Australasian Applicability of European Design Practice for

Street Running Light Rail

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Overview

1. Definition - Street running Light Rail
2. European system performance
3. French design practice
4. Application in Australasia
5. Micro-simulation as an LRT design tool
6. Summary and Conclusions

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1. Definition – Street running Light Rail

Light Rail Transit (LRT):

- Large vehicles 30m+
- (trams 10m to 24m)
- Low axle-load vehicle
- Low floor vehicles

Street Running

- Segregated from traffic in exclusive lanes

Collis and Elaurant 2016

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2. European LRT Performance

- What systems perform best?
- Is high performance only due to population density?

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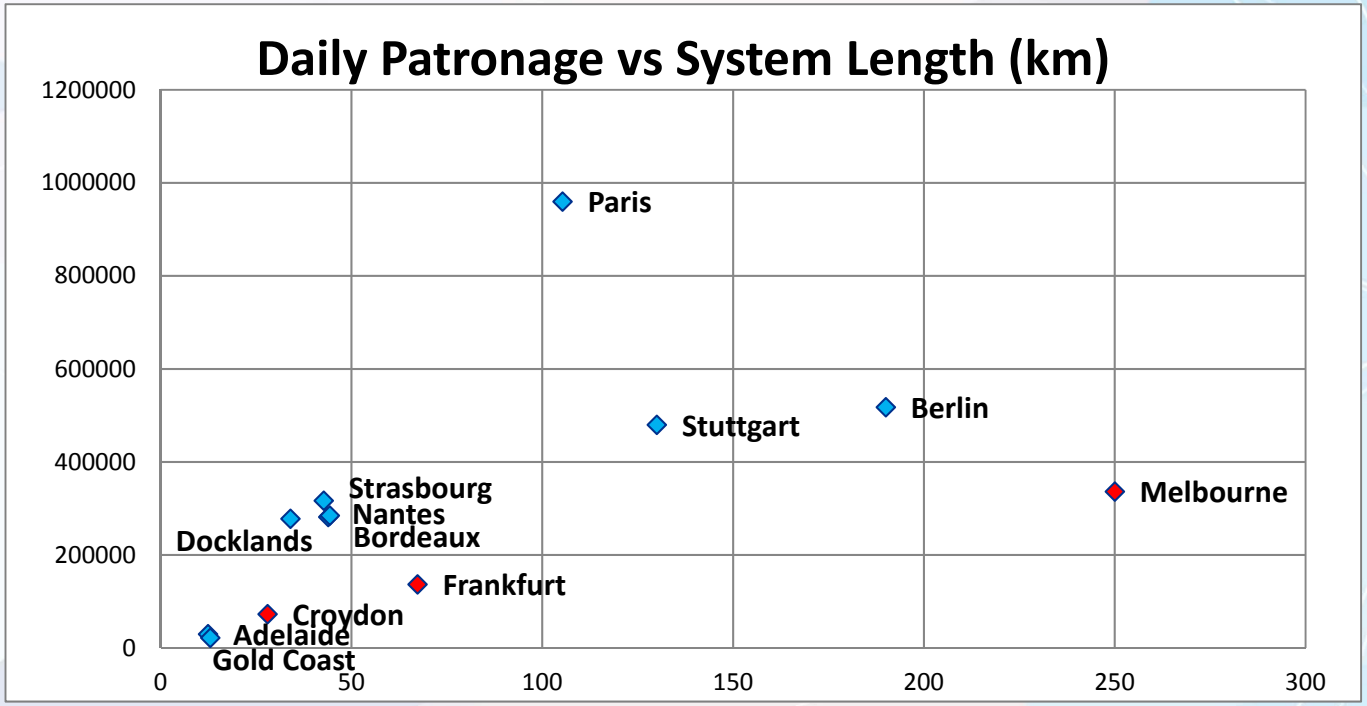
2. European LRT Performance



LRT (segregated) patronage higher than Tram (shared)

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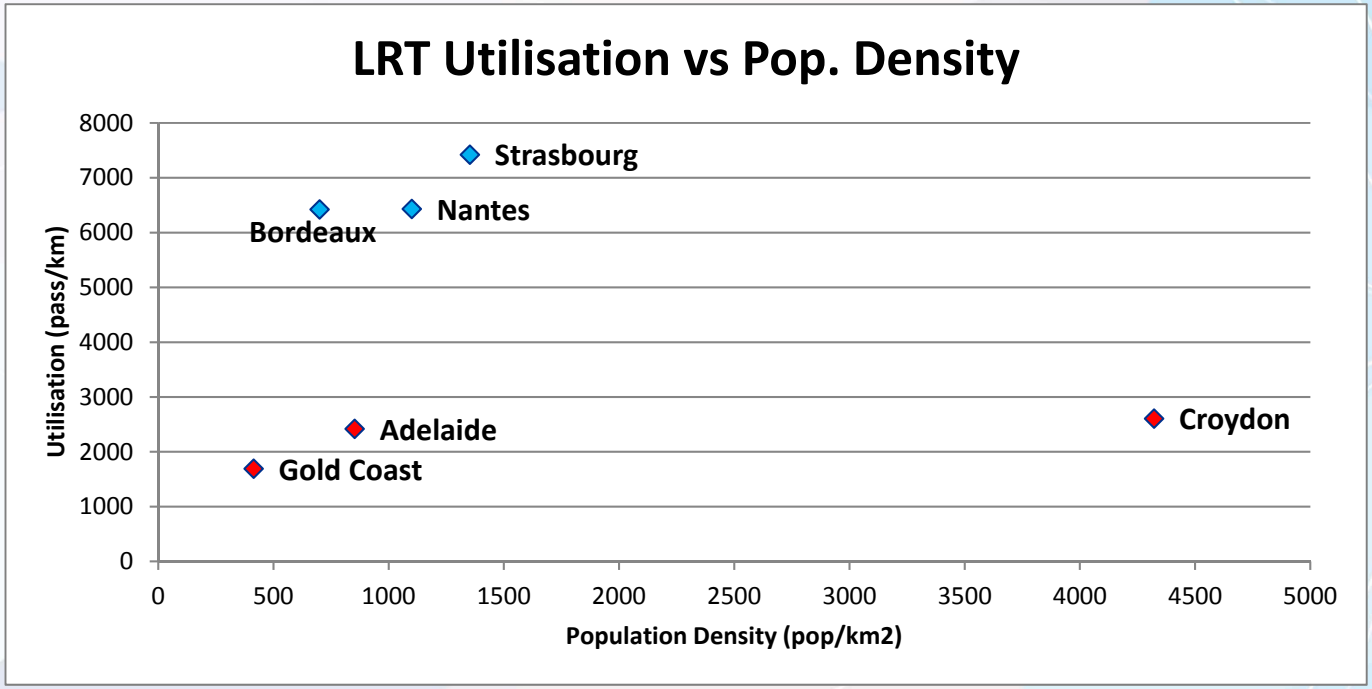
2. European LRT Performance



French LRT systems out-perform those in **other** countries.

What makes them perform so well?

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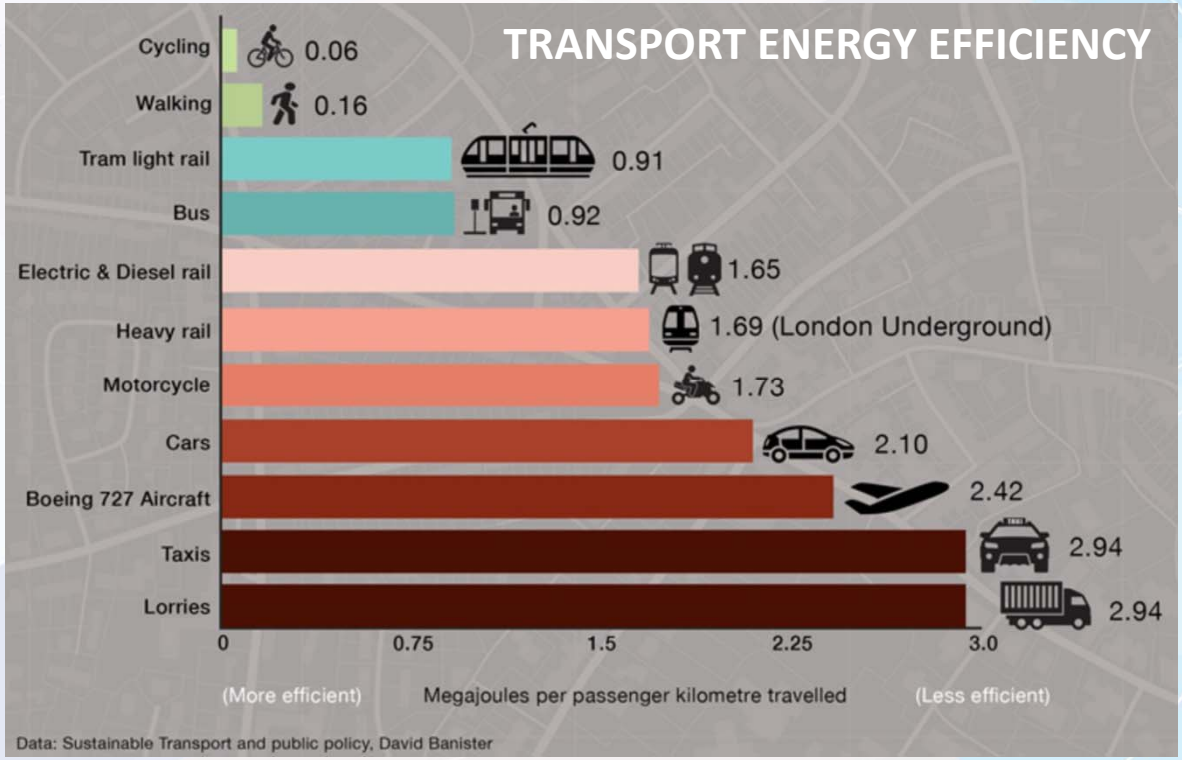
2. Sustainability: Energy use (Bannister)



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3. French LRT Design Practice

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3. French LRT Design Practice

1. Comparator cities: Bordeaux, Nantes, Strasbourg
2. Operations: level of service & speed
3. Key design features affecting transport performance

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3.1 Focus on Bordeaux, Nantes, Strasbourg

Bordeaux, Merignac suburb; LRT line under construction centre-left (Google Maps)

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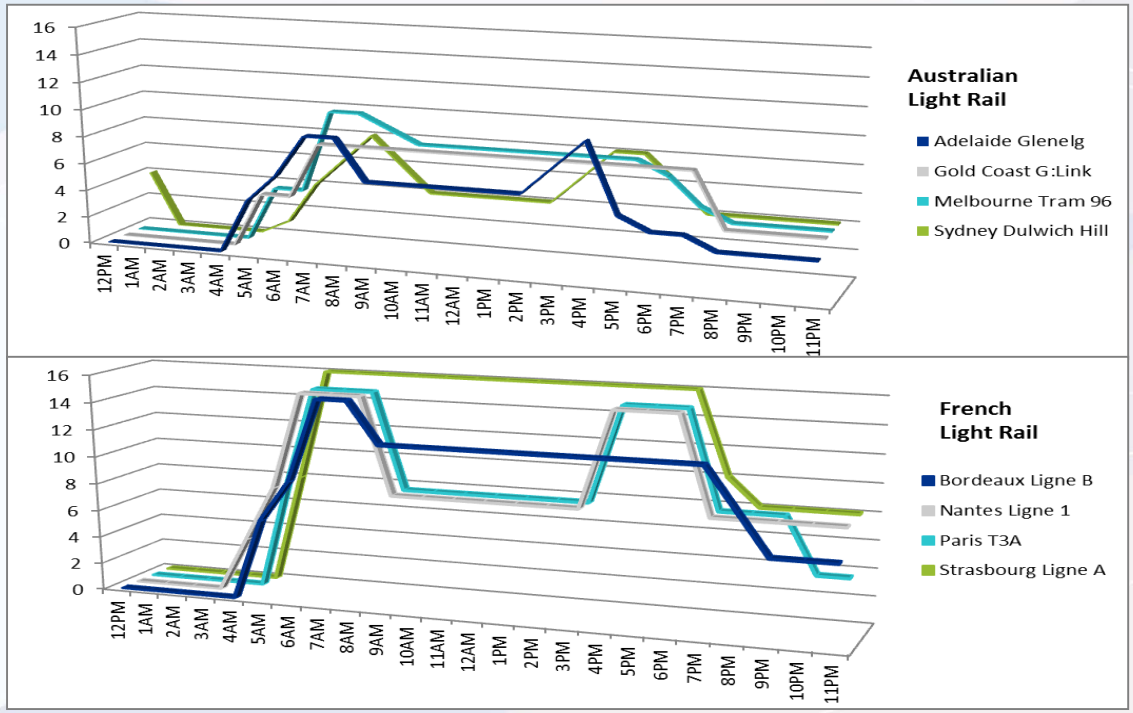
3.2 Operations – *high* level of service throughout day



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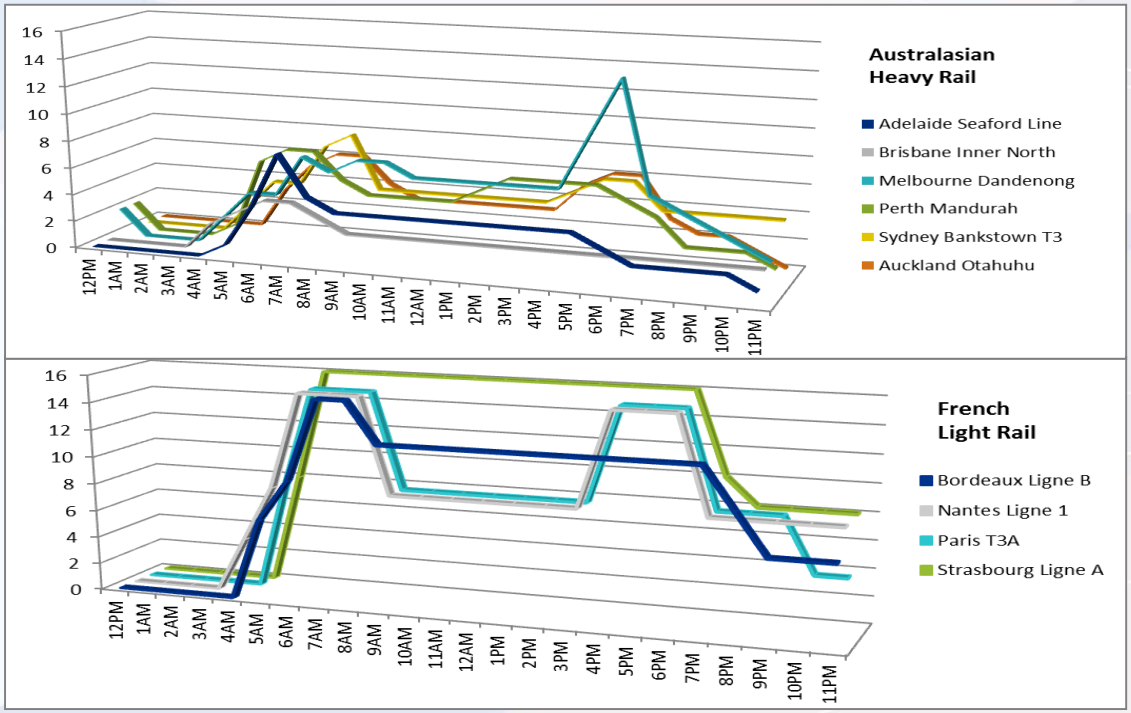
3.2 Operations – *high* level of service throughout day



Are Australasian Rail Assets under-utilised?

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3.2 Operations – average speed is *high*

City	Length (km)	Stops	Stop Spacing (m)	Corridor	Signal Priority	Avg. Speed (km/hr)
Bordeaux	44	90	488	Segregated	Yes; Pre-emption	23 km/hr
Nantes	44	83	534	Segregated	Yes; Pre-emption	21 km/hr
Paris	105	186	566	Segregated	Yes; Pre-emption	20 km/hr
Strasbourg	43	75	573	Segregated	Yes	18 km/hr
Adelaide	15	22	681	Segregated	No	17 km/hr
Gold Coast	13	16	813	Segregated	Yes; Pre-emption	23 km/hr
Melbourne	250	1763	142	Shared	No	16 km/hr
Sydney	13	23	565	Segregated	Yes	23 km/hr

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3.3 Design: Segregated track

No sharing with traffic:

- Safer
- More reliable
- Higher frequency
- Longer vehicles
- Higher capacity

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3.3 Design: Signal Priority

LRV has priority at signals – only stops for pedestrians

- Predictive logic: Signal dwell time <4%
- Paris: LRT average 20 km/hr; Metro 25 km/hr (Transdev)

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3.3 Design: Insertion into key centres

- LRT runs directly into centres
- Connects to:
- Hospitals
- Universities
- Shopping centres

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3.3 Design: Low Floor LRVs and integrated platforms

- Good accessibility
- High boarding capacity
- Improved amenity

Low floor LRT (Paris)

High floor LRT (Stuttgart)

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3.3 Design: Make Active Transport attractive

- Make LRT corridors attractive walking environments
- High quality paving
- Grass track
- Street trees

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3.3 Design: Typical Cross Sections reduce road space

CBD/Main Street

Arterial Road

Sub-Arterial Road

Collector Street

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4. Applicability in Australasia

- Can it work here? Yes, it already does.

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4.1 Applicability in Australasia

- Lack of Australasian guidelines for LRT track design;
- French style street running LRT examples:
  - Implemented in Sydney, Gold Coast, Adelaide
  - Under construction for Sydney SE, Canberra
- First example with signal pre-emption is Gold Coast

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4.2 Design process

- Different to road design: Focus on LRT priority, pedestrian access
- Ensure LRT can maintain uninterrupted path
- Reprogram signal phasing to achieve LRT priority
- Traffic lanes to maintain access & connectivity

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4.3 Applicability in Australasia

- Conventional traffic management used to control street running

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5. Micro-simulation

1. Simulates interactions between general traffic and LRVs
2. Visual simulation is more meaningful to decision makers

Table 2: LRT Vehicle parameters can be modelled in micro-simulation

Parameter	Value
Acceleration	+ 0.9 m/s^2
Deceleration	- 0.8 m/s^2
Pedestrian area top speed	30 km/hr
Street running speed	50 km/hr

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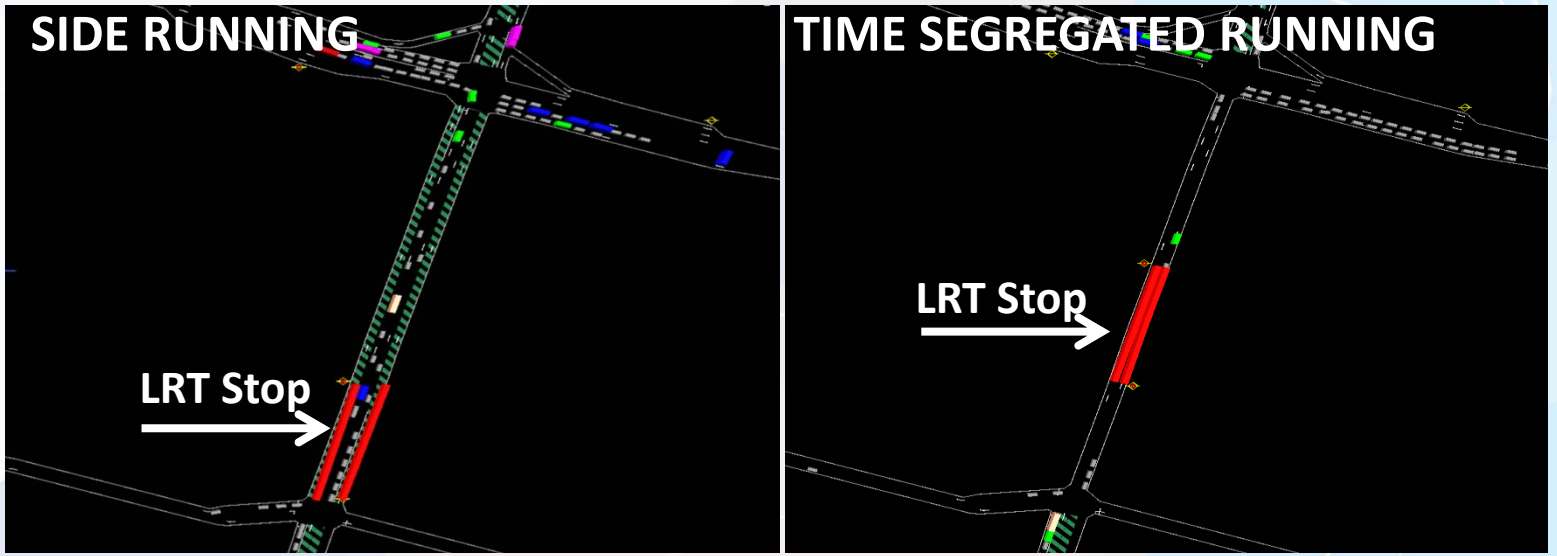
5. Micro-simulation

- S-Paramics and Aimsun used to model LRT in Auckland



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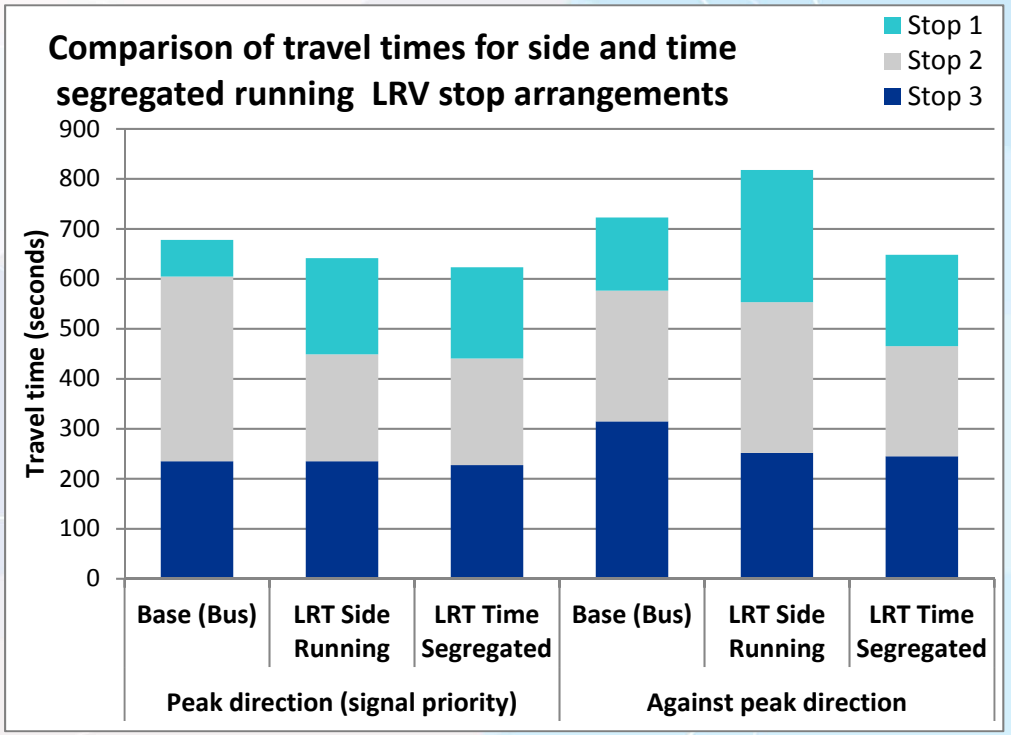
5. Micro-simulation

- LRVs with time segregated running are faster than the base case for buses and side running options



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6. Conclusions for Street Running LRT

- French approach to street running LRT has proven most effective
- LRT performance best with segregated track & signal priority
- Pedestrian and cycle access critical to integrate with LRT
- Strong emphasis on removing on-street parking & through traffic
- Focus on connecting to major destinations by LRT
- Application in Australasia
- Street running LRT can be implemented under Austroads guides
- Need to change transport planning methodology for LRT
- Micro-simulation can be used to test LRT performance & impacts

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