

Parking in the Sydney CBD

An International Comparison Update

NRMA

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1. INTRODUCTION

1.1 Background

In 2014, Bitzios Consulting was engaged by the NRMA to compare key parking characteristics of Sydney with global cities (*P1510 005R International Comparison- CBD Parking Study*, dated 13 February). The purpose of that study was to analyse the impacts of removing large sections of public on-street parking and loading zones in order to facilitate the CBD and South East Light Rail and consequent changes to bus routes and through traffic routes.

The NRMA is aware that much of the contemporary comment on transport planning in large cities, frequently mentions European cities (i.e. London, Paris, Vienna and Zurich) as good examples of public transport providing viable alternatives to private car use. In such cities, it is argued that parking is less important because motorists have many practical alternatives and so road space priority is allocated to buses and service vehicles. Notwithstanding this, even these cities understand the importance of convenient short stay on-street parking to the viability of small businesses. NRMA is concerned, however, that Sydney is very different to European cities in that it has developed in response to lower residential densities and higher rates of car ownership and motorisation. In this sense, Sydney is more akin to similar sized cities in the USA.

Bitzios Consulting has been engaged by the NRMA to update the 2014 report using more recent demographic and parking data.

1.2 Sydney's Land Use Development and Motorisation

Prior to WWII, there was no comprehensive planning scheme for the Greater Sydney Metropolitan Area. The County of Cumberland Planning Scheme was released in 1948 and gazetted in 1951. It has been described as “the most definitive expression of a public policy of the form and content of an Australian metropolitan area ever attempted”¹. The scheme introduced land use zoning, suburban employment zones, open space acquisitions and the idea of a ‘green belt’ for Greater Sydney. It included the then Department of Main Roads plans for an expressway network and it enabled the establishment of the Cumberland County Council in 1947, which was a tier of government between local and state governments.

The green belt around established urban areas was intended to restrict urban sprawl and ‘satellite towns’ beyond the green belt were intended to take care of future growth. However, a combination of local council and state government agencies’ concerns about loss of planning control and developer opposition meant that the Cumberland County Council was dissolved in 1963 and replaced by a State Planning Authority. In 1965, the scheme’s grand objectives were abandoned, and thousands of hectares of farming land were released for housing to cater for increased population resulting from post-war immigration and the ‘baby boom’. Furthermore, there was pressure on the proposed expressway land reservations, meaning that many of the ‘County’ roads never eventuated.

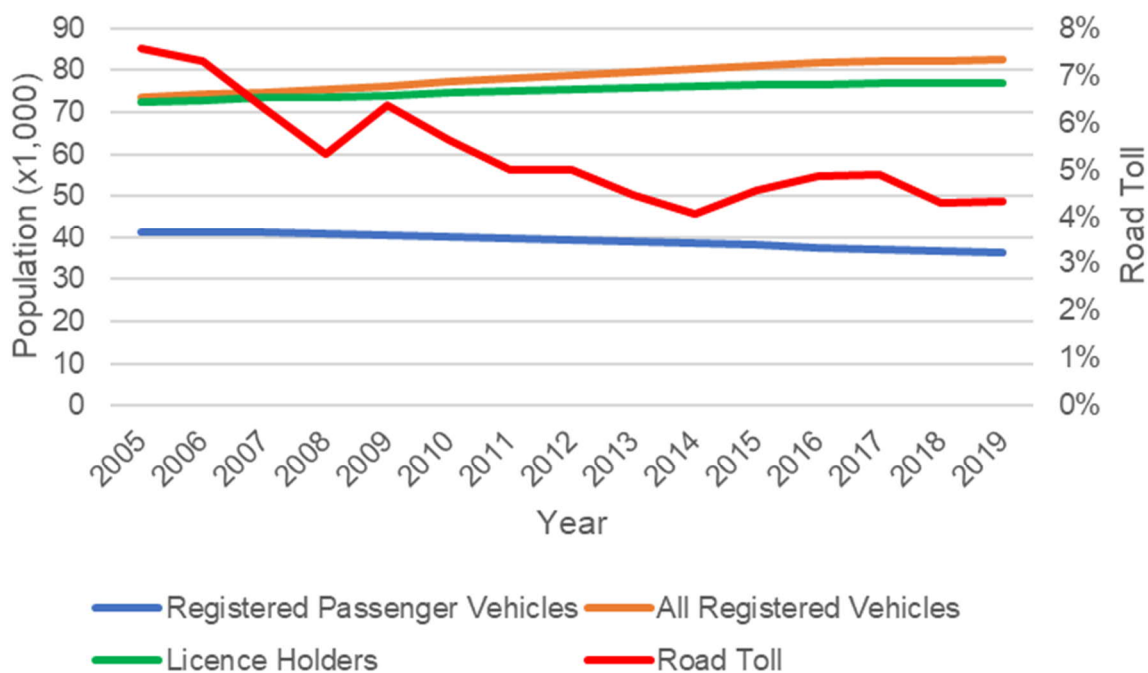
¹ *The Dictionary of Sydney*, https://dictionaryofsydney.org/entry/county_of_cumberland_planning_scheme

The rate of total motorisation in NSW continues to increase, but total passenger car motorisation has decreased since 2005 as shown in Figure 1.1. No new major railway lines were built during that period until the Epping to Chatswood Rail Link in 2009 and the Sydney Metro North West Line (between Tallawong and Chatswood) in 2019. Since the abandonment of Sydney's vast tramway network in 1961, the Inner West Light Rail Line (between Central and Wentworth Park) was built in 1997 and extended to Lilyfield and Dulwich Hill in 2000 and 2014 respectively. The CBD and South East Light Rail Line to Randwick and Kingsford was built in 2019 and 2020 respectively.

Hence, there was considerable urban sprawl in the Sydney Metropolitan Area and increasing pressure on the arterial road network. Employment tended to be concentrated in the Sydney and North Sydney CBDs until other major urban centres like Parramatta and Macquarie Park were developed, as well as intermediate urban centres like Liverpool and Norwest.

There have been a number of emerging trends which have affected on-street parking, particularly in the Sydney CBD and surrounding inner city areas. These trends are primarily aimed at reducing congestion and promoting cheaper, more convenient and sustainable alternatives to private car use, namely car share and ride share services. Local planning controls will increase the number of car share parking spaces provided in new commercial and residential developments².

Accordingly, car use across the Sydney metropolitan area is relatively high.



Sources: Transport for NSW^{3,4,5} and ABS⁶

Figure 1.1: Trends in NSW Registered Vehicles and Driver Licences per 100,000 population

² City of Sydney, <https://www.cityofsydney.nsw.gov.au/public-health-safety-programs/car-share>

³ Transport for NSW, <https://www.rms.nsw.gov.au/about/corporate-publications/statistics/registrationandlicensing/tables/table111.html>

⁴ Transport for NSW, <https://www.rms.nsw.gov.au/about/corporate-publications/statistics/registrationandlicensing/tables/table211.html>

⁵ Transport for NSW, <https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/nsw.html?tabnsw=5>

⁶ Australian Bureau of Statistics, ABS TABLE 4. Estimated Resident Population, States and Territories (Number)

1.3 Cities for Comparison

As explained in Section 2, this report compares the availability of on-street and off-street parking in Sydney, with the same types of parking in the following US cities:

- Boston, Massachusetts
- Philadelphia, Pennsylvania
- San Diego, California
- San Francisco, California
- Seattle, Washington.

The report also includes information on transport, car share and ride share facilities and policies in each of the comparison cities.

2. SELECTION OF CANDIDATE CITIES FOR COMPARISON

2.1 Overview

A preliminary study was conducted to assess candidate cities in North America for inclusion in the benchmarking study. The nominated cities displayed similar development characteristics (stemming from geographical constraints), as well as comparable population size and land area of their respective metropolitan areas.

2.2 Methodology

A survey of major North American cities identified 27 candidate cities: 24 located in the United States mainland and three in Canada. A comparison was then carried out upon the metropolitan area associated with each city. The metropolitan area is a representation of the labour market for the city, often encompassing multiple, smaller cities as well as the core city. For example, in Australia, the Sydney Metropolitan Area, known as 'Greater Sydney', extends well beyond Sydney City itself, incorporating the Central Coast to the north and the Blue Mountains to the west as shown in Figure 2.1. Figure 2.2 shows that the greater Sydney area includes:

- High density development within the Inner Sydney, North Sydney and Parramatta regions
- Low to medium density in the outer suburbs
- Large expanses of very low density (largely national parks).

In this preliminary study, metropolitan areas were selected from the following:

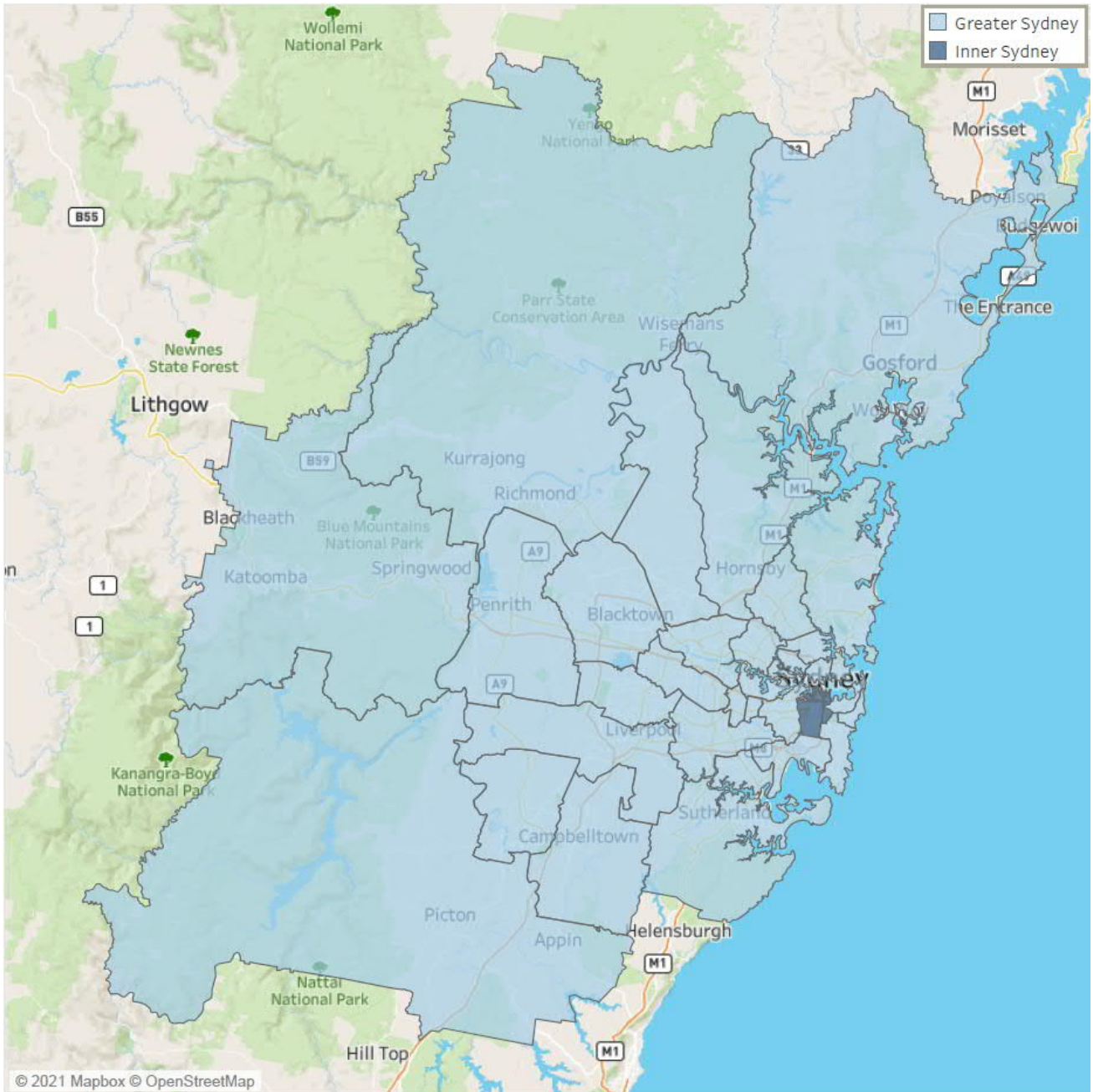
- **Australia:** Greater Capital City Statistical Area⁷
- **United States:** Metropolitan Area (Core Based Statistical Area)⁸
- **Canada:** Census Metropolitan Area⁹.

The population and land area characteristics of each metropolitan area were compared with those of Greater Sydney. Population counts were taken from the most recent censuses conducted in Australia (2016), Canada (2016) and the US (2019 estimates in the absence of recent census data).

⁷ Australian Bureau of Statistics (2020), Australian Statistical Geography Standard

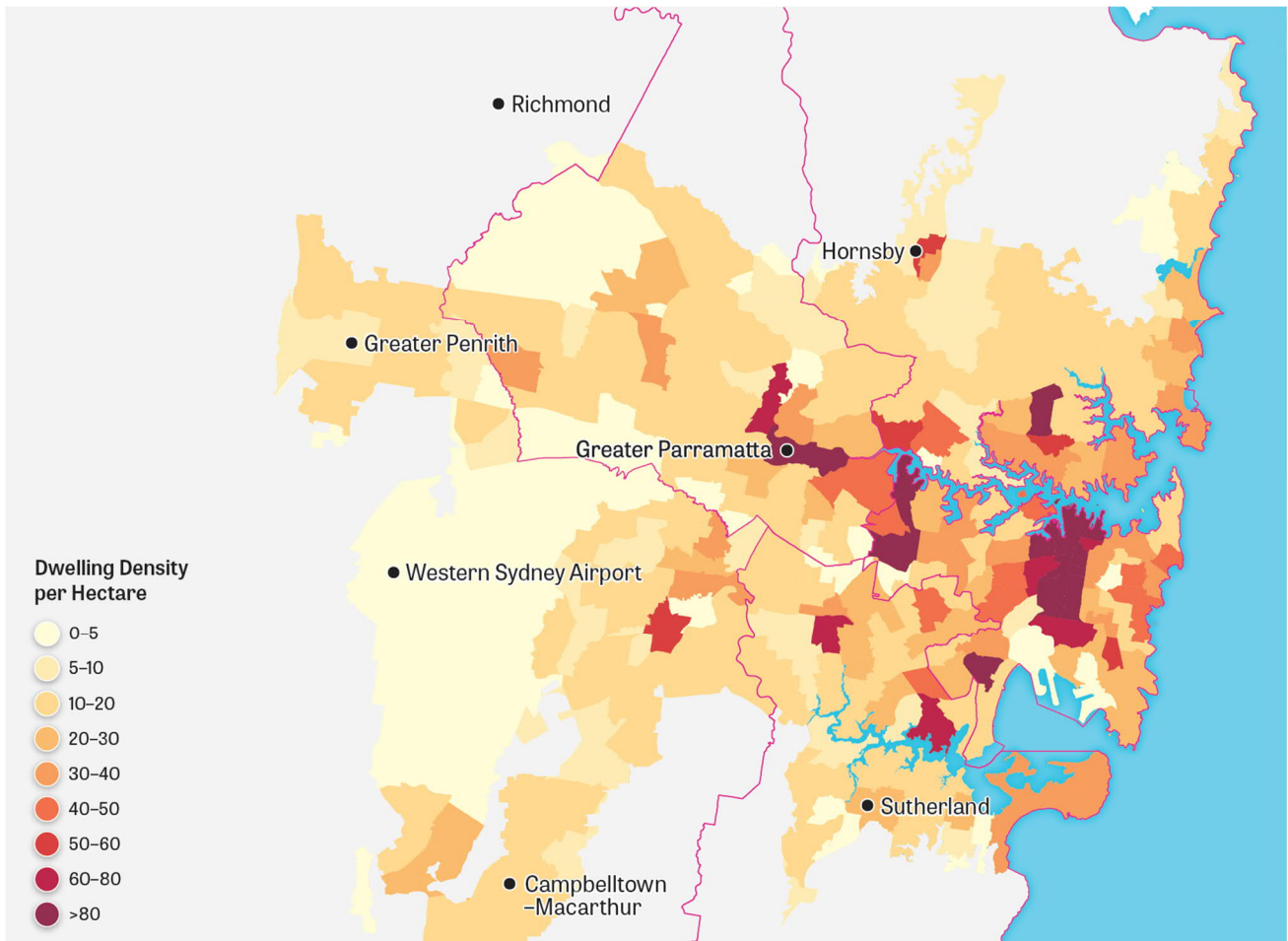
⁸ United States Census Bureau, <https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-metro-and-micro-statistical-areas.html>

⁹ Statistics Canada, <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>



Source: Australian Bureau of Statistics (2020), Australian Statistical Geography Standard

Figure 2.1: Map of Greater Sydney



Source: <https://www.greater.sydney/metropolis-of-three-cities/past-present-and-future>

Figure 2.2: Residential Density of Greater Sydney 2016

2.3 Candidate Cities

The cities considered initially as being comparable to Sydney are listed in Table 2.1.

Table 2.1: Candidate Comparable Cities

United States		Canada
▪ Austin, Texas	▪ Indianapolis City, Indiana	▪ Ottawa, Ontario
▪ Baltimore, Maryland	▪ Kansas City, Missouri	▪ Toronto, Ontario
▪ Boston, Massachusetts	▪ Miami, Florida	▪ Vancouver, British Columbia
▪ Charleston, South Carolina	▪ Minneapolis, Minnesota	
▪ Charlotte, North Carolina	▪ Orlando, Florida	
▪ Cincinnati, Ohio	▪ Philadelphia, Pennsylvania	
▪ Cleveland, Ohio	▪ Phoenix, Arizona	
▪ Columbia, South Carolina	▪ Pittsburgh, Pennsylvania	
▪ Dallas, Texas	▪ Raleigh, North Carolina	
▪ Denver, Colorado	▪ San Diego, California	
▪ Detroit, Michigan	▪ San Francisco, California	
▪ Houston, Texas	▪ Seattle, Washington	

2.4 City Comparison Results

Table 2.2 shows the metropolitan population and land area associated with each candidate city.

Table 2.2: Population and Land Area of Selected International Metropolitan Areas

City	Metropolitan Area	Population	Land Area (km ²)	Population Density (per km ²)
Sydney, NSW	Greater Sydney	4,823,991	12,367.70	390
United States				
Atlanta, GA	Atlanta-Sandy Springs-Alpharetta, GA	6,020,364	22,496.38	268
Austin, TX	Austin-Round Rock-Georgetown, TX	2,227,083	10,929.46	204
Baltimore, MD	Baltimore-Columbia-Towson, MD	2,800,053	6,737.80	416
Boston, MA	Boston-Cambridge-Newton, MA-NH	4,873,019	9,032.38	540
Charleston, SC	Charleston-North Charleston, SC	802,122	6,703.36	120
Charlotte, NC	Charlotte-Concord-Gastonia, NC-SC	2,636,883	13,122.69	201
Cincinnati, OH	Cincinnati, OH-KY-IN	2,221,208	10,796.83	206
Cleveland, OH	Cleveland-Elyria, OH	2,048,449	5,172.98	396
Columbia, SC	Columbia, SC	838,433	9,590.08	87
Dallas, TX	Dallas-Fort Worth-Arlington, TX	7,573,136	24,029.37	315
Denver, CO	Denver-Aurora-Lakewood, CO	2,967,239	21,616.22	137
Detroit, MI	Detroit-Warren-Dearborn, MI	4,319,629	10,070.88	429
Houston, TX	Houston-The Woodlands-Sugar Land, TX	7,066,141	21,388.80	330
Indianapolis City, IN	Indianapolis-Carmel-Anderson, IN	2,074,537	11,153.50	186
Kansas City, MO	Kansas City, MO-KS	2,157,990	18,791.92	115
Miami, FL	Miami-Fort Lauderdale-Pompano Beach, FL	6,166,488	13,150.07	469
Minneapolis, MN	Minneapolis-St. Paul-Bloomington, MN-WI	3,640,043	19,779.82	184
Orlando, FL	Orlando-Kissimmee-Sanford, FL	2,608,147	9,009.22	289
Philadelphia, PA	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	6,102,434	11,919.41	512
Phoenix, AZ	Phoenix-Mesa-Chandler, AZ	4,948,203	37,725.12	131
Pittsburgh, PA	Pittsburgh, PA	2,317,600	13,678.94	169
Raleigh, NC	Raleigh-Cary, NC	1,390,785	5,486.11	254
San Diego, CA	San Diego-Chula Vista-Carlsbad, CA	3,338,330	10,895.12	306
San Francisco, CA	San Francisco-Oakland-Berkeley, CA	4,731,803	6,398.70	739
Seattle, WA	Seattle-Tacoma-Bellevue, WA	3,979,845	15,209.32	262
Canada				
Ottawa, ON	Ottawa-Gatineau (Ontario-Quebec)	1,323,783	6,287.03	211
Toronto, ON	Toronto (Ontario)	5,928,040	5,905.71	1,004
Vancouver, BC	Vancouver (British Columbia)	2,463,431	2,882.55	855

Table 2.3 ranks each city by population of metropolitan area. Cities with a similar population¹⁰ to Sydney include:

- Minneapolis, MN
- San Francisco, CA
- Toronto, ON

¹⁰ ±25% variance from the population of Greater Sydney.

- Seattle, WA
- Boston, MA
- Atlanta, GA
- Detroit, MI
- Phoenix, AZ

Table 2.3: Population of Cities, Ranked Smallest to Largest

Rank	City	Population	% Variation from Sydney
1	Charleston, SC	802,122	-83.4%
2	Columbia, SC	838,433	-82.6%
3	Ottawa, ON	1,323,783	-72.6%
4	Raleigh, NC	1,390,785	-71.2%
5	Cleveland, OH	2,048,449	-57.5%
6	Indianapolis City, IN	2,074,537	-57.0%
7	Kansas City, MO	2,157,990	-55.3%
8	Cincinnati, OH	2,221,208	-54.0%
9	Austin, TX	2,227,083	-53.8%
10	Pittsburgh, PA	2,317,600	-52.0%
11	Vancouver, BC	2,463,431	-48.9%
12	Orlando, FL	2,608,147	-45.9%
13	Charlotte, NC	2,636,883	-45.3%
14	Baltimore, MD	2,800,053	-42.0%
15	Denver, CO	2,967,239	-38.5%
16	San Diego, CA	3,338,330	-30.8%
17	Minneapolis, MN	3,640,043	-24.5%
18	Seattle, WA	3,979,845	-17.5%
19	Detroit, MI	4,319,629	-10.5%
20	San Francisco, CA	4,731,803	-1.9%
21	Sydney, NSW	4,823,991	-
22	Boston, MA	4,873,019	1.0%
23	Phoenix, AZ	4,948,203	2.6%
24	Toronto, ON	5,928,040	22.9%
25	Atlanta, GA	6,020,364	24.8%
26	Philadelphia, PA	6,102,434	26.5%
27	Miami, FL	6,166,488	27.8%
28	Houston, TX	7,066,141	46.5%
29	Dallas, TX	7,573,136	57.0%

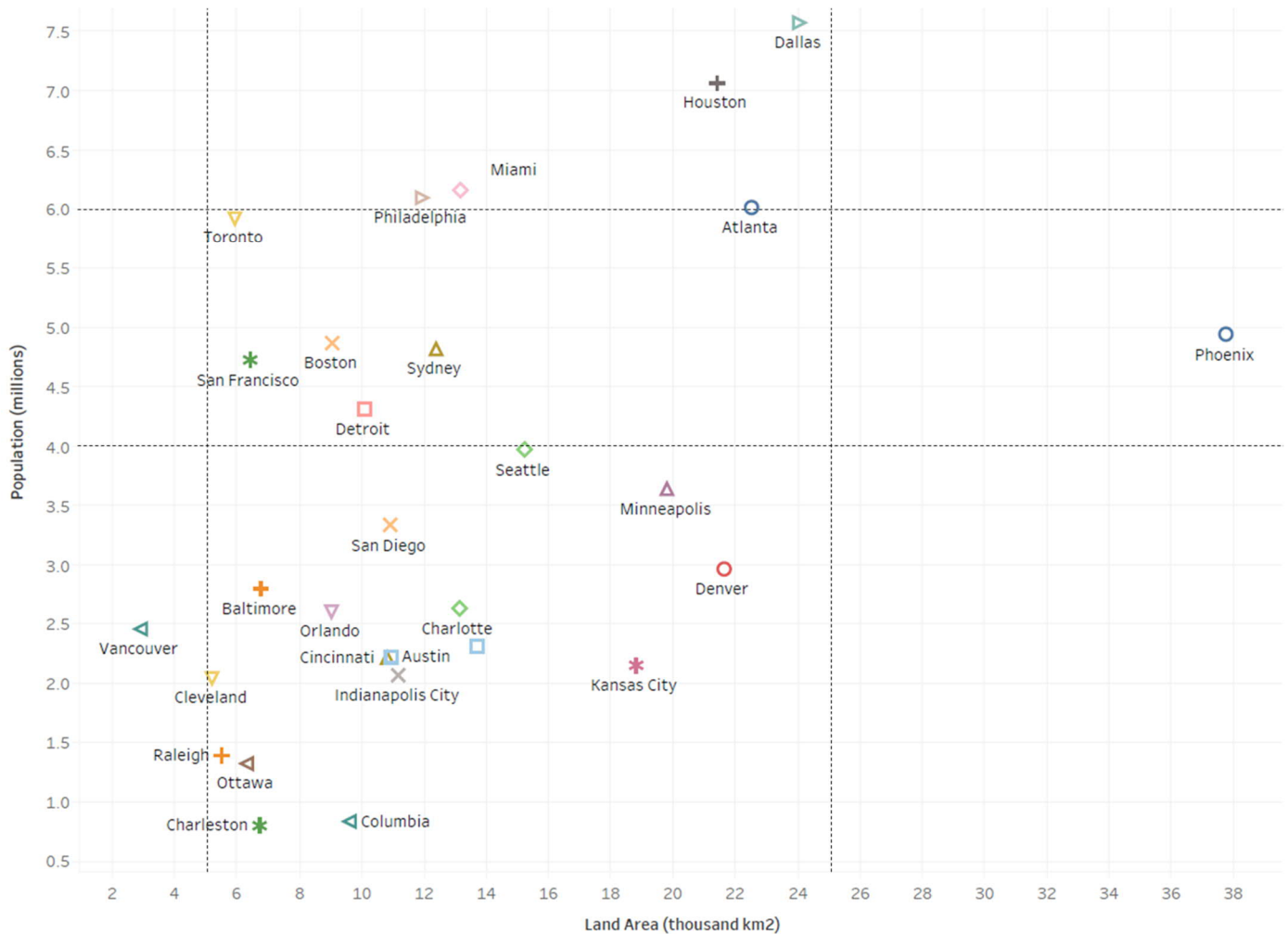


Figure 2.3: Graph of Population vs. Land Area for International Metropolitan Data

Based on Figure 2.3, the following cities displayed similar characteristics to Sydney:

- Boston
- Detroit
- Philadelphia
- San Francisco
- Seattle
- Toronto.

Detroit and Toronto were subsequently excluded from the study due to economic factors and lack of available data, respectively.

These remaining four cities (Boston, Philadelphia, San Francisco and Seattle) are located on a coastline or lakeside as shown in Figure 2.4. As such, they exhibit similar constrained development patterns to Sydney.



Figure 2.4: Map of Selected North American Cities

3. PARKING CHARACTERISTICS

3.1 Sydney

3.1.1 Availability

Table 3.1 summarises the total floor area, and number of employees (both full and part-time) and tenant parking spaces in the Sydney City Centre in 2007, 2012 and 2017¹¹.

Table 3.1: Parking Spaces in the Sydney City Centre*

Survey Year	Total Floor Area (km ²)	Employees	Tenant Parking Spaces		
			Internal	External (onsite)	Total
2007	19.17	283,419	37,990	2,092	40,082
2012	19.73	315,144	40,896	1,911	42,807
2017	20.85	375,032	43,322	2,102	45,424

*Includes the CBD and Harbour, Chinatown and CBD South, and Harris Street Villages.

It is also worth noting that:

- There are approximately 8.2 employees per parking spaces (excluding on-street parking) within the City Centre
- There are a total of 160,000 parking spaces in the Sydney Local Government Area (LGA), or about 1.75 spaces for every vehicle registered. This is compared with the Sydney average of over three parking spaces per vehicle¹²
- Approximately half of the on-street spaces in Central Sydney are designated as loading zones for some portion of the day. The City of Sydney has estimated that there is just one parking space available for every six workers in the area¹³.

Parking in Central Sydney is both restricted and relatively expensive. This is partially due to the NSW Government Parking Space Levy of \$2,490 per annum, which equates to a cost of approximately \$9.50 per off-street space per weekday.

3.1.2 Policy

The City of Sydney has identified several key objectives for parking in Central Sydney, including:

- Reduce the provision of new parking spaces by 50% by 2030
- Continued prioritisation of on-street parking for service/delivery vehicles, taxis and disabled persons and adjustment of on-street parking rates to approach off-street rates
- Target 30% of city residents who drive are members of a car share scheme¹⁴
- Promotion of sustainable commercial parking facilities. This may involve reduced access during the morning peak or provision of bicycle spaces or electric vehicle recharging points.

The City has sought to limit the provision of new parking spaces. It has enforced maximum rather than minimum rates for parking in new developments since 1995.

The City of Sydney LGA currently has over 50,000 registered car share members. Since 2008, over 850 on-street car sharing spaces have been installed, with additional spaces off street and in the

¹¹ City of Sydney (2017), Floor Space and Employment Survey

¹² City of Sydney (2012), Connecting Our City Summary Report

¹³ City of Sydney (2012), Connecting Our City Technical Report

¹⁴ City of Sydney (2018), Environmental Action Strategy and Action Plan

peer-to-peer network. Four operators, Car Next Door, Flexicar, GoGet and Popcar, are helping more than a third of local households to go car free as of 2016, up from 29% a decade earlier¹⁵.

3.2 Boston

3.2.1 Availability

In this study, the Boston CBD included the Downtown neighbourhood in an inventory of off-street parking spaces. This is detailed in *Future of Parking in Boston (2016)*¹⁶, a research report on existing parking conditions in Boston. The survey found that there were 77,800 parking spaces in the Boston CBD and approximately two employees per parking space.

3.2.2 Policy

The report also proposed strategies to reduce future parking demand in Boston, such as:

- Expanding the annual \$10 per space fee of off-street parking in South Boston to all new development citywide, starting with the Downtown Parking Freeze Area
- Endorsing a transit-oriented maximum parking requirement in base zoning
- Eliminating minimum parking requirements citywide.

Metered on-street spaces allow parking for a maximum of two hours. However, they are significantly cheaper than commercially-owned off-street car parks, charging between \$1.25 and \$3.75 an hour.

Many loading zones throughout the city restrict parking to 30 minutes for active loading and are only available to vehicles registered for commercial purposes.

In 2015, the City of Boston launched *DriveBoston*, which offered residents an alternative to personal vehicle ownership by providing dedicated parking spaces in municipal lots and on-street for car share vehicles. The pilot program licenced 80 public parking spaces to operate vehicle sharing services. During the initial 18-month pilot phase:

- More than one million miles were travelled
- Vehicles were used on average seven hours a day, compared to the average of one hour a day privately-owned cars are used
- There was an average of 23 users per vehicle.

As a result of the positive outcomes of the pilot program, in 2019, the City of Boston rebranded the program to Car Share Boston and increased the number of parking spaces to up to 250. They also partnered with Zipcar and Getaround to provide car sharing services, with new locations added in 2020¹⁷.

3.3 Philadelphia

3.3.1 Availability

2015 parking inventory recorded 46,400 off-street public parking spaces in Philadelphia City Centre, and an estimated 3,700 on-street parking spaces. These figures exclude off-street private parking in buildings.

¹⁵ NIEIR (2019), *City of Sydney: Number of cars per household. Based on ABS Census data.*

¹⁶ *A Better City (November 2016), Future of Parking in Boston*

¹⁷ *City of Boston, <https://www.boston.gov/departments/transportation/car-share-boston#:~:text=Car%20Share%20Boston%20is%20a,to%20participate%20in%20the%20program>.*

3.3.2 Policy

The City introduced a new zoning code in 2012 which reduce the minimum requirements on development parking. These included:

- Reducing the minimum requirement for residential units from 1 per unit to 3 per 10 units
- No minimum requirements for office, retail and commercial uses.

The City also raised the parking tax in July 2015 from 20% to 22.5%. Parking rates for public (off-street) parking facilities have also increased as shown in Figure 3.1. Despite these increases, there has not been a comparative decrease in occupancy, which may be due to the lack of alternative such as on-street (long-stay) or convenient public transport connections¹⁸.

Zipcar currently operates car share services in partnership with the City. Quick search identified over 100 available car share vehicles in the city centre.

Enterprise Car share suspended its car share operations in June 2020, which is likely due to the downturn in demand through COVID-19.

Average One-Hour Parking Rate
Nominal Dollars with Parking Tax Rate

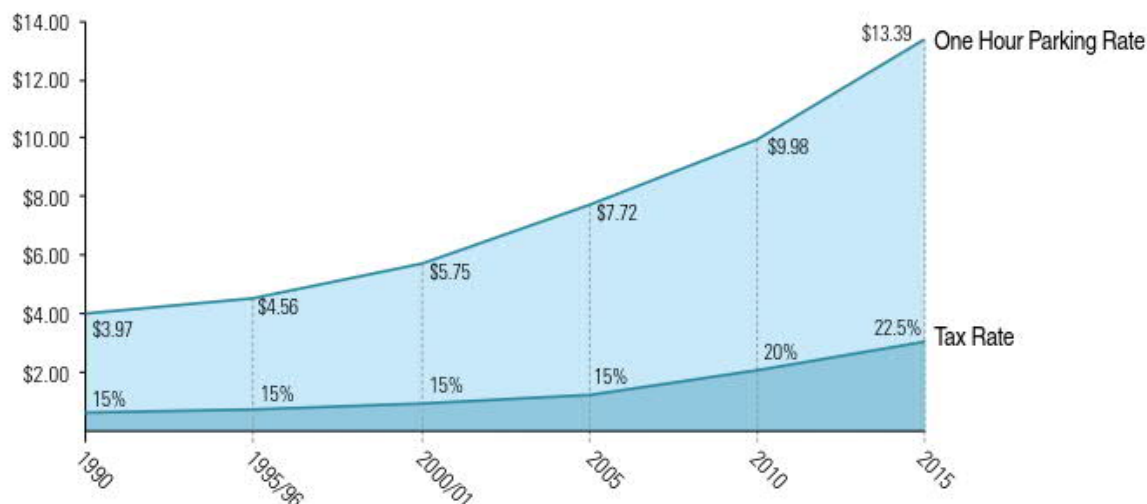


Figure 3.1: One-Hour Parking Rate Change, Philadelphia City Centre

3.4 San Diego

3.4.1 Availability

Downtown San Diego has approximately 63,000¹⁹ parking spaces, including around 7,614 on-street parking spaces. 507 of these are short-term parking spaces. There are also approximately 1,300 loading spaces and 190 motorcycle spaces.

In 2010, there was an estimated surplus of over 16,000 parking spaces during the day on weekdays, but conservative estimates suggested that there would be a deficit of over 4,700 spaces by 2015²⁰.

3.4.2 Policy

Most parking meters are enforced from 8am to 6pm Monday to Saturday. However, the Comprehensive Parking Plan for Downtown San Diego recommended altering these hours to 10am

¹⁸ 2015 Philadelphia City Centre Parking Inventory.

¹⁹ Downtown Community Parking District Implementation Plan (2017)

²⁰ Wilson & Co., Wilbur Smith Associates 2008 (2009), Comprehensive Parking Plan for Downtown San Diego

to 8pm to encourage drivers to make use of plentiful off-street parking facilities. The plan also notes that the optimal on-street parking utilisation should be set at 85%.

San Diego continues to specify minimum parking provisions for new developments, except in the case of industrial developments²¹.

San Diego's Mobility Choices Regulations provide reward points of 2 per unit for providing car share parking spaces in new developments as part of reducing citywide vehicle miles travelled ²².

3.5 San Francisco

3.5.1 Availability

In this study, the San Francisco CBD included three districts on the city's north-eastern edge: Civic Center-Downtown, Russian Hill-Nob Hill and North Embarcadero, totalling approximately 10km².

On-street parking data was sourced from an inventory undertaken between 2008 and 2014²³, and off-street parking data from an inventory undertaken by the San Francisco Municipal Transportation Agency (SFMTA) in 2010 (the latter in the absence of more recent data). There were approximately 24,635 on-street parking spaces and 59,600 off-street parking spaces in the San Francisco CBD. Of the off-street spaces, approximately 4,200 (7%) were for employee or company vehicles only²⁴.

Table 3.2: Available Parking in San Francisco

District	On-street Spaces	Off-street Spaces	Total spaces
Civic Center - Downtown	7,348	34,433	41,781
Russian Hill - Nob Hill	10,517	12,203	22,720
North Embarcadero	6,008	12,948	18,956
Total	23,873	59,584	83,457

3.5.2 Policy

The SFMTA Strategic Plan (2018)²⁵ was established in response to significant changes in travel patterns throughout the city, a growing population and public expectations. It has four strategic goals, aimed at operating, maintaining, and facilitating a safe, equitable, and sustainable transportation system:

1. Create a safer transportation experience for everyone
2. Make transit and other sustainable modes of transportation the most attractive and preferred means of travel
3. Improve the quality of life and environment in San Francisco and the region
4. Create a workplace that delivers outstanding service.

Between 2011 and 2013, the SFMTA conducted a pilot program into a demand-based pricing scheme named SFpark in 7,000 of San Francisco's 28,800 metered on-street parking spaces and 12,250 parking spaces in 15 of 20 city-owned garages. Their utilisation was monitored in real-time and prices adjusted by small increments monthly to encourage drivers to park in underutilised areas²⁶.

The SFpark demand-responsive pricing pilot program found that:

²¹ City of San Diego (2009), *San Diego Municipal Code*

²² The City of San Diego, <https://www.sandiego.gov/sites/default/files/4-appendix-t-mobility-choices-implementation-guidelines.pdf>

²³ City and County of San Francisco (2019), <https://data.sfgov.org/Transportation/Map-of-On-Street-Parking-based-on-Parking-Census/w7jc-w57c> (last updated 4 May 2021)

²⁴ San Francisco Municipal Transportation Agency (September 2011), *San Francisco Municipal Transportation Agency Parking Census*

²⁵ San Francisco Municipal Transportation Agency (April 2018), *San Francisco Municipal Transportation Strategic Plan*

²⁶ San Francisco Municipal Transportation Agency, <https://www.sfmta.com/projects/sfpark-pilot-program>

- Sales tax revenues rose over 35% in SFpark areas during the compared to less than 20% in the other parts of the city
- Average meter rates were reduced by 4% (down \$0.11/hour) in SFpark on-street areas. City-owned garage rates went down by 12% (down \$0.42/hour)
- Reported parking search time went down by 43%
- Reduced circling for parking led to a 30% decrease in miles travelled in SFpark areas, benefiting safety, easing congestion and reducing neighbourhood pollution.

In December 2017, the SFMTA subsequently expanded demand-responsive pricing to all 28,800 metered on-street spaces and all SFMTA-metered surface parking lots. The meter prices adjust by 25 cents an hour as needed based on demand and will occur once every three months²⁷.

SFMTA's On-Street Shared Vehicle Permit Program permits for kerbside parking spaces to be dedicated to shared vehicle use; a key goal of the SFMTA's *2013-2018 Strategic Plan*. The program was approved in July 2017 after it was tested as a pilot project starting in 2013.

There are currently five car share providers in San Francisco: Zipcar, Getaround, U-Haul (24/7 self-service vans), Truqit (24/7 self-service pick-up trucks) and GIG.

3.6 Seattle

3.6.1 Availability

Downtown Seattle has approximately 48,960 car parking spaces, including 4,490 on-street parking spaces²⁸.

With approximately 348,000 jobs based in Downtown Seattle, there is one parking space for every seven workers.

3.6.2 Policy

The Seattle Department of Transport (SDOT) has adopted a *Performance-Based Parking Pricing Program* with an aim to achieve 1-2 spaces available per block (i.e. a target 70-85% occupancy).

The SDOT provided a real-time electronic parking guidance scheme for off-street car parking in the downtown area, but these were turned-off in July 2020 due to reduced funding as a result of COVID-19.

As part of the City's COVID-19 response, SDOT introduced *Priority Pickup Zones*, including 5-minute loading zones and 3-minute Food Priority Pick-up Zones to cater for the increased demand for food and parcel deliveries.

Car sharing was launched in Seattle in late 2012 and at one stage had three operators providing these services. By the end of 2019, all three operators had pulled out of the Seattle market. One operator blamed "the volatile state of the global mobility landscape" and difficulty navigating complicated infrastructure challenges unique to North American transportation²⁹. In 2020, GIG Car Share Services reintroduced the car sharing service with 250 Toyota Prius hybrid vehicles.

The City designated on-street parking for car sharing vehicles, with operators required to pay a permit fee of:

- \$300 per year (unpaid parking space)
- \$3,000 per year (paid parking space)

²⁷ San Francisco Municipal Transportation Agency (5 December 2017), <https://www.sfmta.com/blog/san-francisco-adopts-demand-responsive-pricing-program-make-parking-easier>

²⁸ Seattle DoT Curbside Management team 2019 Annual Report

²⁹ <https://www.geekwire.com/2019/car2gone-share-now-shuts-north-america-leaving-seattle-no-free-floating-car-sharing-services/>

3.7 Comparison

3.7.1 Parking Spaces

Table 3.3 and Figure 3.2 compare the volume of available parking within the Sydney CBD with downtown districts in Boston, Philadelphia, San Diego, San Francisco and Seattle.

Table 3.3: Comparison of Available Parking in Sydney CBD with International CBDs

City	On-street Spaces	Off-street Spaces	Total Spaces
Sydney, NSW	N/A	45,424	-
Boston, MA	N/A	77,800	-
Philadelphia, PA	3,700	46,400	50,100
San Diego, CA	8,104	54,896	63,000
San Francisco, CA	24,635	59,600	84,235
Seattle, WA	4,490	44,470	48,960

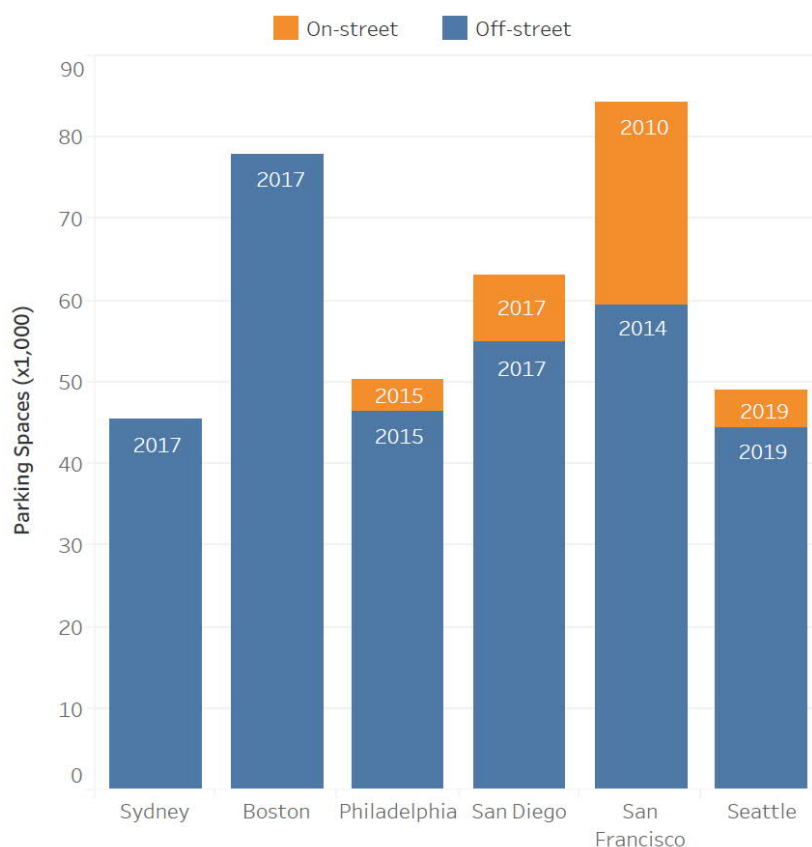


Figure 3.2: Number of Parking Spaces (Year of Survey Marked)

3.7.2 Parking, Population and Employment

Table 3.4 compares the total available parking availability with the metropolitan population, metropolitan density and number of spaces available per employee within the CBD.

The number of people employed within the Sydney CBD was sourced from the 2016 ABS Census³⁰ and the number of people employed US CBDs was estimated using 2018 ZIP Code Business Patterns from US Census data³¹. It should be noted that ZIP code areas do not correspond exactly with the

³⁰ Australian Bureau of Statistics, *Census of Population and Housing, 2016, TableBuilder*

³¹ United States Census Bureau, <https://onthemap.ces.census.gov/>

study area used to estimate parking availability. The Sydney CBD area examined in this study is geographically large compared to the comparison cities. As such, there is some disparity in the number of employees.

Table 3.4: Comparison of Parking, Population and Employment in Sydney CBD with International CBDs

City	Total Spaces	Metropolitan Population	Metropolitan Population Density (per km ²)	Employees	Spaces per 1,000 Employees
Sydney, NSW	45,424	4,823,991	390.05	320,829	142
Boston, MA	77,800	4,873,019	539.51	305,487	255
Philadelphia, PA	48,960	6,102,434	511.97	225,364	217
San Diego, CA	50,100	3,338,330	306.41	92,378	542
San Francisco, CA	63,000	4,731,803	739.49	350,327	180
Seattle, WA	84,235	3,979,845	261.67	221,706	380

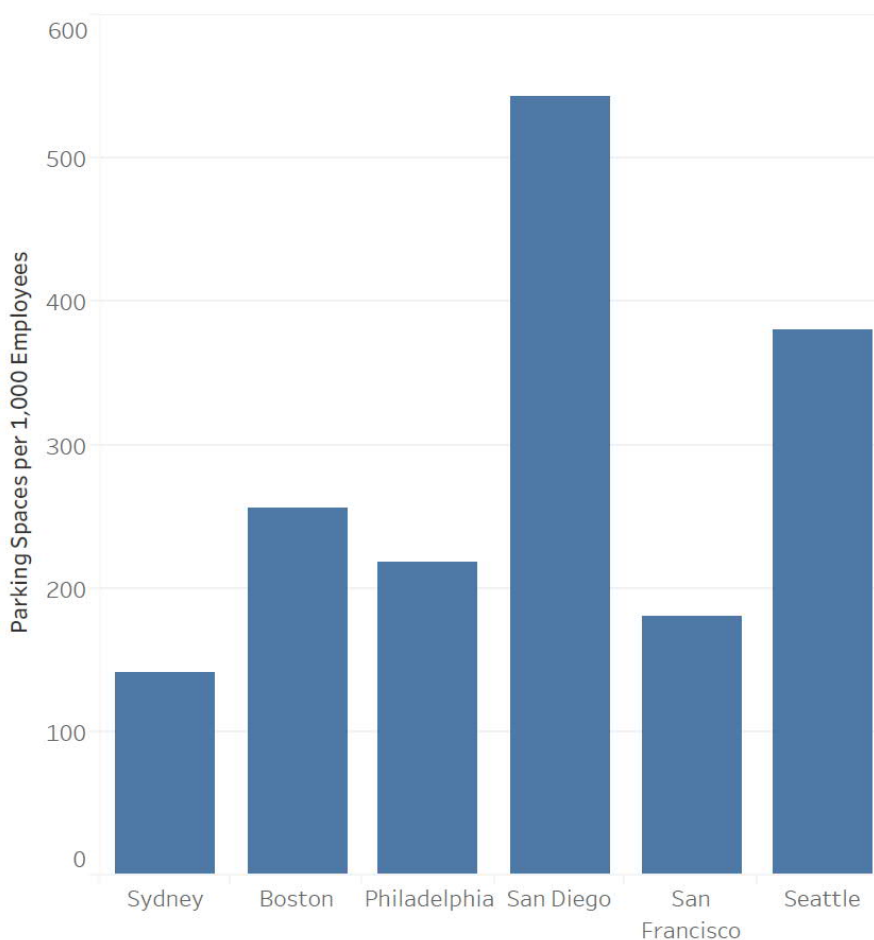


Figure 3.3: Comparison of Available Parking with Number of Employees

3.7.3 Parking Rates

Drivers in the Sydney CBD also pay substantially more for publicly accessible off-street parking than in North American cities, which may contribute to a higher reliance on public transport for everyday commuting. However, employees in the Sydney CBD are likely to make use of discounted early bird parking rates, which offer daily parking at approximately one third of the casual rate. Parking rates

also vary by location, with drivers in the northern end of the CBD around The Rocks paying higher rates than those in the southern end around the City Centre and Darling Harbour.

Table 3.5 compares the median daily and monthly parking rates within the Sydney CBD with downtown districts in Boston, Philadelphia, San Diego, San Francisco and Seattle.

Table 3.5: Comparison of Casual Parking Rates³²

City	Median Daily Parking Rate (USD)	Median Monthly Unreserved Parking Rate (USD)
Sydney, NSW ³³	\$46.00	N/A
Boston, MA	\$33.71	\$337
Philadelphia, PA	\$24.90	\$258
San Diego, CA	\$19.95	\$138
San Francisco, CA	\$27.06	\$297
Seattle, WA	\$23.16	\$231

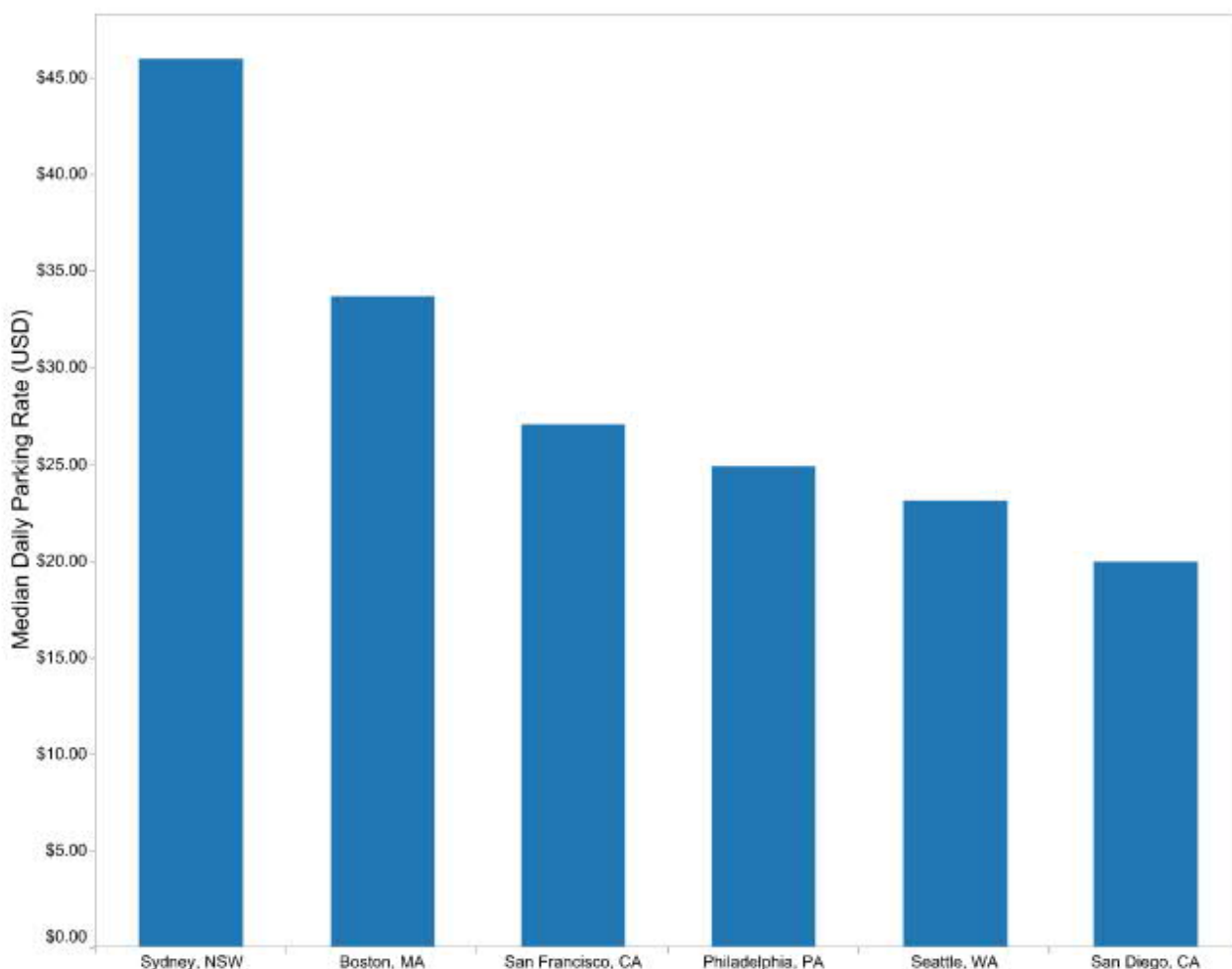


Figure 3.4: Comparison of Median Daily Parking Rates (USD)

³² Parkopedia_ North American Parking Index 2019

³³ Parkopedia_ Global Parking Index 2019

Casual two-hour parking in off-street facilities is significantly more expensive than on-street parking, as presented in Table 3.6. Parkopedia Global Parking Index Report (2019) noted that this trend is reversed in a number of European cities (i.e. Amsterdam, London, Paris) which are likely to reflect travel demand management policies.

Table 3.6: Comparison of Casual 2-Hour Off-Street vs On-street Parking Rates (USD)^{28,29}

City	Casual 2-Hour Parking Rate Off-street (USD)	Casual 2-Hour Parking Rate On-street (USD)	% Difference Off vs On
Sydney, NSW	\$27.37	\$11.86	130%
Boston, MA	\$20.63	\$3.51	488%
Philadelphia, PA	\$16.55	\$4.99	232%
San Diego, CA	\$11.81	\$2.38	396%
San Francisco, CA	\$12.35	\$5.33	132%
Seattle, WA	\$9.65	\$6.35	52%

3.7.4 Parking Management Strategies

Table 3.7 compares different parking management strategies within the Sydney CBD with downtown districts in Boston, Philadelphia, San Diego, San Francisco and Seattle.

Table 3.7: Comparison of Parking Management Strategies

Strategy	Sydney	Boston	Philadelphia	San Diego	San Francisco	Seattle
Reduce new parking provisions	✓	✓				
Prioritise service vehicles	✓	✓	✓		✓	✓
Increase on-street parking rates	✓				✓	
Restrict access to commercial car parks in morning peak	✓					
Promote car share services	✓	✓	✓	✓	✓	✓
Demand Responsive Parking Pricing					✓	✓
Supply real-time parking availability data					✓	✓
Expand public transport capacity in CBD	Light rail	✓				✓
	Bus (priority bus corridors)	✓	✓			✓
	Bus Rapid Transit				✓	✓

3.8 Parking Supply Discussion

In terms of overall parking supply, it can be seen from Table 3.4 and Figure 3.3 that Sydney compares reasonably with Philadelphia, San Diego and San Francisco. Boston and Seattle appear to have a much larger parking supply, but this is consistent with a much lower proportion of work trips by public transport as explained further in Section 4.

Whilst it might be argued that on-street parking provides the greatest convenience for short term users (i.e. shopping or business meetings), these types of drivers often engage in 'hunting' behaviour while seeking a space and this leads to 'around the block' manoeuvres and additional congestion at intersections. In turn, the additional congestion adversely impacts 'essential' vehicles such as buses, taxis and couriers. The SFMTA has sought to address this issue through its demand-based pricing scheme throughout San Francisco.

The City of Sydney has gradually adjusted on-street parking prices to match off-street prices (except perhaps in premium parking precincts) and it is understood from the CBD Access Strategy that there is spare daytime capacity of 10-30% of total off-street supply. Therefore, it could be argued that motorists seeking short term spaces should be using the available off-street parking supply.

In the relatively narrow streets of the Sydney CBD, it will be important to allocate the limited kerbside space to essential activities. These include bus stops, taxi zones, loading zones, car share zones and turning lanes at intersections. Outside business hours, some loading zones may be released for short-term (2 or 4 hour) parking.

3.9 Ride Share

Ride sharing is relatively new to Australia and Sydney compared to the US and European markets. In 2015, the NSW Government moved to regulate ride sharing.

In 2019, the NSW Minister for Transport and Roads announced a review of the "point to point" transport industry, which was completed in March 2020. While independent review³⁴, which is currently being considered by government, consider "access to road and kerbside infrastructure". The key differentiation being that the point-to-point transport reforms:

- Maintained taxis' exclusive rights to provide rank and hail services, as set out in the NSW Road Rules, whereas
- Ride share vehicles are not permitted to stand or park the hire vehicle for hire on any road or road related area or use the hire vehicle to carry out a hiring other than for a booking made before the driver stops the vehicle at the place where the passenger is picked up, or stop, stand or queue in a taxi zone.

The review recommended that access to kerbside space needs further consideration and that all point-to-point transport customers should have access to safe pick-up and drop-off points.

3.9.1 Boston

There are currently three ride share companies permitted to operate in Massachusetts: Lyft, Uber and Via. Boston dominates Uber and Lyft rides in the state, with some 42.2 million trips in 2018 starting in the city, a 21% increase from 2017³⁵. In 2019, over 45 million ride share rides each started and ended in Boston, of which over 33 million (72%) were within Boston. This is approximately 3 million more than 2018.

Furthermore, ride share companies are required to pay 20 cents per ride that is distributed among cities and towns, Massachusetts' general transportation fund and MassDevelopment to assist small

³⁴ NSW Government Point to Point Independent Review 2020

³⁵ The Boston Globe (13 June 2019), <https://www.bostonglobe.com/business/2019/06/13/uber-lyft-use-skyrocketing-massachusetts/eoF1pkQHhVsHNzmWllhADI/story.html>

businesses operating in the taxicab, livery or hackney industries. Over \$12 million was collected in 2017, over \$16 million was collected in 2018 and over \$18.2 million was collected in 2019³⁶.

3.9.2 Philadelphia

Xiaoxia Dong & Erick Guerra, Ph.D (2020)³⁷ investigated ride share's impact on transit. Key points to note from the investigation are:

- Ride share is mostly used to fill occasional rather than regular travel needs, with many ride-share trips used for short recreation and errand purposes in urban area
- Younger and lower income users tend to use ride share services more frequently than older higher income users
- ridership for all of City's four main transit modes in the study area declined after ride-hailing services' entry. Buses suffered the biggest ridership losses

3.9.3 San Francisco

SF Bay³⁸ provides a range of ride share options throughout San Francisco such as individual and coordinated carpools (i.e. Merge, Casual Carpool, Waze Carpool Rider, Waze Carpool Driver and Scoop) and Vanpools. It offers rewards including 10 points per carpool trip and a \$25 reward for every 250 points earned, free or half-price tolls in express lanes, and financial and tax subsidies.

3.9.4 San Diego

iCommute provides ride share options throughout San Diego through Waze Carpool, uberPOOL, and Lyft Shared. These provide a 50% or more reduction in commuting costs, as well as many free amenities throughout the region including carpool lanes, the I-15 Express Lanes, Park & Ride lots, and the Guaranteed Ride Home program³⁹. A range of services are also provided for employees such as developing carpool plans and schedules and ongoing benefits.

³⁶ Commonwealth of Massachusetts, <https://tnc.sites.digital.mass.gov/>

³⁷ A Philadelphia ride-share story: An Investigation of ride-share's impact on transit

³⁸ 511 SF Bay, <https://511.org/>

³⁹ iCommute San Dag, <https://icommutesd.com/carpool/carpool>

4. PUBLIC TRANSPORT CHARACTERISTICS

4.1 Journey to Work Mode Splits

Analysis of Journey to Work data was undertaken to determine the relative number of employees travelling to work by car as opposed to public transport or active modes⁴⁰.

Employees commuting to the Sydney CBD were less likely to commute by car and more likely to use public transport than in other cities, with 61% public transport uptake. Whilst Boston and San Francisco also displayed a relatively high degree of public transport usage (both approximately 37%), employees commuting to San Diego are overwhelmingly dependent upon car, with just 4% of commuters using public transport. It is also worth noting that a greater number of trips were made to San Diego than the other cities in this study.

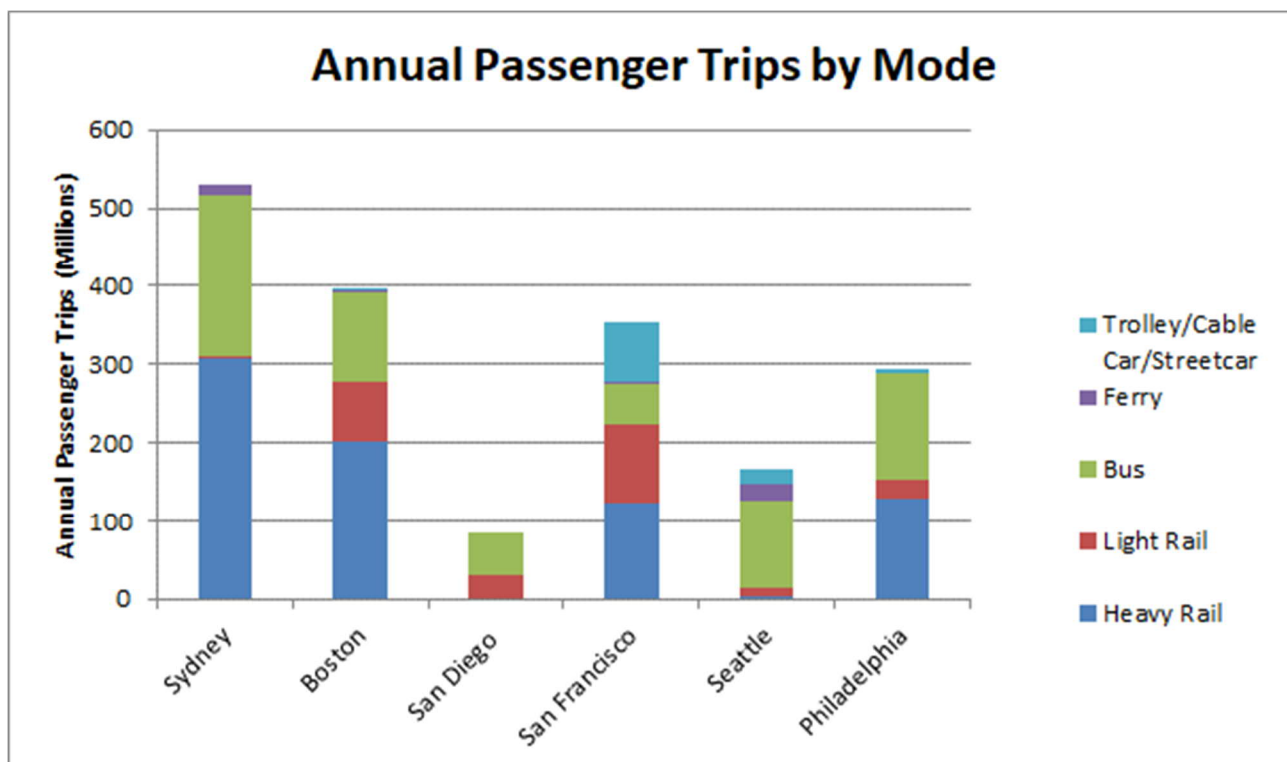


Figure 4.1: Travel Mode Split of Trips to Work

It can be seen that public transport mode share is highest for Sydney, and that Boston and San Francisco are similar. San Diego has very low public transport mode share, reflective of its limited transit system (as explained in Section 4.4) and generous parking supply.

Sydney’s mode share can be explained by a combination of early development of radial train, tram and bus routes, and severe traffic congestion on radial roads leading to the CBD. For many years, there were very limited CBD bypass routes for through traffic (for example north shore to/from the airport). Even now, despite the Eastern Distributor and Cross City Tunnel, CBD streets such as King, Market, Bathurst and Liverpool carry substantial proportions of through traffic.

Figure 4.2 indicates that cities where employees tend to travel to work in the CBD by public transport, such as Sydney, Boston and San Francisco, are less likely to provide extensive parking facilities in the CBD. Conversely, the high level of parking availability in San Diego is likely a reflection of its low public transport mode share. In this context, the effect of Sydney’s limited parking provision is

⁴⁰ Note: Due to differences in mode classification in Australian and U.S Census Data, trips made by car incorporates both car drivers and passengers

somewhat mitigated by its high dependence upon public transport. As its working population grows, the challenge for Sydney will be to moderate future demand for parking by developing those public transport capabilities through projects such as the CBD and South East Light Rail, and the Metro rail network.

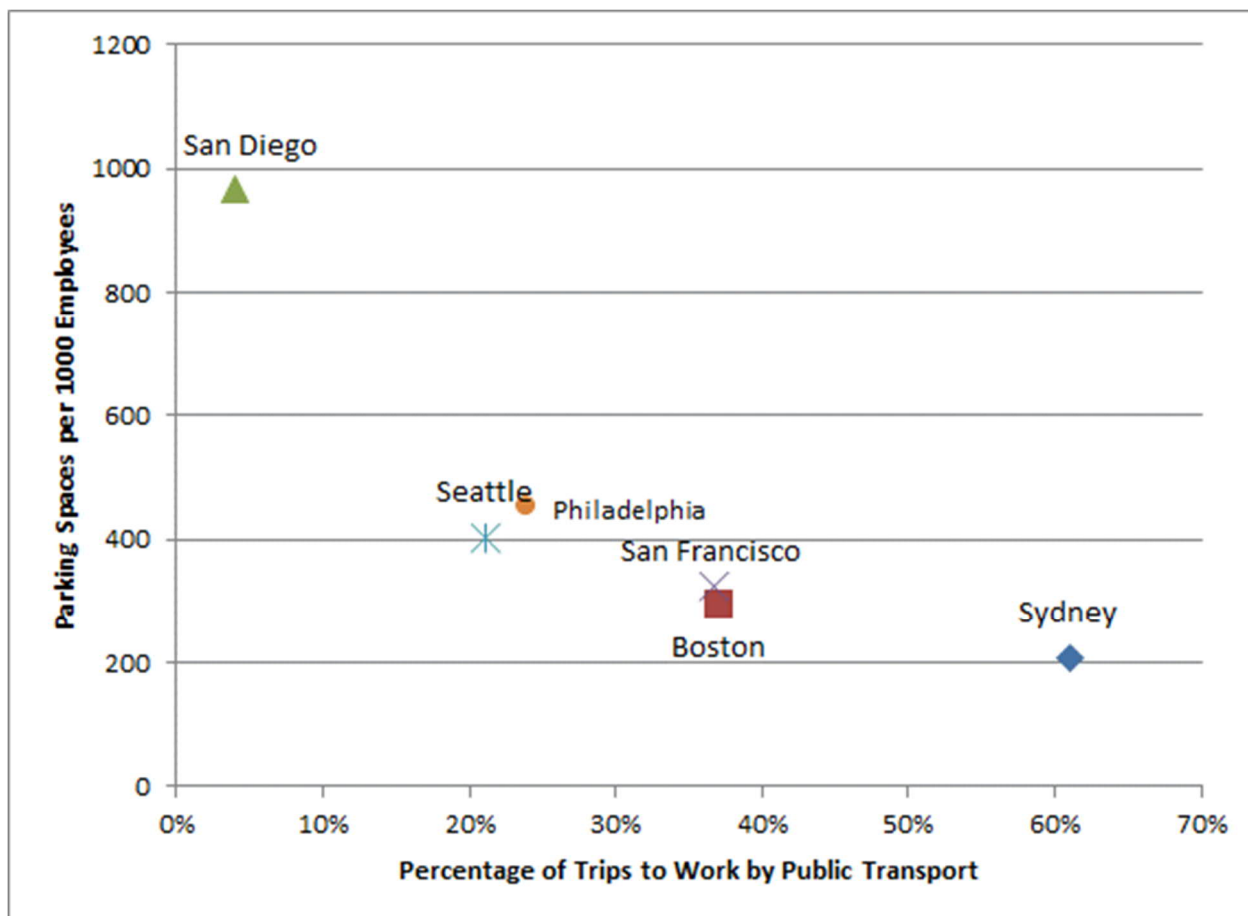


Figure 4.2: Comparison of Parking Availability per Employee with Public Transport Mode Share for Journeys to Work

4.2 Sydney

4.2.1 Network Description

The Sydney public transport network consists of train, bus, and to a lesser extent, light rail and ferry services. Train services are under a joint jurisdiction - higher frequency inner-city and suburban services are operated by Sydney Trains, whilst NSW TrainLink is responsible for intercity services to the South Coast, Southern Highlands, Blue Mountains, Central Coast, Hunter and Newcastle. At present, capacity of the network is restricted by the existing infrastructure and the need for a second Harbour Crossing.

Sydney Metro is the operator of the driverless metro (single deck, high frequency) trains currently operating between Chatswood and Tallawong (in north west Sydney). The metro network is being extended from Chatswood to Bankstown (the CBD and South West Metro project) via North Sydney, the CBD, Waterloo and Sydenham, expected to open in 2024. Planning is also underway for the Sydney West Metro (CBD to Westmead) expected to be completed by 2030.

Bus services are provided by Sydney Buses, as well as several private bus operators. Current planning strategies are aimed at using buses as ‘feeder services’ towards train stations, although commuters in some areas, particularly the Warringah area, are heavily reliant upon express bus

services to the CBD. In addition, a form of Bus Rapid Transit (BRT) is in place on the Liverpool-Parramatta Transitway and from the Northern Beaches (the B-Line).

Light rail services operate from Central rail station to Pyrmont, Lilyfield and Dulwich Hill (L1 Line), and from Circular Quay to Randwick (L2 line) and to Kingsford (L3 Line). The L2 and L3 lines, opened in 2020, resulted in a pedestrian zone on George Street (between Hunter and Bathurst Streets), and a major impact on the operation of streets in the Sydney CBD. Some bus routes were terminated at light rail interchanges, remaining bus routes were diverted to parallel north-south streets, and consequently general traffic displaced to other streets. On the new Bus Priority routes such as Castlereagh Street, the relatively narrow road reservation means that most on-street parking and loading zones were lost as part of the creation of Bus Lanes, general traffic lanes, and turning lanes. All of the on-street parking spaces previously available to motorists were eliminated along the light rail route in the CBD precinct.

Ferry services are now operated by a private entity, Harbour Ferries, and primarily run services to northern harbour locations, as well as Parramatta. Ferries account for just 3% of all public transport trips to the CBD.

4.1 Boston

The Massachusetts Bay Transportation Authority is responsible for public transport within the Greater Boston Area. The Boston CBD is serviced by a subway, consisting of three heavy rail lines and one light rail line; bus services, and BRT (known as the Silver Line). Silver Line buses traverse a 41km route, operating in a dedicated transit lane at street level through the CBD before entering a bus tunnel east of South Station.

A commuter rail network, spanning 11 lines and 100 stations services regional commuters; the lines terminate at North and South Stations at the extremities of the CBD. Lastly, frequent bus services, as well as inner harbour and commuter ferry services are available.

4.2 San Diego

The San Diego Metropolitan Area is heavily reliant upon bus and trolley services, both operated by the San Diego Metropolitan Transit System. The San Diego Trolley is a light rail system spanning three lines, 53 stations and 86km from outer suburbs to Downtown San Diego. A second light rail service named 'Sprinter' also operates in the region, but does not run to San Diego City.

A single commuter train, the 'Coaster', runs from Oceanside south to Downtown San Diego to connect with trolley services. Its peak running frequency is two trains per hour. However, 'Coaster' attracts only 1.6 million trips annually and carries only a very small proportion of commuters to and from San Diego City.

In addition, five BRT routes operate, including three stations along Broadway in Downtown San Diego.

4.3 San Francisco

The Bay Area Rapid Transit System (BART) is San Francisco's most popular mode of public transport, responsible for over 120 million trips annually. It offers regional heavy rail services over five lines and 44 stations. Approximately 60km of track runs underground, with an additional 107 km at surface level or on elevated tracks.

The Muni Metro is an extensive light rail network providing access to Downtown San Francisco from outlying neighbourhoods. The network consists of over 115km of track and includes three tunnels,

nine subway stations, twenty-four surface stations and eighty-seven surface stops⁴¹. Within the Financial District and surrounds, underground stations are shared with BART.

Buses and trolleybuses, as well as a limited number of historic cable cars also operate in the city. A BRT route operates along Van Ness Avenue, a major transportation corridor. This route includes dedicated bus lanes separated from traffic through in the CBD as well as elimination of most left turns, transit signal priority and traffic signal optimisation.

4.4 Seattle

Buses are heavily patronised in the Seattle area, with over 380,000 bus trips taken each weekday⁴². Local services are provided by the King County Department of Transportation (King County Metro), whilst regional services to neighbouring counties are provided by Sound Transit. A number of bus services, as well as the Central Link Line utilise the Downtown Seattle Transit Tunnel, a 2.1 km public transit tunnel which runs the length of downtown Seattle.

Seattle's light rail line, the Link Line operated by Sound Transit, runs from University of Washington in the north through downtown Seattle, Sea-Tac Airport to Tacoma in the south. Light rail patronage is approximately 89,000 trips each weekday.

Sound Transit also operates a commuter rail service, 'Sounder', which extends south of Seattle to Tacoma and Lakewood, and north to Everett. The system accounts for approximately 18,000 trips each weekday.

In its 2012 Transit Master Plan, the Seattle Department of Transportation proposed implementing rapid transit routes on key transit corridors within downtown Seattle. These rapid transit routes are likely to take the form of BRT or streetcar routes. As yet, Seattle does not have a true BRT network in place, although an express bus network, King County Metro's 'RapidRide', incorporates some features of BRT.

Washington State Ferries operate regular ferry services across the Puget Sound, with two routes to the City of Seattle. Due to a lack of alternative connections across the Sound, ferry services are quite popular with over 60,000 trips taken each weekday.

4.5 Philadelphia

The city of Philadelphia is served by three heavy rail lines, 12 commuter rail lines and three trolley (light rail) lines. There are also more than 150 bus routes. Average weekday ridership⁴⁷ ranges from 492,000 on buses, through 329,000 on heavy rail to 106,000 on light rail/trolley. Commuter rail services carry approximately 135,000 passengers on an average weekday.

4.6 Comparison

Table 4.1 compares the public transport facilities in place or under development in each city, while Figure 4.3 shows the number of unlinked passenger trips taken on each of these modes in 2012. For comparison purposes, Bus Rapid Transit systems have been grouped under Bus services.

Of the cities in this study, Sydney is the most reliant upon heavy rail services, which accounted for 58% of passenger trips in 2012. Boston and San Francisco also demonstrated high heavy rail patronage, although both of those cities had a higher ridership on light rail modes (19% and 28% respectively, compared to just 1% in Sydney). Despite this disparity, the total ridership accounted for by light rail and bus modes is similar across these three cities, at 30-40%. In contrast, In San Diego

⁴¹ SFMTA (2021), 'Muni Metro Light Rail', viewed 12 May 2021, <<http://www.sfmta.com>>

⁴² American Public Transport Association (2021), Transit Ridership Report- Fourth Quarter 2019, viewed 12 May 2021, <<http://www.apta.com/resources/statistics/Documents/Ridership/2019-q4-ridership-APTA.pdf>>

and Seattle, bus services account for the bulk of passenger trips. In both cities, this is likely a reflection of the limited provision of alternative modes, particularly in San Diego, where public transport patronage is relatively low (see Figure 4.1). However, while Seattle is in the process of expanding its light rail and streetcar capacities, San Diego has instead chosen to invest in additional BRT routes.

Ferry transport also featured in each city except San Diego but this mode only features prominently in Seattle, where ferries are able to transport passengers across the Puget Sound more effectively than rail or bus.

Table 4.1: Comparison of Public Transport Facilities

Public Transport Mode	Sydney	Boston	San Diego	San Francisco	Seattle	Philadelphia
Heavy Rail	✓	✓		✓	✓	✓
Light Rail	✓	✓	✓	✓	✓	✓
Bus	✓	✓	✓	✓	✓	✓
Bus Rapid Transit	✓	✓	✓	✓	✓	✓
Ferry	✓	✓		✓	✓	
Trolley/Cable Car/Streetcar		✓		✓	✓	✓

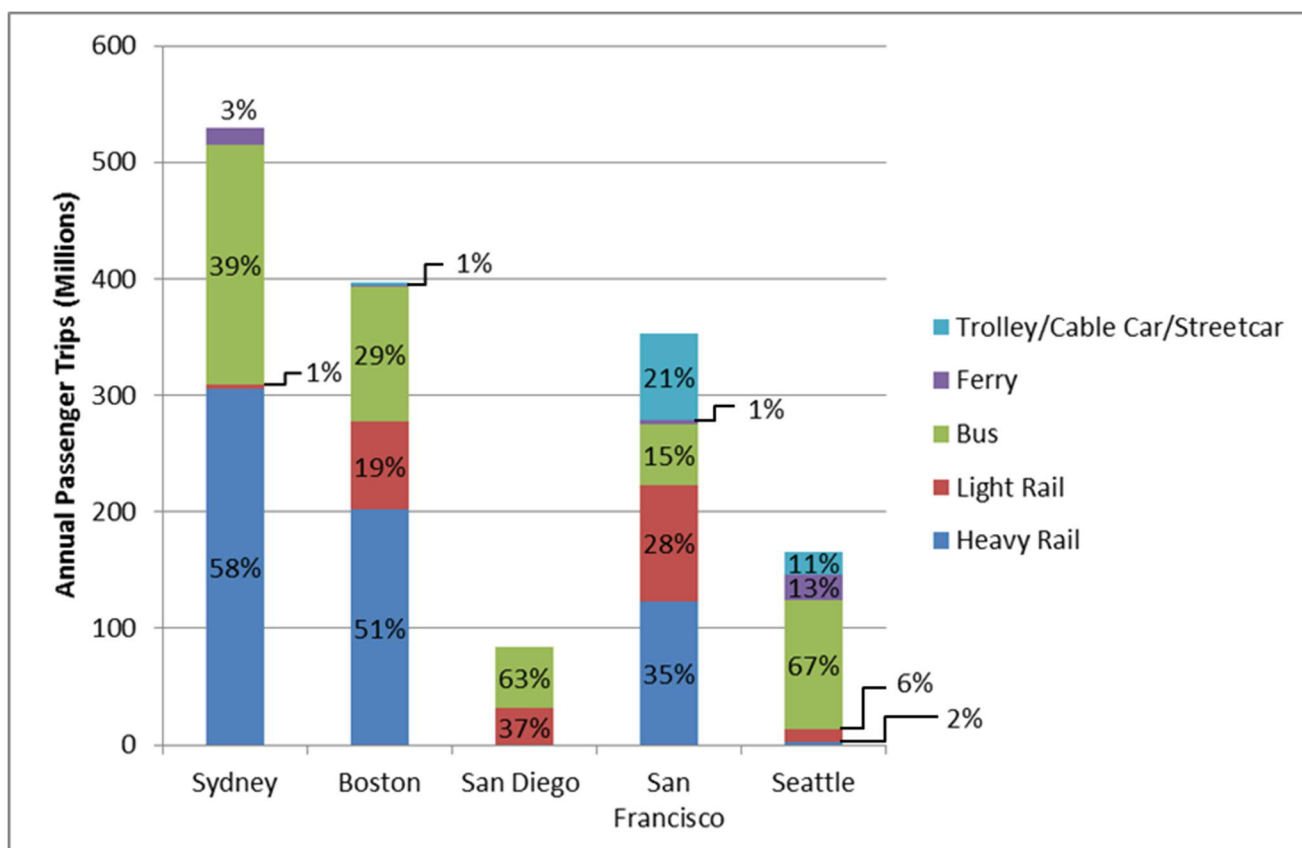


Figure 4.3: 2012 Unlinked Passenger Trips by Public Transport Mode

5. CONCLUSIONS

Sydney's parking and public transport have been compared with those in five similar US cities, namely Boston, San Diego, San Francisco, Philadelphia and Seattle.

In terms of parking supply per CBD employee, Sydney is broadly in line with San Francisco and Philadelphia. Seattle has two to three times the number of spaces, while San Diego has almost four times as many. The median daily parking rate in Sydney is almost double that of the five US cities.

Sydney's public transport mode share for work trips to the CBD is the highest at 61%, followed by Boston and San Francisco (around 37%), Philadelphia (24%), Seattle (21%) and San Diego (just 4%). We note the strong inverse relationship between the number of parking spaces and the public transport mode share.

In comparing parking management strategies, Sydney is further advanced than all five US cities, although San Francisco and Seattle are somewhat similar.