

Unit 6: Network Performance Monitoring and Management

Module 6-2

Traffic Congestion and Management



Traffic Management Training Module



Today's presenter

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Outline of this Module

- Types of Traffic Congestion
- Factors causing Traffic Congestion
- Management Strategies to ease Traffic Congestion

Types of Traffic Congestion



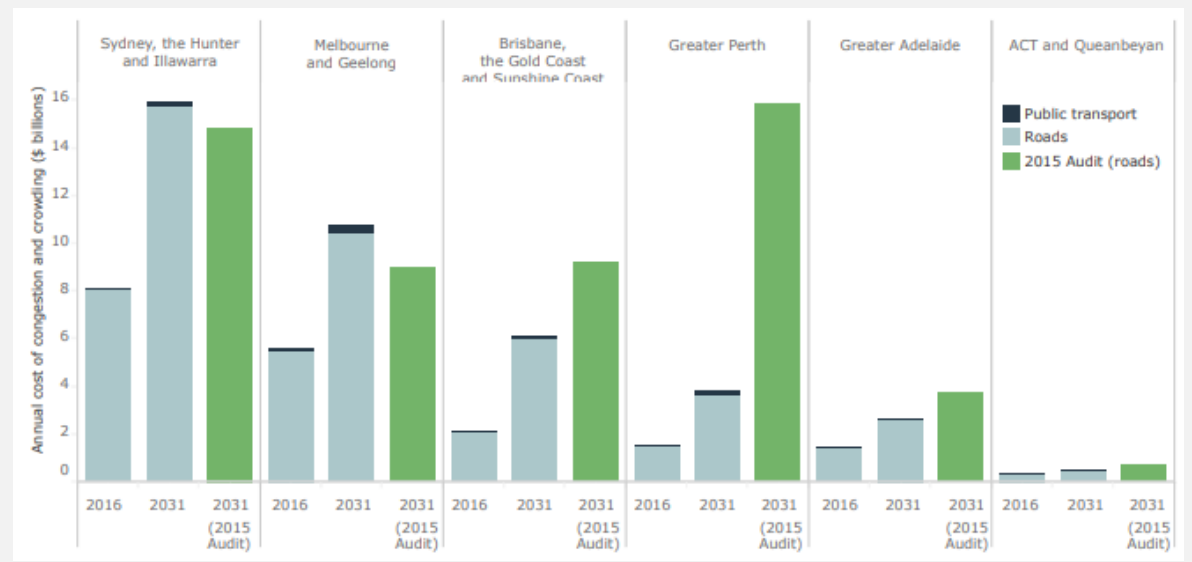
Austroads

Traffic Congestion

- Saturated/Over-saturated traffic conditions (*i.e. Volume/Capacity* → 1)
- Characterised by forced flow of vehicles
- Cost of congestion in Australia: \$16.5 billion in 2015

Two Types (*based on periodicity*):

1. Recurring
2. Non-recurring



Source: Infrastructure Australia (2019)

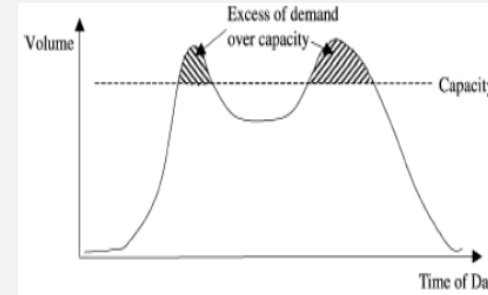
Recurring Traffic Congestion

- Occurs periodically (*e.g. daily basis*)
- Quite prevalent in a road network
- Accounts for 70 – 80% of the total delay (Skabardonis et al., 2008)
- Delays caused due to excessive demand (*i.e. Volume/Capacity $\rightarrow 1$*)
- Probe vehicles used to measure delays
- Easy to model/forecast

Recurring Traffic Congestion

Causes:

1. Fluctuations in demand
2. Presence of bottlenecks in road
 - Merges and diverges
 - Lane reduction
3. Presence of heavy vehicles



Source: Stopher (2004)



Source: The Economist (2018)



Source: Compass (2012)

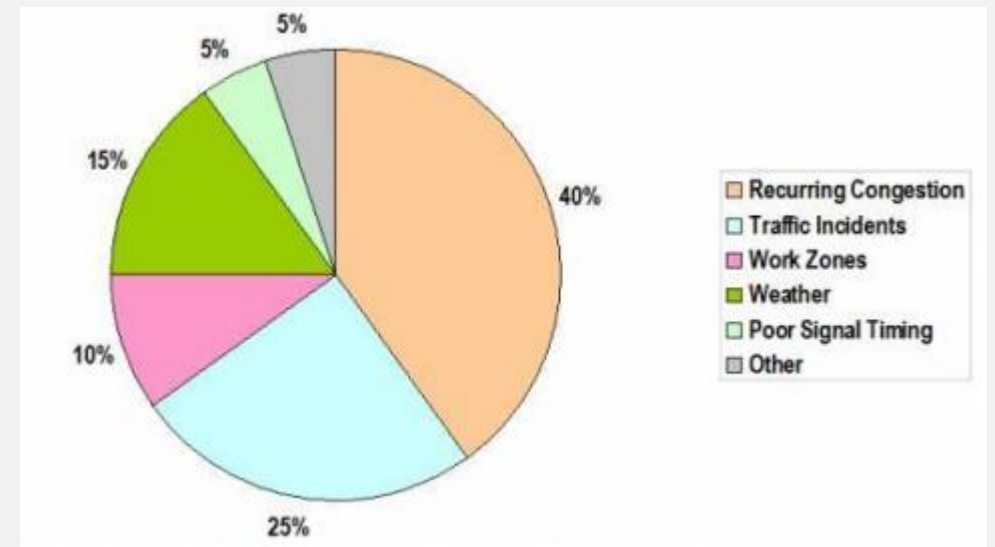


Source: Compass (2012)

See Section 8,
Austrroads (2020a)

Non-recurring Traffic Congestion

- Unexpected yet common, inefficient and dangerous (McGroarty, 2010)
- Accounts for 20 – 30% of the total delay (Skabardonis et al., 2008)
- Challenging to predict (Ferri, 2014)



Source: McGroarty (2010)

Non-recurring Traffic Congestion

Causes:

1. Crashes or incidents
2. Roadworks
3. Inclement weather
4. Special events



Source: Age Fotostock (2020)



Source: SnapComms (2020)



Source: Google



Source: RACQ (2019)

See Section 8,
Austroads (2020a)

Time to Reflect



1. Which of the following is not true about non-recurring traffic congestion?

- A. Caused due to bad weather
- B. Difficult to forecast
- C. Cause discomfort
- D. None of these

Answer:

Option D is correct!

All other options are true for non-recurring congestion.

Traffic Management Strategies



Traffic Management Strategies

Aim: Strategies to regulate the volume and movement of traffic in a road network to counter the factors triggering traffic congestion

Some Strategies:

- Increasing road capacity
- Managing traffic demand
- Efficient traffic movement

Increasing Road Capacity

Aim: To increase roadway capacity in order to accommodate an increased demand

Ways:

- Adding new capacity
 - Augmenting lanes on a road (*i.e. Build more*)
 - Expensive or infeasible in over-crowded areas
- Efficiently use existing capacity
 - Road space allocation



Source: Age Fotostock (2020)

Road Space Allocation

See Section 4,
Austroads (2020b)



The ultimate aim in the management of a road network or individual road length is to achieve a balance in the competing needs of road user groups. (Austroads, 2020b)

- Involves:
 - *Permanent allocation: e.g. medians, pedestrian refuge islands*
 - *Temporary allocation: e.g. lane reversals*
 - *Priority basis: e.g. pedestrian crossings, bus lanes*
- Appropriate allocation depends on road environment, safety and efficiency

Road Space Allocation

See Section 4,
Austroads (2020b)



1. High Occupancy Vehicle (HOV) lanes:

- T2 or T3 lanes
 - Bus, taxis, cars carrying required number of passengers
- *Eco-friendly lane*: For EV, Hybrid cars

2. Bus and Tram lanes:

- Dedicated lane for bus/tram movement
- Other vehicles can use for 100m if necessary to drive in this lane
- *Busways*: Dedicated bus-only corridor



Road Space Allocation

See Section 4,
Austrads (2020b)



3. Bicyclists:

- *Bike lane*: Shared with other users, e.g. pedestrians
- *Bike-only lane*: Dedicated lane



Source: Austrads (2020b)

4. Pedestrians:

- *Paths*: e.g. footpaths, pedestrianised streets
- *Crossings*: e.g. signalised, unsignalised



Managing Traffic Demand

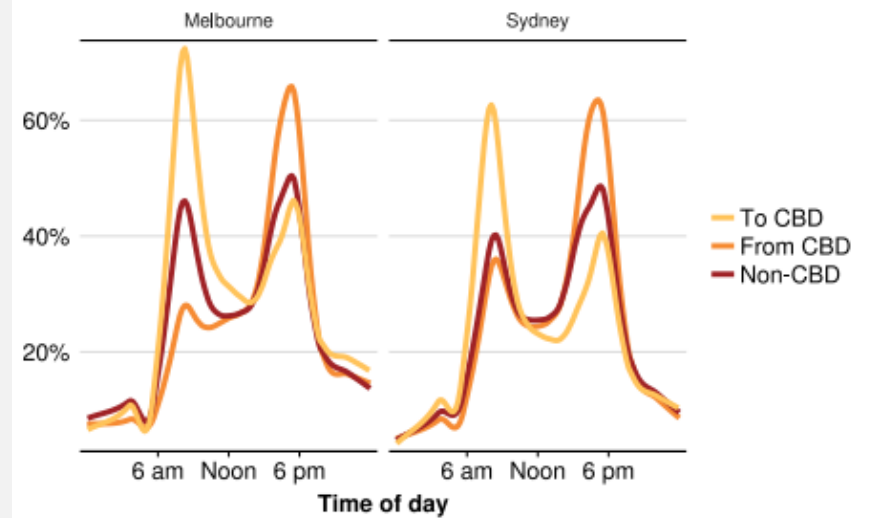
Aim: Reduce or regulate traffic demand in a network for smoother operations

- Tremendous load during peak periods

Ways:

- Peak spreading
- Traffic diversion
- Shift towards mass transit

Figure 4.1: Melbourne's CBD commuters face higher delays than Sydney's
Increase in travel time relative to free-flow



Source: Grattan Inst. (2017)

Managing Traffic Demand

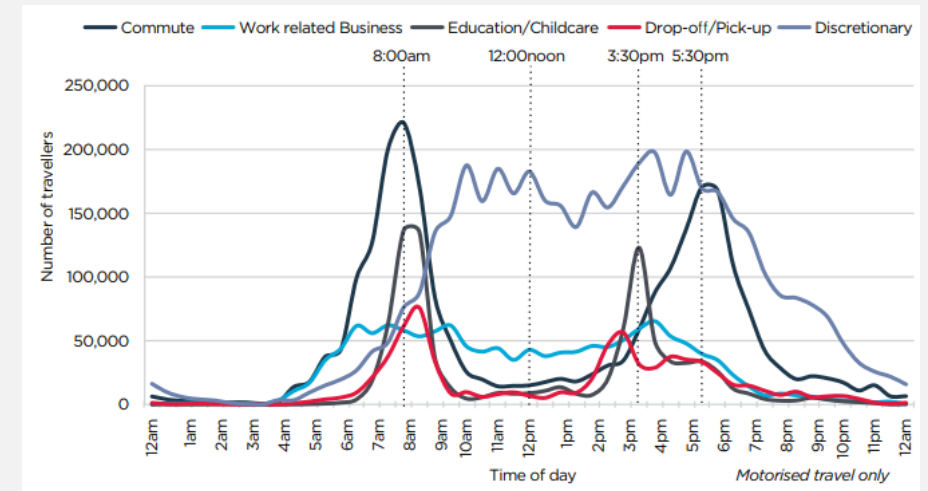


Peak spreading:

- Extending peak periods beyond 7 – 9 (AM peak) and 4 – 7 (PM peak)
- Early start of peaks to reduce excessive congestion

Ways:

- Lower off-peak fares for public transport.
E.g. Train/Metro fares in Sydney
- Separating school zone time from peak periods



Source: TfNSW (2014)

Managing Traffic Demand

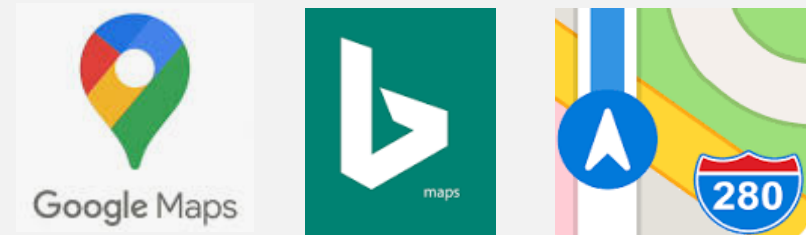


Traffic Diversion:

- Diverting excess demand to adjoining streets to avoid bottlenecks
- Requires proper planning and modelling
- Used in special events, work zones, etc.

Ways:

- Variable Message Signs (VMS)
- Route Planners



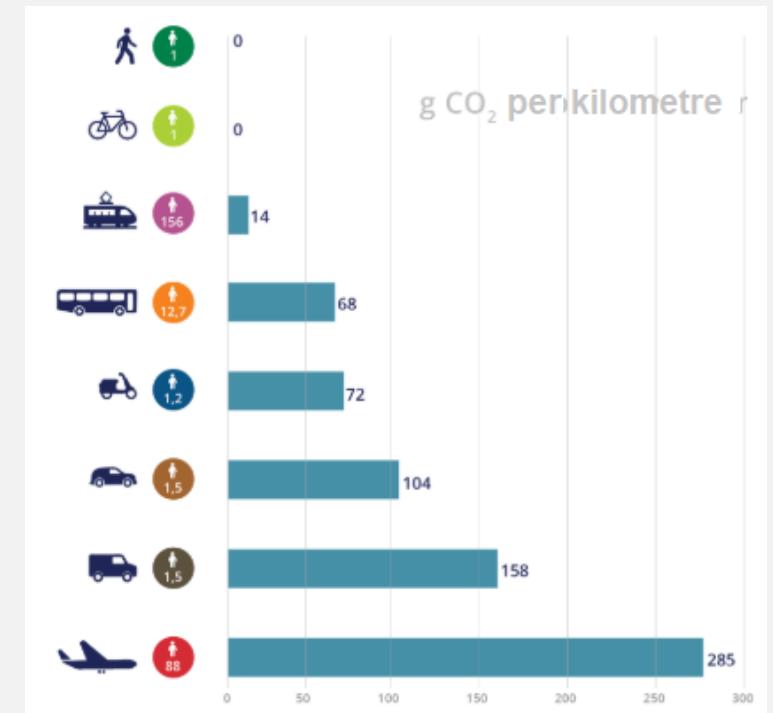
Managing Traffic Demand

Shift Towards Mass Transit:

- Higher average occupancy than cars (*thus, less traffic*)
- More equitable and eco-friendly (*thus, sustainable*)

Ways:

- Integrated public transit
- Better accessibility



Source: TfNSW (2014)

Time to Reflect



2. Select the odd one out:

A. Introducing toll roads

B. Work zone for construction

C. Peak/off-peak fares

D. Introducing bus lanes

Answer:

Option B is correct!

The other three options are demand management strategies.

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Thank you for participating

