



Melbourne Public Transport Standards Review

Department of Transport

Melbourne

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the use and information of the client to whom it is addressed.*

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Executive Summary

The Department of Transport (DOT) has requested a brief review of Melbourne's public transport service standards.

In comparison to other Australian cities:

- Provision of bus services is generally comparable however Melbourne would appear to offer a lesser span of service.
- Melbourne has a more extensive train network in absolute terms. Melbourne's train network is 15% more extensive than Brisbane's and 7% greater than Sydney's network.
- Train network in relation to population size in Melbourne is between Brisbane (80% greater in length per person), and Sydney's network (17% less).
- Melbourne's railway station density (stations per person) is similar to Sydney and Brisbane and about 91% greater than the station density in Perth.
- Perth provides higher frequency and a longer span of service than Melbourne. Melbourne compares more favorably with Brisbane and Sydney.

In an international context:

- Cities in Eastern and Western Europe have public transport networks approximately three times as dense as Melbourne's per urban hectare.
- Service provision is lower in Melbourne with vehicle kilometers per person 137% lower than in Western Europe and 57% lower than in Eastern Europe.
- The average speed of Melbourne's public transport vehicles is faster than the average in sample cities in Asia, Eastern Europe and Western Europe. However Melbourne performs poorly in terms of the relative speed of public transport compared to cars at 74% of the average speed on the road network. This places Melbourne in the lower third of the cities reviewed.

1 Introduction

The Department of Transport (DOT) has requested a quick review of Melbourne's public transport service standards. The review considers Melbourne's current service standards policy and practice and benchmark these findings to other cities in Australia and internationally.

The level of public transport service offered to potential users is critical given that service standards determine the cost of service provision, effectiveness of public transport and equity of mobility provided to people without other means of travel.

Booz and Company (Aust) Pty Ltd has been appointed to assist the DOT in undertaking this review. The report is structured as follows:

- **Section 2** reviews Melbourne public transport service standards. This review is policy based and establishes Melbourne's service standard policy for coverage, density, frequency, speed and span of bus and train service.
- **Section 3** is a comparison of Melbourne service standards in a national context. This comparison includes a review of bus service *policy* and train service *practice*.
- **Section 4** is a comparison of Melbourne service standards in an international context. The review compares public transport service standard *practices* in cities in Asia, North America, Eastern Europe and Western Europe. This section also a discussion of two select case-studies regarding service provision policy standards in Singapore and tram priority and speed in Montpellier.

As noted above it is possible to discuss service standards with regard to either practice or policy. Service standard policy are the documented government targets or aspirations for service provision. Service standard practice is the *actual* level of service provision.

Data for this report has come from three main sources:

- Previous Booz Allen Hamilton analysis: The analysis of Australian bus services standards is a revision of work previously undertaken for the Department of Infrastructure in 2002.
- Timetables and route networks: The review of Australian train service standards has been undertaken by analysing timetables, route information and other statistical information readily available on the internet.
- UITP *Mobility in Cities*, 2001: The review of international public transport standards was conducted using data from the 52 cities in this source.

1.1 Scope

There are two potential aspects of public transport service standards – quality and provision. *Service quality standards* is considered to be aspects such as reliability, punctuality and levels of customer satisfaction. *Service provision standards* are aspects of the network including, frequency, speed, coverage, density and span of hours. It is the latter aspect of service standards with which this report is concerned.

This review will consider the following key factors with regard to service standard provision:

Standard	Measure
Network Provision of train system;	Length of Railway network (km) Length of Railway network per person (m/person)
Density of train system;	Hectares per kilometre of railway line Hectares per train station
Frequency of service;	Headway between: <ul style="list-style-type: none">▪ AM/PM Peak Weekday Services▪ Evening Weekday Services▪ Saturday Services▪ Sunday Services
Comparative public transport vehicle speed to road network speed;	Average public transport speed (all modes) Average public transport speed (road modes) Public Transport Speed as a Ratio of Road Network Speed
Span of hours of service;	Operating hours on Weekday/Weekend
Reserved routes ;	Length of reserved public transport routes per urban hectare Length of reserved public transport routes per person
Service Provision.	Public Transport Vehicle Kilometers per Urban Hectare Public Transport Vehicle Kilometers per person

2 Melbourne Standards

The public transport service quality standards are set out between the State Government and private operators in the agreements between these two parties (see for example the Public Transport Division's "Track Record"). However Melbourne's service provision standards are more ambiguous. This aspects of Melbourne's public transport service standards are largely undefined as shown in Table 1.

The only policy statement on provision of service is Meeting our Transport Challenges (MOTC) through the address of higher-level service targets such as:

- A public transport network which supports a world class lifestyle;
- Accessible and connected communities
- A safer and more secure system
- Less congestion

Table 1 Melbourne's public transport service standards/policy

Service	Policy/Standard	
	Melbourne- bus	Melbourne- rail
Coverage of public transport system	<ul style="list-style-type: none"> ▪ It is a general 'rule of thumb' that public transport should be within 400m of 90% of houses in the urban area. The previous standard relating to percentage of houses within 400m of a public transport route no longer applies¹ in the latest bus contracts. 	
Density of public transport system	<ul style="list-style-type: none"> ▪ Nil 	<ul style="list-style-type: none"> ▪ Nil
Frequency of Service	<ul style="list-style-type: none"> ▪ Smartbus weekday headway: 15min ▪ Smartbus weekend headway: 30 min². 	<ul style="list-style-type: none"> ▪ Nil
Vehicle speed	<ul style="list-style-type: none"> ▪ Nil 	<ul style="list-style-type: none"> ▪ Nil
Span of hours of service	<ul style="list-style-type: none"> ▪ 5am to midnight (Smartbus) ▪ 6am to 9pm on weekdays ▪ 8am to 9pm on Saturdays ▪ 9am to 9pm on Sundays 	<ul style="list-style-type: none"> ▪ Nil

¹ This standard was in the former Metropolitan Buses Transport Services Agreement

² Department of Transport, 2006, MOTC, p36

3 Melbourne in a National Context

This section examines Melbourne's public transport service standards in comparison to those in Sydney, Canberra, Adelaide, Perth and Brisbane. A comparison of Melbourne's service provision standards against other Australian cities is particularly relevant since urban conditions such as density, modal split and population and land use integration are reasonably similar.

The first section of this chapter will be a comparison Melbourne against capital cities in Australia. There is an analysis of bus service standards (policy) and rail service standards (practice) across Australian capital cities. The second part of this chapter will be a the comparison of public transport service standards across a broader selection of international cities.

3.1 National Bus Service Standards Comparison (Policy)

This section compares policies for service provision standards across Australian sample cities and is a revision of work previously undertaken for the Department of Infrastructure in 2002. Table 2 illustrates the service standards used in other Australian cities compared to those in the Melbourne contracts.

In summary, the data shows that:

Coverage of bus system

- Melbourne's practice seems to be broadly in line with other cities. (With the exception of Melbourne all capital cities have a standard relating to bus service coverage.)

Frequency of bus service

- The frequency of Melbourne's Smartbus routes is comparable to the best of the Australian cities.
- There are no frequency standards for non-smart bus routes but the practice of hourly minimums appears to be in-line with other cities.

Span of hours of bus services

- Melbourne weekday minimum service finish times are considerably below the standard of all other Australian cities. Melbourne has a minimum finish time of 9p.m. whilst almost all other cities suggest finish times between 11p.m. and midnight.

Table 2 Comparable bus service standards (policy) in Australian capital cities³

Comparable Bus Service Standards in Australian Major Cities ⁴						
Service Feature	Sydney	Canberra	Adelaide	Perth	Brisbane	Melbourne
Coverage of bus system	95% within 400m 95% within 800m for infrequent routes	Weekday – within 500m for 95% residents 85% employment/ retail areas Weekend less	Mond-Sat within 500m of 95% residents Evenings/Sundays within 1000m 95% residents	Weekday Daytime 400m for 90% residents Other times 600m for 90% residents	Citybus/School within 300-400m Express bus 500-600m	A general rule that public transport should be within 400m of 90% of houses in the urban area. A standard relating to percentage of houses within 400m of a public transport route no longer applies ⁵ .
Frequency of bus service	Peak 20-60mins Interpeak 20-120mins Evening 30-60/0mins Saturday 20-60/0mins Sun 30-120/0mins	Peak 15/30mins Interpeak 30/60mins Evening 30/90mins Saturday 30/60mins Sun 60/90mins	Peak 10/15/20/30mins Interpeak 15/30/60mins Evening 0/30/60mins Saturday 15/30/60mins Sunday 0/30/60mins	Peak 0/30mins Interpeak 60mins Evening 120mins Saturday 120mins Sunday 120mins	Peak 15mins Interpeak 30/60mins Evening 30/60mins Saturday 30/60mins Sunday 30/60mins	Smartbus weekday headway: 15min Smartbus weekend headway: 30 min ⁶ . No standard for non-Smartbus routes although hourly is minimum being adopted in practice
Span of hours of bus services	Weekday 0600-2330 Some 0600-2130 Saturday 0600-0030 Some 0830-1730 Sunday 0800-2200 Some No Service	Weekday 0600-2400 Saturday 0645-2400 Sunday 0815-1845	Weekday 13 hr day and 5 hr evening Saturday 12hr day and 5hr evening Sunday 16 hours	Weekday 0600-2330 Saturday 0600-2330 Sunday 0900-1930	Weekday 0530-2330 Saturday 0700-0130 Sunday 0730-2200	5am to midnight (Smartbus) 6am to 9pm on weekdays 8am to 9pm on Saturdays 9am to 9pm on Sundays

³ Booz Allen Hamilton analysis for NSW Department of Transport, 1999, *REVIEW OF THE POLICY FOR DETERMINING SERVICE LEVELS FOR COMMERCIAL BUS CONTRACTS - METROPOLITAN AREA*, Appendix 1; and

Booz Allen Hamilton analysis, for Department of Infrastructure, 2002, *Service Standards Development*, p9

⁴ Sydney, Canberra, Adelaide, Perth and Brisbane based on 1999 data, Melbourne based on current data.

⁵ This standard was in the former Metropolitan Buses Transport Services Agreement

⁶ Department of Transport, 2006, MOTC, p36

3.2 National Train Service Standards Comparison (Practice)

This section is an analysis of practices for rail service provision standards across a selection of Australian sample cities. Data for this part of the review has been gathered through timetable and route analysis and other statistical information readily available on the internet.

There are some notable differences in a comparison of Melbourne's rail service practices in comparison to other capital cities around Australia. These are as follows:

Rail Network

- Melbourne's length of reserved routes (380km) for rail is 15% greater than that of Brisbane (322km) and 7% greater than Sydney's reserved routes for rail (353km).

Network Provision per Person

- Whilst the length of Melbourne's train lines is comparable to Brisbane the larger population size in Melbourne shows that Brisbane has 80% greater length of rail system per inhabitant than Melbourne.
- There is 0.097m of rail line for each one person in Melbourne compared to Sydney which had 0.063m. This indicates that Sydney's network is 17% less in length compared to population size.
- Melbourne has the second lowest coverage of rail system in comparison to its population size.

Density of rail system

- The density of the rail system is measured in both station density and railway line density:
 - Melbourne had a similar railway station density per urban hectare to Sydney and Brisbane. Melbourne had one station for each 4077 hectares of urban area. This density of railway stations is 91% greater than Perth, which had 7805 hectares for each station.

Frequency of rail service

- Some Melbourne services have lower frequencies to those of Sydney and Perth, which tend to have more consistently high frequencies.
- Melbourne generally has higher frequencies on evenings and weekends than Sydney or Brisbane but lower than Perth which provides a standard 15 minute service.

Span of hours of rail services

- Sydney had the most expansive span of hours operating almost 24 hours on weekdays. In comparison, Melbourne's rail services generally started one hour later and finished 3 hours before Sydney's on weekdays.
- Both Brisbane and Sydney both have consistent spans of hours between Saturday and Sunday. As Melbourne has a varied span between Saturday and

Sunday services Melbourne has a significant span reduction on Sunday in comparison particularly in comparison to Sydney and Brisbane and to a lesser extent to Perth.

- Perth offers a much later Saturday night rail service than any of the Australian comparison cities.
- Melbourne's rail span of hours is generally shorter than Sydney and Perth. The Sunday service span is shorter than all Australian comparison cities.

Table 3 Comparable train service standards (practice) in Australian capital cities

Service Feature	Sydney	Perth	Brisbane	Melbourne
Reserved routes for rail (km)	353	173	322	380 ⁷
Coverage of rail system: Length of Railway line per person (m)	0.082	0.111	0.178	0.098
Density of rail system: Hectares per station	3968	7805	4129	4076
Density of rail system: Hectares per km of railway line	3435	3111	1830	2317
Approximate Frequencies of rail service				
M-F Peak (am) Inbound ⁸ :	10min	5 to 10min	15 to 30min	8 to 15min
M-F Peak (pm) Outbound:	6 to 10min	3 to 10min	15 to 30min	5 to 10min
M-F Evening (post 8pm) Outbound:	30min	20 to 30min	30min	10 to 20 min
Sat (middle day, inbound):	30min	15min	30min	20min
Sun (middle day, inbound):	30min	15min	30min	20min
Average Span of hours of rail services				
Weekday	03:49-3:05	05:14- 0:18	4:46- 23:26	04:35-0:19
Saturday	04:12-01:38	05:39- 02:02	4:56- 0:26	04:41-0:21
Sunday	04:12-01:38	06:06- 0:03	4:56- 0:26	07:10-0:04

⁷ Department of Infrastructure, 2005, *Public Transport Partnerships: An overview of rail franchising in Victoria; and Booz and Company (Aust) Pty Ltd analysis*

⁸ M-F Peak (am and pm) calculations made based on frequencies from final station in Metropolitan area.

Summary Bus Policy Score-card

Measure	Rating
Coverage	With the exception of Melbourne all capital cities have a standard relating to bus service coverage
Frequencies	There are no frequency standards for non-smart bus routes.
Span	Melbourne's bus weekday minimum service standards for finish times are considerably below the standard of all other Australian cities. Melbourne non-Smartbus routes have a minimum finish time of 9p.m. whilst almost all other cities have finishes between 11p.m. and midnight.

Summary Train Practice Score-card

Measure	Rating
Reserved routes	Melbourne's length of reserved routes (380km) for rail is 15% greater than that of Brisbane (322km) and 7% greater than Sydney's reserved routes for rail (353km).
Coverage	Melbourne has the second lowest coverage of rail system in comparison to it's population size.
Station Density	Melbourne had a similar railway station density to Sydney and Brisbane and 91% greater density than Perth.
Frequencies	<p>Some Melbourne services have lower frequencies to those of Sydney and Perth, which tend to have more consistently high frequencies however Melbourne performs better for off-peak services.</p> <p>The frequency of Melbourne's Smartbus routes is comparable to the best of the Australian cities.</p>
Span	Melbourne's rail span of hours is generally shorter than Sydney and Perth. The Sunday service span is shorter than all Australian comparison cities.

4 Melbourne in an International Context

The international comparison of service provision standards is divided into two parts. The first part is a quantitative analysis of Melbourne in comparison to 52 cities in Asia, North America, Eastern Europe and Western Europe. This analysis has been completed using the International Association of Public Transport (UITP), *Mobility in Cities Database, 2001*. The cities included in this assessment are shown at Appendix 1. The second part of the international comparison is a qualitative consideration of specific case-study cities.

4.1 International Public Transport Service Standards Comparison

This quantitative assessment of service standards will include service provision (density and frequency of service), speed (including relative speed of road and public transport modes) and reserved routes for public transport.

Service Provision

In the following three figures service provision is measured taking into account the density of public transport services and frequency of service. Vehicle kilometres (VKM) takes into account the length of the network and the amount of times a vehicle travels on it.

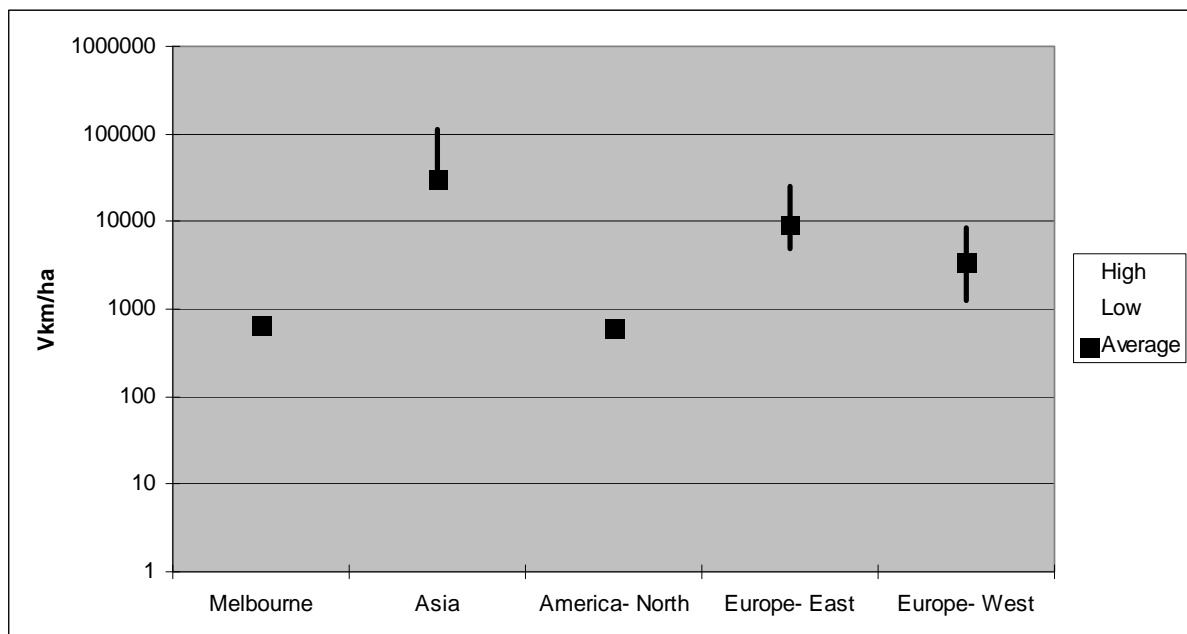


Figure 1 Public Transport Vehicle Kilometers per Urban Hectare

Melbourne has 650 public transport vehicle kilometres per urban hectare. In comparison, sample Eastern European cities have over 4 times as many and Western European have more than 13 times the amount of public transport vehicle kilometres per urban hectare.

Cities with a higher population density would generally be expected to have a greater rate of vehicle kilometres per urban hectare (Figure 1). These cities would require a

greater number of vehicle kilometres over a smaller number of hectares, whereas a public transport network in a more sprawled city such as Melbourne generally has a larger task having spread it's vehicle kilometres over a greater area.

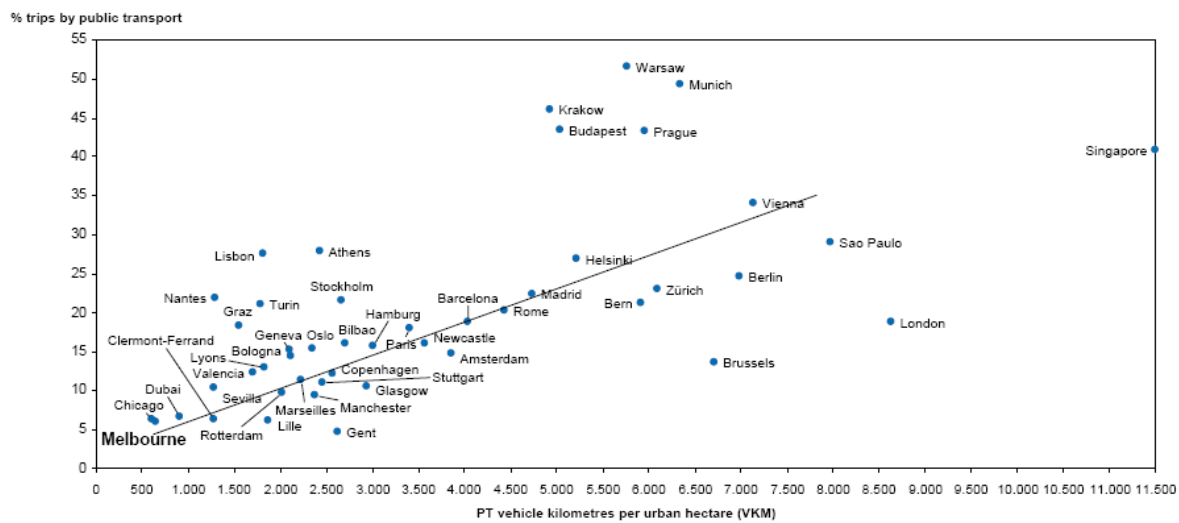


Figure 2 Public Transport Vehicle Kilometers per Urban Hectare by % of daily trips by public transport

As shown in Figure 2 there is a trend between the public transport vehicle kilometers per urban hectare (level of service provision) and the percentage of daily trips made by public transport.

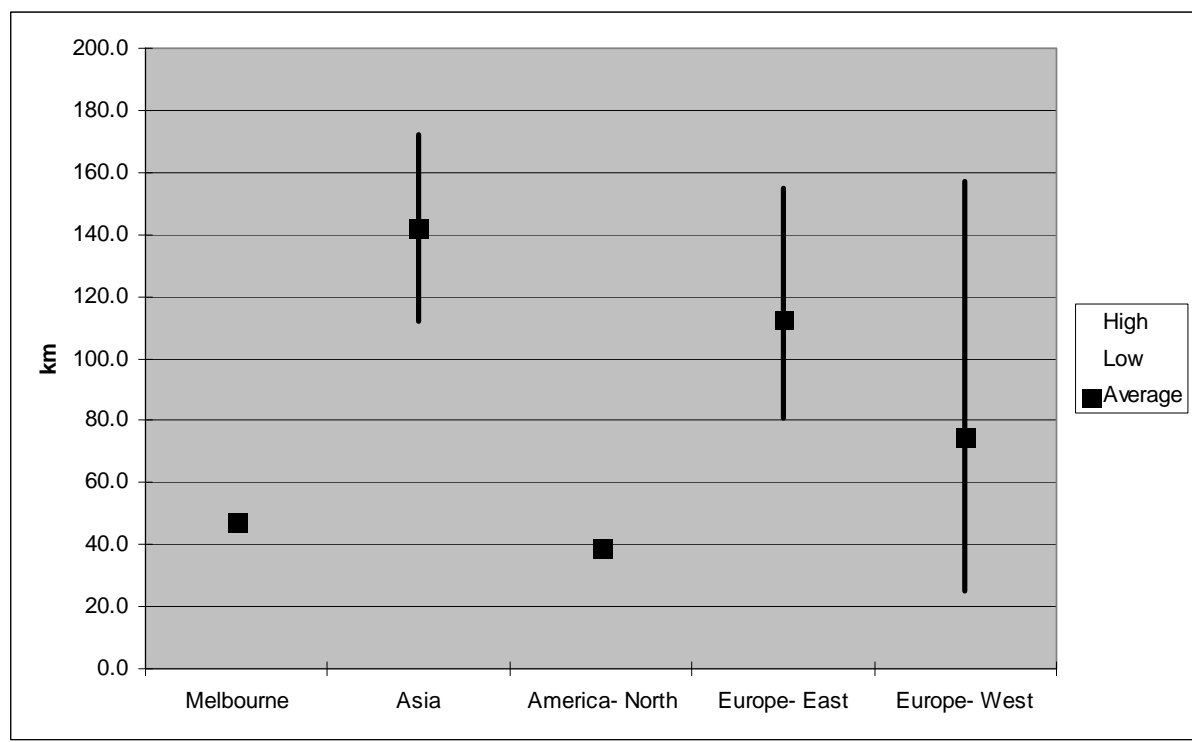


Figure 3 Public Transport Vehicle Kilometres per Person

Whilst Figure 1 considers public transport provision *per urban hectare* Figure 3 removes population density as a variable and considers public transport provision

per person. This is a measure of public transport investment per head of population. Melbourne has a 47.6 vehicle kilometres per person. By comparison, Eastern Europe's vehicle kilometres per person is 137% higher (113 VKM) and Western Europe's is 57% higher (75 VKM).

4.1.1 Public Transport Speed

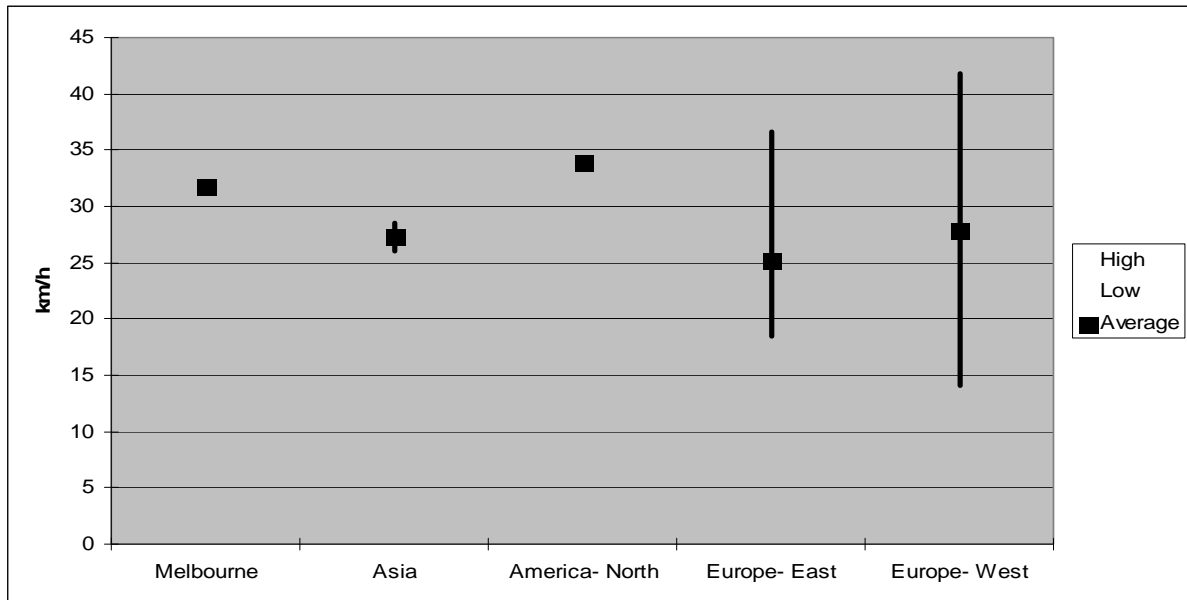


Figure 4 Average public transport speed (all modes)

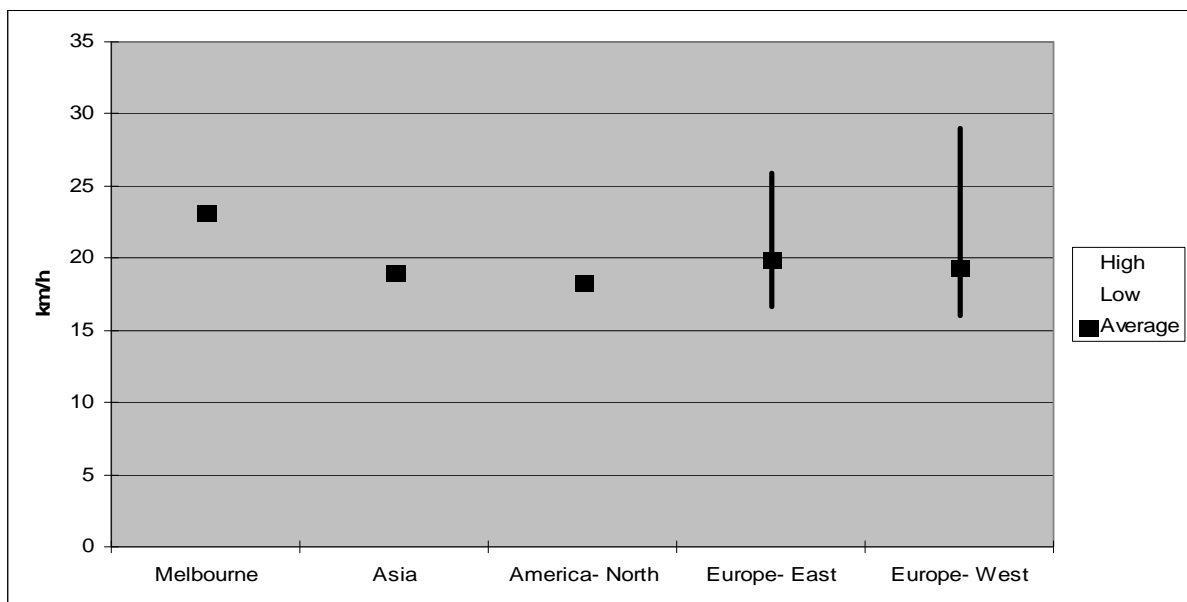


Figure 5 Average public transport speed (road modes)

The speed of public transport in Melbourne (31.7km/h) is 14% faster than the average speed in sample cities in Asia, 21% faster than Eastern Europe and 12% faster than Western Europe.

In comparison, the speed of road-based public transport (23.1km/h) is significantly less in Melbourne in comparison to total public transport speed. However, it is still 18% faster than the average speed of road based public transport in sample cities in Asia, 16% faster than Western Europe and 14% faster than Eastern Europe.

Public Transport Speed as Ratio of Road Network Speed

This section compares public transport and private transport vehicle speeds. This comparison gives an understanding of the relative *appeal* of using public transport or private transport in each of the sample cities.

Figure 6 gives a ratio of private and public transport vehicle speeds with 100% being equal speeds for public transport and the road network.

Public transport speeds in Melbourne were 74% of the average speed on the road network. This places Melbourne 29th of the 39 cities reviewed. By comparison, there are a number of cities where public transport speeds exceed road network speed. These cities are London, Munich, Moscow, Hamburg, Rome, Bern, Barcelona and Rotterdam. Stockholm, which has the most similar population density to Melbourne within this particular sample, achieves public transport speeds 94% of road network speeds.

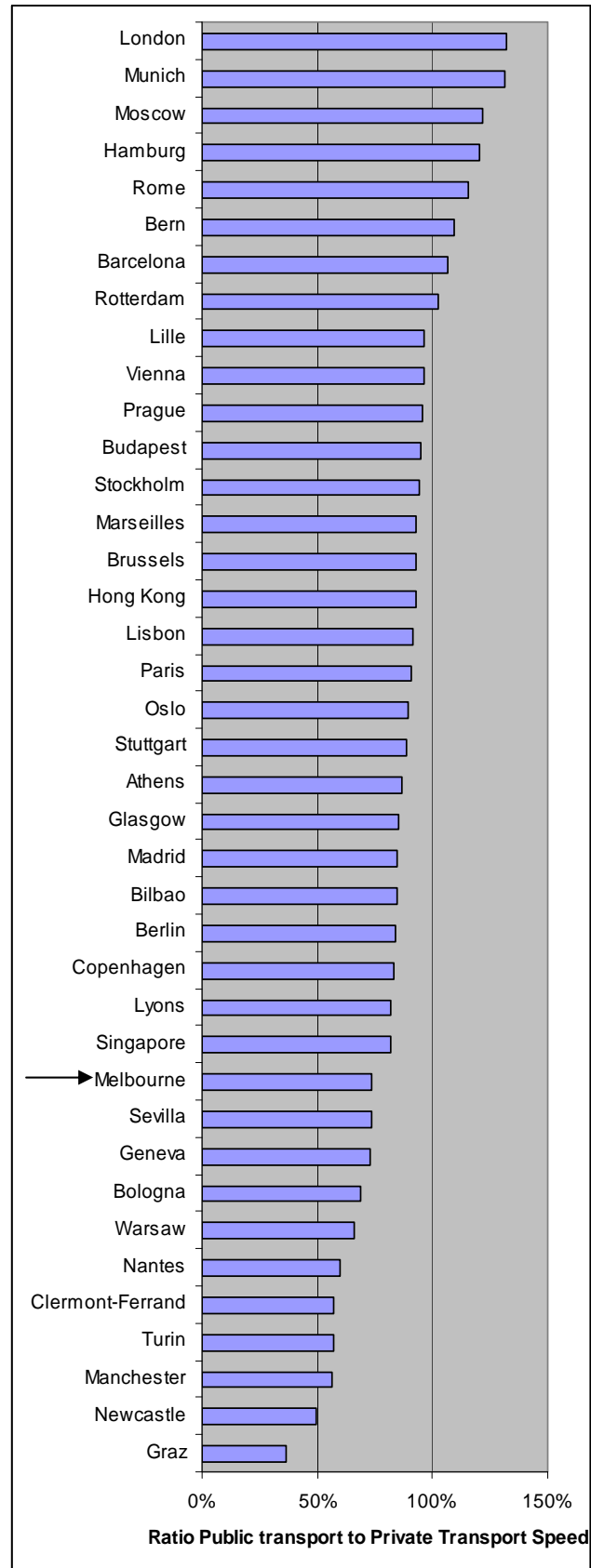


Figure 6 Public transport to private transport vehicle speed ratio



Reserved routes for public transport

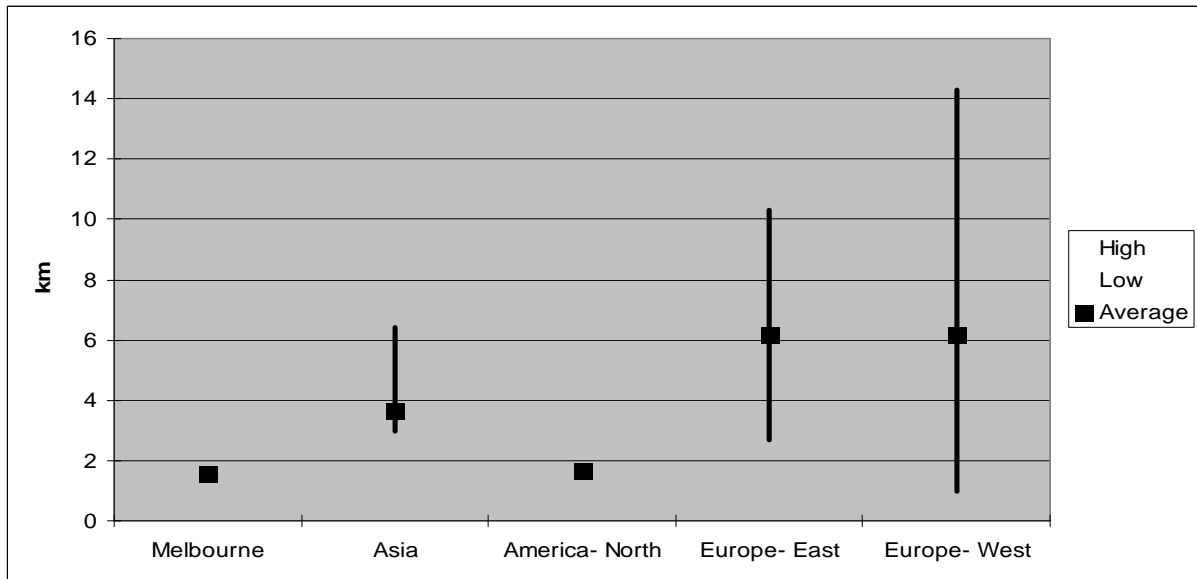


Figure 7 Length of reserved public transport routes per urban hectare

Melbourne has 1.57km of reserved public transport routes per urban hectare. Cities in Eastern and Western Europe have reserved public transport networks approximately three times as dense per urban hectare.

The only cities involved in this comparison which had less reserved public transport per urban hectare were Clermont-Ferrand (0.98km), Graz (1.04km), Bologna (1.44km) and Marseilles (1.54) although these are all significantly smaller cities in population and area⁹ and therefore are difficult to compare individually.

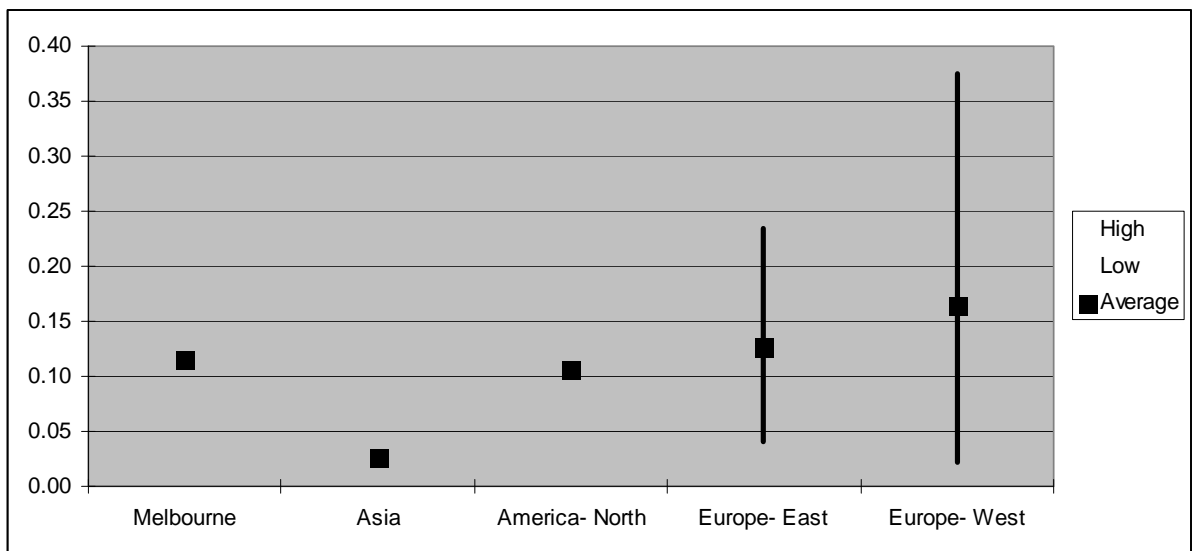


Figure 8 Length of reserved public transport routes per person (m)

⁹ Population is between 264,000 and 800,000 people (compared to 3.37 million in Melbourne) and area is between 59km² and 136km² (compared to 2459km² in Melbourne).

Figure 8 shows the length of reserved public transport routes per person. Density is a significant factor in the length of public transport routes for each person. For example, denser cities such as those in the Asia sample have a much shorter length of public transport route length per person as service can be provided to a greater number of people with less infrastructure. Melbourne has 0.12m of reserved public transport routes per person whereas cities in the Asian sample had an average of 0.03m. Melbourne has 43% longer reserved public transport routes per person than the average in Western European cities and 10% longer compared to Eastern European cities.

Summary Score-card

Measure	Rating
Service Provision	<p>Sample Eastern European cities have over 4 times and Western European have more than 13 times the amount of public transport vehicle kilometres per urban hectare.</p> <p>Compared to Melbourne, sample cities in Eastern and Western Europe have 137% and 57% higher vehicle kilometres per person respectively.</p>
Public Transport Speed compared to Road Network Speed	<p>The speed of public transport in Melbourne is 14% faster than the average speed in sample cities in Asia , 21% faster than Eastern Europe and 12% faster than Western Europe.</p> <p>Public transport speeds in Melbourne were 74% of the average speed on the road network.</p>
Reserved routes	<p>Cities in Eastern and Western Europe have reserved public transport networks approximately three times as dense as Melbourne's per urban hectare.</p>

4.2 Specific Case-Studies

The Department of Transport has asked that aspects of service provision standards in Montpellier and Singapore be examined.

Montpellier, France: Tram Right of Way

Exclusive right of way transit systems are defined as segregated transit systems, on rail or other guided methods, even on wheels provided that the system operates continuously on a reserved lane. The urban transport sector in France is presently in an expansion phase. Many medium and small sized French cities, such as Orléans, Montpellier, Clermont-Ferrand, have decided to expand their public transport network. In total, 62 new exclusive right of way transit system projects were in evidence at the beginning of 1999¹⁰.

Montpellier's new tramway system opened to the public in 2000. Montpellier is currently working on extension proposals to this system. Line 1 and 2, currently in operation has a total length of 35km. A third line, opening in 2012 will add an additional 23km to the system.

In 1995 city leaders decided Montpellier needed a long-term solution for the growing transport problems beyond their existing bus service¹¹. With speeds of up to 80km/h, trams are seen as a more viable long-distance solution in Montpellier. The tram system has a headway varying between 5 and 7 minutes according to the time of the day. In comparison, City buses operate on a less frequent basis of around 8-15 minutes in peak hour and the suburban bus operation, servicing areas beyond the tram network operate around every 30 minutes.

Montpellier is not an easily-transferrable case-study to a Melbourne scenario. However, it does offer a good example of the potential functionality of a tram network with regard to speed when right of ways are created.

¹⁰ World Bank, 2000 *World Bank Urban Transport Strategy Review: Review of French Experience* (siteresources.worldbank.org/INTURBANTRANSPORT/Resources/pub_sect_finan_berger.pdf)

¹¹ *Railway Technology.com*, 2008, 'Montpellier Light Rail Network, France, (www.railway-technology.com/projects/montpellier/)

Singapore- Public Transport Service Standards Policy

Singapore uses an interesting selection of public transport service provision standards (

Table 4).

Table 4 Singapore Public Transport System Goals and Service Provision Policy Standards

Goal	Service Standard	Policy Target
1. Increasing PT mode share to 70% of morning peak hour journeys - PT to be a mode of choice, competitive with car use	AM Peak PT Mode Share Off-peak PT Mode Share Relative PT travel time to motorcar travel time	70% AM peak PT journey time \leq 150% car journey time
2. Meet the needs of diverse population - To offer a range of differentiated services at different prices to suit different market segments	Temporal Coverage Spatial Coverage <i>Inclusiveness – proportion of service meeting relevant standards for people with disabilities</i>	PT services operate at least 18 hours per day
3. To be accessible, easy to use, convenient, seamless (integrated), speedy, comfortable, safe and affordable	Service Quality Index Journey time	85% of all PT journeys must be no more than 60 mins (door to door)
4. Value for money	Cost to Users <i>Operator viability</i>	Does not exceed PT fare cap <i>No operators fail (i.e. directly as a result of the licencing regime)</i>

The above service standards apply to the public transport system as a whole. For the bus system, a more specific set of service standards is applied. There are a number of bus system service standards that are particularly interesting around availability of the service. These standards specify accessibility of bus stops to populations, nominate routes between housing areas and centres for major employment activities operating hours and frequency of service. Whilst not necessarily immediately transferrable to the Melbourne context these standards do suggest a thorough understanding of the populations movement needs and a generosity of service provision with regard to operating hours and frequencies.

By comparison, Melbourne's service standards deal with limited targets relating to span of hours and frequency of services for buses only.

Table 5 Singapore Bus System Goals and Service Provision Policy Standards

Measure	Service Standard	Policy Target
Loading	Bus loading during weekday peak periods on each bus service	Not exceeding 95% daily.
Safety	Accident rate on all bus services	Less than 0.75 accidents per 100,000 bus-km per month.
Availability	Access to any bus service	To run at least one bus service within 400m radius of any development subject to minimum demand.
	Provision of direct bus service connections	<i>To run direct bus services:</i> a) Between an Housing Development Board (HDB) neighbourhood and a nearby bus interchange or MRT station. b) Between major employment/ activity centres and a nearby bus interchange or MRT station. c) Between HDB towns and the Central Business District, and Jurong Industrial Estate.
	Bus service operating hours	At least 18 hours daily, unless otherwise stipulated.
	Bus service scheduled headways (frequencies)	a) At least 80% of bus services to operate at headway of not more than 15 minutes (to be changed to 10 minutes with effect from Aug 2009) during weekday (excluding public holidays) peak periods, unless otherwise stipulated. b) At least 85% of bus services to operate at headway of not more than 20 minutes during off-peak periods, unless otherwise stipulated. c) 100% of bus services to operate at headway of not more than 30 minutes, unless otherwise.
Integration	Bus service integration in Housing Development Board Towns	a) At least one bus service to depart from the bus interchange/terminal at 6.00 am or earlier, daily. b) At least one bus service to depart from the bus interchange/terminal at 12 midnight or after the last train service, whichever is later, daily.
Information	Availability of up-to-date information	a) To provide hotline and information on internet website for convenient trip planning; b) To display information at all bus interchanges/ terminals with passenger boarding activities; c) To display information at all bus stops with display facilities; and d) To provide timetables at bus stops for bus services with long headway (i.e. headway of 20 minutes or more, for more than 20% of the bus trips)

5 Summary of Key Points

Nationally, Melbourne is shown to have comparably:

- higher rail route length;
- higher station density;
- higher route density;
- average frequencies;
- lower coverage; and
- lower span of hours.

Internationally, Melbourne is shown to have:

- lower public transport vehicle kilometers per urban hectare;
- lower public transport vehicle kilometers per person;
- faster average public transport speed than cities in Asia, Western Europe and Eastern Europe;
- slower public transport speeds in comparison to road network speeds than the majority of cities in the comparison; and
- less length of reserved routes per urban hectare and per person.

Appendix 1:

The following is a list of cities used in the quantitative comparison of international service levels:

Australia: Melbourne

Asia: Singapore; Hong Kong

North America: Chicago

Eastern Europe: Moscow; Krakow; Prague; Warsaw; Tallinn; Budapest.

Western Europe: Lille; Vienna; Valencia; Stuttgart; Barcelona; Amsterdam; Sevilla; Milan; Paris; Marseilles; Rotterdam; Berlin; Athens; Lyons; Clermont-Ferrand; Bilbao; Munich; Hamburg; Nantes; Turin; Geneva; Zürich; Graz; Bern; Brussels; Oslo; Bologna; Gent; Rome; Madrid; Lisbon; Copenhagen; Dublin; Manchester; London; Stockholm; Newcastle; Glasgow; Helsinki