

Unit 4: Transport Operations Control Strategies and Systems

Module 4-1

# Objectives and Principles of Transport Operations



Traffic Management Traffic Management



# Today's presenter

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# Outline of this Module

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- Maintaining road serviceability and safety
- Traffic control
- Road user information
- Demand management

# Maintaining Road Serviceability and Safety



# Some statistics

See Section 3.5,  
Austroads (2020a)



## Incident management strategies have been found to reduce...

freeway congestion by up to 30%

secondary crashes by 80%

travel times by 20%

incident duration by 50%

# Approach to incident types

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See Section 3.5,  
Austroads (2020a)



## 1. Maintenance, rehabilitation and upgrade works

- Use of alternative construction methods and working hours (off-peak or night-time)
- Re-routing traffic as outlined by appropriate pre-trip information

## 2. Planned special events

- Limit the inconvenience to road users by choosing the least constraining time periods and techniques
- Successful implementation requires careful planning

# Approach to incident types

See Section 3.5,  
Austroads (2020a)



## 3. Major weather events and adverse road conditions

- Installation of variable speed limits in areas where adverse weather conditions are regularly experienced

Find more information on  
incident management in  
Module 6-3

## 4. Emergency incidents

- Facilitate quick action from the appropriate emergency services
- Protect the incident area through guidance markings
- Warn upstream motorists as quick as possible
- Response time is the prime performance indicator



# Traffic Control



*Austroads*





# Ramp-metering

See Table 3.9,  
Austroads (2020a)



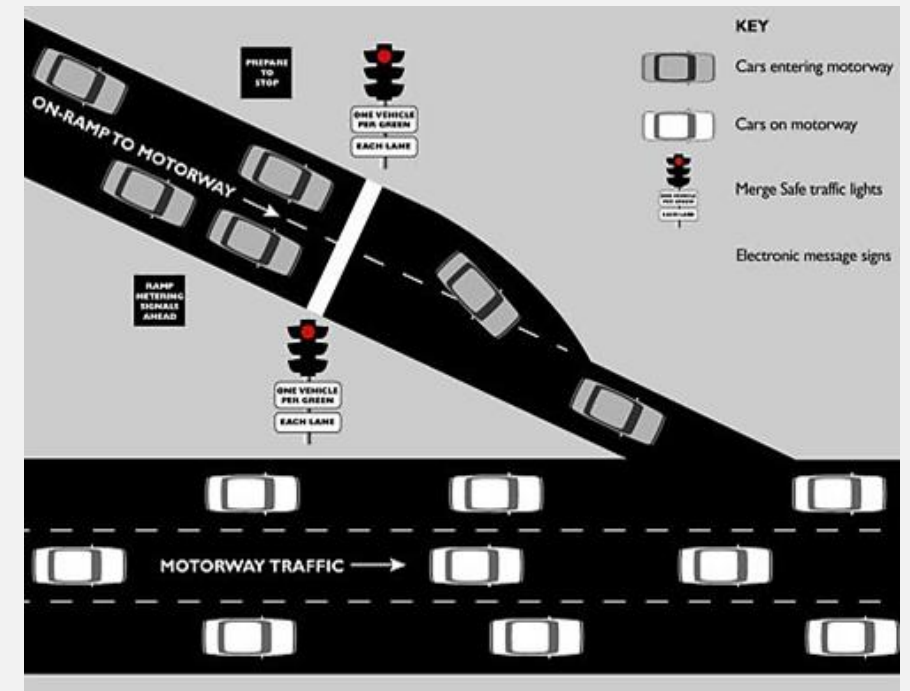
*Optimises motorway capacity through better merging and entering traffic*

## Tools

- Uses traffic signals and control equipment at entry ramps (see Figure)

## Effects and considerations

- Increases speed and safety on the motorway
- Decrease in fuel consumption and air pollution
- Need to manage the queues at entry ramps



Source: ATC (2019)



# Speed control

See Table 3.9,  
Austroads GTM9 (2020)



*Optimise the use of motorway capacity through speed smoothing*

## **Tools**

- Uses traffic data collection stations and algorithms to optimise the displayed speeds (VMS)

## **Effects and considerations**

- Increase effective motorway capacity
- Decrease rear-end crashes
- Speed control may not increase capacity at bottlenecks

# Lane use management

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*Optimise the use of road capacity through dynamic lane use assignment*

## Tools

- Dynamic closure or creation of bus, HOV, truck or reversible lanes
- Requires decision support tools to allocate lanes based on traffic data

## Effects and considerations

- Reduction of recurrent congestion
- Improved safety conditions for drivers
- Difficulties altering lanes under traffic flow conditions

See Table 3.9,  
Austroads (2020a)

# Adaptive traffic signal control

See Table 3.9,  
Austroads (2020a)



*Optimise the capacity of urban street networks*

Additionally, provides traffic signal priority to PT and emergency services

## **Tools**

- Requires inductive loop and video sensors for traffic volume measurement
- Traffic-response algorithms for real-time calculation

## **Effects**

- Increase in the average travel speed of specialised vehicles
- Reduction of total travel time spent

# Route guidance

See Table 3.9,  
Austroads (2020a)

Find more information on  
freeway traffic controls in  
Module 8-2



*Optimise the use of road networks by influencing route choice*

## Tools

- Directional variable message signs (VMS) provide route advice
- Algorithms to predict travel time calculations

## Effects and considerations

- Reduces congestion by redirecting traffic to an underutilised competing route
- Requires predictions of re-routing impact to avoid over-diversion phenomena



Source: Infrastructure Magazine (2018)

# Road User Information



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# Predictive information

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## Addresses:

- General traffic condition forecasts
- Planned incidents
- Anticipated disturbances

See Section 3.7.1,  
Austroads (2020a)

## Implementation and dissemination requires:

- Centralisation of information
- Transmission of regular information bulletins
  - Radio – Newspapers – Television – Internet – Telephone enquiry

# Pre-trip information devices

See Section 3.7.4,  
Austroads (2020a)



## Internet

- Supported road condition website

## Commercial broadcast media

- Road agencies often provide travel information to commercial providers

## Messaging services

- Message subscription services provide route information



# Real-time information

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## Addresses:

- Real-time traffic conditions
- Unanticipated disturbances

See Section 3.7.2,  
Austroads (2020a)

## Implementation and dissemination requires:

- A permanent system to detect and monitor traffic flow conditions
- Real-time communication systems
  - Variable message signs
  - GPS technology
  - Advisory radio

# Variable Message Signs

See Section 7,  
Austroads (2020b)



Electronic signs are *used primarily where the information to be provided to road users changes with time* (Austroads 2020b)

Generally used for:

- Motorway management systems
- Variable speed limits
- Incident and event management
- Warning systems
- Road user information
- Post-crash response



Source: Austroads (2020b)

# Other real-time devices

See Section 12,  
Austroads (2020b)



Source: Saga (2019)

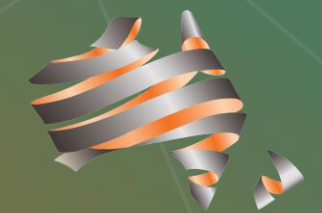
## Devices

- GPS technology (satellite navigation)
  - In-built or separate devices
- Advisory radio

## Applications

- Lane availability due to incidents, roadworks or congestion
- Advisory or optimum travel speeds
- Likely delays
- Suggested alternative routes

# Demand Management



*Austroads*



# Demand Management

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*A concept to promote sustainable transport and manage the demand for car use by changing travellers' attitudes and behaviour – Bliemer (2020)*

Our roads are becoming increasingly congested and strategies to reduce demand are necessary

Demand management achieves this by influencing three travel decisions:

**Mode**

**Departure  
time**

**Route**



# Demand Management

## Trip Information

- Helps drivers to make more informed decisions about their trip
  - Alerts of congestion
  - Provides alternative travel routes/modes to avoid congestion

## High Occupancy Vehicle (HOV) Lanes

- Encourages drivers to car-pool by allowing them access to less congested lanes
  - Issues with policing the restrictions



Source: Bliemer (2020)

# Demand Management

## Encouraging Public and Active Transport

- More sustainable modes
  - Free/subsidised active and public transport (concession cards)
  - Providing safe and appropriate infrastructure

## Road pricing

- Charges road users for the use of a certain road or section of a network
- Influences all three travel decisions



Source: Bliemer (2020)

See Section 3.8,  
Austroads (2020a)

# Quiz Questions



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# Time to Reflect

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**Q1. True or False. Ramp metering increases both speed and safety on motorways.**

A. True

B. False

## **Explanation:**

True!

Despite the increase in speed, the ease of which drivers can merge into the motorway stream minimises the amount of braking required and decreases the chance of a rear-end crash

# Time to Reflect

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**Q2. What are three travel decisions that can be influenced through demand management?**

- A. Trip. Mode. Cost.
- B. Mode. Departure time. Route.
- C. Information. Destination. Mode.

**Explanation:**

Option B is correct!

The three main travel decisions that can be influenced are mode, departure time and route.

# References

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Thank you for participating

