Objectives and Principles of Transport Operations
Today’s presenter

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Outline of this Module

• Maintaining road serviceability and safety
• Traffic control
• Road user information
• Demand management
Maintaining Road Serviceability and Safety
Some statistics

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%

See Section 3.5, Austroads (2020a)
Approach to incident types

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

See Section 3.5, Austroads (2020a)
Approach to incident types

3. Major weather events and adverse road conditions
   • Installation of variable speed limits in areas where adverse weather conditions are regularly experienced

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

Find more information on incident management in Module 6-3

See Section 3.5, Austroads (2020a)
Ramp-metering

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

*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

See Table 3.9, Austroads GTM9 (2020)
Lane use management

*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

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

See Table 3.9, Austroads (2020a)
Route guidance

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)

See Table 3.9, Austroads (2020a)

Find more information on freeway traffic controls in Module 8-2
Road User Information
Predictive information

Addresses:
• General traffic condition forecasts
• Planned incidents
• Anticipated disturbances

Implementation and dissemination requires:
• Centralisation of information
• Transmission of regular information bulletins
  • Radio – Newspapers – Television – Internet – Telephone enquiry

See Section 3.7.1, Austroads (2020a)
Pre-trip information devices

- 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

See Section 3.7.4, Austroads (2020a)
Real-time information

Addresses:

• Real-time traffic conditions
• Unanticipated disturbances

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

See Section 3.7.2, Austroads (2020a)
Variable Message Signs

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

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

Source: Saga (2019)

See Section 12, Austroads (2020b)
Demand Management
Demand Management

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

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


Bliemer (2020). Mobility management, Transport and infrastructure foundations, ITLS5100, The University of Sydney, Sydney, NSW.


Thank you for participating