

**Guide to Traffic Management Part 1**  
Introduction to Traffic Management



# **Guide to Traffic Management Part 1: Introduction to Traffic Management**



*Austroads*

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## Guide to Traffic Management Part 1: Introduction to Traffic Management

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### Abstract

The Austroads *Guide to Traffic Management* has 13 Parts and provides comprehensive coverage of traffic management guidance for practitioners involved in traffic engineering, road design and road safety.

*Part 1: Introduction to Traffic Management* provides an introduction to the discipline of traffic management and an overview of the structure and content of the Guide. It outlines the breadth of the subject, the distribution of content among the various Parts of the Guide, and the relationship with other Guides such as those for *Road Design*, *Road Safety* and *Road Transport Planning*.

Part 1 introduces traffic management in a practical context, and presents fundamental definitions, principles and objectives. It introduces functional road hierarchy as an essential concept, and outlines the basic elements of traffic management and their application. It provides an overview of how the various parts of the Guide would typically be used by a wide range of practitioners.

### About Austroads

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

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

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

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

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

### Keywords

Traffic management, road hierarchy, traffic control, traffic regulations

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Edition 3.1 of the Guide has been updated with Safe System content, including

- A new section 3.4.1 Safe Mobility
- A new section 3.5 Safe System Approach including a table that summarises how each part of the Guide to Traffic Management interacts with each pillar of the Safe System
- Additional references.

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This Guide is produced by Austroads as a general guide. Its application is discretionary. Road authorities may vary their practice according to local circumstances and policies. Austroads believes this publication to be correct at the time of printing and does not accept responsibility for any consequences arising from the use of information herein. Readers should rely on their own skill and judgement to apply information to particular issues.

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# 1. Scope of the Guide

## 1.1 Purpose

The Austroads *Guide to Traffic Management* seeks to capture the contemporary traffic management practice of member organisations, including emerging techniques and technologies, and relevant international experience. It provides valuable guidance to practitioners in the implementation of efficient, safe and economical management of road traffic.

Most practical issues can be well accommodated by the approach outlined in the Guide. Local conditions and circumstances may sometimes require unique or innovative approaches to traffic management. It is recognised that member organisations may develop and publish supplementary guidelines and manuals to cover specific situations.

Each member organisation will determine whether any other documents, including its own supplementary guidelines, take precedence over Austroads guidelines.

## 1.2 Scope

This Guide is restricted to traffic management advice and refers only briefly to issues more appropriately addressed in other Guides. The Guide recognises that the management of traffic should be based on an understanding of road design and of the capabilities and behaviour of all road users, and on the performance and characteristics of vehicles. It is difficult to discuss many aspects of traffic management without reference to road design and/or safety issues, the view is taken that within the *Guide to Traffic Management* any such reference should be brief and be supported by links to the *Guide to Road Design* and/or the *Guide to Road Safety* (refer to scope statements in the *Guide to Road Design* and the *Guide to Road Safety*).

Within the above limits, the scope of the Guide is broad, addressing both urban and rural environments and the full range of situations to be found in each, including:

- freeways/motorways, arterial roads and local roads
- all categories of road users including cars, trucks, public transport, cyclists, motorcyclists and pedestrians
- different road environments, for example, school zones, linear shopping centres along roads and roadwork zones
- other important uses of roads such as parking.

This document provides guidance to good practice in traffic management, rather than specifying mandatory practice. Aspects of practice which are mandatory (for example the form and placement of speed restriction signs) may be mentioned but their specification is the province of relevant standards or legislation. Primary references here are the Australian Standards, particularly *AS 1742 – Manual of Uniform Traffic Control Devices* (15 Parts), the Australian Road Rules and the New Zealand Land Transport Rules. Specific references are given as necessary throughout the Guide.

The Guide is aimed primarily at practitioners with responsibilities for the management of traffic on road networks. The documentation is presented in the form of a number of Parts covering specific aspects of traffic management and its implementation.

## 2. Parts of the Guide

The *Guide to Traffic Management* is divided into the following 13 Parts:

**Part 1: Introduction to Traffic Management** (this Part) provides an introduction to the discipline of traffic management and an overview of the structure and content of the Guide.

**Part 2: Traffic Theory** 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.

**Part 3: Traffic Studies and Analysis** is concerned with the collection and analysis of traffic data for the purpose of traffic management and traffic control within a network. It serves as a means to ensure some degree of consistency in conducting traffic studies and surveys. It provides guidance on the different types of traffic studies and surveys that can be undertaken, their use and application, and methods for traffic data collection and analysis.

**Part 4: Network Management** covers the broad strategies and objectives of managing road networks to provide effective traffic management for all road users, which includes heavy vehicles, public transit users, pedestrians, cyclists and private motor vehicles. It provides specific guidance on transport networks and network operations planning.

**Part 5: Road Management** is focussed on traffic management on sections of road between major intersections. It covers road space allocation, access management, lane management and speed management.

**Part 6: Intersections, Interchanges and Crossings** is focussed on traffic management at locations where various road users must join or cross another stream of traffic. It describes the appropriate use and design of the various intersection types and traffic management techniques that are applied to meet traffic management objectives, and provide efficient and safe intersections considering the needs of all road users including pedestrians, cyclists, motorcyclists, heavy vehicles and public transport.

**Part 7: Traffic Management in Activity Centres** covers principles for the planning and traffic management of activity centres and associated transport nodes.

**Part 8: Local Area Traffic Management** covers the planning and management of road space within a local area, aimed at improved safety and amenity for residents and visitors. It provides guidance on the selection, design, application and effectiveness of traffic control measures on an area-wide or at least whole-of-street basis, including the effects such schemes may have on local and arterial road networks.

**Part 9: Traffic Operations** covers 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 10: Traffic Control and Communication Devices** provides guidance on the design and use of traffic control and communication devices, including signals, signs, markings and delineation.

**Part 11: Parking** describes the process of determining the demand for, and supply of, parking and provides a parking policy framework and how the demand should be addressed. The implementation of on-street and off-street parking including parking controls in urban centres is addressed, as is parking on rural roads and at park-and-ride facilities. Electronic parking guidance systems and signage are also described.

**Part 12: Traffic Impacts of Developments** identifies and manages the impacts on the road system arising from land use developments. It provides guidance for planners and engineers associated with the design, development and management of a variety of land use developments.

**Part 13: Road Environment Safety** is concerned with traffic management practice under a Safe System approach. It considers the role of traffic management in influencing road user behaviour, and provides guidance for practitioners on road safety aspects of traffic management.

The coverage of these Parts is summarised in Table 2.1, which is repeated in the introductory section of each of the separate Parts.

**Table 2.1: Parts of the Guide to Traffic Management**

Part	Title	Content
Part 1	Introduction to Traffic Management	<ul style="list-style-type: none"> <li>• Introduction to the discipline of traffic management.</li> <li>• Breadth of the subject and the relationship between the various Parts of the Guide.</li> </ul>
Part 2	Traffic Theory	<ul style="list-style-type: none"> <li>• An introduction to the characteristics of traffic flow and the theories, models and statistical distributions used to describe many traffic phenomena.</li> <li>• Processes that practitioners should consider.</li> </ul>
Part 3	Traffic Studies and Analysis	<ul style="list-style-type: none"> <li>• Traffic and transport data collection surveys and studies.</li> <li>• Traffic analysis for mid-block situations (including freeways/motorways).</li> <li>• Analysis of signalised and unsignalised intersections, including roundabouts.</li> </ul>
Part 4	Network Management	<ul style="list-style-type: none"> <li>• Broad strategies and objectives of managing road networks to provide effective traffic management for all road users.</li> <li>• Network needs for heavy vehicles, public transport users, pedestrians, cyclists and private motor vehicles.</li> <li>• Guidance on transport networks and network operation planning.</li> </ul>
Part 5	Road Management	<ul style="list-style-type: none"> <li>• Guidance on managing mid-block traffic conditions.</li> <li>• Good practice for access management, allocation of space to various road users, lane management.</li> <li>• Application of speed limits.</li> </ul>
Part 6	Intersections, Interchanges and Crossings	<ul style="list-style-type: none"> <li>• Types of intersection and selection of intersection type.</li> <li>• Appropriate use and design of various intersection types.</li> <li>• Traffic management issues and treatments for intersections, interchanges and other crossings.</li> </ul>
Part 7	Traffic Management in Activity Centres	<ul style="list-style-type: none"> <li>• Principles for planning the management of traffic in activity centres and associated transport nodes.</li> <li>• Techniques for traffic management in activity centres.</li> <li>• Examples and key considerations for various types of centres.</li> </ul>
Part 8	Local Area Traffic Management	<ul style="list-style-type: none"> <li>• Planning and management of road space in a local area.</li> <li>• Guidance on selection, design, application and effectiveness of traffic control measures on an area-wide or at least whole-of-street basis.</li> </ul>
Part 9	Traffic Operations	<ul style="list-style-type: none"> <li>• Applications used in traffic operations.</li> <li>• System configuration and operation guidance.</li> <li>• Current practice for common systems including network monitoring, traffic signals, congestion management, incident management, freeway/motorway management and traveller information.</li> <li>• Related systems integration and interoperability issues.</li> </ul>
Part 10	Traffic Control and Communication Devices	<ul style="list-style-type: none"> <li>• Signing and marking schemes.</li> <li>• Traffic signs, static and electronic.</li> <li>• Pavement markings and delineation.</li> <li>• Traffic signals and islands.</li> </ul>
Part 11	Parking	<ul style="list-style-type: none"> <li>• Parking policy.</li> <li>• Demand and supply.</li> <li>• On-street and off-street parking.</li> <li>• Parking guidance and control devices.</li> </ul>
Part 12	Traffic Impacts of Developments	<ul style="list-style-type: none"> <li>• Guidance on the need and criteria for impact assessment.</li> <li>• Detailed procedure for identifying and assessing traffic impacts and mitigating their effects.</li> <li>• Assessment of safety, infrastructure and environmental effects.</li> </ul>
Part 13	Road Environment Safety	<ul style="list-style-type: none"> <li>• Principles and management of the safety of road environments within a traffic management context.</li> <li>• Links to relevant sections of the Guide to Road Design and Guide to Road Safety.</li> </ul>

## 3. Traffic Management

### 3.1 Practical Context

The transport of people and goods is essential to the economic and social needs of the community, and substantial investment is made in a nation's road networks to facilitate this. The development and maintenance of the road network is faced with several challenges:

- continuing growth in vehicle ownership and usage
- increasing traffic congestion in urban areas
- trends toward larger (and more efficient) freight vehicles
- continuing challenge for safety improvements
- increasing concern about environmental impacts.

The central challenge is to address these often conflicting issues in a manner that balances the economic, social and environmental factors. The effective management of traffic is fundamental to making the best use of the existing road network.

Government policies on the zoning, release and development of land are also prime determinants of the amount and type of traffic generated by various land uses and required to be carried by road networks.

Increasingly, governments are recognising the importance of effective planning, development and management of land use and road networks in a more sustainable manner. This requires consideration not only of the required or desirable traffic flow conditions on different parts of the network, but also of broad issues such as the following:

- land use planning strategies
- travel demand management
- energy/fuel consumption
- urban design requirements
- safety, mobility and accessibility issues for all road users
- access to commercial, retail, industrial, residential and recreational facilities
- parking requirements
- amenity issues in residential areas
- bio-diversity issues for rural roads
- equity in respect to different user groups.

The need to consider or to resolve these often competing issues adds to the complexity of developing and implementing traffic management strategies, plans and treatments.

Some texts on traffic management and its application in the Australasian context include Underwood (1990) and Monash University (2003), and the text by Ogden (1996) covers the specific application of traffic engineering in safety management of the road environment.

## 3.2 Definition

Traffic management is the organisation, arrangement, guidance and control of both stationary and moving traffic, including pedestrians, cyclists and all types of vehicles. Its aim is to provide for the safe, orderly and efficient movement of persons and goods, and to protect and where possible, enhance the quality of the local environment on and adjacent to roads.

Traffic management is the application of specific traffic control practices, within a defined policy framework, over a length of road or an area, to achieve specified objectives which may be set by national, state or local governments. Traffic management is typified by its application over a significant area or length of route, as opposed to a specific traffic control action applied at a single location. A range of traffic management policies, practices and techniques may be appropriate to meet particular objectives.

## 3.3 Objectives and Principles

An overall aim of traffic management is to facilitate the operation of traffic on the roads with safety and efficiency, taking into account the needs of a range of road users. A broad objective may be to provide the most desirable levels of safety, accessibility, amenity and environmental quality in the area under study.

Each particular situation or area will have its own set of issues to be addressed and its own set of specific objectives. Detailed objectives can sometimes be in conflict with one another and compromise is often needed. The weighting given to particular objectives can vary from one area to another. The balance between accessibility, safety and environmental issues can also shift over time, as community values and government policies change.

Specific objectives for traffic management schemes often include the following:

- improved traffic flow conditions, reduction of congestion, (most commonly sought on arterial roads, where traffic flow efficiency objectives claim higher priority)
- enhanced safety of a route or area (arising from crash analysis or from direct community concerns)
- improved safety, mobility and accessibility for children, pedestrians and cyclists
- improved amenity of residential areas
- improved access to commercial, retail, and recreational activities
- improved road freight productivity and safety (particularly important in the achievement of economic objectives in the overall transport task)
- improved operating conditions for road-based public transport (reflecting priority for efficient movement of people rather than on movement of vehicles per se)
- Improved information for road users such a real time traveller information
- amelioration of parking problems.

An important aspect in traffic management recognises the fact that each of the objectives of any traffic management scheme is influenced primarily by the volume, composition and speed of the traffic either throughout the road network or in one or more parts of the network.

The overall volume of traffic on the whole road network is a matter for broad transport policy. It will be influenced by land use patterns, the availability of alternative transport modes, the policy position on regional-level traffic management (to moderate or accommodate traffic growth) and regional environmental objectives.

Applying the principles requires decisions on where traffic is desired, and where it is not wanted, and the consequent introduction of measures to achieve the desired distribution and flow characteristics. This requires firstly the definition of a hierarchy of roads for the study area which best suits the stated objectives. The categories of roads within the hierarchy are identified in terms of their functional description and their appropriate traffic levels.

### 3.4 Functional Road Hierarchy

The different transport and other functions served by roads, together with the needs of abutting land use, determine how they should be managed.

From a road function viewpoint there are two essential needs which must be met:

- the traffic movement, or mobility, function – providing the means by which people and goods can move from one place to another
- the access function – providing access to properties and land uses adjacent to the road.

Consideration of these two main functions of a road is fundamental to traffic management.

Ideally a given road would perform only one of these primary functions, but in practice, most roads do both. Motorways are true movement function roads, being controlled so direct access to adjacent land uses is not provided. All other roads provide some degree of access and the movement function varies greatly. On multi-function roads, traffic flow spans a wide range – and can vary during the course of a day, as can the extent of access demand.

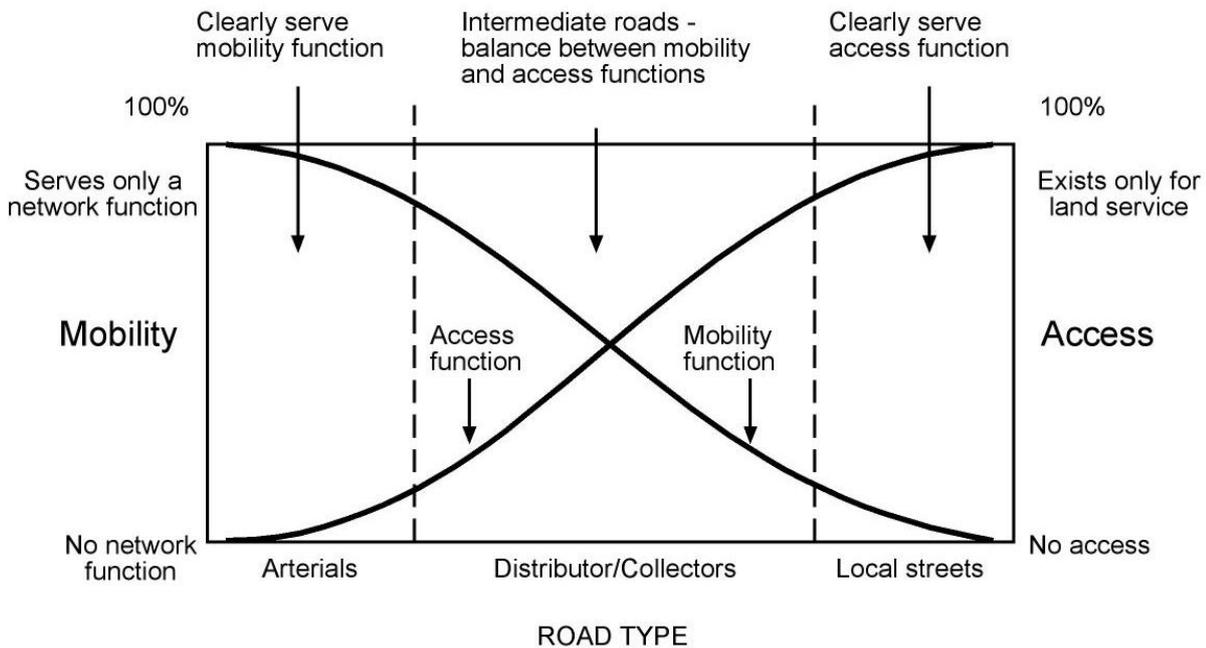
The primary function or balance of different functions may be reflected in the classification of a road. In its purest form, road classification may consist of two basic road types which have fundamentally different traffic and environmental goals:

- arterial roads, the main function of which is to provide for the safe and efficient movement of people and freight
- local roads, which provide direct access to abutting land uses and which contribute to the overall functioning of areas bounded by arterial roads or other barriers. The basic function of a local road is to provide a good environment in which to live or conduct a business and to enable vehicular access to abutting land.

Historically, Australasian practice for the management of the road environment has been based on a mixed function of mobility and access, as illustrated in Figure 3.1. Some road classification systems attempt to reflect the mixed function and the design and management of the roads, and their networks also need to reflect the mixed function.

Figure 3.1 demonstrates that for some roads there are competing legitimate demands for a strong emphasis on mobility on the one hand, and increased emphasis on local amenity on the other. These competing demands require a balance between mobility and access.

Figure 3.1: Road type and function: mobility vs access



Most road classification systems include additional categories which reflect this mixed function. The design and operation of streets and roads reflect their roles in the general road traffic, public transport, cycling and walking networks, and their linkage to local networks. The design and traffic management of the roads must also reflect the mixed function.

The mixture of functions met by roads across a network is usually expressed as a functional hierarchy. The basis of a traffic management plan for a road network is the development of an agreed road hierarchy by means of which roads can be classified according to their existing, or their intended function. The operational, safety or other benefits that are pursued by traffic management actions must be assessed in the context of the functional hierarchy of roads within the network.

The function of a road is reflected in traffic characteristics such as volume, speed, and mix of vehicular and non-motorised traffic. The function should also be reflected in the physical characteristics of the road, such as formation width, number and width of lanes, proximity and protection of potential hazards.

Roads, generally, are classified on the basis of how they currently operate, but consideration should also be given as to how they are expected or desired to function in the future, in terms of the relative significance of the traffic function versus the land access function for a particular road, and its desirable operating speeds and traffic volumes.

The management of different road classes may require the needs of a particular road user group (e.g. public transport users, cyclists, pedestrians) to be given priority, or for the needs of different users to be 'balanced'. Where available road space is limited, this may mean that a particular transport mode is favoured over others.

For some roads there are competing legitimate demands for a strong emphasis on mobility on the one hand, and increased emphasis on local amenity on the other. This inevitably creates challenges with respect to the traffic management required to achieve an appropriate balance between the mobility and access functions on many of these roads.

The importance of functional road classification, as a fundamental concept in traffic management, is developed in more detail elsewhere in this Guide, particularly Parts 4, 5, 8 and 9.

### 3.4.1 Safe Mobility

While road safety has always been a focus for road agencies, safety has in the past been typically addressed through reactively addressing road network locations with a crash history. As outlined in Austroads (2016a), road safety practitioners are moving towards the Safe System approach which involves a more proactive approach to road safety based on the assessed potential crash risk of the road.

The shift towards the Safe System approach and delivery of safe mobility is a key component of network operation planning. As outlined in the *Guide to Traffic Management Part 4: Network Management* (Austroads 2016b), a network operation plan (NOP), which is the output of the network operation planning process, aims to guide the operation and development of road/transport networks towards managing competing priorities.

A NOP underpins higher level strategic plans and should be developed in full consultation with stakeholders and the community. One of the key planning principles in a NOP is to provide safer road travel for all road users and to move towards the broader application of the Safe System.

Thus, safe mobility, which is the concept of *mobility within the limits of safe operation* reverses the traditional approach of providing a level of safety once all mobility objectives have been met. Safe mobility requires practitioners to establish a safe operating environment first, and then to find ways of providing an acceptable level of mobility within it.

While the needs of a particular road user group may conflict with the needs of another (for example, in a strip shopping mall on an arterial road), the mobility function should at all times be a secondary consideration behind the need to provide a safe operating environment for all road users.

Further details can be found in *Guide to Traffic Management Part 13: Road Environment Safety* (Austroads, 2017).

## 3.5 Safe System Approach

Safe System principles have been acknowledged in successive national road safety strategies and action plans for over ten years as the guiding principles for road safety programs in Australia. The commitment is continued in the National Road Safety Strategy 2011–2020 (Australian Transport Council 2011). Safe System principles are also central to New Zealand's Strategy 2010–2020: the Safer Journeys Strategy (Ministry of Transport 2014).

The Safe System approach demands a holistic approach to the safety of the road system, with the aim of no person being killed or seriously injured on the road network. All elements of the road system, including safe roads, safe vehicles, safe road use and safe speeds are incorporated in the approach with responsibility required from stakeholders, including the road agencies, governments and road users. Details are given in the National Road Safety Strategy 2011–2020 (Australian Transport Council 2011) and incorporated in the Guide to Road Safety Parts 1, 2, 3 and 7 (Austroads 2013a, 2013b, 2008, 2006).

The Safe System takes human errors and frailty into account, acknowledging that crashes will continue to occur but seeking to avoid death and serious injury as outcomes. Speed is a critical element in this approach. Speeds must be contained so that in the event of a crash the impact forces remain below human injury tolerance.

The goal of the Safe System is to provide safer travel and traffic movement for all road users by minimising the risk posed by the interacting elements of the road transport system. The Safe System approach is shown in Figure 3.2 and is based on the following four cornerstone areas of intervention (Australian Transport Council 2011):

- Safe roads – Roads and roadsides designed and maintained to reduce the risk of crashes occurring and to lessen the severity of injury if a crash does occur. Safe roads prevent unintended use through design and encourage safe behaviour by users.
- Safe speeds – Speed limits complementing the road environment to manage crash impact forces to within human tolerance, and all road users complying with the speed limits.

- Safe vehicles – Vehicles which not only lessen the likelihood of a crash and protect occupants, but also simplify the driving task and protect vulnerable users. Increasingly this will involve vehicles that communicate with roads and other vehicles, while automating protective systems when crash risk is elevated.
- Safe people – Encourage safe, consistent and compliant behaviour through well-informed and educated road users. Licensing, education, road rules, enforcement and sanctions are all part of the Safe System.

Providing a safer road environment involves application of road design and traffic management principles with a clear safety focus. Practitioners responsible for the road network should ensure that the road is designed and managed from a safety perspective, and that its operation is adequately monitored and measured.

Safe System treatments used to improve the safety of the road environment, may be classified as either primary or supporting treatment. Primary treatments focus on reducing the severity of crashes while supporting techniques focus on reducing the number of crashes.

It is expected that Safe System principles and their application in Australia and New Zealand may continue to evolve in the future as the knowledge base expands through further research and experience of road agencies.

Figure 3.2: Safe System in the National Road Safety Strategy



Source: Department of Infrastructure and Regional Development (2016).

Strict application of safe system principles may conflict with mobility objectives. Safe System treatments often involve reducing road capacity, removing on-street parking, reducing speeds or restricting access to side roads or private properties. All of these have the potential to be unpopular with the local community and some road authorities who may prioritise mobility objectives ahead of road safety. When considering the level of infrastructure provision in these instances, practitioners should keep in mind the concept of *safe mobility* which is defined as 'mobility maximised within the limits of safe operation' (further details are given in Section 3.4). This means that safe operation should be established as the first priority, and then mobility can be maximised within those boundaries and so long as it does not compromise safe operation. This is in effect the reverse of traditional practice which has been to provide a level of safety once all mobility objectives have been met.

If it is not possible to provide the desired level of mobility after safety objectives have been met, it will be necessary to question the primary function of the road and whether some modes may be better catered for on a parallel route. Until such time further guidance is provided on the application of Safe Mobility, practitioners should seek guidance on its jurisdiction policy position on its application, particularly for existing roads that require significant changes to meet Safe System criteria.

The pillars of the Safe System have varying degrees of relevance to the aspects of traffic management dealt with in this Guide. Table 3.5 summarises how each part of the Guide to Traffic Management interacts with each pillar of the Safe System.

Table 3.1: Relevance of Safe System pillars

Part of this Guide	Applicability of Safe System pillars				
	Safe Roads	Safe Speeds	Safe Users	Safe Vehicles	
Part 1	General introduction to the Safe System approach.				
Part 2	No direct relevance to safe system principles				
Part 3					
Part 4	As rural roads rarely operate at capacity, road safety considerations largely drive the traffic management focus of rural road networks.		No direct relevance to safe system principles.		
Part 5	Identifies how access management techniques can be used to reduce exposure, likelihood and severity or road user conflicts.	General overview of speed limits, legal basis, how they are set and includes an introduction to Safe System speeds			
Part 6	Primarily focuses on impact angles, safe roadside design and the safety of pedestrians and cyclists at intersections.	How different types of intersections comply with Safe System speeds.			
Part 7	Focuses on pedestrian and cyclist safety in and around activity centres, including the use of traffic calming to reduce speeds.				
Part 8	Focuses on the use of traffic calming on local streets to reduce traffic volumes on speeds.				
Part 9	References network monitoring, traffic control and demand management.	References traffic control, smart motorways and travel aid and user information.	References traffic control, travel aid and user information and demand management.	References travel aid and user information.	
Part 10	References signs and markings as the most fundamental way to communicate with road users. Traffic signals are an important component of this, although they are not typically considered Safe System treatments due to their high speed crash potential.	Speed limit signs, both static and variable, directly contribute to this pillar.	Traffic control and communication devices have a critical role in road user behaviour.	Briefly references emerging driver assistance technology that have the potential to deliver much safer vehicles.	
Part 11	The provision of safe and efficient access to parking facilities is critical to this pillar.	No direct relevance to safe system principles.			
Part 12	Discusses access management in conjunction with the road hierarchy to control access to the road network.	In areas where development directly abuts the road, lower speeds are essential to keep crash forces within safe limits. This is especially important in activity centres where pedestrian activity is usually high.	Certain road infrastructure, such as traffic calming devices and pedestrian crossings, can encourage safe road user behaviour.	No explicit reference.	
Part 13	Provides a comprehensive and detailed description of the Safe System approach and how it applies to traffic management in general.				

## 4. Basic Elements of Traffic Management

Observed traffic flow arises from the characteristics of transport demand, road user behaviour, vehicle performance, and road and weather conditions. Traffic management requires an awareness of these basic elements, an understanding of the characteristics of traffic flow, an ability to measure and analyse traffic conditions, and expertise in identifying and implementing appropriate techniques to influence and control traffic flows to meet objectives.

### 4.1 Traffic Theory and Analysis

The basic variables used to describe a stream of traffic are its volume, speed and concentration (or density), from which other descriptive variables can be derived. There are observed fundamental relationships between these variables which can be described mathematically and graphically. Different combinations of the variable values give rise to different traffic conditions. Monitoring and analysis of traffic conditions, to assess and enhance road capacity and develop effective operational initiatives, is fundamental to traffic management.

These matters are dealt with in Part 2 and Part 3 of the Guide.

### 4.2 Traffic Control Devices

The movement of people and goods can involve a degree of conflict between objectives and some traffic conditions may exceed desired characteristics of operation. Such circumstances require the imposition of constraints on the movements of road users so as to achieve behaviour or operation which is in accord with a general policy or strategy on traffic management. Traffic control devices such as signals, signs, and markings are the engineering tools used for achieving the necessary balance among mobility, safety, amenity, accessibility, etc.

General techniques for dealing with traffic operational matters are covered in Part 9 of the Guide and more detailed guidance on the development and use of control devices is given in Part 10.

### 4.3 Legislation, Standards and Guidelines

The primary requirements for road user behaviour are set down in various Acts, regulations and rules in the various jurisdictions in Australasia. These specify mandatory requirements enforceable under law and often call up more detailed specifications set down in formal standards agreed by government and industry. Further guidance on the practical implementation of facilities to support and give effect to traffic law is given in many guidelines documents issued by jurisdictional governments.

A fundamental requirement of effective and safe traffic management is that similar situations across the several jurisdictions are treated in a consistent way. In Australasia, in addition to the *Guide to Traffic Management*, consistency in traffic management and engineering practice is promoted through several key documents, namely:

- the Australian Road Rules (2006)
- Australian Standards, particularly AS 1742 – Manual of Uniform Traffic Control Devices set 2014 (15 Parts)
- Land Transport Rule: Traffic Control Devices 2004 (New Zealand)
- Land Transport (Road User) Rule 2004 (New Zealand)
- New Zealand Traffic Control Devices (TCD) manual (NZTA 2008).

In practice these are largely adopted by the various jurisdictions, which may also produce supplementary guidelines and manuals to accommodate specific legislative or physical situations and are followed by local government bodies.

## 4.4 Application

The basic elements of traffic management practice – theory, data, analysis, control devices, regulations and standards – are applicable to the wide range of circumstances encountered in practice. The information in the Guide has been assembled to provide guidance for practitioners dealing with traffic management on arterial or local roads, in residential or commercial precincts and in urban or rural areas.

In applying the principles and tools to meet set objectives, typically on defined routes or in defined areas, it is important that broader strategic approaches across the road network are also understood and guide the process. These may relate to freight or public transport issues, for example, or the transport and traffic consequences of major land use developments in a region. Broad network management issues are covered in Part 4 of the Guide. Specific guidance on managing traffic on routes and at intersections is given in Part 5 and Part 6.

Traffic management may also be applied to a range of defined areas, from local residential areas to commercial and civic precincts, and major transport nodes such as ports and inter-modal transfer centres. Part 7 of the Guide covers issues relating to major activity centres and Part 8 deals with local area traffic management.

An important aspect of traffic management in central urban areas, both strategically and operationally, is the issue of parking. This is covered in Part 11 of the Guide. Land use developments, particularly those in urban areas, can have major implications for the generation and management of traffic. These impacts are addressed in Part 12.

In many cases, the nature of a traffic problem, the measures which might be applied, and the likely effectiveness of those measures will not be readily apparent. A range of alternative treatments must therefore be developed and analysed. In developing a traffic management scheme and eventually implementing initiatives or control measures, the following general procedure can be applied:

1. Confirm overall objectives for the study area and general issues to be addressed.
2. Conduct a survey of the network, route or study area, including traffic volumes, travel times, and traffic problem locations.
3. Identify different interest groups, their views and objectives.
4. Identify the desired objectives of the traffic management scheme, together with measures of their achievement.
5. Develop alternative proposals.
6. Conduct initial assessment of the various proposals, including prediction of changes in traffic flows, impacts on all relevant groups and general performance of each scheme relative to the stated objectives.
7. Select the preferred scheme and undertake more detailed analysis and design of that scheme.
8. Implement the scheme on a trial basis, monitoring all possible feedback and modifying the design as appropriate.
9. When satisfactory operation is indicated, complete full implementation of the scheme.
10. Undertake an appropriate evaluation of the scheme so that its effects can be formally assessed and documented.

## 4.5 Road Environment Safety

Traffic management, together with relevant planning, design, construction, and operational practices, is a fundamental tool whereby the road environment can be made safer. It directly affects the physical road environment in which road users operate, and thereby influences the behaviour of road users. In addition to the other Parts of the Guide, guidance relevant to achieving a safe road environment is contained in several other Austroads Guides.

Part 13 of the Guide introduces Safe System principles and approach. It summarises and draws together safety-related guidance material in the context of the strategic application of traffic management practices to achieve safer operation within the road and traffic environment. For the topics presented in Part 13, cross-references are given to their treatment in the relevant Parts of other primary Guides particularly the Guide to Road Safety and the Guide to Road Design.

## 5. Use of the Guide

This Guide is intended to be a primary reference document for practitioners involved in traffic planning and traffic management. However, it should be read in conjunction with other Austroads Guides, relevant Australian/New Zealand Standards, relevant strategies and action plans, individual road agency policies and guidelines, and other relevant texts.

The references in this Guide to relevant Parts of other Austroads Guides, particularly those on *Road Design*, and *Road Safety* are especially important. Reference should also be made to the *Guide to Asset Management*, particularly Part 5 that places road use strategies in the context of broader asset management strategies and the *Guide to Road Tunnels*, particularly Part 2 that covers special requirements of the planning, design and commissioning of road tunnels.

Each Part of the Guide provides guidance supported by appendices and references to resource materials. It is expected that, for the experienced engineer or practitioner, the central guidelines will provide the necessary key information. Less experienced designers or students will find the resource documents particularly useful.

Those wishing to obtain an overview of the traffic management discipline will find this *Part 1: Introduction to Traffic Management* a useful summary.

Practitioners seeking a summary or refresher on the underlying theoretical and analytical aspects of traffic flow can refer to *Part 2: Traffic Theory* and *Part 3: Traffic Studies and Analysis*.

Practitioners dealing with the management of traffic on arterial routes should refer to *Part 5: Road Management* and *Part 6: Intersections, Interchanges and Crossings*.

Those concerned with strategic traffic management across road networks should refer to *Part 4: Network Management*. More detailed guidance on the management of traffic operations and the implementation of various control devices is given in *Part 9: Traffic Operations* and *Part 10: Traffic Control and Communication Devices*.

Planners and those associated with the design and development of local areas would find relevant guidance in *Part 8: Local Area Traffic Management*. For traffic management issues relating to commercial and civic areas, reference should be made to *Part 7: Traffic Management in Activity Centres*, *Part 11: Parking* and *Part 12: Traffic Impacts of Developments*.

For practitioners concerned with the road safety aspects of traffic management in the road environment, *Part 13: Road Environment Safety* provides an informative overview and references to relevant Parts of other Austroads Guides.

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Austrroads' Guide to Traffic Management consists of 13 parts and provides comprehensive coverage of traffic management guidance for practitioners involved in traffic engineering, road design and road safety.

**Guide to Traffic Management Part 1: Introduction to Traffic Management** provides an introduction to the discipline of traffic management and an overview of the structure and content of the Guide.

## Guide to Traffic Management Part 1



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