

**Queensland Guide to Traffic Management**

**Part 2: Traffic Theory Concepts (2020)**

**July 2021**

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## About this document

Austrroads' [Guide to Traffic Management](#) Part 2: *Traffic Theory Concepts* provides practitioners with the theoretical background necessary to appreciate the nature of traffic behaviour and to undertake analyses required in the development and assessment of both traffic management plans and road design proposals.

## How to use this document

The Department of Transport and Main Roads has agreed to adopt the standards published in Austrroads *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 Austrroads *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.

**Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts* is accepted without exception as applicable in Queensland.**

As such, this Part of the *Queensland Guide to Traffic Management* takes precedence over the Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts* except where the *Guide* is accepted without changes.

This Part is designed to be read and applied together with Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts*. Readers must have access to the *Guide* to understand application in Queensland.

This Part:

- sets out how the Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts* applies in Queensland
- has precedence over the Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts* when applied in Queensland, and
- has the same section numbering and headings as the Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts*.

The following table summarises the relationship between the Austrroads *Guide to Traffic Management* Part 2: *Traffic Theory Concepts* and this Part of the *Queensland Guide to Traffic Management*:

<b>Applicability</b>	<b>Meaning</b>
Accepted	The Austrroads <i>Guide</i> section is accepted.
Accepted, with amendments	Part or all of the Austrroads <i>Guide</i> section has been accepted with additions, deletions or differences.
New	There is no equivalent section in the Austrroads <i>Guide</i> .
Not accepted	The Austrroads <i>Guide</i> 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 2: Traffic Theory Concepts*.

Reference to...	Means
AGTM Part 2	<p>Austroads' <i>Guide to Traffic Management Part 2: Traffic Theory Concepts</i>, as amended by this document; for example, a reference to AGTM Part 1 means the reader must refer to the <i>Austroads Guide to Traffic Management Part 2: Traffic Theory Concepts</i>, and the <i>Queensland Guide to Traffic Management Part 2: Traffic Theory Concepts</i> (QGTM Part 2).</p> <p>Throughout AGTM Part 2, references are made to other Parts of the AGTM (for example, when reading Part 2, the reader may be referred to AGTM Part 3 for further information.)</p> <p>In such cases, the reader must refer to the equivalent Part within the QGTM first. Check the applicability of the equivalent QGTM Part before referring to the referenced AGTM Part.</p> <p>Similarly, references may be made to other Austroads Guides (for example, when reading Part 2, the reader may be referred to the <i>Guide to Road Safety Part 3: Speed Limits and Speed Management</i>).</p> <p>In such cases, the reader must refer to the equivalent Queensland Guide first. Check the applicability of the equivalent Queensland Guide before referring to the referenced Austroads Guide Part.</p>
TRUM	The <a href="#"><i>Traffic and Road Use Management</i></a> (TRUM) manual preceded this <i>Queensland Guide to Traffic Management</i> and was withdrawn on publication of the corresponding QGTM Part.
MUTCD	Queensland <a href="#"><i>Manual of Uniform Traffic Control Devices</i></a>
TORUM	<i>Transport Operations (Road Use Management) Act 1995</i>

## References

- [www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)

## Relationship table

Austrroads *Guide to Traffic Management Part 2: Traffic Theory Concepts* is **accepted without exception** as applicable in Queensland.

Section	Title	Queensland application	
1.	Introduction		
	1.1	Purpose	Accepted
	1.2	Intended User	Accepted
	1.3	How to Use	Accepted
	1.4	Scope	Accepted
	1.5	Out of Scope	Accepted
2.	Basic Traffic Variables and Relationships		
	2.1	Basic Descriptors of Traffic Flow	
	2.1.1	<i>Volume</i>	Accepted
	2.1.2	<i>Density</i>	Accepted
	2.1.3	<i>Speed</i>	Accepted
	2.1.4	<i>Headway</i>	Accepted
	2.1.5	<i>Spacing</i>	Accepted
	2.1.6	<i>Lane Occupancy</i>	Accepted
	2.2	Mathematical Relationships	
	2.2.1	<i>Fundamental Relationships</i>	Accepted
	2.3	Time and Space Mean Speed Relationships	Accepted
	2.4	Graphical Relationships for Uninterrupted Flow	Accepted
	2.5	Kinematic Wave Model	Accepted
3.	The Stochastic Nature of Traffic Behaviour		
	3.1	Probabilistic Aspects of Traffic Flow	Accepted
	3.2	Statistical Distributions in Traffic	Accepted
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	3.2.2	<i>The Poisson Distribution</i>	Accepted
	3.2.3	<i>Negative Binomial Distribution</i>	Accepted
	3.2.4	<i>Geometric Distribution</i>	Accepted
	3.2.5	<i>Negative Exponential Distribution</i>	Accepted
	3.2.6	<i>Other Distributions</i>	Accepted
	3.3	Traffic Headway Distributions	Accepted
	3.3.1	<i>Random Arrivals – Negative Exponential Headways</i>	Accepted
	3.3.2	<i>Equal Headways</i>	Accepted
	3.3.3	<i>The Displaced Negative Exponential Distribution</i>	Accepted
3.3.4	<i>Composite Headway Distribution Models</i>	Accepted	

Section	Title	Queensland application	
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	4.4	Steady State Queues with Random Arrivals and Service	
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	4.4.2	<i>Waiting Times in Queues</i>	Accepted
	4.5	Example Application of Steady State Queuing Theory	Accepted
	4.6	Summary of Queuing Theory Formulae	Accepted
5.	Gap Acceptance		
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	5.1.2	<i>Definitions</i>	Accepted
	5.2	Principal Gap Acceptance Formulae	Accepted
	5.2.1	<i>Delays</i>	Accepted
	5.2.2	<i>Absorption Capacities</i>	Accepted
	5.2.3	<i>Multi-lane Flows</i>	Accepted
	5.3	More Complex Gap Acceptance Situations	
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	5.5	Example Applications of Gap Acceptance Analysis	
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	6.2	Gap Acceptance with Multiple Levels of Priority	Accepted

Section	Title	Queensland application	
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	7.2	Car Following	Accepted
	7.2.1	<i>Pipes' Model</i>	Accepted
	7.2.2	<i>Forbes' Model</i>	Accepted
	7.2.3	<i>General Motors' Models</i>	Accepted
	7.3	Traffic Bunches and Overtaking	
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	7.3.2	<i>Traffic Bunches</i>	Accepted
	7.3.3	<i>Overtaking on Two-lane, Two-way Roads</i>	Accepted
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8	Principles Underlying Managed Motorways	Accepted	
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<b>Section</b>	<b>Title</b>	<b>Queensland application</b>
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C3	Commentary 3	
C3.1	<i>Derivations of Queue Length Formulae in Section 4.4.1</i>	Accepted
C4	Commentary 4	
C4.1	<i>Derivations of Queue Delay Formulae in Section 4.4.2</i>	Accepted
C5	Commentary 5	
C5.1	<i>Derivations of Formulae in Section 5.2.1 for Delays to Minor Traffic in Gap Acceptance</i>	Accepted
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## **Austroads guidance applies in Queensland**

Austroads *Guide to Traffic Management Part 2: Traffic Theory Concepts* is **accepted without exception** as applicable in Queensland.

