ALBURY WODONGA BUS NETWORK ASSESSMENT MODEL

ENG4111 and ENG4112 Research Project

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ABSTRACT

This case study research will investigate low levels of bus transport patronage in the cross-border towns of Albury Wodonga. The analysis will identify those factors that influence public transport use, transport behaviours, and how these may apply to the case study area. Software (VISUM) will be used to simulate potential bus network improvements in the case study area.

Academic literature suggests the most important aspects to consider when trying to increase ridership on a public transport network, along with all other factors related to increasing ridership.

Data analyse showed that service area and frequency are too low in the Albury Wodonga region, with timetables and routes having no logical structure. Public transport has not been looked at in years, meaning we are left with a network that does not serve the community's requirements. This is resulting in well below average public transport ridership.

Findings from the Visum software is that a complete system overhaul is required to see any real benefit to the system. The best solution for this is a network cantered around an express service between the two cities. All the solutions proposed saw good improvements to the public transport network.

University of Southern Queensland

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Patrick Quinlivan

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Mrs. Paula Grant, for the support and guidance throughout this dissertation.

I would also like to thank Albury City Council for allowing me to undertake this dissertation, with special thanks to Bilee Oliver for her assistance and support.

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1. INTRODUCTION

1.1. INTRODUCTION

The accessibility of public transport in the Albury Wodonga region has been known to be well below acceptable for a long time now, but exactly why is this the case? Why are only 1% of Albury Wodonga residents using public transport (Census, 2016)? What needs to be done to improve this and get people out of their cars and onto public transport?

To answer this, understanding what influences transport behaviour and how individuals make their daily transport choices will be an essential aspect of breaking down the current issues with Albury Wodonga and why these have not been fixed in the past. Understanding the types of transport and their users in the local area will give an overall image of what would be needed to get people on public transport.

In a forever advancing world, the best treatment methods for public transport continue to change, so all these methods need to be considered to ensure the best strategies are being implemented.

Using advanced modelling software VISUM, the current public transport system can be imported to show precisely how the network works and its effects. With this, solutions can be simulated to see the near-world accuracy of the impacts of our decisions. These changes to Albury Wodonga will come from years of research into public transport but applied to a highly accurate simulation of a regional town. This allows for any option to be trialled within hours, not months.

1.2. BACKGROUND

The case study for this research project is Albury and Wodonga. These towns sit on each side of the border of New South Wales and Victoria, with Albury on the New South Wales side and Wodonga on the Victoria side. Albury has a population of 55,055 with a land area of 307km2, while Wodonga has a population of 39,351 with a land mass of 400km2 (Census, 2016).

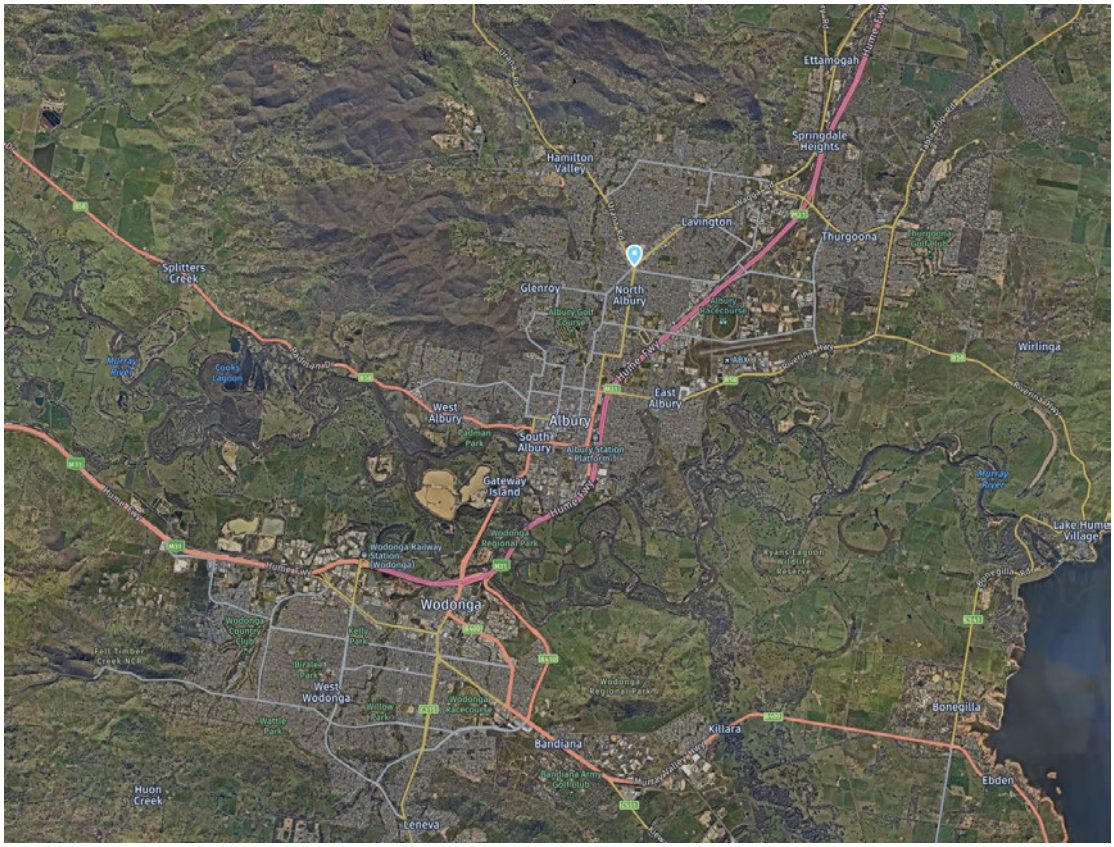


Figure 1(Nearmap, 2021)

The bus network is broken into two separate systems, with one bus route running between the two towns. Dysons and Martins are the two local public transport companies in Albury Wodonga.

The problem faced with the Albury Wodonga area is when looked at as two separate networks, their population has not justified a complete rework. But when you put the two together, which is how they operate, as you can see the population is up there with some of the largest regional towns. When the Corona Virus border restrictions were put in place, it showed the community just how much the two towns function as one.

The current system has an average travel time of over 1 hour to get anywhere in the Two Cities that aren't central. The same trips only take 10 to 15 minutes in the car, so currently the public transport system isn't a realistic form of travel unless you have to, even then it can often be faster just to walk.

The issues surrounding our PUBLIC TRANSPORT is multi-faceted, namely;

- Cross-border discrepancies.
- Two separate systems.
- Lengthy wait times/route times not aligning.
- Lack of payment options.
- The routes not servicing areas that would use them (disabled/elderly/youth/ low socioeconomic).
- Inconvenient service times.

However, there are many others.

1.3. JUSTIFICATION

It has always been known that Albury Wodonga's public transport system does not work, but no research has been done into why this is the case. The result of this is insufficient ridership numbers. Therefore, it is seen as something that doesn't warrant funding. With access to Visum modelling software, I can do something that no one has had the chance to yet, and that is to analyse and model both the current network and any proposed changes. Using Visum to model a network the size of Albury Wodonga is something that has not been done before. This research project allows us to test both the public transport network and assess the success of this type of approach to PT design. This method is a far cheaper alternative to analysing the success of specific treatments compared to trial periods.

When proposing my idea to Albury City, they were very excited and stated it would bring tremendous value to what they wanted to do over the following five years. This report will play as a starting point to their development of a new public transport system.

1.4. AIMS AND OBJECTIVES

This dissertation aims to determine the most effective and efficient way to improve Albury Wodonga's public transport bus system and increase ridership.

A literature review has been done to assess research into why people do and don't use public transport worldwide and how this can best be implemented in Albury Wodonga. Along with this, different forms of public transport treatments and their success will be analysed. With this, the traffic modelling software VISUM will be used to trial these treatments and assess their potential success on Albury Wodonga's Road network.

1.5. CONSEQUENTIAL EFFECTS AND IMPLICATIONS

Albury Wodonga is looking at ways to decrease traffic on its network and especially in its CBDs. Moving into the future, they do not want to increase parking and add extra travel lanes to roads to deal with the increasing population. Instead, they want to look at more sustainable methods of transportation. The current public transport network does not allow users appropriate access to where they want to go in reasonable time frames.

If the public transport system is not improved, people will continue to drive with a forever growing population. Eventually, the two cities will become congested. The goal is to avoid that before it ever occurs to encourage people to change their methods of transport while we change the way road networks are used.

2. LITERATURE REVIEW

To understand the literature relating to this research task, many peer-reviewed research papers were studied. The sections relevant to this study have been reported. This essential information is centred around;

- Why Public Transport
- Rider choice
- Networks
- Service considerations

2.1. PUBLIC TRANSPORT

2.1.1. PRIVATE

Private transport is a form of transport where a passenger uses their own personal motorized or unmotorized vehicle. These include nonmotorized forms of transport like walking and cycling or motorized modes like motorcycles, cars, and heavy vehicles.

2.1.2. PUBLIC

Public transport is a form of transport that includes any paid service to be moved by a company or system from one location to the other. These include buses, rails, trams, and taxis. Public transport looks at moving more people per vehicle to reduce traffic congestion on the roads. If a system is well developed like Melbourne, you look at increased people who do not own personal cars and instead utilise public transport. Public transport is not seen as an option in smaller regional towns and cities as it is far easier to travel by private means.

Figure 2 (Tuomela, 2013)

2.1.3. PRIVATE VS PUBLIC

The primary issue with increasing ridership on public transport is the competition it has directly with private transportation. We understand that cars are more convenient than buses, but why exactly is that the case and other factors considered when people compare the two. Cars are worse for the environment and take up far more urban space, which takes away from other potential uses for community improvements. Still, the majority of users continue to use them. Western society is geared towards using cars and is evaluated more positively than public transport. As you can see in figure 3, cars are conceived to have higher convenience, independence, flexibility, comfort, speed, and reliability because driving is perceived to be more pleasurable. (STEG, 2003)

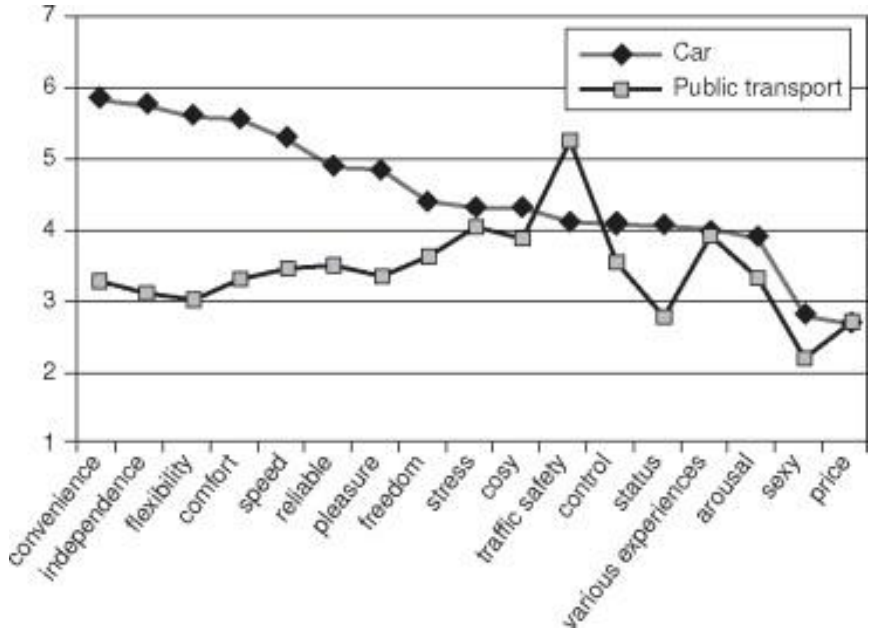


Figure 3 (STEG, 2003)

2.1.4. ENVIRONMENTAL IMPACT

One of the big reasonings outside of city congestion to increase public transport is its decreased impact to the environment. A study into environmental impact assumed all on-road vehicles are fuelled by gasoline. It was found what the impact per passenger when using different forms of private and public transport. The calculations come from Co2 per person from all the common forms of transportation. As you can see in figure 4, as expected, driving cars alone is the worst for the environment, with buses coming in at around half the environmental impact. With cycling and walking having next to no effect on the climate integrating these into your network will see significant benefits. (Transport, Urban, 2010). Trains are shown as the best for public transport and the environment, but this isn't always a workable option with the infrastructure needed to get them going.

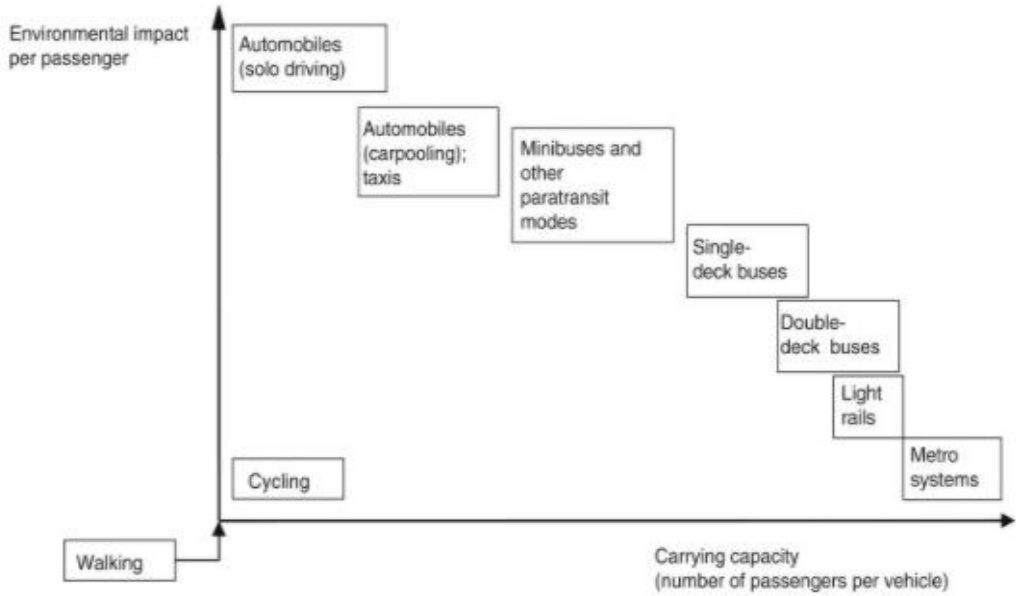


Figure 4 (Transport Urban, 2010)

2.2. MODE CHOICE

2.2.1. PUBLIC TRANSPORT APPEAL

Attracting users to use public transport is the biggest challenge faced when trying to create an effective system. Most know that private car use is both a key contributor to air pollution and traffic congestion issues (Greene and Wegener, 1997). But to the individual, it is far too convenient to consider otherwise. Reducing this appeal to use private transport is a crucial aim for long-term sustainability.

The quality of public transport greatly determines how appealing it is. Without that appeal, no one will choose it over private transport unless they are given no other option. This quality is broken into two main sections, Physical and Perceived. Figure 5 shows the breakdown of what people consider when thinking of the quality of public transport (Redman, Friman, Gärling, and Hartig, 2013).

Table 2
Definitions of public transport (PT) service quality attributes.

	Attribute	Definition
Physical	Reliability	How closely the actual service matches the route timetable
	Frequency	How often the service operates during a given period
	Speed	The time spent travelling between specified points
	Accessibility	The degree to which public transport is reasonably available to as many people as possible
	Price	The monetary cost of travel
	Information provision	How much information is provided about routes and interchanges
	Ease of transfers/ interchanges	How simple transport connections are, including time spent waiting
	Vehicle condition	The physical and mechanical condition of vehicles, including frequency of breakdowns
Perceived	Comfort	How comfortable the journey is regarding access to seat, noise levels, driver handling, air conditioning
	Safety	How safe from traffic accidents passengers feel during the journey as well as personal safety
	Convenience	How simple the PT service is to use and how well it adds to one's ease of mobility.
	Aesthetics	Appeal of vehicles, stations and waiting areas to users' senses

Figure 5 (Redman, Friman, Gärling and Hartig, 2013)

These factors are what needs to be considered when looking at improving your public transport. Understanding what is most important to the end-user can help create a system perceived to have essential improvements.

A study of 74 improvement strategies was completed with the following results found, which breakdown the effectiveness and effects of the different attributes.

Reliability

Reliability has always been considered an essential attribute when talking about public transport quality and effectiveness. One of the first aspects people think about when addressing the public transport system is reliability. Two methods to improve public transport reliability is going with a Rail System that takes priority in the network or more affordably designated bus lanes (Br¨og and Erl,2008). With designated bus lanes, you take

out the possibility of heavy traffic affecting your network's reliability. It has been found that increases in reliability via these methods have seen up to a 50% increase in bus usage over a 5-year period (David and Knowles, 2006).

Frequency

Another significant Factor is frequency. The perceived quality of a public service system often lies significantly with the frequency of services. All the studies completed 75% aimed for frequent all-day services, which saw an increase in ridership from 38% to 76% (Levinson, 2003). Along with frequency, shorter crossover saw an improvement of about 20% (Wall and Mcdonald, 2007). From this, it was found Australia adequately demonstrates sustained growth in its public transport network by improving the frequency of services (Redman, Friman, Gärling, and Hartig, 2013). It is found that frequency improvements that are not implemented soundly can negatively affect people's perceived view of public transport.

Pricing

Pricing can be a balancing act as decreasing prices can encourage ridership but reduce income. Higher usage of public transport is deemed more important than making a profit. It is found that a decrease in fair prices has shown an increase of ridership of 75% in Austin, Texas. But free transit was found to increase users but saw a rise in disruptive riders. It's found that free travel is not seen as important in affecting people's choices as they found safety and comfort has more importance. Findings state that although the price can encourage users, it is one of the less critical aspects to car users' consideration to use public transport (Redman, Friman, Gärling and Hartig, 2013).

Speed

Increasing speed is in line with increasing frequency, meaning users have to spend less time travelling. Like frequency, speed can be increased by designated bus lanes allowing them to flow more freely. In New York, rail service was installed to decrease travel time by 15 minutes, seeing a 25% increase in ridership. The increase in time is perceived better as an increase in reliability than an increase in speed. The actual speed factor is not a hugely important quality (Redman, Friman, Gärling, and Hartig, 2013). It is found that bus vehicle speeds are within 1.4 to 2.6 times longer than private vehicles. This figure varies depending on the type of roads, length of trips, and time of the day. (Liao et al., 2020)

2.2.2. REGIONAL USERS

Regional towns tend to have their population spread over far larger areas than cities. Because of this, it is harder to service the whole community with public transport. For this reason, sacrifices need to be made when prioritising improvements to public transport systems. Without the demand and funding creating a network that services everyone and their requirements are challenging and near impossible. So, finding that balance is essential to making the most out of your system.

A study found that accessibility is more important to regional users than frequency. A network that reaches more of its community is more important than a timetable that runs more frequently (Yu and Zhao, 2021). This is due to people not wanting to walk or being unable to. This makes people feel outside the public transport network, meaning it is unavailable to them. Users can sometimes adjust and work around bus timetables, but if they are simply outside the bus network, they will not consider it.

2.2.3. COVID 19

The current world we live in due to Covid-19 has changed the way we look at moving and interacting with others, and not in a positive way when it comes to Public Transport. For this reason, we have seen a sharp decline in the use of public transport worldwide. With the key cause of transmission being close contact, it is understandable why users have opted for different types of Transport, mainly private. With a major outbreak in New York, it was found that the subway system was a major transmitter of infectious disease during the first wave in March 2020 (Abdullah, 2021).

It was found that those earning less when more likely to consider public transport in the pandemic. As seen in figure 6, you can see the jump between the groups.

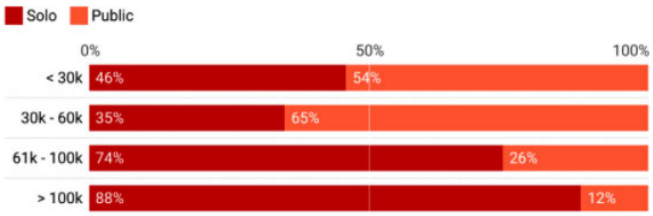


Figure 6 (Abdullah, 2021)

Along with this, it was also found people who own private vehicles are more likely not to use public transport, as seen in figure 7.

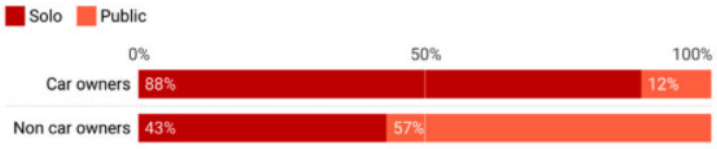


Figure 7 (Abdullah, 2021)

As it can be seen, most people in a higher socio-economic bracket and own their private vehicles would not use public transport in the current climate. This shows the difference between those who must use public transport and those who choose to use public or private transport. This is expected with rules and regulations on close contacts, but it needs to be resolved for public transport to continue to be pushed forward.

The effects of the pandemic on public transport long-term are still unknown, but it is believed that it has changed the way people interact and perceive close contact with others. This could have long-term implications on public transport systems even once the world opens up again.

2.2.4. PAID PARKING

Parking is a requirement for any road network for users of personal vehicles. This is why if you continue to supply free parking for users, they will continue to drive because the convenience is hard to match, especially in more regional towns where driving is by far the fastest choice of transportation. Therefore, paid parking is seen as an efficient solution to reducing car use. It makes it more expensive, meaning more impractical. Although cars are parked 95% of the time, attention is given to when a vehicle is moving, not parked as it spends most of its time. But vehicles perhaps have more problems when parked.

On average, 30% of vehicles in a city are cruising for parking. This is unnecessary transport activity increasing both road congestion and pollution. A large portion of this parking use is users travelling for work. Free all-day parking available at or near places of work makes it far too convenient to drive. Parking fees limit people driving to work, but it is not as effective unless it is a daily fee (Inci, 2015).

If maximum parking requirements are not in place, more parking is installed and unregulated, encouraging more road users. Therefore, never encouraging public transport use even if it is made available and in high quantity. But before you can consider taking parking away, you need to ensure there is a suitable option for road users to consider, and that being an effective public transport system.

2.3. NETWORK

2.3.1. ROUTE DESIGN

An efficient public transport system should utilise various transport modes to employ the advantages of each type. A well-designed network will significantly increase ridership, but you need to make sacrifices elsewhere by improving one aspect. Especially if you do not have the number of riders required to justify such large outlays. By decreasing wait times, you need to increase the number of buses. This is often in conflict between the operator and the passenger as the operator tries to keep costs to a minimum. Still, they also need to supply a level of service if they want to increase ridership. This balance is difficult to get right. A good network should offer users direct options and limit transfers to a maximum of two for people trying to get to less popular areas (Nikolić and Teodorović, 2013).

2.3.2. ROUTE CHOICE

There are different ways to create a public transport system and most of those come under two categories, fixed and flexible. Generally, bus services work by a fixed plan with routes and timetables. But to try and increase ridership, trying to bring in forms of flexible options is starting to become more common. This is generally seen as on-demand services. Mixed in with these two types of public transport is walking/biking. This can be used to get to bus stops from your starting location.

The elements that make up these systems can be broken into;

Network; The road network on which road users and public transport can operate. The fixed network operates within this and can be altered to suit the requirements of the users.

Demand; A set of passengers with an origin and destination point in the network.

Supply; The options users have to reach their destination. This is made up of fixed PT, flexible PT, active, and cars. These supply options can be integrated to make up a passenger's route.

To model these, the characteristics of the user's route choices will need to be identified. From a model route choice done by (Narayan, Cats, van Oort and Hoogendoorn, 2020). It was found that users generally stick to their original mode choice, but when supplying more options with public transport, you start to see other methods mitigating. As seen in figure 8,

car users are most likely to change to public transport when on-demand services are available. This is because you start to compare convenience with a personal vehicle.

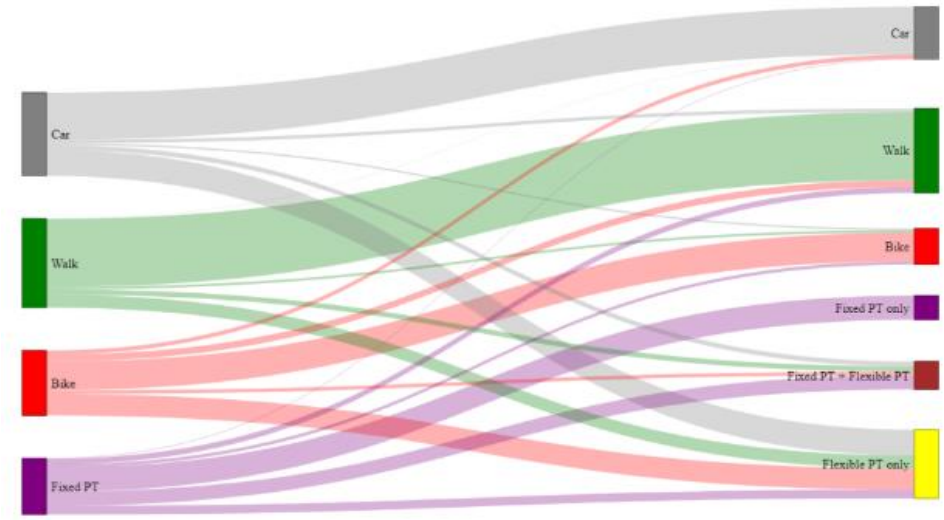


Figure 8 (Narayan, Cats, van Oort and Hoogendoorn, 2020)

2.3.3. ON-DEMAND

One of these network options is On Demand. On-demand service is a system that involves buses coming when the user requires it, not on a fixed timetable. This is often done during off-peak periods throughout the day or overnight. Those on-demand services also have variable routes available to take the user even closer to their destination. This is something that is being trialled throughout NSW, with the results still under review. It is still only early days for these trials, but a town in Amsterdam has done the research. With smartphones being more widely used than ever before, demand responsive transport has become a far more realistic option. These options can be best used in low-density areas since it allows users access when they need. Larger volumes of users become too hard to meet everyone's needs. To evaluate the success of a public transport system is ridership. When seeing an increase in riders, you can use that as successful improvements. From case studies from Mokemflex, Amsterdam, ridership went down by 28% in the trial of on-demand transport. But with this, mileage was decreased to just 11% of what it was previously doing (Coutinho et al., 2020). So, in terms of efficiency it was justified, but any decrease in ridership is in the wrong direction.

2.4. ALTERNATIVE OPTIONS

2.4.1. ELECTRIC BUSSES

If looking at the future of public transport the consideration of electric buses should be considered. A comparison of cost between upgrading to electric buses will help show whether it is even a potential option or not. Air pollution is one of the most complex situations of human society in which transport plays a role. The high consumption of fossil fuels by regular vehicles playing its part in global warming has made companies look to the future of public transport and move it to a more environmentally friendly solution. This year NSW launched its first electric bus as part of the state's zero-emission fleet of 2030 (Vorrah, S, 2021). This runs off a new lithium metal polymer battery that does not have the shortcomings of earlier batteries. This trial in Sydney will shape the way for the rest of the state.

As for now, that kind of funding for Albury Wodonga is out of reach and not an option. But it is the way of the future.

2.4.2. LIGHT RAIL

In 2009 an employee of Albury City Council investigated the potential of a light rail loop from Albury to Wodonga. It would link the Wodonga, Albury, Lavington, and Thurgoona CBDS. Research never left the early concept stage as the two Cities were just not ready for this project. Once the public transport system has been improved and utilised better, I see this as an option to link the two cities. (Glen, A, 2009).

Figure 9 (Express Rail, 2009)

2.4.3. PAYMENT OPTIONS

An essential part of smooth-running public transport is its payment method. A system that ensures people pay but is not as time-consuming as charging every person is a requirement to keep stop over times down. Currently, Albury Wodonga only uses cash which is both time-consuming and useless for anyone that does not carry cash. Electronic ticketing is a method used in major cities all around the world. The systems work by having a card that can be preloaded and paid for, so when you hope on the bus train or tram, you tap your card on the reader as you get on and tap off when you get off. This then automatically calculates how much you are to be charged and subtracts that from your account. This works on all forms of public transport and is integrated as one system. These systems come with their own apps where you can set up payments by preloading or direct debit to ensure you are never stuck without a loaded card.

An example of this is Myki in Melbourne. It is on all Trains, Buses, and Trams in the city, and you tap on and off as you move around, and it allows for hardly any stopover time as you don't need to wait for the driver to serve every passenger personally. Melbourne struggled with the system when it was first put in place as it was not done correctly. This caused delays to people and push back to the system (Vago, 2015). This was primarily due to issues with contractors. Although the outlay price is significant, and it is not straightforward to implement it, the benefits it gives to the end-user are a requirement to encourage public transport use.

2.5. SOFTWARE

2.5.1. VISUM

As software continues to develop, simulation to design all aspects of transportation is also starting to reach more usage and at far greater detail. These types of traffic models are broken into three main categories, macroscopic, mesoscopic, and microscopic. Macroscopic models consider a more extensive traffic flow network with minor detail on individual and vehicle interactions. Where microscopic looks in detail at vehicle interactions, headways, velocity, and vehicle acceleration and declaration. This gives you close to re world simulation but is usually only used for single or multiple intersections. Mesoscopic is a variation between the two being more detailed but in greater networks (Khan and Gulliver, 2018).

Macroscopic is used when working on whole city networks, and one of the leading software in this field is VISUM. This software allows for the integration of Public Transport into a simulation of the city and then do trials of different treatments to assess the outcomes. Figure 10 shows the different variants that can be evaluated in the VISUM software to show the success of whatever method you put in place.

Evaluation parameters	Variant 0	Variant 1
Average travel time	45.30	42.29
Average riding time	33.58	31.25
Average time spent in a vehicle of a public transportation system	26.05	23.16
Average transfer time	7.53	8.09
Average waiting time at the transfer stop	1.42	1.16
Average waiting time at first stop	3.36	3.23
Total number of trips / travels	127 465	134 174
No. of passenger trips / travels without transfers	58 869	57 943
No. of passenger trips /travels with transfers	68596	76231
No. of passenger trips/ travels with 1 transfer	25 899	25 287
No. of passenger trips/ travels with 2 transfers	5 301	7 711
No. of passenger trips/ travels with >2 transfers	222	629

Figure 10 (Khan and Gulliver, 2018)

The steps involved can be broken down into three stages. Firstly, the application of expert knowledge to construct a solution or variant to the current public transport system. This can be any combination of any improvements. From there, it needs to be inserted in the macrosimulation. This can be done using the tools provided as accurately as possible to

simulate your treatment. Once this simulation is run, you can use all the available graphs, charts, and actual visual representations of what is happening on the ground. This information needs to be reviewed and evaluated to deem the success of your design (Solecka and Żak, 2014). The advantage of this sees a simulation of your ideas and strategies without actually implementing them. This leg work in the start saves both time and money in the long run.

2.6. COMPLIANCE

One of the issues with creating one network between the two towns is they operate from two different states. These discrepancies would need to be worked through and considered when it comes time to implement any changes to the public transport network.

2.6.1. DDA (Disability Discrimination Act)

DDA is the Disability Discrimination Act which is designed around ease of access to those with a Disability. This varies from transport and pedestrian movement to shop access and sporting venues. Albury and Wodonga are working towards upgrading their cities to be DDA compliant, meaning any work done is also made compliant. Apart of upgrading the system will be making sure it is DDA compliant. From the public transport sector of the 1992 Act, the following is what is needed for a bus stop to be DDA compliant.

Many buses in Sydney are now designed with low floors requiring fewer steps to get into them, making it easier for those impaired.

The time frame for this compliance is as below;

25% of bus stops to be wheelchair accessible by 2007, 55 % by 2012, and 100% by 2022. • 25% of bus services to be wheelchair accessible by 2007, 55 % by 2012, and 100% by 2022.

3. DATA COLLECTION

To better understand public transport in the Albury Wodonga region, a whole range of data has been collected to help with the design and implementation of different potential solutions. The data relevant to the research are as follows;

- Current forms of PT
- PT users
- Availability
- Shortcomings
- Growth areas
- Case study
- Similar towns and solutions

Figure 11 (J Smiles, 2020)

3.1. ALBURY PUBLIC TRANSPORT

3.1.1. BUSES

Two different bus companies service Albury Wodonga. One being Dysons and the other Martins. These companies currently have no interactions or cooperation to work as one. Dysons is run by PTV and Martins by TfNSW. This segregation is one of the major starting points for problems in Albury Wodonga's public transport network.

19 bus services are operating within Albury Wodonga as per the following;

- 12 services in Wodonga operated by Dysons.
- 1 service connecting Wodonga to Albury operated by Dysons
- 3 services in Albury operated by Dysons
- 3 services in Lavington/Thurgoona operated by Martins

These services are shown in figures 12 and 13, and all timetables are attached as appendix C.

Figure 12 (Martins Service Map)

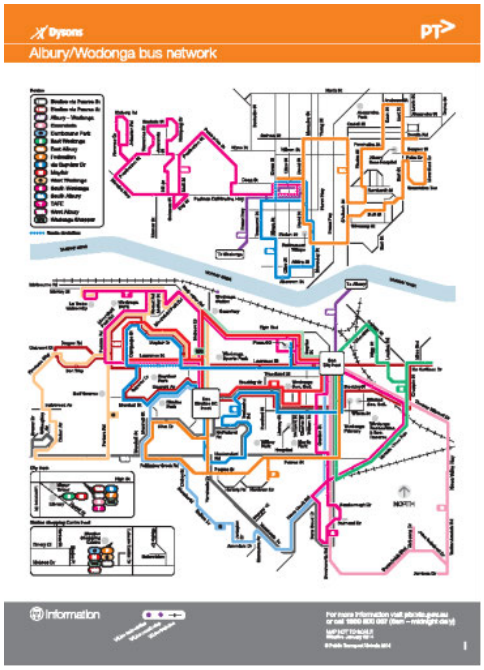


Figure 13 (Dysons Service Map)

3.1.2. TAXIS

There are two major taxi companies in Albury Wodonga, one located in Victoria and one in NSW – Wodonga Taxis and Albury Taxis, respectively. There are several legislative barriers in place to restrict the availability and usability of taxis.

Additionally, Taxis are seen as expensive for many, particularly for those needing to cross the border. A trip from the Albury entertainment precinct to West Wodonga on a Saturday night will cost somewhere between $50-70.

3.1.3. UBER

As a competitor to taxis, uber was recently brought to Albury. Uber is a service that provides ride-hailing, and food delivery is a far more reasonable rate than local taxi services. With the convenience of an extremely easy to use app, you simply put in your location and request an uber. Then on the app you will be delegated a driver and shown how far away the driver is. Once you have received your lift, you are charged directly through the app, which is direct debited. This system is far more streamlined than the current taxi services and is why it has become so popular. It also offers features like reviews and allows you to split the cost between others with uber accounts. Unfortunately, it has not picked up in Albury yet as there aren't enough drivers, but it seems to be getting more popular slowly. Although uber is a great option for direct pickup and drop-off, it is still too expensive to be used as day-to-day public transport.

3.2. ALBURY WODONGA DATA

3.2.1. INTERNAL

Public transport options in Albury Wodonga include buses, taxis, and Uber. There are trains between Albury and Wodonga as part of the V-line and XPT services, however they are not often used to travel between the two cities, particularly as the Wodonga Railway station is located some 4km from the CBD with no connecting bus services.

3.2.2. EXTERNAL

Whilst Albury Wodonga is well connected to Sydney and Melbourne via road and air. Public transport links are infrequent, costly and lengthy. The table below compares the different modes used to travel from Albury Wodonga to Melbourne and Sydney, and compares the time and costs involved. Despite being in southern NSW, Albury is far more linked to Melbourne as it is significantly closer than Sydney. As such, the route from Albury Wodonga to Melbourne is far more frequently travelled.

	MELBOURNE		**SYDNEY**	
	Time	**Price**	**Time**	**Price**
Air	1 hour	$120-$500	1 hr. 20m	$150-$600
Rail	4 hours	$40	8 hours	$60
Private Vehicle	3.5-4 hours	$40-50	6-7 hours	$75-$90

Table 1 (External Travel Times)

It can be seen from the table above that the cost and time taken to travel from Albury Wodonga to Melbourne via rail is comparable to that of a private vehicle (VLine). Due to the distance involved, however, it is not particularly common for residents to travel to Melbourne solo. As such, carpooling (or a family traveling together) makes the trip by private vehicle more cost-effective. This, coupled with the convenience and freedom of driving, means that the journey from Albury Wodonga to Melbourne by private vehicle is far more attractive than catching the train.

3.3. TRANSPORT USERS

3.3.1. CENSUS STATISTICS

Albury's demographic data may be helpful when trying to target and plan for a public transport system that works for them. I have included both Albury and Wodonga as two separate towns so that we can see the difference. This data is from the 2016 census completed by the abs, so the figures are not exact, but there have been no significant changes in the two towns in the last five years to give any reason for the percentages to have changed. I have listed in table 2 all the data I found relevant to this study (Census Data Albury-Wodonga, 2016).

Statistic	**Albury**	**Wodonga**	**Australia**
Male	48.2%	48.7%	49.3%
Female	51.8%	51.3%	50.7%
Median Age	39	37	38
Unemployed	6.8%	7.2%	6.9%
Median Weekly Income	$642	$628	$662
Travel to Work – Car, as driver	74.2%	74.2%	61.5%
Travel to Work – Car, as passenger	4.8%	5.6%	4.6%
Travel to Work – Walked	3.3%	2.5%	3.5%
Travel to Work – Bicycle	1.0%	0.9%	1.0%

Travel to Work – Public Transport	0.9%	0.9%	11.5%

Table 2 (Census Data)

The most important target for public transport is getting those travelling to and from work every day to use public transport. As you can see, both Albury and Wodonga are behind in regard to people travelling to work via public transport to the rest of Australia. The two peak times of traffic are from 8-9 am and 4-5 pm. These times are essential to be serviced when considering timetabling.

3.3.2. PUBLIC TRANSPORT AVAILABILITY

A report generated by a company called Informed Decisions came about from the request of Albury Wodonga councils to identify the accessibility of public transport in the area and their demographic (Petrović, N, 2021). It was to help identify those that do not fall inside the public transport catchments and do not have reliable access to other forms of transport. The focus was on residents outside public transport catchments while not having access to a motor vehicle or only one motor vehicle for a household with multiple residents. For Albury, it was found that 35% of the city's population lived outside the 400m public transport catchments. With 5% of Albury's population living outside the catchments while having no motor vehicle or having access to 1 motor vehicle per household. While Wodonga showed 44% of the city's population, we're outside the catchment areas, with a similar percentage to Albury not having access to sufficient motor vehicles. 400 metre catchments roughly equate to five minutes of walking time. The assessed demographic and socioeconomic characteristics included age, sex, education, employment status, household income, recent arrivals, proficiency in English, and need for assistance.

Albury City residents outside public transport catchments with unreliable access to transport are:

- Generally younger than the Albury City population, with a higher proportion of residents aged 0-14 years, a similar proportion of 15-44-year-olds, a notably lower proportion of 45-64-year-olds but a higher proportion of residents over the age of 65.
- More likely to be female than male, with almost 54% of the population (1,520 residents) being female
- Predominantly attending primary or secondary school with a lower proportion of the population attending university.
- More likely to have residents with no qualification and a slightly lower proportion of residents with Bachelor of Higher Degree qualifications, than Albury City as a whole.
- Less likely to be employed full-time than the Albury City population as a whole and more likely to be employed part-time or be unemployed compared to the city benchmark.
- More likely to have lower household incomes than Albury City as a whole.
- More ethnically diverse than the overall population. There is a higher proportion of recent arrivals and a higher proportion who speak a language other than English.

- More likely to have a need for aid due to disability than Albury City's total population, with 8.2% of residents with a need for aid due to disability compared to 5.9% in Albury City.

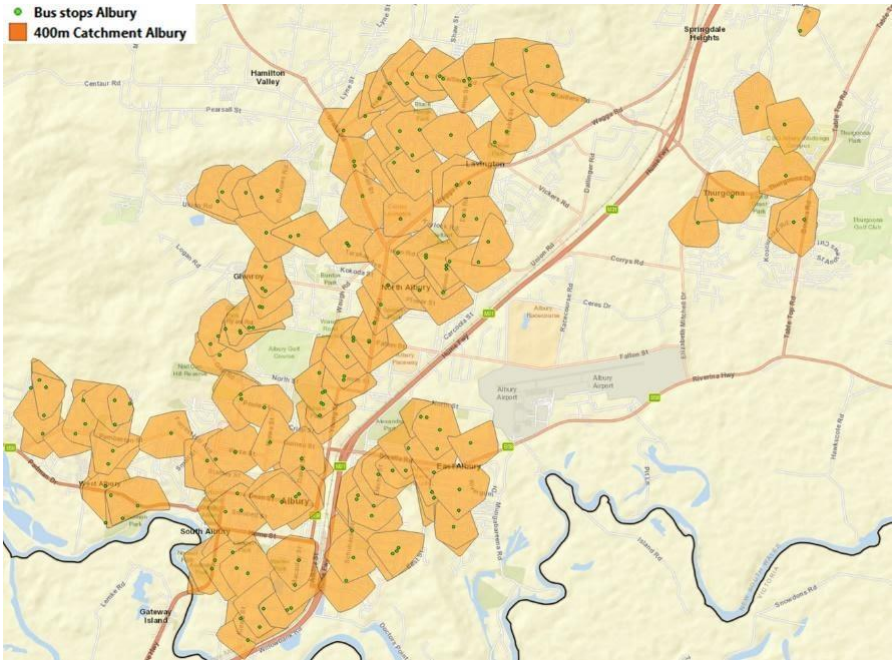


Figure 14 (Petrović, N, 2021)

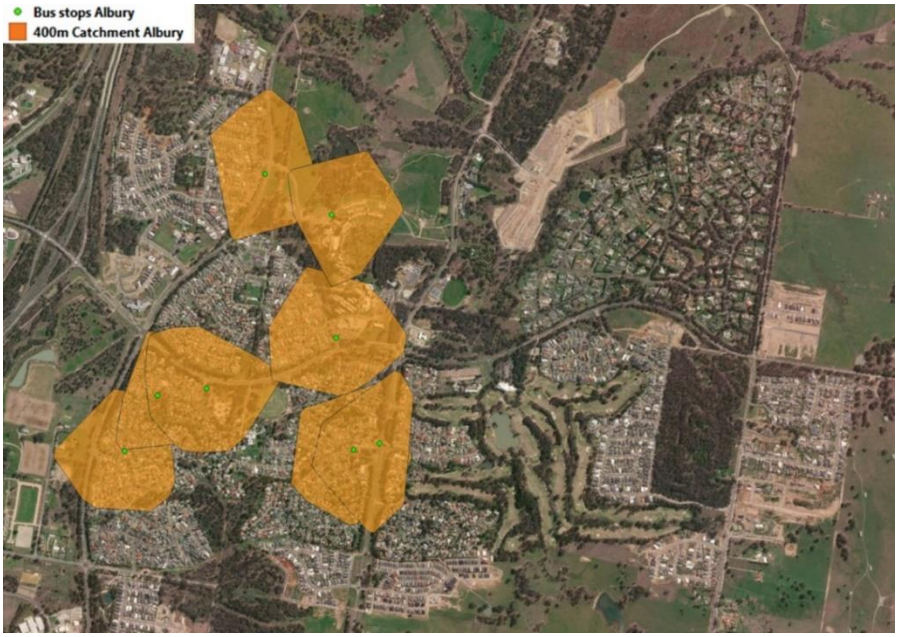


Figure 15 (Petrović, N, 2021)

City of Wodonga residents outside public transport catchments with unreliable access to transport are:

- Younger than the City of Wodonga population, with a higher proportion of residents aged 0-14 years, a lower proportion of residents aged 15-64 years but a higher proportion of older residents over the age of 65.
- More females than male, with 57% of the population (1,170 residents) being female.
- Predominantly attending primary or secondary school with a lower proportion of the population attending university or TAFE.
- More likely to have residents with no qualification and a slightly lower proportion of residents with Bachelor/Higher Degree qualifications, than the City of Wodonga overall.
- Less likely to be employed full-time than the City of Wodonga population as a whole and more likely to be employed part-time or be unemployed compared to the city benchmark.
- More likely to have lower household incomes than the City of Wodonga as a whole.
- More ethnically diverse than the overall population. There is a higher proportion of recent arrivals and a higher proportion who speak a language other than English.
- More likely to have a need for aid due to disability than City of Wodonga's total population, with 10% of residents with a need for aid due to disability compared to 5.8% in the City of Wodonga.

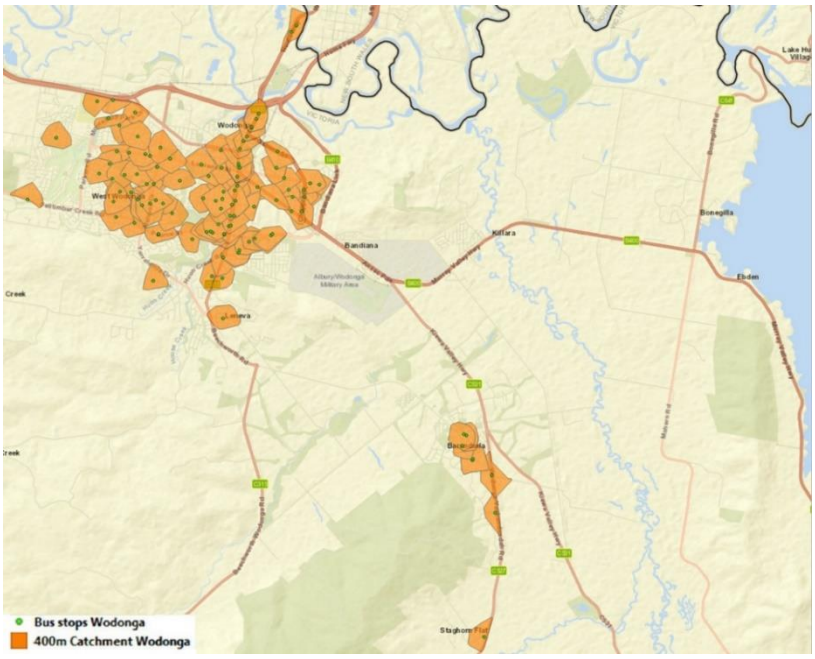


Figure 16 (Petrović, N, 2021)

As you can see, the findings are somewhat similar. They show those living outside the catchment areas have unreliable access to private transport and are more disadvantaged from a demographic and socioeconomic perspective. Coverage to these areas is needed as it is currently inadequate. The public transport system should include those who need it, especially those who do not have adequate access to private vehicles.

3.4. CITY RESEARCH

3.4.1. ALBURY WODONGA

Understanding how these bus systems work and operate currently will be an essential part of finding their shortcomings. Working through the timetables and routes, I have come to a list of significant problems in the current network.

- The Albury Railway Station, Wodonga Railway Station and the Albury Airport are not serviced by any route. This is particularly problematic in Wodonga as the station is located 4km from the centre of the city, and on the other side of the Hume Freeway.
- The ticketing system differs between the services operated by PTV and those operated by Martins Travel for TfNSW. You cannot buy a ticket in Wodonga to get to any destination north of QEII Square.
- There are no EFT facilities on buses to purchase tickets, therefore cash must be used.
- There is no 'tap and go' ticketing system such as Myki or Opal.
- There are no express services from outer suburbs into either CBD.
- Services do not extend far into growth areas such as Thurgoona and Baranduda.
- There are no direct links between either CBD and the two university campuses (La Trobe in West Wodonga and Charles Sturt in Thurgoona).
- Services in Wodonga overlap extensively.
- Most services are travelling through multiple suburbs rather than one, resulting in lengthy travel times for passengers. This allows larger range of service but drastically decreases the quality.
- Many services are not unidirectional, which again results in lengthy travel times for passengers.
- There are no connecting services from one side of the city to the other (east to west or north to south) resulting in multiple connections for one trip, and lengthy wait times between services.
- As services in Albury Wodonga are run by two different states and providers, available information is fragmented and must be sourced from two separate locations. Information about the PTV services can be sourced on the PTV website and/or app, which includes an intuitive journey planner option. Information about the TfNSW services must be located via the Martins Travel Group website, where maps and timetables are pdf downloads, and there is no journey planner option.

3.4.2. WAGGA WAGGA

The city of Wagga recently went to the community to see what would be required for the public transport network to become something they want to use. This was to present their transport needs and challenges in currently getting around the city. The main outcome from this was they needed reliable services and better connections to the places they want to visit at the time they want to go. The first outcome from this was to improve timetable connections and to provide better bus coverage across the city. 240 extra weekly services have been added to the network with new afternoon and evening services for Thursday Friday and Saturday. From the customer feedback reduce travel times for services to Charles Sturt University have been provided. All service timetables have been tweaked and altered from customer feedback and will continue to be done while being monitored after the roll out. They were able to utilise their old bus stops while adding new bus stops along the network. The new service aims for walking distance to bus stop to be approximately no more than 400 to 700 metres. New interchange times of no more than 8 to 15 minutes depending on location of travel from all Central Stations.

A new direct on-demand service is being trialled for a 12-month period. It is a hybrid between timetabled and demand bus servicing and will operate on weekday mornings and afternoons. The first service of the day will get customers to work by 5:30 a.m. the remaining three services will be provided as a demand service and operate when customers book the service. A similar system is used for the evening segment of the day. There's hope to see the on-demand option supplying residents with transport when they need it. Even with all the upgrades Wagga is still charging the same cost per bus trip. All the exact changes to their system have been attached as appendix A for future reference.

3.4.3. TOOWOMBA RESEARCH

Future public transport options for Toowoomba for the Next Twenty Years is a thesis research task done by USQ student Belinda Freeman (Freeman, B, 2016). In her research she looks at Cities all over the world and compares their public transport to Toowoomba's. Using her research into these Cities we can also compare Albury Wodonga. Her solutions for Toowoomba did not go any further than a handful of recommended ideas found from the successful cities. What I will do is take her research and while applying it to Albury Wodonga model the solutions and compare the outcomes. This will build on the research already done while applying it to Albury Wodonga. The survey results obtained in this research are not relevant as there is no way of showing if they would represent the requirements of our

residents. The findings found from this research task will help give direction and ideas to the potential options Albury will need to consider.

3.4.4. BUS STOPS

Apart of any upgrades to the network bus stops will need to be installed. Along with this all-previous bus stops should be upgraded to be DDA compliant to stay in line with that 2022 goal. From Albury City's earlier installations of Bus Stops it was found that it costs around $5,000 to install a bus shelter to the minimum DDA compliance standard. This does not include any bus stop requiring any extra work like larger slabs, retaining walls or larger shelters. Appendix C shows the table of all the current shelters in Albury and what they need to reach DDA compliance. I calculated this to be about $400,000. This does not include any new shelters which will be needed. It is important that all bus shelters in the improved bus system are DDA compliant.

Without access to Wodonga's DDA compliance data it could only be estimated to about a third of the size of Albury's costs being an additional $300,000.

3.5. CASE STUDY

3.5.1. CASE STUDY A

A student living in Lloyd Street, West Wodonga attending 9 am classes at Charles Sturt University, Thurgoona Campus.

PRIVATE VEHICLE

- 20km on the Hume Freeway, 15-25 minutes depending on traffic

PUBLIC TRANSPORT

- Leave home at approximately 6:40 am
- Walk to the nearest bus stop; 5-10 minutes
- Catch Regional Bus F from Uniting Church West Wodonga at 6:58 am
- Arrive Wodonga Library at 7:05 am
- Wait at Wodonga Library for 35 minutes
- Catch Regional bus AW from Wodonga Library 7:40 am
- Arrive Kmart Car Park/Smollett Street 7:49 am
- Walk 500m (10 minutes) to QEII Square and arrive at approximately 8:00 am
- Wait at QEII Square for 25 minutes
- Catch Route 908 from QEII Square at 8:25 am
- Arrive Charles Sturt University at 8:48 am
- Walk to class

TOTAL TRAVEL TIME: Approximately 2 hours with three services

Additional Notes;

PTV Journey Planner can be used to plan a journey from home to QEII Square. The local bus provider website must be used to figure out the possible route from QEII to CSU.

Return journey similar, taking approximately 2 hours with three service changes. The time at which the student can leave the university to return home is limited, and the student cannot stay later than 4:30 pm

3.5.2. CASE STUDY B

A resident of Kerr Road Thurgoona, wishing to travel to Albury CBD on a Saturday morning to go shopping

PRIVATE VEHICLE

- 12km, 15-20 minutes

PUBLIC TRANSPORT

- Walk 3km to the nearest bus stop at Thurgoona Plaza, 40 minutes (or catch a taxi)
- Catch the Route 908 bus from Thurgoona Plaza at 8:25 am
- Arrive QEII square at 8:50 am

TOTAL TRAVEL TIME; 1hr 5minutes with a 3km walk

Additional Notes;

The latest that the resident can begin their return journey is 12:15pm from QEII, as this is the last bus on this service for the weekend. Buses in Albury do not operate in the afternoon on Saturdays, and not at all on Sundays. Most shops in the Albury CBD do not close until 4pm on Saturday and are generally open until at least lunch time on Sundays.

Expecting passengers to walk 3km to access the closest bus stop is completely unrealistic. Further, if a taxi was used, the passenger would travel all the way into Albury, rather than be taken to a Thurgoona bus stop.

A resident could cycle the 3km from Kerr Road to the Thurgoona Plaza to catch the bus, however as there are no lockable facilities for their bicycle, this would be considered undesirable.

3.5.3. CASE STUDY C

Resident in Springdale Heights visiting the Cancer Centre at Albury-Wodonga Health, Albury campus for a weekday, lunch time appointment

PRIVATE VEHICLE

- Three different route options, 6-10kms, all approximately 10 minutes' travel time

PUBLIC TRANSPORT

- Walk to nearest bus stop, 10 minutes
- Catch the Route 906 bus from Kaitlers Road Store at 10:33am
- Arrive QEII square at 11:00am
- Wait 30 minutes
- Catch Regional Bus EA East Albury service from QEII 11:30am
- Arrive Keene Street 11:38am

TOTAL TRAVEL TIME; 1hr 15 minutes with 2 services

3.5.4. CASE STUDY D

Resident of Blackmore Street, West Albury travelling to Vermont Street, Wodonga on a Thursday for a 2:30pm appointment.

PRIVATE VEHICLE

- 9km, 15-20 minutes

PUBLIC TRANSPORT

- Walk to Albury West Public School/Mott Street bus stop, 5 minutes
- Catch the West Albury route at 12:20pm
- Arrive at QEII Square 12:30pm
- Wait 30 minutes
- Catch the Regional Bus 7 to Beechworth at 1:00pm
- Arrive at the Wodonga Water Tower at 1:11pm
- Wait 34 minutes
- Catch Regional Bus G from the Water Tower at 1:45pm
- Arrive at Wilson/Vermont Street at 1:50pm
- Walk down Vermont Street to clinic, arrive approximately 2pm.
- Wait half an hour for appointment.

TOTAL TRAVEL TIME; 1hr 35 minutes with 3 services, and a half an hour wait

Additional Notes;

This is the latest appointment that could be attended, as a return journey leaving Wilson Street/Beechworth Road at 3:58pm is the last possible service to provide connection through to West Albury.

The bus stop at Wilson Street/Beechworth road is 1km from the Vermont Street Clinic, thereby requiring the passenger to walk 15-20 minutes to catch a bus.

The return journey takes a similar period, also requires the use of 3 different services, as well as requiring the passenger to walk 1km at the beginning of the journey, and then an additional 700m at the end of the journey.

3.5.5. CASE STUDY E

Resident of Riverview Terrace, East Wodonga, commuting to the Albury CBD for work at 8:30am.

PRIVATE VEHICLE

- 7km, 10-15 minutes
- Park at the Kiewa Street All-Day multi-deck car park, walk to Dean Street, 5 minutes

TOTAL TRAVEL TIME, 15-20 minutes

PUBLIC TRANSPORT

- Walk to the De Kerilleau Drive bus stop, 5 minutes
- Catch the Regional Bus E to Wodonga at 7:26am
- Arrive at Wodonga Library/Hovell Street at 7:40am
- Wait 20 minutes
- Catch the Regional Bus AW to Albury at 8:00am
- Arrive at Kmart Car Park/Smollett Street at 8:09am
- Walk to Dean Street, 5 minutes

TOTAL TRAVEL TIME; 53 minutes with 2 services

Additional Notes;

The return journey requires the passenger to leave work prior to 5pm to enable them to catch the regional bus AW from QEII Square at 5:01pm. This is the absolute latest service that can be used, as the 5:31pm AW service from QEII Square to Wodonga does not arrive at the Wodonga Water Tower in time for the passenger to change the East Wodonga Service at 5:45pm. If the passenger did catch the 5:31pm AW Service from Albury to Wodonga, they would have to walk 2.5km home from the Water Tower.

The commuter in this instance could cycle the 2.5km from their home to the Wodonga Library stop and then catch the Regional AW bus to Albury, however as there are no lockable facilities for their bicycle, this would be considered undesirable.

3.5.6. SUMMARY

The table and chart below summarise the differences between private and public transport options across Albury Wodonga. It shows that not only is every single journey significantly longer when undertaken on public transport, but that there are additional barriers in place which impact the usability of the service. These barriers include lengthy walking distances, changes to service providers, ticketing & timetabling, and limitations to when services can be accessed.

Case	Journey & Purpose	Private Vehicle	Public Transport
A	West Wodonga to Charles Sturt University, Thurgoona campus for 9am class	15-25 minutes	2 hours, 3 services
B	Kerr Road to Albury CBD for Saturday morning shopping	15-20 minutes	1 hour 5 minutes + 3km walk
C	Springdale Heights to Cancer Centre for weekday, lunch time appointment	10 minutes	1 hour 15 minutes, 2 services
D	West Albury to Central Wodonga for an afternoon appointment	15-20 minutes	1 hour 35 minutes, 3 services +½ hour wait Return journey requires 1km walk + 700m walk
E	East Wodonga commuting to Albury CBD for work	10-15 minutes	53 minutes, 2 services

Table 3 (Case Study Summary)

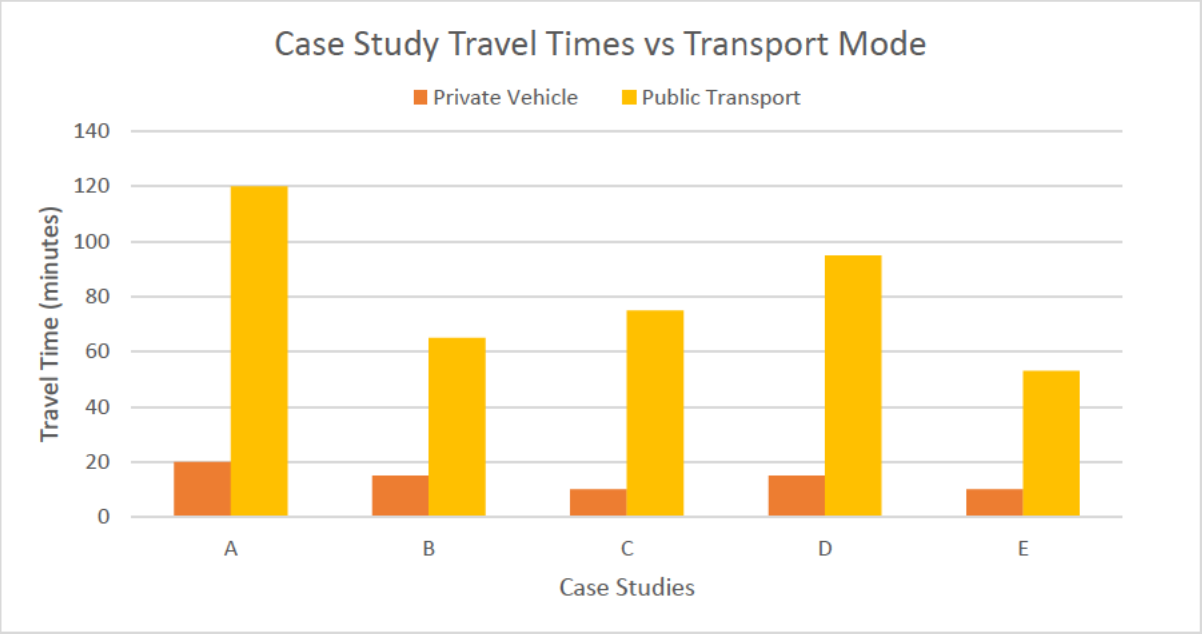


Figure 17 (Case Study Summary Graph)

4. METHODOLOGY

4.1. INTRODUCTION

Using the learnings from the academic research and the data collected regarding Albury Wodonga's public transport network, this now needs to be applied to come forward with solutions that will be implemented and tested in the Visum model. This process has been broken into multiple stages.

- Learn Visum software
- Import PuT
- Assign PuT demand matrices
- PuT solutions

4.2. LEARNING VISUM

Visum is one of the most in-depth traffic planning and modelling software in the world. It is used for traffic analyses, forecasts of GIS-based data management on City, Regional and national levels (PTV Group, 2021). Albury and Wodonga councils have recently just had their entire two cities modelled. This means we have a near real-life accuracy model of all traffic components in the two cities. In a Visum training course, I have learnt how to edit and work with the software and the model to alter it to test whatever scenario I like. From the training, I have learnt it has far more use than anyone thought it would, and it will now play a large part in this research project. This being new to Albury, this project will be the first thing we will be utilising for and leading the way for future traffic-related projects within Albury City. As seen in figure 18, we can see a live simulation of our network. Each of the coloured dots is a vehicle driving around the city. Green means they are in free flow, transitioning to red being congested. This is done with thousands of lines of coding and matrices to simulate the decision-making of the people of Albury Wodonga, depending on the zone they are coming from and the likely demographic of that driver. This was then calibrated with real-life traffic data that has been collected over the years to increase the accuracy of the model to show what is on the ground. The best part of this is with this model, I can make changes to the system and see how it affects the streets around it. I completed a 1-week training course on the software and simulated what would happen to the system if I were to

close the Hume Highway between the two cities [Tafazoli, P, 2021]. This is just an example of what can be done, and this will be utilised heavily in this research task.

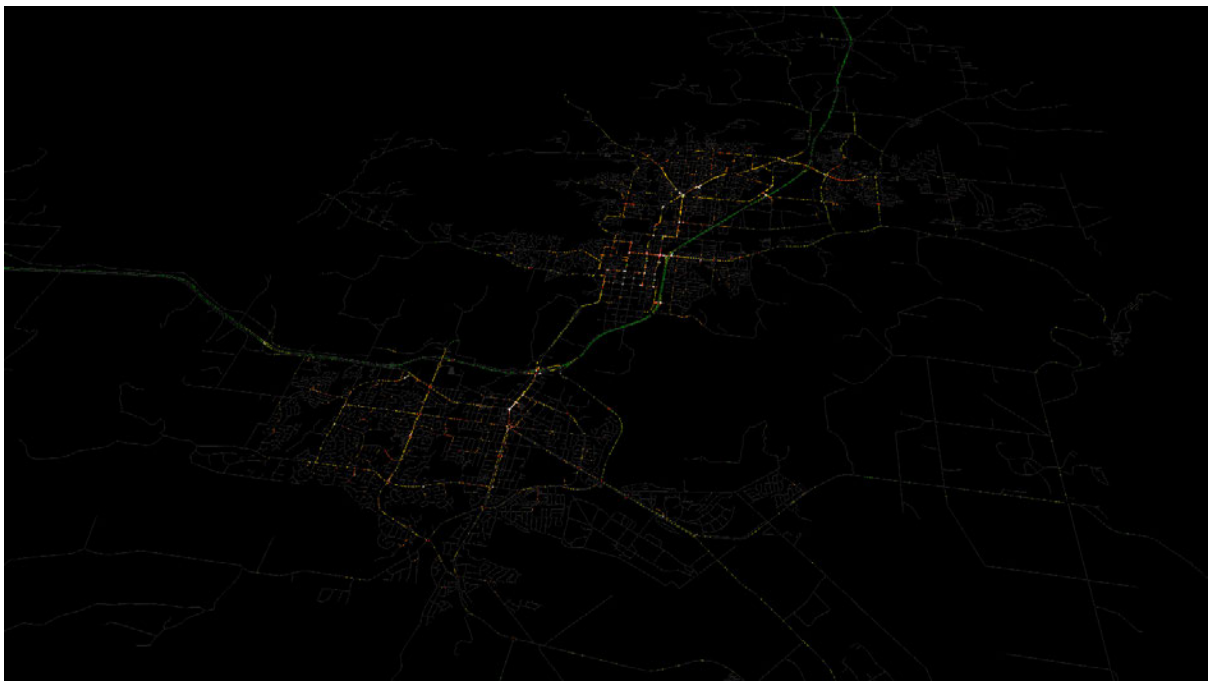


Figure 18 (VISUM 3D Network Output)

The model is made up of a network of nodes and links. These all carry their own attributes like lanes, average speeds, surfaces, vehicle types and so on. Nodes carry data on any change of direction geometry and intersections. Being a macro model, these intersections are not modelled to high accuracy, but they do have all traffic control devices and signal data included. Changing these attributes allows you to trial different ideas and treatments.

4.3. GTFS FILES

The Public Transport network to all bus routes in NSW is available data online. These are GTFS (General Transit Feed Specification) are zip files with data relating to polygons for bus routes, locations of stop points and timetables for each of these networks. These are presented as separate files for each piece of information that is needed to create a public transport network in Visum, and all relate to each other due to line ids. These GTFS files can be imported into Visum which is a super helpful tool. Although the data isn't perfect it is a great starting point, so the network does not have to be inputted manually.

agency	Text Document	2 KB	No
calendar	Text Document	10 KB	No
calendar_dates	Text Document	61 KB	No
notes	Text Document	23 KB	No
routes	Text Document	128 KB	No
shapes	Text Document	328 KB	No
stop_times	Text Document	33,723 KB	No
stops	Text Document	8 KB	No
trips	Text Document	1,471 KB	No

```
route_id,agency_id,route_short_name,route_long_name,route_desc,route_type,route_color,route_text_color,exact_times
"1-10H-U-sj2-2","700","10HU","Maitland, then Singleton, Muswellbrook","Temporary buses","714","00B5EF","FFFFFF","1"
"1-15H-U-sj2-1","700","15HU","Maitland, then all stations to Muswellbrook","Temporary buses","714","00B5EF","FFFFFF","1"
"1-1SC-sj2-1","700","1SC","Kiama, then all stations to Bomaderry","Temporary buses","714","00B5EF","FFFFFF","1"
"1-1T3-sj2-2","700","1T3","Central, then all stations to Sydenham","Temporary buses","714","00B5EF","FFFFFF","1"
"1-2T3-sj2-1","700","2T3","Central, then Sydenham","Temporary buses","714","00B5EF","FFFFFF","1"
"1-32S-C-sj2-2","700","32SC","Dapto, then Albion Park, Oak Flats, Kiama","Temporary buses","714","00B5EF","FFFFFF","1"
"1-43T-2-sj2-2","700","43T2","Ashfield, then all stations to Strathfield","Temporary buses","714","00B5EF","FFFFFF","1"
"1-45T-2-sj2-1","700","45T2","Central, then Macdonaldtown (Erskineville Rd), Newtown, Summer Hill, Ashfield","Temporary buses","714","00B5EF","FFFFFF","1"
"1-46T-2-sj2-1","700","46T2","Central, then all stations to Ashfield","Temporary buses","714","00B5EF","FFFFFF","1"
"1-47T-2-sj2-2","700","47T2","Central, then all stations to Strathfield","Temporary buses","714","00B5EF","FFFFFF","1"
"1-4SC-sj2-2","700","4SC","Dapto, then Kiama","Temporary buses","714","00B5EF","FFFFFF","1"
```

Figure 19 (GTFS Sample)

To import these files into Visum there was issues with the shear size of trying to import all of NSW into one file. To fix this I worked with the Assets department to put together some code (figure 20) to exclude all longitudinal and latitudinal data outside Albury Wodonga's catchment area. This greatly decreased file sizes and allowed the data to be imported in Visum. This GTFS was imported into a blank file so that it could be manipulated to suit our model when it was time to include it.

```
import csv

def chop_it():
    # files to analyse and their lat/long indicies
    infiles = {"shapes.txt": [1, 2], "stops.txt": [3, 4]}
    # albury lat & long bounds (minY, minX, maxY, maxX)
    bounding = (146.56482, -35.79003, 147.35608, -36.23952)

    # for each txt file
    for txt in infiles:
        with open(txt) as readfile:
            reader = csv.reader(readfile)
            # output file
            with open(txt.split(".")[0]+"_chopped."+txt.split(".")[1], "wb") as writefile:
                writer = csv.writer(writefile)
                header = True
                # iterate over each row in the input file
                for row in reader:
                    # make sure to write the headers in the output
                    if header:
                        writer.writerow(row)
                        header = False
                        print "printing header"
                    else:
                        # if (lat < minY and > maxY) and (long > minX and < maxX) then write it to the output file
                        if (float(row[infiles[txt][0]]) < bounding[1] and
                            float(row[infiles[txt][0]]) > bounding[3]) and (
                            float(row[infiles[txt][1]]) > bounding[0] and
                            float(row[infiles[txt][1]]) < bounding[2]):
                            writer.writerow(row)
    return

```

Figure 20 (GTFS Code)

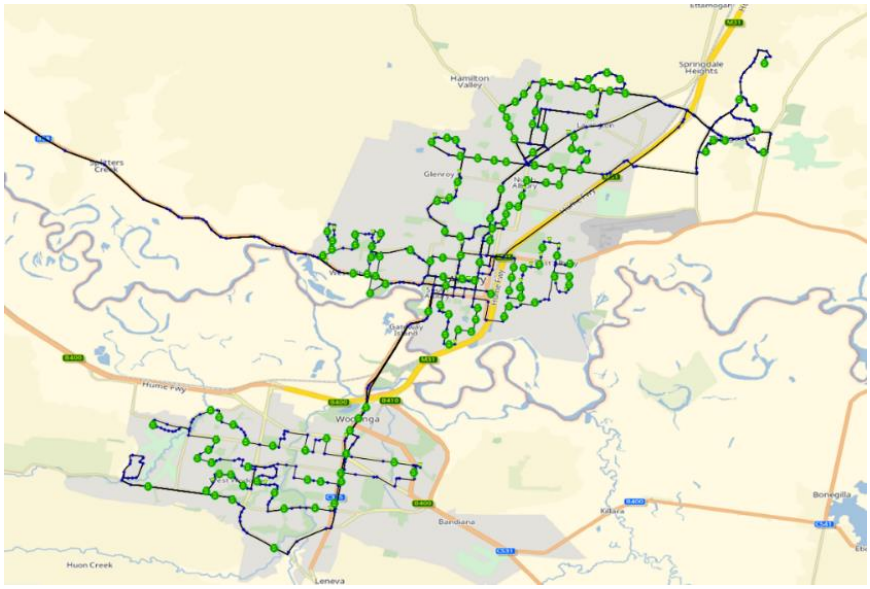


Figure 21 (GTFS Import)

4.4. IMPORT

The issue with this data is that it is just a group of nodes and lines, it is not traffic data attached to the actual model. To do this you can use a tool called PuT supply from Visum. This allows you to take what was previously done but import into the Albury Wodonga traffic model. One of these options is to use the lines in the model network which allows both PuT and PrT to travel on the same roads. To bring the two networks together was very time consuming as all aspects of both the models had to be exactly the same. The trial and error to get these two models to work together as one took weeks.

4.4.1. DEMAND MATRIX

Since we do not have travel data to use for Public Transport, I have opted to use the same demand matrix but at 1% of the private vehicle movements (Census, 2016). These demand matrices are required to run the model as it needs to know what the required movements are. A more accurate model would use real world travel data from public transport uses to proper simulate where people are using public transport. But for the sake of this research the best we can do is assume people using private transport are travelling to the same locations as someone using public transport.

4.5. PT CREATION

Creating a public transport route in Visum is broken down into 3 key components, adding stops, adding the line route and then assigning travel times and headway. Individually these are simple tasks but when trying to bring them together to make something that actually works it becomes far more complex.

4.5.1. STOPS

If a bus stop does not exist in a location that you would like to service a stop needs to be added within the model. This is a very simple process by adding a stop point to a node within the network along with adding a point to the line that you want to apply the stop to. This adds the attribute to the line that their a stop allowing routes to be started and stopped at these points.

4.5.2. ROUTES

To create the public transport route firstly you create the name and set its characteristics. After that you are able to create your route by clicking and dragging around the map. This route automatically adds any stop points that are passed to the service network. This creates your route with the list of stop points that are passed in the direction that you have chosen.

4.5.3. TIMETABLES

To assign headway times you need to designate the travel times for each of the line routes between the stops. For travel times since Albury Wodonga do not have any designated bus lanes the speed of bus movements needed to be determined. This was done by applying what the private transport skim matrices has calculated and applied a factor of 1.5 (Liao et al, 2020). Traffic movements in Albury Wodonga do not hinder larger vehicles like buses a great deal so applying the learnings from the study this was the chosen factor. From this we can generate how often each service is going to run which then generates your timetable.

4.6. RESULTS

The Visum results have been compared with the original case studies to help calibrate and ensure the model is showing similar to real world results. This will also be used to compare the solutions I have implemented to assess their success.

Apart of this assessment the case studies that were put forward will be simulated in the model. This will not only help assess the correctness of the model but also will allow us to compare and analyse any changes made, this is done using Isochrones.

4.6.1. ISOCHRONES

The main method that will be used to analyse and compare the data will be a mapping method called Isochrones. This is a map type that shows data visually using different colours and a legend to show travel times from certain areas in the city. Figure 22 shows an example of this from PTV Visums example files. All of my solutions that I will be testing will use these isochrones to help analyse their success and hopefully see travel times decrease with these changes.

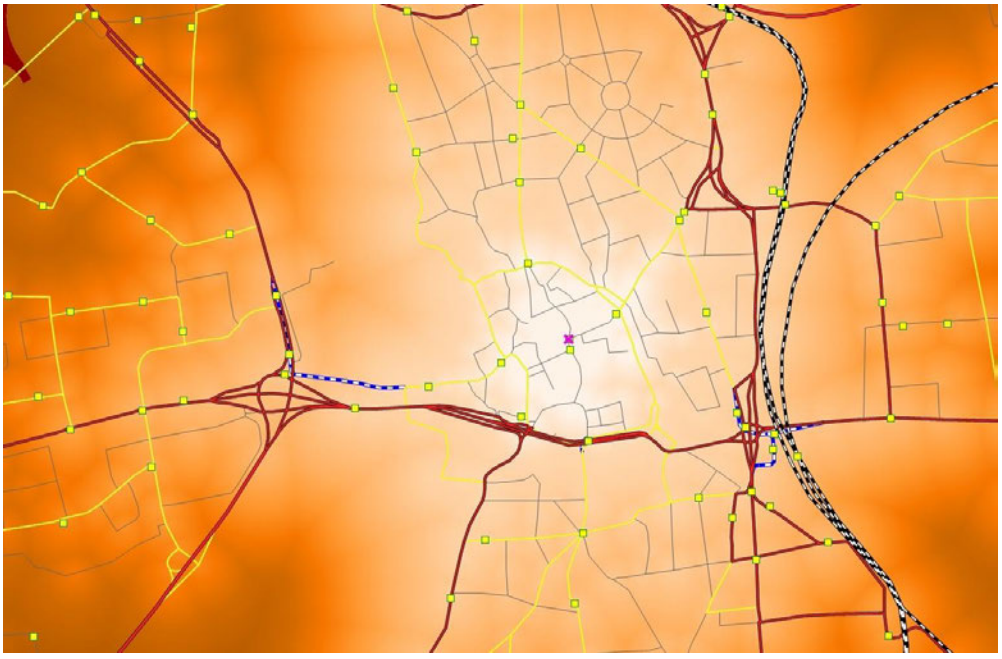


Figure 22 (PTV Visum)

4.6.2. SKIM MATRICES

Skim matrices are an output you can produce from VISUM that tell us how long on average it takes to travel from one stop to another. This is especially useful since assessing the success of public transport can vary depending on the time of day you run the model, this matrix can be used to see changes across the whole network throughout the entire day. These matrices are over 200x200 in size so including them at any point in this report is unrealistic. Examples of each matrix produced is attached as appendix F. The way they will be used is to subtract the two matrices of two different scenarios from each other. This gives us the difference in travel times and can be averaged out to an average travel time changed. This along with the isochrones will be an effective tool to analyse and assess the results in a calculated manner not just visual.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	290.0301	266.2463	289.2968	114.9609	118.1109	253.4636	279.9498	104.9943	289.9556	306.6563	278.365	186.5672	171.9633	279.9339	298.5745	298.7492	298.5086	302.1881	315.4366	286.3021
2	37.11667	0	267.9797	291.0301	116.6943	119.8443	255.197	281.6832	106.7276	291.6889	308.3896	280.0984	188.3005	173.6966	281.6673	300.3078	300.4825	300.2419	303.9214	317.17	288.0354
3	39.83333	38.1	0	37.36667	107.1559	110.3059	78.79962	77.94665	97.18928	64.57998	73.94665	36.44165	172.5158	159.3564	35.24337	75.90947	50.27867	53.47544	57.26345	70.02262	68.94665
4	37.85	36.11667	268.713	0	117.4276	120.5776	255.9303	282.4165	107.4609	292.4222	309.123	280.8317	189.0338	174.4299	282.4006	301.0411	301.2159	300.9752	304.6548	317.9033	288.7687
5	246.8898	245.1564	221.1642	244.4231	0	41.68333	207.7414	234.7616	95.65964	244.4994	261.3424	233.8294	175.9013	161.0937	234.1711	253.2048	254.8258	254.07	257.6892	273.6772	241.1876
6	243.7398	242.0064	218.0142	241.2731	102.4763	0	204.5914	231.6116	92.50964	241.3494	258.1924	230.6793	172.7513	157.9437	231.0211	250.0548	251.6757	250.92	254.5392	270.5272	238.0376
7	38.11934	36.38601	17.42309	35.65267	88.80763	91.95762	0	41.66227	78.84096	47.54449	63.45917	34.71307	154.1422	141.597	32.18311	56.52222	48.82783	52.97618	56.81969	65.96314	45.43349
8	71.73098	69.99764	51.28251	69.26431	122.0516	125.2016	33.77352	0	112.085	47.81007	67.97157	68.42129	187.2522	175.262	50.62674	55.62674	84.68538	87.8152	91.48237	104.6154	42.62674
9	256.8564	255.1231	231.1308	254.3898	48.5	51.65	217.7081	244.7282	0	254.4661	271.3091	243.796	185.8679	171.0604	244.1377	263.1714	264.7924	264.0366	267.6558	283.6439	251.1542
10	85.09764	83.36431	64.64918	82.63098	133.0663	136.2163	47.14019	40.06977	123.0997	0	36.06977	81.78796	202.9434	187.9871	38.44341	43.44341	73.99751	76.01796	79.61134	110.543	31.06977
11	75.73097	73.99764	55.28251	73.26431	125.907	129.057	37.77352	30.7031	115.9403	74.48281	0	72.4213	191.2038	179.1583	76.04797	82.31646	87.51999	91.32376	95.17469	103.9943	69.39415
12	116.313	114.5797	88.09361	113.8463	125.3812	128.5312	79.85079	82.86342	115.4145	69.49676	78.86343	0	189.0224	174.8376	40.16033	80.84159	59.73512	51.48476	55.32593	112.2684	73.86343
13	314.9311	313.1977	290.1841	312.4644	156.2268	159.3768	278.2275	304.4334	146.2602	314.1844	330.8532	302.1223	0	212.3387	304.5251	322.7242	322.5809	322.275	325.9271	337.4432	310.307
14	338.5944	336.8611	313.8886	336.1277	179.8273	182.9773	301.8828	328.0738	169.8606	337.8357	354.4841	325.7743	99.97875	0	328.1801	346.3743	346.3403	345.9435	349.5927	361.127	333.978
15	76.16118	74.42785	50.11073	73.69451	94.14927	97.29926	39.4805	42.04184	84.1826	29.05338	38.42005	56.75031	165.4058	149.4698	0	38.88386	33.91741	36.12092	39.75353	57.82406	33.33679
16	92.73098	90.99765	72.28484	90.26431	128.2059	131.3559	54.77352	47.7031	118.2393	34.33644	43.7031	89.48057	196.8755	181.3078	31.7031	0	67.27979	69.28289	72.87794	103.8262	38.7031
17	99.3632	97.62988	68.33081	96.89654	107.9667	111.1167	62.37075	73.34605	98	59.55203	68.91771	71.70239	178.3031	162.5728	30.23347	70.83743	0	17.79053	23.08974	97.3068	63.92853
18	95.46764	93.7343	64.64555	93.00096	103.8763	107.0263	58.90024	69.30764	93.90962	55.57306	64.93906	67.56935	173.7672	158.1637	26.24754	66.84776	61.59067	0	17.5793	93.81693	59.94639
19	102.3684	100.6351	66.41624	99.90176	101.2631	104.4131	64.90073	67.9229	91.29645	54.55623	63.9229	66.27192	171.4971	155.5923	25.2198	65.84654	60.77564	62.82427	0	97.73768	58.9229
20	167.1447	165.4114	138.1929	164.6781	176.3582	179.5083	130.7317	141.7039	166.3916	127.7822	137.1479	140.6607	246.4292	231.0631	98.36997	138.9803	67.90827	85.69879	91.06162	0	132.1584
21	79.84131	78.10797	59.02081	77.37464	121.9539	125.1039	42.30269	35.28263	111.9872	37.62478	31.28062	74.65709	189.6685	176.4159	40.3688	45.44144	71.9214	74.7505	78.40726	101.2159	0
22	291.0801	289.3468	265.563	288.6135	114.2776	117.4276	252.7803	279.2665	104.3109	289.2722	305.973	277.6817	185.8838	171.2799	279.2506	297.8911	298.0659	297.8253	301.5048	314.7533	285.6187
23	290.7468	289.0135	265.2297	288.2801	113.9443	117.0943	252.447	278.9332	103.9776	288.9389	305.6396	277.3484	185.5505	170.9466	278.9173	297.5578	297.7325	297.4919	301.1714	314.42	285.2854
24	289.6968	287.9635	264.1797	287.2301	112.8943	116.0443	251.397	277.8832	102.9276	287.8889	304.5896	276.2984	184.5005	169.8966	277.8673	296.5078	296.6825	296.4419	300.1214	313.37	284.2354
25	121.2646	119.5312	78.50552	118.7979	119.649	122.799	84.82676	87.84003	109.6823	74.47337	83.84003	34.70584	181.3049	167.3045	45.13693	85.81896	64.84502	56.46003	60.29418	117.2456	78.84003
26	41.13333	39.4	36.68333	38.66667	97.25659	100.4066	115.483	114.63	87.28993	101.2633	110.63	73.35802	165.7673	151.8094	71.9267	112.5928	87.0152	90.15878	93.94678	106.7059	105.63
27	249.5398	247.8064	223.8142	247.0731	41.18333	44.33333	210.3914	237.4116	98.30964	247.1494	263.9924	236.4793	178.5513	163.7437	236.8211	255.8548	257.4757	256.72	260.3392	276.3272	243.8376
28	145.5706	143.8373	125.2035	143.1039	191.5849	194.7349	110.4082	144.2259	181.6183	128.9074	138.2716	142.6337	257.4767	245.9423	100.008	139.998	107.6464	109.0624	122.7624	169.2231	133.3072
29	71.73098	69.99764	51.28251	69.26431	122.0516	125.2017	33.77352	0	112.085	47.81007	67.97157	68.42129	187.2523	175.262	50.62674	55.62674	84.68537	87.81521	91.48237	104.6154	42.62674
30	123.5971	121.8637	101.5961	121.1304	168.3135	171.4635	87.48261	119.1068	158.3468	104.5204	113.8867	118.7711	234.6481	221.9395	75.72708	115.6526	86.36605	87.76295	99.48847	144.5779	108.8908
31	126.7059	124.9725	104.9223	124.2392	171.9662	175.1162	89.91944	121.462	161.9995	106.9166	116.2832	121.7671	238.2248	225.1513	78.05583	117.9836	87.13518	88.47472	101.3474	147.5058	111.2834
32	124.6111	122.8777	102.9632	122.1444	170.3589	173.5089	87.59542	119.1712	160.3922	104.3813	113.7484	119.8418	236.6919	223.2978	75.61468	115.5536	85.84016	87.11409	99.57173	145.6487	108.7451
33	124.6111	122.8777	102.9632	122.1444	170.3589	173.5089	87.59541	119.1712	160.3922	104.3813	113.7484	119.8418	236.6919	223.2978	75.61468	115.5536	85.84016	87.11407	99.57174	145.6487	108.7451

Table 4 (Skim Matrix Sample)

4.6.3. TRANSFERS

Another important aspect to users is the number of transfers required to get to their location. Each of the treatments simulated will not only be assessed based on the frequency and area covered but also the number of transfers. In figure23 we can see how many transfers are required to reach any given point from the Wodonga CBD. Green being one, yellow being two and red being 3 or more. No trip from any of the CBDs should take more than two trips.

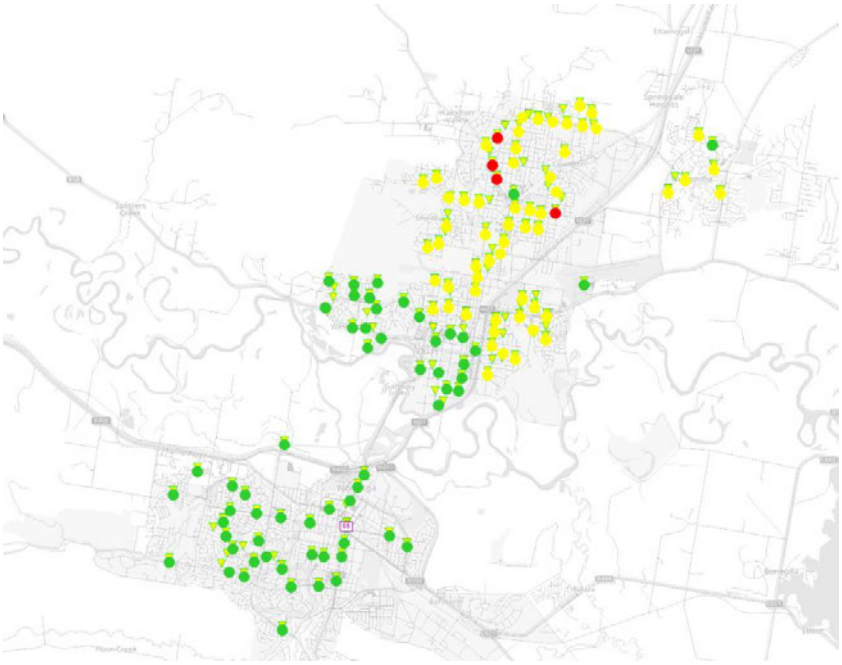


Figure 23 (Transfer numbers)

4.6.4. PUBLIC VS PRIVATE

A good comparison to help get an understanding of how bad the network is and set a benchmark to compare the solutions to is to compare the current public transport network to travelling from the same location via car. This will both iterate how bad the current network is along with giving a good comparison.

4.7. TREATMENTS

4.7.1. EXPRESS

A key option that I will be trialing in the model to analyze its success is an express route running through all the key points of Albury Wodonga. This will be uni-directional with a Bus starting at each end and travelling back and forth. In the Northern direction the services will be the Wodonga train station, La Trobe University. Birralee Shopping Centre, Central Wodonga, Albury Train Station, Central Albury, Central Lavington and Charles Sturt University. This service will not stop anywhere between these stops to ensure efficient and reliable service. This service provides both direct travel between key areas while also covering areas that are currently not serviced like the train stations and airports.

To do this bus stops will need to be added to the Wodonga trains station, Latrobe, Albury Train Station and the Albury Airport. The rest will utilise the current stops. Once these are added to the network a line route is inserted in both directions. After applying the private vehicle travel times multiplied by the 1.5 factor the travel times for this route are generated. One minute stop over times will be used for each stop which brings us to the total travel time. After applying the private vehicle travel times multiplied by the 1.5 factor the travel times for this route are generated. One minute stop over times will be used for each stop which brings us to the total travel time (figure 26)

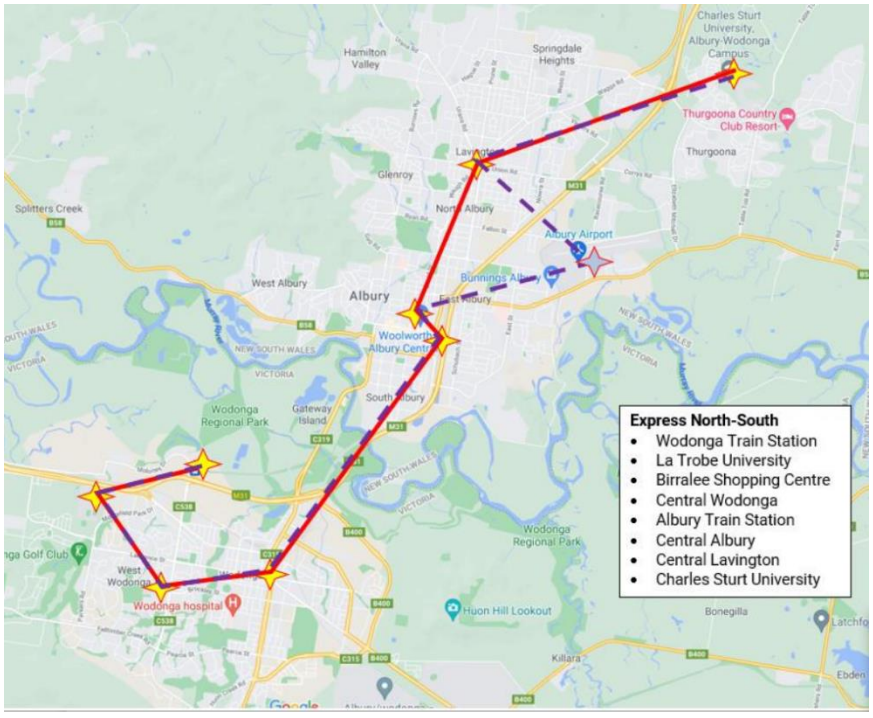


Figure 24 (Express Concept)

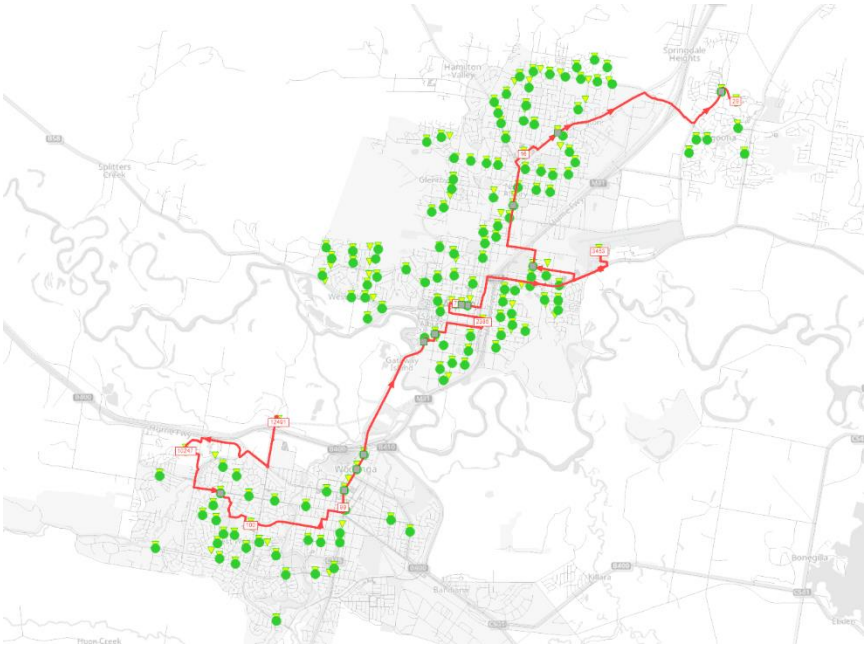


Figure 25 (Express Designed)

ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
12491			07:00:00	09:00:00	11:00:00	13:00:00	15:00:00	17:00:00
10247			07:13:00	09:13:00	11:13:00	13:13:00	15:13:00	17:13:00
51	369057	Gayview Dr And Lawrence S	|	|	|	|	|	|
101	36905	Birallee Shopping Centre	07:27:00	09:27:00	11:27:00	13:27:00	15:27:00	17:27:00
100	36902	Wodonga Water Tower, Hig	07:35:30	09:35:30	11:35:30	13:35:30	15:35:30	17:35:30
199	369022	130 High St	|	|	|	|	|	|
197	369024	44 High St	|	|	|	|	|	|
145	369023	10 High St	|	|	|	|	|	|
167	264023	Australia Park, Wodonga Pl	|	|	|	|	|	|
125	264084	Townsend St After Ebden St	|	|	|	|	|	|
2385			07:50:30	09:50:30	11:50:30	13:50:30	15:50:30	17:50:30
7	26403	QEII Square, Dean St	08:05:00	10:05:00	12:05:00	14:05:00	16:05:00	18:05:00
58	264065	Dean St Before Olive St	|	|	|	|	|	|
27	264019	Dean St Before David St	|	|	|	|	|	|
3453			08:19:30	10:19:30	12:19:30	14:19:30	16:19:30	18:19:30
155	264053	Ian Barker Fields, Keene St	|	|	|	|	|	|
13	2640118	Mate St Opp Curlew Cres	|	|	|	|	|	|
16	26411	Lavington Square, Griffith St	08:35:30	10:35:30	12:35:30	14:35:30	16:35:30	18:35:30
228	264137	Wagga Rd At McDonald Rd	|	|	|	|	|	|
212	2640160	Elizabeth Mitchell Dr Before	|	|	|	|	|	|
29	264011	Charles Sturt University	08:50:30	10:50:30	12:50:30	14:50:30	16:50:30	18:50:30

Figure 26 (Express Timetabled)

4.7.2. THURGOONA LOOP

All the future growth in Albury is out towards Thurgoona, as seen in figure 27 you can see that all the designated land for development is in this direction, and it currently has no public transport access. At a minimum the development that is currently completed should have access to public transport. Running a simple bus service out and around Kerr Road should service allot of this area.

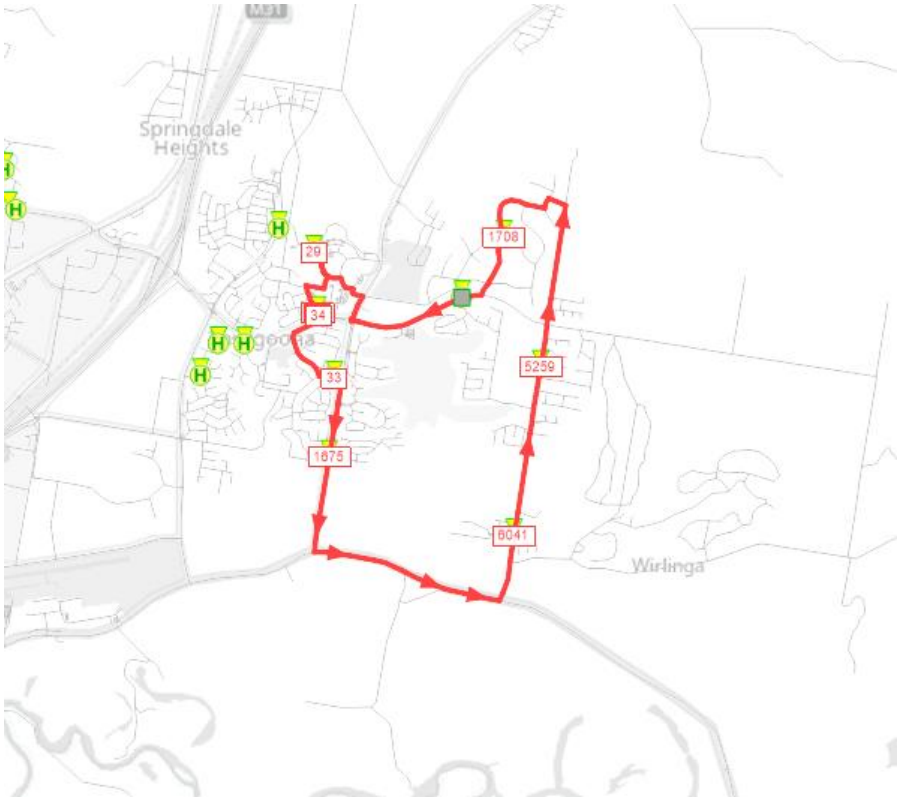


Figure 27 (Thurgoona loop design)

4.7.3. BANDIANA LOOP

Another known growth area is in Wodonga heading out to Bandiana. This new area has been in development for years and still does not see any bus services apart from school buses in the area. This area requires at least one potentially two bus services to cover the area and be included in the public transport catchment area.

4.7.4. NETWORK REDESIGN

After sampling some realistic smaller solutions and ensuring the software works as intended an entire re design of the network was done to see what would be needed to see a real significant difference. This redesign will run off the idea of the express route but instead all other services will run loops off of this servicing each area of Albury Wodonga. This will be tested at different frequencies to get an understanding of what would be needed to get people to their location at a far more reasonable travel time. With this we can find how many extra services would be needed and estimate a cost for the complete overhaul. Comparing this with our other solutions will help decide if it is justifiable.

A simplified version of this was created going only to the Wodonga, Albury, Lavington and Thurgoona CBDs. To make this an effective system these need to be running at least every half an hour

Timetables applied are attached as appendix E.

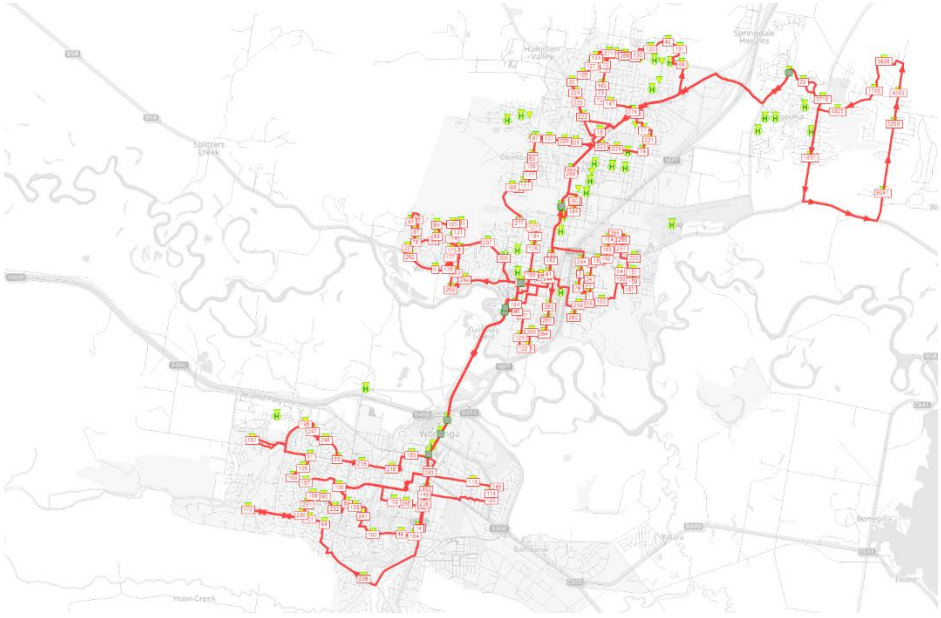


Figure 28 (Redesign Plan)

5. RESULTS

With the model up and running I was able to start creating and comparing some scenarios. Using isochrones as a visual method to see the changes in both travel times and access I was able to test all the mentioned changes and treatments to see their effects on the network and analyse their success. Along with this these results will be compared in matrices based on travel time to different zones to get some data on how much better the new service is or is not preforming. Public transport efficiency results can be compared in varying ways so using the isochrones to analyse case by case results along with using the matrices as a calculation method to get an understanding of the whole network at every point of the day. The mixture of these two will give us enough information to gather results to then be analysed later.

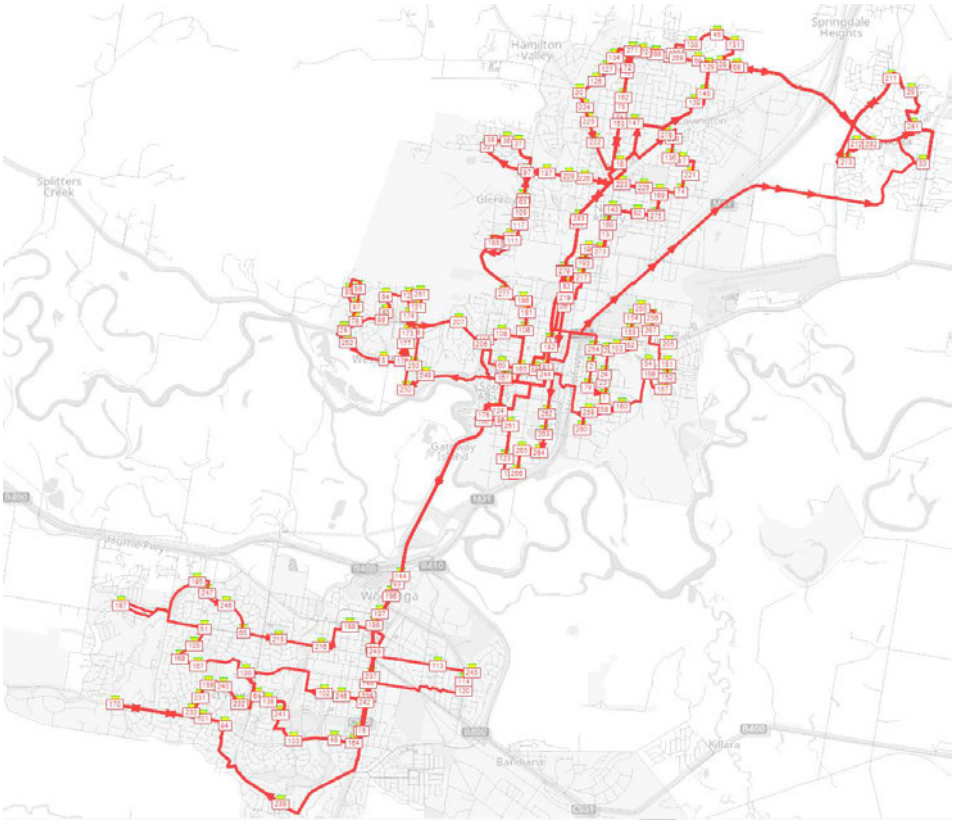


Figure 29 (Albury Wodonga Public Transport Model)

5.1. PRIVATE VS PUBLIC

At 5pm on any given day the travel time between private vehicle and public transport were tested. In figure 30. you can see the travel times from the Albury CBD via private vehicle. Travel from here to almost anywhere in Albury Wodonga can be done under 15 minutes via private vehicle even in peak hour travel. From the same spot at the same time, you can see in figure 31 the same map but for public transport. This time also closely lines up with a bus service departing that location and the results are still heavily in favour of cars. This information supports our understanding and research into to why so many people continue to travel via car.

It was found that the average travel time via public transport in Albury Wodonga was 2 hours and 23 minutes. This number is higher than what you would consider in the real world as it does not take into consideration that some stops being close to each other but on different networks would be far quicker to walk to. These came from the travel matrix output for travel times between all the stops in the network. This figure will help guide the success of the other outputs.

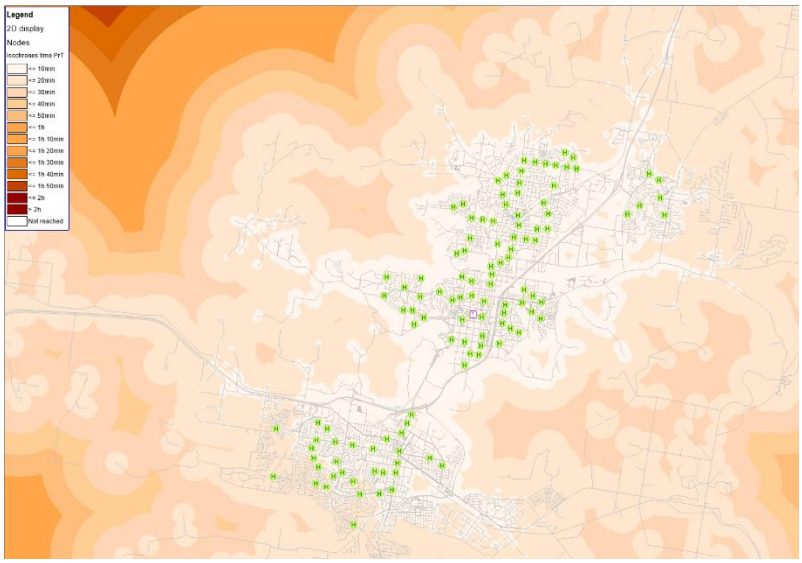
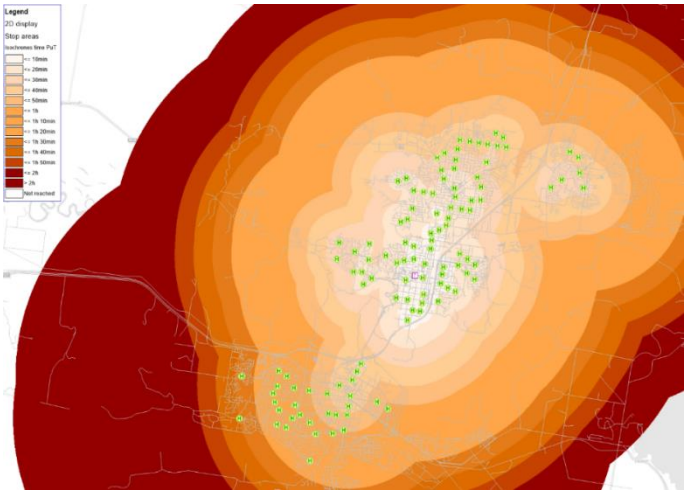


Figure 30 (Private Vehicle Isochrone)

Figure 31 (Public Transport Isochrone)



5.2. EXPRESS

When modelled with the required travel times it was shown that it would take 1 hour and 50 minutes to travel the designated express route. Meaning there would be about a 2-hour frequency in each direction. This was then trailed with both 1 hour, and 30-minute frequencies. This resulted in four and then eight services to be running at once to facilitate. Eight services are way too much outlay for one route and wouldn't see the required return so a four service, one hour frequency express route was decided on. To help compare the success of this express route three of the five case studies that were used were tested as they provide a wide spread of locations and times. As you can see from a connectivity standpoint the outer areas on each of these scenarios are now far more connected then previously. Although I had expected to see improvements on travel times to the central areas, but these only improved slightly. This is due to the fact the current network is not set up around the express network so apart from users travelling directly along the express route or travelling to one of the places no other bus route services they are not going to see much benefit.

Case A

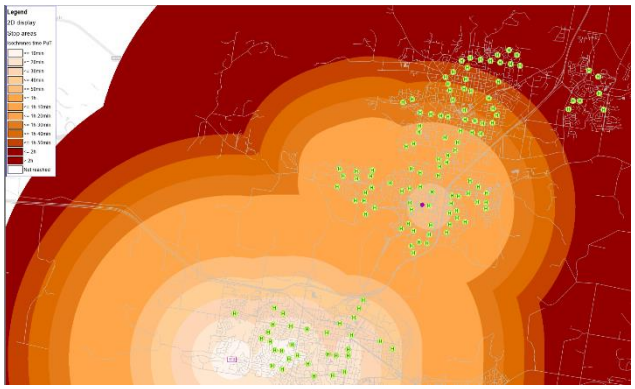


Figure 32 (Case A Current Network)

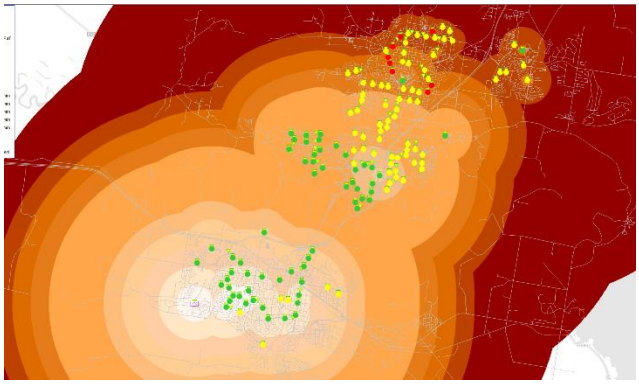


Figure 33 (Case A Express Network)

Case C

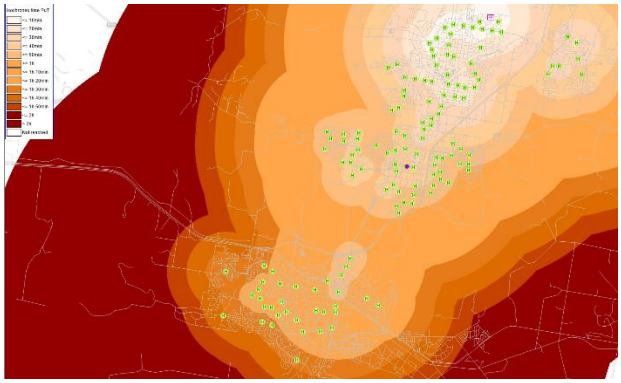


Figure 34 (Case C Current Network)

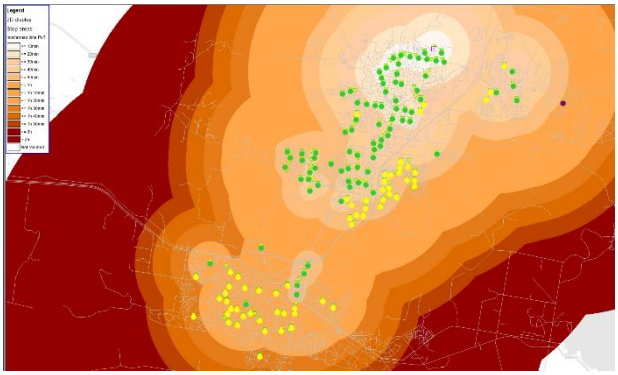


Figure 35 (Case C Express Network)

Case E

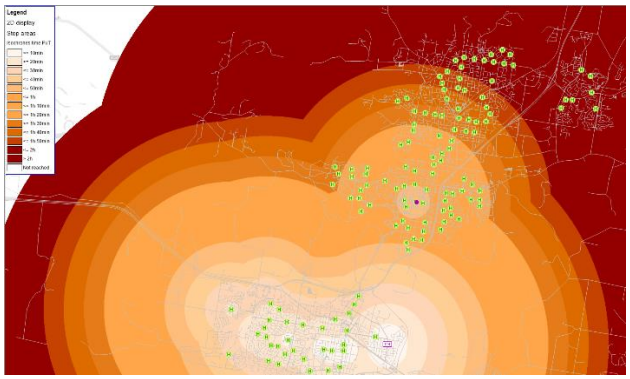


Figure 36 (Case E Current Network)

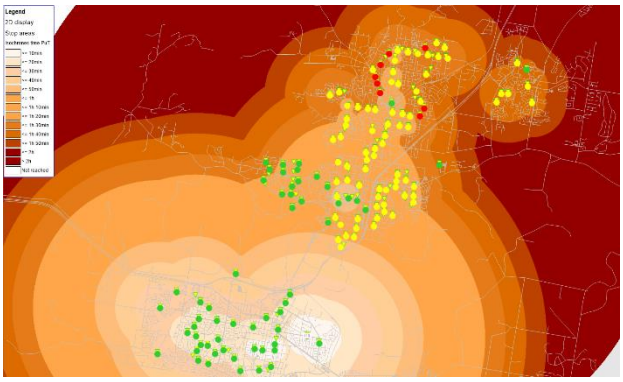


Figure 37 (Express Network)

On average the express service decreased travel times by 23 minutes. Although this is only a minor decrease it was found that travel times to the CBDs were found to have decreased on average by 42 minutes. This being an average across the day shows that the times analysed did not sit well with the isochrone assessments.

5.3. NETWORK REDESIGN

Due to the results of the express route not seeing the improvements on the wider network that I was hoping for it was clear an entire network remodel was required. An express network is still an effective way to service a sprawling town like this so that will be the basis of what the redesign works around. One of the problems with the express route previously designed, although it worked well to service key areas it was far too long. As seen in figure 38. the redesign did show some improvements to the network.

Due to limitations on time, I was only able to have one real attempt at remodelling the network. This is a very time-consuming process with a huge amount of room for refinement, but as an early stage redesign the results were promising.

This early stage re design had already found a decrease on average travel time of 32 minutes. I believe with further refinement this could easily reach 1 hour average travel time. This meant there was a 22% improvement on travel times which again could be improved upon dramatically. Relying on transfers onto the express network increased the average number of transfers required but this trade-off is justified with the improvements in travel times. The stop overs between stops should be no longer than 15 minutes in the way this network was designed.

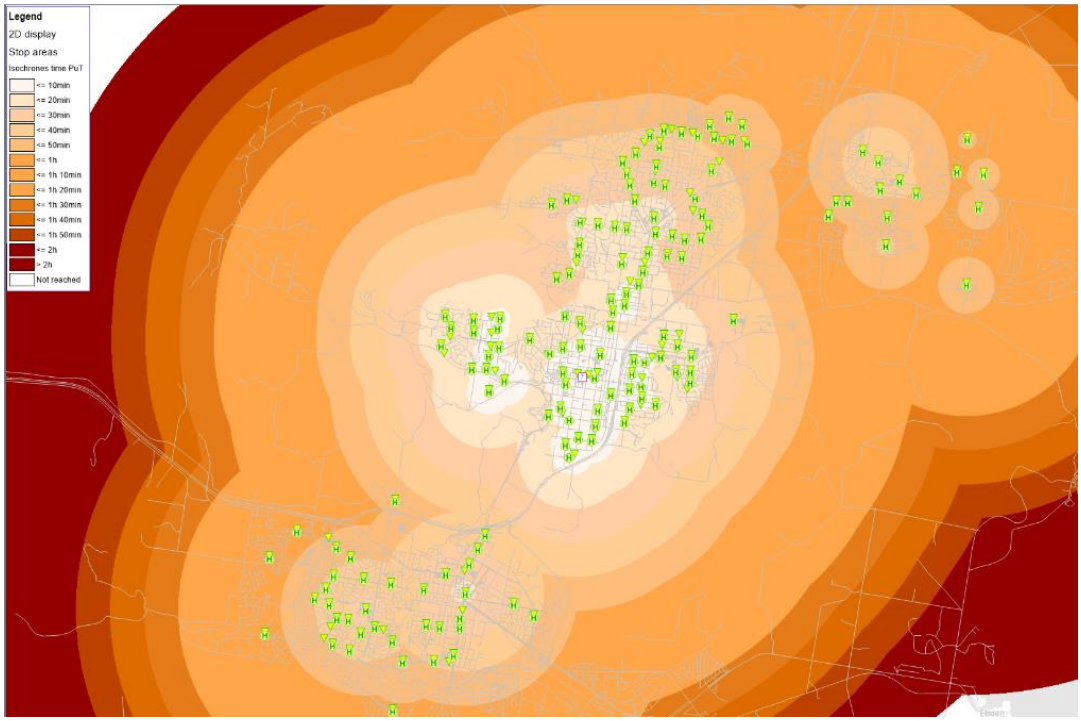


Figure 38 (Network Redesign)

5.4. THURGOONA LOOP

The results for the Thurgoona loop were as expected with the increased area covered allowing public transport users access to these locations with the requirement of excessive walking therefore as seen in figure… the travel times from these outer areas of Thurgoona have decreased. Previously there was no access to Albury or Wodonga from Kerr Rd which is a major development area but with the addition of one more service all that area of Thurgoona is now included. This service has been applied to the current network and is not included with the express network. I believe if it was modelled with the express network in place, we would see far quicker travel times to Albury CBD and reasonable travel times to Wodonga.

The same results were seen for the inclusion of services to Bandiana.

Figure 39 (Kerr Rd Standard)

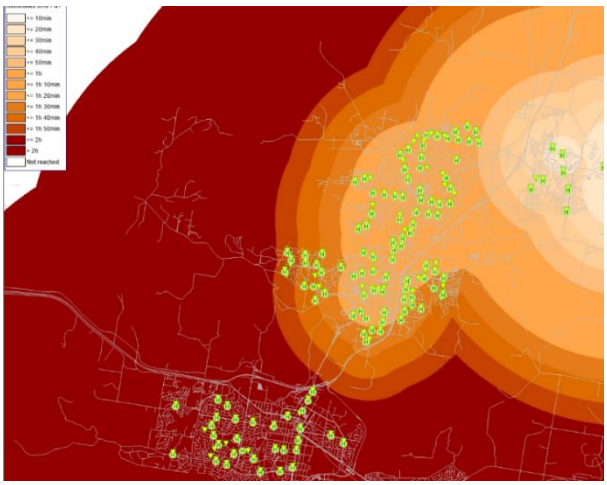


Figure 40 (Kerr Rd Loop)

6. DISCUSSION

The results found were not as big of improvements as I was hoping for, but there were defiantly some promising signs for the future of this research.

When analysing the current bus network, it was found to be accurate to the findings of the real-world case studies. Instantly, you could see the visual representation of all the problems noted in the research so far, making it further clear that the issues mentioned are real. To gauge how bad this is, comparing it to the private vehicle again reinforced my findings that they aren't even comparable. Why would anyone choose public transport over private in this situation? My goal from seeing this was to try and bridge the gap as much as possible.

The express service is something that Albury Wodonga would defiantly consider integrating if the inconsistencies between the two states could be resolved. This service is the easiest fix for the lack of connectivity between the CBDs while also incorporating the lack of service to those key areas. Initially with the idea of the service running bidirectional with a bus starting at each end made sense. Once it was modelled it was found that services would only run every two hours, which is not enough for an express service. This was then brought down to 1 hour with the use of 4 vehicles. It would be great for the frequency to be even less but as the quick fix option anything more than 4 services is unrealistic. When looking at the results of this being modelled into the system it wasn't as much of

After testing various changes and only seeing small results it came clear to me that the network had been neglected for so long that these fixes just weren't going to be suitable. An entire network redesign being the only option I based

The results of adding service loops to the key growth areas that are currently serviced were as expected. It increased the catchment areas by large amount which was impressive with only two services needed to improve this area as you can see the area reached is far greater. These areas being serviced are essential to increasing ridership as people cannot use the bus network if they do not have any form of access to it in the first place.

The network redesign is still in its early stages of development. Although the routes are in place and timetables and travel times have been assigned there is allot that could go into adjusting and refining the system to see greater improvements. These include improving catchment areas, increased efficient in-service locations, improved timetabling and more. All of these things need to be refined to see any real improvements over what was seen in the results. I see these results as promising that we were already seeing big improvements to

travel times at an early stage of development. A properly refined redesign could begin to see even far better results from 22% to potentially up to 40% decreases in travel times. These results are all guided and work towards what was found important to the user which is access and frequency. With far greater access and increased frequency of services to minimise travel times we should see higher levels of ridership. This is based on previous research that stated by improving these things people will begin to use the system.

Although all those results are positive for the future of public transport in Albury Wodonga and it is clear that there is a range of options that could be implemented and see instant improvements. Even the network redesign seeing the best improvements to the overall network the concern is that the public transport in figure 41 are still nowhere near the travel times of private vehicles seen in figure 42. Although it is not expected that public transport should be faster than private vehicles the discrepancies seen between these two transport types along with the large amounts of free parking available, public transport just isn't seen as a viable choice for most users in Albury Wodonga. This does not mean nothing should be done, but improving the network is just the first step needed in getting high levels of ridership in Albury Wodonga.

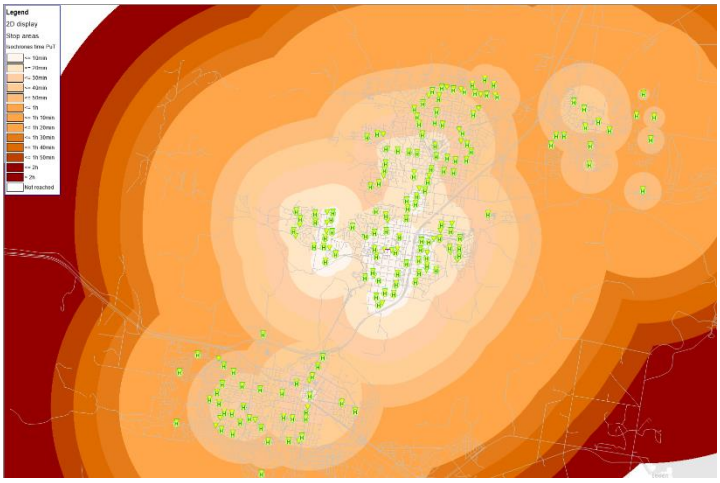


Figure 41 (Network Redesign)

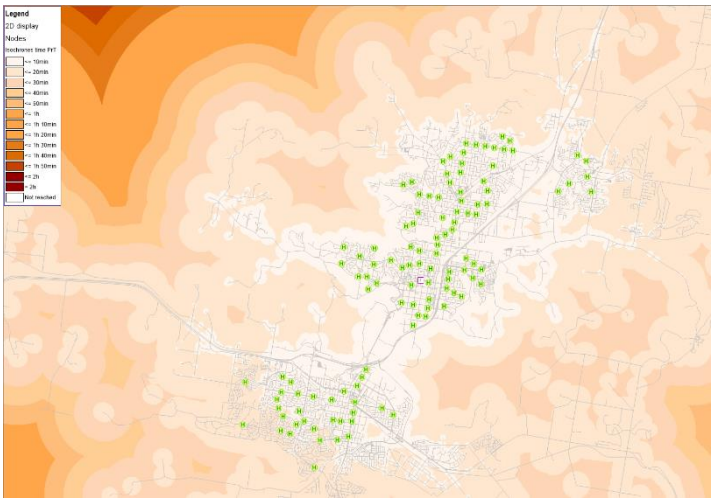


Figure 42 (Private Vehicle Isochrone)

7. CONCLUSION

Albury Wodonga public transport network is far below what is considered a functional system. It's lack of access to key areas and travel times makes it only applicable to those who do not have availability to a private vehicle. Along with this lack of access being in mostly disadvantaged areas the bus network does not service the requirements of Albury Wodonga. It has been found to take on average 5 times longer to travel by bus then PT.

Many other issues were found with the public transport network but since research found users mostly care about access and frequency that is what was considered a priority in this research project.

To do this PTV Visum was used to model and analyse the current network. This method of macro analyses allowed us to review the network as a whole and see the effects certain changes had on the entire traffic network. Firstly, it supported findings that the current network is well below standard and showed similar travel times and results as what was found in the case studies. All the solutions trialled found positive results with varying levels of success.

The main outtake from these trials is that if Albury Wodonga was to ever compete with private transport, they would require a complete redesign with far more services running then what is currently available. But in the meantime, there is a bunch of solutions that can be considered at a far lower cost that will see good benefits to the community.

8. FUTURE WORK

For future works I would like to continue to develop and refine the model. There is far more that can be done with this model with more advanced knowledge. One of these being advanced assignments where you can simulate riders' decision-making and the model will have people travel by car, bus, or bike. So part of this will be developing a model for active transport, this will include needing to add all shared paths along with bicycle lanes and other aspects affecting active transport.

I'd also like to continue developing a new bus network in this more refined model to eventually present to Albury City as a viable solution. This solution most likely be a further developed version of the redesign I have completed in this research task that is based around an express service just with far more time to get it right. Once this is fully developed, I'd also like to share all my learning and knowledge with Wodonga Council as they have already shown interest in what I'm doing.

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10. APPENDIX

10.1. APPENDIX A

ENG4111/4112 Research Project

Project Specification

For: Patrick Quinlivan

Title: Public Transport access and vulnerability in Albury Wodonga

Major: Civil

Supervisors: Paula Grant

Enrollment: ENG4111 – EXT S1, 2021

ENG4112 – EXT S2, 2021

Project Aim

To research and evaluate Albury and Wodonga's Public Transport system that is currently reliant on buses and come to a solution to get people utilising the system.

Programme : Version 1, 10/04/2021

1. Conduct a full literature review into public transport almost entirely focused on buses. Identify existing knowledge gaps and types of public transport and how to get people to best utilise the public transport systems. Where should be serviced and how often. How to get people who currently don't use public transport using it. Will redoing the entire system get people using it or are there more underlying issues that need to be solved.
2. Review existing reports, social media polls and work already done by Albury and Wodonga councils to collect data. Identify the case study area, how the current system works and note all of the shortcomings. Some of these problems already noted include;

- 3 separate systems
- Cross-border discrepancies
- Lengthy wait times/route times not aligning
- Lack of payment options
- The routes not servicing areas that would actually use them

(disabled/elderly/youth/low socioeconomic)

- Inconvenient service times

3. Conduct benchmarking research into other regional councils, similar in size and population to ascertain how they deal with similar public transport problems. Identify a best practice framework for public transport against which I can formulate, analyse and assess the proposed solutions arising from this research.
4. Identify the problems and what I will need to do to fill those gaps in research that will be needed to come to final solution.
5. Data collection for what the community is after like Facebook polls.
6. Identify potential solutions that need to be integrated to overcome identified problems.
7. Prepare a draft program to solve problems. With a system like this many iterations will need to be worked through before a final solution can be presented. All options will need to be considered.
8. Evaluate the effectiveness of the final solution believed to be against an identified framework for best practice public transport systems in a regional setting. How will it effect Albury and Wodonga's network and will it ease congestion with more people using public transport.

10.2. APPENDIX B

Route 960 – operating between Lake Albert and Charles Sturt University

• Route 960 has been combined with Route 967 to provide a more direct service and reduced travel times for customers travelling from Lake Albert and Kooringal to Wagga CBD and university.

• Services via Tatton, previously provided on Route 960, will now be provided on new Route 969. Customers from Tatton can transfer between new Route 969 and Route 960 at Lakeside Drive and

Lake Albert Rd bus interchange. Railway Street – changes

• Route 960 will no longer operate along Railway St. This trip will now be made by new Route 969 which will operate along Railway St during morning and afternoon school periods between 8 – 9am, and 3 – 4pm

• Customers on Railway St can use the new Route 969 at Coleman St.

Red Hill Road – Changes

• Route 960 will no longer operate along the 1km section of Red Hill Road between Tamar Drive and Lake Albert Road. Currently, there is no bus stop on this section of Red Hill Road.

• Customers near Red Hill Road between Tamar Drive and Plumpton Road can hail and ride on Route 960 via Lake Albert Rd or new Route 969 at either Lansdowne Avenue or Tamar Drive. The walking distance for hail and ride services is approximately 400m to 700m.

Route 969 – Tatton and Central Wagga via TAFE and Botanic Gardens

• Introducing new Route 969 which provides 140 new weekly services between Tatton and Central Wagga via the TAFE and Botanic Gardens.

• Customers in Tatton will have direct services to Kooringal Mall on morning and afternoon school periods only between 8 – 9am, and 3 – 4pm. Alternatively, Tatton customers can use new Route 969 towards Lake Albert to transfer to Route 960 at Lakeside Drive and Lake Albert Rd.

Route 966 – Central Wagga and Estella Rise

• Routes 964, 966 and 968 have been consolidated into new route number 966 which provides improved services to the new residential community at Estella Rise.

• Services will operate every two hours, seven days a week, instead of the three services on weekdays.

How many services go to Charles Sturt University?

• Route 960 will provide over 60 extra weekly services to CSU, increasing the frequency of weekday services from every two hours to every hour.

Will there be direct services to TAFE?

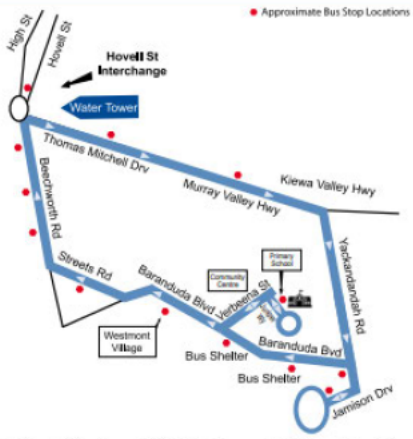
• Customers from Tatton, Tolland, Mount Austin and Turvey Park will have direct services to TAFE on Route 969.

• Alternatively, customers can travel towards Wagga Court House and interchange for connecting services to TAFE on Route 969.

• Customers will also have the option of walking to TAFE from Central Wagga

10.3. APPENDIX C

Baranduda (B)



Route: Depart Water Tower in High St via Thomas Mitchell Drv, Kiewa Valley Hwy, Yackandandah Rd, Jamison Drv, Yackandandah Rd, Baranduda Bvd, Verbeena St, **Baranduda Primary**, Verbeena St, Baranduda Blvd, Kinchington Rd, Streets Rd, Beechworth Rd, Hovell St Interchange.

Baranduda (B) – Monday to Friday

High St	Jamison Drv	Baranduda Primary	Streets Rd	Hovell St
7:30	7:42	7:45	7:55	8:00*
NS	8:57	9:00	9:10	9:15*
10:45	10:57	11:00	11:10	11:15*
1:15	1:27	1:30	1:40	1:45
3:15	** 3:40	3:35	NS	4:00
5:45	5:57	6:00	6:10	6:15*

*These services have a direct connection at Hovell St to Albury
**School Holiday Timetable changes:
8:45am High St then as per timetable
3:27pm Jamieson, 3:30pm Baranduda Primary School, 3:45pm Hovell St

Mayfair(M)

Route: Depart Water Tower High St via Lawrence St, Smythe St, **Centro Wodonga**, Elgin Bvd, Melbourne Rd, Melrose Drv, right Lawrence St, Campaspe St, Mayfair Drv, left Lawrence St, right Melrose Drv, **Birallee**, Brockley St, Charles St, Wilson St, **Wodonga Hospital**, Lindsay St, right Brockley St, Beechworth Rd, Hovell St.

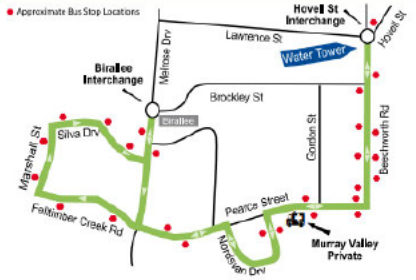
Mayfair (M) – Monday to Friday

All services run via Hospital and Centro Wodonga. All services, except 4:15, 5:15, 6:20 have a direct connection to Albury from Hovell St.

Water Tower High St	Centro	Mayfair Shops	Birallee	Wodonga Hospital	Water Tower Hovell St
NS	NS	7:48	7:40**	NS	8:00
8:45	NS	9:08	9:00**	NS	9:15
9:15	9:20	9:25	9:30	9:40	9:45*
10:15	10:20	10:25	10:30	10:40	10:45*
11:15	11:20	11:25	11:30	11:40	11:45*
12:45	12:50	12:55	1:00	1:10	1:15*
2:15	2:20	2:25	2:30	2:40	2:45
4:15	4:20	4:25	#4:35	4:40	4:45
4:45	5:10	5:08	5:00**	4:50	5:15
5:15	NS	5:38	5:30**	NS	5:45
5:45	NS	6:10	6:00	NS	6:15
6:20	NS	6:35	6:30	NS	6:40

*These services travel directly to Albury
**These services travel to Birallee before Mayfair Shops
#Change buses at Birallee for Albury Service

Federation (F)



Route: Depart Water Tower High St via Beechworth Rd, Pearce St, left Nordsvan Drv, **M.V. Hospital**, right Nordsvan Drv, left Pearce St, Feltimber Creek Rd, Marshall St, Silva Drv, left Melrose Drv, **Birallee**, right Melrose Drv, left Pearce St, Beechworth Rd, Hovell St.

Federation (F) – Monday to Friday

All services except 3:15, 4:15, 5:15 and 6:20 have a direct connection to Albury from Hovell Street

Water Tower High St	Murray Valley Hosp.	Fed Park Shops	Birallee	Pearce St Bus Shelter	Water Tower Hovell St
6:50	NS	6:55	6:58	7:00	7:05*
7:30	7:40	7:45	7:50	7:55	8:00*
9:15	9:20	9:23	9:30	9:38	9:45
10:15	10:20	10:23	10:30	10:38	10:45
11:15	11:20	11:23	11:30	11:38	11:45
12:15	12:20	12:23	12:30	12:38	12:45
1:15	1:20	1:23	1:30	1:38	1:45*
2:15	2:20	2:23	2:30	2:38	2:45*
3:15**	NS	3:23	3:30	NS	3:40*
4:15	4:20	4:23	#4:35	4:38	4:45
4:45	4:50	4:53	5:00	5:08	5:15
5:15	5:20	5:25	5:30	NS	5:45
5:45	NS	5:55	6:05	6:10	6:15
6:20	6:25	6:28	6:30	NS	6:40

*These services travel directly to Albury
**This service travels to Birallee then down Brockley St
#Change buses at Birallee for Albury Service

TAFE – Via Plaza (T)

Route: Depart Water Tower in High St, Lawrence St, Smythe St, **Centro Wodonga**, Elgin Bvd, Melbourne Rd, Moorefield Park Drive, McKoy St, **TAFE and LaTrobe Uni**, McKoy St, right Romet Rd, Moorefield Park Drv, Parkers Rd, Lawrence St, right Melrose Drv, **Birallee**, left Melrose Drv, right Melbourne Rd, right Watson St, left Stanley St, left Smythe St, **Centro Wodonga**, U-Turn at round-a-bout, left Lawrence, Hovell St Interchange.

TAFE – Via Centro Wodonga (T) – Monday to Friday

High St	Centro	Tafe	Birallee	Centro	Hovell St
8:15	8:20	8:25	NS	NS	8:45
9:45	9:50	9:55	10:05	10:10	10:15
12:15	12:20	12:25	12:35	12:40	12:45*
2:00	2:05	2:10	2:20	2:25	2:30*
NS	NS	4:15	4:35***	Travel to Albury	
5:15	5:20	5:25**	NS	NS	5:45

*These services have a direct service to Albury
**This service connects to Albury at the Continuing Education Centre
***This service travels directly to Albury via Gayview and Hume Freeway

South Wodonga (S)

Route: Depart Water Tower in High St via Beechworth Rd, Brockley St, Gordon St, Pearch St, right Beechworth Rd, Huon Creek Rd, Sans Souci Drv, Beechworth Rd, Balmoral Drv, Scarborough Drv, Beechworth Rd, Victoria Cross Pde, Thomas Mitchell Drv, Hovell St.

South Wodonga (S) - Monday to Friday

High St	Sans Souci Drv	Whitebox Rise	Hovell St
NS	7:30	NS	7:40*
8:00	8:05	NS	8:15**
9:00	9:05	9:10	9:15**
9:30	9:35	9:40	9:45**
10:30	10:35	10:40	10:45**
12:00	12:05	12:10	12:15**
1:45	1:50	1:55	2:00
2:45	2:50	2:55	3:00
4:00	4:05	4:10	4:15
4:45	4:50	4:55	5:00
5:15	5:20	5:25	5:30*
5:45	5:50	NS	6:15

* These services have a direct service to Albury

** These services have a direct connection at Hovell St with a bus to Albury

Cambourne (C)

Route: Depart Birallee via Hedgerow Crt, Sketch St, Emerald Ave, Marshall St, Stevenson Street, Feltimber Creek Rd, Chifley St, Menzies St, Ballara Drv, Jevington Drv, Avondale Drv, Clarendon Ave, Yarralumla Drv, Huon Creek Rd, Beechworth Rd, Hovell St Interchange.

Cambourne (C) – Monday to Friday

Birallee	Chifley St	Huon Crk Rd	Hovell St
9:00	9:04	9:12	9:15
9:30	9:34	9:42	9:45
10:30	10:34	10:42	10:45
11:30	11:34	11:42	11:45
2:00	2:04	2:12	2:15
3:00	3:04	3:12	3:15
5:00	5:04	5:12	5:15
Drop Only	5:46	5:54	6:15

All services have a direct connection at Hovell St with a bus to Albury

Wodonga to Albury / Albury to Wodonga Monday - Friday

Wodonga To Albury Route: Depart Water Tower in Hovell St, South St, High St, Lincoln Causeway, Wodonga Place, **Kmart** Smollet St, David St, Dean St

Albury To Wodonga Route: Depart Dean & David Sts, Townsend St, Smollet St, Wodonga Place, Gateway Village, Lincoln Causeway, High St Water Tower Interchange.

Wodonga To Albury		Albury Connections	Albury To Wodonga		Wodonga Connections
Hovell St	Dean St		Dean St	High St	
7:05	7:20	EA	7:20	7:30	F
7:40	7:50		7:55	8:15	T
8:00	8:10		8:15	8:30	
8:20	8:35		8:35	8:50	
9:15	9:30	EA	9:00	9:15	C, F, E, S^, M
9:45	10:00	WA, SA	9:30	9:45	G, T, WS, WO
10:15	10:30	EA	10:00	10:15	C, F, E, S^, M
10:45	11:00	WA	10:30	10:45	G, B, WS, WO
11:15	11:30	EA	11:00	11:15	C, F, M
11:45	12:00	WA	11:30	11:45	G, E, S^, WS, WO
12:15	12:30		12:00	12:15	F, T
12:45	1:00	WA	12:30	12:45	M, E^
1:15	1:30	EA	1:00	1:15	F, B
1:45	2:00	WA	1:30	1:45	C, G, T^
2:15	2:30	EA	2:00	2:15	F, WS, E^, M, WO
2:30	2:45	SA	2:30	2:45	C, G, S
2:45	3:00		3:00	3:15	B, F
3:15	3:30		3:45	4:00	S
3:40	3:55		4:00	4:15	F, G, M, WO
4:15	4:30		4:30	4:45	F, G, S, E^
5:15	5:30		5:00	5:15	T, S, F, G
5:30	5:45	EA, SA	5:30	5:45	C, F, G, S, M, E, B
6:15	6:30		6:05	6:20	F, G
			6:30	6:45	

^These services have a 15 minute wait at High St

West Albury (WA)

Route: Departs corner Dean & David St, Dean St, Townsend St, Smollett St, Padman Drive, Day St, Solomon St, Padman Drive, Hill St, Spurway Drive, Pemberton St, Jacaranda St, Kurrajong Cres, Jacaranda St, Banksia St, Warrenlee Drv, Glendale Ave, Rosedale Drive, Pemberton St, Somerset Drv, Doulton Drv, Johnson Rd, Klnberg Rd, Greentree Way, Somerset Drv, Pemberton St, **Private Hospital**, Padman Drive, Mott St, Pemberton St, Thurgoona St, Dean St, Wodonga Pl, Smollett St, Townsend St, Dean St, or David St.

West Albury (WA) – Monday to Saturday

David St	Banksia St	Albury Private Hospital	QEII Square
		Weekdays	
Part Service	7:45	NS	8:05
9:00	9:08	9:15	9:30*
10:00	10:08	10:15	10:30
11:00	11:08	11:15	11:30
12:00	12:08	12:15	12:30*
1:00	1:08	1:15	1:30
2:00	2:08	2:15	2:30
4:15	4:23	4:30	4:45
5:15	5:23	5:30	5:45
		Saturdays	
8:45	8:53	9:00	9:15
10:00	10:08	10:15	10:30
11:45	11:53	12:00	12:15
1:00	1:08	1:15	1:30

*This service will follow red route.

Wodonga/Albury Saturday (160)

Route: Depart High Street, Lawrence St East, De Kerilleau Drv, Chapple St, Thomas Mitchell Drv, Brockley St, Beechworth Rd, Wilson St, **Hospital**, Lindsay St, Brockley St, **Birallee**, Hedgerow Crt, Skitch St, Emerald Ave, Marshall St, Gayview Drv, Lawrence St, Parkers Rd, Drages Rd, Oakmont Circ, Iron Way, Drages Rd, Moorefield Park Drv, Mayfair Drv, Lawrence St, Smyth St, **Centro Wodonga**, u-turn at round-a-bout, Lawrence St, Hovell St Interchange, Wodonga to Albury

Wodonga/Albury Saturday (160)

High St	Birallee	Oakmont	Hovell St	Dean St	High St
8:30	8:40	8:50	9:00	9:15	9:30
9:30	9:40	9:50	10:00	10:15	10:30
10:30	10:40	10:50	11:00	11:15	11:30
11:30	11:40	11:50	12:00	12:15	12:30
12:30	12:40	12:50	1:00	1:15	1:30
1:30	1:40	1:50	2:00	2:15	2:30
3:30	3:40	3:50	4:00	4:15	4:30

Western Park, Oakmont & TAFE (O)

Route: Depart **Birallee**, Melrose Drv, Melbourne Rd, Moorefield Park Rd, McKoy St, **Tafe and LaTrobe Uni**, McKoy St, Romet Rd, right Moorefield Park Rd, Parkers Rd, Feltimber Creek Rd, Brewer Drv, Dalton Ave, Shannon Ave, Willoughby Ave, Innisbrook Ave, Firestone Way, Oakmont Circuit, Iron Way, Drages Rd, left Moorefield Park Rd, rear **TAFE**, right Mayfair Drv, Lawrence St, Melrose Drv, **Birallee.**

Western Park Oakmont (O) – Monday to Friday

Birallee	TAFE	Western Park	Oakmont	Rear TAFE	Birallee
NS	NS	7:25	7:30	NS	7:40
9:00	9:05	9:15	9:22	9:24	9:30
10:00	10:05	10:15	10:22	10:24	10:30
11:00	11:05	11:15	11:22	11:24	11:30
1:30	1:35	1:45	1:52	1:54	2:00
2:30	2:35	2:45	2:52	2:54	3:00
4:35	NS	4:45	4:52	4:54	5:00
NS	NS	NS	6:05	6:07	5:55 **

All services connect at Birallee to Hovell St and Albury

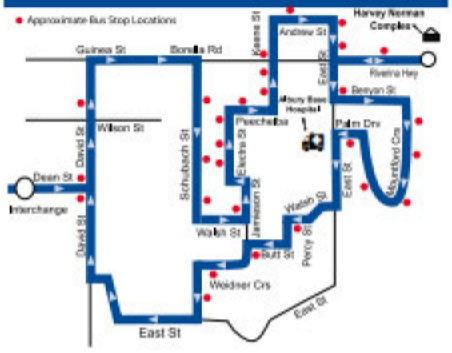
** This service operates in reverse and terminates at Hovell St.

Wodonga/Albury Saturday (150)

Route: Depart Water Tower High St, Beechworth Rd, San Souci Dry, Huon Creek Rd, Yarralumla Blvd, Felltimber Creek Rd, Brewer Dry, Dalton Ave, Keogh St, Willoughby Ave, Brewer Dry, Felltimber Creek Rd, Marshall St, Silva Dry, Melrose Dry, **Birallee**, Melrose Dry, McFarland Rd, Pearce St, Nordsvan Dr, Beechworth Rd, Hovell St, Interchange, Wodonga to Albury.

Wodonga/Albury Saturday (150)					
High St	**Federation Shops**	**Birallee**	**Hovell St**	**Dean St**	**High St**
8:00	8:10	8:20	8:30	8:45	NS
9:00	9:10	9:20	9:30	9:45	10:00
10:00	10:10	10:20	10:30	10:45	11:00
11:00	11:10	11:20	11:30	11:45	12:00
12:00	12:10	12:20	12:30	12:45	1:00
1:00	1:10	1:20	1:30	NS	NS
2:30	2:40	2:50	3:00	3:15	3:30
4:30	4:40	4:50	5:00	NS	NS

East Albury (EA)



Route: Departs QEII Square, Dean St, David St, Guinea St, Borella Rd, Schubach St, Walsh St, Jamieson St, Mount St, Electra St, Peechalba St, Keene St, Andrews St, East St, Riverina Hwy, U-Turn at round-a-bout, Riverina Hwy, East St, Benyon St, Mountford St, Grandview Tce, Palm Dve, East St, Walsh St, Percy St, Butt St, Weidner St, Schubach St, East St, Atkins St, Hume St, David St, Dean St

East Albury (EA) – Monday to Saturday				
QEII Square	**Andrew Street**	**Hospital (East St)**	**Butt Street**	**Dean Street**
Weekdays				
7:20	7:30	7:38	7:40	7:50
9:30	9:40	9:48	9:50	10:00
10:30	10:40	10:48	10:50	11:00
11:30	11:40	11:48	11:50	12:00
1:30	1:40	1:48	1:50	2:00
2:30	2:40	2:48	2:50	3:00
4:45	4:55	5:03	5:05	5:15
5:45	5:55	6:03	6:05	6:15
Saturdays				
9:30	9:40	9:48	9:50	10:00
11:15	11:25	11:33	11:35	11:45
12:30	12:40	12:48	12:50	1:00

East Wodonga (E)

Route: Depart Water Tower in Hovell St, Osburn St, Wigg St, Lawrence St, London Rd, Chapple St, De Kerilleau Dr to roundabout, Chapple St, Victoria Cross Pde, Beechworth Rd, Hovell St.

East Wodonga (E) - Monday to Friday			
Hovell St	**De Kerilleau Drv**	**Whitebox Rise**	**Hovell St**
NS	7:25	NS	7:40*
8:00	8:10	NS	8:15**
9:15	9:25	9:28	9:30
10:15	10:25	10:28	10:30
11:45	11:55	11:58	12:00
1:00	1:10	1:13	1:15**
2:30	2:40	2:43	2:45**
4:30	4:40	4:43	4:45
5:00	5:10	5:13	5:15*
5:45	5:50	5:53	6:15

*These services have a direct service to Albury

** These services have a direct connection at Hovell St with a bus to Albury

10.4. APPENDIX D

ObjectID	GlobalID	Select Route(s)	Timetable	Seat	Kerb Ramp	Shelter	Condition	No
1	{0304923A-13DA-41F9-A71E-BB33970C3272}	SouthAlbury	Yes	No	No	No	2	
2	{5BEE98E6-28C6-48CB-AAFC-E56562217818}	SouthAlbury	Yes	No	No	No	2	Fa
3	{4A914DC8-F554-4360-8311-B795E603E223}	SouthAlbury	Yes	No	Driveway Available	No	1	
4	{EBFC859F-CE16-427A-B718-E49DD7D972C4}	SouthAlbury	No	Yes	No	No	1	
5	{F3122E04-5EB5-4308-B8F5-AB2EC5540810}	SouthAlbury	Yes	Yes	Driveway Available	No	1	
6	{AF0D0827-01CC-46DF-B232-9D48C98133D6}	SouthAlbury	Yes	No	Driveway Available	No	2	Fa
7	{E836F6C6-4CAC-4ACE-A2D1-0ADD2D72CA57}	SouthAlbury	Yes	No	Driveway Available	No	2	Fa

8	{4DE9752C-00FF-4262-BFAA-C78D4DE76705}	SouthAlbury	No	No	No	No	2	Fa
9	{3EFE80E2-5E51-4566-9C6A-635249C142E8}	SouthAlbury	Yes	No	No	No	2	Fa
10	{0A4952C5-FBBD-4DD5-B346-40AF038FCA20}	SouthAlbury	Yes	No	No	No	2	Fa
11	{A7A41D5E-8280-4A7E-8DFE-A964BBC7EF61}	SouthAlbury	Yes	Yes	No	Yes	2	Fa so
12	{5200FC9A-F867-4AE7-8100-192C9F8D4D41}	EastAlbury	Yes	No	Driveway Available	No	2	Fa
13	{24B02ACC-9236-4C28-A616-55FFE27557B7}	EastAlbury	Yes	No	Driveway Available	No	2	Fa
14	{D119F911-6B79-4DAC-8C59-92F2E3607059}	EastAlbury	No	No	No	No	1	
15	{DFF3F0EF-01C1-49D9-B751-F6ED8C6889BB}	EastAlbury	Yes	Yes	Driveway Available	No	2	Fa
16	{A31731D4-A121-49CD-9822-BC374631D6FA}	EastAlbury	Yes	No	Driveway Available	No	1	

17	{9C021AFB-BB5C-4E7D-A1DC-73BF19D7F5B4}	EastAlbury	Yes	Yes	No	No	2	Cr
18	{5964682D-1D69-4A0D-BEC6-195876DA4AA8}	EastAlbury	Yes	No	No	No	1	
19	{DA42A706-25AF-48C4-A945-212C6E03B93A}	EastAlbury	Yes	No	No	No	2	Fa
20	{CA8D02F2-B2EF-450D-9676-43CB7E411758}	EastAlbury	Yes	Yes	Driveway Available	Yes	2	Fa
21	{B6DD5CDF-3162-4F89-8ADA-A4EBCDC3B17E}	EastAlbury	Yes	Yes	Driveway Available	No	2	Fa
22	{8DBE5F85-9DF0-40DB-8E99-6E3D4404D68B}	EastAlbury	Yes	Yes	No	No	2	Fa
23	{963EF493-2782-40DF-B971-037A0DDC7813}	EastAlbury	No	Yes	Driveway Available	Yes	3	Cr fa
24	{541C1778-B095-48F6-8EAF-E41D86FB26C2}	EastAlbury	Yes	Yes	No	No	1	
25	{874F1A04-737A-462B-9CDA-3187908A9CAA}	EastAlbury	Yes	No	Driveway Available	No	3	Fa cr

26	{8FCCEF54-2A25-4818-B6DD-D39441150DAA}	EastAlbury	Yes	No	No	No	2	Fa
27	{D90C57B8-FAB9-4EEE-961D-887554A9A630}	EastAlbury	Yes	Yes	Yes	No	1	
28	{F5E8465E-B4A1-447C-8239-F1335915F39F}	EastAlbury	Yes	No	Driveway Available	No	2	Fa
29	{3D4A1DBD-07C4-4C42-AD54-9B950C0FF419}	EastAlbury	Yes	No	No	No	2	Fa
30	{74D470D8-C278-4A1B-B611-53649A55C6F9}	EastAlbury	Yes	Yes	Yes	Yes	1	
31	{F389A91C-E0E5-4D56-8920-4AD833964FD1}	EastAlbury	Yes	Yes	No	No	1	
32	{58AC9323-89A5-489A-BD5F-C639FCBA9C20}	EastAlbury	No	No	Driveway Available	No	1	
33	{92B66501-FACC-49B2-BF67-3BA093154196}	EastAlbury	Yes	No	Driveway Available	No	1	
34	{4B3AC982-3650-41F4-	EastAlbury	Yes	No	No	No	2	

	8A95-578AEFF71E02}							
35	{3C395FE5-B38F-41D5-BAE1-ED9943CEB2C3}	EastAlbury	Yes	Yes	Driveway Available	No	2	Fa dr
36	{108F18C1-5D2C-4AB7-B9D2-94760A866B4C}	Route908	Yes	No	Driveway Available	No	2	Fa
37	{ACC58C8F-4BE2-46B4-A802-6F41475DB81D}	Route908,Route906	Yes	Yes	Yes	Yes	1	
38	{FA0B3B1B-730B-4B10-AAE9-3318E5432363}	Route908	Yes	No	Driveway Available	No	2	
39	{9EDFB1CE-BC93-488B-A403-64B1BFAA7427}	Route908	Yes	No	Driveway Available	No	1	
40	{BADAF299-D3E3-454B-9BDA-2F1A8AE99E01}	Route908	No	No	No	No	2	
41	{800B649B-2AEC-4985-BCD1-97AD899BC521}	Route908	Yes	No	No	No	3	Ve
42	{18308EF0-5227-4485-A4DB-FF0D0B666787}	Route908	Yes	Yes	No	No	2	
43	{90973332-37DD-40F6-	Route908	No	No	No	No	3	

	92B4-5994B1507C0C}							
44	{8A58CAFD-5998-4404-908C-69A13CF554D9}	Route908	Yes	No	Driveway Available	No	3	Ve
45	{65A7292C-6FDF-4AE4-B198-C54210690CDC}	Route908	Yes	Yes	No	No	2	
46	{EC0E2543-6C9B-4479-821E-EE844F4E8C75}	Route908	Yes	Yes	Driveway Available	No	2	
47	{E01AF121-B5BC-4D5A-82D5-8732540A6D2B}	Route908	Yes	No	No	No	3	Ve
48	{5D938E30-956B-484C-A179-6DBED114A3C8}	Route908	Yes	No	No	No	2	
49	{110D5E73-A28F-4708-B6AC-168F98A99FF7}	Route908	Yes	No	No	No	3	Ve
50	{501FC282-F130-42FF-BB8F-E668DB0E3C55}	Route908	Yes	Yes	Yes	Yes	2	Fa
51	{D095EDD9-5020-48C2-A54E-3D8099AB5093}	Route908	Yes	Yes	Yes	Yes	1	

52	{425E572E-8FA7-4B12-BA80-97183EF5759C}	Route908	Yes	Yes	Yes	Yes	2	
53	{BE033236-59FD-40D8-BFAB-D795360BE83A}	Route906	Yes	No	No	No	2	
54	{B315ED83-3558-4A3F-9997-D92A41E78EAB}	Route906	No	No	No	No	2	
55	{72EE280E-CB45-4F53-B710-DCDD33782733}	Route906	No	No	No	No	1	
56	{A9DAB6DF-4BFC-4E7F-B5DE-0D67F93FB912}	Route906	No	No	Driveway Available	No	3	Fa
57	{2B449102-85BE-40BF-A609-DD8626406F4E}	Route906	Yes	No	Driveway Available	No	5	Tir de
58	{5C362F60-6DAB-4380-8659-0370EF1B58ED}	Route906	Yes	No	Driveway Available	No	4	Ba tir
59	{29184B50-E88E-4794-A4C4-438AD6F56C50}	Route906	Yes	Yes	Yes	Yes	4	Ru
60	{16BAD0E5-A44C-4079-825B-2EFEB97B144E}	Route906	No	Yes	Driveway Available	No	2	

61	{ED46656D-0074-4373-B07F-FC0DE5FD8451}	Route906	Yes	No	Yes	No	3	
62	{A641ABFC-0B9C-447F-8F40-E1CF83DCD8D3}	Route906	No	Yes	No	No	3	Fa
63	{652DB2F2-7B5A-469E-938E-5B8E2979DC07}	Route906	Yes	Yes	Driveway Available	Yes	3	Ne cle
64	{959C34C6-BCC6-4206-B0A5-F8D2C9F73CA0}	Route906	Yes	No	No	No	3	Fa
65	{21F83B2E-5966-431C-9A36-403B5C921DD6}	Route906	Yes	No	Driveway Available	No	4	Ve an tin
66	{A76BCB84-B86A-43C6-A547-5AEF94F273AE}	Route906	Yes	No	No	No	3	
67	{D02A4146-E354-4819-99C9-264127AEC1F9}	Route906	Yes	Yes	Driveway Available	No	3	Po tin an
68	{A51CDBAD-47AF-4D59-BEA4-1A89E312998F}	Route906	Yes	No	No	No	4	Gr sig
69	{1E3831FF-7782-4A42-BFD5-D8115266CF28}	Route906	Yes	Yes	Driveway Available	No	3	Fa
70	{CAAE6993-BB6B-4F71-	Route906	Yes	No	Driveway Available	No	3	Po tin

	9949-8ACEE1F9CFF5}							
71	{079054CA-D546-48CC-A33F-38A55029CA44}	Route906	Yes	No	Driveway Available	No	3	Fa
72	{50CF46F2-4E66-4F27-829B-6AB9E33F5B2A}	Route906	No	Yes	Driveway Available	No	2	Se oil
73	{4D8E636C-0A4E-4B83-B4DF-38D79FFA7117}	Route906	Yes	Yes	Driveway Available	Yes	3	Fa an tin
74	{C1320375-BB65-4036-9EB8-78ED42EDF1FA}	Route906	Yes	No	No	No	3	
75	{439156B6-3DEF-43B0-BB9B-86FFAF7BB5FC}	Route906	No	No	No	No	3	Fa
76	{7238A8B6-C63D-4F4D-85FA-E03D23D1778C}	Route906	Yes	Yes	No	No	3	Fa
77	{60F4C98F-7C99-4F8F-89F7-FEC8A0C7C373}	Route906	Yes	No	Driveway Available	No	3	Fa
78	{46C8F3C9-FA77-4EA0-B1F1-B664327CA109}	Route906	Yes	Yes	No	No	2	
79	{97976589-3AA3-4860-	Route906	Yes	Yes	Driveway Available	No	3	Fa

	B7B0-D02163348B4E}							
80	{D67B7952-09EA-42E3-B779-4D93C02A8ED2}	Route906	No	No	Driveway Available	No	4	Po
81	{39FE67A6-6204-48F5-B741-D772268DB965}	Route906	Yes	Yes	Driveway Available	No	3	Po
82	{B69FE67A-43E2-42B8-94E9-B1FFCCD06ADF}	Route906	No	No	No	No	4	Sig fa
83	{6CB470D1-62DD-4305-ABC3-1192644E1F24}	Route906	Yes	No	Yes	No	2	
84	{19DB5753-B6A8-486B-908F-E2A64A8DEBBD}	Route906	No	No	No	No	3	Fa
85	{2A7D5EF6-4F81-4C2F-AA10-ED98C8D29A0E}	Route906	Yes	Yes	No	Yes	3	Fa
86	{297B142C-E298-4721-918F-753E55B22697}	Route906	Yes	Yes	Driveway Available	No	3	Fa
87	{06153264-89A3-4012-AAC1-70CC6B4BEB5D}	Route906	Yes	Yes	No	Yes	3	Fa
88	{63E73705-D870-4E5C-	Route906	Yes	Yes	Driveway Available	No	3	Fa an tin

	BDC0-F8DA940C9BB7}							
89	{F0C86D59-14F2-4113-BDED-E2C012C0E770}	Route906	No	No	Driveway Available	No	3	Ve
90	{3C183AD0-E289-4C76-AAA3-867982B9F7A3}	Route906	No	Yes	Driveway Available	No	3	Ve sig
91	{32FD17B5-E961-4EF9-B9A1-70305B634601}	Route906	Yes	Yes	No	Yes	3	Fa sig
92	{D006C92B-074B-4DF5-B07A-C46CEBE831FF}	Route906	Yes	Yes	Driveway Available	Yes	2	
93	{249F476D-B914-4937-A630-27EA6C1D71B9}	Route906	Yes	No	Driveway Available	No	3	Fa
94	{49654A0F-48C9-4819-9F55-569ECD3D2999}	Route906	Yes	Yes	No	Yes	2	
95	{75F158F8-4FFA-486B-B9EF-020292B3BC45}	Route906	Yes	Yes	Yes	No	2	
96	{93882AEF-D3E0-4CDF-98D2-B6FA662C66BB}	Route906	Yes	No	Driveway Available	No	3	Fa
97	{09D0AB51-0CCC-4EE1-	Route906	Yes	No	Driveway Available	No	2	

	92A9-F42158A6DABE}							
98	{CA37FB02-06D4-4F33-BF73-951B2DB161F6}	Route907	Yes	Yes	Driveway Available	No	3	Fa
99	{8168C541-75B5-41E6-B482-F14CC515F426}	Route907	No	No	No	No	3	Fa
100	{454A639C-8ECF-444D-AE03-BB1DAD17AB6C}	Route907	Yes	Yes	Driveway Available	No	1	
101	{3DD150A0-15DF-427E-8874-B7898E720010}	Route907	No	Yes	Driveway Available	Yes	1	
102	{01CBA4CB-AD64-4A7D-9816-002D6A4D0EE8}		Yes	No	Driveway Available	No	1	
103	{4088A1BE-475C-4864-979B-218E6F6ABEAF}	Route907	No	Yes	No	Yes	3	De sh
104	{75E41BBB-29AE-4CD6-804F-BB8FB4095059}	Route907	Yes	No	No	No	3	Fa
105	{97F9963F-67DF-4FF2-887D-23C6B79EB307}	Route907	Yes	No	No	No	3	Fa

106	{CF155141-D7BD-4D44-BD59-3E338065E2BD}	Route907	Yes	No	No	No	3	Ve sig
107	{A1DF0C89-C1B8-4E0E-BF24-5BD1C3B91701}	Route907	No	No	Driveway Available	No	3	fa
108	{FF371149-4060-49C3-A985-A4E4335512EF}	Route907	Yes	Yes	No	No	2	
109	{C674804E-3561-4A9F-9C57-D235700F53C1}	Route907	No	Yes	Driveway Available	No	2	
110	{F225721A-641B-49BA-9BC1-A00AF6769587}	Route907	Yes	Yes	Yes	No	2	
111	{0ECD4153-C8F6-4708-9E18-0091EA8A3906}	Route907	Yes	No	No	No	2	
112	{42571924-EEDC-4A56-8D09-05D965AA39A5}	Route907	Yes	No	No	No	3	Fa
113	{C1B031D9-B4B8-4D3E-AD0F-AD77E7D5C845}	Route907	Yes	No	Driveway Available	No	4	Ve
114	{7A08EFFC-2EE6-4BB2-98BD-D76891F9D057}	Route907	Yes	No	No	No	3	Fa

115	{4B236862-92B0-416D-81F1-7321ED0B01B2}	Route907	Yes	No	Driveway Available	No	4	Ve
116	{3914DB2C-C101-4729-B36D-5DBAC9D94F85}	Route907	Yes	No	Driveway Available	No	4	Ve sig
117	{D0E8DD60-0374-424B-A3CB-0A5324B48F1C}	Route907	No	No	No	No	1	
118	{56504C5D-674D-4019-A980-F8E1315A5250}		No	Yes	No	No	4	Ve
119	{4F625D9B-33E5-41DA-854F-A3953C2C6709}	Route907	No	Yes	Driveway Available	No	2	
120	{5F65BCC3-1A9B-4162-A885-736186880B02}	Route907	Yes	No	Driveway Available	No	3	
121	{84DECEA8-E63B-4C5A-945D-BCF7873673CB}	Route907	Yes	Yes	Driveway Available	No	3	Fa
122	{32A8A880-6E50-4962-9783-2004160FE18C}	Route907	Yes	No	No	No	4	Ve sig
123	{A25A009B-A721-4AEA-	Route907	Yes	Yes	No	No	4	Ve sig

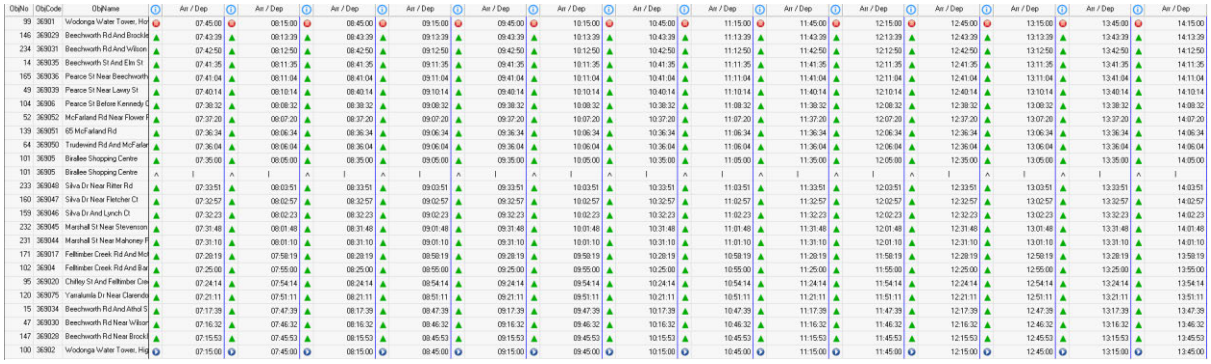
	A540-C74CF8ED8CE7}							
124	{04EEF951-0EBF-4A45-B07C-78F9948AE169}	Route907	Yes	Yes	No	No	3	Fa
125	{0C02BD7E-CAD5-4ECE-AA5E-36C5411D0B19}	Route907	Yes	Yes	Driveway Available	No	3	Ve sig
126	{29371D2A-1956-49A0-B314-764B0D8C1D2D}	Route907	Yes	Yes	Driveway Available	No	4	Ve sig
127	{7B8EB2D4-E63C-45E3-9850-9659325F14F6}	Route907	Yes	Yes	Driveway Available	No	3	
128	{F0124840-C7BA-4A4C-93E4-C51D7C851E15}	Route907	Yes	Yes	Driveway Available	No	3	Ve sig
129	{5B8843B0-18FC-4A76-8122-BEC499119ECD}	Route907	No	Yes	No	No	3	Ve sig
130	{8E309780-3261-4BFE-83A8-731FD26CCD8E}	Route907	No	No	No	No	4	Ve sig
131	{7EE4DCB5-A491-4977-A99B-C47A1DA224CD}	Route907	Yes	No	No	No	4	Ve sig
132	{19DF00AB-3A85-43E1-	Route907	Yes	Yes	Driveway Available	No	3	Fa

	A9A7-2D4797BDB88B}							
133	{201E34E5-2109-4E0D-9888-561AC701D47C}	Route907	No	Yes	No	No	1	
134	{ABC43F35-50C4-4C2D-A0A3-34506C1BB3E6}	Route907	Yes	Yes	Driveway Available	Yes	1	Fa
135	{715E364F-99BF-4FD5-B646-3FA86F1B7446}	Route907	Yes	Yes	Driveway Available	No	2	
136	{5EB246DC-CB02-4A1C-8063-2F14852BF5A2}	AlburyWodonga	Yes	Yes	No	No	2	
137	{F5CABEF1-6B91-4A62-98BE-96AD149B648F}	Route907,AlburyWodonga	No	Yes	Driveway Available	No	1	
138	{F5F1216F-21F9-4995-828E-85C59C02AC2E}	WestAlbury	Yes	Yes	Driveway Available	No	1	
139	{70C587D3-1860-4B76-97A6-DEC587945448}	WestAlbury	Yes	No	No	No	3	No ba
140	{9C61D16C-0BD5-4E5B-B6A7-69BAAD66D287}	WestAlbury	Yes	No	Driveway Available	No	1	
141	{DC3EC6D2-8304-4A45-	WestAlbury	Yes	No	Driveway Available	No	1	

	8DC2-38F7DE43E40B}							
142	{1227E1CE-32ED-4A7E-AA09-36341B956114}	WestAlbury	Yes	Yes	Driveway Available	No	2	Se ne oil re alu sla
143	{F8FC8360-8CBB-4AF6-A692-1D4DE798A8B7}	WestAlbury	Yes	No	Driveway Available	No	1	
144	{B4FD64F6-0BE1-43B4-B09A-3F09A9FE3EC6}	WestAlbury	Yes	Yes	No	No	2	Se be gra
145	{2B19004B-D211-473E-B5A4-613729E78A58}	WestAlbury	Yes	Yes	Driveway Available	No	2	Gr tin
146	{3A23CA7E-3C8D-4050-B126-EA6C5CE47A7C}	WestAlbury	Yes	Yes	No	No	1	
147	{8C9885A3-B91F-4010-A7FD-20B2187FB41E}	WestAlbury	Yes	Yes	Yes	Yes	3	Tir mi
148	{A9204DFB-FA3D-47BB-A164-6F3DA6EBC5D5}	WestAlbury	Yes	No	Driveway Available	No	2	
149	{CF7563AA-CB62-47C9-	WestAlbury	Yes	Yes	Driveway Available	Yes	1	

	952B-86FC2EDA92F6}							
150	{28C1E277-720A-4E10-9DFE-C477C5C5A3B8}	WestAlbury	Yes	No	Driveway Available	No	1	
151	{E0D6864D-0E96-4AFE-8A9C-CD1A532E6B19}	WestAlbury	Yes	Yes	No	No	1	
152	{3B1E4160-CEEE-4F81-BA68-F520B793044A}	WestAlbury	Yes	No	Driveway Available	No	2	
153	{1CCD22E5-69C4-4227-A0B2-AB9AA68DDA0A}	WestAlbury	Yes	No	No	No	3	Fa
154	{C701E84F-B121-4A2B-B027-46EA7B3EB6C6}	WestAlbury	Yes	Yes	Driveway Available	Yes	2	
155	{33FB20B1-8D5B-4093-9279-F5D1EB42AD20}	WestAlbury	Yes	Yes	No	No	2	No sig inc pla
156	{53CE8D61-33EE-4BC1-BB7C-95D21C31B94F}	WestAlbury	Yes	No	No	No	2	
157	{DFB8AAF5-B3D9-4297-BA4C-C68E47AF50B1}	WestAlbury	Yes	No	Driveway Available	No	3	Fa

10.5. APPENDIX E



ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
99	36901	Wodonga Water Tower, Hor	07:45:00	08:15:00	08:45:00	09:15:00	09:45:00	10:15:00	10:45:00	11:15:00	11:45:00	12:15:00	12:45:00	13:15:00	13:45:00	14:15:00
146	369029	Beechworth Rd And Brockl	07:43:39	08:13:39	08:43:39	09:13:39	09:43:39	10:13:39	10:43:39	11:13:39	11:43:39	12:13:39	12:43:39	13:13:39	13:43:39	14:13:39
234	369031	Beechworth Rd And Wilson	07:42:50	08:12:50	08:42:50	09:12:50	09:42:50	10:12:50	10:42:50	11:12:50	11:42:50	12:12:50	12:42:50	13:12:50	13:42:50	14:12:50
14	369035	Beechworth St And Elm St	07:41:35	08:11:35	08:41:35	09:11:35	09:41:35	10:11:35	10:41:35	11:11:35	11:41:35	12:11:35	12:41:35	13:11:35	13:41:35	14:11:35
165	369036	Pearce St Near Beechworth	07:41:04	08:11:04	08:41:04	09:11:04	09:41:04	10:11:04	10:41:04	11:11:04	11:41:04	12:11:04	12:41:04	13:11:04	13:41:04	14:11:04
49	369039	Pearce St Near Lawy St	07:40:14	08:10:14	08:40:14	09:10:14	09:40:14	10:10:14	10:40:14	11:10:14	11:40:14	12:10:14	12:40:14	13:10:14	13:40:14	14:10:14
104	36906	Pearce St Before Kennedy	07:38:32	08:08:32	08:38:32	09:08:32	09:38:32	10:08:32	10:38:32	11:08:32	11:38:32	12:08:32	12:38:32	13:08:32	13:38:32	14:08:32
52	369052	McFarland Rd Near Flower	07:37:20	08:07:20	08:37:20	09:07:20	09:37:20	10:07:20	10:37:20	11:07:20	11:37:20	12:07:20	12:37:20	13:07:20	13:37:20	14:07:20
139	369051	65 McFarland Rd	07:36:34	08:06:34	08:36:34	09:06:34	09:36:34	10:06:34	10:36:34	11:06:34	11:36:34	12:06:34	12:36:34	13:06:34	13:36:34	14:06:34
64	369050	Trudewind Rd And McFarla	07:36:04	08:06:04	08:36:04	09:06:04	09:36:04	10:06:04	10:36:04	11:06:04	11:36:04	12:06:04	12:36:04	13:06:04	13:36:04	14:06:04
101	36905	Binalee Shopping Centre	07:35:00	08:05:00	08:35:00	09:05:00	09:35:00	10:05:00	10:35:00	11:05:00	11:35:00	12:05:00	12:35:00	13:05:00	13:35:00	14:05:00
101	36905	Binalee Shopping Centre	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
233	369048	Silva Dr Near Ritter Rd	07:33:51	08:03:51	08:33:51	09:03:51	09:33:51	10:03:51	10:33:51	11:03:51	11:33:51	12:03:51	12:33:51	13:03:51	13:33:51	14:03:51
160	369047	Silva Dr Near Fletcher Ct	07:32:57	08:02:57	08:32:57	09:02:57	09:32:57	10:02:57	10:32:57	11:02:57	11:32:57	12:02:57	12:32:57	13:02:57	13:32:57	14:02:57
159	369046	Silva Dr And Lynch Ct	07:32:23	08:02:23	08:32:23	09:02:23	09:32:23	10:02:23	10:32:23	11:02:23	11:32:23	12:02:23	12:32:23	13:02:23	13:32:23	14:02:23
232	369045	Marshall St Near Stevenson	07:31:48	08:01:48	08:31:48	09:01:48	09:31:48	10:01:48	10:31:48	11:01:48	11:31:48	12:01:48	12:31:48	13:01:48	13:31:48	14:01:48
231	369044	Marshall St Near Mahoney P	07:31:10	08:01:10	08:31:10	09:01:10	09:31:10	10:01:10	10:31:10	11:01:10	11:31:10	12:01:10	12:31:10	13:01:10	13:31:10	14:01:10
171	369017	Feltimber Creek Rd And Mcl	07:28:19	07:58:19	08:28:19	08:58:19	09:28:19	09:58:19	10:28:19	10:58:19	11:28:19	11:58:19	12:28:19	12:58:19	13:28:19	13:58:19
102	36904	Feltimber Creek Rd And Bar	07:25:00	07:55:00	08:25:00	08:55:00	09:25:00	09:55:00	10:25:00	10:55:00	11:25:00	11:55:00	12:25:00	12:55:00	13:25:00	13:55:00
95	369020	Chilley St And Feltimber Cre	07:24:14	07:54:14	08:24:14	08:54:14	09:24:14	09:54:14	10:24:14	10:54:14	11:24:14	11:54:14	12:24:14	12:54:14	13:24:14	13:54:14
120	369075	Yarralumla Dr Near Clarenda	07:21:11	07:51:11	08:21:11	08:51:11	09:21:11	09:51:11	10:21:11	10:51:11	11:21:11	11:51:11	12:21:11	12:51:11	13:21:11	13:51:11
15	369034	Beechworth Rd And Athol S	07:17:39	07:47:39	08:17:39	08:47:39	09:17:39	09:47:39	10:17:39	10:47:39	11:17:39	11:47:39	12:17:39	12:47:39	13:17:39	13:47:39
47	369030	Beechworth Rd Near Wilson	07:16:32	07:46:32	08:16:32	08:46:32	09:16:32	09:46:32	10:16:32	10:46:32	11:16:32	11:46:32	12:16:32	12:46:32	13:16:32	13:46:32
147	369028	Beechworth Rd Near Brockl	07:15:53	07:45:53	08:15:53	08:45:53	09:15:53	09:45:53	10:15:53	10:45:53	11:15:53	11:45:53	12:15:53	12:45:53	13:15:53	13:45:53
100	36902	Wodonga Water Tower, Hig	07:15:00	07:45:00	08:15:00	08:45:00	09:15:00	09:45:00	10:15:00	10:45:00	11:15:00	11:45:00	12:15:00	12:45:00	13:15:00	13:45:00

Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
13:45:00	14:15:00	14:45:00	15:15:00	15:45:00	16:15:00	16:45:00	17:15:00	17:45:00	18:15:00
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13:33:51	14:03:51	14:33:51	15:03:51	15:33:51	16:03:51	16:33:51	17:03:51	17:33:51	18:03:51
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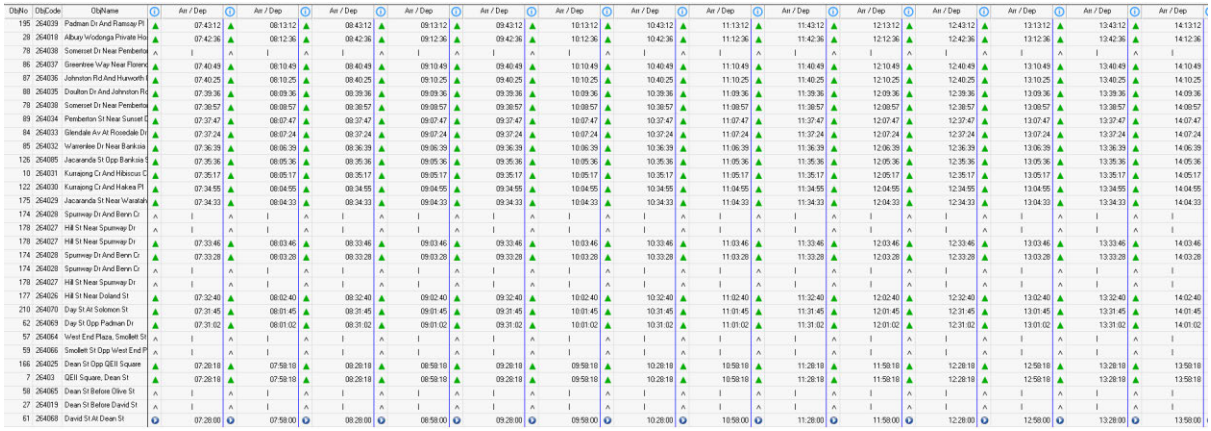
13:16:32	13:46:32	14:16:32	14:46:32	15:16:32	15:46:32	16:16:32	16:46:32	17:16:32	17:46:32
13:15:53	13:45:53	14:15:53	14:45:53	15:15:53	15:45:53	16:15:53	16:45:53	17:15:53	17:45:53
13:15:00	13:45:00	14:15:00	14:45:00	15:15:00	15:45:00	16:15:00	16:45:00	17:15:00	17:45:00



ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
195	264039	Padman Dr And Ramsay Pl	07:43:12	08:13:12	08:43:12	09:13:12	09:43:12	10:13:12	10:43:12	11:13:12	11:43:12	12:13:12	12:43:12	13:13:12	13:43:12	14:13:12
28	264018	Albury Wodonga Private Ho	07:42:36	08:12:36	08:42:36	09:12:36	09:42:36	10:12:36	10:42:36	11:12:36	11:42:36	12:12:36	12:42:36	13:12:36	13:42:36	14:12:36
78	264038	Somerset Dr Near Pemberto	|	|	|	|	|	|	|	|	|	|	|	|	|	|
86	264037	Greentree Way Near Floren	07:40:49	08:10:49	08:40:49	09:10:49	09:40:49	10:10:49	10:40:49	11:10:49	11:40:49	12:10:49	12:40:49	13:10:49	13:40:49	14:10:49
87	264036	Johnston Rd And Hurworth	07:40:25	08:10:25	08:40:25	09:10:25	09:40:25	10:10:25	10:40:25	11:10:25	11:40:25	12:10:25	12:40:25	13:10:25	13:40:25	14:10:25
88	264035	Doulton Dr And Johnston Rd	07:39:36	08:09:36	08:39:36	09:09:36	09:39:36	10:09:36	10:39:36	11:09:36	11:39:36	12:09:36	12:39:36	13:09:36	13:39:36	14:09:36
78	264038	Somerset Dr Near Pemberto	07:38:57	08:08:57	08:38:57	09:08:57	09:38:57	10:08:57	10:38:57	11:08:57	11:38:57	12:08:57	12:38:57	13:08:57	13:38:57	14:08:57
89	264034	Pemberton St Near Sunset D	07:37:47	08:07:47	08:37:47	09:07:47	09:37:47	10:07:47	10:37:47	11:07:47	11:37:47	12:07:47	12:37:47	13:07:47	13:37:47	14:07:47
84	264033	Glendale Av At Rosedale Dr	07:37:24	08:07:24	08:37:24	09:07:24	09:37:24	10:07:24	10:37:24	11:07:24	11:37:24	12:07:24	12:37:24	13:07:24	13:37:24	14:07:24
85	264032	Warrenlee Dr Near Banksia	07:36:39	08:06:39	08:36:39	09:06:39	09:36:39	10:06:39	10:36:39	11:06:39	11:36:39	12:06:39	12:36:39	13:06:39	13:36:39	14:06:39
126	264085	Jacaranda St Opp Banksia	07:35:36	08:05:36	08:35:36	09:05:36	09:35:36	10:05:36	10:35:36	11:05:36	11:35:36	12:05:36	12:35:36	13:05:36	13:35:36	14:05:36
10	264031	Kunajong Cr And Hibiscus C	07:35:17	08:05:17	08:35:17	09:05:17	09:35:17	10:05:17	10:35:17	11:05:17	11:35:17	12:05:17	12:35:17	13:05:17	13:35:17	14:05:17
122	264030	Kunajong Cr And Hakea Pl	07:34:55	08:04:55	08:34:55	09:04:55	09:34:55	10:04:55	10:34:55	11:04:55	11:34:55	12:04:55	12:34:55	13:04:55	13:34:55	14:04:55
175	264029	Jacaranda St Near Waratah	07:34:33	08:04:33	08:34:33	09:04:33	09:34:33	10:04:33	10:34:33	11:04:33	11:34:33	12:04:33	12:34:33	13:04:33	13:34:33	14:04:33
174	264028	Spurway Dr And Benn Cr	|	|	|	|	|	|	|	|	|	|	|	|	|	|
178	264027	Hill St Near Spurway Dr	|	|	|	|	|	|	|	|	|	|	|	|	|	|
178	264027	Hill St Near Spurway Dr	07:33:46	08:03:46	08:33:46	09:03:46	09:33:46	10:03:46	10:33:46	11:03:46	11:33:46	12:03:46	12:33:46	13:03:46	13:33:46	14:03:46
174	264028	Spurway Dr And Benn Cr	07:33:28	08:03:28	08:33:28	09:03:28	09:33:28	10:03:28	10:33:28	11:03:28	11:33:28	12:03:28	12:33:28	13:03:28	13:33:28	14:03:28
174	264028	Spurway Dr And Benn Cr	|	|	|	|	|	|	|	|	|	|	|	|	|	|
178	264027	Hill St Near Spurway Dr	|	|	|	|	|	|	|	|	|	|	|	|	|	|
177	264026	Hill St Near Doland St	07:32:40	08:02:40	08:32:40	09:02:40	09:32:40	10:02:40	10:32:40	11:02:40	11:32:40	12:02:40	12:32:40	13:02:40	13:32:40	14:02:40
210	264070	Day St At Solomon St	07:31:45	08:01:45	08:31:45	09:01:45	09:31:45	10:01:45	10:31:45	11:01:45	11:31:45	12:01:45	12:31:45	13:01:45	13:31:45	14:01:45
62	264069	Day St Opp Padman Dr	07:31:02	08:01:02	08:31:02	09:01:02	09:31:02	10:01:02	10:31:02	11:01:02	11:31:02	12:01:02	12:31:02	13:01:02	13:31:02	14:01:02
57	264064	West End Plaza, Smollett St	|	|	|	|	|	|	|	|	|	|	|	|	|	|
59	264066	Smollett St Opp West End P	|	|	|	|	|	|	|	|	|	|	|	|	|	|
166	264025	Dean St Opp QEII Square	07:28:18	07:58:18	08:28:18	08:58:18	09:28:18	09:58:18	10:28:18	10:58:18	11:28:18	11:58:18	12:28:18	12:58:18	13:28:18	13:58:18
7	26403	QEII Square, Dean St	07:28:18	07:58:18	08:28:18	08:58:18	09:28:18	09:58:18	10:28:18	10:58:18	11:28:18	11:58:18	12:28:18	12:58:18	13:28:18	13:58:18
59	264065	Dean St Before Olive St	|	|	|	|	|	|	|	|	|	|	|	|	|	|
27	264019	Dean St Before David St	|	|	|	|	|	|	|	|	|	|	|	|	|	|
61	264068	David St At Dean St	07:28:00	07:58:00	08:28:00	08:58:00	09:28:00	09:58:00	10:28:00	10:58:00	11:28:00	11:58:00	12:28:00	12:58:00	13:28:00	13:58:00

Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
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|	|	|	|	|	|	|	|	|
14:40:49	15:10:49	15:40:49	16:10:49	16:40:49	17:10:49	17:40:49	18:10:49	18:40:49
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14:34:55	15:04:55	15:34:55	16:04:55	16:34:55	17:04:55	17:34:55	18:04:55	18:34:55
14:34:33	15:04:33	15:34:33	16:04:33	16:34:33	17:04:33	17:34:33	18:04:33	18:34:33
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14:33:46	15:03:46	15:33:46	16:03:46	16:33:46	17:03:46	17:33:46	18:03:46	18:33:46
14:33:28	15:03:28	15:33:28	16:03:28	16:33:28	17:03:28	17:33:28	18:03:28	18:33:28
^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
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14:32:40	15:02:40	15:32:40	16:02:40	16:32:40	17:02:40	17:32:40	18:02:40	18:32:40
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14:31:02	15:01:02	15:31:02	16:01:02	16:31:02	17:01:02	17:31:02	18:01:02	18:31:02
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^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
14:28:18	14:58:18	15:28:18	15:58:18	16:28:18	16:58:18	17:28:18	17:58:18	18:28:18
14:28:18	14:58:18	15:28:18	15:58:18	16:28:18	16:58:18	17:28:18	17:58:18	18:28:18
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^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
14:28:00	14:58:00	15:28:00	15:58:00	16:28:00	16:58:00	17:28:00	17:58:00	18:28:00

▲	13:40:49	▲	14:10:49	▲	14:40:49	▲	15:10:49	▲	15:40:49	▲	16:10:49	▲	16:40:49	▲	17:10:49	▲	17:40:49	▲	18:10:49	▲	18:40:49
▲	13:40:25	▲	14:10:25	▲	14:40:25	▲	15:10:25	▲	15:40:25	▲	16:10:25	▲	16:40:25	▲	17:10:25	▲	17:40:25	▲	18:10:25	▲	18:40:25
▲	13:39:36	▲	14:09:36	▲	14:39:36	▲	15:09:36	▲	15:39:36	▲	16:09:36	▲	16:39:36	▲	17:09:36	▲	17:39:36	▲	18:09:36	▲	18:39:36
▲	13:38:57	▲	14:08:57	▲	14:38:57	▲	15:08:57	▲	15:38:57	▲	16:08:57	▲	16:38:57	▲	17:08:57	▲	17:38:57	▲	18:08:57	▲	18:38:57
▲	13:37:47	▲	14:07:47	▲	14:37:47	▲	15:07:47	▲	15:37:47	▲	16:07:47	▲	16:37:47	▲	17:07:47	▲	17:37:47	▲	18:07:47	▲	18:37:47
▲	13:37:24	▲	14:07:24	▲	14:37:24	▲	15:07:24	▲	15:37:24	▲	16:07:24	▲	16:37:24	▲	17:07:24	▲	17:37:24	▲	18:07:24	▲	18:37:24
▲	13:36:39	▲	14:06:39	▲	14:36:39	▲	15:06:39	▲	15:36:39	▲	16:06:39	▲	16:36:39	▲	17:06:39	▲	17:36:39	▲	18:06:39	▲	18:36:39
▲	13:35:36	▲	14:05:36	▲	14:35:36	▲	15:05:36	▲	15:35:36	▲	16:05:36	▲	16:35:36	▲	17:05:36	▲	17:35:36	▲	18:05:36	▲	18:35:36
▲	13:35:17	▲	14:05:17	▲	14:35:17	▲	15:05:17	▲	15:35:17	▲	16:05:17	▲	16:35:17	▲	17:05:17	▲	17:35:17	▲	18:05:17	▲	18:35:17
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▲	13:33:46	▲	14:03:46	▲	14:33:46	▲	15:03:46	▲	15:33:46	▲	16:03:46	▲	16:33:46	▲	17:03:46	▲	17:33:46	▲	18:03:46	▲	18:33:46
▲	13:33:28	▲	14:03:28	▲	14:33:28	▲	15:03:28	▲	15:33:28	▲	16:03:28	▲	16:33:28	▲	17:03:28	▲	17:33:28	▲	18:03:28	▲	18:33:28
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▲	13:32:40	▲	14:02:40	▲	14:32:40	▲	15:02:40	▲	15:32:40	▲	16:02:40	▲	16:32:40	▲	17:02:40	▲	17:32:40	▲	18:02:40	▲	18:32:40
▲	13:31:45	▲	14:01:45	▲	14:31:45	▲	15:01:45	▲	15:31:45	▲	16:01:45	▲	16:31:45	▲	17:01:45	▲	17:31:45	▲	18:01:45	▲	18:31:45
▲	13:31:02	▲	14:01:02	▲	14:31:02	▲	15:01:02	▲	15:31:02	▲	16:01:02	▲	16:31:02	▲	17:01:02	▲	17:31:02	▲	18:01:02	▲	18:31:02
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▲	13:28:18	▲	13:58:18	▲	14:28:18	▲	14:58:18	▲	15:28:18	▲	15:58:18	▲	16:28:18	▲	16:58:18	▲	17:28:18	▲	17:58:18	▲	18:28:18
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●	13:28:00	●	13:58:00	●	14:28:00	●	14:58:00	●	15:28:00	●	15:58:00	●	16:28:00	●	16:58:00	●	17:28:00	●	17:58:00	●	18:28:00

Pass through

	Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep
▲	07:48:00	▲	08:18:00	▲	08:48:00	▲	09:18:00	▲	09:48:00	▲	10:18:00	▲	10:48:00	▲	11:18:00	▲	11:48:00	▲	12:18:00	▲	12:48:00	▲	13:18:00	▲	13:48:00	▲	14:18:00
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▲	07:46:00	▲	08:16:00	▲	08:46:00	▲	09:16:00	▲	09:46:00	▲	10:16:00	▲	10:46:00	▲	11:16:00	▲	11:46:00	▲	12:16:00	▲	12:46:00	▲	13:16:00	▲	13:46:00	▲	14:16:00
▲	07:45:28	▲	08:15:28	▲	08:45:28	▲	09:15:28	▲	09:45:28	▲	10:15:28	▲	10:45:28	▲	11:15:28	▲	11:45:28	▲	12:15:28	▲	12:45:28	▲	13:15:28	▲	13:45:28	▲	14:15:28
▲	07:44:25	▲	08:14:25	▲	08:44:25	▲	09:14:25	▲	09:44:25	▲	10:14:25	▲	10:44:25	▲	11:14:25	▲	11:44:25	▲	12:14:25	▲	12:44:25	▲	13:14:25	▲	13:44:25	▲	14:14:25
▲	07:43:47	▲	08:13:47	▲	08:43:47	▲	09:13:47	▲	09:43:47	▲	10:13:47	▲	10:43:47	▲	11:13:47	▲	11:43:47	▲	12:13:47	▲	12:43:47	▲	13:13:47	▲	13:43:47	▲	14:13:47
▲	07:43:05	▲	08:13:05	▲	08:43:05	▲	09:13:05	▲	09:43:05	▲	10:13:05	▲	10:43:05	▲	11:13:05	▲	11:43:05	▲	12:13:05	▲	12:43:05	▲	13:13:05	▲	13:43:05	▲	14:13:05
▲	07:42:02	▲	08:12:02	▲	08:42:02	▲	09:12:02	▲	09:42:02	▲	10:12:02	▲	10:42:02	▲	11:12:02	▲	11:42:02	▲	12:12:02	▲	12:42:02	▲	13:12:02	▲	13:42:02	▲	14:12:02
▲	07:40:54	▲	08:10:54	▲	08:40:54	▲	09:10:54	▲	09:40:54	▲	10:10:54	▲	10:40:54	▲	11:10:54	▲	11:40:54	▲	12:10:54	▲	12:40:54	▲	13:10:54	▲	13:40:54	▲	14:10:54
▲	07:40:15	▲	08:10:15	▲	08:40:15	▲	09:10:15	▲	09:40:15	▲	10:10:15	▲	10:40:15	▲	11:10:15	▲	11:40:15	▲	12:10:15	▲	12:40:15	▲	13:10:15	▲	13:40:15	▲	14:10:15
▲	07:39:26	▲	08:09:26	▲	08:39:26	▲	09:09:26	▲	09:39:26	▲	10:09:26	▲	10:39:26	▲	11:09:26	▲	11:39:26	▲	12:09:26	▲	12:39:26	▲	13:09:26	▲	13:39:26	▲	14:09:26
▲	07:38:45	▲	08:08:45	▲	08:38:45	▲	09:08:45	▲	09:38:45	▲	10:08:45	▲	10:38:45	▲	11:08:45	▲	11:38:45	▲	12:08:45	▲	12:38:45	▲	13:08:45	▲	13:38:45	▲	14:08:45
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▲	07:37:26	▲	08:07:26	▲	08:37:26	▲	09:07:26	▲	09:37:26	▲	10:07:26	▲	10:37:26	▲	11:07:26	▲	11:37:26	▲	12:07:26	▲	12:37:26	▲	13:07:26	▲	13:37:26	▲	14:07:26
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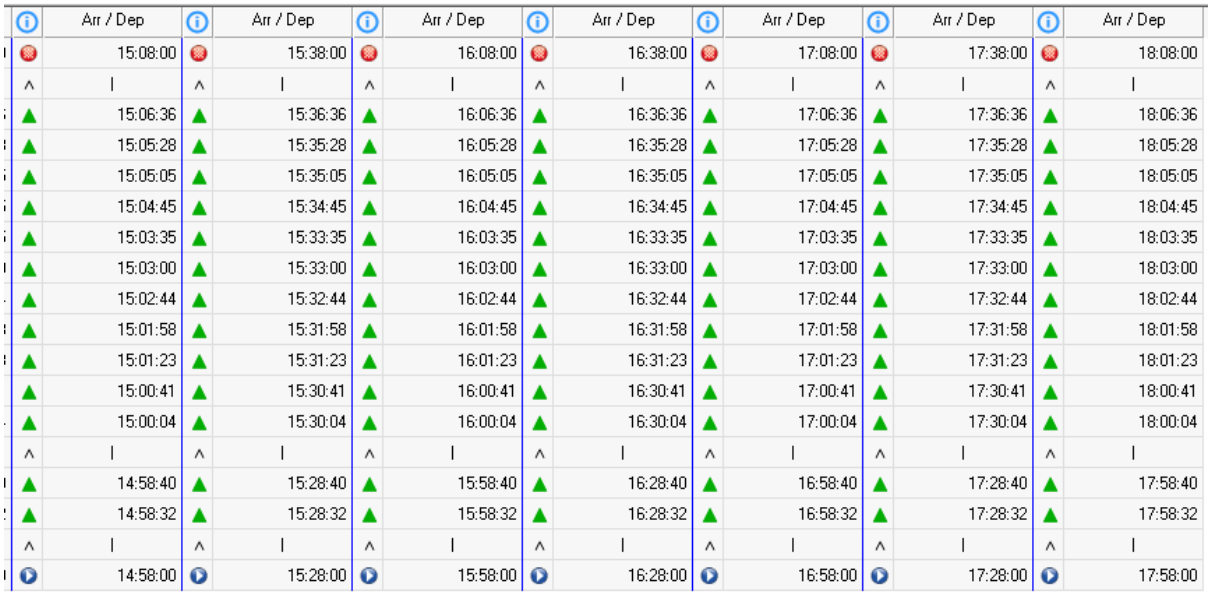
▲	07:35:27	▲	08:05:27	▲	08:35:27	▲	09:05:27	▲	09:35:27	▲	10:05:27	▲	10:35:27	▲	11:05:27	▲	11:35:27	▲	12:05:27	▲	12:35:27	▲	13:05:27	▲	13:35:27	▲	14:05:27
▲	07:35:07	▲	08:05:07	▲	08:35:07	▲	09:05:07	▲	09:35:07	▲	10:05:07	▲	10:35:07	▲	11:05:07	▲	11:35:07	▲	12:05:07	▲	12:35:07	▲	13:05:07	▲	13:35:07	▲	14:05:07
▲	07:34:26	▲	08:04:26	▲	08:34:26	▲	09:04:26	▲	09:34:26	▲	10:04:26	▲	10:34:26	▲	11:04:26	▲	11:34:26	▲	12:04:26	▲	12:34:26	▲	13:04:26	▲	13:34:26	▲	14:04:26
^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
▲	07:33:37	▲	08:03:37	▲	08:33:37	▲	09:03:37	▲	09:33:37	▲	10:03:37	▲	10:33:37	▲	11:03:37	▲	11:33:37	▲	12:03:37	▲	12:33:37	▲	13:03:37	▲	13:33:37	▲	14:03:37
▲	07:32:42	▲	08:02:42	▲	08:32:42	▲	09:02:42	▲	09:32:42	▲	10:02:42	▲	10:32:42	▲	11:02:42	▲	11:32:42	▲	12:02:42	▲	12:32:42	▲	13:02:42	▲	13:32:42	▲	14:02:42
▲	07:31:58	▲	08:01:58	▲	08:31:58	▲	09:01:58	▲	09:31:58	▲	10:01:58	▲	10:31:58	▲	11:01:58	▲	11:31:58	▲	12:01:58	▲	12:31:58	▲	13:01:58	▲	13:31:58	▲	14:01:58
▲	07:29:59	▲	07:59:59	▲	08:29:59	▲	08:59:59	▲	09:29:59	▲	09:59:59	▲	10:29:59	▲	10:59:59	▲	11:29:59	▲	11:59:59	▲	12:29:59	▲	12:59:59	▲	13:29:59	▲	13:59:59
^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
▲	07:28:41	▲	07:58:41	▲	08:28:41	▲	08:58:41	▲	09:28:41	▲	09:58:41	▲	10:28:41	▲	10:58:41	▲	11:28:41	▲	11:58:41	▲	12:28:41	▲	12:58:41	▲	13:28:41	▲	13:58:41
^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
●	07:28:00	●	07:58:00	●	08:28:00	●	08:58:00	●	09:28:00	●	09:58:00	●	10:28:00	●	10:58:00	●	11:28:00	●	11:58:00	●	12:28:00	●	12:58:00	●	13:28:00	●	13:58:00

ObjNo	ObjCode	ObjName		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep		Arr / Dep
61	264068	David St At Dean St	●	07:38:00	●	08:08:00	●	08:38:00	●	09:08:00	●	09:38:00	●	10:08:00	●	10:38:00	●	11:08:00	●	11:38:00	●	12:08:00	●	12:38:00	●	13:08:00	●	13:38:00	●	14:08:00	●	14:38:00
59	264066	Swallett St Opp West End P	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
57	264064	West End Plaza, Swallett St	▲	07:36:36	▲	08:06:36	▲	08:36:36	▲	09:06:36	▲	09:36:36	▲	10:06:36	▲	10:36:36	▲	11:06:36	▲	11:36:36	▲	12:06:36	▲	12:36:36	▲	13:06:36	▲	13:36:36	▲	14:06:36	▲	14:36:36
125	264084	Townsend St After Ebden St	▲	07:35:28	▲	08:05:28	▲	08:35:28	▲	09:05:28	▲	09:35:28	▲	10:05:28	▲	10:35:28	▲	11:05:28	▲	11:35:28	▲	12:05:28	▲	12:35:28	▲	13:05:28	▲	13:35:28	▲	14:05:28	▲	14:35:28
97	264083	Ebden St Before Townsend	▲	07:35:05	▲	08:05:05	▲	08:35:05	▲	09:05:05	▲	09:35:05	▲	10:05:05	▲	10:35:05	▲	11:05:05	▲	11:35:05	▲	12:05:05	▲	12:35:05	▲	13:05:05	▲	13:35:05	▲	14:05:05	▲	14:35:05
96	264082	Kiewa St After Nurigong St	▲	07:34:45	▲	08:04:45	▲	08:34:45	▲	09:04:45	▲	09:34:45	▲	10:04:45	▲	10:34:45	▲	11:04:45	▲	11:34:45	▲	12:04:45	▲	12:34:45	▲	13:04:45	▲	13:34:45	▲	14:04:45	▲	14:34:45
124	264081	Kiewa St At Panmure St	▲	07:33:35	▲	08:03:35	▲	08:33:35	▲	09:03:35	▲	09:33:35	▲	10:03:35	▲	10:33:35	▲	11:03:35	▲	11:33:35	▲	12:03:35	▲	12:33:35	▲	13:03:35	▲	13:33:35	▲	14:03:35	▲	14:33:35
123	264080	Abercorn St Opp Plummer St	▲	07:33:00	▲	08:03:00	▲	08:33:00	▲	09:03:00	▲	09:33:00	▲	10:03:00	▲	10:33:00	▲	11:03:00	▲	11:33:00	▲	12:03:00	▲	12:33:00	▲	13:03:00	▲	13:33:00	▲	14:03:00	▲	14:33:00
201	264079	Olive St Before Abercorn St	▲	07:32:44	▲	08:02:44	▲	08:32:44	▲	09:02:44	▲	09:32:44	▲	10:02:44	▲	10:32:44	▲	11:02:44	▲	11:32:44	▲	12:02:44	▲	12:32:44	▲	13:02:44	▲	13:32:44	▲	14:02:44	▲	14:32:44
202	264078	Albins St Before Olive St	▲	07:31:58	▲	08:01:58	▲	08:31:58	▲	09:01:58	▲	09:31:58	▲	10:01:58	▲	10:31:58	▲	11:01:58	▲	11:31:58	▲	12:01:58	▲	12:31:58	▲	13:01:58	▲	13:31:58	▲	14:01:58	▲	14:31:58
203	264077	Albins St After Macauley St	▲	07:31:23	▲	08:01:23	▲	08:31:23	▲	09:01:23	▲	09:31:23	▲	10:01:23	▲	10:31:23	▲	11:01:23	▲	11:31:23	▲	12:01:23	▲	12:31:23	▲	13:01:23	▲	13:31:23	▲	14:01:23	▲	14:31:23
204	264076	Macauley St After Bridge St	▲	07:30:41	▲	08:00:41	▲	08:30:41	▲	09:00:41	▲	09:30:41	▲	10:00:41	▲	10:30:41	▲	11:00:41	▲	11:30:41	▲	12:00:41	▲	12:30:41	▲	13:00:41	▲	13:30:41	▲	14:00:41	▲	14:30:41
205	264075	Macauley St After Hovell St	▲	07:30:04	▲	08:00:04	▲	08:30:04	▲	09:00:04	▲	09:30:04	▲	10:00:04	▲	10:30:04	▲	11:00:04	▲	11:30:04	▲	12:00:04	▲	12:30:04	▲	13:00:04	▲	13:30:04	▲	14:00:04	▲	14:30:04
61	264068	David St At Dean St	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
61	264068	David St At Dean St	▲	07:28:40	▲	07:58:40	▲	08:28:40	▲	08:58:40	▲	09:28:40	▲	09:58:40	▲	10:28:40	▲	10:58:40	▲	11:28:40	▲	11:58:40	▲	12:28:40	▲	12:58:40	▲	13:28:40	▲	13:58:40	▲	14:28:40
27	264019	Dean St Before David St	▲	07:28:32	▲	07:58:32	▲	08:28:32	▲	08:58:32	▲	09:28:32	▲	09:58:32	▲	10:28:32	▲	10:58:32	▲	11:28:32	▲	11:58:32	▲	12:28:32	▲	12:58:32	▲	13:28:32	▲	13:58:32	▲	14:28:32
58	264065	Dean St Before Olive St	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|	^	|
7	26403	QEII Square, Dean St	●	07:28:00	●	07:58:00	●	08:28:00	●	08:58:00	●	09:28:00	●	09:58:00	●	10:28:00	●	10:58:00	●	11:28:00	●	11:58:00	●	12:28:00	●	12:58:00	●	13:28:00	●	13:58:00	●	14:28:00



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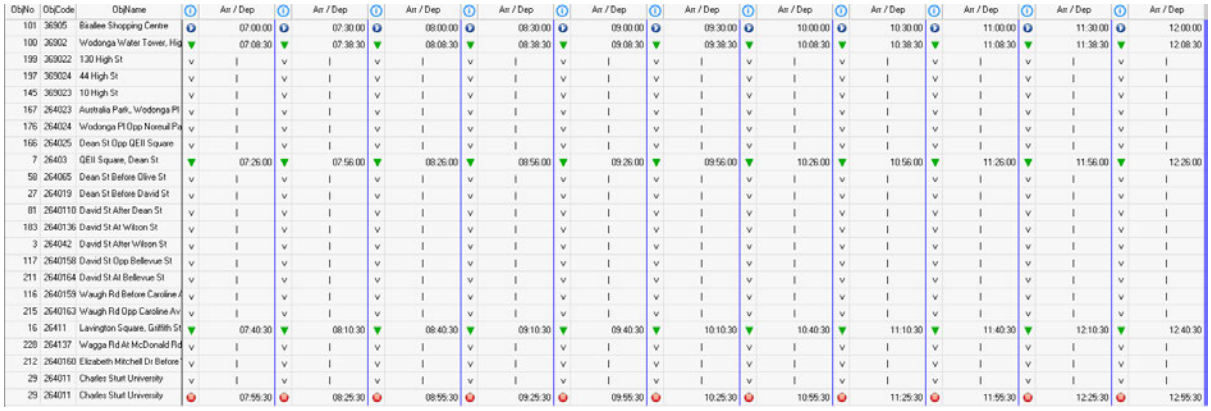
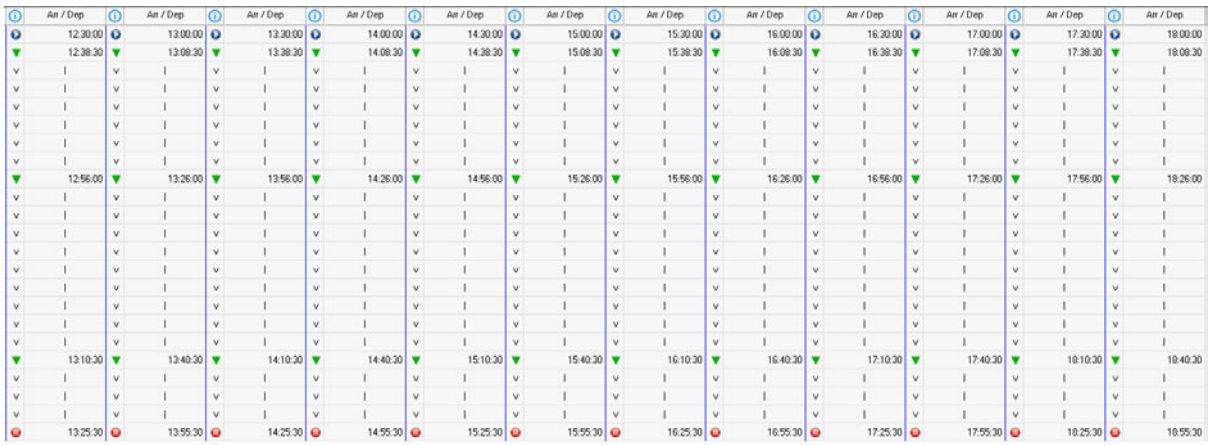
15:06:36	15:36:36	16:06:36	16:36:36	17:06:36	17:36:36	18:06:36
15:05:28	15:35:28	16:05:28	16:35:28	17:05:28	17:35:28	18:05:28
15:05:05	15:35:05	16:05:05	16:35:05	17:05:05	17:35:05	18:05:05
15:04:45	15:34:45	16:04:45	16:34:45	17:04:45	17:34:45	18:04:45
15:03:35	15:33:35	16:03:35	16:33:35	17:03:35	17:33:35	18:03:35
15:03:00	15:33:00	16:03:00	16:33:00	17:03:00	17:33:00	18:03:00
15:02:44	15:32:44	16:02:44	16:32:44	17:02:44	17:32:44	18:02:44
15:01:58	15:31:58	16:01:58	16:31:58	17:01:58	17:31:58	18:01:58
15:01:23	15:31:23	16:01:23	16:31:23	17:01:23	17:31:23	18:01:23
15:00:41	15:30:41	16:00:41	16:30:41	17:00:41	17:30:41	18:00:41
15:00:04	15:30:04	16:00:04	16:30:04	17:00:04	17:30:04	18:00:04
14:58:40	15:28:40	15:58:40	16:28:40	16:58:40	17:28:40	17:58:40
14:58:32	15:28:32	15:58:32	16:28:32	16:58:32	17:28:32	17:58:32
14:58:00	15:28:00	15:58:00	16:28:00	16:58:00	17:28:00	17:58:00



ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
101	36905	Bisalee Shopping Centre	07:00:00	07:30:00	08:00:00	08:30:00	09:00:00	09:30:00	10:00:00	10:30:00	11:00:00	11:30:00	12:00:00	
100	36902	Wodonga Water Tower, Hig	07:08:30	07:38:30	08:08:30	08:38:30	09:08:30	09:38:30	10:08:30	10:38:30	11:08:30	11:38:30	12:08:30	
199	369022	130 High St												
197	369024	44 High St												
145	369023	10 High St												
167	264023	Australia Park, Wodonga Pl												
176	264024	Wodonga Pl Opp Norvuil Pa												
166	264025	Dean St Opp QEII Square												
7	26403	QEII Square, Dean St	07:26:00	07:56:00	08:26:00	08:56:00	09:26:00	09:56:00	10:26:00	10:56:00	11:26:00	11:56:00	12:26:00	
59	264065	Dean St Before Olive St												
27	264019	Dean St Before David St												
81	2640110	David St After Dean St												
183	2640136	David St At Wilson St												
3	264042	David St After Wilson St												
117	2640158	David St Opp Bellevue St												
211	2640164	David St At Bellevue St												
116	2640159	Waugh Rd Before Caroline A												
215	2640163	Waugh Rd Opp Caroline Av												
16	26411	Lavington Square, Griffith St	07:40:30	08:10:30	08:40:30	09:10:30	09:40:30	10:10:30	10:40:30	11:10:30	11:40:30	12:10:30	12:40:30	
228	264137	Wagga Rd At McDonald Rd												
212	2640160	Elizabeth Mitchell Dr Before												
29	264011	Charles Sturt University												
29	264011	Charles Sturt University	07:55:30	08:25:30	08:55:30	09:25:30	09:55:30	10:25:30	10:55:30	11:25:30	11:55:30	12:25:30	12:55:30	



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12:30:00	13:00:00	13:30:00	14:00:00	14:30:00	15:00:00	15:30:00	16:00:00	16:30:00	17:00:00	17:30:00	18:00:00	
12:38:30	13:08:30	13:38:30	14:08:30	14:38:30	15:08:30	15:38:30	16:08:30	16:38:30	17:08:30	17:38:30	18:08:30	
12:56:00	13:26:00	13:56:00	14:26:00	14:56:00	15:26:00	15:56:00	16:26:00	16:56:00	17:26:00	17:56:00	18:26:00	
13:10:30	13:40:30	14:10:30	14:40:30	15:10:30	15:40:30	16:10:30	16:40:30	17:10:30	17:40:30	18:10:30	18:40:30	
13:25:30	13:55:30	14:25:30	14:55:30	15:25:30	15:55:30	16:25:30	16:55:30	17:25:30	17:55:30	18:25:30	18:55:30	

ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
101	36905	Bialiee Shopping Centre	07:55:30	08:25:30	08:55:30	09:25:30	09:55:30	10:25:30	10:55:30	11:25:30	11:55:30	12:25:30	12:55:30
100	36902	Wodonga Water Tower, Hig	07:48:00	08:18:00	08:48:00	09:18:00	09:48:00	10:18:00	10:48:00	11:18:00	11:48:00	12:18:00	12:48:00
199	369022	130 High St	|	|	|	|	|	|	|	|	|	|	|
197	369024	44 High St	|	|	|	|	|	|	|	|	|	|	|
145	369023	10 High St	|	|	|	|	|	|	|	|	|	|	|
167	264023	Australia Park, Wodonga Pl	|	|	|	|	|	|	|	|	|	|	|
176	264024	Wodonga Pl Opp Noreuil Pa	|	|	|	|	|	|	|	|	|	|	|
166	264025	Dean St Opp QEII Square	|	|	|	|	|	|	|	|	|	|	|
7	26403	QEII Square, Dean St	07:30:30	08:00:30	08:30:30	09:00:30	09:30:30	10:00:30	10:30:30	11:00:30	11:30:30	12:00:30	12:30:30
59	264065	Dean St Before Olive St	|	|	|	|	|	|	|	|	|	|	|
27	264019	Dean St Before David St	|	|	|	|	|	|	|	|	|	|	|
81	2640110	David St After Dean St	|	|	|	|	|	|	|	|	|	|	|
183	2640136	David St At Wilson St	|	|	|	|	|	|	|	|	|	|	|
3	264042	David St After Wilson St	|	|	|	|	|	|	|	|	|	|	|
117	2640158	David St Opp Bellevue St	|	|	|	|	|	|	|	|	|	|	|
211	2640164	David St At Bellevue St	|	|	|	|	|	|	|	|	|	|	|
116	2640159	Waugh Rd Before Caroline A	|	|	|	|	|	|	|	|	|	|	|
215	2640163	Waugh Rd Opp Caroline Av	|	|	|	|	|	|	|	|	|	|	|
16	26411	Lavington Square, Griffith St	07:16:00	07:46:00	08:16:00	08:46:00	09:16:00	09:46:00	10:16:00	10:46:00	11:16:00	11:46:00	12:16:00
229	264137	Wagga Rd At McDonald Rd	|	|	|	|	|	|	|	|	|	|	|
212	2640160	Elizabeth Mitchell Dr Before	|	|	|	|	|	|	|	|	|	|	|
29	264011	Charles Sturt University	|	|	|	|	|	|	|	|	|	|	|
29	264011	Charles Sturt University	07:00:00	07:30:00	08:00:00	08:30:00	09:00:00	09:30:00	10:00:00	10:30:00	11:00:00	11:30:00	12:00:00

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13:18:00	13:48:00	14:18:00	14:48:00	15:18:00	15:48:00	16:18:00	16:48:00	17:18:00	17:48:00	18:18:00	18:48:00
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13:00:30	13:30:30	14:00:30	14:30:30	15:00:30	15:30:30	16:00:30	16:30:30	17:00:30	17:30:30	18:00:30	18:30:30
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12:46:00	13:16:00	13:46:00	14:16:00	14:46:00	15:16:00	15:46:00	16:16:00	16:46:00	17:16:00	17:46:00	18:16:00
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12:30:00	13:00:00	13:30:00	14:00:00	14:30:00	15:00:00	15:30:00	16:00:30	16:30:00	17:00:00	17:30:00	18:00:00

ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
3	264042	David St After Wilson St	07:03:12	07:33:12	08:03:12	08:33:12	09:03:12	09:33:12	10:03:12	10:33:12	11:03:12	11:33:12	12:03:12	12:33:12	13:03:12	13:33:12
218	2640114	Frauenfelder St At Smith St	07:06:01	07:36:01	08:06:01	08:36:01	09:06:01	09:36:01	10:06:01	10:36:01	11:06:01	11:36:01	12:06:01	12:36:01	13:06:01	13:36:01
185	2640134	Frauenfelder St At Smith St	07:06:22	07:36:22	08:06:22	08:36:22	09:06:22	09:36:22	10:06:22	10:36:22	11:06:22	11:36:22	12:06:22	12:36:22	13:06:22	13:36:22
194	2640133	Frauenfelder St At Stephen S	07:07:09	07:37:09	08:07:09	08:37:09	09:07:09	09:37:09	10:07:09	10:37:09	11:07:09	11:37:09	12:07:09	12:37:09	13:07:09	13:37:09
80	2640115	Frauenfelder St At Stephen S	07:07:30	07:37:30	08:07:30	08:37:30	09:07:30	09:37:30	10:07:30	10:37:30	11:07:30	11:37:30	12:07:30	12:37:30	13:07:30	13:37:30
116	2640159	Waugh Rd Before Caroline A	07:09:12	07:39:12	08:09:12	08:39:12	09:09:12	09:39:12	10:09:12	10:39:12	11:09:12	11:39:12	12:09:12	12:39:12	13:09:12	13:39:12
215	2640163	Waugh Rd Opp Caroline Av	07:09:40	07:39:40	08:09:40	08:39:40	09:09:40	09:39:40	10:09:40	10:39:40	11:09:40	11:39:40	12:09:40	12:39:40	13:09:40	13:39:40
44	2640148	Union Rd At Wahroonga Rd	07:11:53	07:41:53	08:11:53	08:41:53	09:11:53	09:41:53	10:11:53	10:41:53	11:11:53	11:41:53	12:11:53	12:41:53	13:11:53	13:41:53
227	264136	Union Rd At Wahroonga Rd	07:12:13	07:42:13	08:12:13	08:42:13	09:12:13	09:42:13	10:12:13	10:42:13	11:12:13	11:42:13	12:12:13	12:42:13	13:12:13	13:42:13
11	2640149	Union Rd At Mardross Ct	07:12:57	07:42:57	08:12:57	08:42:57	09:12:57	09:42:57	10:12:57	10:42:57	11:12:57	11:42:57	12:12:57	12:42:57	13:12:57	13:42:57
230	264135	Union Rd Opp Mardross Ct	07:13:17	07:43:17	08:13:17	08:43:17	09:13:17	09:43:17	10:13:17	10:43:17	11:13:17	11:43:17	12:13:17	12:43:17	13:13:17	13:43:17
91	2640121	Union Rd After John Ct	07:14:10	07:44:10	08:14:10	08:44:10	09:14:10	09:44:10	10:14:10	10:44:10	11:14:10	11:44:10	12:14:10	12:44:10	13:14:10	13:44:10
138	264115	Union Rd Opp John Ct	07:14:31	07:44:31	08:14:31	08:44:31	09:14:31	09:44:31	10:14:31	10:44:31	11:14:31	11:44:31	12:14:31	12:44:31	13:14:31	13:44:31
98	2640150	Burrows Rd At Union Rd	07:15:24	07:45:24	08:15:24	08:45:24	09:15:24	09:45:24	10:15:24	10:45:24	11:15:24	11:45:24	12:15:24	12:45:24	13:15:24	13:45:24
41	2640143	Burrows Rd After Logan Rd	07:16:37	07:46:37	08:16:37	08:46:37	09:16:37	09:46:37	10:16:37	10:46:37	11:16:37	11:46:37	12:16:37	12:46:37	13:16:37	13:46:37
63	2640151	Burrows Rd At Logan Rd	07:17:05	07:47:05	08:17:05	08:47:05	09:17:05	09:47:05	10:17:05	10:47:05	11:17:05	11:47:05	12:17:05	12:47:05	13:17:05	13:47:05
40	2640142	Burrows Rd Opp Resolution	07:17:47	07:47:47	08:17:47	08:47:47	09:17:47	09:47:47	10:17:47	10:47:47	11:17:47	11:47:47	12:17:47	12:47:47	13:17:47	13:47:47
110	2640152	Burrows Rd After Resolution	07:18:09	07:48:09	08:18:09	08:48:09	09:18:09	09:48:09	10:18:09	10:48:09	11:18:09	11:48:09	12:18:09	12:48:09	13:18:09	13:48:09
43	2640141	Burrows Rd Opp Kurrell St	07:18:50	07:48:50	08:18:50	08:48:50	09:18:50	09:48:50	10:18:50	10:48:50	11:18:50	11:48:50	12:18:50	12:48:50	13:18:50	13:48:50
118	2640153	Burrows Rd At Kurrell St	07:19:12	07:49:12	08:19:12	08:49:12	09:19:12	09:49:12	10:19:12	10:49:12	11:19:12	11:49:12	12:19:12	12:49:12	13:19:12	13:49:12
112	26407	Watson Rd Before Ryan Rd	07:20:04	07:50:04	08:20:04	08:50:04	09:20:04	09:50:04	10:20:04	10:50:04	11:20:04	11:50:04	12:20:04	12:50:04	13:20:04	13:50:04
42	2640140	Wilkinson St Before Watson	07:20:45	07:50:45	08:20:45	08:50:45	09:20:45	09:50:45	10:20:45	10:50:45	11:20:45	11:50:45	12:20:45	12:50:45	13:20:45	13:50:45
186	2640139	Wilkinson St After Tenbink	07:21:22	07:51:22	08:21:22	08:51:22	09:21:22	09:51:22	10:21:22	10:51:22	11:21:22	11:51:22	12:21:22	12:51:22	13:21:22	13:51:22
9	26406	TAFE Albury Campus, Sack	07:23:24	07:53:24	08:23:24	08:53:24	09:23:24	09:53:24	10:23:24	10:53:24	11:23:24	11:53:24	12:23:24	12:53:24	13:23:24	13:53:24
30	264010	Sackville St Opp TAFE Albu	07:23:48	07:53:48	08:23:48	08:53:48	09:23:48	09:53:48	10:23:48	10:53:48	11:23:48	11:53:48	12:23:48	12:53:48	13:23:48	13:53:48
187	2640138	Poole St After Kiewa St	07:24:50	07:54:50	08:24:50	08:54:50	09:24:50	09:54:50	10:24:50	10:54:50	11:24:50	11:54:50	12:24:50	12:54:50	13:24:50	13:54:50
108	2640154	Poole St Before Kiewa St	07:25:11	07:55:11	08:25:11	08:55:11	09:25:11	09:55:11	10:25:11	10:55:11	11:25:11	11:55:11	12:25:11	12:55:11	13:25:11	13:55:11
182	2640137	Albury High School, Kiewa S	07:26:00	07:56:00	08:26:00	08:56:00	09:26:00	09:56:00	10:26:00	10:56:00	11:26:00	11:56:00	12:26:00	12:56:00	13:26:00	13:56:00
107	2640155	Kiewa St Before Kiewa Pl	07:27:01	07:57:01	08:27:01	08:57:01	09:27:01	09:57:01	10:27:01	10:57:01	11:27:01	11:57:01	12:27:01	12:57:01	13:27:01	13:57:01
7	26403	QEII Square, Dean St	07:28:27	07:58:27	08:28:27	08:58:27	09:28:27	09:58:27	10:28:27	10:58:27	11:28:27	11:58:27	12:28:27	12:58:27	13:28:27	13:58:27

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DbjNo	DbjCode	DbjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
16	26411	Lavington Square, Griffith St	07:00:00	07:30:00	08:00:00	08:30:00	09:00:00	09:30:00	10:00:00	10:30:00	11:00:00	11:30:00	12:00:00
228	264137	Wagga Rd At McDonald Rd	07:02:47	07:32:47	08:02:47	08:32:47	09:02:47	09:32:47	10:02:47	10:32:47	11:02:47	11:32:47	12:02:47
68	264147	Kaitlers Rd Before Chalia Pl	07:06:27	07:36:27	08:06:27	08:36:27	09:06:27	09:36:27	10:06:27	10:36:27	11:06:27	11:36:27	12:06:27
132	264122	Baranbale Way Opp Burong	07:08:10	07:38:10	08:08:10	08:38:10	09:08:10	09:38:10	10:08:10	10:38:10	11:08:10	11:38:10	12:08:10
48	26413	Baranbale Way Before Carol	07:09:18	07:39:18	08:09:18	08:39:18	09:09:18	09:39:18	10:09:18	10:39:18	11:09:18	11:39:18	12:09:18
131	264123	Baranbale Way Opp Dami Dr	07:10:40	07:40:40	08:10:40	08:40:40	09:10:40	09:40:40	10:10:40	10:40:40	11:10:40	11:40:40	12:10:40
134	264124	Kemp St Before Kaitlers Rd	07:11:57	07:41:57	08:11:57	08:41:57	09:11:57	09:41:57	10:11:57	10:41:57	11:11:57	11:41:57	12:11:57
70	264145	Kaitlers Rd Before Kemp St	07:12:43	07:42:43	08:12:43	08:42:43	09:12:43	09:42:43	10:12:43	10:42:43	11:12:43	11:42:43	12:12:43
19	26414	Kaitlers Rd Opp Garoogong	07:13:36	07:43:36	08:13:36	08:43:36	09:13:36	09:43:36	10:13:36	10:43:36	11:13:36	11:43:36	12:13:36
21	26419	Kaitlers Rd At Garoogong Rd	07:14:09	07:44:09	08:14:09	08:44:09	09:14:09	09:44:09	10:14:09	10:44:09	11:14:09	11:44:09	12:14:09
133	264125	Kaitlers Rd At Saville Av	07:14:56	07:44:56	08:14:56	08:44:56	09:14:56	09:44:56	10:14:56	10:44:56	11:14:56	11:44:56	12:14:56
71	264144	Kaitlers Rd After Prune St	07:15:41	07:45:41	08:15:41	08:45:41	09:15:41	09:45:41	10:15:41	10:45:41	11:15:41	11:45:41	12:15:41
136	264126	Kaitlers Rd At Prune St	07:16:12	07:46:12	08:16:12	08:46:12	09:16:12	09:46:12	10:16:12	10:46:12	11:16:12	11:46:12	12:16:12
135	264127	Hague St At Zago Ct	07:17:19	07:47:19	08:17:19	08:47:19	09:17:19	09:47:19	10:17:19	10:47:19	11:17:19	11:47:19	12:17:19
129	264128	Hague St At Schaefer St	07:18:10	07:48:10	08:18:10	08:48:10	09:18:10	09:48:10	10:18:10	10:48:10	11:18:10	11:48:10	12:18:10
127	264129	Hague St Opp Moffat St	07:19:08	07:49:08	08:19:08	08:49:08	09:19:08	09:49:08	10:19:08	10:49:08	11:19:08	11:49:08	12:19:08
20	26415	Hague St At Urana Rd	07:20:24	07:50:24	08:20:24	08:50:24	09:20:24	09:50:24	10:20:24	10:50:24	11:20:24	11:50:24	12:20:24
225	264130	Urana Road Oval, Urana Rd	07:21:28	07:51:28	08:21:28	08:51:28	09:21:28	09:51:28	10:21:28	10:51:28	11:21:28	11:51:28	12:21:28
226	264131	Urana Rd After Mcdonald Rd	07:22:20	07:52:20	08:22:20	08:52:20	09:22:20	09:52:20	10:22:20	10:52:20	11:22:20	11:52:20	12:22:20
223	264132	Urana Rd Before Breen St	07:23:23	07:53:23	08:23:23	08:53:23	09:23:23	09:53:23	10:23:23	10:53:23	11:23:23	11:53:23	12:23:23
16	26411	Lavington Square, Griffith St	07:26:13	07:56:13	08:26:13	08:56:13	09:26:13	09:56:13	10:26:13	10:56:13	11:26:13	11:56:13	12:26:13
16	26411	Lavington Square, Griffith St	07:26:49	07:56:49	08:26:49	08:56:49	09:26:49	09:56:49	10:26:49	10:56:49	11:26:49	11:56:49	12:26:49
16	26411	Lavington Square, Griffith St	07:26:50	07:56:50	08:26:50	08:56:50	09:26:50	09:56:50	10:26:50	10:56:50	11:26:50	11:56:50	12:26:50

Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
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12:32:47	13:02:47	13:32:47	14:02:47	14:32:47	15:02:47	15:32:47	16:02:47	16:32:47	17:02:47	17:32:47	18:02:47
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12:42:43	13:12:43	13:42:43	14:12:43	14:42:43	15:12:43	15:42:43	16:12:43	16:42:43	17:12:43	17:42:43	18:12:43
12:43:36	13:13:36	13:43:36	14:13:36	14:43:36	15:13:36	15:43:36	16:13:36	16:43:36	17:13:36	17:43:36	18:13:36
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ObjNo	ObjCode	ObjName	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
29	264011	Charles Sturt University	08:00:00	08:30:00	09:00:00	09:30:00	10:00:00	10:30:00	11:00:00	11:30:00	12:00:00	
3718			08:01:31	08:31:31	09:01:31	09:31:31	10:01:31	10:31:31	11:01:31	11:31:31	12:01:31	
1651			08:03:39	08:33:39	09:03:39	09:33:39	10:03:39	10:33:39	11:03:39	11:33:39	12:03:39	
6041			08:08:01	08:38:01	09:08:01	09:38:01	10:08:01	10:38:01	11:08:01	11:38:01	12:08:01	
5259			08:10:17	08:40:17	09:10:17	09:40:17	10:10:17	10:40:17	11:10:17	11:40:17	12:10:17	
4853			08:11:28	08:41:28	09:11:28	09:41:28	10:11:28	10:41:28	11:11:28	11:41:28	12:11:28	
3928			08:13:38	08:43:38	09:13:38	09:43:38	10:13:38	10:43:38	11:13:38	11:43:38	12:13:38	
1705			08:15:32	08:45:32	09:15:32	09:45:32	10:15:32	10:45:32	11:15:32	11:45:32	12:15:32	
3325			08:17:15	08:47:15	09:17:15	09:47:15	10:17:15	10:47:15	11:17:15	11:47:15	12:17:15	
3718			08:18:44	08:48:44	09:18:44	09:48:44	10:18:44	10:48:44	11:18:44	11:48:44	12:18:44	
29	264011	Charles Sturt University	08:19:52	08:49:52	09:19:52	09:49:52	10:19:52	10:49:52	11:19:52	11:49:52	12:19:52	

Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep	Arr / Dep
12:30:00	13:00:00	13:30:00	14:00:00	14:30:00	15:00:00	15:30:00	16:00:00	16:30:00	17:00:00	17:30:00	18:00:00
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12:33:39	13:03:39	13:33:39	14:03:39	14:33:39	15:03:39	15:33:39	16:03:39	16:33:39	17:03:39	17:33:39	18:03:39
12:38:01	13:08:01	13:38:01	14:08:01	14:38:01	15:08:01	15:38:01	16:08:01	16:38:01	17:08:01	17:38:01	18:08:01
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12:48:44	13:18:44	13:48:44	14:18:44	14:48:44	15:18:44	15:48:44	16:18:44	16:48:44	17:18:44	17:48:44	18:18:44
12:49:52	13:19:52	13:49:52	14:19:52	14:49:52	15:19:52	15:49:52	16:19:52	16:49:52	17:19:52	17:49:52	18:19:52

10.6. APPENDIX F

Due to the shear size of these matrices, they could not be included in their entirety so examples of each one has been included.

Car

2.919522	1.866314	1.289432	6.629414	2.740353	7.645834	6.364822	2.790191	2.998578	1.498797	1.329263	7.156539	6.423621	7.013998	7.928711	8.868773	8.658068
0	1.439544	1.834942	7.223194	3.49559	6.132128	6.854288	1.06113	1.269517	1.447113	2.641209	7.309749	6.181634	6.964984	6.622308	6.62705	7.003946
1.431858	0	1.459943	7.866747	2.489961	7.600015	7.602155	2.019577	2.227963	1.530745	2.170812	8.463641	7.642157	8.251331	8.090195	8.094937	8.471832
1.787255	1.402438	0	7.178458	2.796699	7.238362	6.913865	1.657925	1.866311	0.744016	1.191708	7.705582	6.972664	7.563041	7.728543	7.733284	8.11018
7.776947	8.603187	8.026305	0	9.477226	3.687798	0.864953	7.044858	7.182365	8.23567	8.066136	2.397058	1.949926	2.254517	2.782456	2.961252	3.580599
3.519621	2.466413	2.830656	8.617239	0	8.953857	8.352646	3.39029	3.598677	2.901459	2.921303	9.144363	8.411445	9.001822	9.421403	9.46565	9.842546
8.517004	9.834437	9.34425	3.91908	10.83743	0	3.131976	8.328292	8.319132	9.238659	9.280935	1.807989	1.111928	1.438437	1.138263	1.943963	1.595862
7.546352	8.372592	7.79571	0.872018	9.246631	2.900927	0	6.814264	6.95177	8.005075	7.835541	1.610187	1.163056	1.467646	1.995586	2.174382	2.793728
1.048183	1.997524	1.692664	6.423729	3.391786	6.389475	6.159136	0	0.661443	1.052649	2.498931	7.18069	6.319354	6.901097	6.879655	6.884397	7.261293
1.255863	2.205204	1.900344	6.562286	3.599466	6.449528	6.297693	0.662493	0	1.087949	2.706611	7.08941	6.356492	6.946869	6.939708	6.94445	7.321346
1.432443	1.475006	0.745782	7.38888	2.869268	6.88355	7.124288	1.050927	1.086933	0	1.402131	7.952845	7.047084	7.750281	7.37373	7.378472	7.755368
2.596024	2.061199	1.193502	7.220083	2.935238	8.140297	6.95549	2.466693	2.67508	1.402867	0	7.747207	7.014289	7.604667	8.51938	8.542053	8.845169
8.68625	9.173786	8.596904	2.406767	10.04783	1.799677	1.619664	7.615458	7.752964	8.806269	8.636735	0	1.670246	0.656939	0.683435	1.127918	1.197727
7.909792	8.524446	7.947563	1.97797	9.398485	1.114052	1.190867	6.966117	7.103624	8.156929	7.987395	1.714573	0	1.345022	1.364159	2.109158	1.846473
8.485773	9.031373	8.454491	2.264355	9.905413	1.428909	1.477251	7.473045	7.610551	8.663856	8.494323	0.656939	1.299478	0	0.725328	1.470328	1.540137
8.907173	10.08054	9.563471	2.792184	11.0775	1.120143	2.005081	8.668581	8.656485	9.620541	9.453218	0.683748	1.320145	0.726858	0	1.078333	0.824266
8.779244	10.09824	9.743659	2.971924	11.39742	1.961154	2.184821	8.58366	8.5745	9.480316	9.621182	1.128802	2.065715	1.472428	1.078903	0	0.976896
9.165051	10.55904	10.20445	3.635195	11.85821	1.584258	2.848091	8.969467	8.960307	9.866123	10.32695	1.209576	1.851347	1.553202	0.830782	0.9481	0
7.393007	8.219246	7.642364	1.017669	9.093286	3.46787	0.965375	6.660918	6.798424	7.851729	7.682196	2.177113	1.729981	2.034572	2.562512	2.741308	3.360654
6.343964	7.170203	6.593321	1.3741	8.044243	2.903426	1.308582	5.611875	5.749381	6.802687	6.633153	2.100299	1.517239	1.957759	2.485698	2.989557	3.867209
8.145055	9.190227	8.682511	3.117425	9.890371	0.557291	2.330321	7.762328	7.709161	8.743991	8.479281	1.514923	0.818862	1.145371	1.049044	1.909508	1.506644
6.740806	7.567046	6.990164	1.986881	8.441085	2.480789	1.199777	6.008717	6.146224	7.199529	7.029995	1.991495	1.258577	1.848954	2.763667	3.62987	3.493024
7.895903	8.878129	8.370414	2.804629	9.577575	1.503493	2.017526	7.458174	7.392623	8.427931	8.166485	2.344945	1.174197	2.113404	1.993673	2.897471	2.617994
10.8311	12.24332	11.91844	5.8822	13.5993	4.16593	5.248816	10.63551	10.62635	11.53217	12.81807	3.791248	4.709156	4.134873	3.412454	2.804776	3.181672
3.129502	2.076294	1.938186	7.673953	2.950333	8.503341	7.40936	3.000172	3.208558	2.147552	1.978018	8.201077	7.468159	8.058537	8.972991	9.075531	9.452427
8.591598	6.173352	9.745519	11.82345	3.828869	11.62736	11.55886	7.859509	7.997016	9.286713	7.504174	12.35057	11.61765	12.20803	12.11754	12.12228	12.49918
4.538898	6.310192	5.73331	4.3876	7.184231	5.404019	4.123007	3.806809	3.944315	5.705476	5.773141	4.914725	4.181807	4.772184	5.686897	5.549164	6.349382
7.124829	7.951069	7.374187	1.336167	8.825108	4.762977	1.767787	6.392741	6.530247	7.583552	7.414018	3.237186	2.790054	3.094645	3.622585	3.801381	4.876489
2.397421	3.42351	3.118649	6.202147	4.817771	6.006056	5.937554	1.260843	1.39835	2.370707	3.924916	6.729271	5.996353	6.586731	6.496236	6.500978	6.877874
2.992576	2.782618	3.454773	9.341769	3.490724	9.029014	9.077176	4.014408	4.222794	3.525576	3.645834	10.13922	9.011103	9.751752	9.519194	9.523936	9.900832
1.954614	2.430296	3.622624	8.335902	4.314326	7.244836	7.966997	2.899505	3.278498	3.285488	4.031641	8.422458	7.294342	8.077692	7.735017	7.739758	8.116654
2.584046	4.042827	3.737966	5.815895	5.437088	5.619804	5.551302	1.61614	1.753646	2.803526	4.657546	6.343019	5.610101	6.200479	6.109985	6.114726	6.491622

Current PT

0	290.0301	266.2463	289.2968	114.9609	118.1109	253.4636	279.9498	104.9943	289.9556	306.6563	278.365	186.5672	171.9633	279.9339	298.5745
37.11667	0	267.9797	291.0301	116.6943	119.8443	255.197	281.6832	106.7276	291.6889	308.3896	280.0984	188.3005	173.6966	281.6673	300.3078
39.83333	38.1	0	37.36667	107.1559	110.3059	78.79962	77.94665	97.18928	64.57998	73.94665	36.44165	172.5158	159.3564	35.24337	75.90947
37.85	36.11667	268.713	0	117.4276	120.5776	255.9303	282.4165	107.4609	292.4222	309.123	280.8317	189.0338	174.4299	282.4006	301.0411
246.8898	245.1564	221.1642	244.4231	0	41.68333	207.7414	234.7616	95.65964	244.4994	261.3424	233.8294	175.9013	161.0937	234.1711	253.2048
243.7398	242.0064	218.0142	241.2731	102.4763	0	204.5914	231.6116	92.50964	241.3494	258.1924	230.6793	172.7513	157.9437	231.0211	250.0548
38.11934	36.38601	17.42309	35.65267	88.80763	91.95762	0	41.66227	78.84096	47.54449	63.45917	34.71307	154.1422	141.597	32.18311	56.52222
71.73098	69.99764	51.28251	69.26431	122.0516	125.2016	33.77352	0	112.085	47.81007	67.97157	68.42129	187.2522	175.262	50.62674	55.62674
256.8564	255.1231	231.1308	254.3898	48.5	51.65	217.7081	244.7282	0	254.4661	271.3091	243.796	185.8679	171.0604	244.1377	263.1714
85.09764	83.36431	64.64918	82.63098	133.0663	136.2163	47.14019	40.06977	123.0997	0	36.06977	81.78796	202.9434	187.9871	38.44341	43.44341
75.73097	73.99764	55.28251	73.26431	125.907	129.057	37.77352	30.7031	115.9403	74.48281	0	72.4213	191.2038	179.1583	76.04797	82.31646
116.313	114.5797	88.09361	113.8463	125.3812	128.5312	79.85079	82.86342	115.4145	69.49676	78.86343	0	189.0224	174.8376	40.16033	80.84159
314.9311	313.1977	290.1841	312.4644	156.2268	159.3768	278.2275	304.4334	146.2602	314.1844	330.8532	302.1223	0	212.3387	304.5251	322.7242
338.5944	336.8611	313.8886	336.1277	179.8273	182.9773	301.8828	328.0738	169.8606	337.8357	354.4841	325.7743	99.97875	0	328.1801	346.3743
76.16118	74.42785	50.11073	73.69451	94.14927	97.29926	39.4805	42.04184	84.1826	29.05338	38.42005	56.75031	165.4058	149.4698	0	38.88386
92.73098	90.99765	72.28484	90.26431	128.2059	131.3559	54.77352	47.7031	118.2393	34.33644	43.7031	89.48057	196.8755	181.3078	31.7031	0
99.3632	97.62988	68.33081	96.89654	107.9667	111.1167	62.37075	73.34605	98	59.55203	68.91771	71.70239	178.3031	162.5728	30.23347	70.83743
95.46764	93.7343	64.64555	93.00096	103.8763	107.0263	58.90024	69.30764	93.90962	55.57306	64.93906	67.56935	173.7672	158.1637	26.24754	66.84776
102.3684	100.6351	66.41624	99.90176	101.2631	104.4131	64.90073	67.9229	91.29645	54.55623	63.9229	66.27192	171.4971	155.5923	25.2198	65.84654
167.1447	165.4114	138.1929	164.6781	176.3582	179.5083	130.7317	141.7039	166.3916	127.7822	137.1479	140.6607	246.4292	231.0631	98.36997	138.9803
79.84131	78.10797	59.02081	77.37464	121.9539	125.1039	42.30269	35.28263	111.9872	37.62478	31.28062	74.65709	189.6685	176.4159	40.3688	45.44144
291.0801	289.3468	265.563	288.6135	114.2776	117.4276	252.7803	279.2665	104.3109	289.2722	305.973	277.6817	185.8838	171.2799	279.2506	297.8911
290.7468	289.0135	265.2297	288.2801	113.9443	117.0943	252.447	278.9332	103.9776	288.9389	305.6396	277.3484	185.5505	170.9466	278.9173	297.5578
289.6968	287.9635	264.1797	287.2301	112.8943	116.0443	251.397	277.8832	102.9276	287.8889	304.5896	276.2984	184.5005	169.8966	277.8673	296.5078
121.2646	119.5312	78.50552	118.7979	119.649	122.799	84.82676	87.84003	109.6823	74.47337	83.84003	34.70534	181.3049	167.3045	45.13693	85.81896
41.13333	39.4	36.68333	38.66667	97.25659	100.4066	115.483	114.63	87.28993	101.2633	110.63	73.35802	165.7673	151.8094	71.9267	112.5928
249.5398	247.8064	223.8142	247.0731	41.18333	44.33333	210.3914	237.4116	98.30964	247.1494	263.9924	236.4793	178.5513	163.7437	236.8211	255.8548
145.5706	143.8373	125.2035	143.1039	191.5849	194.7349	110.4082	144.2259	181.6183	128.9074	138.2716	142.6337	257.4767	245.9423	100.008	139.998

Express

0	186.9068	170.082	186.1735	114.943	118.093	151.0696	191.962	104.9763	200.9823	218.9318	187.2037	176.2709
37.11667	0	171.8154	187.9068	116.6763	119.8263	152.803	193.6953	106.7096	202.7157	220.6651	188.937	178.0042
39.83333	38.1	0	37.36667	103.5268	106.6768	74.54342	77.94669	93.56014	64.58002	73.94669	36.42694	162.7442
37.85	36.11667	172.5487	0	117.4096	120.5596	153.5363	194.4287	107.443	203.449	221.3985	189.6703	178.7376
176.6817	174.9484	156.9778	174.215	0	41.68333	138.7823	175.8238	95.65964	185.0945	203.87	174.0968	165.697
173.5317	171.7984	153.8278	171.065	102.4763	0	135.6323	172.6738	92.50964	181.9445	200.72	170.9468	162.547
38.11933	36.386	17.42309	35.65267	87.98015	91.13015	0	41.53392	78.01348	47.13343	63.00517	34.70582	143.2395
71.73097	69.99764	51.37654	69.2643	121.5775	124.7275	33.77352	0	111.6108	47.81007	67.97157	68.42129	178.2712
186.6484	184.915	166.9445	184.1817	48.5	51.65	148.749	185.7904	0	195.0611	213.8366	184.0635	175.6637
85.09764	83.3643	64.7432	82.63097	133.4929	136.6429	47.14019	40.06977	123.5263	0	36.06977	81.78796	191.7319
75.73097	73.99764	55.37654	73.2643	125.4179	128.5679	37.77352	30.7031	115.4512	74.87567	0	72.4213	182.2712
112.7271	110.9938	89.50392	110.2605	119.5996	122.7496	76.72135	82.86342	109.6329	69.49676	78.86343	0	181.394
229.361	227.6277	218.0405	226.8943	156.2268	159.3768	192.0191	234.0288	146.2602	243.2105	260.323	234.3158	0
198.6924	196.9591	178.2429	196.2258	179.8273	182.9773	160.7348	202.9708	169.8606	212.1286	229.2659	195.176	99.97875
73.87166	72.13834	49.33786	71.40499	94.70533	97.85533	36.48043	41.97604	84.73866	29.05338	38.42005	56.5904	156.0215
92.72712	90.99378	72.37513	90.26045	126.701	129.851	54.76952	47.7031	116.7343	34.33644	43.7031	89.46425	191.4659
97.13213	95.39881	68.34245	94.66547	107.8744	111.0244	60.33402	73.43875	97.90776	59.5524	68.91772	71.71801	169.5019
93.06982	91.33648	64.66345	90.60316	103.5737	106.7237	56.83775	69.387	93.60702	55.57331	64.93906	67.59922	164.9593
99.04253	97.3092	66.41686	96.57585	100.8444	103.9944	61.78084	67.9229	90.87778	54.55623	63.9229	66.27193	161.3392
170.562	168.8287	138.591	168.0954	176.0453	179.1953	133.609	142.0059	166.0787	127.9791	137.3445	140.6907	244.8308
79.87489	78.14156	58.95682	77.40822	122.0553	125.2053	42.24192	35.28263	112.0887	37.61161	31.28062	74.5654	180.7809
187.9568	186.2235	169.3987	185.4901	114.2596	117.4096	150.3863	191.2786	104.293	200.299	218.2485	186.5203	175.5876
187.6235	185.8901	169.0654	185.1568	113.9263	117.0763	150.053	190.9453	103.9596	199.9657	217.9151	186.187	175.2543
186.5735	184.8401	168.0154	184.1068	112.8763	116.0263	149.003	189.8953	102.9096	198.9157	216.8651	185.137	174.2043
117.6991	115.9658	78.51998	115.2325	111.8299	114.9799	81.69795	87.84003	101.8632	74.47337	83.84003	34.70534	171.5624
41.13333	39.4	36.68333	38.66667	97.0988	100.2488	106.9918	114.3246	87.13213	101.2634	110.63	73.35802	155.6146
179.3317	177.5984	159.6278	176.865	41.18333	44.33333	141.4323	178.4738	98.30964	187.7445	206.52	176.7468	168.347

Redesign

0	72.68641	63.38564	71.95308	70.73701	73.88701	53.89851	86.53604	60.77034	76.08952	218.9318	187.2037	116.1218	103.0214
16.73333	0	65.11897	73.68641	72.47034	75.62034	55.63184	88.26937	62.50368	77.82285	220.6651	188.937	117.8552	104.7547
19.45	17.71667	0	16.98333	68.68	71.83	40.53336	35.1249	58.71333	24.70693	73.94669	36.42694	102.7218	89.53168
17.46667	15.73333	65.8523	0	73.20368	76.35368	56.36517	89.00271	63.23701	78.55618	221.3985	189.6703	118.5885	105.488
62.72229	60.98896	43.99278	60.25563	0	18.15	41.47717	64.41983	48.83299	54.00268	203.87	174.0968	103.6925	90.59986
59.57229	57.83896	40.84278	57.10562	55.64966	0	38.32717	61.26983	45.68299	50.85268	200.72	170.9468	100.5425	87.44986
20.94925	19.21592	12.25448	18.48258	31.8777	35.0277	0	37.78094	21.91103	27.36942	63.00517	34.70582	62.22691	49.12302
40.40445	38.67112	31.97578	37.93779	51.56021	54.71021	19.68271	0	41.59355	46.63638	67.97157	68.42129	81.90594	68.80555
72.68896	70.95562	53.95945	70.22229	24.96667	28.11667	51.44384	74.38649	0	63.96934	213.8366	184.0635	113.6592	100.5665
51.19309	49.45976	42.60548	48.72642	62.36568	65.51568	30.48895	25.0421	52.39902	0	36.06977	81.78796	92.69764	79.61222
75.73097	73.99764	55.37654	73.2643	125.4179	128.5679	37.77352	30.7031	115.4512	74.87567	0	72.4213	182.2712	165.6879
112.7271	110.9938	89.50392	110.2605	119.5996	122.7496	76.72135	82.86342	109.6329	69.49676	78.86343	0	181.394	175.0553
229.361	227.6277	218.0405	226.8943	156.2268	159.3768	192.0191	234.0288	146.2602	243.2105	260.323	234.3158	0	212.3386
93.29925	91.56592	84.60448	90.83258	104.2277	107.3777	72.35	110.1309	94.26103	99.71942	229.2659	195.176	38.93333	0
49.44925	47.71592	40.75448	46.98258	60.3777	63.5277	28.5	66.28094	50.41103	55.86942	38.42005	56.5904	76.72691	63.62302
92.72712	90.99378	72.37513	90.26045	126.701	129.851	54.76952	47.7031	116.7343	34.33644	43.7031	89.46425	191.4659	180.6282
78.24843	76.5151	69.55525	75.78177	89.17887	92.32887	57.30139	95.07939	79.21221	84.66843	68.91772	71.71801	105.5244	92.42421
76.59843	74.8651	67.90525	74.13177	87.52887	90.67887	55.65139	93.42939	77.56221	83.01843	64.93906	67.59922	103.8744	90.77421
69.76592	68.03258	61.07115	67.29925	80.69436	83.84436	48.81667	86.5976	70.7277	76.18608	63.9229	66.27193	97.04358	83.93969
76.04843	74.3151	67.35525	73.58177	86.97887	90.12887	55.10139	92.87939	77.01221	82.46843	137.3445	140.6907	103.3244	90.22421
79.87489	78.14156	58.95682	77.40822	122.0553	125.2053	42.24192	35.28263	112.0887	37.61161	31.28062	74.5654	180.7809	166.1439
73.73641	72.00307	62.7023	71.26974	70.05368	73.20368	53.21517	85.8527	60.08701	75.40618	218.2485	186.5203	115.4385	102.338
73.40308	71.66974	62.36897	70.93641	69.72034	72.87034	52.88184	85.51937	59.75368	75.07285	217.9151	186.187	115.1052	102.0047
72.35307	70.61974	61.31897	69.88641	68.67034	71.82034	51.83184	84.46937	58.70368	74.02285	216.8651	185.137	114.0552	100.9547