INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

Uber

AUSTRALIAN TRAVEL TIME METRIC

2020 EDITION

INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

Infrastructure Partnerships Australia

Infrastructure Partnerships Australia is an industry think tank and an executive member network, providing research focused on excellence in social and economic infrastructure. We exist to shape public debate and drive reform for the national interest.

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OVERVIEW

Australia's transport networks are at a critical juncture

Over the past six months, transport networks have faced dramatic disruption. As the impacts of COVID-19 took hold and travel restrictions were put in place, roads and public transport networks were all but deserted. This was in stark contrast to the increasing transport crowding and congestion that have become part of daily life for many commuters in Australia's cities, as their populations have grown, and economic activity has become increasingly concentrated.

Before transport demand took a sharp decline in the first quarter of 2020, there were already signs that congestion on Australia's road networks had plateaued. This is cause for optimism. A wave of investment in infrastructure, driven by ambitious government agendas in a number of states, had seen major projects move from construction to operation, with transport users reaping the benefits. There were also signs that travel behaviours had started to become more efficient, underpinned by a growing number of transport options and real-time data at users' fingertips.

However, there were also concerning signs of a spike in congestion in some cities – most notably Melbourne and Perth – towards the end of 2019. This is an important reminder that we cannot take our foot off the pedal of investment and reform. Keeping transport networks running efficiently is a race that cannot be won – networks require ongoing efforts to meet users' changing needs.

This edition of the *Australian Travel Time Metric* by Infrastructure Partnerships Australia charts road network performance in Australia's largest cities up to the end of 2019. Using data from Uber, it highlights the shifts underway just before the virus hit our shores. Uber's on-vehicle time and speed measurements also provide a detailed picture of the human impact of infrastructure decision making.

This report illustrates that Australian transport networks are at a critical juncture. With COVID-19 having hit the reset button, the question now becomes how to reshape travel demand to lock in the positive changes that had started to materialise before the pandemic.

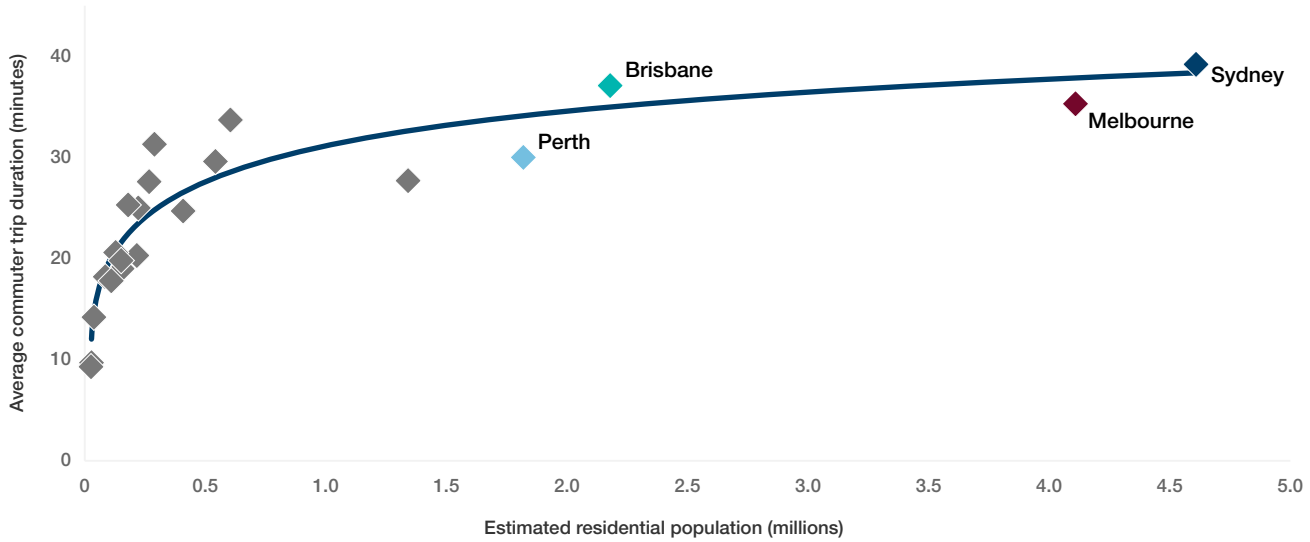
This report will form the backdrop for further advice from Infrastructure Partnerships Australia on the investments and reforms required to ensure Australia's transport networks keep heading in the right direction.

Australia's cities have grown accustomed to mounting congestion

Australia's four largest cities – Sydney, Melbourne, Brisbane and Perth – are home to nearly 60 per cent of our total population.[1] By 2016, nearly four million Australians in these cities were using private vehicles for their daily commutes, reflecting 64 per cent of people travelling for work.[2]

The scale of our largest cities, both in terms of population and geographic spread, coupled with a continued reliance on private vehicle use, has resulted in worsening congestion on key parts of our road networks. As Figure 1 shows, the performance of Australian cities' transport networks, across all modes, is closely tied to their population.

Figure 1: Relationship between average commute duration (all modes) and population size



Source: Bureau of Infrastructure, Transport and Regional Economics (2016)[3]

1 Australian Bureau of Statistics, 2019, Regional Population Growth, Australia, 2018-19
2 Australian Bureau of Statistics, 2018, Census of Population and Housing: Commuting to Work - More Stories from the Census, 2016
3 Bureau of Infrastructure, Transport and Regional Economics, 2016, Lengthy Commutes in Australia

However, with over 1.3 million commuters in private vehicles– the most for any Australian city– Melbourne remains the longest morning commute for private vehicle users across the four cities.[4] While the burgeoning populations of our largest cities have brought substantial growth, productivity and improvements in quality of life, the resulting congestion has also caused economic and social costs. This was highlighted in the previous *Australian Travel Time Metric*, released in 2017, which found that congestion was worsening across all cities except Perth.

Despite continued growth in our cities, congestion has plateaued

Despite the population of these cities growing substantially over the last four years, with total road kilometres travelled also increasing, the 2020 *Australian Travel Time Metric* shows that peak commutes in and out of the CBDs of the big four cities have largely remained steady. For example, a trip to Melbourne's CBD from the inner and outer metropolitan suburbs took just over 20 minutes in Q3 2015. By the end of 2019, this trip took roughly the same time. During the same period, the morning peak traffic volumes in Melbourne city have dropped by four per cent, even as all-day traffic volumes rose by five per cent, indicating a clear shift in travel behaviour during peak hours.[5]

The four largest cities also saw off-peak travel times improve over the four-year period to 2020. This is despite the population in the four cities growing by eight percent during the same period. These improvements are likely due to a combination of factors like the major transport infrastructure upgrades that have become operational across cities and a resultant gradual shift in commuter modes to public transport. Evolving travel behavioural changes have also been enabled by increased availability of real-time travel information for users – empowering individuals to travel more efficiently and minimise their impact on the broader network.

Figure 2 shows the quarterly aggregated Travel Time Index for Australia's four largest cities, measuring each city's morning peak and off-peak travel times against off-peak data from Q3 2015 as the benchmark. These travel times represent inbound trips to each city's CBD from their inner or outer metropolitan rings. With inner and outer metropolitan rings being the same distance in each city, the index provides a comparable metric across the four cities.

About this report

The *Australian Travel Time Metric* uses Uber's anonymised ride share data to examine how private vehicle travel times between the CBD and equally distanced inner suburban rings in each city have changed.

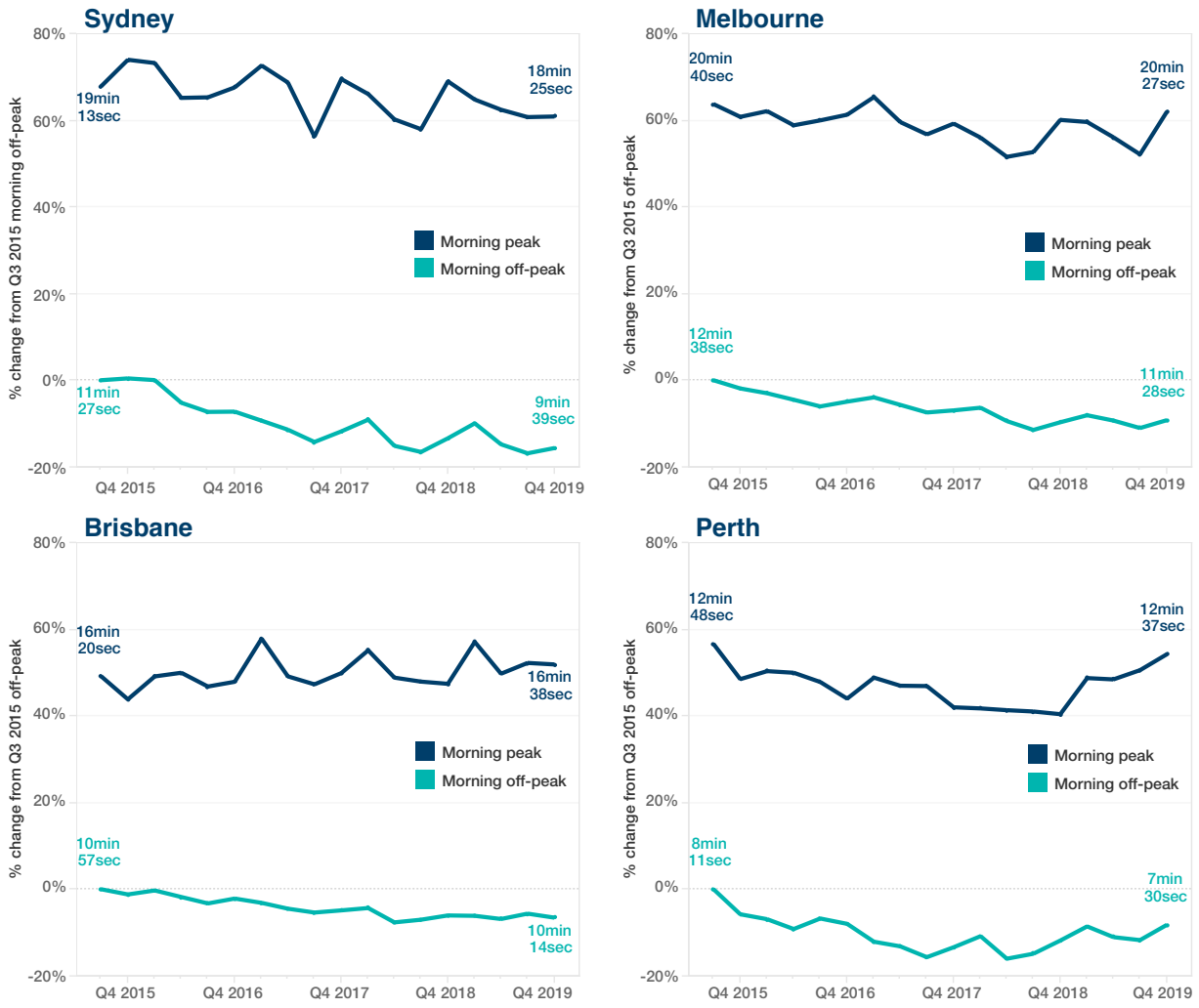
Building on the 2017 edition, this report also provides insights into how this data can be a tool for policy makers in measuring the impact of transport project delivery, identifying network performance constraints, as well as understanding user behaviours and travel pattern changes over time.

This edition uses city-wide travel time data available from the Uber Movement platform until the final quarter of 2019 – enabling analysis of the road performance trends right up until the COVID-19 crisis hit Australian cities. Travel time data has been supplemented by Uber's Speeds database for Sydney – a recent addition to the Movement platform – to highlight the impact of the COVID-19 crisis on congestion in our cities.

To explore broader performance trends, this report compares the peak and off-peak travel time outcomes for Sydney, Melbourne, Brisbane and Perth, for the four-year period leading up to 2020.

4. Australian Bureau of Statistics, 2016, Commuting Distance by Personal Characteristics
5. VicRoads, 2020, Traffic Signal Volume Data

Figure 2: Historical Travel Time Index across four largest cities



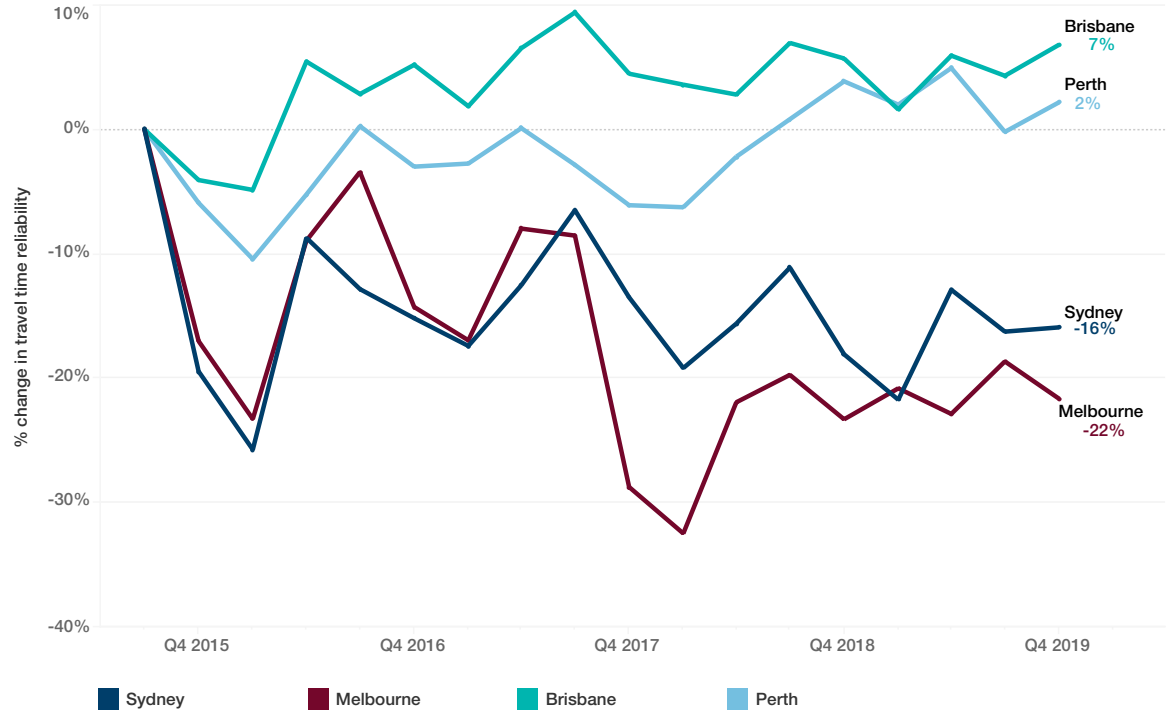
The index shows that all four cities have seen off-peak travel times improve since 2015, albeit at different rates. Sydney saw a near-16 per cent improvement, while Melbourne's off-peak improved by nine per cent. Perth's average off-peak reached a low of below-seven minutes in the second quarter of 2018 but has since risen.

In comparison, morning peak travel times have largely failed to capture the positive trends in the off-peak. As Sydney's off-peak became faster by 16 per cent, the peak only saw a four per cent improvement. Since 2015, Melbourne – the city with the longest private vehicle commute – saw the peak delay increase by 12 per cent as the morning off-peak improved by nine per cent. This increase in delay largely materialised in the final quarter of 2019, which drove up the total travel times by six per cent in that quarter. In Brisbane, peak travel time during the morning commute remained steady, but the average delay has increased by 19 per cent. Perth's congestion remains the lowest compared to other cities. However, peak travel times have spiked by ten per cent during the last year.

Deteriorating travel time reliability in some cities is a concern

The reliability of travel times in peak periods has seen diverging trends. While, in absolute terms, the measure was relatively similar across the cities since Q3 2015, the peak travel time reliability has worsened by 22 per cent for Melbourne (Figure 3). Similarly, Sydney's peak travel time reliability has worsened by 16 per cent. In contrast, Brisbane and Perth saw the reliability improve by seven and two per cent respectively. This is an important measure, and a concerning trend, because reliability factors heavily in travel decisions. If a commute regularly oscillates between 25 minutes and 40 minutes, the commuter will necessarily take the decision to allow for 15 minutes delay in every journey – 15 minutes that could be spent in better ways. It is also an indication of a transport system that is routinely close to its efficiency limits, where minor incidents or marginal increases in demand have dramatic negative impacts on performance.

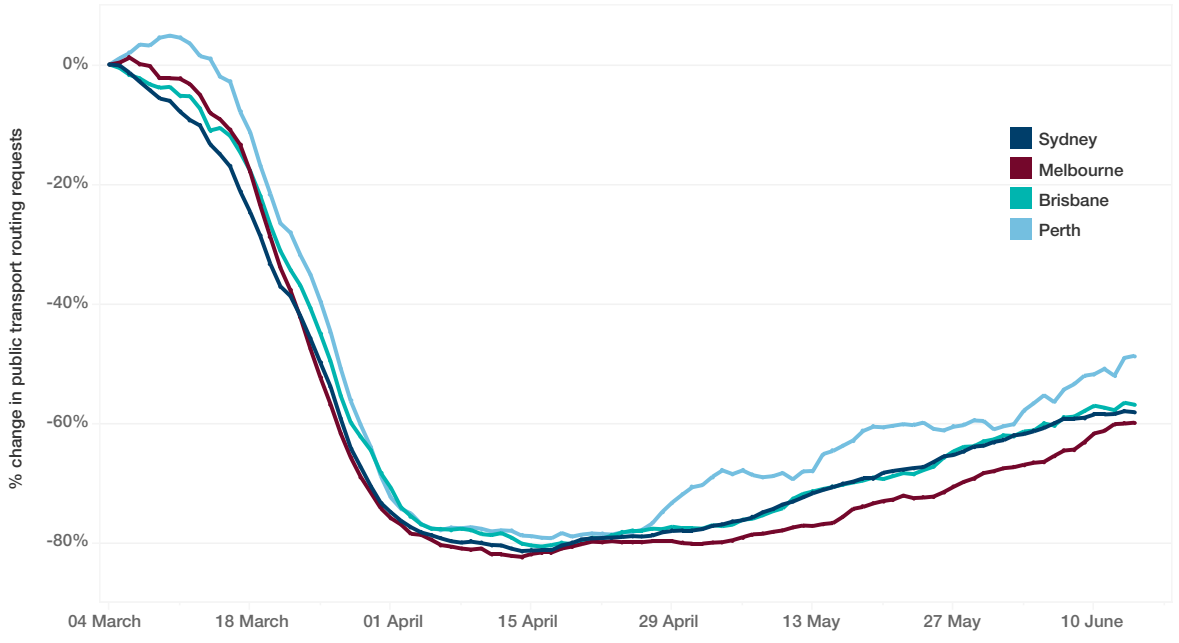
Figure 3: Change in reliability of peak travel times from outer metropolitan ring to the CBD



COVID-19 hit the reset button on urban transport

It is against this backdrop that Australian cities were thrown into a new chapter of mobility with the COVID-19 pandemic. The transport sector was among the hardest hit by the disruptive impacts of COVID-19. With government restrictions being introduced quickly, public transport commutes in our four largest cities dropped by as much as 80 per cent in March 2020 (Figure 4).

Figure 4: Change in public transport routing requests during COVID-19

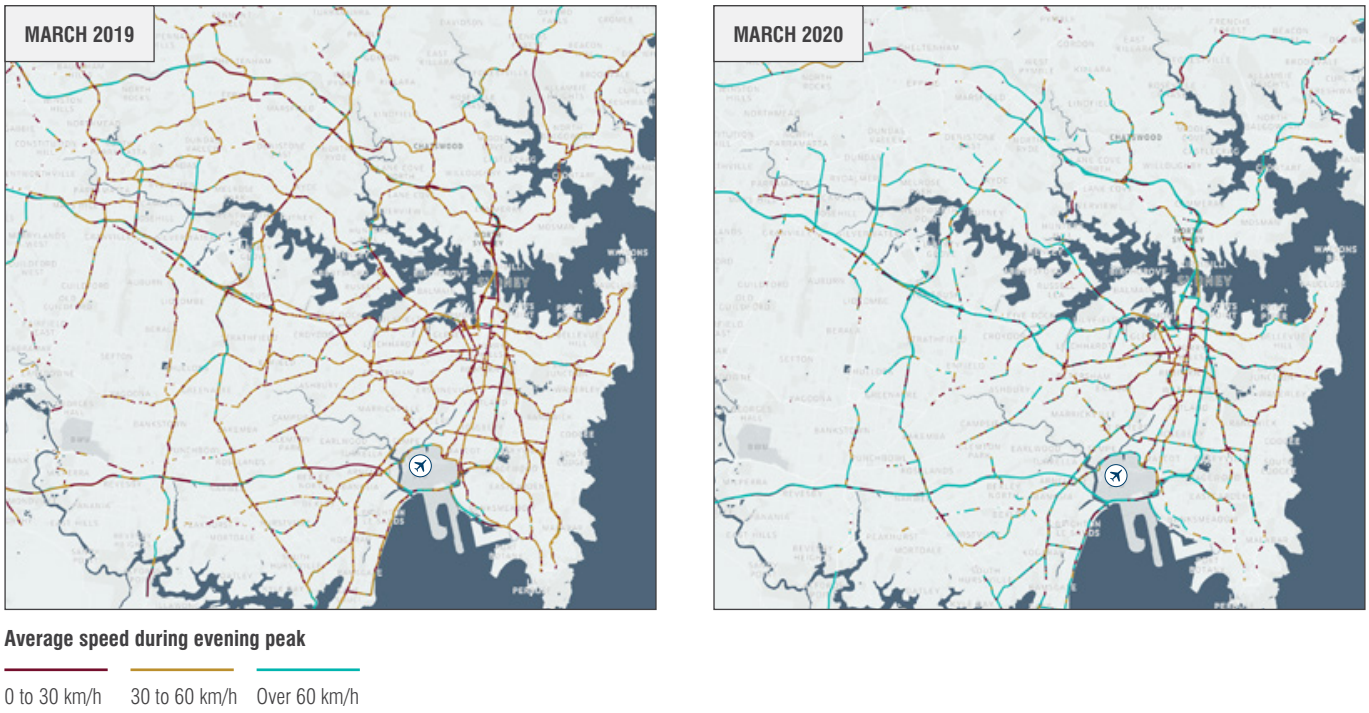


Source: Moovit (2020)[6]
Note: Graph compares percentage change in seven-day moving averages of routing requests to those in the first week of March

6. Moovit, 2020, Moovit Public Transit Index

Even with many public transport users instead opting for private cars for essential travel, Australia's capital cities saw a substantial change in congestion levels (Figure 5). By the final week of March this year, both morning and evening peak speeds on key Sydney arterials, as well as gateways like the Harbour Bridge and Cross City Tunnel, resembled the speeds of evening off-peak (7 p.m. to midnight) of pre-COVID Sydney.

Figure 5: Speeds in Sydney's key corridors during evening peak in late March 2020, compared to same period last year



Now is the time for a rethink on transport in our biggest cities

As restrictions ease and movements within our cities increase over the coming months, Australian commuters are presented with several challenges and opportunities. The question now is what the 'new normal' will look like.

Many users may opt for the perceived safety of socially isolated private cars, with potential implications for congestion in the immediate term. And if there is a significant increase in private car use, like we are seeing in other markets, there is a risk we will face a return of congestion in our cities – perhaps worse than before.

However, several opportunities are emerging out of the pandemic. With practices like remote and flexible working now commonplace for many of those who previously commuted to CBDs daily, some commuters may now have the option to travel off-peak or to commute less frequently. Many cities are also responding to the increase in active transport participation with temporary bike lanes, easing pressure on both the public transport and road networks.

As Australian cities move into the post-COVID era, governments have an opportunity to reshape commuter behaviour and reassess outdated policies. The experience of this crisis may in fact provide an accelerated pathway to achieve some long-overdue reforms.

A suite of broader reform measures will be required to support future investments in road capacity. As economic activity rebuilds and population growth resumes post-COVID, governments should focus on measures that lock in positive changes to travel behaviour and service provision.

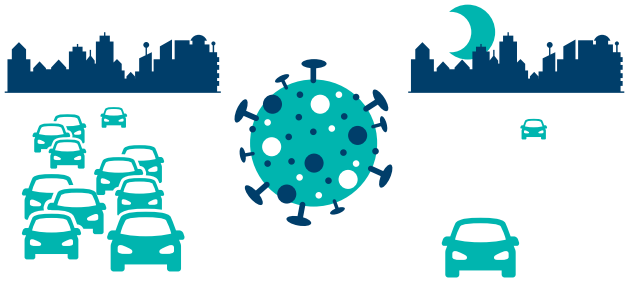
For instance, the current conditions have provided a test case for the opportunity to reduce and spread peak demand by incentivising off-peak travel through public transport pricing or encouraging businesses to adopt flexible and remote work models. With public transport operators having to rethink the concentration as well as frequency of services to respond to emerging user behaviours, this may also provide an opportunity to approach mobility in our largest cities as a whole-of-network service.

Other options for continued reform include incremental efforts to improve the quality and depth of real-time data for users, integration of transport pricing across modes, and spreading the peak demand. More broadly, governments should consider road reform to implement a fairer and more sustainable way of paying for road use and managing transport demand.

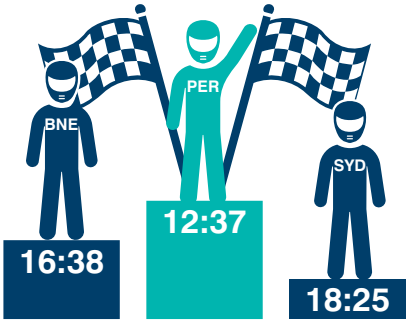
Infrastructure Partnerships Australia will continue to monitor the performance of Australia's transport networks as we emerge from this crisis, and provide advice on the reforms and investments required to support the economic recovery.

KEY FINDINGS

Commuters travelling from **Melbourne's** outer metro to the CBD spend **79 hours** each year **stuck in traffic**.

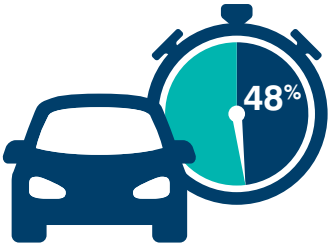


COVID-19 turned **Sydney's peak hour** congestion into pre-pandemic evening **off-peak** levels, with **speeds improving** in some corridors by up to **70 per cent**.

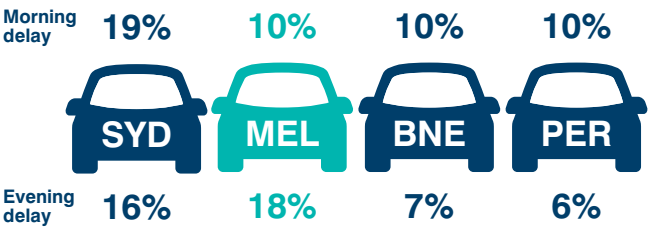


Perth recorded the **fastest** overall morning **commute**, at under **13 minutes**.

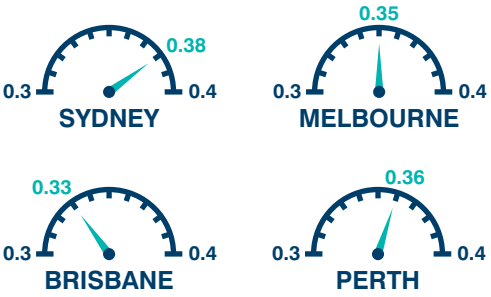
Brisbane commuters travelling between its **outer metro and the CBD** experienced the **lowest share** of peak **delays**, compared to other major cities.



In 2019, commuters from **Sydney's** outer metro spent **48 per cent** of their trip to the CBD **stuck in traffic**.

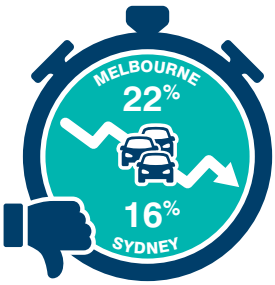


All cities except Melbourne experienced **bigger delays** driving from inner to outer metropolitan areas in the **morning peak**, compared to the evening.



Reliability in peak **trip times** was **similar** across the four cities, with **Brisbane** leading the pack with the **lowest** coefficient of **variation** for travel times.

Travel time from the **Airport to Sydney's CBD** was **87 per cent longer** in the **morning peak** – the **most delay** for any city's airport corridor.



Melbourne's reliability in peak trip times **deteriorated** by **22 per cent** in the four years since 2015, while **Sydney's** worsened by **16 per cent**.

Despite being the second longest in distance, the evening peak trip from **Brisbane's CBD** to the **Airport** corridor was the **quickest** and least delayed for any city during a peak period. The trip was under **21 minutes** with just a six per cent delay.

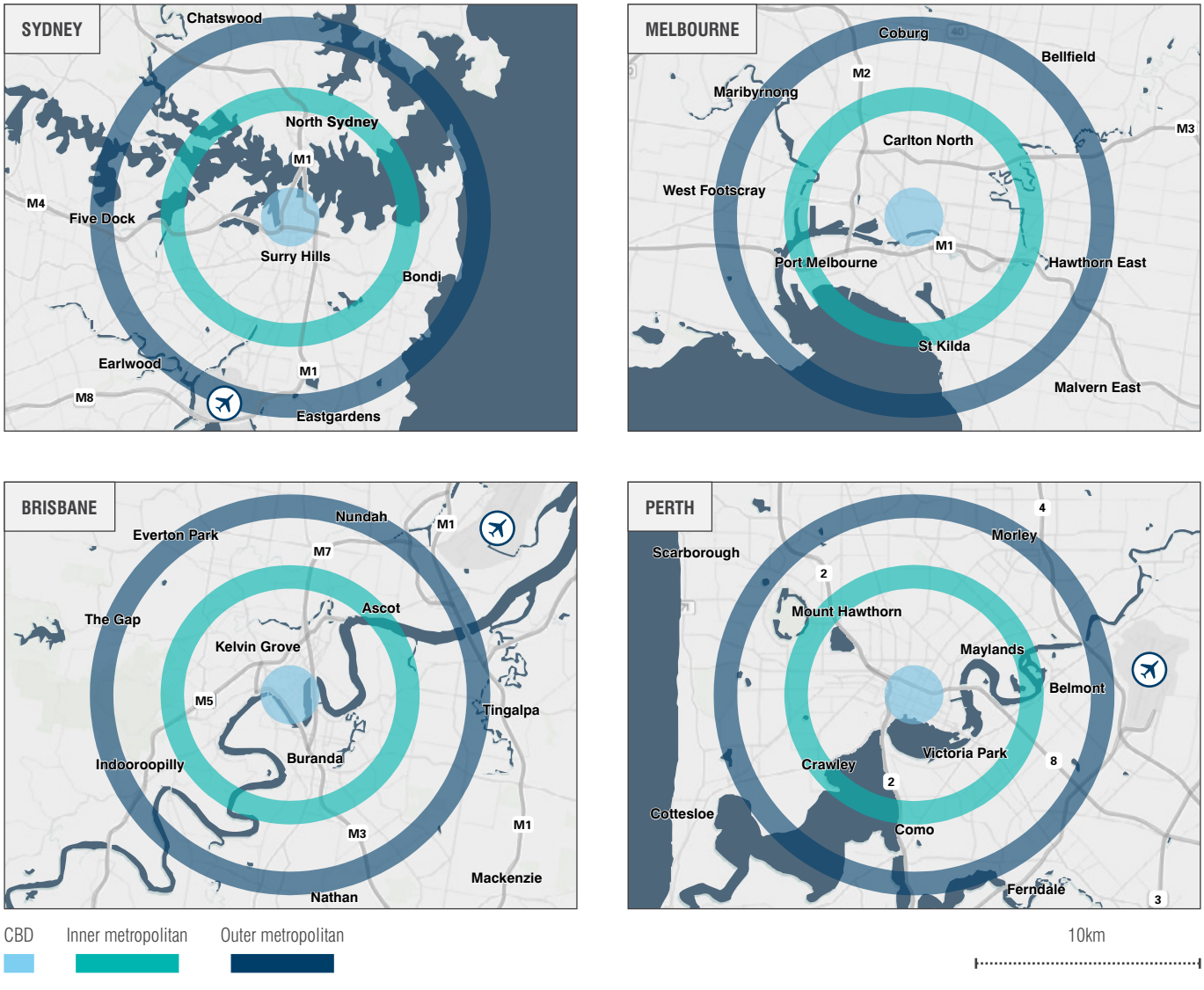
Over the four years leading up to 2020, the **delay** in travelling from **Perth's CBD** to **Airport decreased** by **42 per cent** – the biggest drop for any airport corridor.

METHODOLOGY

The Travel Time Index measures road transport performance across Australia's four largest cities using Uber's anonymised trip data. Uber's on-vehicle measurement systems capture the GPS location of each vehicle, every four seconds, during each ride. This geocoded information is then used to calculate the time taken to traverse between different travel zones that each vehicle passes through during a ride. By aggregating these zone-to-zone travel times by hours, days, months and quarters, summary travel times are then produced, which de-identify individual trips. A similar process is also used to calculate and aggregate speeds along individual road segments of each city's transport network. This Travel Time data is now available for over 50 cities globally on Uber's Movement platform, while Uber Speeds data is also becoming gradually available. Compared to estimations or modelled outputs, using travel times and speeds measured from actual trips provides a more accurate picture of the traffic in our cities.

This edition provides an update on quarterly travel times up to the end of 2019. To make the headline figures comparable across cities, travel times from inner and outer metropolitan rings (Figure 6) to each city's CBD are taken into consideration. Using concentric rings with the same diameters in each city produces measurements that are standardised for the differences in shape and size of these cities.

Figure 6: CBD, inner and outer metropolitan mobility zones



Throughout the report, we use morning off-peak (12 a.m. to 7 a.m.) as a proxy for least congested network conditions. Headline figures measure inbound travel times during morning off-peak against morning peak (7 a.m. to 10 a.m.). For each city, a time series of percentage difference, in both peak and off-peak travel times are then calculated against the base case of 2015 Q3 morning off-peak. We also show mean travel times at the beginning and end of each time series, providing a more relatable measure of commute time and, by extension, delays to the road users. To measure the performance in outbound trips, we compare evening peak (4 p.m. to 7 p.m.) trips against the morning off-peak throughout this report.

To measure the reliability of peak travel times, we use the coefficient of variation for the weekday trips between 8 a.m. and 9 a.m. from the outer metropolitan ring to each city's CBD. In Figure 3, the percentage change in coefficient of variation is mirrored to convey reliability.

Beyond the headline figures, each city's profile includes a summary of peak travel time performance in 2015 Q3 and 2019 Q4 between key mobility zones, broken down by off-peak travel time, and time spent stuck in traffic (peak delay). The figure labels also show the proportion of time that is attributed to off-peak travel and time spent in traffic.

As a relatable journey, we have included the travel time trends in the corridor between the CBD and each city's airport. These rely on travel zones used by Uber, which are often the same ones used by planners in each jurisdiction. Unlike the 2017 edition, we have broadened the CBD catchment area to include all travel zones within each CBD, rather than using a single point in the CBD to represent travel to and from the city.

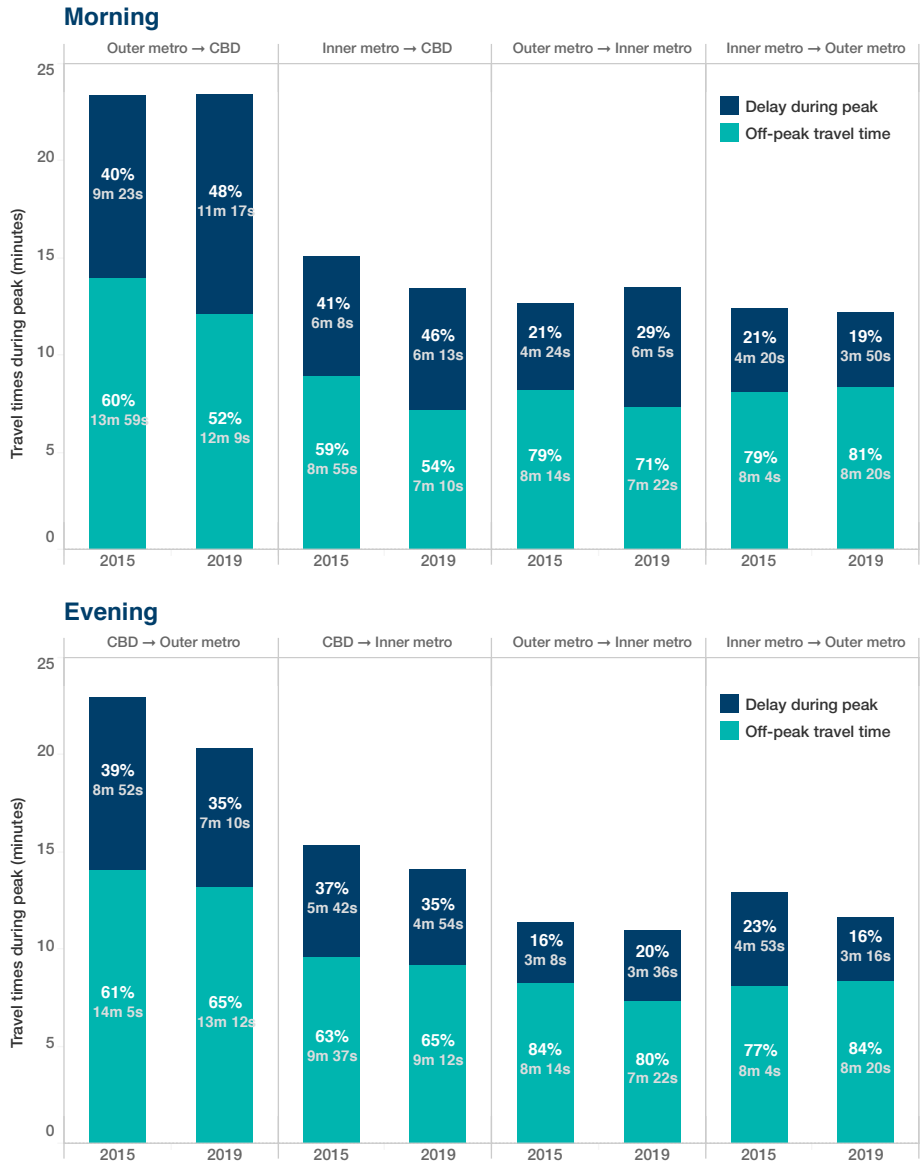
We have also used the zone-level trip data to develop several case studies exploring the effects of major transport upgrades and special events on congestion and travel behaviour. Figure 5 in the Overview uses Sydney Speeds data that currently provides information up to and including the first quarter of 2020 . The figure shows mean speeds along primary and arterial roads in Sydney. Road segments where the number of trips has not reached Uber's threshold are not reported on the Movement platform.

Beyond treatments applied by Uber when reporting the data, statistical significance tests were not conducted during this study. More on the methodology in capturing anonymised travel time and speed data from Uber's rideshare services can be found here.

SYDNEY

Figure 7 shows Sydneysiders from the outer metropolitan ring spent the most time – nearly 18 minutes on average – stuck in traffic on their daily commutes (both morning and evening). This accounts for 42 per cent of the commute, and totals to more than three days (76.8 hours) spent in traffic jams each year.

Figure 7: Sydney's dashboard: 2015 and 2019



Analysis

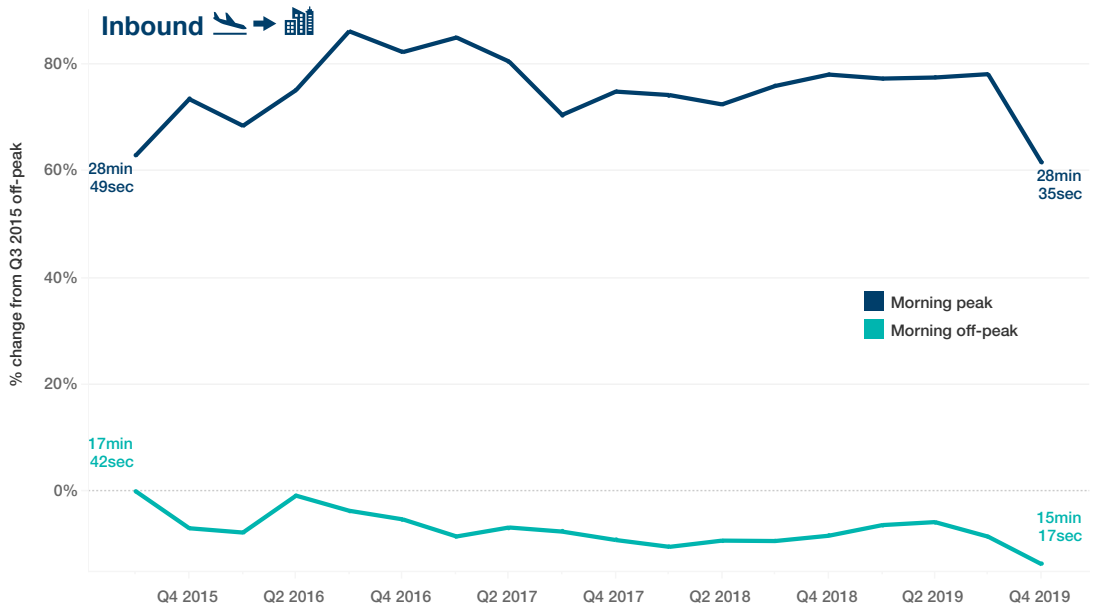
While off-peak travel continued to improve, the peak delay during the morning commute has increased in absolute terms for trips between key mobility zones. A trip from the outer metropolitan ring to the CBD saw a jump of nearly two minutes in delay time, making the time stuck in traffic during morning commute nearly as long as the total trip duration in the off-peak. Similarly, morning trips from the inner metro to the CBD also saw higher proportionate delays. However, a trip from the inner ring was ten minutes shorter compared to one from the outer ring – a significant decrease.

In comparison to morning inbound trips, outbound trips in the evening saw more promising outcomes for commuters leaving the city. As off-peak travel times continued to improve in absolute terms, the evening peak delays decreased faster, lessening the proportion of time stuck in traffic for trips from the CBD to inner or outer metropolitan rings.

Airport Travel

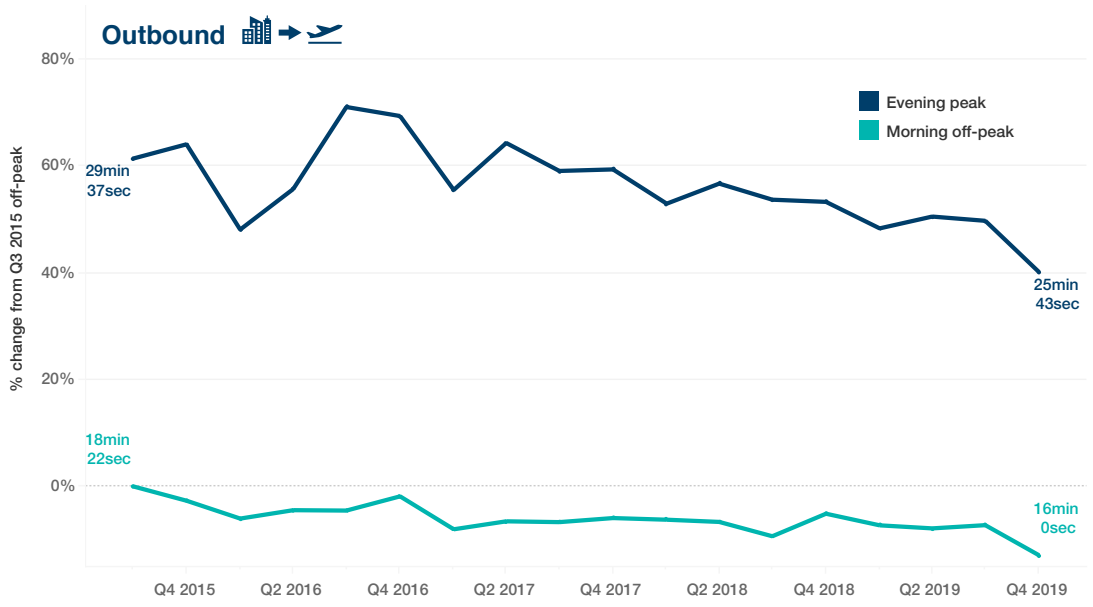
Figure 8 shows that trips from Sydney Airport to the CBD saw a widening gap between the morning off-peak and the peak travel times. While the off-peak travel times have shown a clear downward trend in the final two quarters, what started as an 11-minute peak delay in Q3 2015 has now grown to over 13 minutes.

Figure 8: Inbound: Sydney Airport to CBD



In comparison, outbound trips from the CBD to the airport saw modest improvements under both off-peak and peak conditions (see Figure 9). While the trend of morning inbound trips faring worse than outbound trips has largely been true across Sydney, another factor that may contribute to enforcing this pattern in the Airport to CBD corridor would be the efflux of trips out of Sydney airport, as the flight curfew lifts at 6 a.m. The morning arriving passenger trips into the CBD would coincide with the morning peak starting at 7 a.m. In contrast, evening peak trips would have a lower concentration.

Figure 9: Outbound: Sydney CBD to Airport



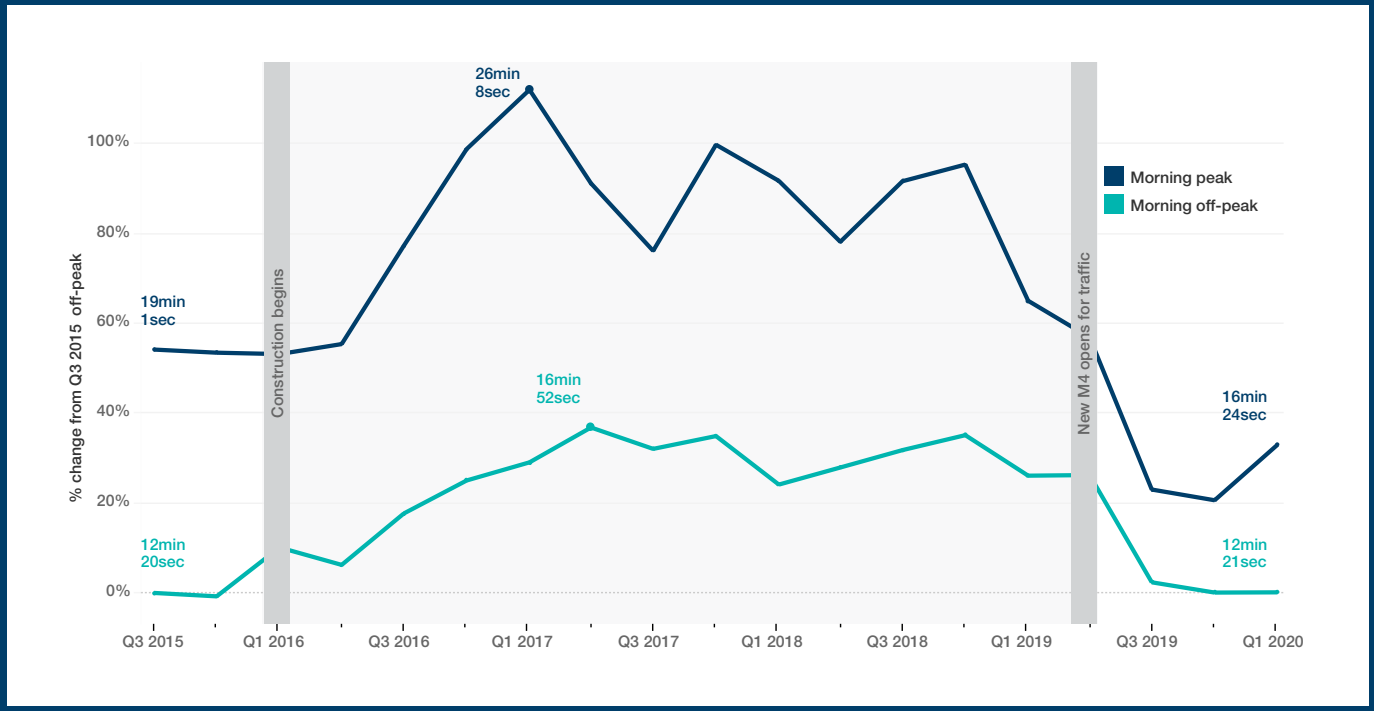
Case Study 1: Key Corridor Upgrades

As Sydney continues to undergo an unprecedented level of transport infrastructure upgrades, gauging how travel times and commuter behaviour change during and post construction can provide further understanding of the transport network.

The staged delivery of Sydney's WestConnex includes the key corridor of the New M4. The New M4 Tunnels, completed in 2019, created a new connection between Parramatta and Sydney CBD, including a new 6.5-kilometre motorway between Homebush and Haberfield that includes 5.5 kilometres in tunnels.

Figure 10 shows how travel times between Homebush and Haberfield in the morning peak and off-peak have fared compared to off-peak in Q3 2015. These travel times capture all Uber trips made between the two suburbs, irrespective of the route taken to complete them.

Figure 10: Travel time changes for all trips between Homebush Bay and Haberfield



Before construction started on the New M4, the average off-peak travel time between the two suburbs was around 12 minutes. This rose by nearly 40 per cent by mid-2017. Since the New M4 Tunnels opened in July 2019, average off-peak conditions have recovered to the pre-construction levels.

During construction, the peak travel times between Homebush and Haberfield increased from just over 19 minutes, to over 26 minutes. This reflects a 37 per cent increase in the peak.

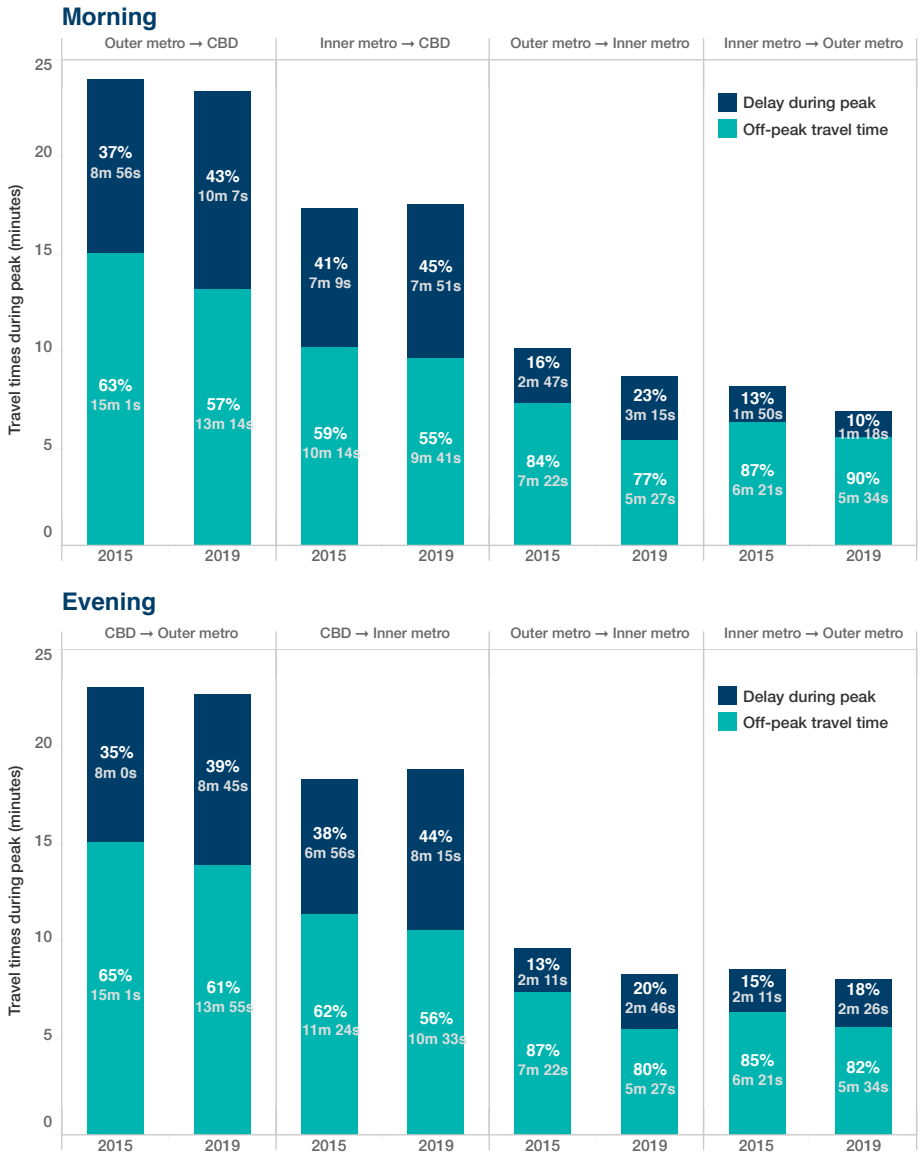
Since the New M4 opened, the peak travel time for all trips has dropped substantially. The journey was 20 per cent quicker by the end of 2019, compared to 2015 pre-construction times. While journeys completed using the New M4 exclusively will have further considerable time savings due to bypassing all signalised intersections between the two suburbs – and travelling at increased speed limits, the upgrade also appears to have achieved better travel times for commuters using other routes, including the old Parramatta Road.

As more sections of WestConnex complete the broader corridor, and interlinks with existing road network are optimised, these travel time outcomes are likely to further improve.

MELBOURNE

Figure 11 shows Melbournians from outer metropolitan areas spent the most time – nearly 19 minutes on average – stuck in traffic on their daily commutes. This accounts for 41 per cent of the commute (both morning and evening), and totals to over three days (78.6 hours) spent in traffic jams each year.

Figure 11: Melbourne's dashboard: 2015 and 2019



Analysis

Melbourne's off-peak conditions made a gradual improvement during the four-year period. However, the total travel times during evening and morning peaks have largely remained at the same level, partly due to a spike in the final quarter of 2019. This meant that the time spent in traffic delays has seen a consistent increase in all but one movement scenario measured. The biggest proportionate jump in delay – by six percentage points – occurred in trips from the CBD to inner metropolitan suburbs. Compared to other cities, there is a clear divide of higher travel times for trips in and out of Melbourne's CBD, as opposed to ones within surrounding metropolitan suburbs.

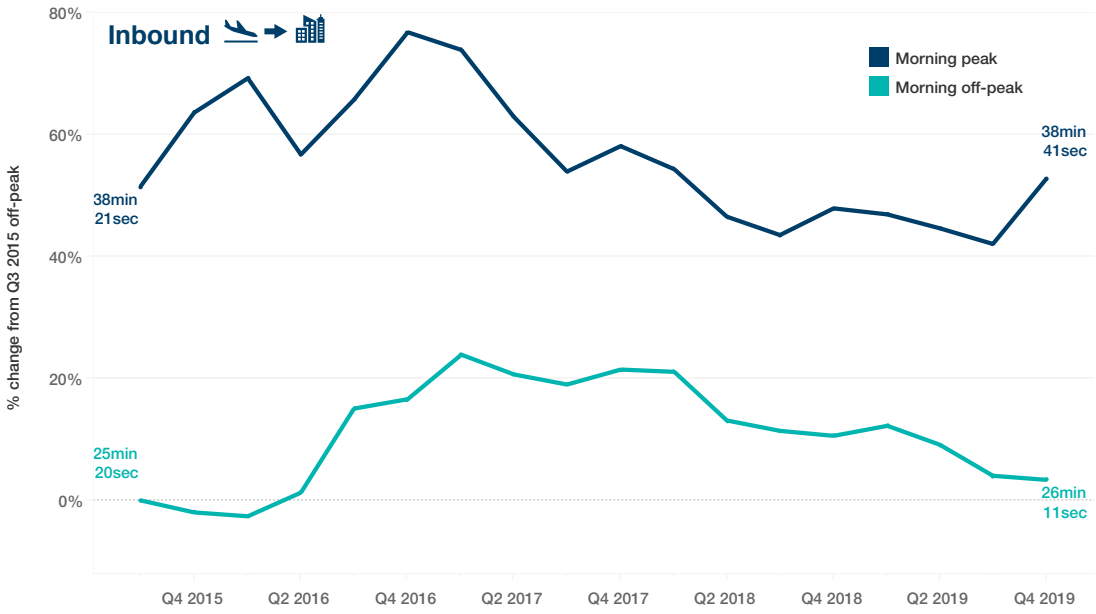
Airport Travel

In contrast, the performance of the Melbourne Airport to CBD corridor has fluctuated over recent years across off-peak and peak travel times, before making substantial improvements (Figure 12). At its worst, the average peak inbound trip to the CBD spiked to a 44-minute high in the fourth quarter of 2016, before reaching a 36-minute low by Q3 2019. This reflects the need for, execution of, and resulting improvements from, substantial infrastructure upgrades in the corridor.

The final quarter of 2019 saw the peak travel time again increase, widening the peak delay by over three minutes, and making the trip 50 per cent slower than an off-peak inbound trip in Q3 2015. The inbound off-peak travel times that also increased before dipping, has yet to recover to its original travel times by Q4 2019.

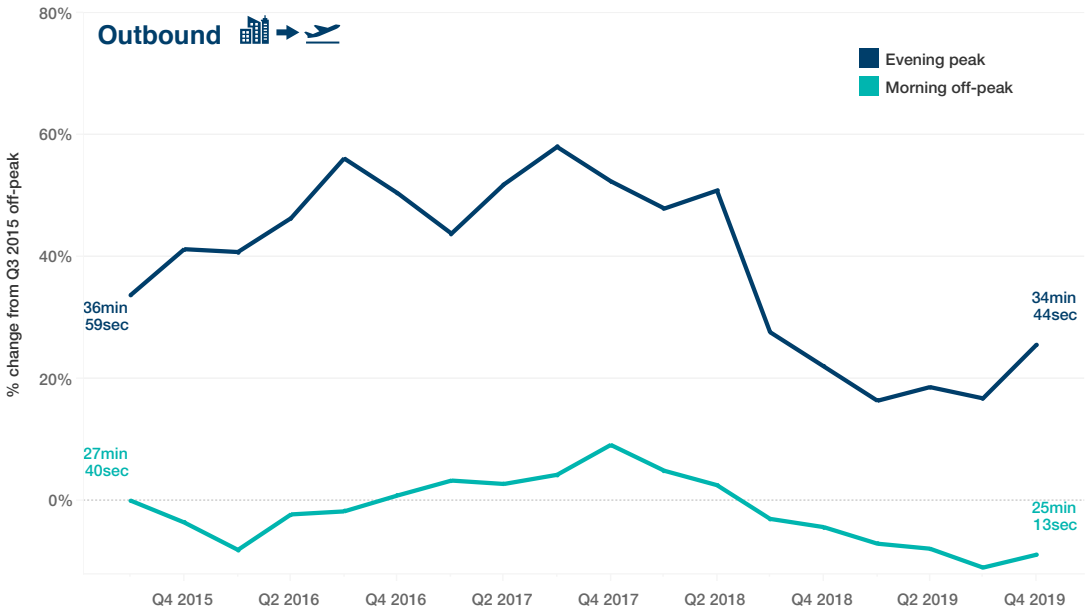
The spike in travel times, and the subsequent drop coincided with the Stage One CityLink Tulla widening, from Bulla Road into Melbourne's CBD. The construction work for the widening started in October 2015 and wrapped up in late 2017. It is therefore likely that the slowing seen in the final quarter of 2019 is caused during the last leg of the trip, as commuters exit the freeway and merge with CBD traffic. Previously, Melbourne's Travel Time Index (Figure 2) indicated that trips reaching the CBD in the morning peak also saw a sharp time deterioration in the final quarter of 2019.

Figure 12: Inbound: Melbourne Airport to CBD



Like the morning inbound, the outbound trip to the airport during evening peak (Figure 13) has followed a similar trend, albeit at a smaller magnitude. The off-peak travel time fared better in comparison and is nine per cent shorter than it was in Q3 2015. The evening peak travel times have dipped since the second half of 2018, which coincided with the Tullamarine Freeway widenings that became operational in late 2018. However, similar to the inbound trips, the evening outbound saw an uptick in peak travel time in 2019's last quarter.

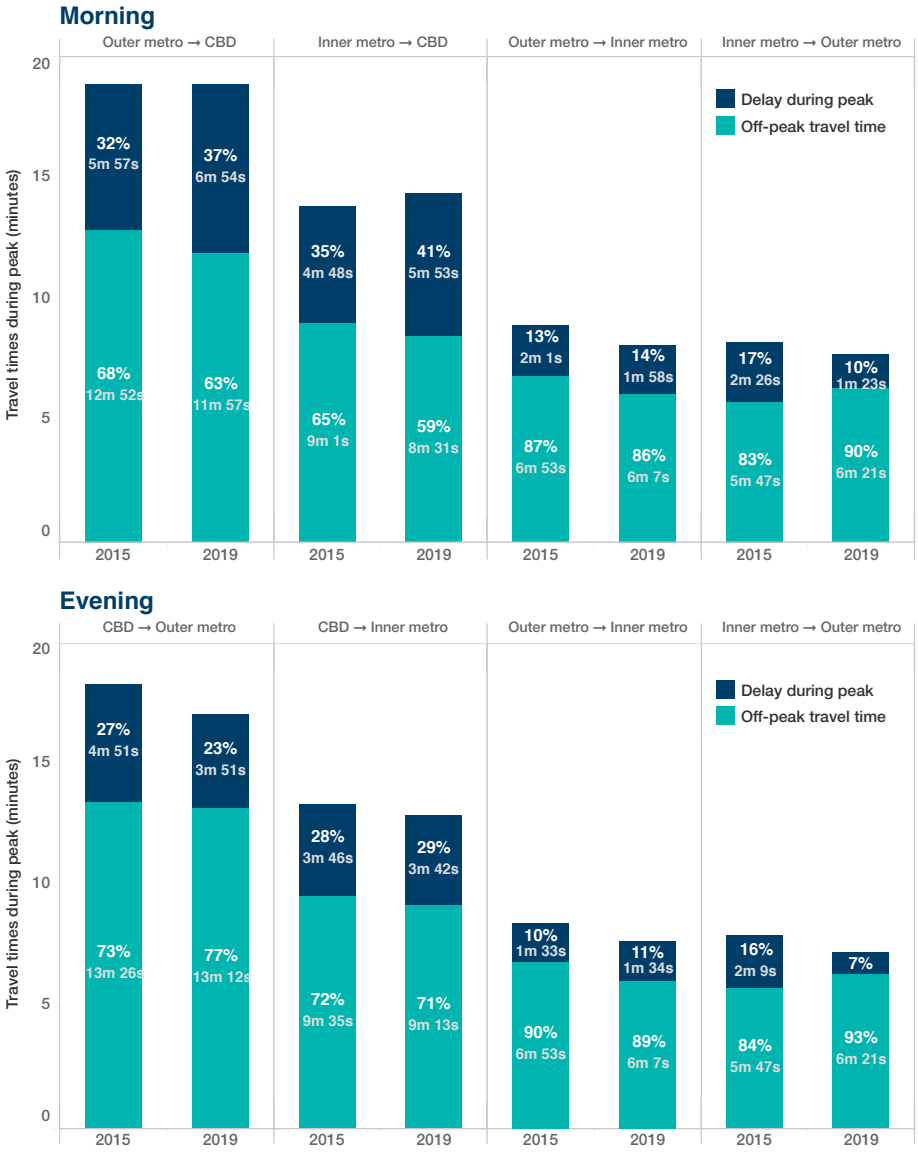
Figure 13: Outbound: Melbourne CBD to airport



BRISBANE

Figure 14 shows Brisbane's commuters from the outer metropolitan ring spent nearly 11 minutes stuck in traffic on a daily basis, totalling to 45 hours each year. As a smaller city compared to the two other East Coast capitals, Brisbane's average travel times, as well as proportionate delays, were lower.

Figure 14: Brisbane's dashboard: 2015 and 2019



Analysis

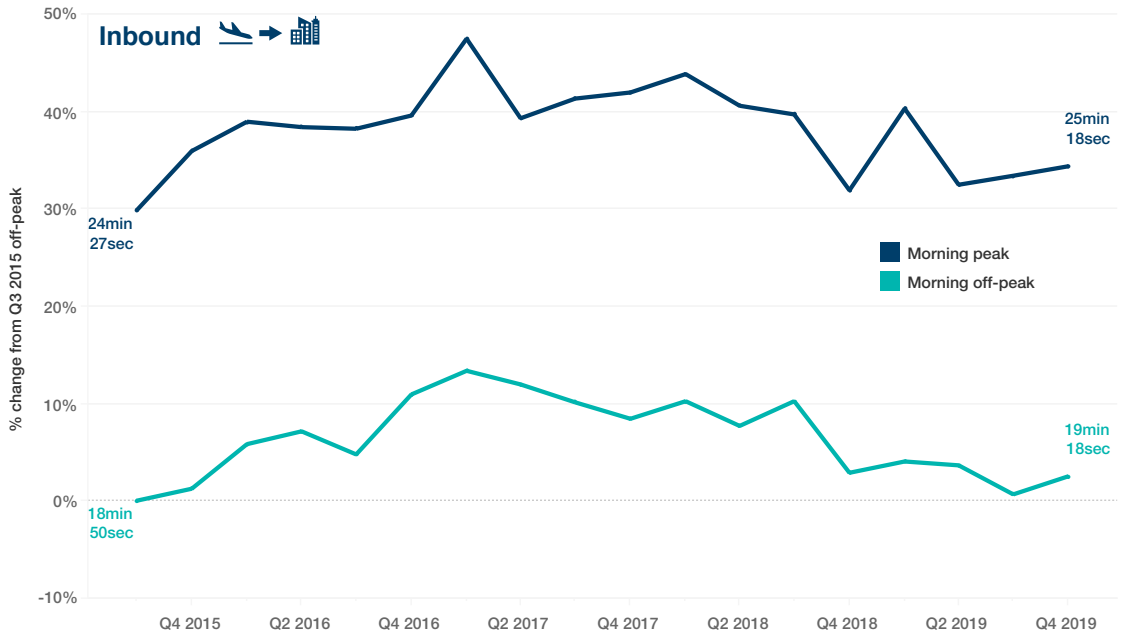
Brisbane CBD's morning peak traffic slightly worsened during the four years. Both the overall travel times in and out of the city, as well as the share of traffic delay increased since 2015.

For CBD commuters, Brisbane's evening outbound trips had significantly less traffic delays compared to the morning inbound ones. While this gap was insignificant for trips made outside of the CBD, the overall percentage peak delays were one of the lowest across the four cities. For instance, a trip from the inner metro to the outer ring during evening peak was delayed by just under a minute – accounting for seven per cent of the journey.

Airport Travel

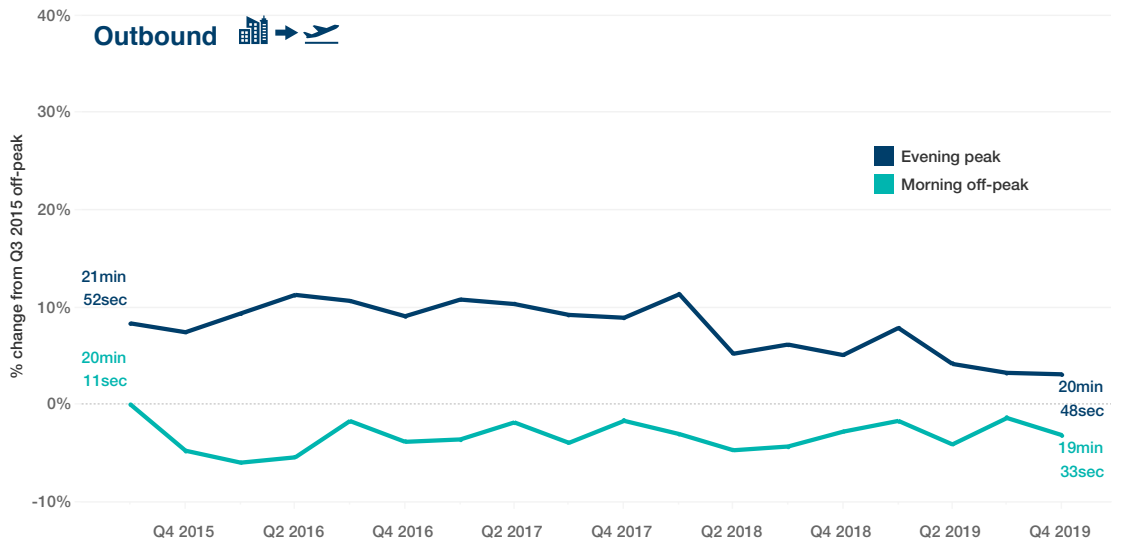
Figure 15 shows that the trip from Brisbane Airport to the CBD did not show a clear trend. The morning off-peak travel time decayed until 2017, before almost recovering back to Q3 2015 levels. Throughout the four-year period, the morning peak travel time was roughly one third slower than the off-peak.

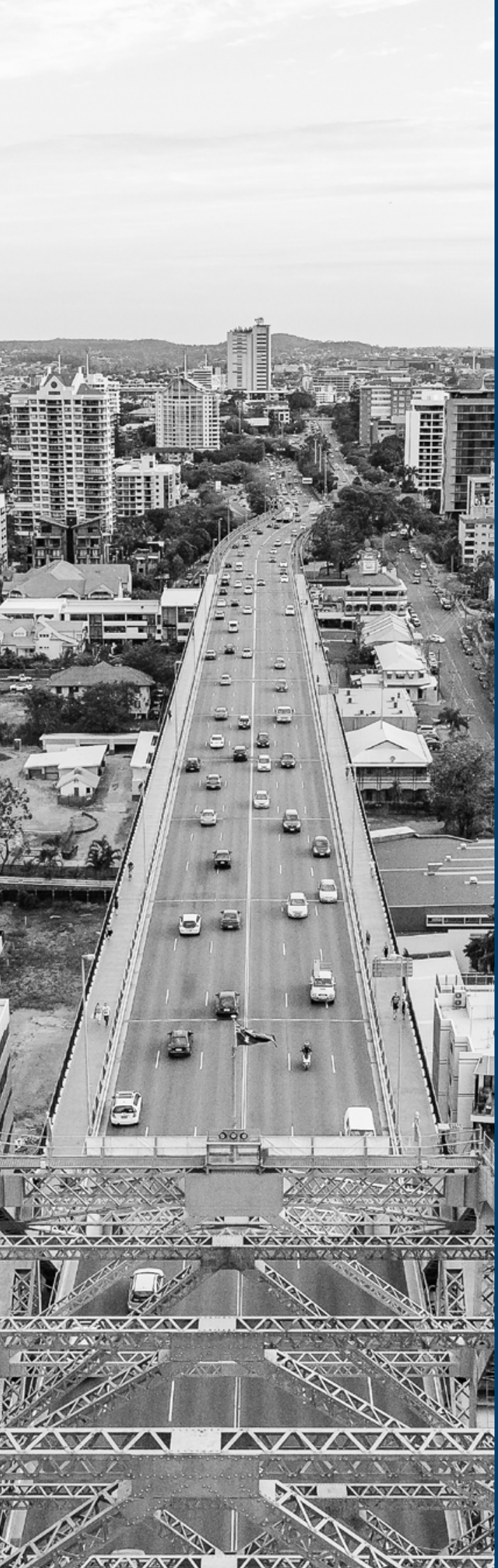
Figure 15: Inbound: Brisbane Airport to CBD



In contrast, the outbound evening trip to the airport saw far smaller fluctuations in terms of both off-peak and peak travel times. Evening peak travel time showed an improvement of just over a minute during the course of the four years, while off-peak conditions improved by an even smaller margin. Brisbane's evening airport run showed the smallest delay for any city's CBD to airport corridor. This is likely due to drivers taking the direct tolled link between the CBD and airport that provides sufficient capacity during peak demand. With the evening peak being only 75 seconds slower than the morning off-peak conditions, the peak delay for the trip in Q4 2019 was just over six per cent of the total travel time.

Figure 16: Outbound: Brisbane CBD to airport





Case Study 2: Special Events

Aside from measuring the efficiency of the road network, the Uber data also enables analysis of how transport systems respond to special events. A large concentration of trips generated from one location in a short span has the potential to overload the road capacities and bring the local network to a standstill.

On Wednesday 5 June 2019, Game 1 of National Rugby League's State of Origin took place in front of a 50,000-strong Suncorp Stadium. Figure 17 shows the mean travel times from the stadium to Brisbane's various suburbs on the evening of the game, as a proportion of the evening travel times for the rest of that week. The figure also plots the percentage change in the spread of travel time range for each suburb. This is used as a measure of reliability.

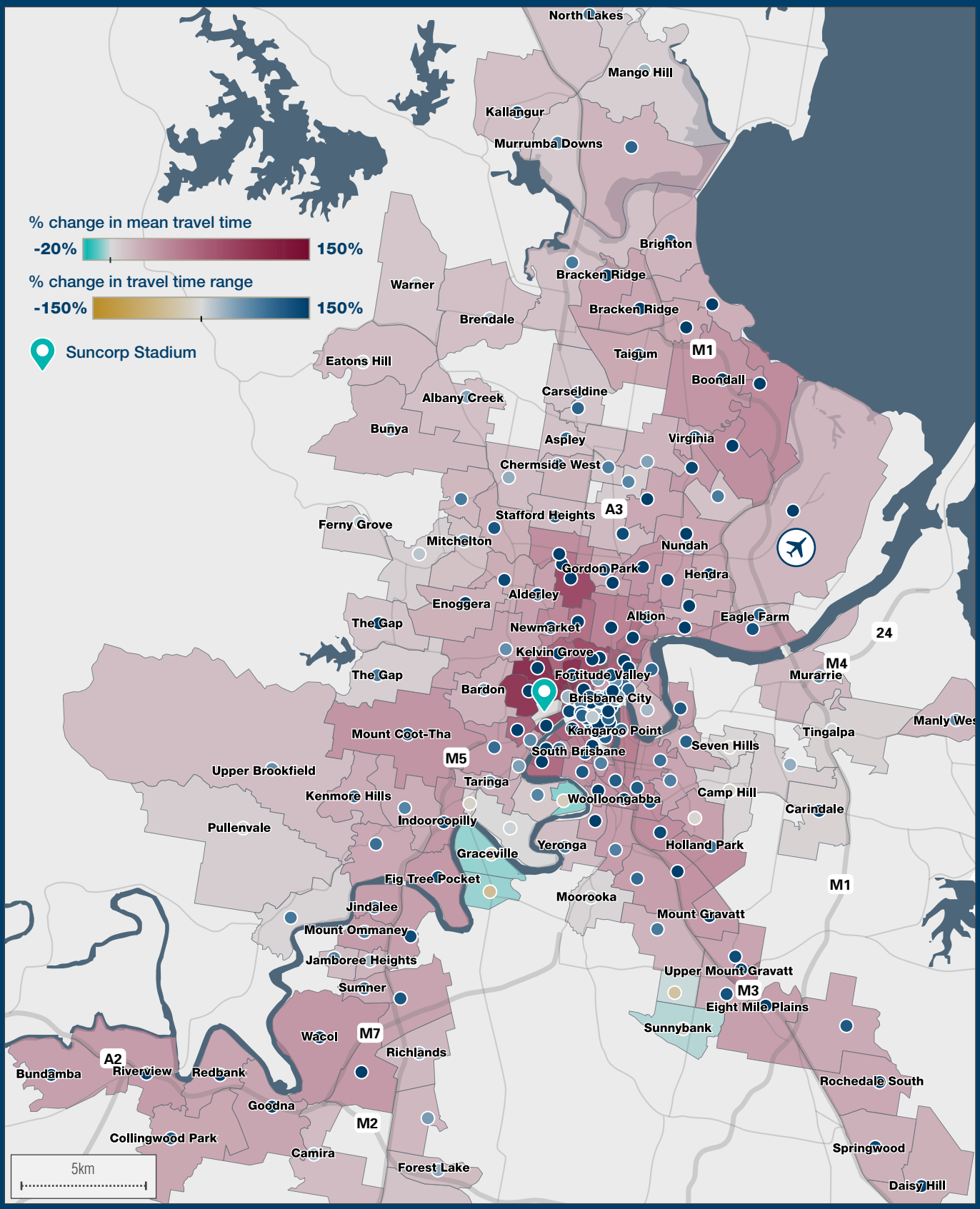
Overall, trips to almost all suburbs saw a spike in mean travel times. The disruption to the local traffic significantly affected the travel times to neighbouring suburbs, with trips to Paddington, Red Hill, Kelvin Grove, and parts of Brisbane CBD recording delays of over 130 per cent. It is worth noting these short-distance trips are compared to a smaller base, meaning a few minutes' delay would easily double the usual trip time.

However, these local network disruptions compound for travellers moving to outer suburbs. While the share of delay generally decreased as the trip distance increased, and spread across the greater city area, key corridors such as the M3, M5 – connecting with the M2 and M1 saw these delays concentrate. A trip to Upper Mount Gravatt took 62 per cent longer while a trip to Riverview, north east of Ipswich, took 42 percent longer. A trip to Nudgee was 50 per cent slower.

Beyond mean trip times, the reliability of trips, measured here by the differential between upper and lower bound travel times – or travel time range – also varied significantly. Compared to a normal weekday evening, on game night, this range quadrupled to the city's South West, while Daisy Hill in the South East recorded a 240 per cent increase. In the north eastern corridor, suburbs like Nudgee and Banyo recorded the trip time range widening by over five times compared to the rest of the week.

Worsened trip reliability correlated with longer travel times in the inner suburbs. However, while the percentage spike in mean travel times decayed with distance from the stadium, the trip reliability measure largely remained random. This may be due to drivers hedging on different route choices to avoid localised congestions. A well-defined arterial road network is likely to help minimise this unpredictability in the performance of the overall network.

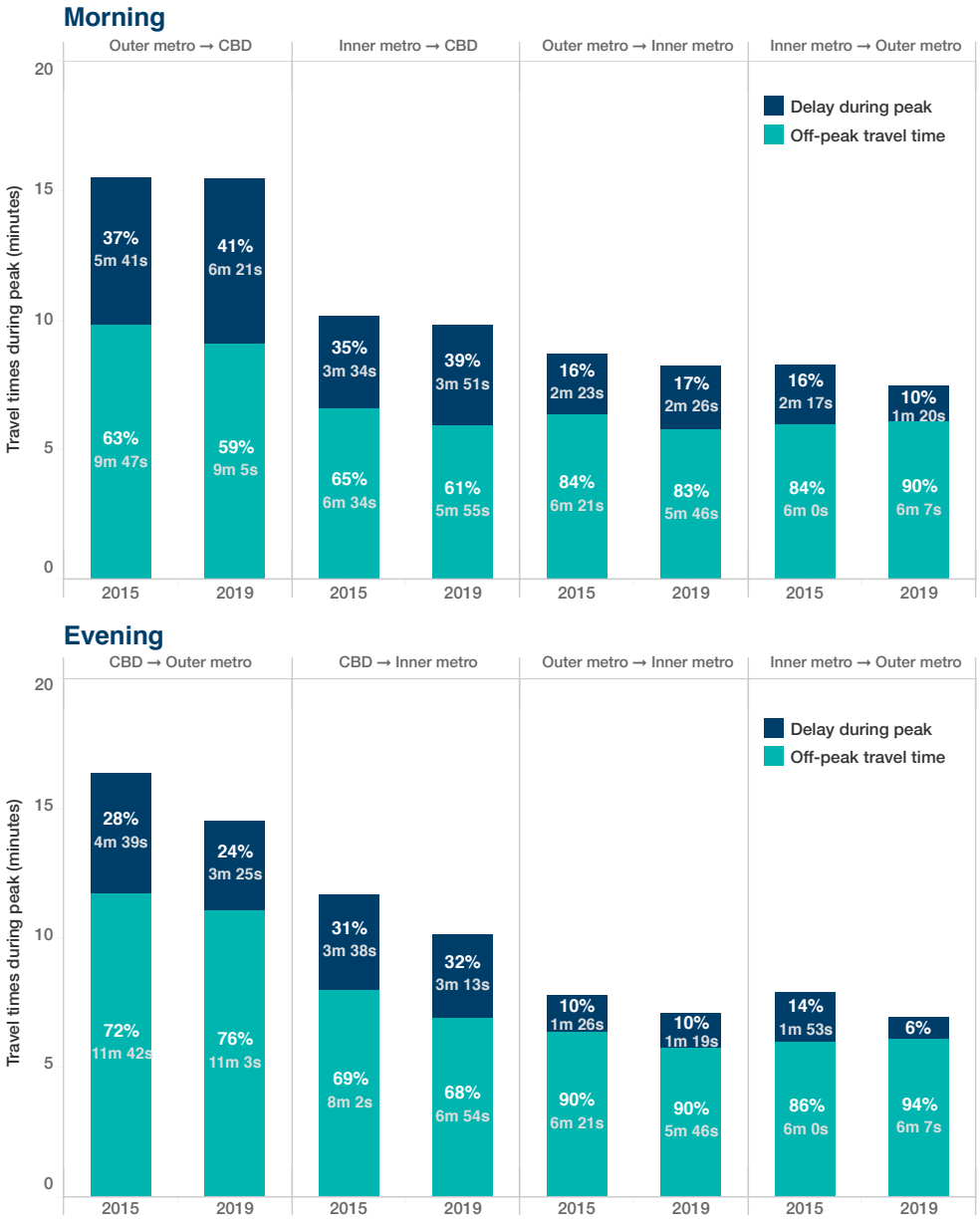
Figure 17: Percentage changes in travel times from Suncorp Stadium, and their reliability



PERTH

Perth's dashboard, in Figure 18, shows that in 2019, road users from the outer metropolitan ring spent close to ten minutes of their daily commute stuck in traffic. This was 33 per cent of their total daily commute, and aggregates to over 41 hours of delay time over a year.

Figure 18: Perth's dashboard: 2015 and 2019



Analysis

In absolute terms, Perth has the shortest travel times across all four cities. With 12 per cent fewer private vehicle users on the road compared to Brisbane, Perth's morning commute from its outer metropolitan to the CBD was 22 per cent quicker than the equivalent trip in Brisbane.[7]

However, Perth still saw bigger proportionate peak delays in comparison. As off-peak conditions made small improvements, the majority of Perth's morning commuters sat idle in traffic for longer. Delays in inbound trips from both Perth's inner and outer metropolitans accounted for an extra four percentage points of the total trip by 2019. As Figure 2 suggests, this widening gap between morning peak and off-peak has largely occurred in 2019.

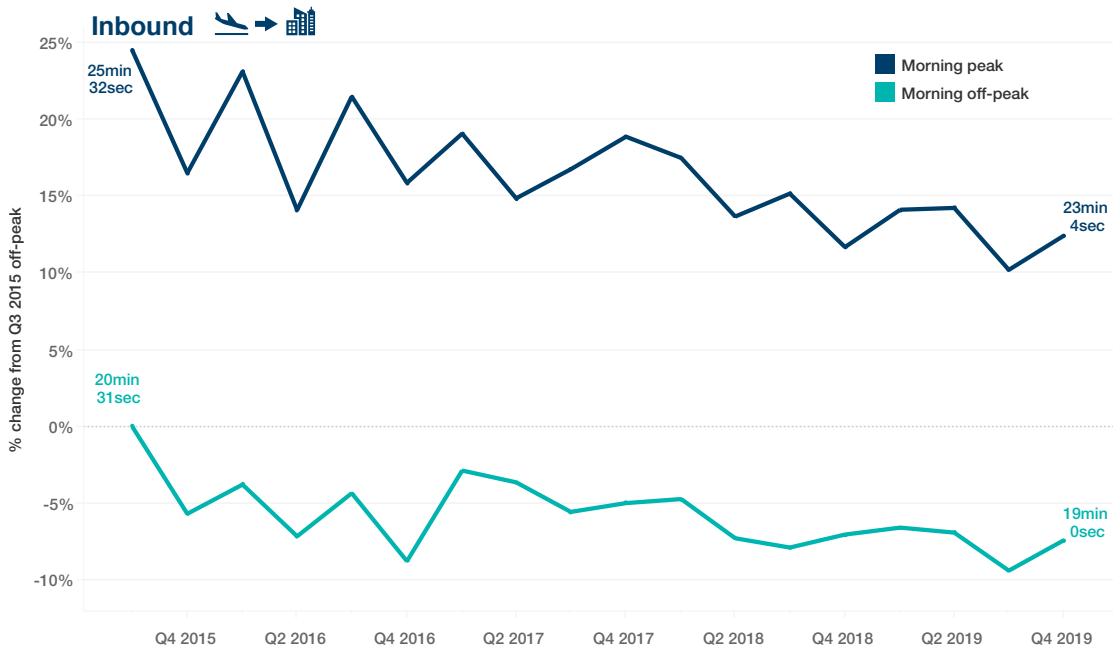
7. Australian Bureau of Statistics, 2016, Commuting Distance by Personal Characteristics

Perth's outbound trips in the evening peak experienced slightly better conditions than the morning. With a trip to the outer metropolitan just under 15 minutes, Western Australians made the quickest trips home. The outbound trips also accounted for smaller traffic delays. However, it is worth noting that, being a relatively small city compared to its east coast counterparts, these outcomes do not reflect a significant difference.

Airport Travel

Being a smaller city, Perth has the advantage of having its airport relatively close to its CBD. This is reflected in the travel times in the CBD to airport corridors. While the trend has been volatile, Figure 19 shows morning peak trips to the CBD improving by 12 percentage points compared to the baseline. These improvements largely followed the falling off-peak travel times, ensuring the peak delay remained at five and a half minutes through the four-year period.

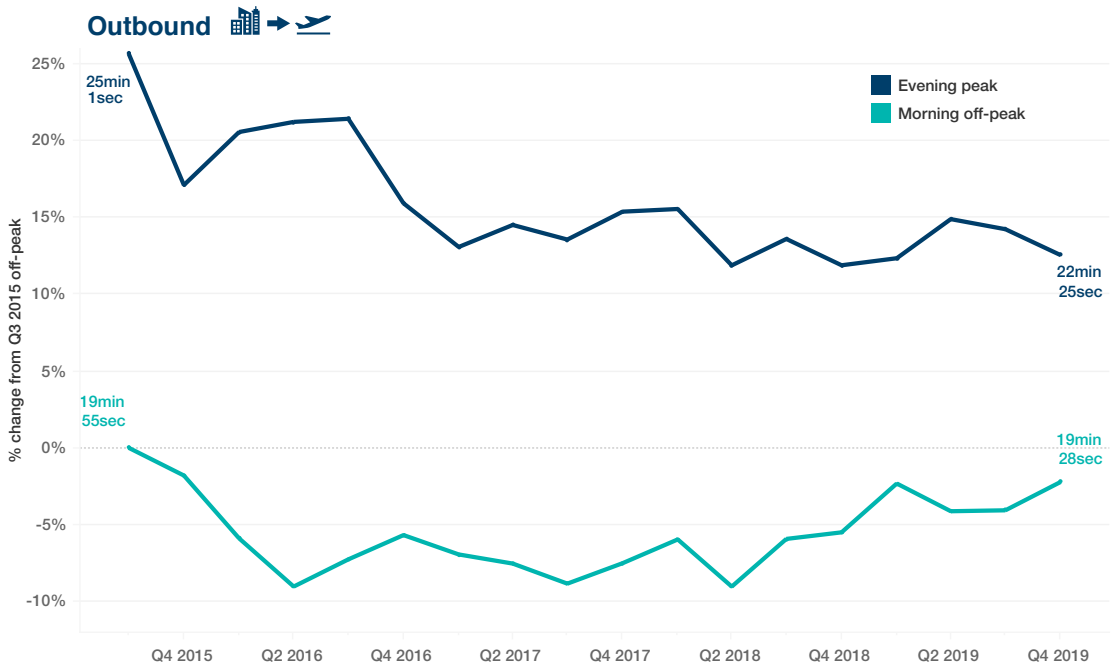
Figure 19: Inbound: Perth Airport to CBD



In contrast, the outbound trips from Perth CBD in the evening peak (Figure 20), while showing reasonable initial improvements, have largely stalled from 2017. In Q1 2017, the peak travel time into the airport was around 22.5 minutes. This remains largely unchanged by Q4 2019.

Interestingly, after an initial drop and flatlining that followed, the off-peak travel times from the CBD have started to tick upwards since mid-2018. Consequently, the peak travel delay in the outbound corridor has decreased by 26 per cent, even though the total peak travel times have not improved for over three years from 2017.

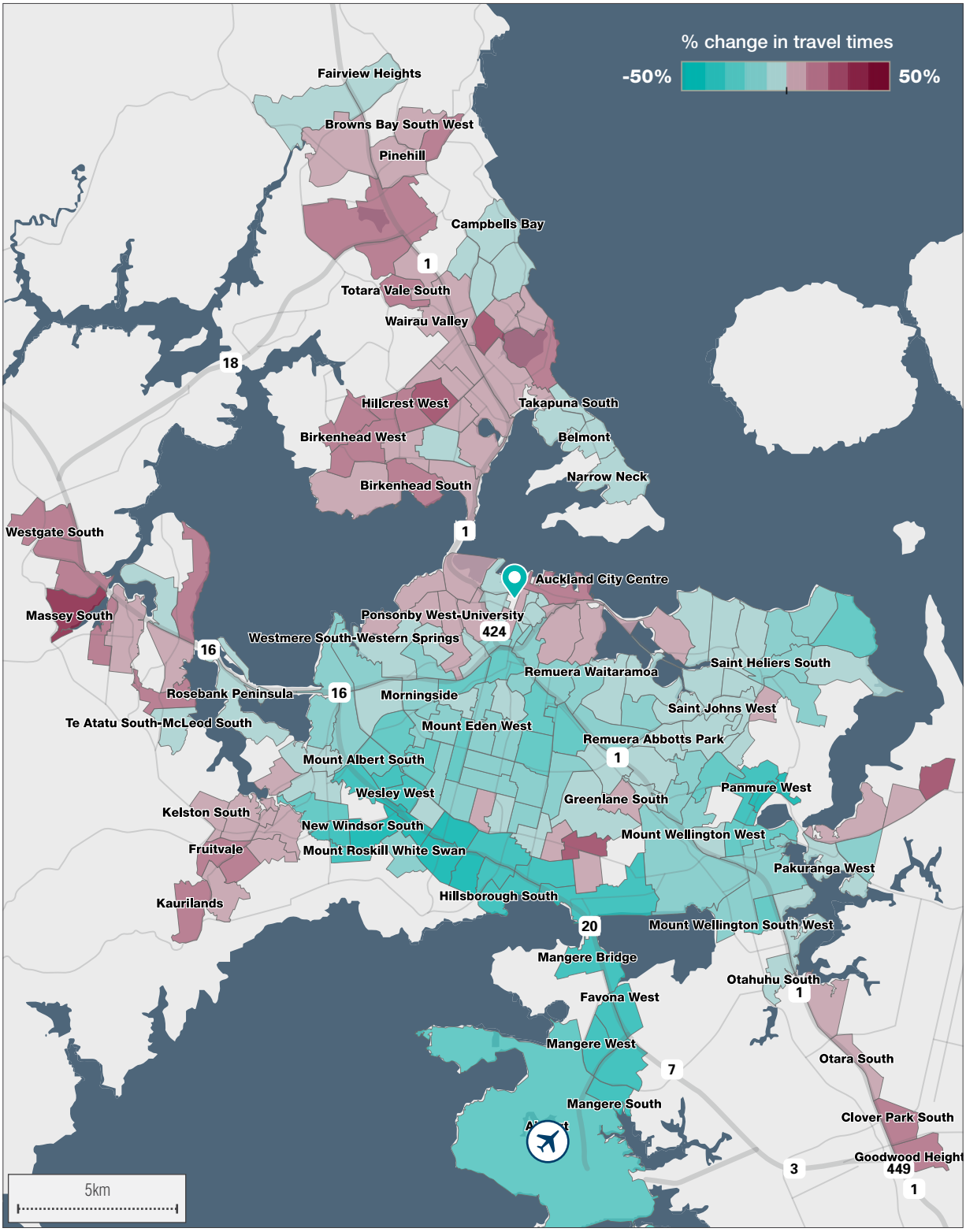
Figure 20: Outbound: Perth CBD to airport



A SNAPSHOT: AUCKLAND'S TRAVEL TIME TRENDS

Across the Tasman, Uber's Movement platform has now released travel time data for Auckland, starting from 2016. Figure 21 shows how outbound trip times from Auckland's city centre to surrounding suburbs, during evening peak, have changed from the first quarter of 2016 to the last quarter of 2019.

Figure 21: Percentage change in evening peak travel times for trips from Auckland's city centre (Q1 2016 to Q4 2019)



Over the four-year period, many inner and southern suburbs saw substantial improvements in outbound trip times. Travel times dropped by as much as 40 per cent for suburbs like New Windsor, Wesley, Mount Roskill and Hillsborough. These time savings are likely due to the Waterview Tunnel, along the Southwestern Motorway (SH20), that opened in July 2017.

However, suburbs on the North Shore and in the West saw travel times increase. Some suburbs around Massey saw their trips extended by as much as 37 per cent. While the southern transport network seems to have improved substantially over the four years, one reason for the asymmetry in travel time outcomes could be due to capacity constraints and bottlenecks in road links from the city to the North and West. Several road upgrades currently being delivered are likely to relieve these pressures.

For instance, the Auckland Northern Corridor upgrade is set to provide commuters from the southern suburbs with a motorway-to-motorway connection to the North Shore. The upgrade will enable traffic between the Northern Motorway (SH1) and Auckland Airport to bypass the city through a redesigned Upper Harbour Highway (SH18), connecting to the new Northwestern Motorway (SH16) and Waterview Connection (SH20). The project is also set to increase capacity on Northern Motorway. Travel time outcomes in the next few years, as these upgrades become operational, should provide a clear indication of their impacts.

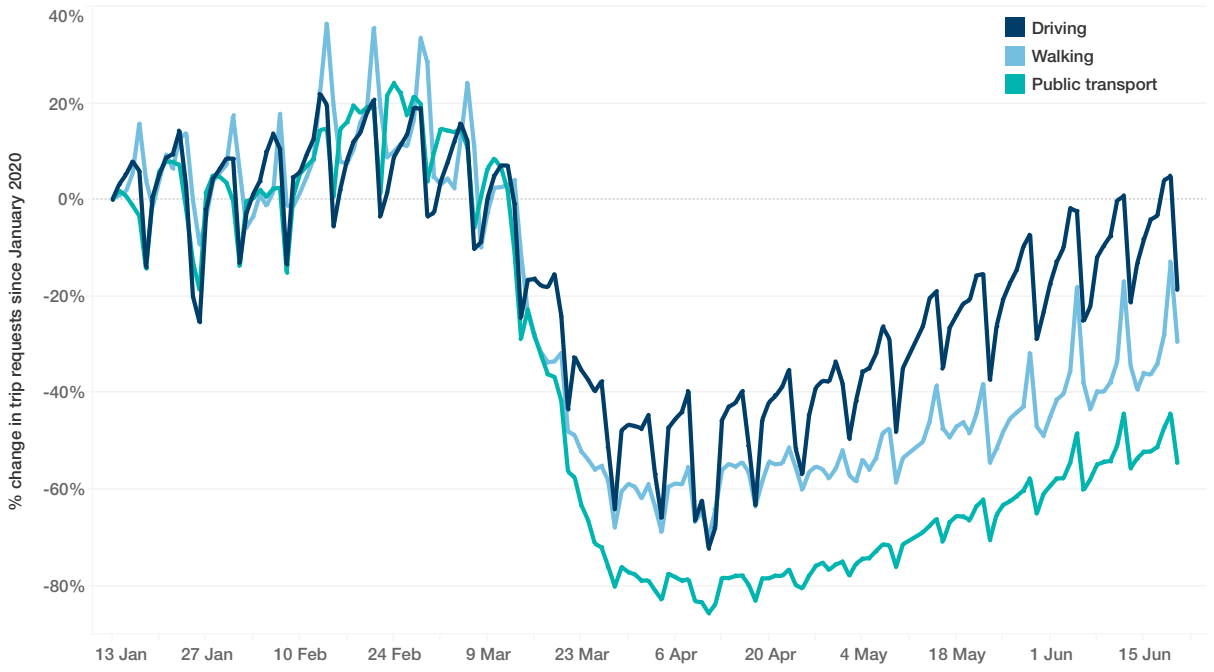
MOVING FORWARD

Historically, transport policy has focused on measuring inputs like the dollar value invested in infrastructure upgrades, assumed benefits versus the costs of projects, or estimates and modelled future demands. Often policy makers have had little opportunity to measure outcomes of past investments, or to identify gaps that should be addressed at both the macro and micro level. However, the rapid development of technologies in the past few years provides a wealth of data that can help understand how well our transport systems work.

Uber's on-vehicle time and speed measurements are one such resource that provides a more detailed picture of the human impact of infrastructure decision making. The Travel Time Index (Figure 2) and the dashboards show broader city trends over the four years leading up to 2020. Outcomes of major infrastructure upgrades are reflected in the gradual improvement of off-peak travel times. While peak travel times are more complex, they too indicate plateauing trends. More importantly, the data shows how specific road upgrades have affected the travel times along key corridors during and post-delivery. The data can also help to isolate pressure points and where further improvements may be necessary. These sources therefore can be used by policy makers, both in planning for our future transport needs and reviewing the efficacy of our approach so far.

While the seismic disruption of COVID-19 is clear to us looking at data from the early months, its enduring effects on how our largest cities move, may still be in the making. Figure 22 shows that Australia's four largest cities are reaching pre-COVID levels of private vehicle use, while active and public transport use are gradually rising behind. As more data becomes available to better illustrate ongoing impacts of COVID-19 on transport networks, and how user travel behaviours are influenced, the shape of the 'new normal' will be revealed. The next edition of the *Australian Travel Time Metric* will highlight this transformation.

Figure 22: Change in routing requests by mode for Sydney, Melbourne, Brisbane and Perth



Source: Apple Data (2020)[8]

The transition into the post-COVID era also provides governments an opportunity to influence how commuter behaviour is reshaped. With public transport having to respond to emerging commuter needs by regulating concentration in and frequency of services, it may be vital to approach mobility in our largest cities as a whole-of-network service. In our upcoming work, Infrastructure Partnerships Australia will continue to monitor the performance of Australia's transport networks, and provide advice on the reforms and investments required to optimise our transport sector moving beyond the crisis.

8. Apple, 2020, Apple Maps Mobility Trends Reports

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