Queensland Guide to Traffic Management

Part 9: Transport Control Systems – Strategies and Operations (2020)

November 2024

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Feedback

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About this document

Austroads' *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* is concerned with the day-to-day operations that support the provision of road services to road network users. It introduces the concept of traffic operations as underpinning road user services, covers the major types of services provided and outlines the role of intelligent transport systems (ITS) in delivering these services.

Part 9 provides guidance on the configuration and operation of systems, both ITS and manual, supporting traffic operations including network monitoring systems, incident management, traffic signal systems, congestion management, freeway / motorway management systems and traveller information systems.

How to use this document

The Department of Transport and Main Roads has agreed to adopt the standards published in Austroads *Guides* as part of national harmonisation. The department seeks to avoid duplicating information addressed in national guidance and has developed documents instead that provide Queensland-specific advice while following the structure established in Austroads *Guides*.

Queensland-specific advice includes practices which vary from national practice because of local environmental conditions (such as geography, soil types, climate); different funding practices; local research; local legislation requirements; and to expand instruction on particular issues.

As such, this Part of the *Queensland Guide to Traffic Management* (QGTM) takes precedence over the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* except where the Austroads *Guide* is accepted without changes.

This Part is designed to be read and applied together with Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations*. Readers must have access to the Austroads *Guide* to understand its application in Queensland.

This document:

- sets out how the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* applies in Queensland
- has precedence over the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* when applied in Queensland
- has the same section numbering and headings as the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations*.

The following table summarises the relationship between the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* and this document:

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

Definitions

The following general amended definitions apply when reading the Queensland *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations*.

Term	Definition
AGTM Part 9	Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations*, as amended by this document; for example, a reference to AGTM Part 9 means the reader must refer to the Austroads *Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations*, and the *Queensland Guide to Traffic Management* Part 9: *Transport Control Systems – Strategies and Operations* (QGTM Part 9). Throughout AGTM Part 9, references are made to other Parts of the AGTM (for example, when reading AGTM Part 9, the reader may be referred to AGTM Part 3 for further information.) In such cases, the reader must refer to the equivalent Part within the *Queensland Guide to Traffic Management* first. Check the applicability of the equivalent QGTM Part before referring to the referenced AGTM Part. Similarly, references may be made to other Austroads Guides (for example, when reading AGTM Part 9, the reader may be referred to the *Guide to Road Safety* Part 3: *Safe Speed)*. In such cases, the reader must refer to the equivalent Queensland Guide first, where such exists. Check the applicability of the equivalent Queensland Guide before referring to the referenced Austroads Guide Part.
TRUM	The *Traffic and Road Use Management Manual* preceded this Part of the *Queensland Guide to Traffic Management* and was withdrawn on publication of the corresponding QGTM Part.
Managed motorway	The managed motorway is one that has the necessary infrastructure and ITS which enable upstream demand and operations to be managed to meet downstream capacity; the managed motorway standard allows the road operator to dynamically manage operations to minimise congestion due to flow breakdown
MRTS	(Transport and) Main Roads Technical Specification
MUTCD	Queensland *Manual of Uniform Traffic Control Devices*

Term	Definition
Official traffic sign	An official traffic sign is a traffic control device in relation to which the methods, standards and procedures are prescribed in the Queensland *Manual of Uniform Traffic Control Devices* (MUTCD) or are approved by the Director-General, Transport and Main Roads. TORUM states that an official sign is: *…a sign, marking, light or device placed or installed to regulate, warn, or guide traffic…*
QLD*Traffic* website and 13 19 40 phone service	QLD*Traffic*.qld.gov.au (QLD*Traffic* website) and 13 19 40 phone service provide accurate, timely and relevant traffic and road condition information to help all motorists make informed travel decisions, reduce the disruption caused by incidents and minimise the effects of congestion.
Road	As defined by Schedule 4, TORUM, a road: *a) includes a bus way under the TIA, and* *b) includes an area that is:* *i. open to or used by the public and is developed for, or has as one of its uses, the driving or riding of motor vehicles, whether on payment of a fee or otherwise, or* *ii. dedicated to public use as a road, but* *c) does not include an area declared under a regulation not to be a road.* Example of an area that is a road – a bridge, cattle grid, culvert, ferry, ford, railway crossing, shopping centre car park, tunnel, or viaduct.
RPEQ	Registered Professional Engineer Queensland
State-controlled road (SCR)	A road or land, or part of a road or land, declared under s24 of the TIA to be a state-controlled road (SCR)
TIA	*Transport Infrastructure Act 1994*
TORUM	*Transport Operations (Road Use Management) Act 1995*
Traffic control signs	Traffic control signs are a collection of non-standard traffic control (TC) signs that have been 'officially approved' (as required by TORUM). These signs have been designed for specialised use and designed to comply with the standards set out in the Queensland MUTCD.

References

QGTM section	Reference
All	www.legislation.qld.gov.au
Help phone (roadside emergency phones)	• Engineering Policy EP149 *Managed Motorways* • IMD Advice Note 3: *New help phones on current and future projects* (email timanagement@tmr.qld.gov.au to request a copy of this internal document). • MRTS221 *Help Phones* • *Road Planning and Design Manual* (RPDM) 2nd edition – Volume 3 Part 6B *Roadside Environment* – Volume 5 *Intelligent Transport Systems*

Relationship table

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	1.2	Intended user	Accepted	
	1.3	How to use	Accepted	
	1.4	Scope	Accepted	
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	3.9	Enforcement	Accepted	
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Section		Title	Queensland application	Dept contact*
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	7.4.2	*C-ITS communication mediums*	Accepted	
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	7.5.1	*Road user information*	Accepted	
	7.5.2	*Information delivery channels*	Accepted	
	7.5.3	*Pre-trip information*	Accepted	
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	8.1.2	*Elements of a smart motorway*	Accepted	
	8.1.3	*Hierarchy of sub-systems*	Accepted	
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	8.5.2	*LUMS applications*	Accepted	
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	8.5.4	*LUMS fundamental and policy rules*	Accepted	

Section		Title	Queensland application	Dept contact*
	8.6	Use of emergency lane in smart motorway	Accepted	
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	8.7.2	*Management of exit ramp interfaces*	Accepted	
	8.7.3	*Management of end-of-motorway interfaces*	Accepted	
	8.7.4	*Management of motorway-to-motorway interfaces*	Accepted	
9.	**Performance indicators**		Accepted	
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B	FHWA major event planning checklists		Accepted	
C	Special event planning checklist		Accepted	
D	Road occupancy applications		Accepted	
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	E.3.1	*Description and input data for design 1*	Accepted	
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	E.5.3	*Selection of controller settings*	Accepted	
F	Electrical design of traffic signals			
	F.1	General	Accepted	
	F.2	Installation	Accepted	
	F.3	Cables	Accepted	
	F.4	Vehicle loop detector cables	Accepted	
	F.5	Data link cables	Accepted	

Section		Title	Queensland application	Dept contact*
	F.6	Cable connection design	Accepted	
G	Signal timings			
	G.1	Introduction	Accepted with amendments	ANO
	G.2	Signal timing methods		
	G.2.1	*Green times and cycle time*	Accepted	
	G.2.2	*Maximum tolerable delay*	Accepted	
	G.3	Actuated controller operation	Accepted	
	G.3.1	*Vehicle phase intervals*	Accepted	
	G.3.2	*Pedestrian intervals*	Accepted	
	G.3.3	*Actuated controller settings*	Accepted	
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	G.4.1	*Late start setting*	Accepted	
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	G.4.4	*Gap setting*	Accepted	
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	G.4.6	*Vehicle clearance settings*	Accepted with amendments	ANO
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	G.5.2	*Minimum green setting*	Not accepted	ANO
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	G.5.4	*Pedestrian delay setting*	Accepted	
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	H.5	Distance from signalised crossing	Accepted	
	H.6	Push-button posts	Accepted	
	H.7	Audio-tactile buttons	Accepted	
I	Traffic signal special situations		Accepted	
	I.1	Railway level crossing between paired intersections	Accepted	

Section		Title	Queensland application	Dept contact*
	I.2	Signalised intersection with bus priority	Accepted	
J	Traffic signal pre-commissioning checklist		Accepted	
K	Traffic signal monitoring and evaluation checklist		Accepted	
L	Traffic signal techniques to support network operation planning toolkit		Accepted	
Commentaries				
Commentary 1		Inter-agency coordination for incident management	Accepted	
C1.1		*Multi-agency roles and responsibilities*	Accepted	
C1.2		*Formal agreements*	Accepted	
C1.3		*Multi-agency teams*	Accepted	
C1.4		*Incident command system*	Accepted	
C1.5		*Institutional arrangements: recommended practice*	Accepted	
Commentary 2		Performance of advanced traffic signal control strategies	Accepted	
Commentary 3		Broader transport operations function	Accepted	
Commentary 4		Site management after incident	Accepted	
Commentary 5		Clearance of incidents	Accepted	
Commentary 6		Conflict points of a two-phase signal	Accepted	
Commentary 7		Inductive loop detector	Accepted	
Commentary 8		SCATS degree of saturation	Accepted	
Commentary 9		Advance loop detectors	Accepted	
Commentary 10		Design considerations related to signal coordination	Accepted	
Commentary 11		Timing strategies to improve safety during the clearance phase	Accepted	
Commentary 12		Real-time travel estimation	Accepted	
Commentary 13		Pedestrian protection	Accepted	

Departmental contacts:

- ANO: Active Network Operations, Traffic Engineering Technology & Systems, Engineering and Technology, Transport and Main Roads email ET_TETS_ANO_Allstaff@tmr.qld.gov.au.
- ITS Tech: Intelligent Transport Systems Technologies, Traffic Engineering Technology & Systems, Engineering and Technology, Transport and Main Roads email ET_TETS_TrafficSignalTechnologies@tmr.qld.gov.au.
- MPI: Mobility Policy & Insights, Traffic Engineering Technology & Systems, Engineering and Technology, Transport and Main Roads email TIManagement@tmr.qld.gov.au.
- TEP: Traffic Engineering Practice, Traffic Engineering Technology & Systems, Engineering and Technology, Transport and Main Roads email TrafficEngineering.Support@tmr.qld.gov.au.

Contents

5 Systems and procedures for maintaining road serviceability and safety

5.1 Incident management

Addition

Operational standard for temporary restrictions of state-controlled roads due to wet weather and flooding (includes reopening roads)

Refer for Transport and Main Roads *Operational standard for temporary restrictions of state-controlled roads due to wet weather and flooding (includes reopening roads)*. The operational standard will be renamed to *Operational standard for temporary restrictions on state-controlled roads due to unplanned events* in the near future.

5.1.5 Planning for traffic incident management

Addition

Traffic Incident Management Services (TIMS)

Refer to Transport and Main Roads *Traffic Incident Management Services* manual.

5.1.6 Incident detection and verification

Addition

Help phone (roadside emergency phones)

The planning and operational installation decisions for emergency / help phones should be undertaken in accordance with the following Transport and Main Roads documents:

- *Engineering Policy EP149 Managed Motorways*
- IMD Advice Note 3: *New help phones on current and future projects* (as of November 2018, email timanagement@tmr.qld.gov.au to request a copy of this internal document).

The design and technical specifications of emergency / help phones should be undertaken in accordance with the following Transport and Main Roads documents:

- *Road Planning and Design Manual* (RPDM) 2nd edition Volume 3 Supplement Part 6B *Roadside Environment*
- RPDM 2nd edition Volume 5: *Intelligent Transport Systems*
- MRS221 *Help Phones*, Specification (Measurement)
- MRTS221 *Help Phones*, Technical Specification

5.2 Planned and special event management

Addition

Special events affecting roads in Queensland: A guide to securing approvals

This section is for Event Organisers seeking the approvals required by Queensland legislation to run a special event on or affecting roads. This document should be read together with *Events in Queensland Best practice guidelines for event delivery* in Queensland, published by the Department of the Premier and Cabinet.

By Queensland law, event organisers are required to obtain written approval to conduct a special event from the Queensland Police Service (QPS). The consent of the road owners such as local council or the Department of Transport and Main Roads is also required.

Refer to Transport and Main Roads' *Event Traffic Management Design Guideline* for Queensland-specific advice on managing traffic at special events.

6 Systems and procedures for arterial traffic control – traffic signals

6.5 Movements and phases

6.5.2 Phase intervals

Addition

Pedestrian Countdown Timers

This section defines recommended practice on the application of pedestrian countdown time (PCT) displays in Queensland and supplements guidance contained in the following Austroads publications:

- Austroads *Guide to Traffic Management*
  - Part 6 *Intersections, Interchanges and Crossings Management*
  - Part 9 *Transport Control Systems – Strategies and Operations*, and
  - Part 10 *Transport Control – Types of Devices*.

Background

'Standard' pedestrian signals at traffic signals and pedestrian-actuated crossings provide a short green WALK period for pedestrians to commence crossing, followed by a clearance flashing red DON'T WALK period of sufficient time to allow pedestrians to complete the crossing before a steady red DON'T WALK period and a commencement of a conflicting vehicle green phase. Under this operation, the *Queensland Road Rules* permit pedestrians to commence crossing during the green WALK period only.

While the standard sequence generally serves pedestrians well at most locations, an issue can arise at locations with high pedestrian demand. At these sites, due to high pedestrian volumes, it is common to see pedestrians start to walk and complete the crossing well within the relatively long clearance flashing DON'T WALK period that is required to cater for the less able-bodied pedestrians to complete their crossing.

The PCT display provides information to pedestrians on remaining duration of the pedestrian clearance phase. PCT safety and efficiency relies upon pedestrians being able to judge for themselves how much time they need to complete the crossing if they commence to cross during the PCT sequence. PCTs appear to increase pedestrian amenity. There is currently limited evidence regarding PCT safety benefits.

Applicability

PCTs can only be used where pedestrian clearance times are fixed and are most appropriate at scramble crossings or mid-block crossings. Pedestrian-responsive traffic signals incorporating pedestrian detection technology, also known as Smart Crossings (refer *Smart pedestrian crossings guideline*) are preferred over PCTs due to operational benefits realised for all road users. PCTs are incompatible for use in conjunction with smart pedestrian crossings, as the clearance times vary, based upon pedestrian presence.

To maximise the benefit for pedestrians while providing an appropriate level of safety, the following criteria should be considered to determine whether PCTs are appropriate:

- PCTs should only be installed at crossings where the countdown timer period is greater than six seconds as providing PCTs at locations with short clearance times provides little or no real crossing benefit for pedestrians.
- PCTs are potentially most appropriate in areas with high pedestrian demand: for example, CBD, shopping precincts, public transport hubs.
- In some cases, PCTs can result in increased delays for turning vehicles, as more pedestrians cross during the clearance period. As a result, the impact on efficiency may need to be considered at intersections with high volumes of turning vehicles.
- PCTs should not be used at crossings predominantly used by primary school children – it is considered that some school children may not be sufficiently well-developed to estimate the distance required for them to cross during the PCT or to understand the risk of crossing too late and continuing to walk during the steady red DON'T WALK.

Operational issues

On controller 'start up', the PCT unit needs to learn the applicable clearance time. During the initial cycle, the PCT will show a standard sequence flashing red DON'T WALK (symbol).

As much as possible, PCT displays should be shielded from the view of approaching drivers and unintended pedestrian movements by lantern positioning or by the use of extended length visors.

Installation requirements

PCT displays shall be installed in accordance with requirements set out in the Queensland MUTCD Part 14 *Traffic Signals*.

Where PCT displays are installed, the G9-Q10_2 adhesive label shall be positioned above the top of the pedestrian push-button. This label replaces the CROSS WITH CARE (G9-Q10_1) adhesive label usually installed at signalised crossings.

6.5.3 Phasing design

Addition

Pedestrian protection

Pedestrian protection will be provided at all intersections. The length of the timed protection period shall be as follows:

- pedestrians should be protected for the walk period as a minimum, and
- full protection should be provided in the situations listed following:
  - where indicated in Austroads *Guide to Traffic Management* (restricted sightlines, high speed and two turning lanes)
  - in activity-based places in the movement and place framework (some movement and significant place aspects)
  - at Smart Crossings where carriageway pedestrian detectors have been provided (these ensure pedestrian protection is provided only while pedestrians are on the crossing), and/or
  - in accordance with the requirements of Austroads *Guide to Traffic Management* Part 9 Section 6.5.3.

Addition

Control of right turn movements

There are factors to consider in controlling right-turn movements.

- **Number of lanes**: Bicycle lane shall be counted as a traffic lane when considering the risk factors for filter turns. A right-turning lane from an opposite approach shall be counted as a traffic lane when considering the risk factors for filter turns if it is at all offset to the right of the right-turn lane.
- **Road safety**: Low demand periods are the period when the majority of opposing-turning crashes occur. Consideration for all movements and users of the intersection shall be taken into account.
- **Time of day**: Low demand periods are the period when the majority of opposing-turning crashes occur. Consideration for all movements and users of the intersection shall be taken into account.

The usual method of allowing part-time full control at certain times of the day is to include a data parameter in traffic signal plan data which controls whether the arrow is allowed to drop off or not. In TRAFF controllers, this is usually the Z+ or Z- signal. The default mode of operation for the controller must be full control of the right turn. Filter turns are only permitted when the controller is running a plan with the relevant signal or flag. Where there is concern that a plan which allows right turn movement(s) to filter may be called at a time of day when the right-turn filtering is not appropriate, alternative arrangements, or not using part-time filter control, must be considered.

Addition

Provision of U-turns at traffic signals

U-turns should only be permitted at signalised intersections where:

a) the intersection approach has a raised median

b) the approach has an auxiliary right-turn lane

c) geometry is sufficient to allow the U-turn to be made in one continuous manoeuvre by vehicles of the type likely to turn

d) there is adequate visibility of approaching vehicles

e) there would be no danger to pedestrians

f) there are no more than two lanes of opposing through traffic

g) there is no left-turn green arrow (signal) control in the road to the right

h) a fully-controlled right-turn phase is provided: Items (d) and (f) previously may not be relevant, and/or

i) there is sufficient width for a vehicle to wait to turn clear of through traffic and the lack of an auxiliary right-turn lane would not affect traffic flow and cause delays and crashes.

U-turns should not be provided at signalised intersections where:

a) the intersection is a very high volume intersection

b) the provision of U-turns at the signals alters phasing arrangements at the intersection, adversely affecting good progression along the route

c) their provision would significantly affect safety or traffic operating conditions at the signals (for example, delays)

d) their introduction would cause an unexpected conflict with pedestrians or motor vehicles, for example, with a left-turn green arrow (signal) control in the road to the right

e) the right-turn volume is substantial and U-turn movements represent 65% or more of the total right-turn volume

f) there is adequate opportunity either upstream or downstream of the signals to safely carry out a U-turn at a median opening, and/or

g) right turns have been generally prohibited along the route (for example, due to limited road width) and access is provided by means of alternate ‘loop’ routes instead, unless the intersection is important from a road network perspective and a U-turn can be properly provided.

Refer to the *Road Planning and Design Manual*, Austroads *Guide to Road Design* and the Austroads *Design Vehicles and Turning Path Templates* for geometric design requirements.

U-turns at traffic signals (when permitted by the U-TURN PERMITTED sign R2-15) should only be permitted when a green circle aspect or green signal right turn arrow is displayed.

6.7 Traffic signal controllers

6.7.1 General

Addition

Traffic signal controllers in Queensland

Reference to the Area Traffic Control (ATC) system recognises different systems in operation in Queensland, such as STREAMS or SCATS. As such, any mention of SCATS can be read as either STREAMS or SCATS.

In addition to Appendix F of Part 9 of Austroads *Guide to Traffic Management*, guidance in electrical design is available in the *Traffic and Road Use Management* (TRUM) manual Volume 4 *Intelligent Transport Systems and Electrical Technology* Part 3 *Electrical Design for Roadside Devices*.

Location

Controllers must be located so access can be gained for maintenance purposes. A ground-mounted controller has only one door for access. This type of controller is normally located adjacent to the property boundary, with the door opening towards the footway. The location of the controller is also affected by other conditions. Ideally, the controller should be located so that:

- a continuous 230 V single-phase power supply can be conveniently obtained (some poles cater for roadway lighting or high voltage supply only)
- a Telstra line is available nearby for STREAMS communications
- it is clear of high-voltage poles and cabinets with electrodes or earth grids as this can affect the electronics in the controller
- it is clear of future widening proposals
- the position does not detract significantly from the visual quality of the streetscape (painting in a decorative way may be appropriate)
- there will be an unobstructed view of all approaches to the site for timing and maintenance purposes
- it does not unduly obstruct the footway
- it will not be unduly exposed to accidental damage by passing traffic, and
- access is available for maintenance personnel to park a vehicle.

If it is located where it is vulnerable to traffic, it must be protected by an appropriate safety barrier. It is preferable to find a less vulnerable location and avoid introduction of another hazard (safety barrier).

6.7.2 Types of control

Addition

Types of control in Queensland

In Austroads *Guide to Traffic Management* Part 9 Section 6.7.2, the ATC can be STREAMS or SCATS as determined by the road agency.

6.7.6 Display duration facilities

Addition

Display duration facilities in Queensland

Add the following dot point:

- **Connection to the ATC System, such as STREAMS or SCATS via either**:
  - a private network
  - a Telstra line is available nearby, or
  - cellular network, or
  - other means which is able to support the needs of the ATC.

6.7.10 Controller programming

Addition

Two-aspect signal controls of pedestrian crossings on slip lanes

This section provides advice about the use of two-aspect signal control of vehicles at signalised pedestrian crossings on slip lanes and guidance on their installation and operation.

Principles

Two-aspect (yellow-red) vehicle signals may be used to control traffic on a slip lane, allowing pedestrians to cross on a green WALK pedestrian signal. This arrangement should generally be used where signals are required, as it results in significantly-reduced delay for both pedestrians and left-turning traffic.

The use of two-aspect (yellow-red) vehicle signals at a slip lane allows traffic to be stopped using the usual yellow-red sequence, but there is no green display. When the traffic signals are not showing red or yellow, traffic on the slip lane is required to give way to all other traffic at the intersection.

Disadvantages of three-aspect control of vehicles on a slip lane

The slip lane cannot be given a green signal if there is any conflicting traffic, including traffic filtering right from the opposite approach. This can result in significant delays to the left-turning traffic which can be perceived as unnecessary, frustrating drivers, and often leading to a high rate of non-compliance by both traffic and pedestrians.

If the left turn is signalled green when the adjacent through movement is green, the right turn from the opposing approach cannot be allowed to filter. This results in considerable additional delay to other road users and reduces the capacity and design life of the intersection.

Pedestrian non-compliance at signalised slip lanes

Slip lane pedestrian signals need to respond quickly to pedestrian demand, otherwise they will result in a high level of pedestrian non-compliance which undermines the safety benefit of treatment.

Guidelines for design

The signal layout used should conform with the design principles of the Austroads *Guide to Road Design*. Specifically, signals should be placed in positions to provide stopping and starting functions. A primary signal should be provided, nominally 3 m from the left-hand end of the stop line. A dual primary (right-hand primary) lantern is desirable to reinforce the stopping position and to provide better sight lines for approaching traffic. Secondary and tertiary lanterns should be provided so that at least two lanterns are visible from the stop line. Arrowed lanterns or inserts should be used in all left-turn lanterns if there is confusion with the through movement lantern control. Pedestrian lanterns and push buttons should be located in accordance with Austroads *Guide to Road Design* and the Queensland MUTCD Part 10 *Pedestrian control and protection*.

Sufficient distance should be allowed between the stop line and the give way or merge lines to ensure drivers understand the need to give way at the merge point. There should be space for at least a single vehicle past the crossing (to reduce the potential that vehicles queue on the crossing). Guidance on signing and marking the merge point is given in Part 2 of the Queensland MUTCD. A give way sign may be provided if indicated by Queensland MUTCD.

Phasing arrangement

While details of the signal group operation for the slip lanes should be site-specific, the general principle is to let the slip lane vehicle signals go to red at any time. Consideration can, however, be given to excluding the period when the parallel through movement has just started – that is, during the intergreen preceding and the minimum green periods of the parallel through movement. The decision to do this would be based on the geometry of the intersection, the length of any short left-turn lane and the probability of it queueing back and restricting the flow of the through movement.

It should be noted that pedestrians would almost always have to push a button to cross the slip lane and another to cross the main carriageway. Consideration should be given to the use of signs advising pedestrians to press the second button to cross the subsequent crossing (R3-Q01 WALK TO ISLAND AND WAIT FOR FURTHER SIGNAL).

Wherever possible, the minimum green for traffic on the slip lane should be set to allow pedestrians to cross the slip lane at least two points in each cycle of the intersection signals.

6.8 Traffic detection

6.8.3 Detection system functions

Addition

Detector logic

Vehicles can be detected during two parts of the traffic signal cycle. Traffic waiting for a green signal registers an initial demand that it requires right-of-way (call); provided advance detectors are no closer than 15 m to the stop line, the controller can increment the initial green time. Traffic already given the right-of-way via a green signal registers its continuing requirement for right-of-way so that the green signal can be extended, depending on the prevailing traffic conditions (extend).

Detector logic is used to specify the conditions under which an actuation from a detector can call, extend, or increment a phase; for example, the standard detector logic for a stop line detector is:

- call a phase except while it is green, and
- extend a phase while it is green

and for an advance detector is:

- call a phase except while it is green
- extend a phase while it is green, and
- increment initial green except while it is green.

Using this logic, there is only one phase involved and only one condition for each function. This logic is sufficient for a simple two-phase design but, for most other types of phasing, several conditions may be required and a detector may demand and/or extend more than one phase. When designing detector logic for these situations, the basic aim is to minimise the cycle time while satisfying all the traffic and safety needs of the intersection.

This is achieved by:

- avoiding the introduction of unnecessary phases by only registering and maintaining required demands
- demanding a phase that satisfies the most (or main) vehicle movements
- minimising the variable initial green time by allowing detectors to increment when a queue is forming, and
- avoiding unnecessary extension of a phase: for example, by ceasing extension by vehicles on a given movement when that movement also runs in the following phase.

6.8.9 Pedestrian detection

Addition

Smart pedestrian crossings in Queensland

Refer to Transport and Main Roads guideline *Smart pedestrian crossings*.

7 Systems and procedures for arterial traffic control – other

7.2 Lane management systems

7.2.4 Tunnel control systems

Addition

Traffic management procedures for tunnel closures in Queensland

Refer to Transport and Main Roads *Traffic management procedures for tunnel closures guideline*.

8 Systems and procedures for smart motorways

8.4 Ramp metering

Addition

Design guidelines for the provision of managed motorway ramp signalling in Queensland

Refer to Transport and Main Roads *Queensland Guide to Smart Motorways*.

Appendices

Appendix G Signal timings

G.1 Introduction

Addition

Phase intervals in a group-based controller may have different names and/or slightly different functionality from the phase intervals in a TRAFF controller. Time settings may vary from those specified here, and in Austroads *Guide to Traffic Management*, if based on sound engineering calculation demonstrating that an appropriate level of safety is maintained. Refer to the relevant Transport and Main Roads design guides and the manufacturers' manuals for more information.

G.4 Vehicle settings

G.4.6 Vehicle clearance settings

Addition

Yellow time

Formula A2 in Austroads *Guide to Traffic Management* Appendix G Section G.4.6 *Yellow Time* shall be used. The design speed for the calculation of yellow times should be the posted speed of the approach to the intersection.

All-red time

Formula A3 in Austroads *Guide to Traffic Management* Appendix G Section G.4.6 *All-red Time* shall be used.

For through movements, the design speed should be, in the initial calculation, the posted speed of the approach. For left- and right-turning movements, it should be 35 km/h or 45 km/h respectively.

Designers and/or operators shall ensure the resultant all-red time is appropriate, considering any site-specific factors. Further guidance on allowing for bicycles at traffic signals is given elsewhere in Austroads guidelines and reports.

G.5.2 Minimum green setting

Not accepted

Section G.5.2 in Austroads *Guide to Traffic Management* Part 9 *Transport Control Systems – Strategies and Operations Appendices* is not accepted and does not apply in Queensland.