DELIVERING FOR QUEENSLAND

Manual

Queensland Guide to Temporary Traffic Management Part 3: Static Worksites

November 2025

Queensland Government

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Feedback

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About this document

This document supplements the Austroads *Guide to Temporary Traffic Management Part 3 Static Worksites*, which has been prepared to assist with the preparation of traffic guidance schemes (TGSs), in accordance with Austroads best practice. It provides general information about the context and components of designing temporary traffic guidance schemes at static worksites.

How to use this document

This document is designed to be read and applied together with the Austroads *Guide to Temporary Traffic Management Part 3: Static Worksites (*AGTTM03-21 Edition 1.1). You must have access to the Guide to understand what applies in Queensland.

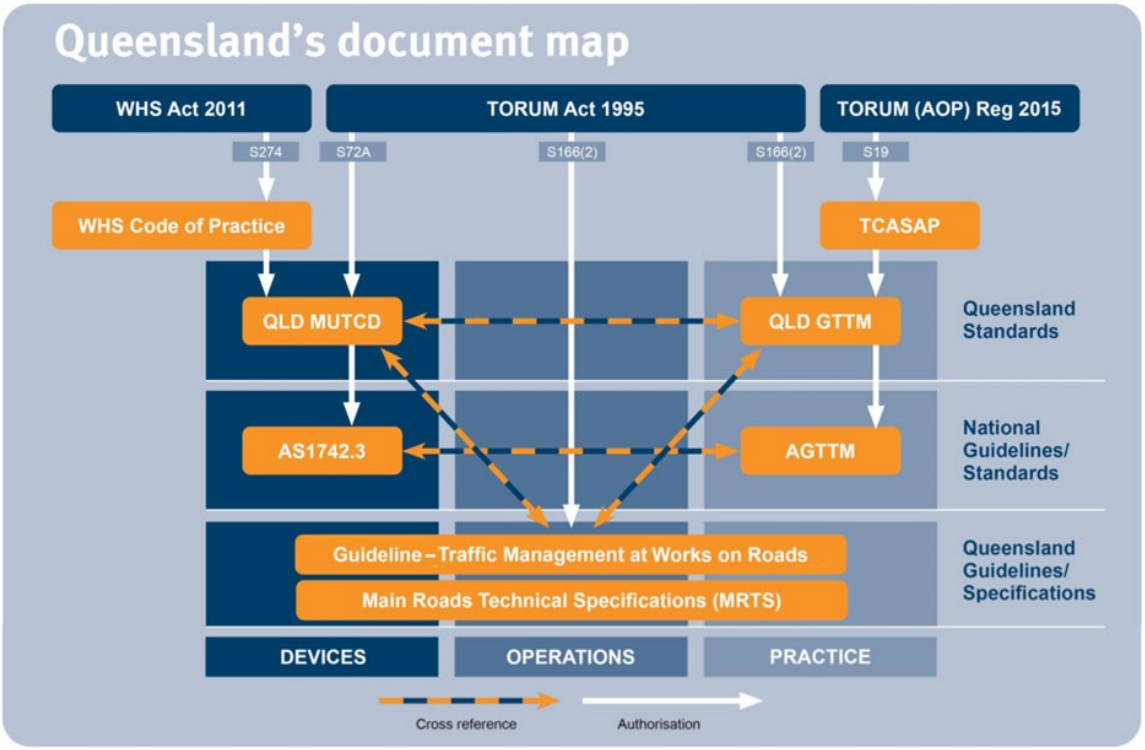
This document:

- sets out how AGTTM03-21 applies in Queensland
- has precedence over AGTTM03-21 when applied in Queensland
- has the same section and clause numbering and headings as AGTTM03-21.

The following table summarises the relationship between AGTTM03-21 and this document:

Applicability	Meaning
Accepted	The Guide section or clause is accepted.
Accepted, with amendments	Part or all of the section or clause has been accepted with additions, deletions or differences.
New	There is no equivalent section or clause in the Guide.
Not accepted	The Guide section or clause is not accepted.

A summary of the documents relevant to TTM practice in Queensland, and their links, is provided following:



References

The following references apply when reading AGTTM03-21.

Reference to...	Means
AGTTM03-21	Austroads *Guide to Temporary Traffic Management Part 3 Static Worksites*, as amended by this document: for example, a reference to AGTTM03-21 means you must refer to the *Queensland Guide to Temporary Traffic Management (*QGTTM) Part 3. Throughout AGTTM03-21, references are made to other parts of the Guide (for example, when reading Part 3 you may be referred to Part 1 for further information.) In this case, you must refer to the equivalent Part within the QGTTM. Check the applicability of the equivalent Part in the QGTTM **before** referring to the referenced Austroads Guide Part.
AGTTM	Austroads *Guide to Temporary Traffic Management*
AS 1742	Australian Standard AS 1742 *Manual of Uniform Traffic Control Devices*
Queensland (Q) series / Traffic Control (TC) signs	MUTCD (Q) series and TC signs.

Reference to...	Means
Queensland MUTCD	Queensland *Manual of Uniform Traffic Control Devices* which supplements AS 1742.

Relationship table (harmonised to AGTTM03-21 Edition 1.1)

Section		Description	Applicability
1	**Introduction**		
	1.1	Purpose	Accepted
	1.2	Structure of AGTTM	Accepted
	1.3	Scope of Part 3	Accepted
	1.4	Application of Part 3 to New Zealand	Accepted
	1.5	Definitions	Accepted
2	**Design Process**		
	2.1	General	Accepted
	2.2	Risk assessment	Accepted with amendments
	2.2.1	*Risk considerations*	Accepted
	2.2.2	*Hierarchy of control – eliminate, separate or control*	Accepted
	2.3	Design steps – around, through, past	Accepted
	2.4	Design balance	Accepted
	2.5	Essential design principles	Accepted
	2.5.1	*Worksite layout*	Accepted
	2.5.2	*Worksite access*	Accepted
	2.5.3	*Signs*	Accepted with amendments
	2.5.4	*Sight distance*	Accepted with amendments
	2.5.5	*Road categories*	Accepted
	2.5.6	*Traffic volume*	Accepted
	2.5.7	*Traffic lanes*	Accepted with amendments
	2.5.8	*Lane width*	Accepted with amendments
	2.5.9	*Speed*	Accepted
	2.6	Variations to design	Accepted with amendments

Section		Description	Applicability
	2.7	Combining different works protection methods	New
3	**Around the worksite**		
	3.1	General	Accepted
	3.2	Worksite layout	Accepted
	3.3	Separate the work area	Accepted
	3.4	Road closures	Accepted with amendments
	3.4.1	*Property access*	Accepted
	3.5	Safe traffic speed	Accepted
	3.6	Safety buffer	Accepted with amendments
	3.7	Advance warning area	Accepted
	3.8	Design and traffic management	Accepted with amendments
	3.8.1	*Detours*	Accepted with amendments
	3.8.2	*Detours via sidetracks*	Accepted
	3.8.3	*Contraflow*	Accepted
	3.9	Termination area	Accepted with amendments
	3.10	Vulnerable road users	Accepted
	3.10.1	*Pedestrians*	Accepted with amendments
	3.10.2	*Cyclists*	Accepted with amendments
	3.10.3	*Motorcyclists*	Accepted
	3.11	Public transport	Accepted
4	**Through the worksite**		
	4.1	General	Accepted
	4.2	Worksite layout	Accepted
	4.3	Separate the work area	Accepted
	4.4	Delineate the route	Accepted

Section		Description	Applicability
	4.5	Safe traffic speed	Accepted with amendments
	4.6	Safety buffer	Accepted
	4.7	Traffic control and site entry	Accepted with amendments
	4.8	Advance warning area	Accepted with amendments
	4.8.1	*Intersections within the advance warning area*	New
	4.8.2	*Police performing planned traffic control duties*	New
	4.8.3	*Additional end-of-queue protection*	New
	4.8.4	*Queued traffic ahead multi-message sign*	New
	4.9	Termination area	Accepted with amendments
	4.10	Vulnerable road users	Accepted
	4.10.1	*Pedestrians*	Accepted with amendments
	4.10.2	*Cyclists*	Accepted with amendments
	4.10.3	*Motorcyclists*	Accepted
	4.11	Public transport	Accepted
5	**Past the worksite**		
	5.1	General	Accepted
	5.2	Worksite layout	Accepted
	5.3	Separate the work area	Accepted
	5.3.1	*Road safety barrier system*	Accepted with amendments
	5.3.2	*Containment fence*	Accepted with amendments
	5.3.3	*Visibility screens*	Accepted with amendments
	5.4	Delineate the route	Accepted with amendments
	5.4.1	*Traffic cones and bollards*	Accepted with amendments

Section		Description	Applicability
	5.4.2	*Temporary hazard markers*	Accepted with amendments
	5.4.3	*Temporary kerbing*	Accepted
	5.4.4	*Shuttle flow*	Accepted with amendments
	5.5	Safe traffic speed	Accepted with amendments
	5.5.1	*Temporary speed limits*	Accepted with amendments
	5.5.2	*Temporary speed humps*	Accepted with amendments
	5.5.3	*Rumble strips*	Accepted with amendments
	5.5.4	*Speed enforcement*	New
	5.6	Safety buffer	Accepted with amendments
	5.7	Overhead clearance	Accepted
	5.8	Additional warning area and devices	Accepted
	5.8.1	*Truck-mounted attenuators*	Accepted with amendments
	5.9	Transition area	Accepted
	5.9.1	*Tapers*	Accepted with amendments
	5.9.2	*Chicanes*	Accepted with amendments
	5.9.3	*Contraflow*	Accepted
	5.9.4	*Closing the shoulder*	New
	5.10	Traffic control	Accepted with amendments
	5.10.1	*Portable traffic control devices*	Accepted with amendments
	5.10.2	*Traffic controllers*	Accepted with amendments
	5.10.3	*Site entry*	Accepted

Section		Description	Applicability
	5.10.4	*Combining portable traffic control devices*	New
	5.11	Advance warning area	Accepted with amendments
	5.12	Termination area	Accepted with amendments
	5.13	Vulnerable road users	Accepted
	5.13.1	*Pedestrians*	Accepted with amendments
	5.13.2	*Cyclists*	Accepted with amendments
	5.13.3	*Motorcyclists*	Accepted
	5.14	Public transport	Accepted
6	**Design for additional issues**		
	6.1	General	Accepted
	6.2	Permanent traffic signals	Accepted
	6.3	Roundabouts	Accepted
	6.4	Overtaking lane	Accepted
	6.5	Shoulder as a temporary lane	Accepted with amendments
	6.6	Pavement markings	Accepted with amendments
	6.7	Night works	Accepted with amendments
	6.8	Excavations	Accepted with amendments
	6.8.1	*Lateral excavations*	New
	6.9	Unattended worksites	Accepted

Section		Description	Applicability
	6.10	Placement and Operation of Portable Variable Message Sign (VMS)	Accepted with amendments
	6.10.1	*Principles and guidance*	Accepted with amendments
	6.10.2	*Aiming distance*	Accepted with amendments
	6.10.3	*Longitudinal placement*	Accepted
	6.10.4	*Lateral placement*	Accepted with amendments
	6.10.5	*Visibility*	Accepted
	6.10.6	*Other location requirements*	New
	6.10.7	*Drive through requirements*	New
	6.10.8	*TVMS specification*	New
	6.10.9	*Display of messages on TVMSs*	New
	6.11	Clear Zones	New
	6.11.1	*Factors influencing the clear zone*	New
	6.11.2	*Determination of clear zone requirements*	New
	6.12	Star pickets	New
7	**How to apply the Traffic Guidance System**		
	7.1	General	Accepted
	7.2	Pre-installation	Accepted
	7.3	Installation	Accepted with amendments
	7.4	Removal	Accepted with amendments
	7.4.1	*Redundant devices*	Accepted with amendments
	7.4.2	*Ghost markings*	Accepted
	7.5	Inspection and record keeping	Accepted

Section		Description	Applicability
Appendices			
A	**Temporarily closing or restricting access to roads**		
	A.1	General	New
	A.2	Closing or restricting access on a state-controlled road only	New
	A.3	Closing a road	New
	A.4	Restricting access	New
	A.5	Warning of a road closure ahead	New
	A.6	Example layouts	New

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2 Design process

2.2 Risk assessment

Difference

Replace:

> It is important to note that a Design Exceptions Report must be approved by the relevant Road Infrastructure Manager (RIM) and road authority if design exceptions are made or published standards or the AGTTM are not adhered to.

with:

> Where variations to the treatments in the Queensland MUTCD Part 3 or QGTTM are proposed, a risk assessment certified in accordance with the requirements of Clause 1.9 of Queensland MUTCD Part 3 must be undertaken.

2.5 Essential design principles

2.5.3 Signs

Difference

Replace the entire Section 2.5.8 with the following:

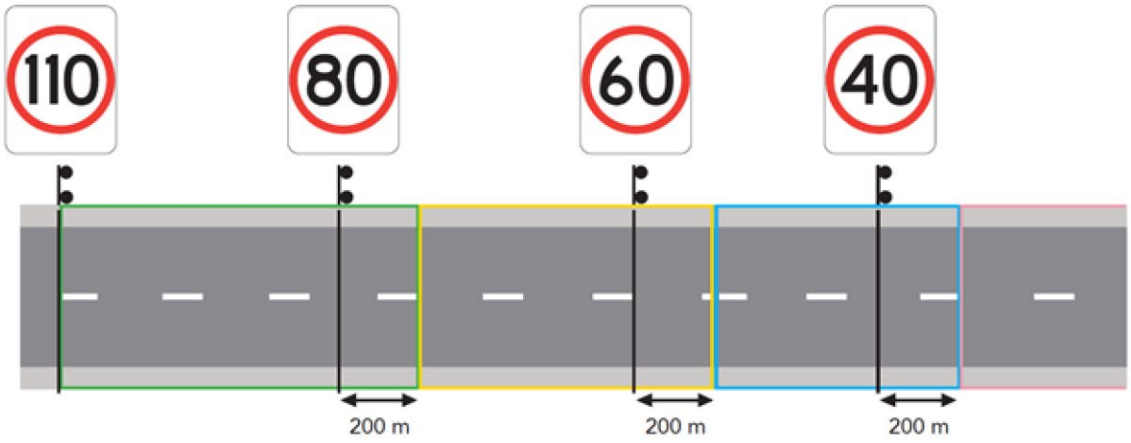
> Signs indicate the nature of the hazard or work. For details on choosing an appropriate sign see AS1742.3. Once an appropriate sign is chosen, its location needs to be incorporated into the TGS. There are two steps in sign placement:
>
> 1. Locate the sign (see below).
> 2. Check sight distance (see Section 2.5.4).
>
> Signs must be positioned a distance equal to that shown in Table 2.2 from the worksite or hazard (e.g. taper). Space successive signs (after the primary sign) the same distance as shown in Table 2.2 unless stated otherwise. If there is only a single advance warning sign on the approach, the sign must be positioned at double the spacing shown in Table 2.2 from the worksite or hazard.
>
> Note that sign spacing in Table 2.2 does not apply to the distance between the traffic controller and traffic control sign. Refer to AGTTM Part 7 for traffic controller guidance.

Table 2.2: Sign spacing

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

When designing spacing of advance warning signs, the speed to use in Table 2.2 must be as per Figure 2.2 rather than the intended travel speed. For example, if signs are positioned in the green zone, even when the speed changes from 110 km/h to 80 km/h, use the distance spacing which corresponds to a speed of 110 km/h in Table 2.2 for the first 200 m past the 80 km/h speed zone signs. If signs are positioned in the yellow zone, even when speed changes from 80 km/h to 60 km/h, use the distance which corresponds to a speed 80 km/h. Use 60 km/h for the blue zone and so on. In summary, always choose the higher speed limit in the first 200 m of the start of the new speed zone to ensure greater distance is provided to more accurately reflect potential travel speeds in these zones.

Figure 2.2: Speed to be used for advance warning sign spacing



Where a sign spacing is partially within the 200 m zone after a speed limit change, use the higher speed limit in determining the relevant full spacing (even though only part of this spacing may be within this zone).

Tapers which are partially within the 200 m zone after a speed limit change are to use the higher speed limit in determining the relevant full taper length (even though only part of the taper length may be within this zone).

The following figures illustrate the relationship between a speed zone change and the spacing / distance applicable to signs or hazards (such as a taper).

Where traffic speed is substantially different (+/- 10 km/h or more) to the posted or temporary speed zone values, refer to Section 2.5.9 for the speed value to use in the tables.

Figure 2.2(a) – Sign or hazard within 200 m of a speed zone change

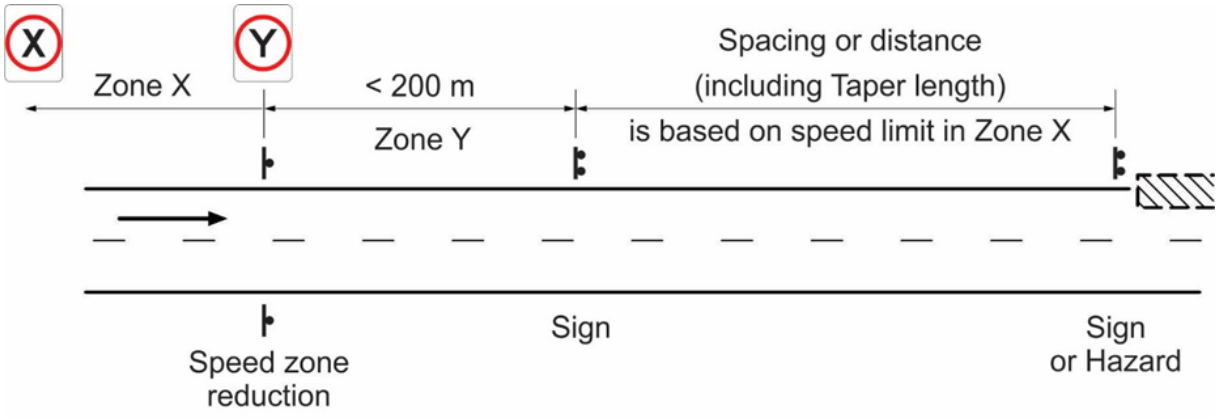
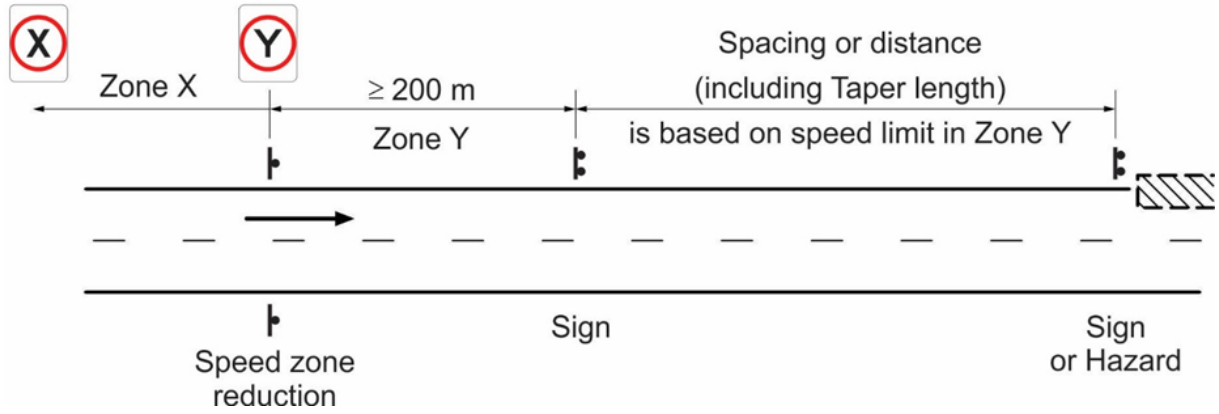


Figure 2.2(b) – Sign or hazard greater than or equal to 200 m from a speed zone change



Where site restrictions prevent the placing of required signs (e.g. local topography, median barriers, bridges) the following should be considered:

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

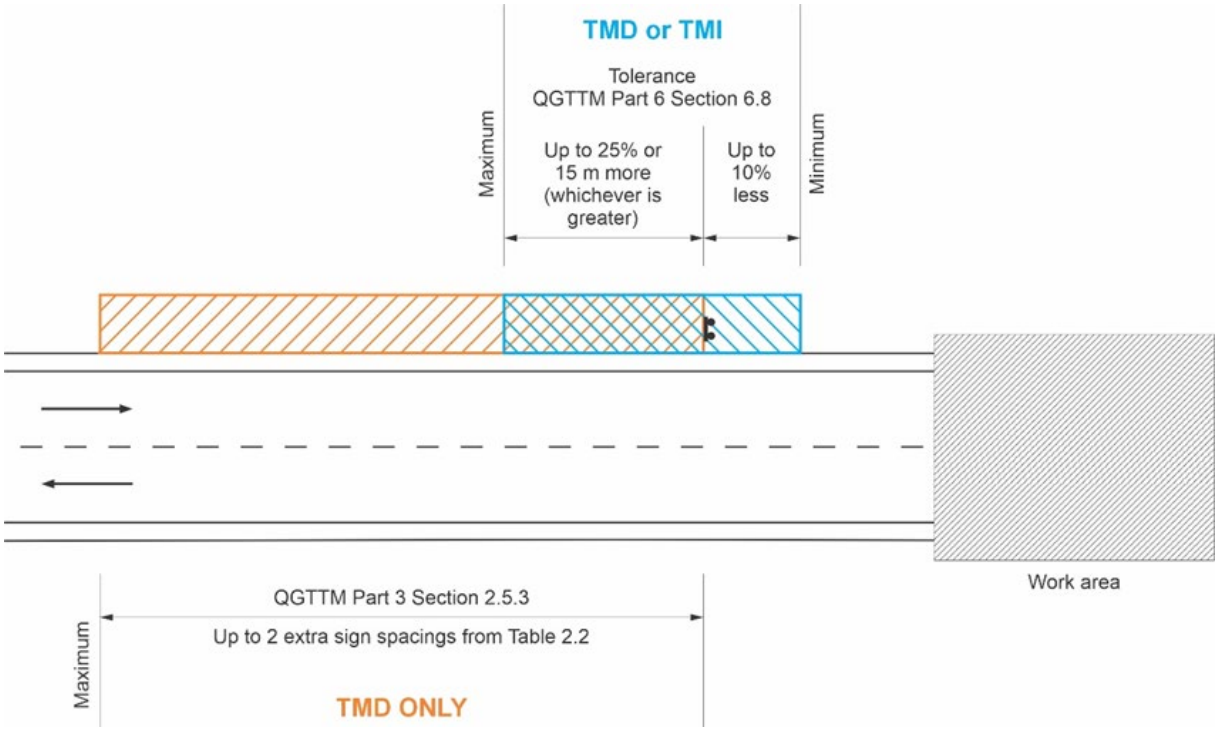
Where a physical constraint on site impacts locating the sign(s) as per the spacing requirements in Table 2.2 and it is supported by a risk assessment, the TMD may increase this spacing requirement (up to a total maximum spacing of three times the spacing in Table 2.2) to suit the site conditions without requiring an RPEQ sign off.

A TMD may apply tolerances (see AGTTM Part 6 Section 6.8) to the spacing requirements for signs and devices when preparing the design of a TGS.

See Figure 2.5.3(a) for the tolerances that apply to a sign spacing.

If a TMD applies a tolerance, which is either the minimum or maximum allowable (as per the above or AGTTM Part 6 Section 6.8), or is so close to the maximum or minimum such that a TMI also applying the maximum tolerance as per AGTTM Part 6 Section 6.8 on site may exceed the total allowable tolerance, or uses the provisions above to increase the spacing, the TMD must specify this distance as either a minimum or maximum (or provide the maximum or minimum value) on the TGS so that a tolerance is not also applied on site by the TMI which would then exceed any applicable limits.

Figure 2.5.3(a) – Sign spacing tolerances



While any sign may be installed in a permanent manner on posts sunk into the ground, signs required for works which will be in progress for longer than 14 days (that are not exclusively targeting pedestrians) should be installed in a permanent manner on posts sunk into the ground. Check that underground utilities are not located below and making holes is approved by the relevant road authority. Ensure regular site inspection, maintenance and securing practices occur in these circumstances. In these situations, the installation height of all temporary signs mounted in a permanent manner must be based on the requirements in AGTTM Part 6 Section 6.6.1 and AS1742.3 clause 4.3.2. Signs directed exclusively towards

pedestrians must be installed at a height which will enable signs to be viewed easily by pedestrians (see QGTTM Part 6 Section 6.6.1).

The following must be considered when locating signs:

- 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 2.5.4)
- 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?
- Do any additional measures need to be included to make the signage effective? E.g. For temporary speed limits, it is recommended that speed management treatments are included.

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. For road closures, consider mounting them on barricades or barriers to reduce risk of encroachment. Mounting on vehicles is also acceptable although caution and checks by an appropriately qualified person are recommended if this option is considered.
- Signs should be placed on the side of the road where work is being undertaken, though situations might arise where signs can only be put on the opposite side of the road.
- To effectively communicate relevant messages to road users, signs should be placed on both sides of all multilane roads and should also be placed on both sides of high volume (7500 vpd or greater) roads. For temporary speed restriction signs, refer to Section 5.5.1 for requirements to install on both sides of the road. If sign duplication is not possible (for example, vegetation, barrier, inadequate width), the designer must document an alternative to ensure all road users are able to see signs. This may involve:
    1. placing signs on high temporary frames
    2. repeating signs on one side of the road

3 closing one lane to be used for sign placement, and/or

4 use of a variable message sign (VMS).

- Signs and sign support structures should be kept away from the edge of the roadway as outlined in AGTTM Part 6.
- Sign supports on the outside of curves and other vulnerable places should be avoided or the sign support should be protected. Signs used at roadwork sites should be frangible and not require protecting with additional devices such as road safety barriers.
- The Lane Status sign must be used where one or more lanes of a multiway roadway are closed to assist with providing advance warning. These signs must not to be used instead of signage of the closure. They should be used in conjunction with closure signage.
- 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. a traffic cone) should be placed at the base of signs on footpaths or bicycle lanes. If the width of the footpath/cycle path is insufficient, then an appropriate TGS must be determined to manage the path users.
- Avoid placement that could direct road users into incorrect or dangerous situations.
- Signs or their supports must not obstruct visibility of other devices (e.g. signals, other signs, etc.), should not obstruct the view between different road users, or create a hazard for pedestrians or cyclists. 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 not be used where their legibility and effectiveness are compromised by contamination and/or marks and abrasions. Signs must be kept clean, especially in dusty or muddy conditions.
- Signs that conflict with the works must be removed or covered. Consider weather conditions (e.g. wind, rain) when choosing a suitable covering. It is essential that all signs at the worksite or varied travel route accurately represent the prevailing conditions at all times. Covering, altering or replacing signs may need to be approved by a RIM. Ensure that permanent signs are not damaged when doing so. Restore these signs when works are completed.
- Covering signs may be difficult due to height or size of the sign. When covering signs that are high, ensure this is done in a safe manner. All

conflicting signs must be covered or removed, so it is important to identify any possible issues before implementation.

- Sign messages must not be permitted to be formed with tape, for example, Lane Status signs and mocking speed numerals in tape.
- Sign support structures must not be left in place without signs attached.

For merge tapers where the posted permanent speed limit of the road is 80 km/h or greater, the sign spacing between the lane status sign and the start of the merge taper may be increased to a distance of two sign spacings.

For merge tapers at any speed limit, where more than one lane is being closed, the sign spacing between the lane status sign and the start of the initial merge taper may be increased to a distance of two sign spacings.

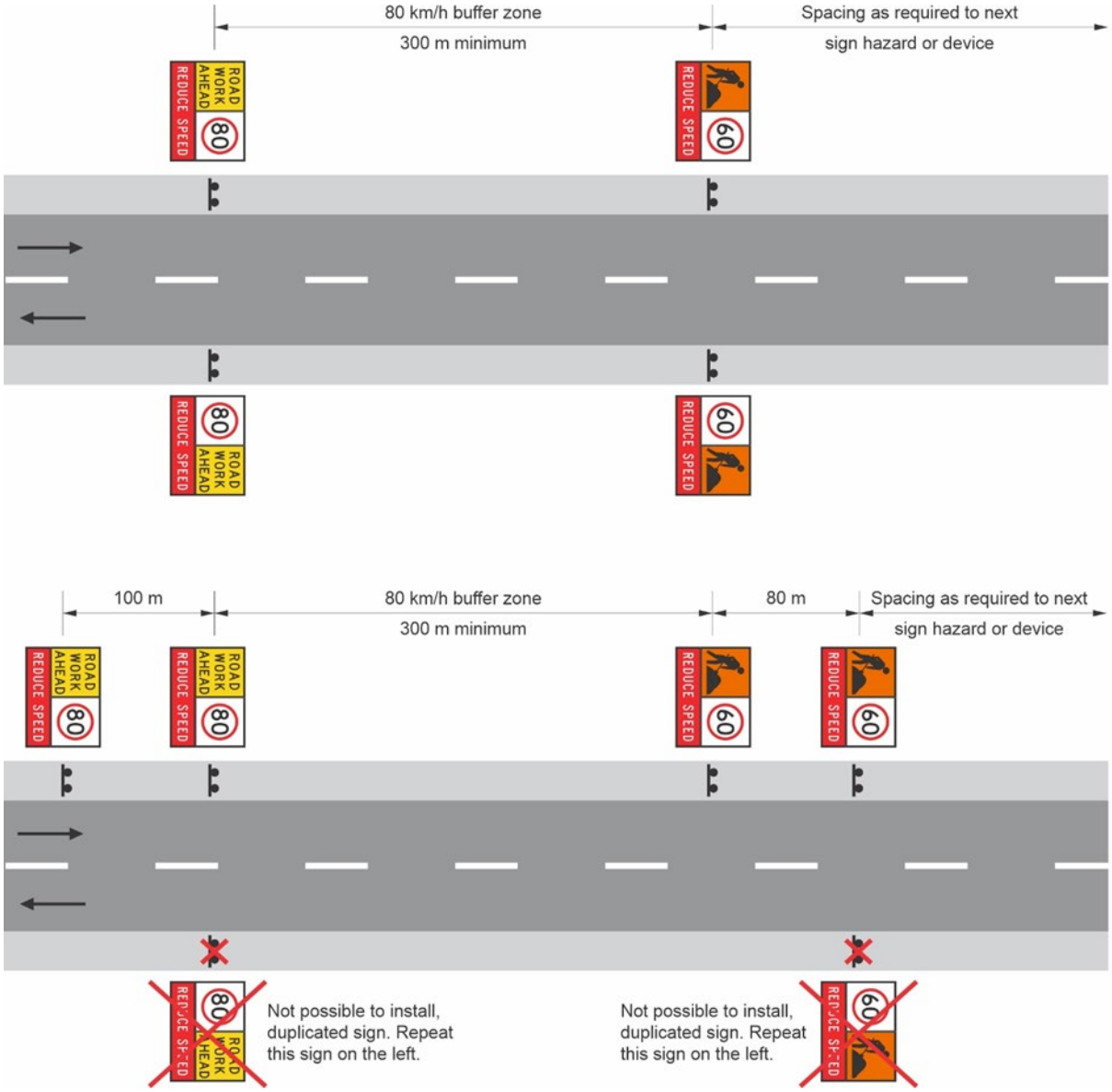
A distance plate (TC2287) may be added to the lane status multi message sign to indicate the distance from the lane status sign to the start of the merge taper.

If sign duplication is not possible and the designer has chosen to repeat signs on the one side of the road, repeated signs are located a minimum of one sign spacing from the original sign.

If there are spacing requirements between the original sign being repeated and another sign, device, or hazard beyond the sign (in the direction of travel), then this spacing requirement will now apply to the repeated sign. Any spacing requirements between the original sign being repeated and another sign, device, or hazard prior to the sign (in the direction of travel), will remain as a requirement to the original sign being repeated.

See Figure 2.5.3(b) for an example showing signs for one direction of travel only on a two-way road. This figure does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 2.5.3(b) – Example showing duplicated signs and repeated signs when signs are not able to be duplicated



2.5.4 Sight distance

Addition

Add the following note to Table 2.3:

> The speed value used in Table 2.3 to determine the sight distance, must be as per Figure 2.2 of Section 2.5.3, with the 200 m zone applicable when selecting the speed value.

2.5.7 Traffic lanes

Difference

Replace Table 2.4 with the following:

Table 2.4 – Desirable number of lanes for each direction

Mid-block (one direction) (vph)	Within 200 m of controlled intersection (one direction) (vph)^	Desirable number of open lanes for direction considered
≤ 1000	≤ 500*	1
1001–2000	501–1000	2
2001–3000	1001–1500	3
3001–4000	1501–2000	4

* Right turns out of the single lane may need to be prohibited, depending on the proportion of heavy vehicles and the volume of opposing traffic.

^ This is a controlled intersection where traffic in the directions being considered is controlled (by traffic signals, roundabout, GIVE WAY or STOP signs).

NOTE: Volumes shown in the Table may need to be reduced by the amount shown if the following apply:

- Pavement surface is rough or unsealed – reduce traffic volume by 30%.
- Horizontal geometry through the restriction is reduced to a speed value of less than 40 km/h – reduce volume by 50%.
- Volume of heavy vehicles exceeds 10 % and downward, level or easy upgrade – reduce traffic volume by 20%.
- Volume of heavy vehicles exceeds 10 % and sustained upgrades > 5% – reduce traffic volume by 40%.

2.5.8 Lane widths

Difference

Replace the entire Section 2.5.8 with the following:

> Lanes carrying traffic around, through or past a roadworks site must be as per Table 2.5. Lane widths should consider accommodating the swept path of large vehicles expected to negotiate the roadworks site.

Table 2.5 – Lane widths

Criteria	Lane width (m)
General lane widths	
≤60 km/h	Minimum 3.0*
70, 80 or 90 km/h	Minimum 3.2*
≥100 km/h	Minimum 3.4*
Curve with radius 100–250 m	Add curve widening of 0.5 m per lane
Curve with radius <100 m	In addition to the curve widening of 0.5 m per lane, consider the swept path of long vehicles (for example, buses, trams)
Two-way residential street	Minimum of 5.5 (sum both ways)
Shuttle flow operation	
Shuttle flow with active control (by traffic controllers or PTCDs)	Minimum 3.0*
Shuttle flow, without active control on residential streets, includes no control or the use of GIVE WAY and ONE WAY signs (see Section 5.4.4).	Minimum 3.0* and Maximum 3.5 to ensure vehicles take turns using a single lane

*Temporary minimum lane widths are not to be greater than existing lane widths. This minimum temporary lane width 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. Where these conditions apply, consider widths wider than those listed previously to accommodate large vehicles. The speed to be used when considering lane width requirements is the speed limit (permanent or reduced) which is applicable to that length of road.

Consideration must also be given to cyclists and pedestrians (see Sections 3.10, 4.10 and 5.13 for further details on traffic management regarding pedestrians and cyclists).

When selecting lane widths, especially when travel paths are confined on each side by physical barriers and / or hazards (e.g. excavations or safety barriers) for a significant distance, it is important to consider any impact of breakdowns and congestion for emergency vehicle access and on traffic flow. Refer to QGTTM Part 2 Section 3.3.4 for more detail.

Where there is a change in speed limit, the minimum lane width requirements may also change with lane widths based on the applicable speed limit at that location. Changes to lane widths will apply at the change in speed limit, with the transition to the new lane width commencing at the speed limit change location. The transition to the new lane width must occur at a rate which matches the transition rate for a lateral shift (see Table 5.7) of the same distance (the lane width change) in the same location (note the 200 m value for Figure 2.2 applies to taper lengths): for example, for a lane width reduction of 0.4 m, as the lateral shift values are based on a full 3.5 m shift, the equivalent recommended lateral shift distance would be divided by approximately 8.7 (3.5 / 0.4) to establish the taper length required for the 0.4 m transition in lane widths.

As an example, a transition distance for a new speed limit (60 km/h) and lane width (3.0 m), from a 100 km/h zone with an existing 3.5 m lane width, will commence at the 60 km/h sign and transition the 0.5 m change in width over a distance of approximately 15 m, based on a 3.5 m lateral shift at 100 km/h being 100 m long (100 / (3.5 / 0.5) = 14.3).

2.6 Variations to design

Addition

Refer to Clause 1.9 of the Queensland MUTCD Part 3.

2.7 Combining different works protection methods

New

Combining different works protection methods at the one site is permitted where the requirements for the different works protection methods are met.

Within a static work site, a mobile works treatment (QGTTM Part 4) or short-term low-impact works protection methods (QGTTM Part 5) may be used when appropriate and when satisfying the risk assessment and other provisions and criteria of the different works protection methods.

As per requirements in QGTTM Part 5 Section 3.6, a static work site must not be created solely for enabling a speed reduction which would permit short-term low-impact work protection methods which require a lower speed limit then applies to be used.

When a mobile works treatment (QGTTM Part 4) or short-term low-impact works protection methods (QGTTM Part 5) are used in a static work site, the respective requirements of QGTTM Part 4 or Part 5 must be applied.

3 Around the worksite

3.4 Road Closures

Difference

Replace the dot point:

- if the worksite blocks a side road a detour should be provided (see Section 3.8)

with the following:

- not all road closures will require a detour route to be installed, Section 3.8 includes the requirements and considerations when signing a detour route and the parameters for determining the need for signing a detour route.

3.6 Safety buffer

Difference

Replace the fourth paragraph:

> A safety buffer must be provided immediately in advance of the work area where the speed is 60 km/h or higher. An area 20 m to 30 m in length is generally sufficient. However, if the work area is hidden from approaching traffic (e.g. by a crest or curve), the length of the safety buffer should be extended to a point which can be clearly seen by approaching traffic. On multilane roads, this may be increased up to 100 m.

with the following:

> A safety buffer must be provided immediately in advance of the work area where the speed is 60 km/h or higher and either of the following apply:
>
> - local traffic may continue beyond the detour point towards the work area (as indicated by Figure 3.2), or
> - the work area is within 50 m of traffic at the detour point and traffic is travelling toward the work area before being detoured (see Figures 3.6(a), 3.6(b), 3.6(c) and 3.6(d) with the green zone indicating a safety buffer).
>
> An area 20 m to 30 m in length is generally sufficient: however, if the work area is hidden from approaching traffic (for example by a crest or curve), the length of the safety buffer should be extended to a point which can be clearly seen by approaching traffic. On multilane roads, this may be increased up to 100 m.

On roads with a permanent speed limit (prior to any reductions for the works) of less than or equal to 80 km/h, the safety buffer may be omitted where the works (including the work area, all workers, vehicles, equipment and materials) are at least 6 m clear of traffic and is supported by a risk assessment.

Figure 3.6(a) – Safety buffer for T-intersection

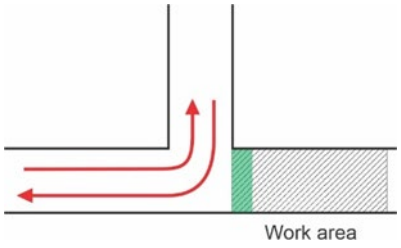


Figure 3.6(b) – Safety buffer for cross intersection

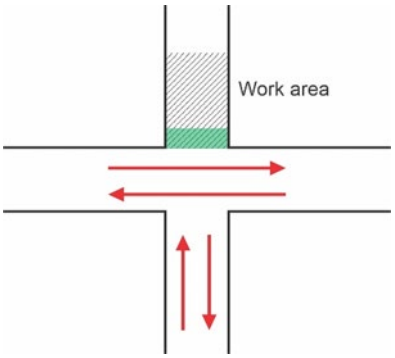


Figure 3.6(c) - Safety buffer for roundabout

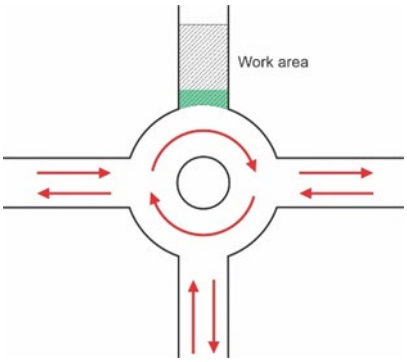
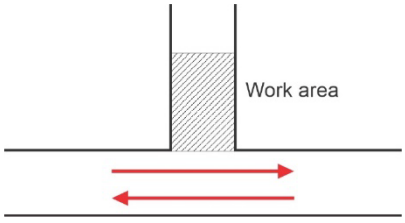


Figure 3.6(d) – Safety buffer for terminating leg of T-intersection



Note: For works areas that extend close to the traffic lanes of the continuing leg of the T-intersection, 'past' methods of control (see Section 5) may be more appropriate.

3.8 Design and Traffic Management

Addition

The need for a detour route should be considered for all road closures The following additional guidance is provided for determining the need for and signing detours (also see Section 3.8.1 for information on designing and signing a detour).

Detour routes may not be required for short road closures of local streets in a simple grid network or for side road closures of minor roads when an alternative route is available and obvious. When closing a road and determining the need for a detour route the TMD must consider several factors including:

1. The need for a detour is primarily dependent on:
    a. the type of road being closed
    b. the types of road users impacted by the closure, and
    c. the surrounding road network (availability and suitability of a detour route).
2. Other factors include consideration of the following:
    a. the length of the closure (both in terms of time frame and the overall length of the road section being closed)
    b. the length or complexity of any potential detour routes
    c. the surrounding road network and the ease to which the typical road user may locate a suitable alternative route without the need to fully or partially sign a detour route
    d. the risks versus benefits associated with installing the signs for a detour route, and
    e. the potential confusion for road users who encounter the signs for a detour route but are not impacted by or aware of the road closure requiring a detour (especially relevant when closing a local street and using a higher order road as part of the detour route).

In addition to the above, detour routes should be provided when closing major links such as tunnels or bridges or arterial roads, and the following options for detour routes and signs for these links should be considered:

3. Fully sign the closure and the various detour routes based on likely destinations to be sought by road users.
4. Fully sign the closure and allow road users to use the existing current signage if adequate to direct them to their chosen destinations.

5. Fully sign the closure and provide some VMS signs near the closure but allow road users to use the existing current signage if adequate to direct them to their chosen destinations.
6. Fully sign the closure and provide some VMS signs near the closure and some additional VMS or other direction signs at key decision points along the various detour routes to supplement the existing current signage to direct road users to their chosen destinations.

When closing major links such as tunnels or bridges or arterial roads, advance warning of the closure at a point where drivers can easily choose an alternative route should be provided.

For closures and detour routes that are to be in place for an extended period or are frequently used, the use of a diversion route signing approach as per TRUM Volume 3 Part 9 may be considered. The diversion route signing approach may also be considered for short term detours or to provide clarity where multiple different detour routes exist or overlap.

3.8.1 Detours

Difference

Replace:

> Detour markers must be erected at all subsequent changes of direction and intersections along the route to reassure road users they are on the correct path (e.g. detour in a built-up area through side streets) and they can continue their journey using permanent road sign information. This usually involves directing road users back onto their original route of travel at a point past the worksite. Signs must be erected for each direction of travel affected by the closure and checked to ensure all detour signs are prominently displayed with clear sight distance (see Section 2.5.3 Table 2.3).

with:

> Detour markers must be erected at all subsequent changes of direction. Detour markers should also be installed at intersections along the route where drivers may consider turning or where they may require reassurance that they are on the correct detour path (e.g. detour in a built-up area through side streets) and they can continue their journey using permanent road sign information. This usually involves directing road users back onto their original route of travel at a point past the worksite. Signs must be erected for each direction of travel affected by the closure and checked to ensure all detour signs are prominently displayed with clear sight distance (see Section 2.5.3 Table 2.3).

Difference

Replace:

> END DETOUR sign must be placed at the end of the detour, indicating to road users that they have returned to their original route and permanent signs can be followed.

with:

> END DETOUR sign should be placed at the end of the detour, indicating to road users that they have returned to their original route and permanent signs can be followed.

Addition

For detour routes that include a U-turn requirement, these should only be used where a U-turn would normally be permitted (excluding signals which are not operating and are under other controls such as Police or Traffic Controllers who can manage the need for the U-turn movement). Where a U-turn would not normally be permitted, the turning paths and characteristics of the expected vehicle types should be reviewed in conjunction with advice from the RIM. A U-TURN NOT SUITABLE FOR LONGER VEHICLES (TC1972) sign may be required.

3.9 Termination Area

Addition

Additional guidance is provided in Section 5.12.

3.10 Vulnerable Road Users

3.10.1 Pedestrians

Difference

Replace the two dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). If these widths are not practicable, alternative routes must be provided with a firm smooth surface and no trip hazards in the following order of preference:
  1. on the side of a road reserve away from traffic
  2. between the work area and road but not in a traffic lane
  3. onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane
  4. across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).
  5. a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.
- Appropriate surfacing must be provided for prams, strollers, wheelchairs or any other mobility aids.

With these three dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). At localised constraints an absolute minimum width of 1m may be provided, where opposing pedestrian are able to recognise the short constraint and pass at wider areas. If these widths are not practicable, alternative routes should be provided in the following order of preference:
    1 on the side of a road reserve away from traffic
    2 between the work area and road but not in a traffic lane
    3 onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane
    4 across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).
    5 a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.
- Appropriate surfacing with a firm even surface and no trip hazards should be provided to footpaths or alternative routes to cater for prams, strollers, wheelchairs or any other mobility aids. Surfacing should be no worse than the existing path and should be suitable for use in all weather conditions and should not deteriorate or form ruts or be damaged from repeated use.
- The length of time a temporary footpath is required, would also need to be considered when selecting an alternative route and surface type.

Addition

Where pedestrians with vision impairment are expected or existing signs with tactile elements are provided at a location or in an area, refer to AS 1428.4.2 for consideration of tactile requirements for any temporary signs required.

3.10.2 Cyclists

Difference

Replace the sub-dot point:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant stopping distance in advance of the closed section of the bicycle lane.

with:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant distance (see Section 2.5.3) from the start of the closed section of the bicycle lane. Sufficient sight distance as per Table 2.3 must be provided for drivers and riders to sight the temporary signage on approach.

4 Through the worksite

4.5 Safe traffic speed

Addition

Additional guidance on supplementary devices to reduce speed is provided in the *Guideline – Traffic Management at Works on Roads*.

4.7 Traffic control and site entry

Addition

Refer to Section 4.8 of this document for the placement of the 60 km/h speed zone when the speed zone in advance of the traffic control station is above 60 kmh.

4.8 Advance warning area

Difference

Replace the entire Section 4.8 with the following:

The advance warning area is critical to the success of ‘through’ traffic management and aims to provide:

- no surprises to road users regarding traffic control
- a controlled release of relevant information (e.g. signs)
- repeated information where pertinent to emphasise danger.

It can also reduce traffic in the area by inducing road users to actively plan alternative routes where possible (refer to AGTTM Part 2). Advance warning signs and information also strengthen the delineation of a route and ensure that road users can safely and effectively navigate their way to their intended destinations. Note the following steps in conjunction with Figure 4.4, Figure 4.5 and Figure 4.6 examples when designing the advance warning area for 'through' methods:

1. Identify the PTCD or traffic controller position.
2. STOP HERE ON RED SIGNAL and STOP HERE WHEN DIRECTED must be installed where warranted in accordance with Queensland MUTCD Part 3. When used, they must be installed 6 m before the PTCD / traffic control position in the direction of travel. A temporary STOP line may be installed using temporary removable road marking tape.
3. Four cones should be placed on the centreline spaced 4 m apart starting from the STOP HERE ON RED SIGNAL or STOP HERE WHEN DIRECTED sign position (downstream). A Temporary Hazard marker (T5-7) or KEEP LEFT sign (R2-3-Q01) may be installed at the start of the row of four cones (on both ends of the four cones) to direct traffic to the correct travel path if needed.
4. Estimate end-of-queue position (via the box instructions in Austroads *Guide to Temporary Traffic Management* Part 3 Section 4.8). A marker (for example, a cone or bollard) should be placed on the shoulder at the predicted end-of-queue to assist the traffic controller and traffic management implementer to monitor queue lengths.
5. A PREPARE TO STOP sign must be placed in conjunction with the Boom Barrier or Traffic Controller (symbolic) or Signals Ahead sign a minimum distance as shown in Table 2.3 from the predicted end-of-queue, not the PTCD / traffic controller position. This is the primary PREPARE TO STOP sign.

   If the PREPARE TO STOP sign is more than 240 m from the traffic controller, an additional PREPARE TO STOP sign must be placed 120 m from the traffic controller (see Figure 4.4 and Figure 4.5). The primary purpose of this sign is to protect the traffic controller. This is the additional PREPARE TO STOP sign.

   If visibility is lost or the distance from the PREPARE TO STOP sign to the PTCD / traffic controller is more than 300 m, the use of repeater PREPARE TO STOP signs should be considered as per Table 4.4(a).

Where these conditions are met and the additional or repeater PREPARE TO STOP signage is required, a Queued Traffic Ahead multi-message sign assembly may be used as the primary PREPARE TO STOP sign. If used, this multi-message sign assembly must include the Queued Traffic (symbolic) (TM1 47A), QUEUED TRAFFIC AHEAD (TM1 46A) and the PREPARE TO STOP (TM1-18B), see Figure 4.8(a) following.

The primary PREPARE TO STOP must be installed in advance of the predicted end-of-queue in accordance with Austroads *Guide to Temporary Traffic Management* Part 3 Table 2.3.

Figure 4.8(a) – Queued traffic ahead multi-message sign assembly

Where this assembly is used, the preferred method of display is to locate the QUEUED TRAFFIC AHEAD text panel (TM1-46A) closest to traffic.

6. A ROADWORK AHEAD sign, or VMS must be placed as per Table 4.4(b) in advance of the primary PREPARE TO STOP sign position discussed in Step 5, except for advance signs on side roads, where the requirement of Step 9 will apply.
7. Surges in traffic demand can occur so adequate monitoring of the queue must be undertaken to minimise the risk of end-of-queue collision. If the end of queue extends beyond the estimated end-of-queue position, adequate warning of the end of queue must be provided. The options available include:
    a) initially, when traffic queues are approaching the estimated end-of-queue position, the traffic controllers should advise the site supervisor that traffic queues are approaching their maximum length and contingency planning may need to be implemented
    b) as an interim measure, the traffic controllers may adjust their timing or give priority to one approach to minimise queuing from the key direction

c) if adjusting timings is not successful in managing queue lengths, implement a pre-designed contingency plan to cater for the longer queue lengths being experienced – this will need to be completed by the traffic management implementer while traffic controllers continue to control traffic, and

d) if a pre-designed contingency plan is not provided, seek urgent advice from the traffic management designer for the works.

8. Where the speed limit on approach to the traffic control station is greater than 60km/h, a 60 km/h speed zone must be commenced at least one sign spacing (Table 2.2) in advance of the primary PREPARE TO STOP sign. This does not apply to situations where the traffic control station is located down a side road and the speed of traffic on approach to the traffic control station and the end of the traffic queue is less than 60 km/h through other controls (such as the traffic needing to turn onto the side road at a lower speed). Speed signs may be required on the side road if the speed of traffic on the side road may exceed 60km/h prior to the traffic control station or the end of the traffic queue. See Section 4.8.1 for more information on speed limits for traffic control stations on a through road near a side road.

   Duplicate the speed limit signs on both sides of the road and install repeater speed limit signs as required in Section 5.5.1.

9. Where intersections are located within the advance warning area (between the traffic control station and the ROADWORK AHEAD or VMS sign), see Section 4.8.1 for the signing requirements for traffic on or entering from side roads.

10. Provide additional devices and methods for avoiding end-of-queue collisions as required in Section 4.8.3.

11. For shuttle flow operations, the traffic control taper must start a minimum of 6 m from the traffic control station.

As per AGTTM Part 7 Section 2.6.3, when used in a multi-message situation, the PREPARE TO STOP panel must be placed closest to the travel way and that the 600 x 600 version of this sign is used as illustrated in Figure 4.8(b), excluding where the use of the 1200 x 300 version is specifically permitted by QGTTM.

Figure 4.8(b) – Multi message sign assembly examples (sign located on left side of the road)

Table 4.3: Estimated queue length

Maximum stopping time (minutes)	Multiplier	
	Ma (multiplier for average vehicles)	Mo (multiplier for oversized vehicles
2	2.4	8
5	6	20
10	12	40
15	18	60
30*	36	120

**A 30 minute stop time is unusual but has been included for some circumstances*

For the purpose of estimating the end-of-queue position only, the term 'oversized vehicles' also includes 'heavy vehicles'.

When estimating the queue length, Table 4.3 uses an average vehicle length of 6 m and an average heavy vehicle length of 20 m for a five minute stopping time (based on the five minute traffic count) and then adjusts the multipliers for other stopping time values.

Where very long vehicles are expected (for example outback and mining routes or routes where most vehicles are towing), then to ensure estimated queue lengths are as accurate as possible, an average length per vehicle that matches the actual traffic mix expected at that location should be used.

The estimated queue length must be at least a minimum of one average vehicle plus one heavy vehicle (of a length which may be applicable to the site). Part lengths of vehicles must be rounded up when estimating queue lengths.

To calculate the 'maximum stopping time' value used in Table 4.3 for each approach, the Traffic Management Designer must estimate the likely duration of time that queued traffic will be stopped at a traffic control station. Calculating the maximum stopping time needs to include the total time from when the traffic controller stops traffic, through until the same traffic controller releases traffic for the next cycle from that approach. This would typically include the following considerations:

- the time taken for the traffic queue from one approach to pass the traffic control station and travel the length of the closure
- the time for the queue at the other end of the site to leave that traffic control station and also travel the length of the closure (this may commence at the same time as the other queue or following the completion of the other queues travel if shuttle flow is in operation)
- if traffic queues are held for a period (with no traffic traveling through or past the site), then this hold time will also need to be included

- a factor of safety may also be allowed for vehicles travelling the closure below the signed speed limit, and
- if more than two traffic control stations (one each end) are in operation, depending on the operating characteristics of the roadworks site, the time for each queue to be released and travel through the roadworks site may need to be considered and included.

The 'maximum stopping time' value will be used in Table 4.3 to determine the multipliers to be used with the number and type of vehicle (average or heavy) from the five minute count or calculation.

Table 4.4(a) – Maximum spacing for repeater PREPARE TO STOP signs

Speed (km/h)*	Distance (m)
≤55	60
≥56	180

* The 'Speed' value to be used for the maximum spacing for repeater PREPARE TO STOP signs is the actual posted speed (temporary or permanent) which applies (this will generally be 60 km/h but may be less) where the repeater spacing is required. If the speed limit changes within a repeater spacing, use the spacing for the lower speed limit.

Note: The 200 m zone in Figure 2.2 does not apply.

Table 4.4(b) – Minimum distance from ROADWORK AHEAD or variable message sign to primary PREPARE TO STOP sign

Speed (km/h)^	Distance (m)
≤55	30
≥56–65	90
≥66–75	140
≥76–85	240
≥86	Four times the speed (km/h)

^The 'Speed' value to be used for the minimum distance from the ROADWORK AHEAD or variable message sign to the primary PREPARE TO STOP sign is the actual permanent posted speed of the road prior to any reduction for the roadworks.

Estimate end of queue position

Queueing is expected for 'through' methods at stop locations where PTCDs or traffic controllers are positioned, sometimes resulting in collision. Collision can occur when the stationary queue extends past the PREPARE TO STOP sign location, most commonly when speed is greater than 70 km/h or the sight distance of approaching traffic to the end of the queue is:

- less than two times the speed limit in open road areas
- less than 1.5 times the speed limit in built-up areas.

To estimate queue length:

- Count the number of average and oversized vehicles that pass the PTCD/traffic controller position for five (5) minutes.
- Consider whether the majority of vehicles have been average or oversized (i.e. trucks). This will influence the 'multiplier' column used in Table 4.3.
- Multiply the number of vehicles counted by the number in the chosen 'multiplier' column (Ma for mostly average sized vehicles, or Mo for mostly oversized vehicles) using the maximum stop time required at the specific worksite.
- If you are unsure of the maximum required stop time or whether to use the 'average' or 'oversized' multiplier, seek assistance from a competent person or road authority.
- Use the formula below to calculate the estimated queue length:

  (number of average vehicles × Ma) + (number of oversized vehicles × Mo) = queue length

If more accurate data is available (e.g. traffic counts), this should be used instead of counting vehicles for five (5) minutes.

An estimated end-of-queue position is to be determined for the approach to each traffic control station and is to be based on the maximum expected traffic flow on that approach during the time traffic control will be in operation.

The count or estimate of the number of average and heavy vehicles during a five-minute period at a site may be completed using the following in order of preference:

1. Actual five-minute count of vehicles during the peak time the site will be occupied. This five-minute count is based on the vehicles approaching the selected traffic control station from the approach to be controlled by that station (not a sum of both directions of traffic). Consideration of peak traffic flow direction may be needed.
2. If a five-minute count is not possible, use annual average daily traffic (AADT) values with hourly breakdowns and percentage heavy vehicle data. To estimate the five-minute count, select the peak hourly period during the time the site will be occupied and divide by 12 to get an estimated five-minute value. Divide this by two if the AADT is for a two-way road. Use the percentage heavy vehicles information with this value to estimate the number of heavy vehicles for this five-minute period.

3. If a five-minute count is not possible, and AADT values with hourly breakdowns are not available, use AADT values and percentage heavy vehicle data. To estimate the five-minute count, firstly divide the AADT by a factor of 10 (to get an estimated hourly count) and then divide this by 12 to get an estimated five-minute value. Divide this by two if the AADT is for a two-way road. Use the percentage heavy vehicles information with this value to estimate the number of heavy vehicles for this five-minute period.

AADT information for state-controlled roads can be located on the Queensland Open Data Portal – Traffic Census data.

The duplication of the advance warning signs for a traffic control station as indicated in Figures 4.4, 4.5 and 4.6 below is not a specific requirement. Signs are to be duplicated in accordance with the requirements in Section 2.5.3 and Section 5.5.1 for speed signs.

Figure 4.4 illustrates an example of sign positioning for queues as per the steps above for a speed of 60 km/h where the PREPARE TO STOP sign is less than or equal to 240 m away from the PTCD/traffic controller. This diagram is not an example of how to install all traffic control devices and is not to be used as a TGS diagram.

Figure 4.4: Avoiding end of queue collisions (≤ 240 m)

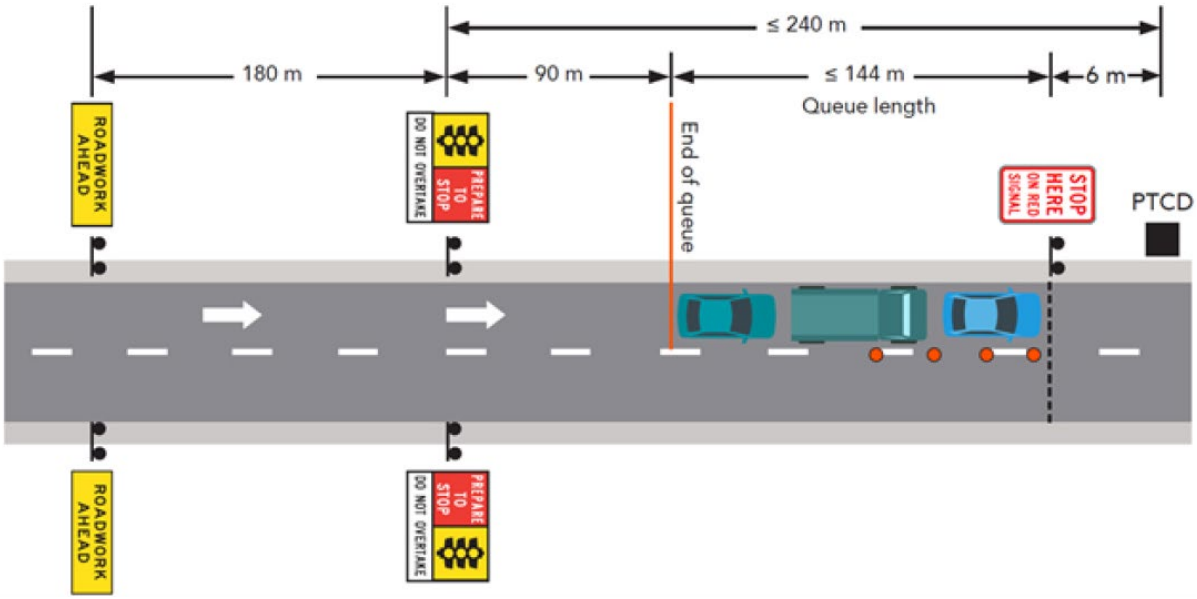


Figure 4.5 illustrates an example of sign positioning for queues as per steps above for a speed of 60 km/h where the primary PREPARE TO STOP sign is more than 240 m, but less than or equal to 300 m away from the PTCD/traffic controller. This diagram is not an example of how to install all traffic control devices and is not to be used as a TGS diagram.

Figure 4.5: Avoiding end of queue collisions (241 m to 300 m)

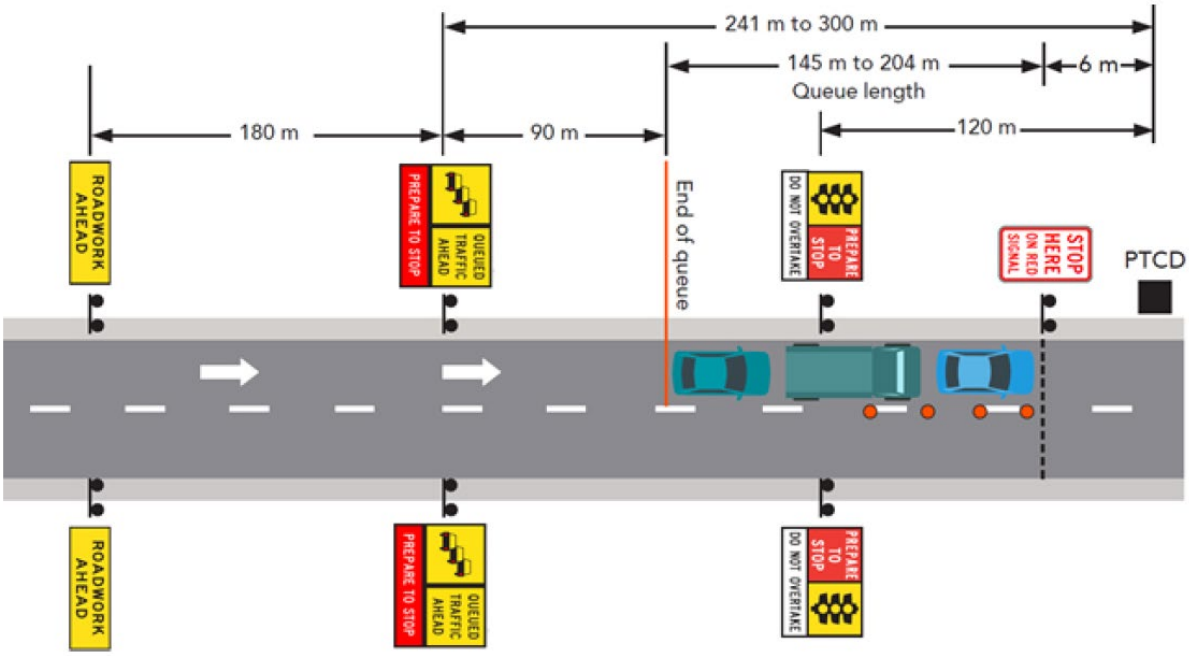
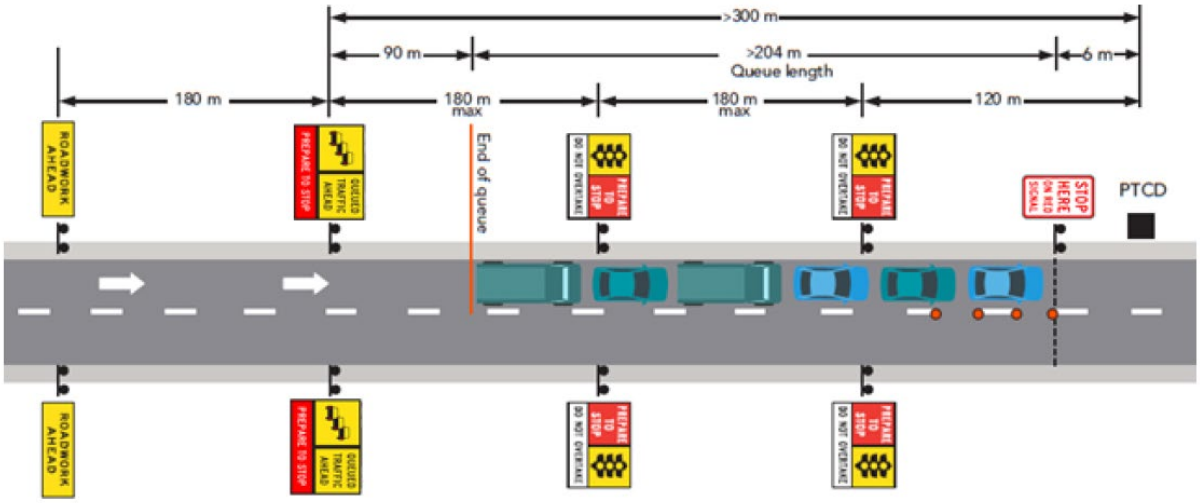


Figure 4.6 illustrates an example of sign positioning for queues as per steps above for a speed of 60 km/h where the primary PREPARE TO STOP sign is more 300 m away from the PTCD/traffic controller. This diagram is not an example of how to install all traffic control devices and is not to be used as a TGS diagram.

Figure 4.6: Avoiding end of queue collisions (> 300 m)



While using two lanes for queuing is possible and may reduce the physical length of the queue, it does come with additional risks related to driver behaviour and capability. Lane utilisation may not be evenly distributed, as drivers often favour one lane over another, especially when approaching a merge point. Many drivers tend to merge earlier than necessary, which can cause the end of the queue to extend further back, and lead to increased end of queue risk. Driver aggression and frustration may also be experienced by those in the queue due to motorists cutting in late, which may not be the best frame of mind for drivers to be in when approaching the traffic control station or passing the workers on the site.

On multi-lane approaches, drivers are generally less prepared to stop, as they are not expecting this, which can create safety issues. The preference is to utilise queuing in a single lane where possible to minimise these risks.

If using two lanes for queuing, it's crucial to carefully assess the specific site conditions, implement additional safety measures, and closely monitor the actual queue formation during operation to ensure adequate warning of the traffic queue ahead is provided.

When multiple lanes are available within the expected queue distance, the queue length in any full width traffic lane may be used for queueing (the length of the merge taper for the merging lane must not be included in the queue length calculation). Additional queue length may be added to mitigate the risks of drivers favouring one lane over the other for queueing.

When using two lanes for queueing, consider the use of the WHEN QUEUEING USE BOTH LANES panel (TM2-Q04) and/or the MERGE IN TURN [panel (TM2-Q05) with the lane status signs.

Figure 4.8(c) – Multi message sign assembly examples for multiple lane queueing (sign located on left side of the road)

4.8.1 Intersections within the advance warning area

New

Where intersections exist within the advance warning area (between the traffic control station and the ROADWORK AHEAD or VMS sign), the following warning sign arrangements must apply.

Where the intersection is located between:

i. the primary PREPARE TO STOP sign and the ROADWORK AHEAD sign or VMS, an additional ROADWORK AHEAD sign or VMS must be located on the side road and should be a minimum distance of a single sign spacing from the intersection (see Figure 4.8.1(a))

ii. the predicted end-of-queue location and the primary PREPARE TO STOP sign, either:

   a) an additional primary PREPARE TO STOP sign must be located on the side road and should be a minimum of a single sign spacing from the intersection and a ROADWORK AHEAD sign, or VMS must be positioned in advance of this sign and should be located a minimum of a single sign spacing further down the side road (see Figure 4.8.1(b)), or

   b) an additional PREPARE TO STOP sign must be provided as a repeater on the through road and should be located a minimum of 15 m along the through road after turning from the side road, travelling towards the traffic control station, and a ROADWORK AHEAD sign or VMS must be located down the side road and should be a minimum of a single sign spacing from the intersection (similar to Figure 4.8.1(c), but with the end of queue located after turning from the side road towards the traffic control station).

iii. the traffic control station and the predicted end-of-queue location, either:

   a) an additional primary PREPARE TO STOP sign must be located on the side road and should be a minimum of a single sign spacing from the intersection, and a ROADWORK AHEAD sign or VMS must be positioned in advance of this additional PREPARE TO STOP sign and should be located a minimum of a single sign spacing further down the side road (similar to Figure 4.8.1(b), but with the queue extending past the side road) or

b) an additional PREPARE TO STOP sign must be provided as a repeater on the through road and should be located a minimum of 15 m along the through road after turning from the side road, travelling towards the traffic control station, and a ROADWORK AHEAD sign or VMS must be located on the side road and should be a minimum of a single sign spacing from the intersection (see Figure 4.8.1(c)).

In determining the sign requirements and effects on the side road, the Designer should also consider the speed of traffic on the side road approaching the intersection, the likely queue lengths on the side road and speed limits on the through road with the following to apply:

i. if approach speeds on the side road are high, and/or the queue lengths on the side road are long, consider reducing the speed limit on the side road

ii. if traffic queues are likely to form on the side road, then sign spacings down the side road will need to be greater than those noted previously and additional signs may be required

iii. if side road speed limits are greater than 60 km/h, consider installing a repeater speed limit sign on the through road just after the intersection for traffic entering the through road from the side road – a repeater speed limit sign may be required for both directions of travel

iv. if the speed limit on the through road (prior to any reductions for the works) is greater than 60 km/h and is reduced prior to the side road, a repeater speed limit sign on the through road just after the intersection for traffic entering from the side road must be installed – a repeater speed limit sign must be installed for both directions of travel, and

v. the first sign spacing on the through road (for a repeater PREPARE TO STOP sign or speed limit sign for traffic turning onto the through road) may be located a minimum of 15 m from the intersection (as turning speeds from the side road will be low); however, all signs on the through road will also need to meet the minimum sign spacing requirements in Table 2.2 for the through road traffic speeds.

The following Figures (4.8.1(a), 4.8.1(b) and 4.8.1(c)) do not include all traffic control devices required and are not to be used as TGS diagrams.

Figure 4.8.1(a) – Additional ROADWORK AHEAD sign, or variable message sign located on the side road

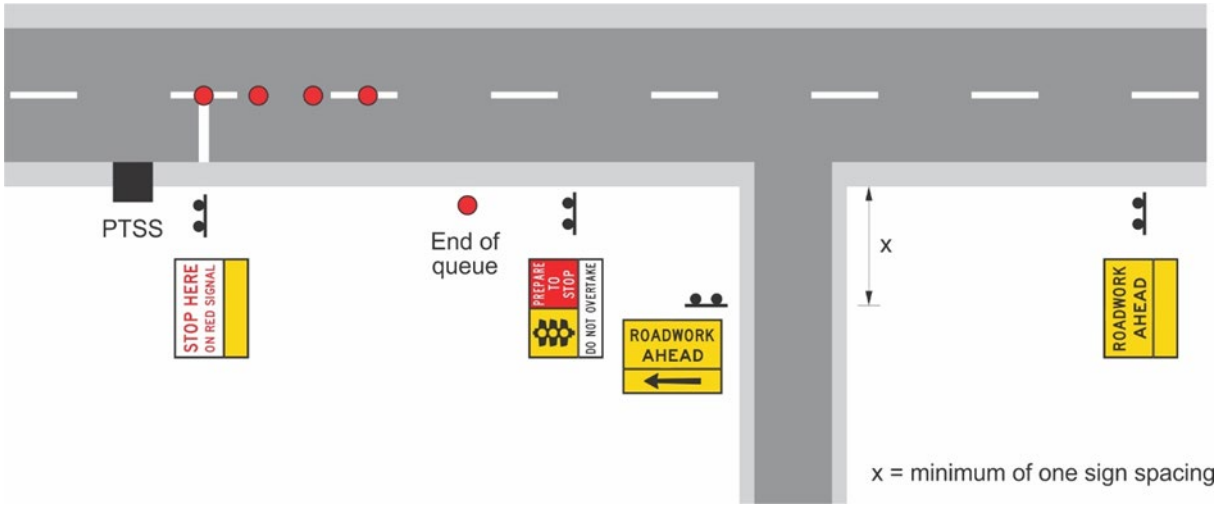


Figure 4.8.1(b) – Additional ROADWORK AHEAD sign, or variable message sign and the PREPARE TO STOP sign located on the side road

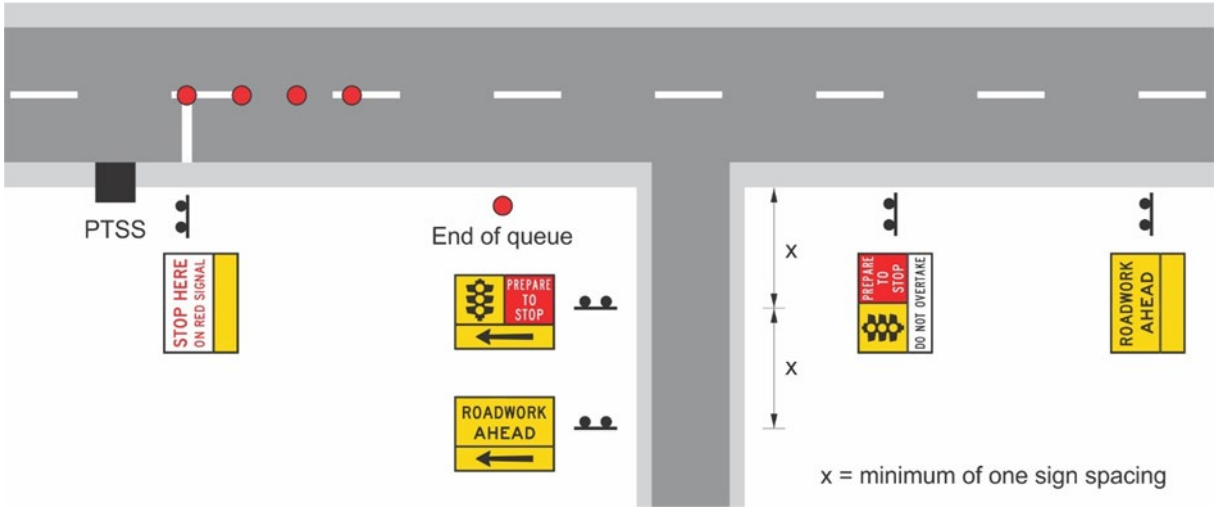
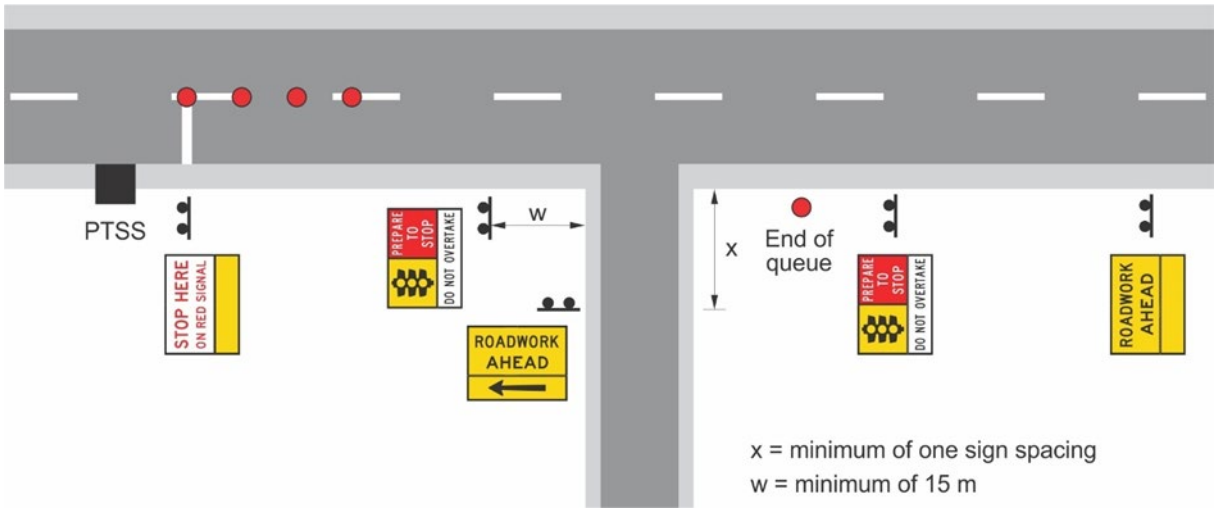


Figure 4.8.1(c) – Additional ROADWORK AHEAD sign, or variable message sign located on the side road and an additional repeater PREPARE TO STOP sign located on the through road



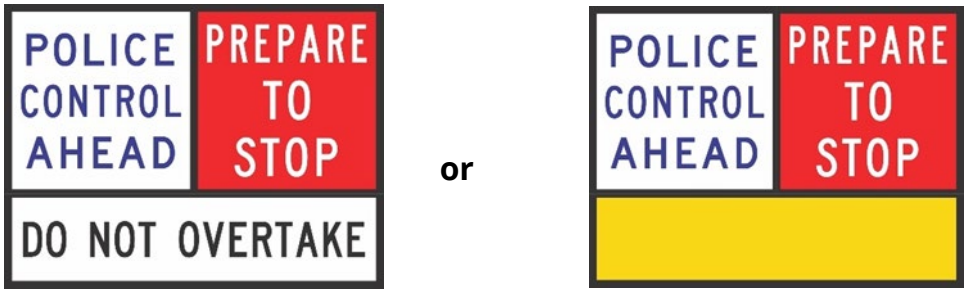
4.8.2 Police performing planned traffic control duties

New

Where Police perform traffic control duties in a planned arrangement as part of a static worksite, the POLICE CONTROL AHEAD panel must replace the Traffic Controller (symbolic) panel or portable traffic control device panel in the multi-message signs required by Section 4.8 (see Figure 4.8.2(a)).

Both multi-message sign arrangements in Figure 4.8.2(a) are permitted in Queensland by the Queensland MUTCD Part 3; however, these are not in strict accordance with the requirements for multi-message signs in AS 1742.3 Clause 4.2.2(d).

Figure 4.8.2(a) – Police performing traffic control duties, PREPARE TO STOP sign (not at signals which are switched off)



Where Police perform traffic control duties in a planned arrangement as part of a static worksite at traffic signals which are not in operation, the POLICE CONTROL AHEAD panel must be used with the Signals Not Operating (symbolic) panel in the top two 600 x 600 panels, with the POLICE CONTROL AHEAD panel positioned closest to traffic, and the 1200 x 300 version of the PREPARE TO STOP panel (see Figure 4.8.2(b)).

Figure 4.8.2(b) – Police performing traffic control duties, PREPARE TO STOP sign at signals (which are switched off or flashing amber)

4.8.3 Additional end-of-queue protection

New

Where traffic control is in use, one or a combination of end-of-queue risk control measures in Chapter 1, Clause 2 of the *Guideline – Traffic Management at Works on Roads* must be implemented to manage the risk of rear end crashes where either of the following apply:

- the speed limit is 80 km/h or higher (prior to any reductions for the roadworks) and an annual average daily traffic (total vehicle count in both directions of travel per day) of over 500 vehicles per day, or
- where sight-distance to the end of the traffic queue is restricted (less than the value from Table 2.3).

End-of-queue risk control measures must also be implemented when nominated in Clause 5.8 of Annexure MRTS02.1 *Provision for Traffic*.

In addition to the requirements above, end-of-queue risk control measures should be considered and implemented to address end of queue risks at any site. Some considerations include:

- Where traffic slows significantly, or queues are formed due to congestion or roadworks.

- Where environmental or geometric issues exist that limit visibility or impact normal stopping distances such as poor weather conditions (for example rain or fog), poor road conditions, a downhill approach, vertical curves, night works (driver fatigue or visibility) or a slippery road surface are present.
- Where significant volumes of heavy vehicles are present or expected.

4.8.4 Queued traffic ahead multi-message sign

New

The Queued traffic ahead multi-message sign assembly (see Figure 4.8(a)) may be used at other locations (in addition to on approach to traffic control stations) where the temporary warning of traffic congestion is desirable.

4.9 Termination Area

Addition

Additional guidance is provided in Section 5.12.

4.10 Vulnerable Road Users

4.10.1 Pedestrians

Difference

Replace the two dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). If these widths are not practicable, alternative routes must be provided with a firm smooth surface and no trip hazards in the following order of preference:
    1 on the side of a road reserve away from traffic
    2 between the work area and road but not in a traffic lane
    3 onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane

4 across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).

5 a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.

- Appropriate surfacing must be provided for prams, strollers, wheelchairs or any other mobility aids.

With these three dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). At localised constraints an absolute minimum width of 1m may be provided, where opposing pedestrian are able to recognise the short constraint and pass at wider areas. If these widths are not practicable, alternative routes should be provided in the following order of preference:

  1 on the side of a road reserve away from traffic

  2 between the work area and road but not in a traffic lane

  3 onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane

  4 across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).

  5 a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.

- Appropriate surfacing with a firm even surface and no trip hazards should be provided to footpaths or alternative routes to cater for prams, strollers, wheelchairs or any other mobility aids. Surfacing should be no worse than the existing path and should be suitable for use in all weather conditions and should not deteriorate or form ruts or be damaged from repeated use.

- The length of time a temporary footpath is required, would also need to be considered when selecting an alternative route and surface type.

Addition

Where pedestrians with vision impairment are expected or existing signs with tactile elements are provided at a location or in an area, refer to AS1428.4.2 for consideration of tactile requirements for any temporary signs required.

4.10.2 Cyclists

Difference

Replace the sub-dot point:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant stopping distance in advance of the closed section of the bicycle lane.

with:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant distance (see Section 2.5.3) from the start of the closed section of the bicycle lane. Sufficient sight distance as per Table 2.3 must be provided for drivers and riders to sight the temporary signage on approach.

5 Past the worksite

5.3 Separate the work area

5.3.1 Road safety barrier system

Difference

Replace the entire Section 5.3.1 with the following:

> The road safety barrier system provides a physical barrier between the work area and moving traffic, designed to resist intrusion by errant vehicles and, as far as practicable, redirect errant vehicles back into the travelled path. While safety barriers can be considered for all projects, this method may be inappropriate due to physical space requirements and limited edge clearances.

If a road safety barrier is to be used, its design must be based on the speed of traffic past the barrier. In most cases, this will be a semi-permanent reduced speed limit posted at the site which generally applies 24 hours a day / 7 days a week, with other further temporary reductions only applicable when required for works which are occurring. Where a general reduction in speed limit past the site has not been implemented, the permanent posted speed limit must be used as the design speed for the road safety barrier design.

The requirements of Section 2.5.9 are applicable to the design speed. If the traffic speed is greater than 10 km/h higher or lower than the speed limit past the road safety barrier, the speed of traffic must be used as the design speed for the road safety barrier design.

Speed limits past the road safety barrier must be monitored throughout the completion of works to ensure compliance with the road safety barrier design speed.

Safety barriers are typically used to:

- separate road users from severe hazard (e.g. deep excavation, a bridge pier, stockpile)
- separate traffic travelling in opposite directions
- reduce delays by avoiding more restrictive speed limits
- protect road workers and vulnerable road users (e.g. road shoulder as a temporary footpath) from narrow lateral clearance to moving traffic (e.g. when the work area is closer than 3 m to the nearest edge of traffic and the speed limit is more than 60 km/h). For work areas located more than 6 m to the nearest edge of traffic see Section 3: Around the Worksite.

End treatments must be provided when installing road safety barrier systems, ensuring they are immediately operational as part of the barrier system. They are designed to absorb energy and reduce the severity of impacts, also assisting in reducing the risk of errant vehicles entering the work area and road users accidentally impacting the barrier. End treatment options include:

- starting or connecting the barrier to the end of a permanent barrier or guardrail
- securely attaching any approved end treatment as per the Austroads Guide to Road Design Part 6 (e.g. crash cushions).

The Austroads Safety Barrier Assessment Panel (ASBAP) expects products to conform to /NZS 3845. However, if a jurisdiction wants to deploy a product that has not been assessed by ASBAP, the jurisdiction will undertake its own risk assessment.

End treatments are not required if the temporary road safety barrier system is flared behind a permanent road safety barrier (or another temporary road safety barrier) and is outside the deflection zone requirements for that barrier system and therefore not regarded as a hazard.

The following elements apply when positioning road safety barrier systems:

- Adequate delineation of the road safety system must be provided to ensure road users are safely guided past the worksite.
- Fittings other than delineators (e.g. visibility screens) must not be fixed to the road safety barrier unless they are designed to accommodate the fitting.
- Screens designed to fit to barriers should also be approved by the relevant road authority relative to the work being done.
- Water runoff should pass unimpeded to avoid surface ponding.
- If positioned near high obstructions (e.g. power poles, fixed VMS, bridge piers, underpass scaffolding), the design should consider the extent of vehicle body roll (especially high vehicles) during impact.
- Barrier deflection must be accommodated in the area immediately behind the road safety barrier system. A containment fence or longitudinal channelising barrier should be placed a clear distance equal to the likely dynamic deflection behind the road safety barrier system. Clearance in Table 5.1 is measured between traffic and the front of the barrier system and not behind the barrier system in the deflection zone. For example, see Figure 5.4 illustrating dynamic deflection. This example does not include all traffic control devices required and must not be used as a TGS diagram.
- A clearance between road safety barriers and traffic should be provided. The recommended minimum clearance between the road safety barrier system and the edge of the nearest traffic lane is shown in Table 5.1. When determining the appropriate speed to select in Table 5.1, consider the range of speed limits and vehicle speeds that may occur while the safety barrier is in place and the likelihood that road users often increase their travel speed during times the worksite is unattended.

For further guidance regarding road safety barrier systems, see Austroads Guide to Road Design Part 6.

Figure 5.3 illustrates an example of safety barrier placement around the work area. This diagram does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.3: Safety barrier protection of work area

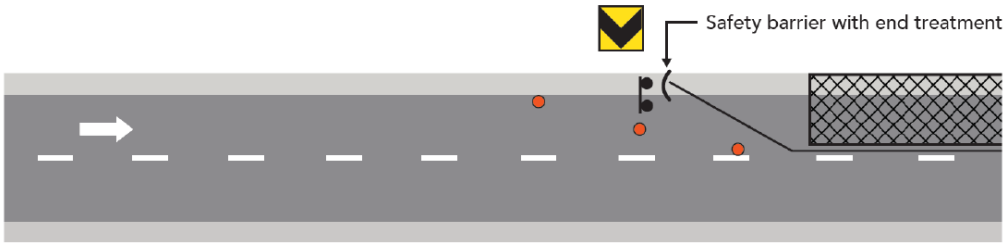


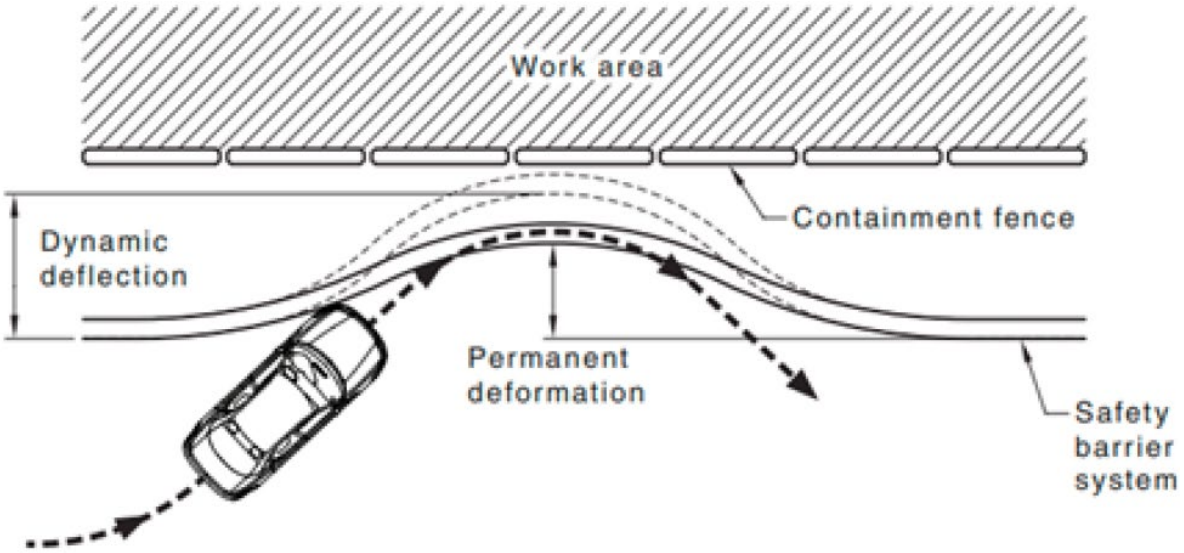
Table 5.1 – Road safety barrier system clearance to traffic lane

Speed (km/h)	Recommended minimum Distance (m)*
≤ 40	0.3
41–60	0.5
61–80	0.5
> 80	1

*Clearance is measured in front of the barrier system and not behind the barrier system in the deflection zone.

Figure 5.4 illustrates an example of dynamic deflection. Clearance in Table 5.1 is measured in front of the barrier system and not behind the barrier system in the deflection zone. This example does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.4: Dynamic deflection and protective fencing behind a safety barrier system



For additional guidance on road safety barriers in Queensland, see the *Road Planning and Design Manual Edition 2: Volume 3, Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers*, with Section 6.8 of this document detailing the requirements for temporary road safety barriers.

Only road safety barriers included on the current list of products in the Transport and Main Roads *Accepted Road Safety Barrier Systems and Devices* document must be used at roadwork sites in Queensland.

The Austroads Safety Hardware Training and Accreditation Scheme (ASHTAS) will, over time, offer courses for Safety Barrier Operative (Entry Level), Installers (Permanent and Temporary Safety Barriers), Designers (Permanent and Temporary Safety Barriers), and more. See QGTTM Part 8 Section 5.5.12 for more details.

For more ASHTAS details see the departmental web page Austroads Safety Hardware Training and Accreditation Scheme (ASHTAS).

5.3.2 Containment fence

Difference

Replace:

> Note that metal star pickets should not be used in situations where they are directly exposed to traffic or any environment where they may be hit by a vehicle.

with:

> The use of star pickets must be in accordance with Section 6.12.

5.3.3 Visibility screens

Addition

For additional guidance on anti-gawking screens, see the *Guideline – Traffic Management at Works on Roads*.

5.4 Delineate the route

Difference

Replace:

> If narrower edge clearance is required, obtain approval from the relevant road infrastructure manager.

with:

> If narrower edge clearances are required due to constrained geometry, the requirements of Clause 1.9 of the Queensland MUTCD Part 3 must apply.

Difference

Replace:

> The spacing between delineation devices should be as detailed in Table 5.3.

with:

> The maximum spacing between delineation devices should be as detailed in Table 5.3, excluding where the delineation devices are used to separate traffic from workers on foot, in which case the maximum spacing between delineation devices must be as detailed in Table 5.3.

Addition

Add the following note to Table 5.3:

> Where the delineation devices are used to separate traffic from workers on foot, the maximum spacing between delineation devices must be as detailed above.

5.4.1 Traffic cones and bollards

Difference

Replace the first dot point

- Maximum spacing of cones and bollards must be as shown in Table 5.3.

with

- Maximum spacing of cones and bollards should be as shown in Table 5.3, excluding where the delineation devices are used to separate traffic from workers on foot, in which case the maximum spacing between delineation devices must be as detailed in Table 5.3.

5.4.2 Temporary hazard markers

Difference

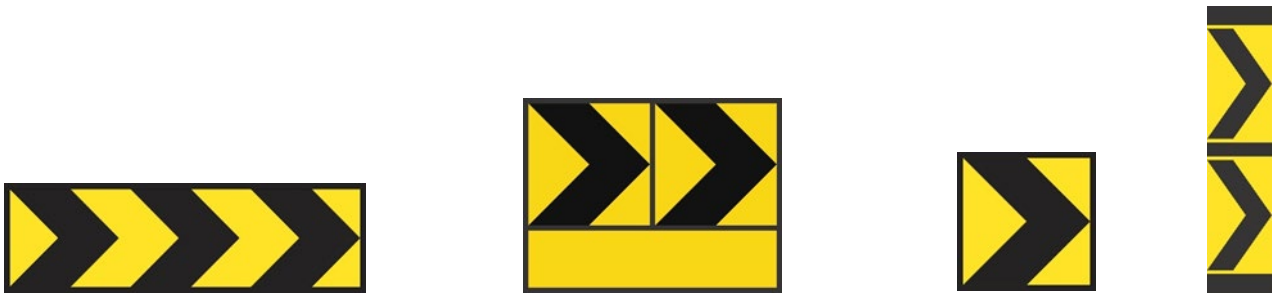
Replace the dot point:

- Repeated markers must be spaced so they appear as a continuous line to approaching road users.

with:

- Repeated larger Temporary Hazard markers (T5-4 or 2 x TM5-5A panels in a multi-message frame arrangement – see Figure 5.4.2) must be spaced so they appear as a continuous line to approaching road users.
- The smaller Temporary Hazard markers (T5-5 or T5-7 - see Figure 5.4.2) should be installed in a minimum group of three for a 3.0 m–3.5 m-wide taper, with one hazard marker at the start of the taper, another at the end of the taper and a third hazard marker at the approximate mid-point of the taper for approaching road users.

Figure 5.4.2 – Types of Temporary Hazard marker



T5-4 | 2 x TM5-5A panels in a multi-message frame | T5-5 | T5-7

5.4.4 Shuttle flow

Difference

Replace the entire Section 5.4.4 with the following:

This method is typically used when a portion of the roadway is closed so that a single lane is used alternately by traffic travelling in opposite directions. It is one-way flow with one direction first, then the other.

When using shuttle flow, the following are requirements and recommendations:

- Lane widths must be in accordance with Table 2.5. For further guidance on lane widths, see Section 2.5.8.

- The swept path must accommodate heavy and over-dimensional vehicles if required.
- Active traffic control (by traffic controllers or PTCDs) must be provided at each end of the operation (see Section 5.10), except as follows:
  - GIVE WAY and ONE LANE signs are provided at one end of the shuttle lane and the NO OVERTAKING OR PASSING sign is also to be erected at the start of the single lane for traffic in the opposite direction and all the following apply:
    - traffic volume in both directions is 150 vph or less
    - the traffic speed is 70 km/h or less
    - each entry to the work area is visible from the other
    - the length of the single lane or shuttle flow segment is 120 m or less, and
    - there is sight distance to opposing traffic of at least 200 m beyond the far end of the work area for traffic facing the GIVE WAY, ONE LANE assembly.
  - No specific traffic control signs are required for the single lane section, and traffic operates under natural give and take using the one open lane and either one of the following applies:
    - it is a residential street (permanent posted speed is 50 km/h or less) and there is clear visibility past the work area and beyond it for at least 75 m, or to the end of the road if less than 75 m away and the length of the shuttle lane does not exceed 60 m, or
    - road users have clear visibility of the work area and the opposing approach for a distance greater than 150 m or to the end of the road if less than 150 m away, the traffic volume in both directions is 40 vph or less, the permanent posted speed is 70 km/h or less, and the length of the shuttle lane is 60 m or less.
- Where active traffic control is not provided (working under natural give and take, or where GIVE WAY and ONE LANE signs are in operation), the taper should be at 45 degrees on both the approach and departure sides of the work area and the remaining open single lane section should have a maximum width of 3.5 m. See Figure 5.4.4(a) for an example layout.
- Single-lane section lengths should not exceed the recommended maximum distance as shown in Table 5.4.

- Contingency planning for longer than expected queue lengths should be included as part of the TGS design.
- End of queue protection measures must be provided in accordance with Section 4.8.3.

Table 5.4 – Recommended maximum length of operation under shuttle flow

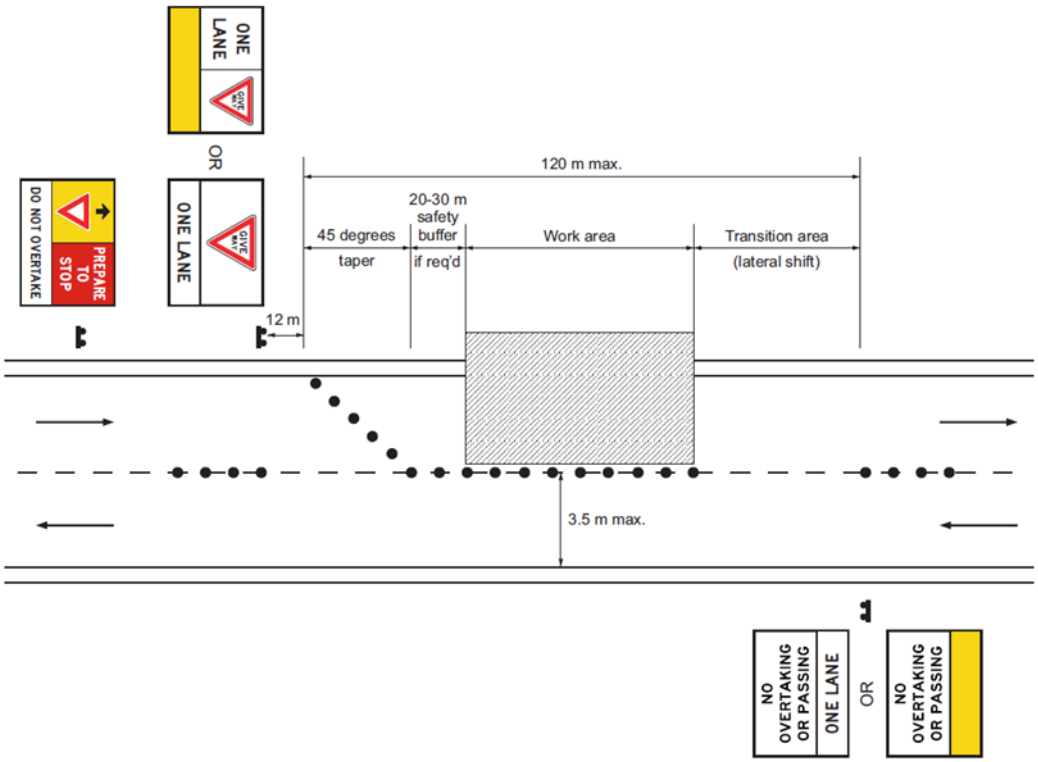
Traffic volume (Total for both directions) (vph)	Length of single lane section (m)
701–800	70
601–700	100
501–600	150
401–500	250
351–400	400
301–350	600
≤ 300	800

The volumes in Table 5.4 have been determined to allow a quick analysis without referring to a traffic engineering professional. Additional traffic engineering input is required to support a longer length of single-lane operation.

Generally, when using Table 5.4, and where the lengths are within the maximum limits, single-lane operation using active control by portable traffic control devices or traffic controllers will lead to a relatively short and consistent or stable queue length; however, additional traffic engineering input and considerations (risk assessments) are required to support longer lengths of single-lane operation which will generally lead to longer maximum queue lengths and queue lengths that are not easily managed, or are variable and unstable.

Figure 5.4.4(a) does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.4.4(a) – Example layout using GIVE WAY signs



When GIVE WAY and ONE LANE signs are provided at one end of the shuttle lane (in accordance with this section), and advance warning of this arrangement is required, the Give Way Sign Ahead sign (W3-2 or WM3-2A in a multi-message sign assembly – see Figure 5.4.4(b) should be used.

Figure 5.4.4(b) – Advance PREPARE TO STOP sign for Give Way control

5.5 Safe traffic speed

Addition

Additional guidance on supplementary devices to reduce speed is provided in Chapter 1, Clause 1 of *Guideline – Traffic Management at Works on Roads*.

5.5.1 Temporary speed limits

Difference

Replace the entire Section 5.5.1 with the following:

Temporary speed limits can be used to regulate the speed of traffic due to roadworks, temporary hazards, emergencies or special events. Authorisation from the relevant road infrastructure manager needs to be obtained prior to works commencing, normally during the planning stage (TMP phase). Details of the temporary speed limit, approximate length of the temporary speed zone (e.g. temporary speed limit of 60 km/h for 150 m) and associated roadwork signing is submitted with the TMP. If alternative means of traffic control are adequate, there is no need to implement additional temporary speed zones.

Temporary speed limits are implemented for workplace safety and traffic safety requirements to protect workers from oncoming or passing traffic and road users from hazards within the static work site. To meet specified safe workplace requirements, including the protection of traffic controllers, reduction in traffic speeds to either 80 km/h, 60 km/h or 40 km/h must be required.

If the specified temporary speed limit is lower for site workplace safety requirements than traffic safety requirements, the temporary speed limit for workplace safety requirements takes precedence (e.g. high level of hazard for workers on foot in a worksite with reduced visibility – the required temporary speed limit is 40km/h or less).

Temporary speed zone conditions and lengths are outlined in Table 5.5.

The primary objective of temporary speed zones is to ensure that all workers operating in and around the work zone are safe. The secondary objective is to ensure the application of temporary speed zones are safe and convenient for road users. Sufficient warning of changes in speed limit due to surface condition and work zone layouts need to be communicated to all road users.

Where a decision has been made to create a temporary speed limit, the following apply:

- The temporary speed limit should be self-enforcing or will be enforced.
- The temporary speed limit must be realistic and reflect the condition of the worksite in real time. This will reduce the risk of road users ignoring the speed limit.
- The temporary speed limit must be obvious to all road users.

- The temporary speed limit should encourage uniform speed of travel.
- Speeds should be low enough to allow road users time to react to signs, directions, traffic control or unusual events.
- The temporary speed limit must not be so low that a significant number of road users disregard it.
- Temporary speed limits may be a compromise where conditions vary over a length of road.
- The length of the temporary speed zone should be as shown in Table 5.5.
- The speed limit applied to the zone must not exceed the maximum safe speed of travel at which traffic can safely traverse the site. The maximum safe speed of travel depends on a number of factors including:
    6 number and type of vehicles
    7 number of pedestrians / cyclists
    8 type of works undertaken
    9 extent of the works
    10 road characteristics
    11 number of incidences, conflicts or hazards on the road. Where the frequency of incidents, conflicts or hazards on a road increase, the maximum safe speed of travel needs to be reviewed.

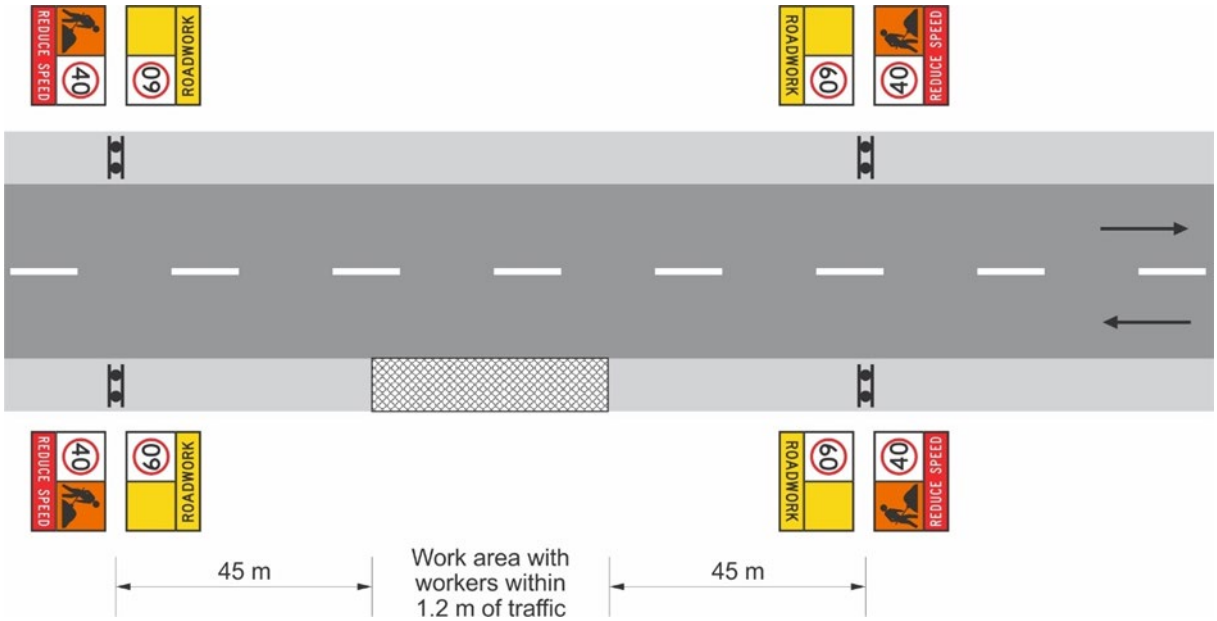
The Designer should ensure reduced speed zones are as short as possible and that they are not commenced so far prior to the hazard (or workers) that drivers start to disregard them and speed up. There is a balance between ensuring drivers can reduce speed prior to a hazard and not making that distance so long that compliance becomes an issue.

Speed limits implemented to meet specified safe workplace requirements for the protection of workers in an active work area should commence a minimum of a single sign spacing in advance of the active work area. The 200 m zone requirements past a speed limit reduction apply when determining this sign spacing value.

When considering the extent of the reduced speed beyond the work area, the guidance in Section 5.12 should be used, while remembering that offset speed zone requirements and the need to reduce traffic speeds past the work area for the other direction of travel may dictate the speed sign locations.

Figure 5.5.1 illustrates an example of a speed reduction arrangement for road worker safety on a 60 km/h road where road workers will be working within 1.2 m of the traffic lane and the speed past the workers is to be reduced to 40 km/h. The distance in advance of the workers for the start of the 40 km/h reduced speed zone is based on appropriate sign spacing in Table 2.2. As this spacing is within 200 m of a speed limit change (to 40 km/h), the speed value to use in Table 2.2 is 60 km/h which equates to a distance of 45 m. This Figure does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.5.1 – Speed limit sign location for road worker safety



Selecting the speed limit

Selecting the temporary speed limit at works is dependent on workplace safety and traffic safety requirements. Temporary speed limits are a viable option for any of the following examples:

- shuttle flow
- contraflow
- temporary stopping
- temporary traffic signals and PTCD
- the number of lanes is reduced
- merges
- narrow lanes
- protecting traffic controllers

- visibility is restricted (e.g. dust, work equipment, construction materials, abnormal weather conditions)
- limited clearance between road workers or equipment and moving traffic
- the alignment or road surface is below standard
- loose material or stones
- works can be damaged by higher speeds
- emergencies (e.g. flooding, slips, crashes, fire)
- good technical reasons (e.g. the road might otherwise collapse).

A guide to selecting the required temporary speed zone is provided in Table 5.5.

Table 5.5 – Recommended length of temporary speed zone

Temporary speed limit (km/h)	Length of zone (m)	Conditions
<40	100–200	• unusually high level of hazard for workers on foot or road users (pedestrians or cyclists) • it is impractical to separate pedestrians or cyclists from vehicular traffic in the work area
40	100 (minimum)–500 (maximum)*	• workers on foot within 1.2 m of traffic with no physical barrier • structural danger to bridges • high level of hazard for workers on foot or road users (pedestrians or cyclists)
60	150 (minimum)	• workers on foot between 1.2 m and 3 m of traffic or plant within 3 m of traffic with no physical barrier (that is, road safety barrier) • on approach to the traffic controller or PTCD • 60 km/h buffer zone • reduced visibility (for example, dust or smoke) • reduced standard alignment • degraded pavement surface • newly laid bituminous seal
80	500 (minimum)	• workers on foot or plant between 3 m and 6 m of traffic with no physical barrier • disturbance to alignment or pavement surface
80 (buffer)	300 (minimum)	• for advance warning of a 40 km/h or 60 km/h when speed is 100 km/h or more

*Subject to a risk assessment, the maximum length for a 40 km/h temporary speed limit may be extended to 1000 m.

Designing the speed limit

Speed limits may be reduced depending on the size of the reduction by one or a combination of the following:

- a speed limit sign

- a speed limit of intermediate value or a buffer zone
- a speed limit AHEAD sign.

Speed limit reductions must be implemented as provided in Table 5.6.

Table 5.6: Method for reducing speed limit

Speed limit reduction	Method for reducing speed limit	Recommended applications	Alternative applications
10	Speed limit sign	60 – 50 50 – 40 40 – 30	
20	Speed limit sign or Speed limit AHEAD* (alternative)	100 – 80 80 – 60 60 – 40	100 – 80 AHEAD – 80* 80 – 60 AHEAD – 60* 60 – 40 AHEAD – 40*
30	Speed limit AHEAD or Speed limit sign or Speed limit signs (alternative)	110 – 80 AHEAD – 80 110 – 80 90 – 60 AHEAD – 60 90 – 60 70 – 40 AHEAD – 40 70 – 40	110 – 100 – 80 90 – 80 – 60 70 – 60 – 40
40	Speed limit AHEAD or Speed limit signs	100 – 80 – 60 100 – 60 AHEAD – 60 80 – 60 – 40 80 – 40 AHEAD – 40	
50	Speed limit signs and/or Speed limit AHEAD	110 – 80 – 60 110 – 80 AHEAD – 80 – 60 100 – 80 – 50 100 – 80 – 50 AHEAD – 50 90 – 60 – 40 90 – 60 AHEAD – 60 – 40	110 – 80 – 60 AHEAD – 60 100 – 80 AHEAD – 80 – 50
60	Speed limit signs and/or Speed limit AHEAD	110 – 80 – 60 – 50 110 – 80 AHEAD – 80 – 50 110 – 80 – 50 AHEAD – 50 100 – 80 – 60 – 40 100 – 60 AHEAD – 60 – 40 100 – 80 – 40 AHEAD – 40	110 – 80 – 50
70	Speed limit signs and/or Speed limit AHEAD	110 – 80 – 60 – 40 110 – 80 AHEAD – 80 – 60 – 40 110 – 80 – 40 AHEAD – 40	110 – 80 – 60 – 40 AHEAD – 40* 110 – 80 – 60 AHEAD – 60 – 40*

*May be used where additional advance warning of speed limit reduction is required

Where the need for a temporary speed limit occurs part way into a worksite, the temporary speed zone must be started at that point rather than the start of the worksite. For example, the short term need to localise a speed limit and accommodate workers on foot less than 1.2 m clear of a traffic. More than one localised speed zone is permitted within one worksite if the minimum distance between them is equal to the length of zone for the higher speed limit shown in Table 5.5.

Temporary speed zones that result in different speed limits for each direction of travel at a particular location (offset speed zones) may be used in the following conditions:

- on divided roads where works affect road users on one side of the median only
- on multilane undivided two-way roads that meet all of the following:
  - more than one lane in the same direction of travel past the worksite
  - works in the left lane and/or clear of the road
  - conditions necessitating the temporary speed limit are confined to one direction of travel only
  - there are no intersections or property access requirements within the temporary speed zone.
- where a speed buffer zone is provided. For example, advance warning of a 60 km/h speed limit is provided in an 80 km/h buffer zone, when the original speed was 100 km/h. This buffer zone speed limit is not needed for road users leaving the temporary speed zone because the buffer does not apply to the opposite direction of travel. The offset speed zone will only apply in the speed zone buffer area and not the whole worksite.

Temporary speed zones are communicated clearly to road users with the following traffic control devices in order for them to recognise the need to adjust their speed:

- a Speed Limit AHEAD sign must be located a distance double the speed in advance of the Speed Restriction sign and must be located on the left-hand side of the road and should be duplicated (placed on both sides of the roadway) where practicable on roads with an annual average daily traffic (total vehicle count in both directions of travel per day) of over 500 vehicles per day. Refer to Table 5.6 – *Methods for reducing speed limit* for the use of the Speed Limit AHEAD sign
- a Supplementary ROAD WORK and Speed Restriction sign or a Speed Restriction sign in a multi message panel at the start of temporary speed zone as follows:
  - Speed Restriction signs must be placed on the left-hand side of the road at the start of a temporary speed zone (either a speed reduction or speed increase).

    - Speed Restriction signs should be duplicated (also placed on the right-hand side of the road) where practicable in the following situations:
        - At the start of a reduced temporary speed zone on a road with an annual average daily traffic (total vehicle count in both directions of travel per day) of over 500 vehicles per day and a permanent posted speed limit greater than 60 km/h, or
        - On a multi-lane road (includes divided, undivided, one-way or ramps).
    - In addition to the above, any Speed Restriction sign may be duplicated (also placed on the right-hand side of the road).
- an END Speed Limit sign to terminate the temporary speed zone must be placed as per the requirements for a Speed Restriction sign above. In this case, the speed limit beyond the END Speed Limit sign will revert to the default speed limit.
- an END ROADWORK sign may be placed beyond the termination of the temporary speed zone or concurrent with a Speed Restriction sign or the END Speed Limit sign.
- If sign duplication is not practicable or possible (due to for example, vegetation, safety barrier, inadequate width), the designer must document an alternative to ensure all road users are able to see the speed limit signs (refer to Section 2.5.3 for options).

Repeater speed limit signs must be used to confirm and remind users of the speed limit where the zone is long and there are locations which could seem like the temporary speed limit no longer applies (for example, between work areas in an extended worksite), or to advise road users entering the temporary speed limit. Repeater speed limit signs may be used as required above, and must be placed on the left-hand side of the road at a maximum spacing of 500 m. On multi-lane road (including divided, undivided, one-way or ramps), repeater speed limit signs should also be placed at a maximum spacing of 500 m on the right-hand side of the roadway where practicable.

At the end of the temporary speed zone, the following requirements apply:

- Speed Restriction or END speed limit signs must be used to end the temporary zone.
- When using these signs at the end of the roadworks, the ROAD WORK supplementary signs must not be used in conjunction.
- Speed Restriction and END speed limit signs must be placed as per the requirements for a Speed Restriction sign above.

If it is not practicable or possible to terminate the temporary speed limit beyond the temporary speed zone by the above methods, the END Speed Limit sign (R4-12) may be used. An example of this is where the default speed limit (typically on rural roads), road surface, alignment or other conditions will not allow the road user to travel safely at that speed. It is a legal requirement that a speed zone is terminated by:

- another regulatory speed control sign or END Speed Limit sign
- other means of traffic regulation imposed by the State.

Operational

The following apply when installing speed signs:

- Any permanent speed signs that contradict the temporary speed limit in the required zone must be covered or removed.
- Any advisory speed signs higher than the temporary speed limit in the required zone must be covered.
- Speed Restriction signs where required to be duplicated in the 'Designing the speed limit' section should be placed on both sides of the roadway where practicable to ensure road users have clear visibility of speed limit signs.
- Temporary speed limit signs should be used together with other appropriate devices already required by other site conditions. For example, display temporary speed limit signs used for.
- worksite protection and safety in conjunction with the Workers (symbolic) sign.
- All speed limits related to road worker safety must be removed or covered when road workers, traffic controllers or plant are not on site.
- Speed limits when road workers, traffic controllers and plant are not on site should be determined with consideration of the safe passage of road users. If no hazard to road users exists, the speed limit should be returned to the permanently posted speed limit.
- Any gantries within the worksite with Variable Speed Limit or Lane Control signs must be programmed to display the temporary speed limit or turned off. Check the TMP for guidance on other large permanent signs and variable speed limit signs.
- A record of dates and times temporary speed limits are in operation must be kept, including any changes made, the name of personnel installing, changing or removing signs (see Section 2.5.3).
- Workplace safety must be considered during set-up and dismantling of signs.

Temporary speed limits should only apply while the condition that makes them necessary exists, so remove temporary speed limit signs as soon as the necessity passes. For further details on signs see Section 2.5.3.

Guidance on the use of temporary variable speed limit signs in construction and maintenance work areas on motorways is given in the *Guideline – Traffic Management at Works on Roads*.

5.5.2 Temporary speed humps

Addition

Guidance on the use of temporary speed humps and associated signage is given in the *Guideline – Traffic Management at Works on Roads*.

5.5.3 Rumble strips

Addition

Guidance on the use of rumble strips and associated signage is given in the *Guideline – Traffic Management at Works on Roads*.

5.5.4 Speed enforcement

New

Requirements for planned speed enforcement are included in Technical Specification MRTS02 *Provision for Traffic*. Projects not subject to the requirements of MRTS02 may adopt the requirements in MRTS02.

Speed enforcement planned and undertaken in accordance with MRTS02 must include the TC sign SPEED CAMERAS USED AT ROADWORKS FOR ROAD SAFETY (TC2320_1, see Figure 5.5.4(c)) and must include an orange target board to the speed limit signs as per TC2320_2 for camera enforcement, or TC2320_3 for enforcement by a Roadways Behaviour Monitoring System (RBMS) camera. The orange target board must be added to all speed limit signs (including repeater and speed limit AHEAD signs) on approach to the enforcement location. The ROADWORK AHEAD sign (T1-1 or equivalent, such as a VMS) must be installed in advance of the site. The multi-message sign arrangements in Figures 5.5.4(a) and 5.5.4(b) must not be used for speed enforcement in accordance with MRTS02.

When speed enforcement is planned and undertaken outside the requirements of MRTS02, TC sign TC2361 must be used as follows:

- For enforcement by camera, use the multi-message sign arrangement in Figure 5.5.4(a).

- For enforcement other than by camera, use the multi-message sign arrangement in Figure 5.5.4(b).

The multi-message sign arrangement in Figure 5.5.4(b) may be used at roadworks sites where there is no active speed enforcement; however, in this case, the installation of this arrangement must be limited to locations which meet all the following criteria:

- the roadworks site has known or expected low speed compliance, and
- it is not feasible or practicable to implement other engineering treatments to reduce vehicle speeds (or where the treatments in Chapter 1, Clause 1 of the *Guideline – Traffic Management at Works on Roads* have been ineffective), and
- the location should have a permanent speed limit of 70 km/h or greater (prior to any speed reductions for the works).

When used, the enforcement signs SPEED CAMERAS USED AT ROADWORKS FOR ROAD SAFETY (TC2320_1 – see Figure 5.5.4(c)) and the multi-message sign arrangements in Figures 5.5.4(a) and 5.5.4(b):

- must be located in advance of any enforcement device
- must be located in the advance warning area as an additional sign
- must be separated from other signs and devices by a minimum of at least one sign spacing
- must be duplicated in accordance with the requirements in Section 2.5.3, and
- ideally should be located one sign spacing in advance of a speed restriction sign within the advance warning area.
    - Where enforcement is occurring, and this is not the speed limit which is being enforced and if space is available, a repeater enforcement sign may be installed one sign spacing in advance of the lower speed restriction sign (this repeater enforcement sign may be outside the advance warning area).

There are no requirements for the special enforcement style signs to be in place for police to conduct unplanned speed enforcement.

Figure 5.5.4(a) – Multi-message sign arrangement for planned camera enforcement (undertaken outside the requirements of Technical Specification MRTS02 Provision for Traffic)

Figure 5.5.4(b) – Multi-message sign arrangement for planned enforcement by other than a camera (undertaken outside the requirements of Technical Specification MRTS02 Provision for Traffic)

Figure 5.5.4(c) – Traffic Control sign TC2320_1 for speed enforcement planned and undertaken in accordance with Technical Specification MRTS02 Provision for Traffic

5.6 Safety buffer

Addition

On roads with a permanent speed limit (prior to any reductions for the works) of less than or equal to 80 km/h, the safety buffer may be omitted where the works (including the work area, all workers, vehicles, equipment and materials) are at least 6 m clear of traffic and is supported by a risk assessment.

5.8 Additional warning area and devices

5.8.1 Truck-mounted attenuators

Addition

Additional guidance on the use of truck-mounted attenuators (TMAs) is given in the *Guideline – Traffic Management at Works on Roads*.

Only TMAs included on the current list of products in Transport and Main Roads' *Accepted Road Safety Barrier Systems and Devices* document must be used at roadwork sites in Queensland.

5.9 Transition area

5.9.1 Tapers

Addition

In subsection **'Traffic control taper'**, add the following:

For shuttle flow operations, the traffic control taper must start a minimum of 6 m from the traffic controller or PTCD.

Difference

Replace the title for Table 5.8:

Table 5.8: Distance between tapers

with

Table 5.8: Minimum distance between tapers

Difference

Replace the text following Table 5.8:

The speed to use in Table 2.2 and 5.8 must be as per Figure 2.2 of Section 2.5.3.

For details on how to use delineation devices see Section 5.4.

with

The speed value used in Tables 5.7 and 5.8 shall be as per Figure 2.2 of Section 2.5.3 – the 200 m zone in Figure 2.2 applies to the recommended length and recommended spacing of tapers.

For the spacing of delineation devices at tapers, see Section 5.4. The 200 m zone in Figure 2.2 does not apply to delineation spacing.

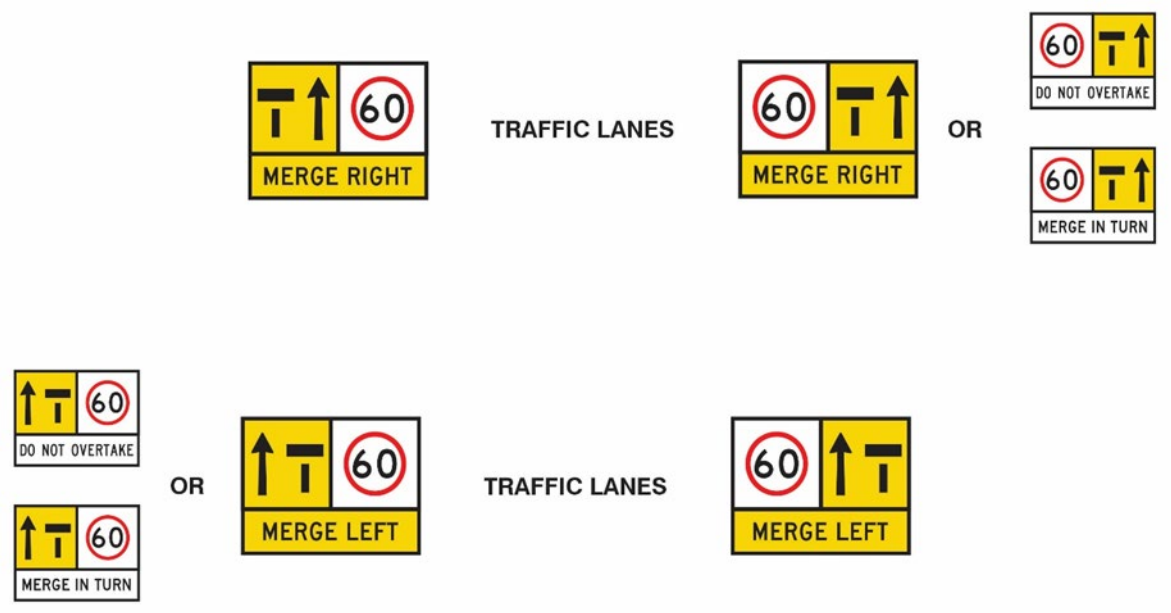
Where the posted permanent speed limit of the road is 80 km/h or greater, the recommended taper length for merge tapers (Table 5.7) and the recommended distance between merge tapers (Table 5.8) may be increased and be based on the posted permanent speed limit of the road.

Addition

In subsection '**Merge taper**', add the following:

When signing merge tapers, the multi-message signs on each side of the multilane road on approach to the merge taper may be different. The MERGE LEFT / MERGE RIGHT panel should be included with the lane status panel for the lane which is required to merge (must change lanes); however, for the lane where no action is required as this lane continues, the MERGE LEFT / MERGE RIGHT panel may be replaced with either a DO NOT OVERTAKE or MERGE IN TURN panel as shown in the following Figure 5.9.1(a).

Figure 5.9.1(a) – Lane status signs for merge tapers



Addition

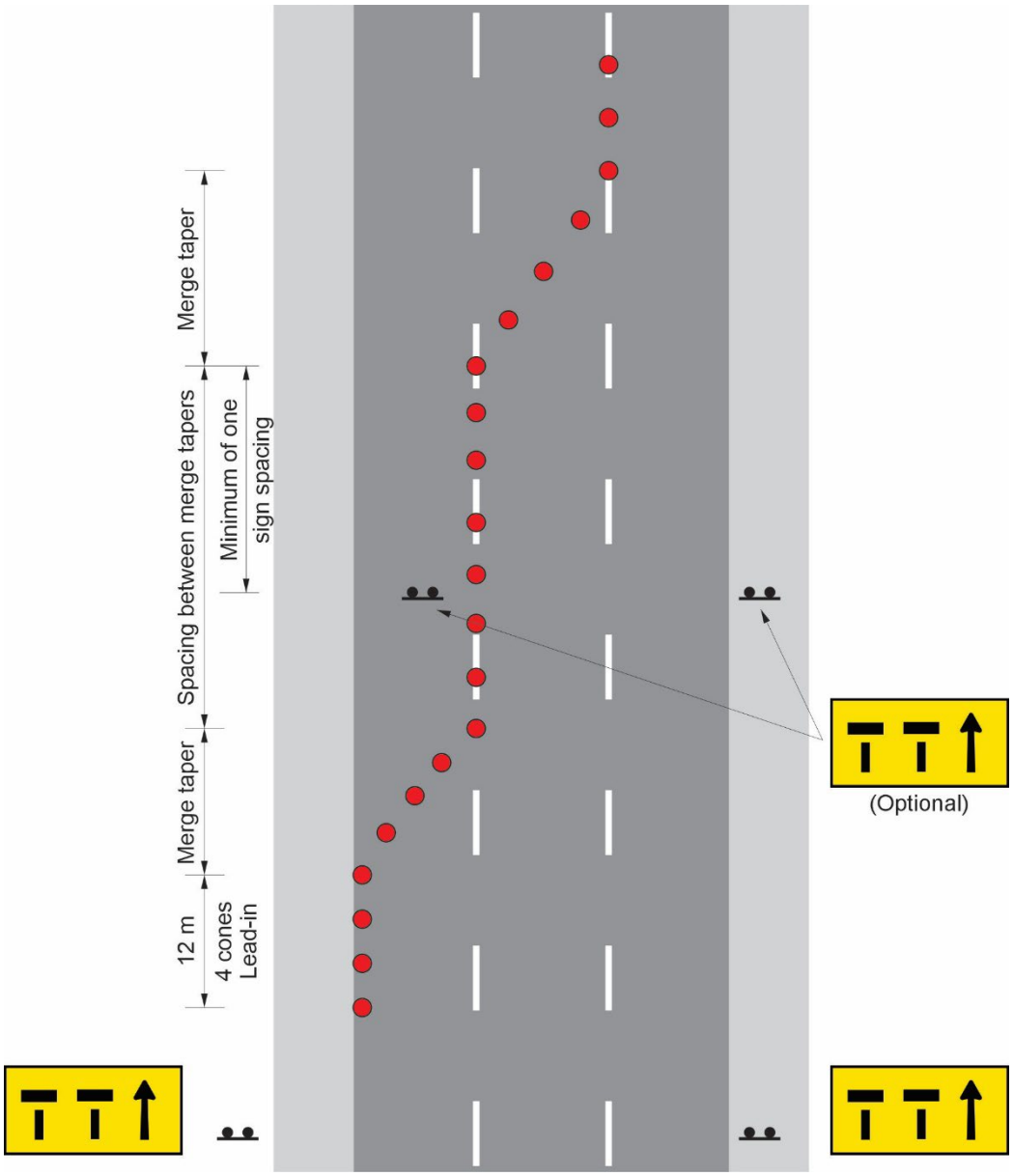
In subsection '**Multiple tapers**', add the following:

When signing multiple merge tapers, the following lane status sign configuration and location requirements will apply:

- All lane status signs must display the final lane configuration regardless of their location.
- A lane status sign must be located a minimum of a single sign spacing prior to the start of the first merge taper; however, as more than one lane is merging, this spacing may be increased to a distance of two sign spacings (see Section 2.5.3).
- A repeater lane status sign may be installed in the area between the two merge tapers and, if used, should be located a minimum of a single sign spacing prior to the start of the second merge taper.

The following Figure 5.9.1(b) is an example of the lane status sign configuration and location for a road with multiple merge tapers. This Figure does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.9.1(b) – Lane status signs for multiple merge tapers



Difference

In subsection '**Designing a taper**', replace the fifth and sixth dot points:

- Tapers must not start or end within 50 m of an intersection on Category 2 roads. In this case, the start of the taper is the point where the shift / merge finishes, and the end of the taper is where closed lanes are re-opened.
- Tapers must not start or end within 100 m of an intersection or on / off-ramp on Category 3 roads. In this case, the start of the taper is the point where the shift / merge finishes, and the end of the taper is where closed lanes are re-opened.

with:

- Merge tapers must not start or end:
  - within 50 m of an intersection (both approach and departure sides) on a controlled leg of an intersection on a Category 2 road
  - within 100 m of an intersection (both approach and departure side) located on a ramp from / to a Category 3 road, or
  - within 100 m of a ramp (on or off) on a Category 3 road.
- Merge tapers located on an uncontrolled leg of an intersection on a Category 2 road should not start or end within 50 m of the intersection (both approach and departure sides).
- Merge tapers must not be implemented through / across an intersection or ramp.
- Lateral shift tapers (excluding at contraflow transition points) must not be implemented through / across an intersection or ramp. Where provided at contraflow transition points, the management of the other approaches to the intersection will be critical.

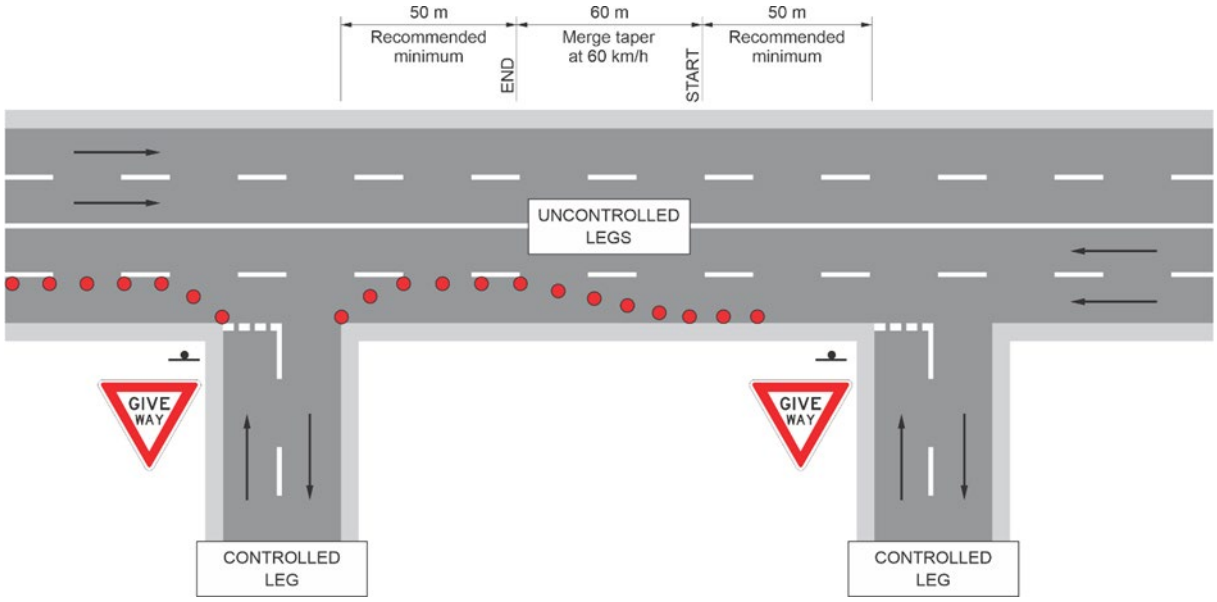
Addition

In subsection **'Designing a taper'**, add the following:

When considering the space requirements for a merge taper, the terminology referring to a controlled leg or uncontrolled leg of an intersection on a Category 2 road is different to a controlled intersection. Controlled legs are those approaches to an intersection controlled by traffic signals, roundabout give way signs, give way signs, or stop signs. In some cases, a controlled intersection may have uncontrolled legs, which are not subject to any formal control method.

Figure 5.9.1(c) shows an example of a merge taper on a Category 2 road with a 60 km/h speed limit that includes intersections with minor side streets (GIVE WAY or STOP signs on the side streets only). The side street legs are controlled while the multilane road has uncontrolled legs through these controlled intersections.

Figure 5.9.1(c) – Controlled and uncontrolled legs on a multi-lane road



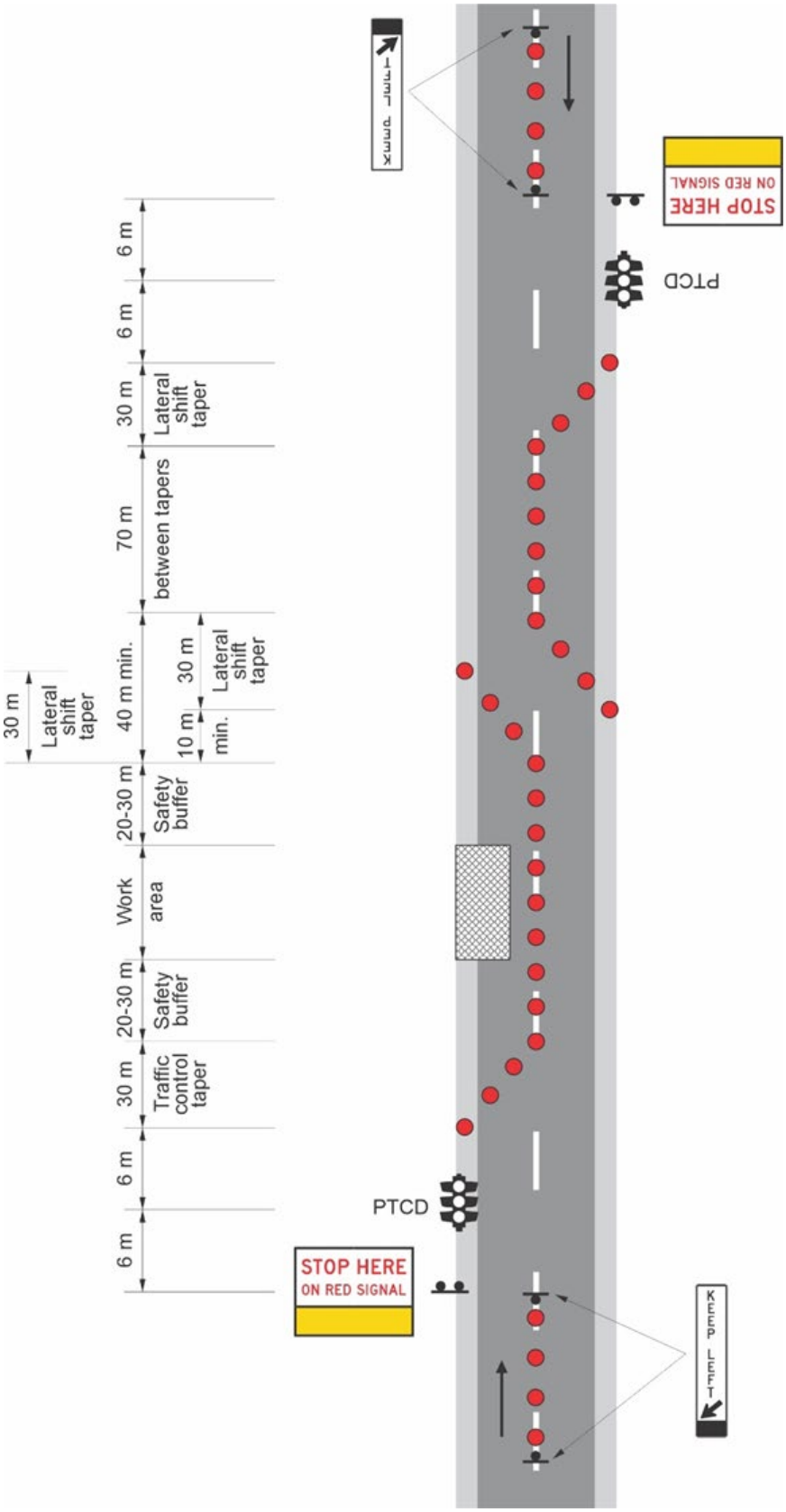
5.9.2 Chicanes

Addition

A chicane is also a useful treatment when using shuttle flow traffic control to ensure vehicles return to the correct side of the road and should be implemented when the site is unattended.

Figure 5.9.2 illustrates an example of a chicane used with shuttle flow and signal traffic control on a road with a 60 km/h speed limit. This diagram does not include all traffic control devices required and is not to be used as a TGS diagram.

Figure 5.9.2 – Chicane with traffic control



5.9.4 Closing the shoulder

New

Shoulders are not generally used as traffic lanes; however, shoulders may be used by cyclists and, in some cases, by motorcyclists. Parking lanes may also appear to some road users as possible traffic lanes.

Where works require the closure of the area outside of the traffic lane (shoulder), to ensure road users do not inadvertently traverse the area behind the delineation of works, the following options apply:

1. Where the shoulder may be used by cyclists and, in some cases, motorcyclists, a short taper at a 45 degree angle to traffic should be provided (see Figures 5.9.4(a), 5.9.4(b) and 5.9.4(c)). This is the preferred method of closing a shoulder.
2. Where the shoulder is unlikely to be used by other road users, subject to a risk assessment, a square closure may be implemented (see Figures 5.9.4(d) and 5.9.4(e)).
3. Where there is a very wide shoulder (for example, wide road reserves in rural towns or where angle parking is provided), subject to a risk assessment, a combination of these options may be implemented (see Figure 5.9.4(f)).

Devices which may be used to close the shoulder include traffic cones, bollards, Temporary Hazard markers, barrier boards, or a combination of these, depending on the site characteristics. The following Figures do not include all traffic control devices required and are not to be used as TGS diagrams.

Figure 5.9.4(a) – Closing a shoulder at a 45 degree angle

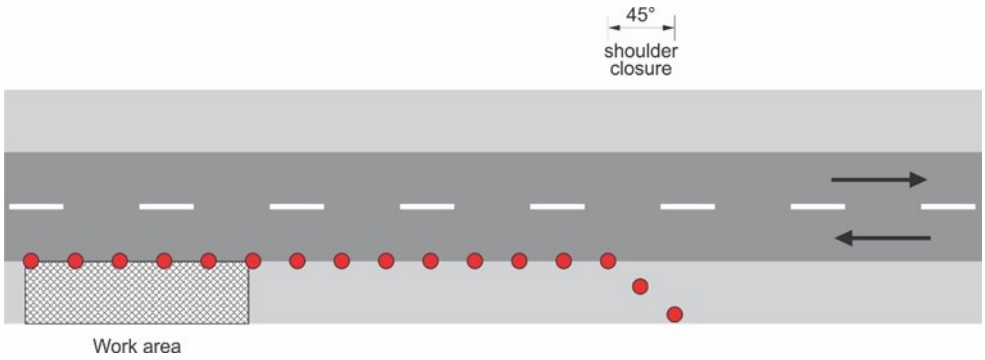


Figure 5.9.4(b) – Closing a shoulder at a 45 degree angle where a taper is required

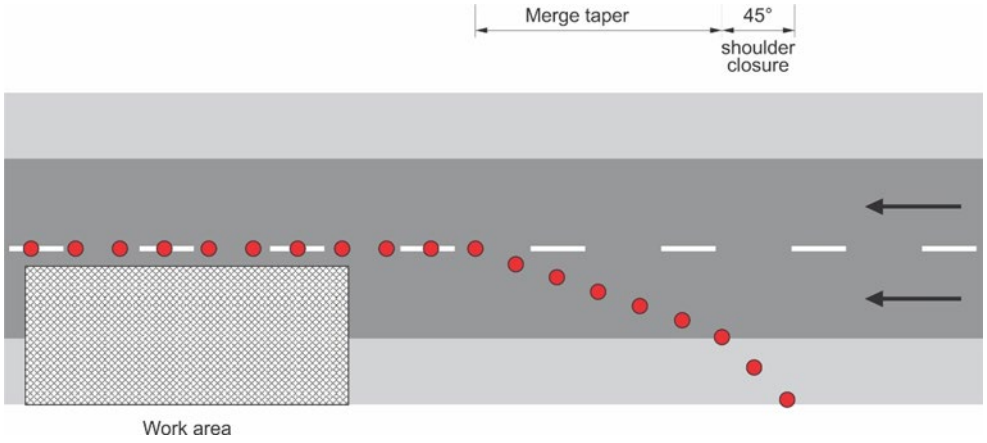


Figure 5.9.4(c) – Closing a shoulder at a 45 degree angle where a taper is required and a lead-in is provided

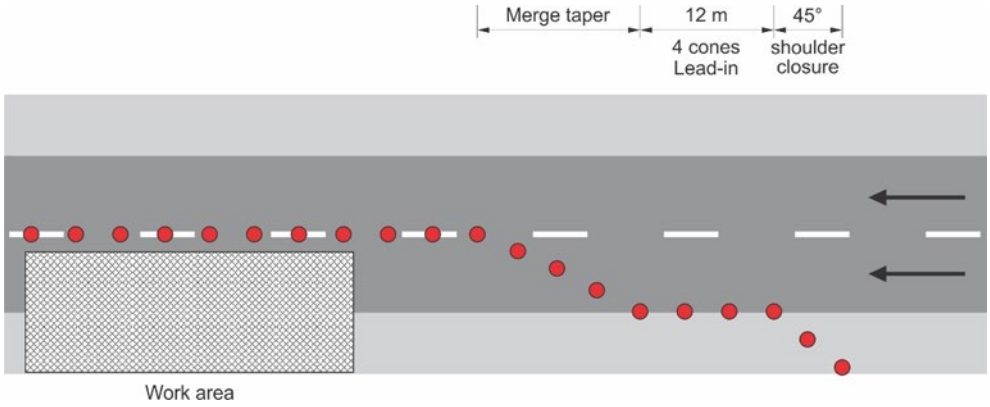


Figure 5.9.4(d) – Closing a shoulder with a square treatment where a taper is required

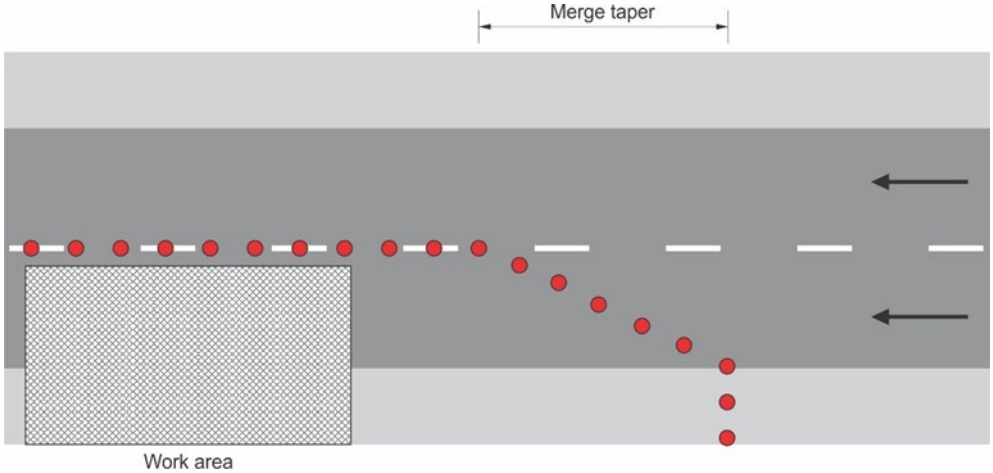


Figure 5.9.4(e) – Closing a shoulder with a square treatment where a taper is required and a lead-in is provided

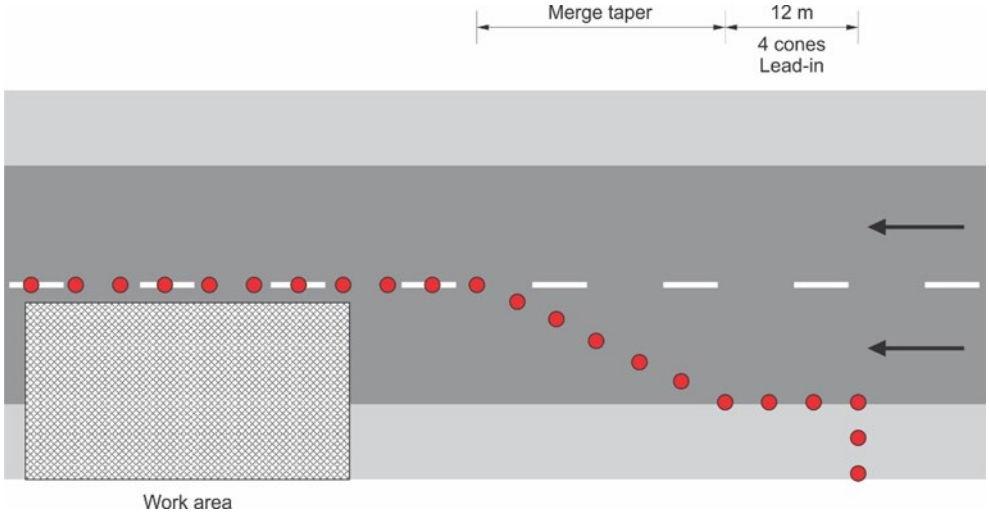
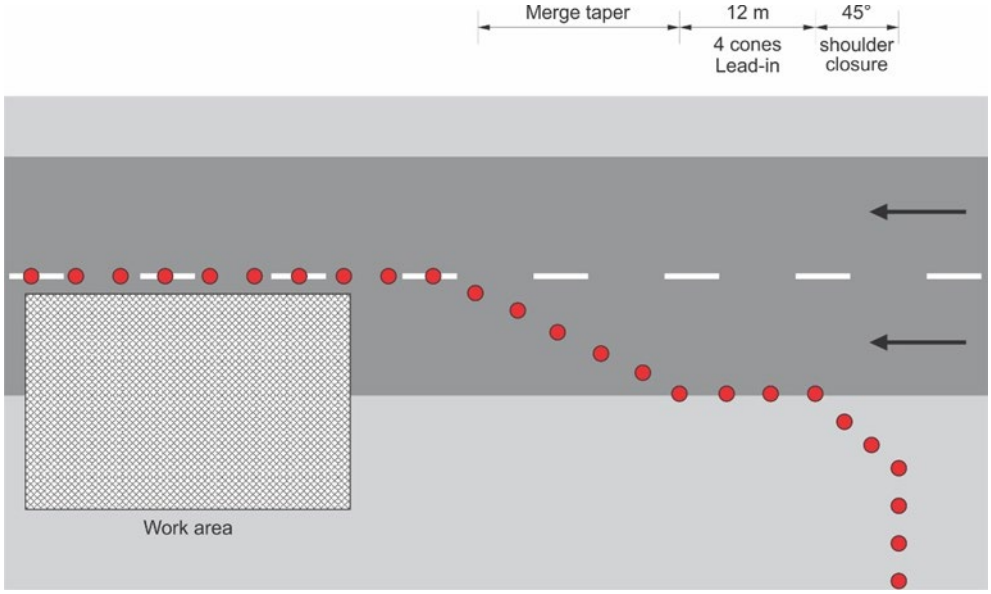


Figure 5.9.4(f) – Closing a wide shoulder with a combination of treatments



5.10 Traffic control

Addition

The advance warning area requirements, including estimating the end of queue position and calculation requirements in Section 4.8 (including subsections) also apply to the traffic control methods used in this section.

5.10.1 Portable traffic control devices

Difference

Replace Section 5.10.1 with the following:

PTCDs are used to enhance the safety and protection of road users and road workers, specifically traffic controllers.

When using PTCDs, and situations occur where vehicles can bypass the temporary traffic control station, the placement of additional cones along the centreline must be installed to provide a sufficient distance to prevent the vehicle passing the PTCD. Prior to including a PTCD in a TGS, a risk assessment must be undertaken to ensure the suitability and choice of PTCD. Other considerations that impact the choice of a PTCD are as follows:

1. impacts of equipment failure on road workers and road users; employ back-up traffic controllers in case of failure
2. background impacts on the visibility of the PTCDs for approaching road users
3. clear visibility and available sight distance (see Section 2.5.4); install PTCDs on the left-hand side of each approach – if they are not readily visible in that location, they should be placed in a more visible position
4. speed of traffic
5. traffic volumes
6. duration of works, and
7. whether or not the PTCD needs to be operated when unattended.

PTCD options include:

8. portable traffic signal systems (PTSS):
    a) intended for shuttle flow (see Section 5.4.4) or gating (all stop) operation
    b) available to provide control at intersections (see *Guideline – Traffic Management at Works on Roads* Chapter 5 Clause 2.5.3.1)
    c) signals automatically respond to traffic demands via vehicle actuated operation (unmanned)
    d) option of fixed time operation that used fixed timed cycles when traffic flow is relatively constant

e) may be used in manual mode but require qualified operators (that is, traffic controller) – operators with two-way radio can monitor signal performance, warn the roadworks site and manage road users, and

f) do not use where side roads intersect the roadworks site and are not controlled by a traffic controller or other PTSS.

g) While PTSS devices may be operated in a few different modes, when using PTSS Type 1 or Type 2 devices, for manually controlled shuttle flow arrangements, they should be used in paired mode using a single HRC whenever possible or suitable. This will prevent a green signal being displayed to both approaches at the same time.

9. Portable boom barriers:

    a) are intended to stop traffic

    b) manage shuttle flow or gating (all stop) operation, and

    c) require qualified operators to operate in manual mode (that is, traffic controller).

When using PTCDs:

10. four cones should be placed on the centreline spaced 4 m apart starting from the STOP HERE ON RED SIGNAL or the STOP HERE WHEN DIRECTED sign position (downstream), and

11. undertake a risk assessment.

Consider the following when using PTCDs:

12. PTCDs must only be manually controlled by qualified operators (that is, traffic controllers).

13. They are intended for traffic control of relatively short duration: for roadworks sites that will continue for a longer period without work area location changes, consider installing temporary, rather than portable, traffic signals (see AS 1742.3).

14. Where traffic is required to stop, temporary road markings may be installed 6 m in advance of the PTCD to indicate a stop line. The STOP HERE ON RED SIGNAL or STOP HERE WHEN DIRECTED must be installed in accordance with the Queensland MUTCD Part 3.

15. Provide warning signs (for example, Signals AHEAD) an appropriate sight distance in advance of any PTCD as shown in Section 2.5.3 (see QGTTM Part 3

Section 4.8 for advance sign options). For PTCD, the Traffic Controller (symbolic) sign must be replaced with the relevant PTCD (symbolic) sign.

16. Apply a temporary speed limit of 60 km/h or less if speed is above 60 km/h (see Section 5.5.1) on approach to the PTCD.
17. PTCDs must be regularly monitored to ensure they are operating effectively and safely by checking that:
    a) the time settings are appropriate
    b) the alignment of the signal displays is appropriate for the speed zone
    c) the associated signs are intact and properly displayed
    d) detectors are functioning correctly
    e) there are no burnt out lanterns, and
    f) batteries are charged.

Figure 5.23 illustrates an example of PTCD and sign placement. This diagram does not include all traffic control devices required and is not to be used as a TGS diagram (see Section 4.8 for avoiding end-of-queue collision options and placement of signs). The speed of traffic must be reduced to a maximum of 60 km/h on the approach to a PTCD and an advance warning sign (ROADWORK AHEAD) is to be located in accordance with Section 4.8.

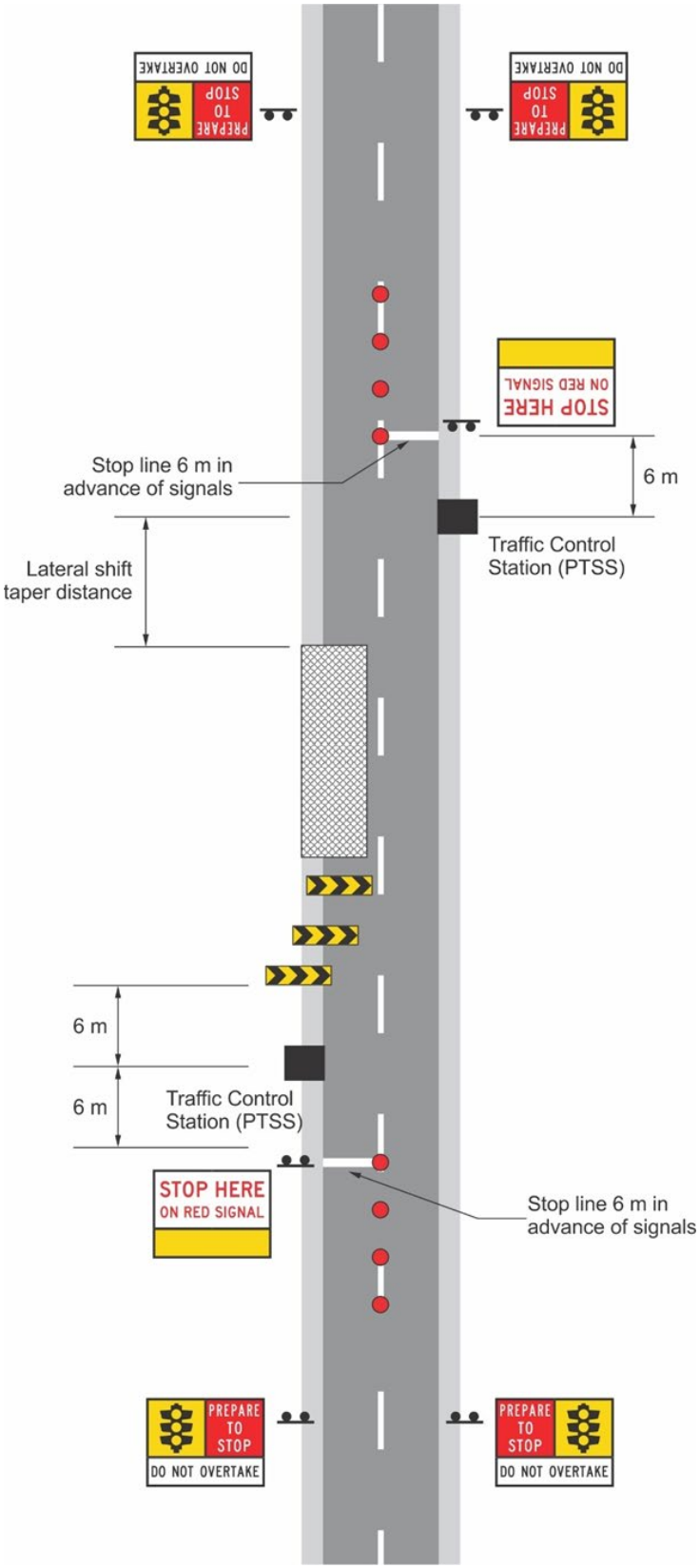
PTCDs may be used on any road environment; however, PTCDs should be used in lieu of traffic controllers using a STOP / SLOW bat on all roads with an annual average daily traffic (total vehicle count in both directions of travel per day) of over 500 vehicles per day and a permanent posted speed limit of 70 km/h or greater.

Where a PTCD is not used as recommended here, a risk assessment in accordance with the requirements of Clause 1.9 of the Queensland MUTCD Part 3 must be undertaken. See also the risk assessments requirements for using TC's in place of PTCDs, in the *Guideline – Traffic Management at Works on Roads* Chapter 5 Section 2.2.

Only PTCDs included on the current list of approved products in the Transport and Main Roads ITS Approved Products document must be used at roadworks sites in Queensland.

Additional guidance on the use, installation and operation of PTCDs, including Type 1 and 2 PTSS and boom barriers, is available in the *Guideline – Traffic Management at Works on Roads*.

Figure 5.23 – Typical use of portable traffic control devices, 60 km/h road



Note:

1. Traffic speed must be reduced to a maximum of 60 km/h on the approach to a PTCD, and
2. An advance warning sign (ROADWORK AHEAD) or VMS must be installed in accordance with Section 4.8.

5.10.2 Traffic controllers

Difference

Replace the entire Section 5.10.2 with the following:

Worksites are hazardous areas so use manual traffic control only where PTCDs are insufficient to provide the safety, capacity and efficiency required for effective traffic control. When traffic controllers are used, traffic controllers cannot direct a road user to contradict upcoming intersection signals. Traffic controllers are to coordinate activities with operating signals. If traffic controllers are operating within close proximity to a signalised intersection and the lights are flashing yellow or are off, a traffic controller must only control one lane and the approach to this intersection must be reduced to one lane of traffic. Where works cause delays to traffic flow, or a side road intersects the worksite, do not use an automated PTCD, a traffic controller using a STOP/SLOW bat or controlling a PTCD is required. The following requirements and recommendations apply when using traffic controllers:

- Only competent persons with appropriate certification must be appointed as a traffic controller (see AGTTM Part 7).
- Speed must be 60 km/h maximum. Provide a temporary speed limit of 60 km/h or less on the approach to a traffic controller if the speed is higher (see Section 5.5.1).
- An escape route must be identified for each traffic controller from their traffic control position.
- Traffic controllers must be positioned a clear sight distance from approaching road users (see Section 2.5.4) with no obstruction and where they are not obstructing visibility to traffic control devices (i.e. signs). No obstruction should be located in the area between the traffic controller and the end of the line of four cones.
- Ensure that a work vehicle is not parked in a way that impacts the visibility of the traffic controller or, limits the traffic controller’s escape route or, is parked between the traffic controller and the taper.
- Ensure that traffic controllers are visible at all times of the day, particularly at dawn, dusk, against low morning or evening sun, when in the shade on a sunny day or working in dusty conditions.

- The traffic control station and the area where traffic controllers are operating PTCDs from must be well illuminated at night. Where required, provide additional lighting. See Section 6.7 Night works for greater detail about working at night.
- Relieve traffic controllers from traffic controller duties at least every 2 hours for at least 15 minutes.
- If cone tapers are used, position the traffic controller 6 m in front of the taper on the left-hand shoulder or edge of the road and facing approaching traffic.
- Place four traffic cones spaced 4 m apart, on the centre-line 6 m in front of the traffic controller position.
- If there is a queue, traffic controllers can move to the driver's side when safe to do so to remain visible to all road users.
- Under no circumstances are traffic controllers to stand or operate unprotected in a lane carrying traffic.
- Traffic controllers are to only communicate with a road user once the vehicle has stopped and is safe to do so.
- A single traffic controller must never control more than one lane of traffic or more than one approach when using a STOP/SLOW bat or a PTCD. This may only be varied where a traffic controller is using a PTCD which is capable of alternative arrangements and both the device and manner of operation is approved by the department. See Section 2.6.2 of AGTTM Part 7 for additional requirements and considerations when designing and using PTCDs for traffic control.
- Provide a traffic controller at intersections to guide road users entering from a side road.
- Some intersections require three or more traffic controllers. Where multiple traffic controllers are used they are required to:
    1. ensure that road users are not seeing conflicting message from other traffic controllers at different locations of the worksite
    2. be in continuous radio contact with each other when they are not visible to each other.

For detailed guidance on traffic controllers see AGTTM Part 7.

5.10.4 Combining portable traffic control devices

New

The Transport and Main Roads Technical Specification, MRTS267 *Boom Barriers for Roadworks*, permits the use of a boom barrier with a Type-1 or Type-2 PTSS and details the technical requirements for the device.

The combination of a Type-1 or Type-2 PTSS with a boom may be used at any location a PTSS may be used but may be suited to locations where compliance with the PTSS has been poor.

The following operational requirements apply when using a combination PTSS with boom:

- The primary device will be the PTSS, with the boom providing a visual support to the operation of the signals.
- The STOP sign must not be installed on the boom.
- As the signals will be the primary device, the advance warning signs will include the signals (symbolic) panel and not the boom barrier (symbolic).
- The STOP HERE ON RED SIGNAL sign must be installed 6 m in advance of the PTSS.
- The boom must be located such that in the raised position it is slightly behind the signals (no greater than 1 m behind) and must not interfere with the visibility of the signals. Traffic stopped at the boom must still be able to see and respond to the PTSS.
- The boom may be either freestanding or attached to the same support structure as the PTSS.
- The boom in the raised position must be at least 800 mm clear of the traffic lane.
- When in the lowered position, the boom must block the approaching traffic lane and extend to a point not further than 600 mm from the road centre line.
- Four cones should be placed on the centre line spaced 4 m apart starting from the STOP HERE ON RED SIGNAL sign and extending toward approaching traffic.

The advance warning area requirements, including estimating the end of queue position and calculation requirements in Section 4.8 (including subsections), also apply to the traffic control method used in this section.

Only combination PTSS and boom barriers included on the current list of approved products in the Transport and Main Roads ITS Approved Products document must be used at roadwork sites in Queensland.

5.11 Advance warning area

Addition

The advance warning area requirements, including estimating the end of queue position and calculation requirements in Section 4.8 (including subsections) also apply to the traffic control methods used in this section.

Difference

Replace:

> For divided multilane roads, advance warning signs are usually only required in one direction unless the work is carried out in the median.

with

> For divided roads, advance warning signs are usually only required in one direction, unless the work is carried out in the median.

Difference

Replace:

- Worker (symbolic) in advance of the worksite (if road workers or plant are visible to traffic)

with:

- Worker (symbolic) – see AS 1742.3.

Difference

Replace:

- space successive signs (after the primary sign) at a distance equal to those specified in Table 2.2

with:

- space successive signs at a distance equal to those specified in Table 2.2 and see Section 2.5.3.

5.12 Termination area

Addition

Refer to the Queensland MUTCD Part 3 Clause 4.6.11 for various requirements for advance warning signs (ROADWORK AHEAD, ROADWORK ON SIDE ROAD) and termination signs (END ROADWORK) for works on a ‘No Through Road’ or ‘Cul-de-sac’ or located partly or wholly on through or side roads.

Addition

Consider the following when designing the termination area:

1. The intent is that the END ROADWORK sign is located beyond the last point on the road effected or impacted by the works (which would include the traffic control station, speed limit reductions and traffic queues for the opposing direction of traffic).
2. Often the END ROADWORK sign is located opposite the ROADWORK AHEAD sign for the opposing direction of traffic, but this is not a requirement.
3. Offset speed zones need to be considered when co-locating the END ROADWORK sign with a speed limit reinstatement sign and this often (but not always) dictates where the END ROADWORK sign is located.
4. While a buffer speed zone may create an offset speed zone, the 60 km/h zone prior to a traffic control station is a required speed zone and speed zones for both directions of travel in this area must be the same.
5. For a site with traffic control, the final speed reinstatement heading away from the work area generally occurs opposite the 60 km/h Speed Restriction sign in advance of the Primary PTS sign and this is where the END ROADWRK sign may be co-located with the final speed reinstatement sign.
6. In the case of a road with a permanent 60 km/h speed limit in place, as the traffic control station and subsequent traffic queue and warning signs would be considered to have an effect or impact on the road, the END ROADWORK sign should still be located opposite the initial Speed Restriction sign (in this case a repeater 60 km/h Speed Restriction sign) located prior to the Primary PTS sign.

5.13 Vulnerable Road Users

5.13.1 Pedestrians

Difference

Replace the two dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). If these widths are not practicable, alternative routes must be provided with a firm smooth surface and no trip hazards in the following order of preference:
  1. on the side of a road reserve away from traffic
  2. between the work area and road but not in a traffic lane
  3. onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane
  4. across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).
  5. a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.
- Appropriate surfacing must be provided for prams, strollers, wheelchairs or any other mobility aids.

With these three dot points:

- Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). At localised constraints an absolute minimum width of 1m may be provided, where opposing pedestrian are able to recognise the short constraint and pass at wider areas. If these widths are not practicable, alternative routes should be provided in the following order of preference:

1. on the side of a road reserve away from traffic
2. between the work area and road but not in a traffic lane
3. onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane
4. across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).
5. a traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.

- Appropriate surfacing with a firm even surface and no trip hazards should be provided to footpaths or alternative routes to cater for prams, strollers, wheelchairs or any other mobility aids. Surfacing should be no worse than the existing path and should be suitable for use in all weather conditions and should not deteriorate or form ruts or be damaged from repeated use.
- The length of time a temporary footpath is required, would also need to be considered when selecting an alternative route and surface type.

Addition

Where pedestrians with vision impairment are expected or existing signs with tactile elements are provided at a location or in an area, refer to AS1428.4.2 for consideration of tactile requirements for any temporary signs required.

5.13.2 Cyclists

Difference

Replace the sub-dot point:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant stopping distance in advance of the closed section of the bicycle lane.

with:

- additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant distance (see Section 2.5.3) from the start of the closed section of the bicycle lane. Sufficient sight distance as per Table 2.3 must be provided for drivers and riders to sight the temporary signage on approach.

6 Design for additional issues

6.5 Shoulder as a Temporary Lane

Difference

Replace:

- moving road users to the shoulder may bring roadside hazards within the clear zone.

with:

- moving road users to the shoulder may bring roadside hazards within the clear zone. See Section 6.11 for details on the clear zone.

6.6 Pavement markings

Addition

The methods specified in Transport and Main Roads Technical Specification MRTS45 *Road Surface Delineation* must be used to cover or remove line marking / pavement marking. In addition to the methods in MRTS45, the use of proprietary line marking tape may be used to either temporarily cover or install temporary line marking / pavement marking.

6.7 Night works

Difference

Replace the entire Section 6.7 with the following:

> Undertaking work at night is effective in reducing delays to traffic because traffic volumes are normally lower than during most daylight hours; however, work at night requires careful additional planning and inspection.
>
> The following are in addition to the requirements in AS 1742.3 Clause 4.2.4 *Night conditions*.

When planning night-time traffic management measures, the following considerations apply:

1. many visual cues available during the day are not available to drivers at night
2. TMA(s) may be used to increase visibility and provide forward warning to motorists as well as protecting workers
3. noise limitations
4. traffic demand will be lower, so traffic speed may increase
5. road user and road worker visibility are reduced

6. road user and road worker awareness may be reduced due to fatigue, increasing the risk of error
7. the potential for road users to be affected by drugs or alcohol is increased
8. traffic management methods may need to be different
9. the installation of delineation devices and any impact of reflective components from multiple rows of delineation
10. flashing lamps may be used for delineation if the flashing lamps are smart devices (see AS 1742.3 Clause 4.13)
11. flashing lamps may be used to warn pedestrians and cyclists of upcoming hazards they need to be aware of, and
12. flashing lamps may be used to alert drivers

When planning night-time traffic management measures, the following requirements and recommendations apply:

13. Personal Protective Equipment (PPE) with increased night-time visibility (for example, reflective tape) must be used
14. additional lighting for the roadworks site, including areas where workers or plant are operating, traffic controller locations, pedestrian paths / areas, bicycle lanes and sections of the travel path or Temporary Traffic Management (TTM) devices which require illumination, must be provided; mount lighting so that it directs light downward and do not use light sources that produce glare that could become disabling or confusing for road users
15. traffic controllers must use illuminated wands in addition to the STOP / SLOW bat.
16. flashing lamps should be used as part of the advance warning for roadworks sites on roads with an approach speed limit of 80 km/h or greater and be located on the initial advance warning signs such as the ROADWORK X km / X m AHEAD, ROADWORK AHEAD, BRIDGEWORK AHEAD, or DETOUR AHEAD signs as applicable: flashing lamps may be used on any other signs as determined by the traffic management designer and a risk assessment – when used, flashing lamps are to be in pairs on both top corners of the sign at least 500 mm clear of traffic lanes on Category 1 roads and at least 1250 mm clear of traffic lanes on Category 2 and 3 roads, and ensure that whatever is holding the lamp is collapsible on impact
17. flashing lamps must not take away the purpose of advance warning signs

18. a variable message sign should be used to increase visibility of warning
19. flashing lamps should be placed on barricades or fences where there is a hazard on a footpath or bicycle lane, and
20. flashing lamps should be placed on the corner of barricades or fences to ensure the roadworks site or hazard is clearly visible.

The level of lighting required must be sufficient in the work area for workers to safely conduct their duties and complete their tasks. For the traffic control station, the level of lighting must be sufficient to allow the traffic controller to see where they are going (use an escape path if required), avoid slips, trips and falls, and also illuminate the traffic control station sufficiently that it is obvious to approaching traffic.

For pedestrian areas, the level of lighting must be sufficient to illuminate any pedestrian paths so that pedestrians may avoid slips, trips and falls, and to also create a feeling of safety (personal safety) for pedestrians, with no dark (unlit or poorly lit) areas. Off- and on-road cycle paths must also be sufficiently illuminated to ensure cyclists can safely navigate and see any surface irregularities.

6.8 Excavations

Difference

Replace the following:

> Where an excavation is readily accessible to any person and likely to collect or retain water of such a depth as to constitute a danger, or is left unattended, it is required that:
>
> - the excavation is fully covered, fenced or backfilled when the worksite is unattended.
> - the excavation is covered, fenced or filled when work is completed.
> - only approved skid resistant plating must be used to cover an excavation.
> - fully enclose the excavation. Do not use barricades, traffic cones or plastic mesh fencing that is not supported by a solid frame as they are not sufficient to adequately protect road users from excavations.

with:

Where an excavation is readily accessible to vulnerable road users and is either likely to collect or retain water of such a depth as to constitute a danger, or is left unattended, it must be protected by one of the following:

6 the excavation is fully covered, fenced or backfilled when the worksite is unattended.

7 the excavation is covered, fenced or filled when the worksite is attended and works on the excavation are not active.

8 fully enclose the excavation.

Do not use barricades, traffic cones or plastic mesh fencing that is not supported by a solid frame as they are not sufficient to adequately protect vulnerable road users from excavations.

When excavations are covered with road plating, only skid resistant road plating must be used.

Difference

Replace the lead-in sentence for the list:

Table 6.1 shows clearance between an excavation, or any ground level hazard associated with the excavation, and the nearest traffic lane, relative to speed and traffic volume. The delineation method is also shown as one of three options. These are as follows:

with:

Table 6.1 defines the recommended protection method for an excavation based on clearance between an excavation or any ground level hazard associated with the excavation, and the nearest traffic lane, relative to speed and traffic volume, and depth of excavation. The protection method which should be implemented is one of the three following options:

Addition

Designers should also consider the stability of the excavation face and material (angle of repose and zone of influence) for the depth of excavation. In addition, the proximity of load-bearing sources on the high side of excavations to items such as safety barriers, delineation, traffic, works vehicles or stored material may affect the stability of the excavation face. The presence of shoring as well as the strength of the shoring will also have an impact on the loads and proximity of loads to the excavated face. Greater clearances between the excavation and these items may be required.

Where safety barriers are provided to protect excavations, the requirements of Section 5.3.1 must also be considered. When excavations are located behind safety barriers, the designer is to consider the deflection zone behind the barrier which must be clear of personnel, equipment, and materials at all times. The designer must also take into account the location and clearance to the excavated face and ensure the safety barrier, if impacted by traffic, does not encroach into the excavation or move close enough to the excavation such that the weight of the safety barrier system affects the stability of the excavated face.

Designers are only responsible for considering the temporary traffic management impact of excavations, such as proximity of temporary traffic management workers, traffic (road users including vulnerable road users) or other temporary traffic management measures (such as safety barriers) to ensure they do not negatively impact the excavated face or are negatively impacted by the excavation.

Designers are not trained to calculate or determine elements related to excavations such as the angle of repose, zone of influence, shoring requirements, or the stability of an excavated face. It is the responsibility of others (such as the Person Conducting a Business or Undertaking (PCBU)) to supply the designer with the necessary input data for excavations, so that the designer may then adequately design the temporary traffic management measures for sites with excavations.

6.8.1 Lateral excavations

New

A site-specific risk assessment (Section 2.2) must be completed for all instances involving lateral excavations in proximity to traffic. Where there is a need to delineate or protect traffic, the requirements in Section 6.8 for excavations may be considered or modified as required.

6.10 Placement and operation of Portable Variable Message Sign (VMS)

Addition

Insert lead in sentence to this Section:

Please note Portable Variable Message Signs (VMS) referred to in this section, are referred to as Temporary Variable Message Signs (TVMS) in Queensland.

6.10.1 Principles and guidance

Addition

The requirements for TVMSs apply to both trailer-mounted VMS and vehicle-mounted VMS.

The need for a TVMS will be determined by either technical documents (including the Queensland *Manual of Uniform Traffic Control Devices* (Queensland MUTCD), or *Queensland Guide to Temporary Traffic Management* (QGTTM) or contract documents such as Technical Specification MRTS02 *Provision for traffic*) or by a risk assessment.

The longitudinal and lateral placement requirements for a TVMS are subject to the requirements of Sections 6.10.3 and 6.10.4 and a risk assessment.

6.10.2 Aiming distance

Difference

Replace:

> Wherever practicable, a VMS should be aimed to the centre of the nearest lane for approaching traffic, using the desirable aiming distance specified in Table 6.1 below, and as shown in Figure 6.2. If the VMS displays two screens, more distance is required for motorists to read and comprehend the sign.

with:

> Wherever practicable, a VMS should be aimed to the centre of the nearest lane for approaching traffic, using the desirable aiming distance specified in Table 6.2 below, and as shown in Figure 6.1. If the VMS displays two screens, more distance is required for motorists to read and comprehend the sign.

Addition

The TVMS aiming distances (Table 6.2) and angle to approaching vehicles (Figure 6.1) are recommendations which may need to be modified based on the design and visibility characteristics of the message on the TVMS, and the road geometry. See Section 6.10.7 for the drive through requirements.

6.10.4 Lateral placement

Difference

Replace item (c):

> Where practicable, the portable VMS should be positioned behind semi-rigid or rigid protection (e.g. guard fence, wire rope).

with:

> Where practicable, the TVMS should be positioned behind semi-rigid or rigid protection (for example, guard fence, wire rope) and outside the appropriate deflection zone clearance area behind the barrier.

Addition

Add after the dot points:

The TVMS should be located in accordance with the provisions of this section (items (a) to (e), as applicable) or outside the applicable clear zone (see Section 6.11).

The further a TVMS can be located from the traffic lane (lateral clearance, see Figure 6.12), the less likely it will be impacted by errant vehicles; however, to perform satisfactorily, the TVMS must be located where drivers will easily see and read the messages displayed.

6.10.6 Other location requirements

New

Subject to the requirements in the previous section, the TVMS should be located so that it does not interfere with, or block visibility to, other official roadside signs and roadside advertising devices. It may be necessary to also consider impact for drivers approaching the rear of the TVMS.

Sight lines for road users from adjoining roads or driveways should also be considered.

Where the TVMS is to be located near a roadside advertising billboard, the requirements of the *Roadside Advertising Manual*, Clause 2.1.2.2 and Appendix C should be considered, with the TVMS desirably being located outside any restriction areas for the billboard if practicable.

6.10.7 Drive through requirements

New

Legibility and readability of the TVMS must be confirmed using a 'drive through' of the site. If there are two alternating screens on the TVMS, ensure both screens can be easily read while travelling at the speed limit on approach. It may be necessary to adjust the aiming distance, angle of the TVMS to traffic and screen timing to ensure the message(s) on the TVMS are both legible and readable.

6.10.8 TVMS specification

New

TVMSs must be manufactured in accordance with the Transport and Main Roads Technical Specification MRTS262 *Temporary Variable Message Signs*.

6.10.9 Display of messages on TVMSs

New

The use of the TVMS to display roadside signs or text messages must be in accordance with the Queensland MUTCD Clauses 4.22 *Variable message signs used at roadworks* and 4.24 *Display of electronic signs*.

6.11 Clear Zone

New

This section on clear zones will apply when clear zones are identified as being required elsewhere in the TTM technical documents. Typically, clear zones will apply to stored plant or materials (see Section 7.4.1), and when traffic is laterally shifted onto a different alignment (see Section 6.5).

The identification of hazards is generally based on the use of the clear zone concept to define the area beside the road that is of most interest in terms of roadside safety.

A clear zone is the area adjacent to the traffic lane that should be kept free from features that would be potentially hazardous to errant vehicles. The clear zone is a compromise between the recovery area for every errant vehicle (allowing a driver to stop safely or safely regain control of a vehicle that has left the road), the cost of providing that area and the probability of an errant vehicle encountering a hazard. The clear zone should be kept free of non-frangible hazards where economically and environmentally possible. Alternatively, hazards within the clear zone should be treated to make them safe or be shielded by a safety barrier.

The clear zone commences from the closest edge of the through travelled way for the direction of travel and is the total roadside border area available for safe use by errant vehicles. This clear zone area may consist of a shoulder, a verge, and a recoverable slope.

While the clear zone concept draws on a wide range of experience and research, engineering judgement should also be applied in the determination of lateral position requirements. The guidance here should be regarded as a supplement to aid in exercising this judgement and not as a substitute for it.

Roadside hazards should be located outside the clear zone or be protected by a suitable and approved safety barrier. If a safety barrier is installed no portion of the hazard is to be located within the deflection limits of the safety barrier.

Hazards that lie outside the clear zone will generally not require assessment because the locations are a sufficient distance from the edge of the road that the probability of a collision is relatively small.

6.11.1 Factors influencing the clear zone

New

The variables that influence the determination of the clear zone include:

- traffic volumes
- vehicle speeds
- road curvature (geometry)
- roadside slopes (cut and fill), and
- presence of physical devices that limit or prevent errant vehicle incursion (e.g. safety barrier or steep cutting).

It is important to consider both objects (hazards) and terrain that may cause vehicles to rollover.

6.11.2 Determination of clear zone requirements

New

The influence of the above-mentioned variables on the width of the clear zone is determined by assessing the roadside environment in accordance with the following:

- The clear zone is measured by extending a horizontal plane from the edge of the travelled way to the edge of the hazard, as indicated in Figure 6.11.2(a).

- Either Table 6.11.2 or Figure 6.11.2(b) may be used to establish the required clear zone distance for hazards located on straight roads, given a designated speed environment, AADT and the slope of the roadside.
- A combination of Table 6.11.2 or Figure 6.11.2(b), and Figure 6.11.2(c) is used when the device is located on a curve in the road alignment. The horizontal curve multiplier established from Figure 6.11.2(c) recognises the higher risk and larger encroachment distance for errant vehicles on the outside of curved road alignments. See Figure 6.11.2(e) for transition requirements between the curve clear zone and the straight clear zone.
- A combination of Table 6.11.2 or Figure 6.11.2(b), and Figure 6.11.2(d) is used to assess the influence of cut height and slope on traversability when the device is located on a cut slope. Non-traversable cuttings typically prevent vehicles from travelling further away from the travel path and reduce the clear zone distance for other hazards beyond the cutting (as vehicles will not reach these hazards), However the non-traversable cutting may also be considered a hazard.
- Consideration of fill slopes. It may be necessary to approximate the contributory influence of each slope element in a roadside environment, noting that non-recoverable fill slopes are disregarded in the calculation of a clear zone. Typically, a vehicle will travel to the bottom of any non-recoverable fill slope and an errant vehicle recovery area beyond the toe of the non-recoverable fill slope will be required. See Figure 6.11.2(f) for fill slope examples.

Figure 6.11.2(a) – Clear zone base parameters on a straight road

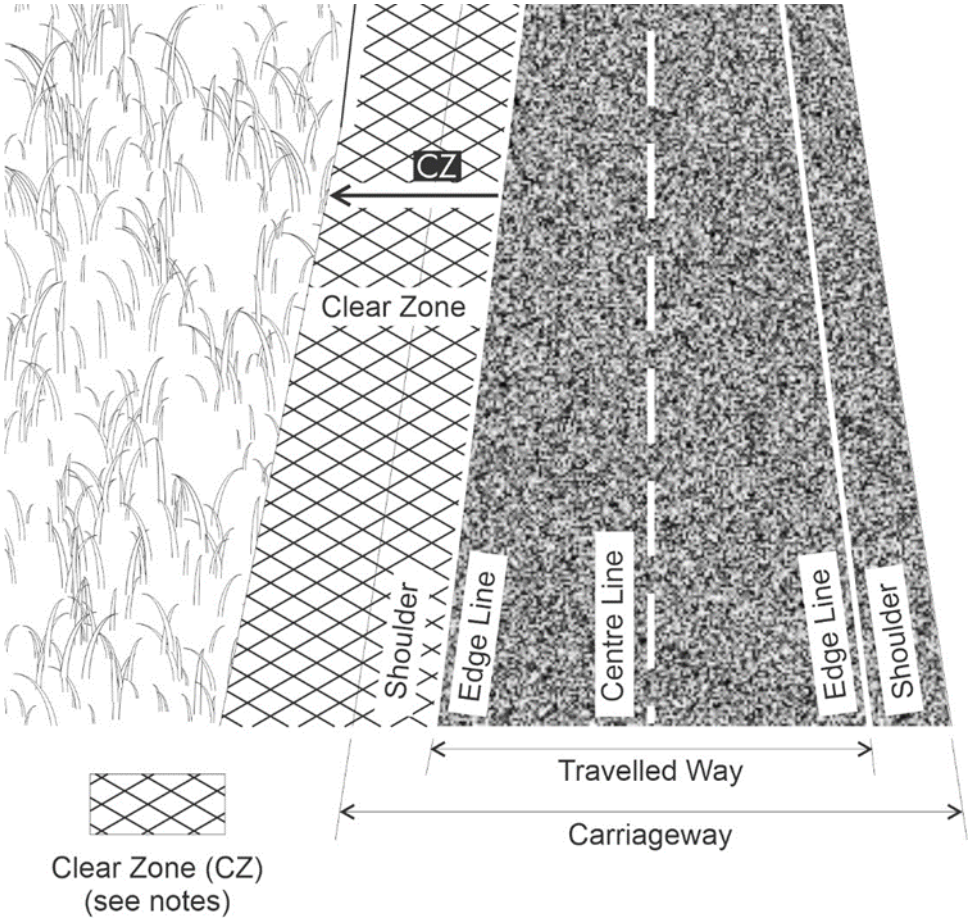


Table 6.11.2 – Clear zone distances from edge of through travelled way (extracted from Table 3.1 (AASHTO 2011))

Design speed (km/h)	Design ADT	Clear zone width (m)					
		Fill batter			Cut batter		
		6:1 to flat	4:1 to 5:1	3:1 and steeper[2]	6:1 to flat	4:1 to 5:1	3:1 and steeper[2]
≤ 60	< 750	3.0	3.0	[2]	3.0	3.0	3.0
	750 – 1500	3.5	4.5	[2]	3.5	3.5	3.5
	1501 – 6000	4.5	5.0	[2]	4.5	4.5	4.5
	> 6000	5.0	5.5	[2]	5.0	5.0	5.0
70 – 80	< 750	3.5	4.5	[2]	3.5	3.0	3.0
	750 – 1500	5.0	6.0	[2]	5.0	4.5	3.5
	1501 – 6000	5.5	8.0	[2]	5.5	5.0	4.5
	> 6000	6.5	8.5	[2]	6.5	6.0	5.0
90	< 750	4.5	5.5	[2]	3.5	3.5	3.0
	750 – 1500	5.5	7.5	[2]	5.5	5.0	3.5
	1501 – 6000	6.5	9.0	[2]	6.5	5.5	5.0
	> 6000	7.5	10.0[1]	[2]	7.5	6.5	5.5
100	< 750	5.5	7.5	[2]	5.0	4.5	3.5
	750 – 1500	7.5	10.0[1]	[2]	6.5	5.5	4.5
	1501 – 6000	9.0	12.0[1]	[2]	8.0	6.5	5.5
	> 6000	10.0[1]	13.5[1]	[2]	8.5	8.0	6.5
110	< 750	6.0	8.0	[2]	5.0	5.0	3.5
	750 – 1500	8.0	11.0[1]	[2]	6.5	6.0	5.0
	1501 – 6000	10.0[1]	13.0[1]	[2]	8.5	7.5	6.0
	> 6000	10.5[1]	14.0[1]	[2]	9.0	9.0	7.5

Notes:

1. Where a site-specific investigation indicates a high probability of continuing crashes, or such occurrences are indicated by crash history, the designer may provide clear zone distances greater than the clear zone shown in this Table.
2. Since recovery is less likely on the unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of the slope. Determination of the recovery area at the toe of the slope should take into consideration available road reservation, environmental concerns, economic factors, safety needs, and crash histories. Also, the distance between the edge of the travelled lane and the beginning of the 3:1 slope should influence the recovery area provided at the toe of the slope. While the application may be limited by several factors, the fill slope parameters which may enter into determining a maximum desirable recovery area are illustrated in Figure 6.11.2(f).
3. The design ADT in the table is the average daily traffic volume in both directions and in all lanes, other than for divided roads where it is the total traffic in all lanes in one direction.
4. Where the road is curved the values in Table 6.11.2 should be adjusted by the curve correction factors in Figure 6.11.2(c).
5. Design speeds used in Table 6.11.2 are to be determined in accordance with Section 2.5.9 *Speed*.

Figure 6.11.2(b) – Clear zone distance curves for straight roads (extracted from Figure 3.1 (AASHTO 1996))

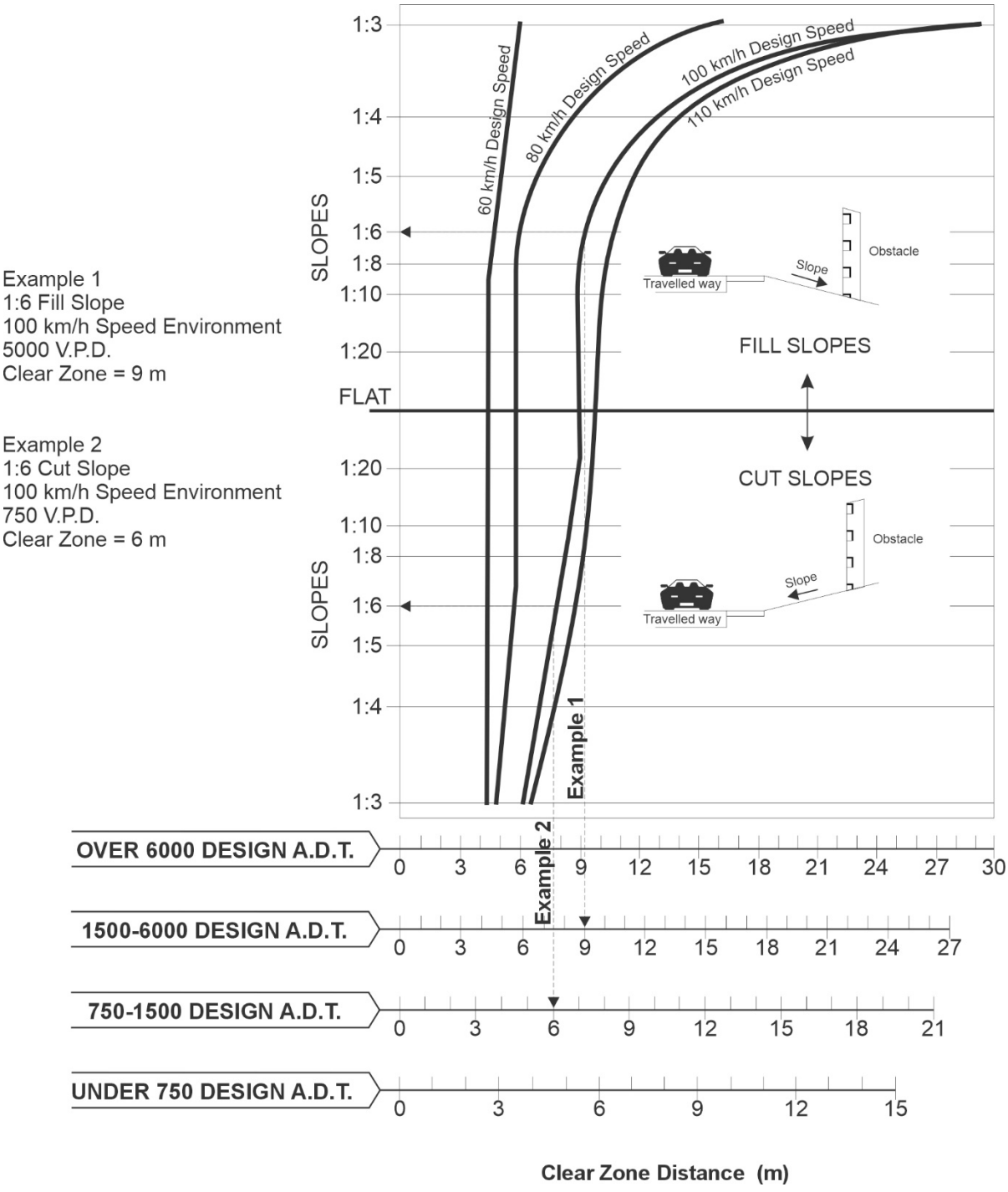
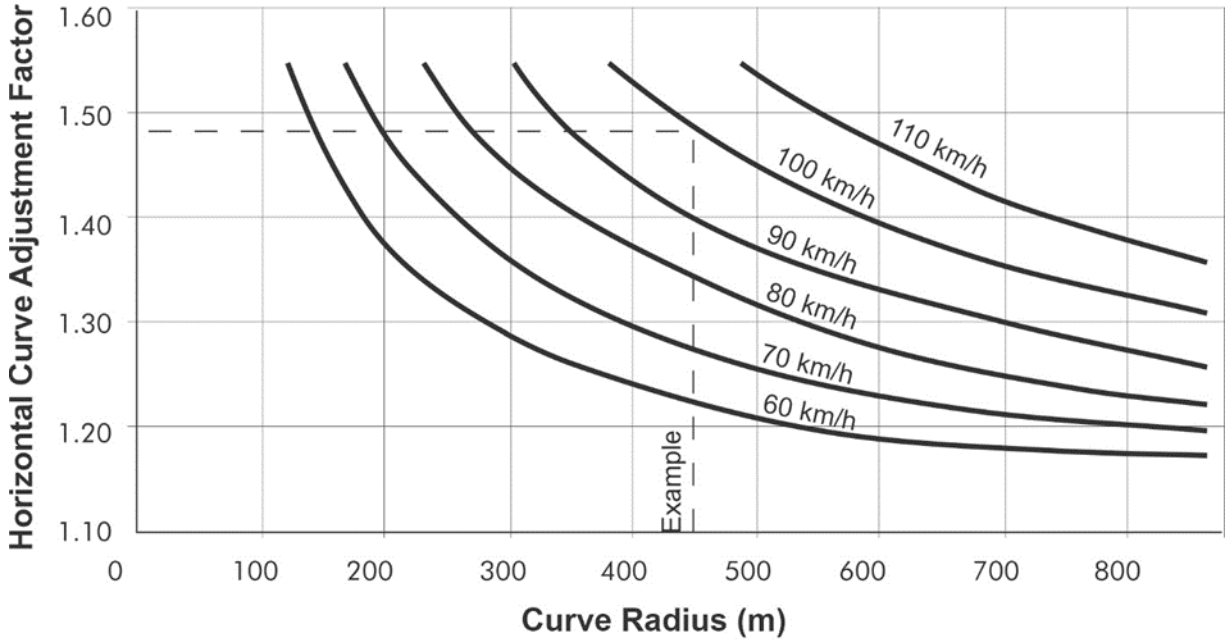
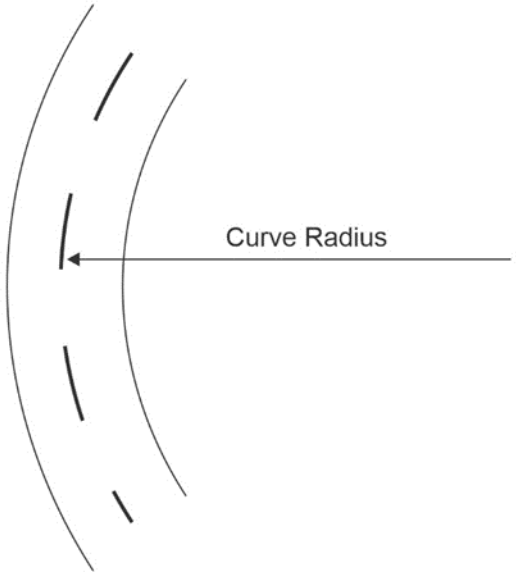


Figure 6.11.2(c) – Clear zone horizontal curve adjustment factors





Example

450m Radius Curve
100 km/h Speed Enviroment

CZ required on flat straight road = 9m (Figure B1)
Curve Adjustment Factor (Figure B2 above) = 1.48

Required Clear Zone = 9 x 1.48 = 13.5m

Figure 6.11.2(d) – Influence of cut height and slope on traversability

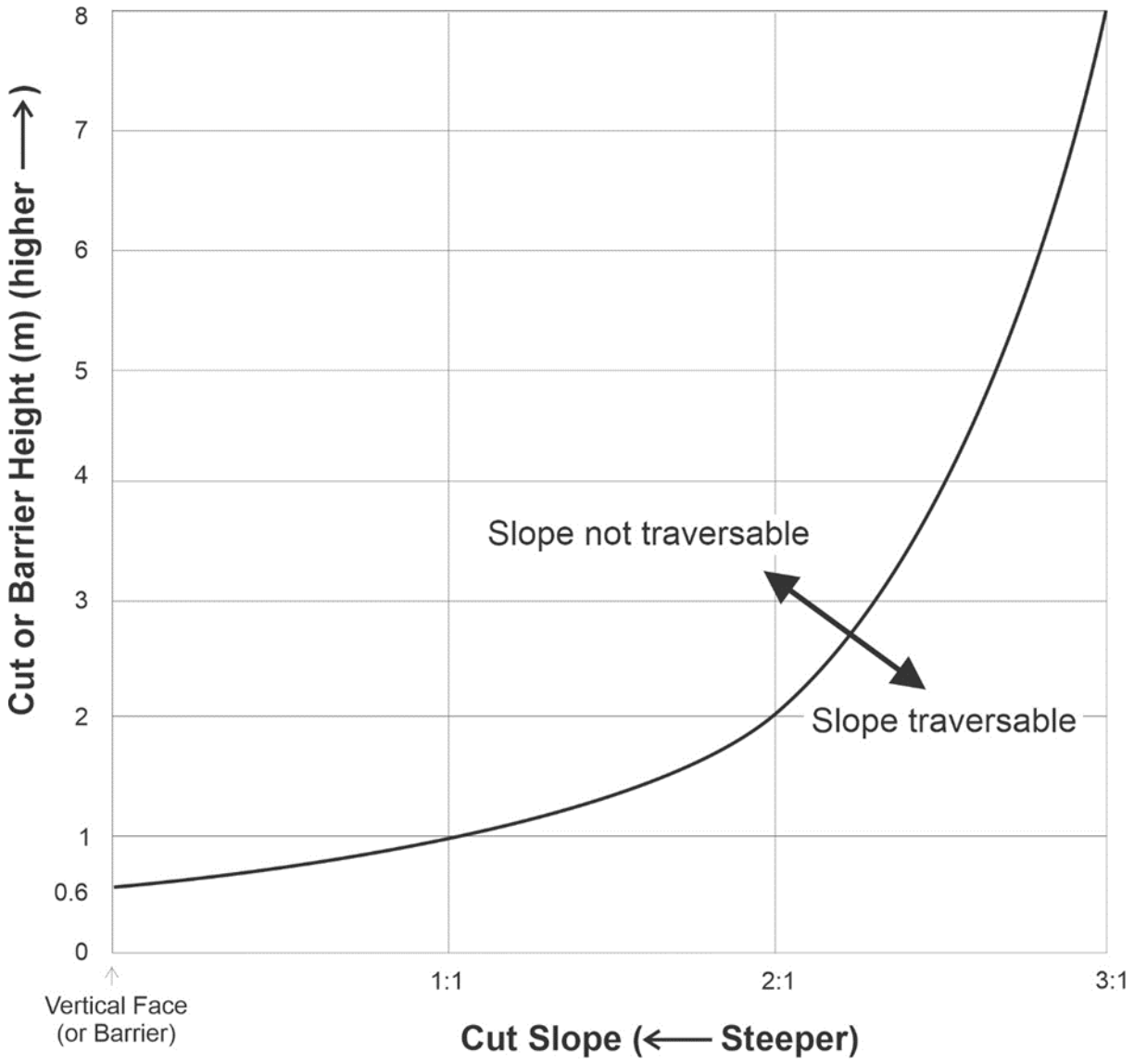


Figure 6.11.2(e) – Influence of curve adjustment factors and transitions (source: Austroads Guide to Road Design Part 6 (2010))

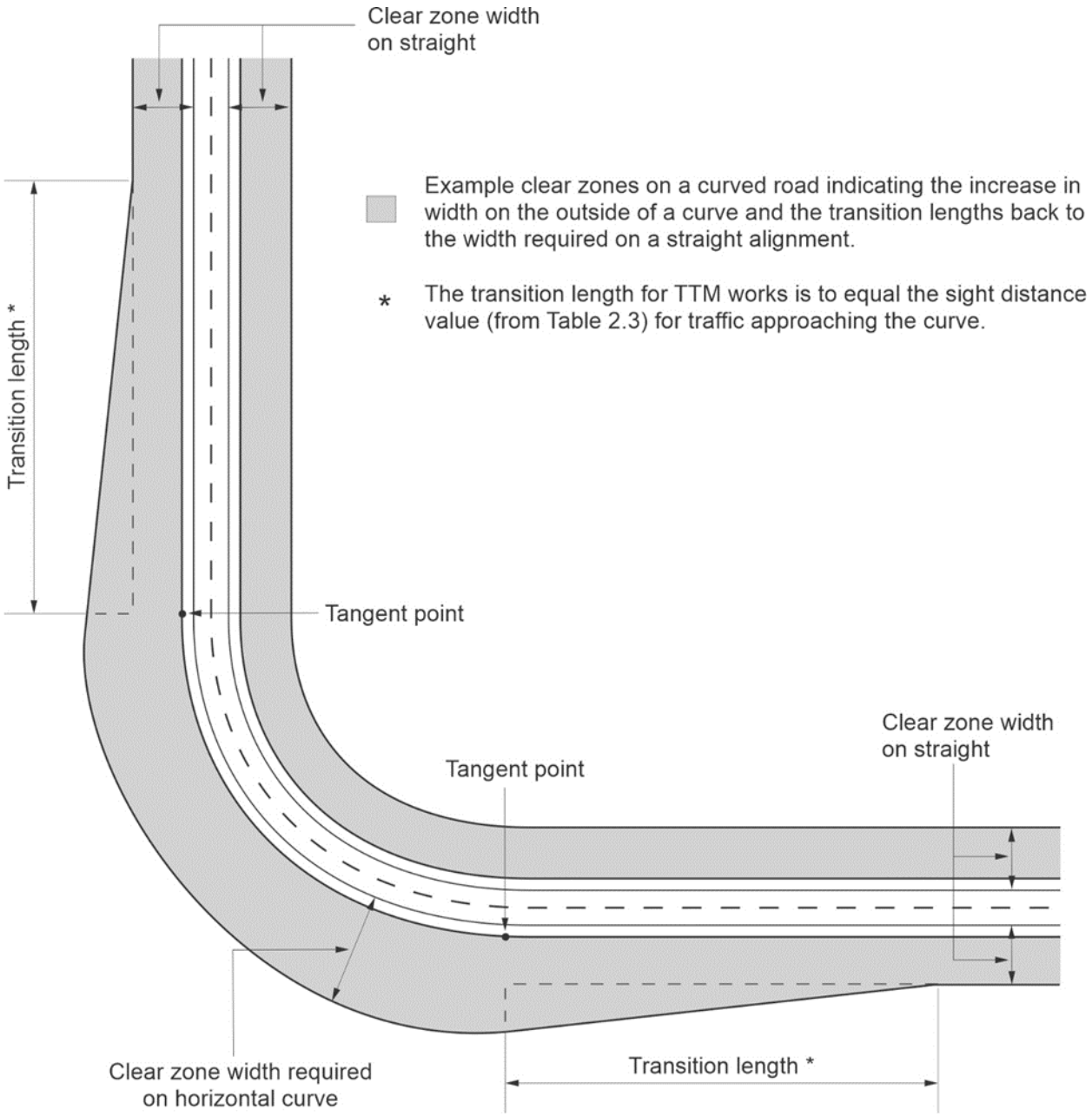
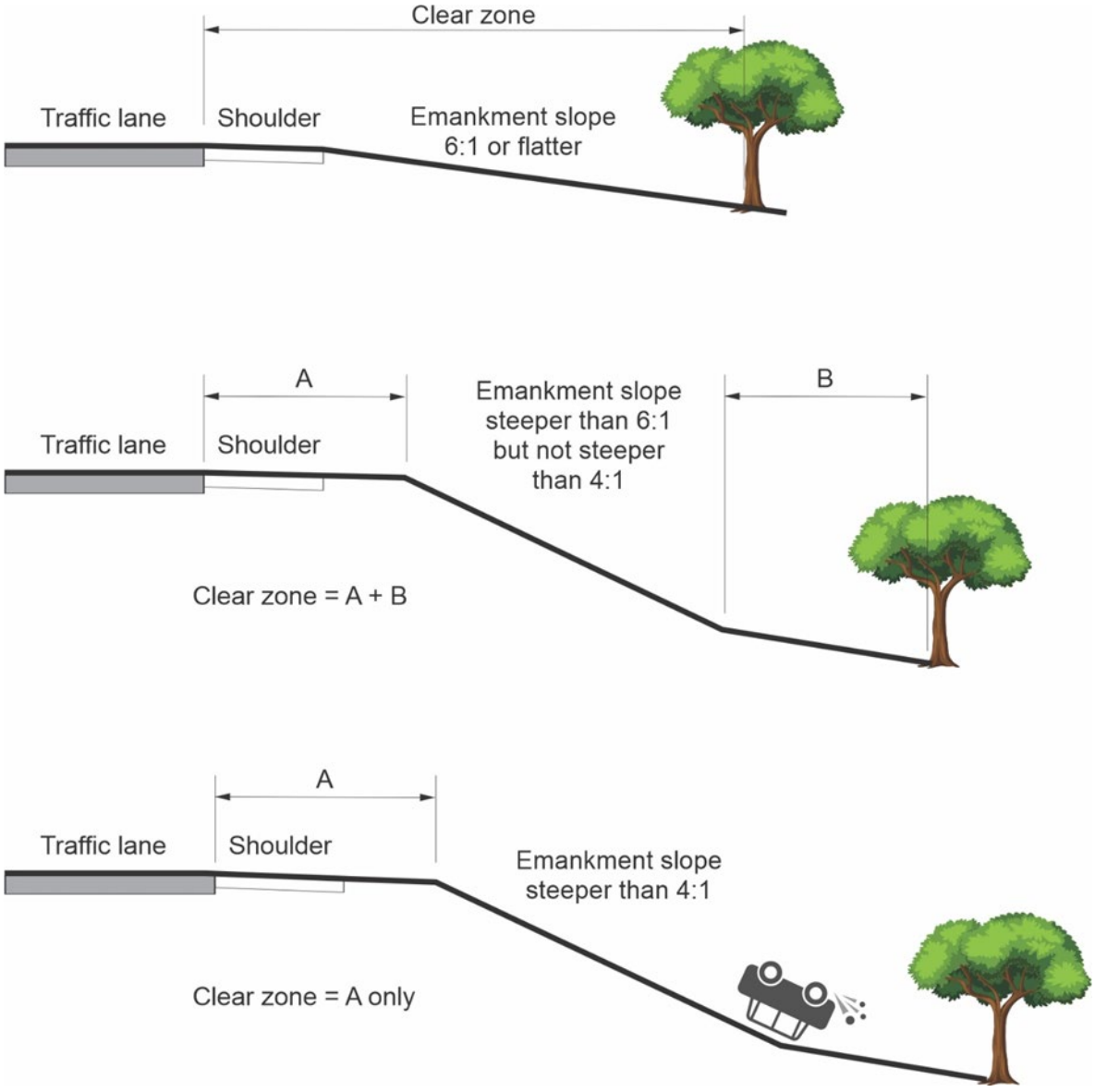


Figure 6.11.2(f) – Examples illustrating clear zones on fill slopes (source: Austroads Guide to Road Design Part 6)



6.12 Star pickets

New

Star pickets have many uses at roadwork sites, including:

- as supports for temporary fencing and flagging
- as supports for delineators (reflectors), and
- as sign supports or to stabilise temporary signs.

It is important that careful consideration is given to how star pickets are used because if used incorrectly they may present a safety hazard.

The use of star pickets must be supported by a risk assessment.

In addition, the use of star pickets is subject to the following:

- Star pickets must not be used within 1 m of the edge of the traffic lane on roads with speed limits of 80 km/h or more.
- Star pickets should not be used within 1 m of the edge of the traffic lane on roads with speed limits of less than 80 km/h.
- Star pickets must be fitted with end caps to reduce the potential of piercing injuries.
- Star pickets must be inspected regularly as per the inspection requirements for temporary traffic management devices, and if they are bent or damaged, they must be replaced or repaired immediately.
- Star pickets must be installed vertically, as installing them at an angle may result in a spearing hazard.
- Star pickets are generally black but may be any colour.
- The presence of underground services must be checked before installing star pickets.
- Star pickets must not be used to support standard signposts by placing a post over the top of an installed star picket.
- Star pickets should be delineated when they are installed within 3 m of traffic, pedestrian or cyclist paths.

7 How to apply the Traffic Guidance Scheme

7.3 Installation

Difference

Replace:

> When designing a TGS, the designer must consider and document the process for installing traffic control devices.

with:

> When designing a TGS, the designer must consider and document the process and order for installing traffic control devices.

7.4 Removal

Difference

Replace:

> As per the installation, the designer should stipulate the process and order of removal of the traffic control devices in the TGS.

with:

> As per the installation, the designer must consider and document the process and order of removal of the traffic control devices in the TGS.

7.4.1 Redundant devices

Difference

Replace:

- The equipment is stored at least 6 m clear from traffic.

with:

- The equipment is stored outside the clear zone (see Section 6.11) and when located within nine metres of the edge of a traffic lane must be delineated, unless located behind a safety barrier.

Appendix A: Temporarily closing or restricting access to roads

A.1 General

New

This Appendix will outline the options available for temporarily closing or restricting access to roads. The available options will vary based on the road owner (state-controlled or other road owner including local government).

In most cases the need to temporarily close or restrict access to roads will be in response to natural disasters such as flooding, bushfire and other hazardous events, however the same approach may be taken when closing or restricting access to roads for planned road works.

A.2 Closing or restricting access on a state-controlled road only

New

A state-controlled road may be temporarily closed or have access restricted as per the provisions of the *Transport Infrastructure Act 1994* (TIA) Section 46, Temporary restrictions on use of state-controlled roads (SCR). A restricted road use notice (RRUN) is used to advise the road user or other persons of how the SCR is restricted and the penalty for driving past the RRUN. The TIA provisions are enforceable under the Act and only apply to state-controlled roads.

The signs in Figures A.2.1, A.2.2 and A.2.3 below are RRUN examples of the multi-message sign arrangements conforming to the requirements of the TIA and the MUTCD. The combination of the black on white messages in the top two panels that include the condition of the closure or restriction and state the penalty – are required for enforcement. They can either be in the one sign or as a multi-message arrangement with the DUE TO FLOODING black on yellow message and the LOCAL ACCESS PERMITS EXCEPTED black on white message being complementary to the enforcement sign but are not required for enforcement.

Barrier boards are required each side of a road closed arrangement (see Figure A.2.2) to completely block access to the roadway at the site of any road closure.

It is important where access to a road is restricted that the start and end points of the restriction are identified by RRUN. The end of the road restriction is also identified by a RRUN which terminates the restriction (see Figure A.2.3). The end of a temporary road closure is not required as the road would be closed for traffic trying to access at the opposite end by a RRUN facing them.

Written approval can be provided by the department to allow a road user to drive past a RRUN for a single, multi-trip or for those performing roles such as transport inspectors. Application (in the form of an approval to drive past a RRUN) is typically made to the Transport and Main Roads' district office and is considered by authorised officers, with the outcome provided to the applicant as soon as practical. Where an outcome is approved certain conditions may be applied, including an assumption of risk by the applicant. Signs at temporary restrictions may indicate LOCAL ACCESS PERMITS EXCEPTED which refers to those that have been issued with an approval to drive past a restricted road use notice. However, where the approval has been issued and the signage does not include such statement, it does not preclude the road user from relying on the approval.

Figure A.2.1 – Example sign arrangements for closing a road

Figure A.2.2 – Example arrangement for closing a road

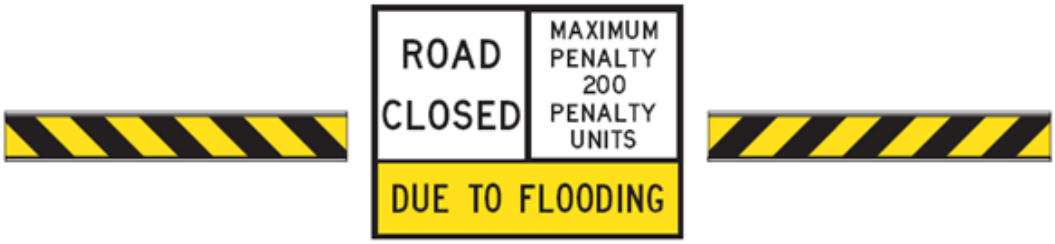
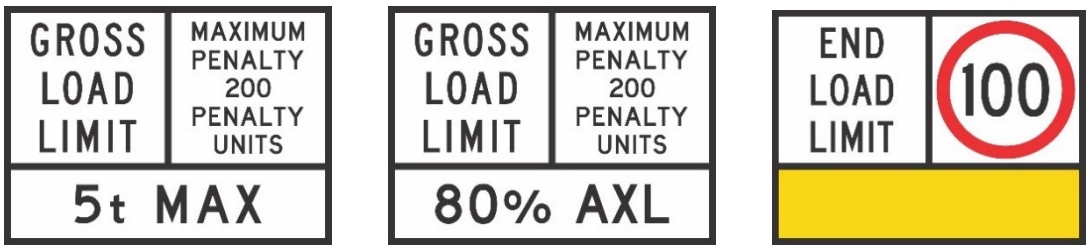


Figure A.2.3 – Example sign arrangements for restricting access to a road and ending the restriction



A.3 Closing a road

New

Section A.2 is specific to state-controlled roads only, however there are a few signing options for the temporary closure of any road (including a state-controlled road). A key difference in the signing options is whether and how the temporary road closure is to be enforced.

In practice, while the ROAD CLOSED message may be enforced using the contravention of an official traffic sign as an offence provision in Section 74 of the *Transport Operations (Road Use Management) Act 1995*, this is a complicated process with a court appearance as a requirement and is not the preferred method of enforcement of a ROAD CLOSED message.

The preferred method of enforcing a ROAD CLOSED message is to install a NO ENTRY regulatory sign with this arrangement and enforce the NO ENTRY sign in accordance with the provisions of Section 100 of the *Transport Operations (Road Use Management—Road Rules) Regulation 2009*.

A NO ENTRY sign is enforceable without the need for other supporting signage when closing a road, however the supporting signs should be used wherever possible.

A range of exceptions apply for a road user to drive past a NO ENTRY SIGN and typically are reserved for drivers of police vehicles and drivers of emergency vehicles or transport inspectors (inspecting the road for damage). Other exemptions for a road user to drive past a NO ENTRY SIGN may be applied through the inclusion of an EXCEPTED message on a sign with the NO ENTRY sign.

Figure A.3.1 provides example road closed multi-message arrangements with the DUE TO FLOODING black on yellow message and the LOCAL ACCESS PERMITS EXCEPTED black on white message being complementary to the enforcement sign but are not required for enforcement.

Barrier boards are required each side of a road closed arrangement (see Figure A.3.3) to completely block access to the roadway at the site of any road closure.

Figure A.3.1 – Example sign arrangements for closing a road

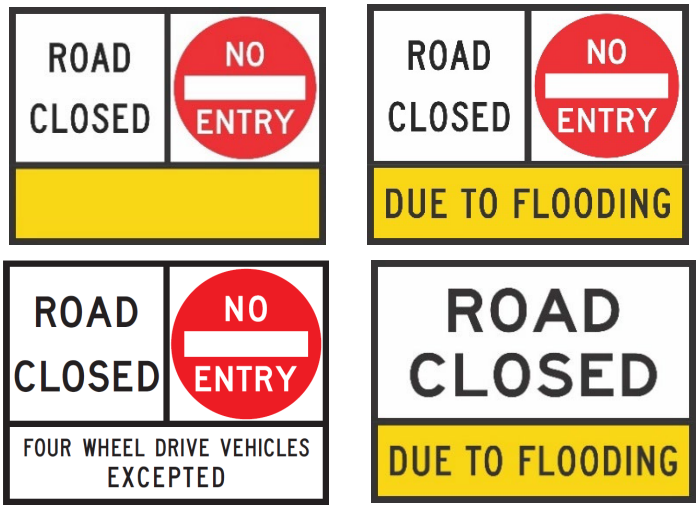


Figure A.3.2 – Example electronic VMS sign arrangements for closing a road

Figure A.3.3 – Example arrangement for closing a road

A.4 Restricting access

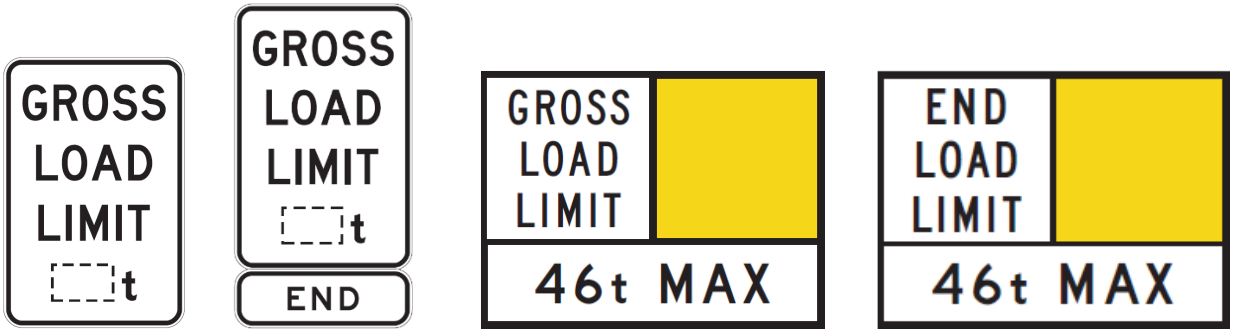
New

Section A.2 is specific to restricting access to a state-controlled road only, however there are standard signs and multi-message panels that may be used to restrict access to any road (including a state-controlled road).

Standard signs may be used to place a permanent or temporary restriction on a road, including a load limit, bridge load limit, height limit or length limit on vehicles using a road. Refer to the Queensland MUTCD Part 2 Section 4 for options.

As an example, the standard GROSS LOAD LIMIT (R6-4) sign may be used to apply a weight limitation on any road. It is important where access to a road is restricted that the start and end points of the restriction are identified. In association with using the R6-4 sign at the start of where the weight limit applies, an END (R7-4) plate is used with the R6-4 sign to indicate where the weight limitation ends. The same arrangements are possible in a multi-message sign, see Figure A.4.1.

Figure A.4.1 – Example signs for restricting access on a road



A.5 Warning of a road closure ahead

New

Advanced warning of a road closure ahead should be provided. Warning signs (see Figure A.5.1 and A.5.2) may be installed at the start of the road section and may be some distance from actual closure point. They should be installed at decision points, where areas exist to turn around the longest vehicles using that stretch of road or where alternative routes are available.

Special arrangements for local traffic to access their properties may need to be considered and the signs adjusted accordingly. Where local traffic is provided access, the ROAD CLOSED signs should be located where the road is closed to all traffic and the ROAD CLOSED AHEAD sign used at the point where only locals should be permitted to travel past.

Where speed limits on approach to a road closure are greater than 60km/h, a 60km/h temporary speed limit must be implemented 300 to 500m in advance of the closure point.

A PREPARE TO STOP message may be used 300 to 500m in advance of the closure point.

Figure A.5.1 – Example sign arrangements for advance warning of a road closure

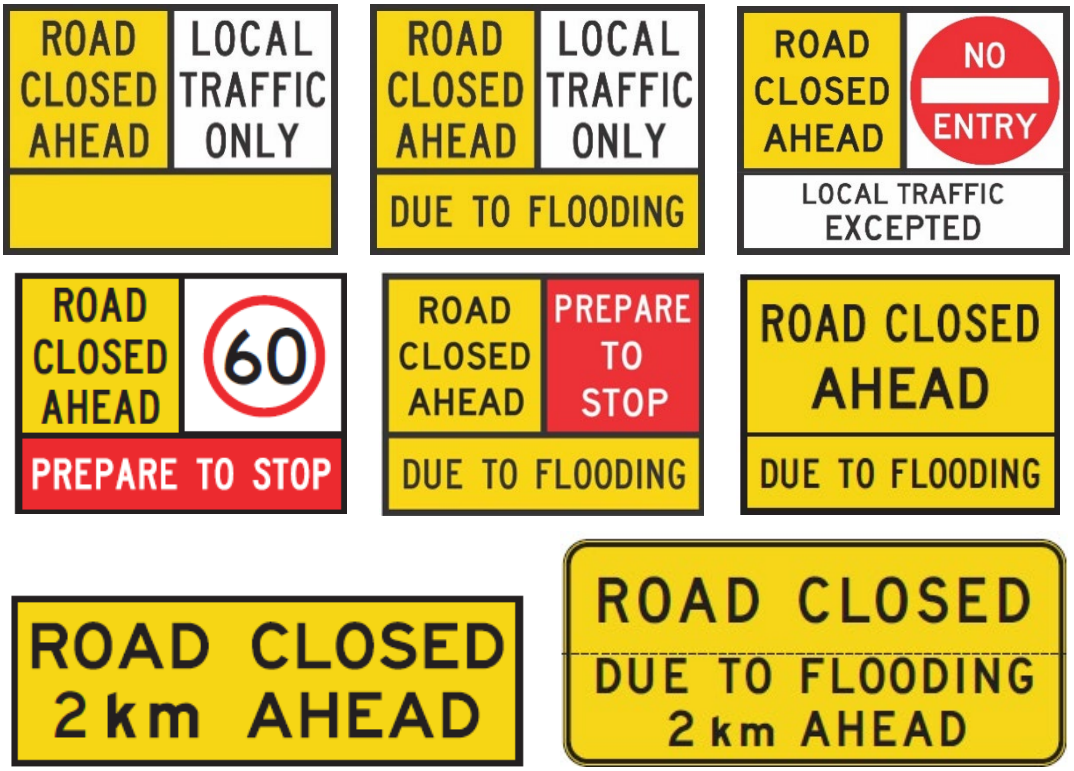


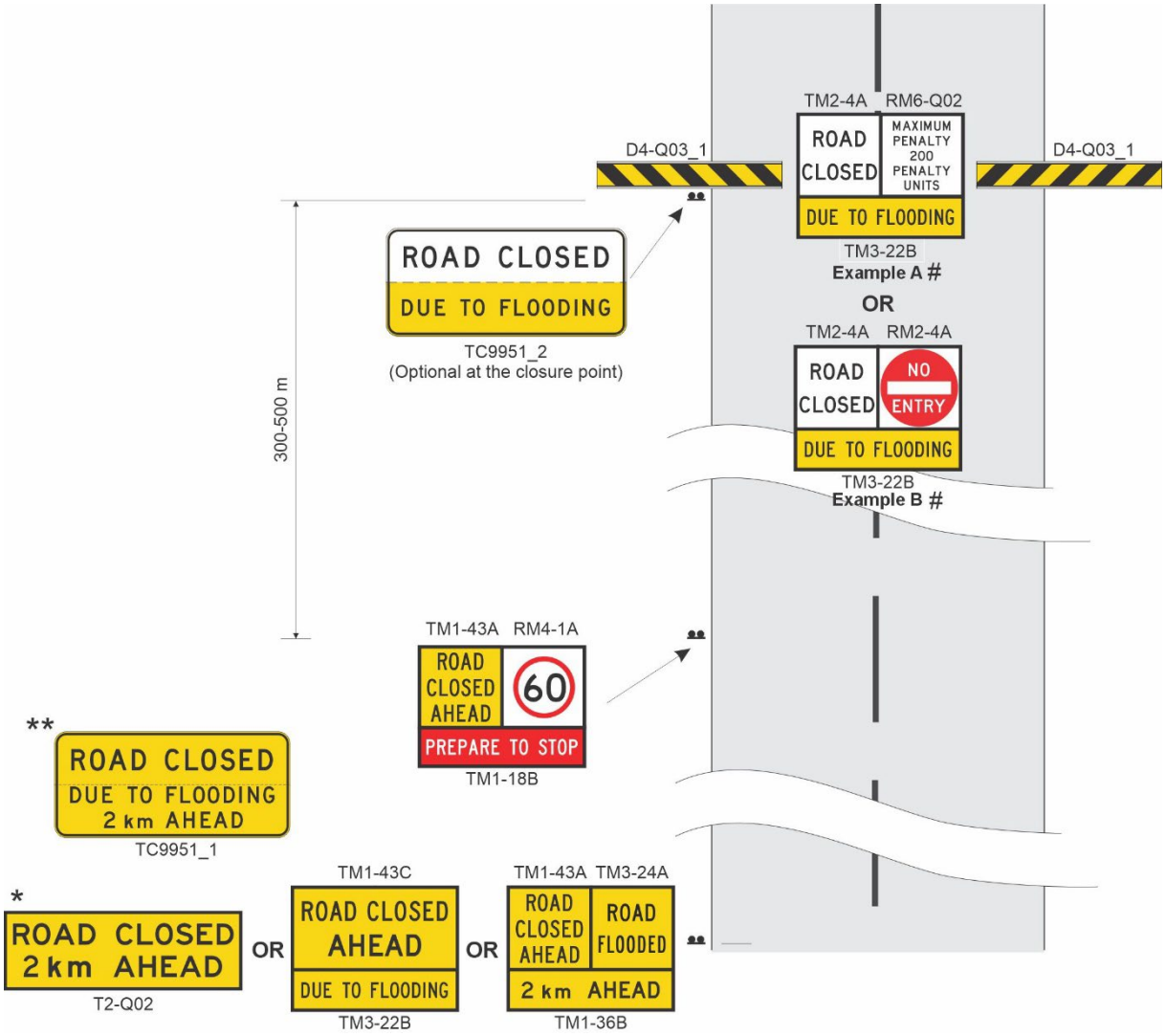
Figure A.5.2 – Example electronic sign arrangements for advance warning of a road closure

A.6 Example layouts

New

The following figures show some example sign arrangement options available for temporarily closing or restricting access to roads. These are examples only and many other sign combinations, arrangements and layouts are possible and will depend on the site-specific circumstances.

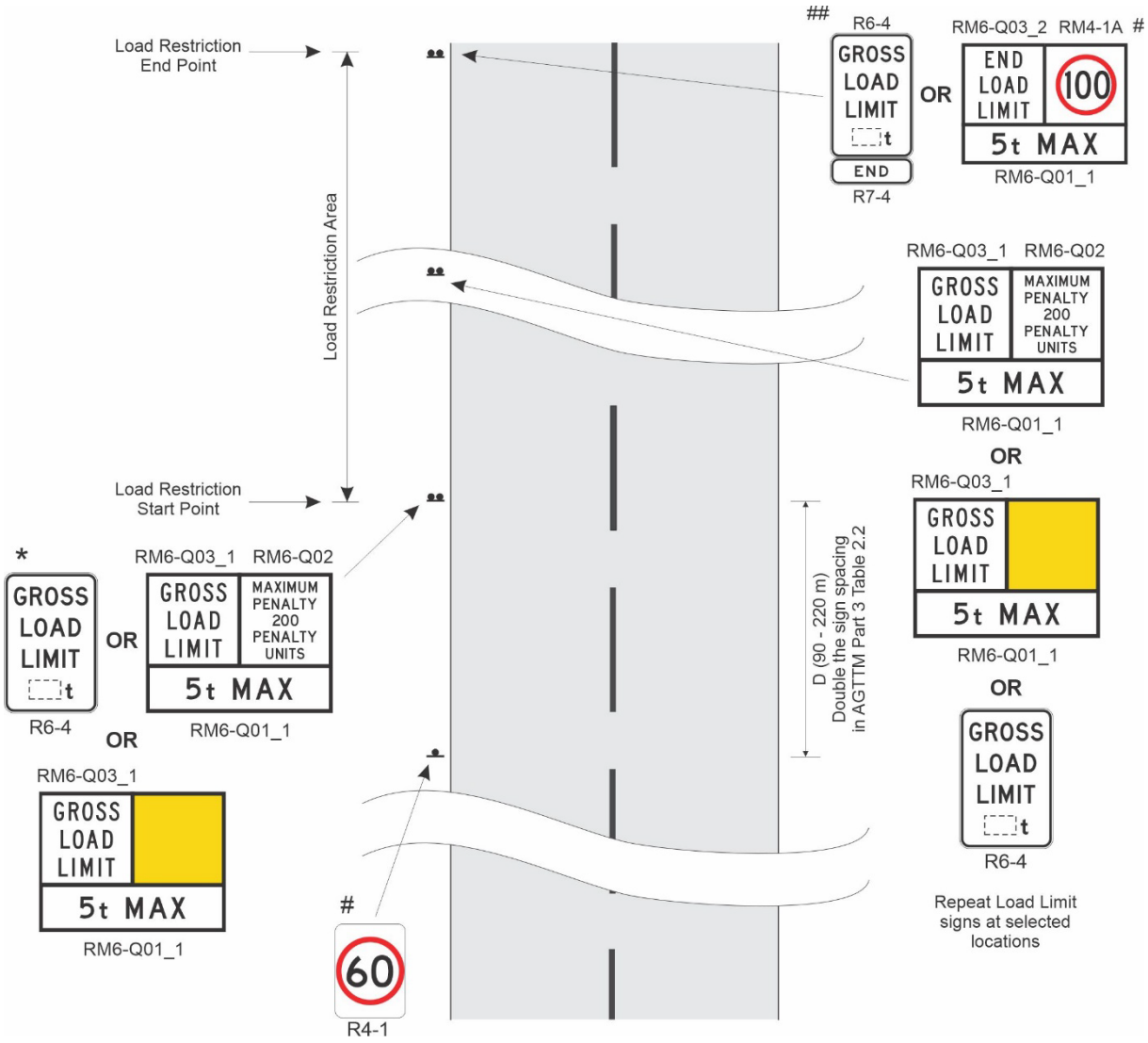
Figure A.6.1 – Example sign layout for closing a road due to flooding



Notes:

1. * May be used if there is a requirement to give more advanced warning.
2. ** TC9951 hinged, permanent sign may be used in known flood locations to provide advance warning.
3. # Examples A or B may be used to close a road; however, Example A can only be used on a state-controlled road.
4. Signs may be installed in advance of the road closure to provide advance warning (1 or 2 km as shown) or may be installed some distance in advance of the closure where an alternative route may be taken.
5. Regional staff should liaise with Transport Enforcement Officers and Queensland Police Service on sign locations prior to installation.
6. Advance signs may be installed at the start of the road section and may be some distance from actual closure point. They should be installed at decision points, where areas exist to turn around the longest vehicles using that stretch of road or alternative routes are available. As an example, refer to page 3 for details.

Figure A.6.2 – Example sign layout for restricting access on a road (weight limit)



Notes:

1. Example of a temporary sign arrangement for a 5 tonne maximum limit. For other load limits refer RM6-Q01.

2. * Either of these signs shall be located at the actual point road restrictions are to apply. MMS arrangement shown may only be used on a state-controlled road.

3. Advance signs may be installed at decision points, where areas exist to turn around the longest vehicles using that stretch of road or alternative routes are available. As an example, refer to Figure A.6.3.

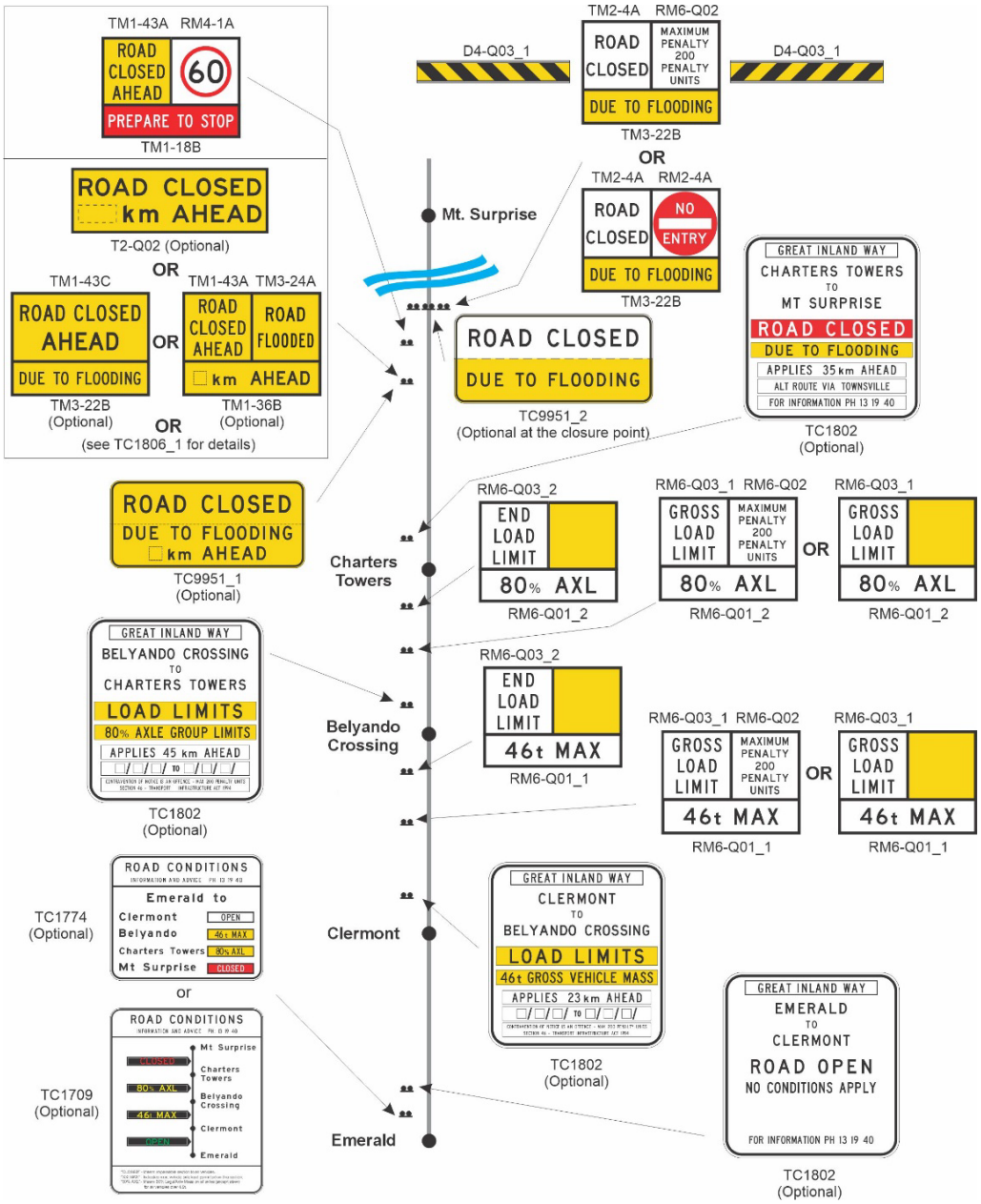
4. # If the speed limit reduction is required in conjunction with a GROSS LOAD LIMIT sign, install R4-1 in advance of the load limit sign. Repeat R4-1 signs over the length of the reduction as required.

5. ## The load restriction area must be terminated with a GROSS LOAD LIMIT sign (R6-4) showing the appropriate weight, combined with an END sign (R7-4) or the multi message frame as shown.

6. Regional staff should liaise with Transport Enforcement Officers and Queensland Police Service on sign locations prior to installation.

7. Load Limit signs should also be installed on the approach to all intersecting roads.

Figure A.6.3 – Example sign layout for a typical route with various restrictions and a closure due to fooding



Notes:

1. Sign TC1802 is not enforceable but may be used as an advance sign indicating a road restriction ahead.
2. The actual point of the closure or restriction must also be signed, and it is this signage that enables enforcement to occur.
3. TC1774 or TC1709 or similar route signs are not enforceable and are advisory traveller information signs used to indicate road restrictions on various sections of the route ahead.
4. Unless signs are combined with a regulatory sign or meet the requirements of the TIA legislation, they are not enforceable.
5. Signs that still meet the requirements of the TIA legislation but provide greater detail may still be used provided any and all the extra detail sections on the sign are completed, accurate and include the penalty requirements.

Figure A.6.4 – Example sign layout for closing a side road due to flooding while allowing locals to access properties .