 Close out processes

Daily records

Daily records of the site layout including devices, sight distances, risk assessments, signs or TGS, should be kept in a diary or in work sheets, which must be retrievable upon request.

Reference to the diagram number which generally applies to the layout used or to a documented procedure is usually sufficient. Any significant departures from, or additions to, the signs and devices included in the relevant diagram(s) should be noted and approved.

Incidents

In the case of incidents (e.g. 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 must be recorded with the site layout 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.

References

New Zealand Government 2018, *Code of Practice for Temporary Traffic Management*, New Zealand Transport Agency, Wellington New Zealand.

Australian Standards

AS 1742.3-2009, Manual of Uniform Traffic Control Devices Part 3: Traffic control for works on roads

Austroads' Guide to Temporary Traffic Management (AGTTM) details contemporary temporary traffic management practice for application in Australia and New Zealand. It provides guidance for the planning, design and implementation of safe, economical and efficient temporary traffic management designs.

Guide to Temporary Traffic Management Part 5: Short Term Low Impact Worksites identifies and details preferred temporary traffic management design and operational practices to be applied for short term low impact works on or near roads.

Guide to Temporary Traffic Management Part 5

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