Traffic Impact Assessment

Proposed Mixed-Use Development
1-7 Station Street, Parramatta

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Contents

1. Introduction

TRAFFIX has been commissioned by Greenrock Property to undertake a traffic impact assessment to accompany the Planning Proposal for the site located at 1-7 Station Street, Parramatta. The proposal seeks to increase the height and floor space ratio on the site as discussed in Section 4 of this report. From a traffic perspective, any increase in the site's FSR would equate to 104-216 residential apartments, 207m^2 retail GFA and 1,903m^2 commercial GFA (as advised to TRAFFIX) and these indicative areas have been adopted for traffic assessment purposes. As a Planning Proposal, the development yields assumed for assessment are indicative only and any firm proposal would be the subject of a subsequent development application.

The development is located within the Parramatta Local Government Area, and the proposal has been developed with due consideration of State and Council planning controls. The objective of this report is to assess the traffic impacts of the concept plan that has been adopted for assessment purposes. This report documents the findings of our investigations and should be read in the context of the Planning Report provided separately.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions.

2. Location and Site

The site is known as 1-7 Station Street West, Parramatta and consists of four lots (Lot 31 Section 1 DP 976, Lot A DP 340959, Lot 33 Section 1 DP 976 and Lot 34 Section 1 DP976). It is located on the northwest corner of Station Street and Raymond Street, approximately 90 metres south of the Harris Park Railway Station, approximately 950 metres south of the Parramatta Town Centre, approximately 13.8 kilometres southwest of Macquarie Park and approximately 22 kilometres west of Sydney CBD.

The site has a rectangular configuration and currently accommodates a commercial building, two residential houses and a community centre over a combined site area of 1,840m^2. It has a southern frontage of approximately 40 metres to Raymond Street, an eastern frontage of approximately 44 metres to Station Street and a western frontage of approximately 42 metres to Raymond Lane. The site is bounded to the north by a residential property.

The site currently provides three driveways off Raymond Lane, with no vehicular access provided via Raymond Street or Station Street.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

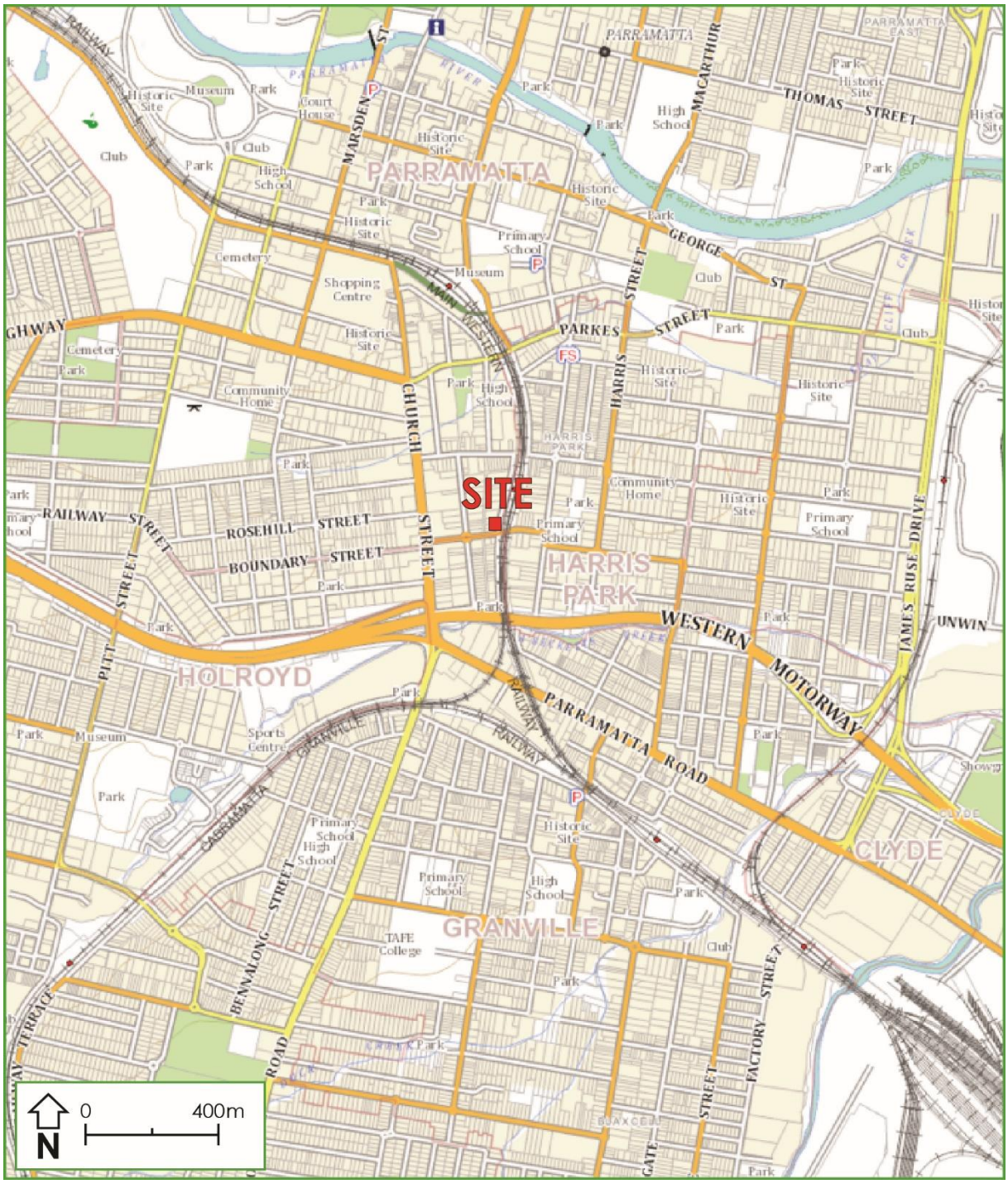


Figure 1: Location Plan

Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Network

The road hierarchy surrounding the site is shown in **Figure 3**, with the following roads in proximity to the site being of particular interest:

- Parkes Street: an RMS State Road (SR2049) which runs in an east-west direction between Hassall Street in the east and Church Street in the west. This road serves as a connection between Great Western Highway to the west, James Ruse Drive to the east and Parramatta Road to the south (via Church Street). It carries approximately 28,000vpd and is subject to a 60 km/h speed zoning. Parkes Street provides two lanes of traffic in either direction.

- Church Street: an RMS Main Road (MR637) which runs in a north-south direction between Great Western Highway in the north and Parramatta Road in the south. It carries approximately 27,400vpd and is subject to a 60 km/h speed zoning. It provides three lanes of traffic in either direction.

- Raymond Street: a local collector road which runs in an east-west direction from Station Street in the east to Church Street in the west. It provides a single lane of traffic in either direction and generally provides kerbside parking along both sides.

- Station Street: a local road which runs in a north-south direction from Marion Street in the north to Raymond Street in the south. It provides a single lane of traffic in only the northbound direction with kerbside parking along the west side.

It can be seen from Figure 3 that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts. It is most noteworthy however that the site's proximity to Harris Park Station will encourage the use of public transport which will further reduce the impact of private vehicles on the local road network.

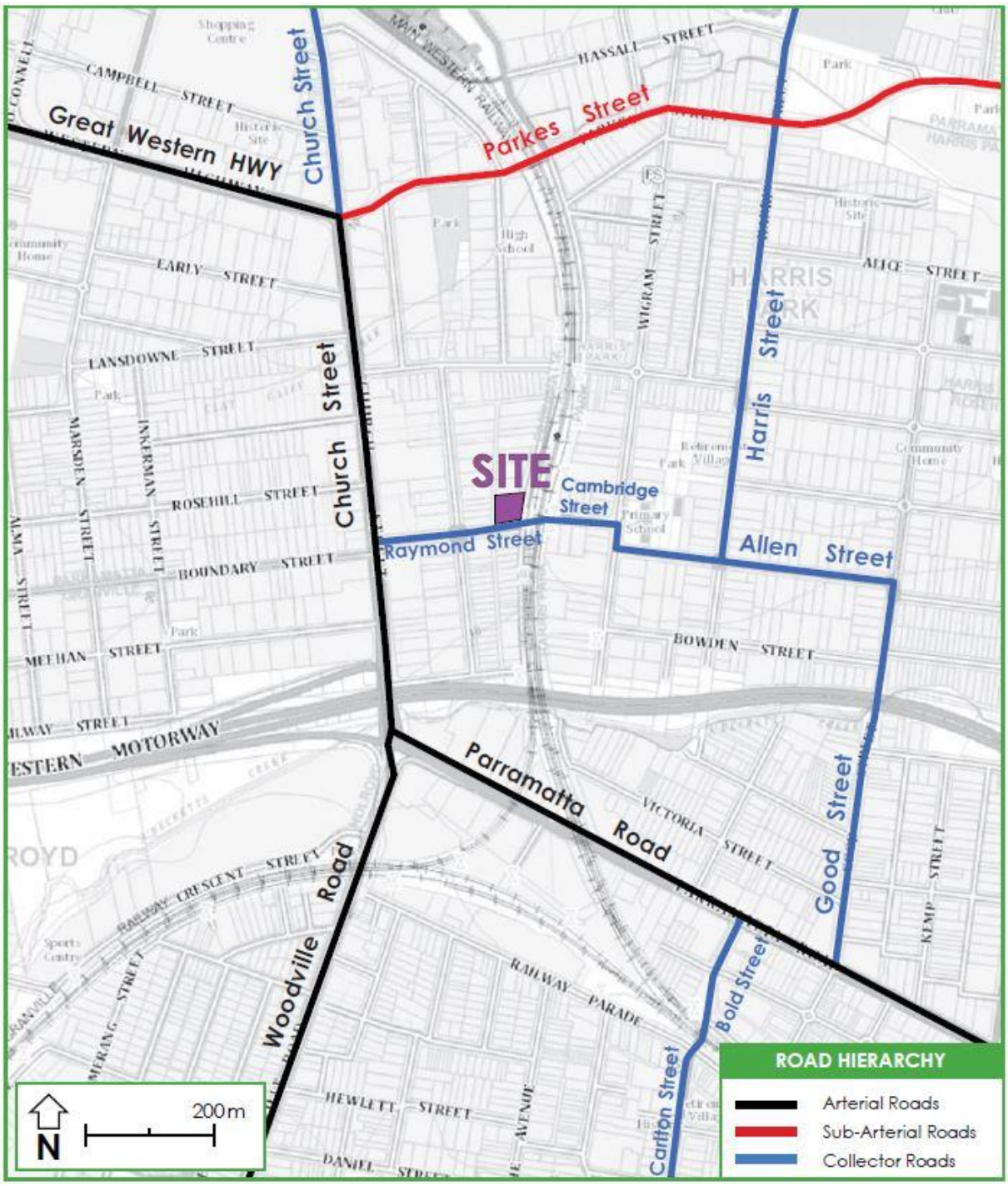


Figure 3: Road Hierarchy

3.2 Existing Intersection Performance

For the purposes of the assessment of traffic impacts of the planning proposal, surveys were undertaken of the following intersections related to the site:

- Church Street / Raymond Street / Boundary Street
- Raymond Street / High Street
- Raymond Street / Laneway

These surveys were undertaken on a typical weekday morning between 7:00-9:00am and afternoon between 4:00pm-6:00pm which corresponds to the expected peak periods of the local road network and the respective peak periods for the future retail and commercial uses. The results of the surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions.

The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Table 1: Intersection Performance Characteristics

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table 2** for the morning (AM) and afternoon (PM) peak hours. Reference should also be made to the SIDRA outputs provided in **Appendix C**, which provide detailed results for individual lanes and approaches.

Table 2: Existing Intersection Performance –SIDRA Network

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay	Level of Service
Church Street / Raymond Street / Boundary Street	Signals	AM	0.591	22.3	B
		PM	0.511	19.3	B
Raymond Street / High Street	Roundabout	AM	0.179	12.8	A
		PM	0.272	11.2	A
Raymond Street / Laneway	Priority	AM	0.009	17.0	B
		PM	0.019	18.4	B

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

It can be seen from Table 2 that all key intersections operate satisfactorily under the existing 'base case' scenario, with Level of Service of B or better and with moderate delays, during both peak periods. It is stressed that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of a future development consistent with the planning proposal. This is discussed further in Section 6.

3.3 Public Transport

The existing bus and train services that operate in the locality are shown in **Figure 4**. It is evident that the site is located in close proximity to the public transport network in the local area. It is only 90 metres south of Harris Park Railway Station which provides services along the T1 – North Shore, Northern and Western Line, connecting to the Sydney CBD in the east, Hornsby and Macquarie Park in the north and Emu Plains in the west. This station also provides services along the T5 – Cumberland Line, connecting to Campbelltown in the south and Schofields in the west.

The Parramatta Railway Station is located approximately 400 metres (10-minute walk) from the site and provides express services to/from the Sydney CBD, with services every 3-10 minutes during the peak periods and travel times of 35-40 minutes.

In addition to frequent train services, numerous bus services that operate in the vicinity of the site are also indicated in Figure 4.

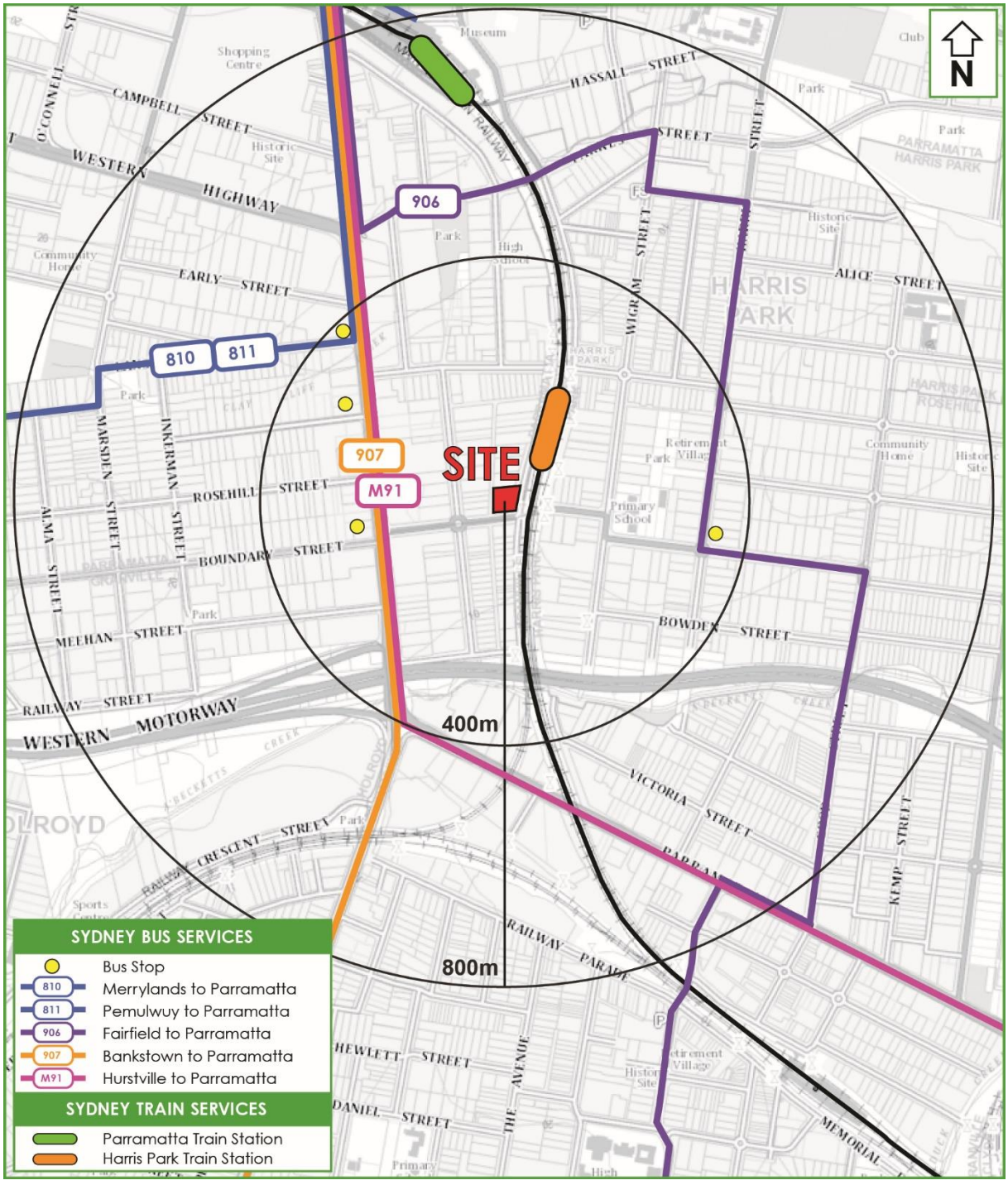


Figure 4: Public Transport

4. Description of Proposed Development

Approval from Parramatta City Council is sought to increase the height and floor space ratio on the site. For the purpose of the traffic assessment, TRAFFIX has assessed two scenarios

- Scenario 1: FSR of 6.9:1; and
- Scenario 2: FSR of 11.5:1

A detailed description of the proposal is provided in the Planning Proposal prepared separately. The key aspects from a traffic perspective are summarised below:

- To establish a mixed use development comprising:
  - A residential yield ranging from 104 units (FSR 6.9:1) to 216 high density units (FSR 11.5:1)
  - A residential unit mix of 10% one-bedroom, 80% two-bedroom and 10% three-bedroom units
- A total of non-residential land use area of 2,110m^2 GFA which may include:
  - Retail Gross Floor Area (GFA) of 207m^2 ; and
  - Commercial GFA of 1,903m^2
- An access driveway located on the laneway to the west of the site, facilitating entry to the basement level car parking.

It is noted that the above indicative yield has been adopted as a maximum to identify the traffic implications of the increase to the FSR and in turn represents a sensitivity type analysis. The traffic and parking impacts arising from the development are discussed in Sections 5 and 6.

5. Parking Requirements

5.1 Planning Controls for Parking

The subject site is located within 800 metres of a railway station and therefore, based on the NSW Apartment Design Guide, the parking rates applicable are the minimum of those stated within the RMS *Guide to Traffic Generating Developments* or those prescribed by the relevant council.

The RMS *Guide to Traffic Generating Developments* provides parking rates relevant to the future development as shown in **Table 3** and utilising the indicative development yield and unit mix advised to TRAFFIX.

Table 3: 'Planning Proposal' RMS Parking Rates

Type	GFA/Number	RMS Parking Rates	RMS Spaces Permitted
Residential			
One Bedroom (10%)	10 – 21	0.6 space per unit	6 - 13
Two Bedroom (80%)	84 - 173	0.9 space per unit	76 - 156
Three Bedroom (10%)	10 - 22	1.4 space per unit	14 - 31
Visitor	104 - 216	1 spaces per 5 units	21 - 43
			117 - 243
Retail /Commercial			
Retail	207m^2	45 space per 1,000m^2	9
Commercial	1,903m^2	1 space per 40m^2	48
			57
Permitted Parking			**174- 300**

It is clear from the above that adoption of the RMS parking rates would result in the provision of 174-300 spaces. In addition to these generic recommended rates, the Parramatta Local Environmental Plan 2011 – Car Parking provides parking rates for subject site. It is noted that the rates identified in this LEP are maximum rates. In this regard, **Table 4** provides an overview of the maximum car parking requirement permitted on site based on the indicative development yields that have been provided to TRAFFIX.

Table 4: 'Planning Proposal' Council Parking Rates

Type	GFA/Number	Maximum Council Parking Rates	Maximum Spaces Permitted
Residential			
All bedrooms	104 – 216	1 space per unit	104 - 216
Visitor	104 - 216	1 spaces per 5 units	21 - 43
			125 - 259
Retail /Commercial			
Retail	207m^2	1 space per 30m^2	7
Commercial	1.903m^2	1 space per 100m^2	19
			28
Maximum Permitted Parking			**153 - 287**

It is evident from the above that the Council parking rates result in a lower demand compared to the RMS rates, and therefore, the rates within the Parramatta LEP (2011) are to be adopted for future development at the subject site.

Accordingly, for 104 to 216 units, retail use of 207m^2 and commercial use of 1,903m^2 GFA, the proposed development and indicative yield identified above is permitted to provide 153 to 287 parking spaces. Whilst it is intended that the development will comply with the relevant residential parking component, it is considered that a lower level of parking provision may be appropriate for the retail components of the development, on the basis that it would benefit from extremely convenient access to public transport and the retail area would primarily attract walk by trips within the precinct.

Whilst detailed site layout plans have not yet been prepared, the proposed residential parking provisions are expected to be consistent with the requirements of Council's DCP and other relevant provisions. It is noted that concept development options have resulted in a potential parking provision range of 125 to 198 spaces.

Any departure from the rates (if sought) would be subject to review during the Development Application process. Compliance with relevant car parking controls will be confirmed as part of any subsequent development application(s), following approval of this Planning Proposal.

5.2 Bicycle Parking

Council's DCP stipulates the following requirements for bicycle parking:

- Bicycle parking for residential flat buildings is to be provided at a rate of 1 bicycle space per 2 dwellings.
- Bicycle parking for business and retail premises is to be provided at a rate of 1 bicycle space per 200m^2 of floor space.
- Bicycle parking is to be provided in the form of Class 2 compounds, as specified in AS 2890.3 – Bicycle Parking Facilities. These facilities may be located in storage areas if good access is provided.
- All bicycle parking should be located in a safe and secure location that is under cover and convenient for users.
- Trip end facilities including showers and lockers must be provided to adequately service the number of bicycle parking spaces required in business and retail premises.
- Bicycle parking in the public domain must be located as close as possible to the main entrance of the building at ground level.

Based upon the above requirements, a total of 52 to 108 bicycle parking spaces for residents and 11 bicycle parking spaces to service the retail components of the development should be provided. It is proposed that compliance with Council bicycle parking controls will be provided and can be further detailed during relevant Development Applications.

5.3 Car Share

Council's DCP stipulates the following controls with regards to car share parking:

- 1 carshare parking space is to be provided for any residential development containing more than 50 residential units and is within a 800m radial catchment of a railway station (which this development is) or 400m radial catchment of a bus stop with a service frequency of an average of 15 minutes or less during the morning peak (7 am - 9 am) in either direction.
- Carshare parking spaces must be publicly accessible at all times, adequately lit and sign posted and located off street.

Greenrock has consulted with CarShare Australia Pty Ltd, operator of the GoGet car sharing services and CarShare Australia Pty Ltd has confirmed support for a new car sharing bay in the proposed development. This relevant document is attached in **Appendix B**.

In light of the above, the provision of car share parking operated by GoGet is feasible on site and can be located within the basement car park. This is a matter that can be addressed during future detailed the future development application staging.

5.4 Servicing

Council's DCP attracts a rate of 1 loading bay per 400m^2 of Gross Floor Area for retail use. Application of this rate to the 2,110m^2 retail and commercial GFA would require 5 spaces. The residential component of the development will ultimately operate as a typical residential development with servicing expected to primarily be associated with waste collection and occasional attendance at site by removalist vehicles. In this regard, it is proposed that a loading area capable of accommodating at least a single 8.8m MRV's would be provided at grade within the property boundary.

The 8.8m MRV is typically adopted as the design vehicle where there is significant movement of goods but provision of more than the occasional HRV or AV is not necessary (AUSTROADS Guidelines). It is therefore considered that the provision of a single loading space for 8.8m MRV's is an appropriate amenity noting the site constraints. TRAFFIX has been involved in numerous mixed use developments

where the MRV is the design vehicle utilised in these situation and a loading dock management plan is prepared to ameliorate any concerns relating to the land uses on site and the respective servicing requirements. It is common to accept a condition of consent that limits the development to this size of truck and this approach recognises site constraints apply in this and many other circumstances.

6. Traffic Impacts

6.1 Trip Generation

The impacts of the proposed development on the external road network have been assessed having regard for the indicative yield scenarios as summarised in Section 4. This assessment has been undertaken in accordance with the requirements of the RMS Guideline and as such, the traffic generation rates published in the RMS Guide have been adopted. The result of this assessment is summarised below:

6.1.1 Residential

The RMS Technical Direction 2013/04a (TD 2013/04a) was published in August 2013 documenting updated trip rate and research data to that published in the RMS Guide to trip Generating Developments. It is particularly noteworthy that the Technical direction states that "*it must be followed when RMS is undertaking trip generation and/or parking demand assessments*. " In this regard, the trip rates that apply to the high density residential flat building are 0.19 trips per unit during the AM peak and 0.15 trips per unit during the PM peak. Application of these rates to the 104 to 216 units result the following generation and directional 80/20 split:

6.9:1 FSR Scheme (104 Units):

- 20 trips per hour (4 in, 16 out) during the AM peak
- 16 trips per hour (13 in, 3 out) during the PM peak

11.5:1 FSR Scheme (216 Units):

- 41 trips per hour (8 in, 33 out) during the AM peak
- 32 trips per hour (26 in, 8 out) during the PM peak

6.1.2 Retail

The retail use at the site has been assessed as a specialty retail, with the applicable RMS rates adopted for the afternoon peak period. It has been assumed that the morning peak hour trips will only consist of those made by the retail staff, and accordingly only two (2) trips have been assigned to this component. The resulting traffic generation is as follows:

- 2 trips per hour (2 in, 0 out) during the AM peak
- 10 trips per hour (5 in, 5 out) during the PM peak

6.1.3 Commercial

Traffic generation rates for the commercial use have also been based on the RMS Technical Direction 2013/04a (TD 2013/04a); which provides a rate of 1.6 trip per 100m^2 during the AM peak and 1.2 trip per 100m^2 during the PM peak. Application of these rates to the 1,903m^2 commercial use result the following generation and directional 80/20 split:

- 30 trips per hour (24 in, 6 out) during the AM peak
- 23 trips per hour (5 in, 18 out) during the PM peak

6.1.4 Combined

Based on the above assumptions the total site would generate the following peak hour traffic flows:

6.9:1 FSR Scheme (104 Units):

- 52 trips per hour (30 in,22 out) during the AM peak
- 49 trips per hour (23 in, 26 out) during the PM peak

11.5:1 FSR Scheme (216 Units):

- 73 trips per hour (35 in, 38 out) during the AM peak
- 67 trips per hour (36 in, 31 out) during the PM peak

6.2 Traffic Distribution

The traffic distribution for the development traffic has been based on the Journey to Work Data obtained from the NSW Bureau of Statistics for both residents and employees in the area. The information can be summarised as follows:

Residents:

- 17% arrive via Church Street (north)
- 26% arrive via Church Street (south)
- 57% arrive via Cambridge Street
- 52% depart via Junction Street
- 48% depart via Cambridge Street.

Employees:

- 13% arrive via Church Street (north)
- 50% arrive via Church Street (south)
- 37% arrive via Cambridge Street
- 67% depart via Junction Street
- 33% depart via Cambridge Street.

6.3 Peak Period Intersection Performance

A summary of the modelling results provided in **Table 4** below. Reference should also be made to the detailed SIDRA outputs which are provided in Appendix C.

Table 4: Intersection Performance SIDRA Network: Existing & Future

Intersection Description	Control Type	Period	Scenario	Degree of Saturation	Average Delay	Level of Service
Church Street / Raymond Street / Boundary Street	Signals	AM	Existing	0.591	22.3	B
			Future 6.9:1 FSR	0.597	22.5	B
			Future 11.5:1 FSR	0.598	22.5	B
		PM	Existing	0.511	19.3	B
			Future 6.9:1 FSR	0.521	19.6	B
			Future 11.5:1 FSR	0.522	19.6	B
Raymond Street / High Street	Roundabout	AM	Existing	0.179	12.8	A
			Future 6.9:1 FSR	0.183	13.1	A
			Future 11.5:1 FSR	0.183	13.2	A
		PM	Existing	0.272	11.2	A
			Future 6.9:1 FSR	0.276	11.4	A
			Future 11.5:1 FSR	0.277	11.4	A
Raymond Street / Laneway	Priority	AM	Existing	0.009	17.0	B
			Future 6.9:1 FSR	0.009	17.8	B
			Future 11.5:1 FSR	0.009	18.2	B
		PM	Existing	0.019	18.4	B
			Future 6.9:1 FSR	0.020	19.4	B
			Future 11.5:1 FSR	0.02	19.6	B

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

It can be seen from Table 4 that with the proposed development traffic generations, the nearby and critical intersections generally maintain the current levels of service of B or better, with only minimal increase in average delays. Accordingly, it can be concluded that the adoption of the highest land use and development yield (this being the 11.5:1 FSR) can readily be accommodated within the external road network and has a minor impact to the existing scenario. The additional traffic volumes resulting from the proposed yield / number of apartments for both FSR schemes is supported, noting that these are worst case scenarios where no account has been incorporated for the existing land uses which currently generate traffic volumes.

7. Access & Internal Design Aspects

7.1 Access

The proposed development would be required to provide a Category 2 Driveway under AS 2890.1 (2004), being a combined entry-exit driveway of width 6.0 to 9.0 metres. This driveway is proposed to be provided off Raymond Lane along the western frontage of the site and will provided access to the on-site basement car park as well as the loading area. No vehicular access is to be provided via Station Street or Raymond Street.

7.2 Internal Design

The internal basement car park will be required to comply with the requirements of AS 2890.1 (2004) and the following characteristics are noteworthy:

7.2.1 Parking Modules

- All non-residential parking spaces (retail public users) will be designed in accordance with a Class 3 user and are provided with a minimum space length of 5.4m a minimum width of 2.6m and a minimum aisle width of 5.8m.
- All residential/commercial parking spaces will be designed in accordance with a Class 1A user and are provided with a minimum space length of 5.4m a minimum width of 2.4m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions of greater than 150mm in height are to be provided with an additional width of 300mm.
- Dead-end aisles are to be provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All disabled parking spaces are to be designed in accordance with AS2890.6. Spaces are provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

7.2.2 Clear Head heights

- A minimum clear head height of 2.2m is required to provide for all areas within the basement car park as required by AS2890.1. A clear head height of 2.5m is required to be provided above all disabled spaces as required by AS2890.6.

7.2.3 Other Considerations

- All columns are required to be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).

- Appropriate visual splays are to be provided in accordance with the requirements of Figure 3.3 of AS2890.1 at all accesses.

7.2.4 Service Area Design

- The internal design of the service area will be designed in accordance with the requirements of AS28090.2 for the maximum length vehicle permissible on-site being a 8.8m MRV

- A minimum clear head height of 4.5m is to be provided within the service area

- All ramps are to be designed in accordance with Table 3.2 of AS2890.2 with a maximum grade not in excess of 1:6.5 (15.4%) and maximum rate of change of 1:16 (6.25%).

- A minimum bay width of 3.5m is to be provided for all service bays.

In summary the internal configuration of the basement car park and loading areas will be designed in accordance with the both AS2890.1 and AS2890.2. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

8. Conclusions

The application seeks approval of a planning proposal for increased height and FSR on the site at 1-7 Station Street, Parramatta. For the purpose of the traffic assessment, TRAFFIX has assessed two scenarios in the event that an FSR of 6.9:1 or FSR of 11.5:1 was permitted. The following conclusions are noteworthy:

- Parking
  - The proposed development with a residential yield ranging between 104-216 residential units (FSR of 6.9:1 or FSR of 11.5:1), retail use of 207m^2 and commercial use of 1,903m^2 is permitted to provide a maximum of between 174 to 300 car parking spaces and a minimum of 63 to 119 bicycle spaces. In response, it has been demonstrated through high level concept development undertaken by AJC Architects that a basement of 125-198 parking spaces can be provided and will not exceed the maximum parking rates identified in the Parramatta Local Environmental Plan 2011. The allocation of parking will of course be subject to further analysis however it would be proposed that the majority of parking be dedicated the residential land use.

- Car Park Access Driveway
  - The car park access driveway requires a Category 2 Driveway under AS2890.1 (2004), this being a 6.0-9.0 metres driveway width. In response, the development will provide a driveway with access to the west of the site which would satisfy the minimum requirements of AS2890.1.

- Internal Design
  - The internal access arrangements, including car parking ,will be designed in accordance with the Australian Standard requirements of AS2890.1 (2004) Part 1: Off-street car parking, AS2890.2 (2002) Part 2: Off-street commercial vehicle facilities, AS2890.6 (2009) Part 6: Off-street parking for people with disabilities and AS4299 (1995) Adaptable housing.

- Traffic Generation
  - Based on the above assumptions the total site would generate the following peak hour traffic flows:

6.9:1 FSR Scheme (104 Units):

  - 52 trips per hour (30 in,22 out) during the AM peak
  - 49 trips per hour (23 in, 26 out) during the PM peak

11.5:1 FSR Scheme (216 Units):

- 73 trips per hour (35 in, 38 out) during the AM peak
- 67 trips per hour (36 in, 31 out) during the PM peak

- Intersection Analysis

  - The external traffic impacts of the site have (as discussed above) been assessed for the 6.9:1 FSR and 11.5:1 FSR schemes. The key intersections assessed continue to operate under the same levels of service as existing for both schemes with minor increase in delays. Accordingly, the local road network can readily accommodate the additional traffic volumes resulting from the intensified uses on site noting that there are minor measurable impacts and differences between the two FSR options tested.

This report demonstrates that the proposed planning proposal is supportable on traffic planning grounds, based on the concept planning options that have been adopted for assessment purposes, recognising that further detailed investigations will be undertaken at the future development application stage. It is therefore concluded that the proposed development is supportable on traffic planning grounds and can operate satisfactorily.

Appendix A

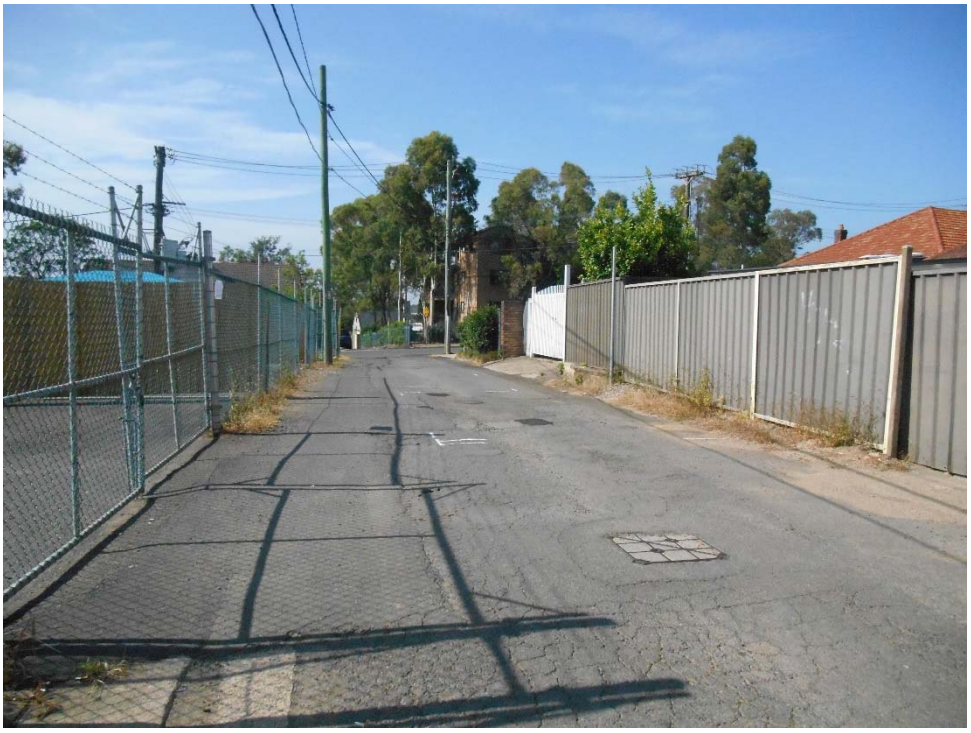
Photographic Record

View looking south at the subject site frontage along Station Street

View looking north at the site access along Raymond Street.

View looking east at the proposed site access along the western frontage of the site.

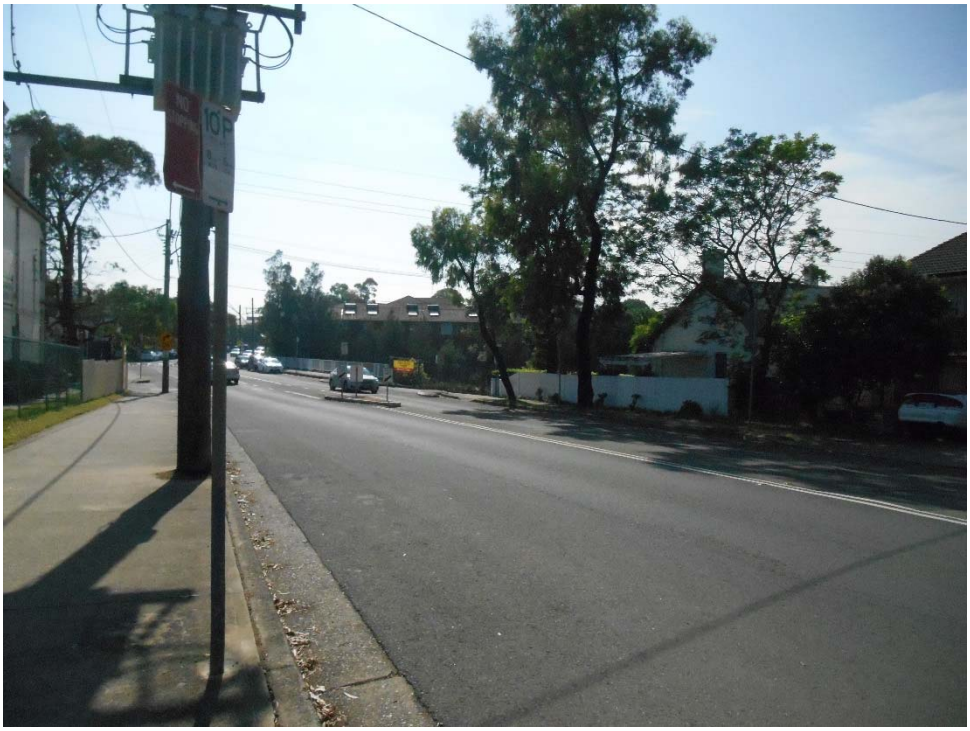
View looking north along the laneway from the site access.



View looking south along the laneway, towards Raymond Street, from the site access.

View looking north at the Laneway to the west of the site.

View looking west along Raymond Street from the Laneway



View looking east along Raymond Street from the Laneway

Appendix B

GoGet Letter of Support

1/12/2015

Attention:
Matthew Norman
JBA Planning
North Sydney
2059

Car Sharing for proposed development at Harris Park Station

CarShare Australia would like to confirm our support for a car sharing bay in the new development at **Harris Park station**. CarShare Australia is keen to install and manage at least one car sharing vehicle in this location, for the benefit of owners/tenants and the surrounding community. GoGet has **27 members within 250 metres** on this development with **no** carshare cars within 250 metres currently.

CarShare Australia Pty Ltd, operator of GoGet, is a unique business partnership formed to take advantage of business, policy, academic and research skills to launch Australia's first and largest car sharing service. Founded 10 years ago by directors Nic Lowe and Bruce Jeffreys, the company has developed a range of strategic partnerships, including formal working relationships with a number of Local Government authorities.

A car sharing program offers local residents and businesses access to a fleet of cars parked close to where they live and work for occasional use. The vehicles are parked in a dedicated location, called a pod, and are returned to that spot at the end of each trip. Car sharing services operate to fill a mobility 'gap' that exists between private car ownership, which is inefficient, expensive and unsustainable and public transport, walking and cycling, which can generally suit most local transport needs. A car sharing service in the development would increase transport efficiencies in the area, and encourage public transport usage by residents. Car sharing is a sustainable form of transport that will contribute to the green credentials of the building.

A car sharing program provides a reliable, convenient and affordable alternative to private car ownership. It has the following advantages:

1. Allows people to live car-free;
2. Promotes alternative transport options such as public transport, cycling or walking;
3. Decreases car usage which improves local air quality and promotes local businesses;
4. Removes private cars from local streets.

Should you require further information please don't hesitate to contact me directly.

Yours sincerely,

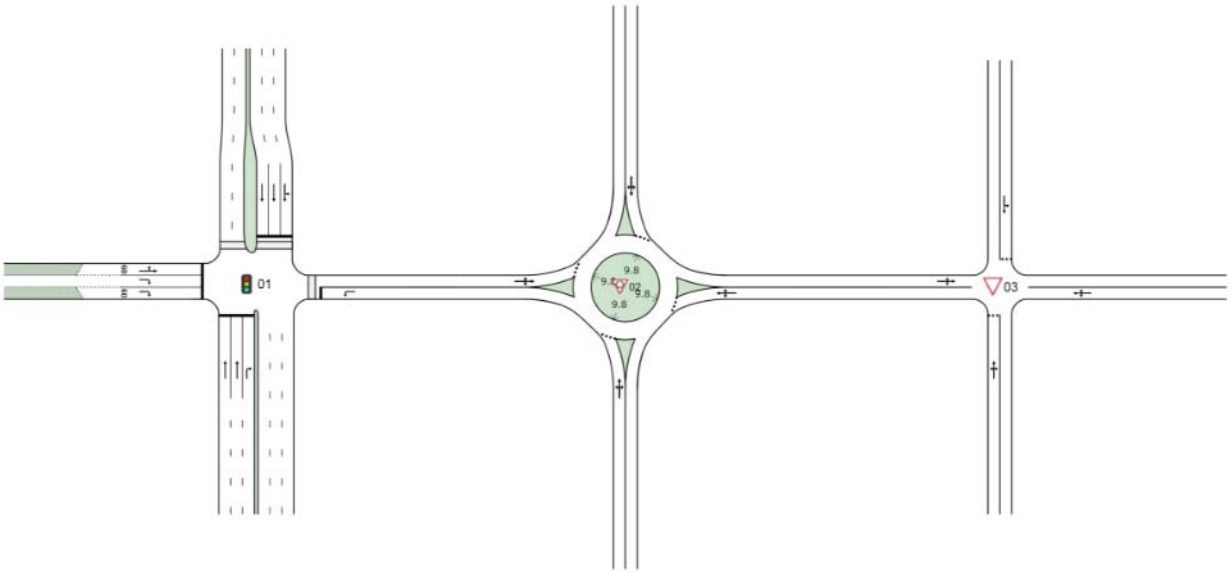
Christopher Vanneste PhD
Head of Locations
GoGet CarShare
Chris@goget.com.au

Appendix C

Sidra Intersection Analysis

NETWORK LAYOUT

Network: Raymond St EX AM



SITES IN NETWORK	
Site ID	**Site Name**
01	01. Raymond-Church EX AM
02	02. Raymond-High EX AM
03	03. Raymond-Laneway EX AM

MOVEMENT SUMMARY

Site: 01. Raymond-Church EX AM

Network: Raymond St EX AM

Raymond Street - Church Street - Boundary Street
Scenario: Existing
Period: AM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1315	10.0	1315	10.0	0.567	10.1	LOS A	16.4	124.4	0.62	0.56	42.8
3	R2	429	10.0	429	10.0	0.575	25.7	LOS B	12.1	92.3	0.81	0.92	17.5
Approach		1744	10.0	1744	10.0	0.575	13.9	LOS A	16.4	124.4	0.66	0.65	36.5
East: Raymond St													
4	L2	187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
Approach		187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
North: Church St													
7	L2	60	10.0	60	10.0	0.585	41.0	LOS C	9.0	68.7	0.95	0.80	17.8
8	T1	615	10.0	615	10.0	0.585	35.3	LOS C	9.2	69.7	0.95	0.79	24.8
Approach		675	10.0	675	10.0	0.585	35.8	LOS C	9.2	69.7	0.95	0.79	24.2
West: Boundary St													
10	L2	14	10.0	14	10.0	0.591	38.4	LOS C	10.0	76.3	0.94	0.79	27.2
11	T1	238	10.0	238	10.0	0.591	33.8	LOS C	10.0	76.3	0.94	0.79	20.3
12	R2	133	10.0	133	10.0	0.164	34.7	LOS C	2.4	17.9	0.83	0.73	24.6
Approach		384	10.0	384	10.0	0.591	34.2	LOS C	10.0	76.3	0.90	0.77	22.2
All Vehicles		2991	10.0	2991	10.0	0.591	22.3	LOS B	16.4	124.4	0.77	0.70	29.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	32.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	35.7	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High EX AM

Network: Raymond St EX AM

Raymond Street - High Street
Scenario: Existing
Period: AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	3	10.0	3	10.0	0.071	6.1	LOS A	0.4	3.0	0.52	0.64	33.0
2	T1	12	10.0	12	10.0	0.071	6.0	LOS A	0.4	3.0	0.52	0.64	40.0
3	R2	46	10.0	46	10.0	0.071	9.2	LOS A	0.4	3.0	0.52	0.64	33.0
Approach		61	10.0	61	10.0	0.071	8.4	LOS A	0.4	3.0	0.52	0.64	35.0
East: Raymond St													
4	L2	17	10.0	17	10.0	0.224	2.8	LOS A	1.7	12.8	0.20	0.49	38.6
5	T1	166	10.0	166	10.0	0.224	2.8	LOS A	1.7	12.8	0.20	0.49	25.2
6	R2	115	10.0	115	10.0	0.224	5.8	LOS A	1.7	12.8	0.20	0.49	41.0
Approach		298	10.0	298	10.0	0.224	4.0	LOS A	1.7	12.8	0.20	0.49	36.1
North: High St													
7	L2	91	10.0	91	10.0	0.179	9.8	LOS A	1.4	10.6	0.80	0.73	32.2
8	T1	5	10.0	5	10.0	0.179	9.6	LOS A	1.4	10.6	0.80	0.73	38.1
9	R2	20	10.0	20	10.0	0.179	12.8	LOS A	1.4	10.6	0.80	0.73	32.2
Approach		116	10.0	116	10.0	0.179	10.3	LOS A	1.4	10.6	0.80	0.73	32.6
West: Raymond St													
10	L2	131	10.0	131	10.0	0.648	6.3	LOS A	5.9	44.6	0.48	0.56	39.2
11	T1	557	10.0	557	10.0	0.648	6.1	LOS A	5.9	44.6	0.48	0.56	29.5
12	R2	6	10.0	6	10.0	0.648	9.3	LOS A	5.9	44.6	0.48	0.56	39.0
Approach		694	10.0	694	10.0	0.648	6.1	LOS A	5.9	44.6	0.48	0.56	33.0
All Vehicles		1168	10.0	1168	10.0	0.648	6.1	LOS A	5.9	44.6	0.45	0.57	33.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway EX AM

Network: Raymond St EX AM

Raymond Street - Laneway
Scenario: Existing
Period AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.009	5.7	LOS A	0.0	0.2	0.61	0.69	28.3
2	T1	1	10.0	1	10.0	0.009	12.7	LOS A	0.0	0.2	0.61	0.69	34.9
3	R2	1	10.0	1	10.0	0.009	17.0	LOS B	0.0	0.2	0.61	0.69	28.3
Approach		3	10.0	3	10.0	0.009	11.8	LOS A	0.0	0.2	0.61	0.69	31.0
East: Raymond St													
4	L2	1	10.0	1	10.0	0.176	8.2	LOS A	0.1	1.1	0.05	0.02	46.3
5	T1	302	10.0	302	10.0	0.176	0.3	LOS A	0.1	1.1	0.05	0.02	44.2
6	R2	7	10.0	7	10.0	0.176	8.3	LOS A	0.1	1.1	0.05	0.02	44.4
Approach		311	10.0	311	10.0	0.176	0.5	NA	0.1	1.1	0.05	0.02	44.3
North: Laneway													
7	L2	17	10.0	17	10.0	0.028	8.5	LOS A	0.1	0.7	0.59	0.73	27.4
8	T1	1	10.0	1	10.0	0.028	13.0	LOS A	0.1	0.7	0.59	0.73	37.8
Approach		18	10.0	18	10.0	0.028	8.7	LOS A	0.1	0.7	0.59	0.73	28.1
West: Raymond St													
10	L2	5	10.0	5	10.0	0.379	3.8	LOS A	0.0	0.1	0.00	0.00	47.2
11	T1	687	10.0	687	10.0	0.379	0.0	LOS A	0.0	0.1	0.00	0.00	49.7
12	R2	1	10.0	1	10.0	0.379	5.3	LOS A	0.0	0.1	0.00	0.00	45.5
Approach		694	10.0	694	10.0	0.379	0.0	NA	0.0	0.1	0.00	0.00	49.6
All Vehicles		1025	10.0	1025	10.0	0.379	0.4	NA	0.1	1.1	0.03	0.02	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 01. Raymond-Church EX PM

Network: Raymond St EX PM

Raymond Street - Church Street - Boundary Street
Scenario: Existing
Period: PM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1081	10.0	1081	10.0	0.415	5.7	LOS A	9.6	73.0	0.44	0.40	49.0
3	R2	344	10.0	344	10.0	0.511	23.4	LOS B	10.7	81.0	0.81	0.88	18.7
Approach		1425	10.0	1425	10.0	0.511	9.9	LOS A	10.7	81.0	0.53	0.51	41.1
East: Raymond St													
4	L2	243	10.0	243	10.0	0.486	33.6	LOS C	9.0	68.2	0.88	0.80	18.6
Approach		243	10.0	243	10.0	0.486	33.6	LOS C	9.0	68.2	0.88	0.80	18.6
North: Church St													
7	L2	22	10.0	22	10.0	0.503	30.3	LOS C	11.3	86.0	0.84	0.72	22.9
8	T1	959	10.0	959	10.0	0.503	24.7	LOS B	11.4	86.3	0.84	0.72	30.2
Approach		981	10.0	981	10.0	0.503	24.8	LOS B	11.4	86.3	0.84	0.72	30.1
West: Boundary St													
10	L2	19	10.0	19	10.0	0.447	43.1	LOS D	5.2	39.6	0.95	0.76	25.4
11	T1	107	10.0	107	10.0	0.447	38.5	LOS C	5.2	39.6	0.95	0.76	18.6
12	R2	89	10.0	89	10.0	0.166	41.1	LOS C	1.8	13.3	0.90	0.73	22.5
Approach		216	10.0	216	10.0	0.447	40.0	LOS C	5.2	39.6	0.93	0.75	21.1
All Vehicles		2865	10.0	2865	10.0	0.511	19.3	LOS B	11.4	86.3	0.70	0.63	31.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	22.1	LOS C	0.1	0.1	0.70	0.70
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	30.7	LOS D			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High EX PM

Network: Raymond St EX PM

Raymond Street - High Street
Scenario: Existing
Period: PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	1	10.0	1	10.0	0.027	6.6	LOS A	0.1	1.1	0.57	0.63	32.4
2	T1	4	10.0	4	10.0	0.027	6.5	LOS A	0.1	1.1	0.57	0.63	39.6
3	R2	16	10.0	16	10.0	0.027	9.6	LOS A	0.1	1.1	0.57	0.63	32.4
Approach		21	10.0	21	10.0	0.027	8.9	LOS A	0.1	1.1	0.57	0.63	34.6
East: Raymond St													
4	L2	66	10.0	66	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	38.3
5	T1	209	10.0	209	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	24.4
6	R2	134	10.0	134	10.0	0.328	6.1	LOS A	2.7	20.4	0.32	0.49	40.6
Approach		409	10.0	409	10.0	0.328	4.1	LOS A	2.7	20.4	0.32	0.49	35.8
North: High St													
7	L2	158	10.0	158	10.0	0.272	8.2	LOS A	2.1	16.2	0.73	0.70	34.2
8	T1	19	10.0	19	10.0	0.272	8.0	LOS A	2.1	16.2	0.73	0.70	39.6
9	R2	34	10.0	34	10.0	0.272	11.2	LOS A	2.1	16.2	0.73	0.70	34.2
Approach		211	10.0	211	10.0	0.272	8.7	LOS A	2.1	16.2	0.73	0.70	34.9
West: Raymond St													
10	L2	55	10.0	55	10.0	0.455	5.5	LOS A	3.2	24.4	0.39	0.52	39.9
11	T1	424	10.0	424	10.0	0.455	5.3	LOS A	3.2	24.4	0.39	0.52	30.9
12	R2	8	10.0	8	10.0	0.455	8.5	LOS A	3.2	24.4	0.39	0.52	39.8
Approach		487	10.0	487	10.0	0.455	5.4	LOS A	3.2	24.4	0.39	0.52	33.2
All Vehicles		1128	10.0	1128	10.0	0.455	5.6	LOS A	3.2	24.4	0.43	0.55	34.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway EX PM

Network: Raymond St EX PM

Raymond Street - Laneway
Scenario: Existing
Period PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.019	6.3	LOS A	0.1	0.4	0.73	0.83	25.3
2	T1	1	10.0	1	10.0	0.019	13.5	LOS A	0.1	0.4	0.73	0.83	32.4
3	R2	3	10.0	3	10.0	0.019	18.4	LOS B	0.1	0.4	0.73	0.83	25.7
Approach		5	10.0	5	10.0	0.019	15.0	LOS B	0.1	0.4	0.73	0.83	27.3
East: Raymond St													
4	L2	26	10.0	26	10.0	0.269	6.1	LOS A	0.5	3.5	0.11	0.05	45.0
5	T1	420	10.0	420	10.0	0.269	0.4	LOS A	0.5	3.5	0.11	0.05	38.8
6	R2	20	10.0	20	10.0	0.269	7.8	LOS A	0.5	3.5	0.11	0.05	43.1
Approach		466	10.0	466	10.0	0.269	1.1	NA	0.5	3.5	0.11	0.05	40.5
North: Laneway													
7	L2	31	10.0	31	10.0	0.043	7.7	LOS A	0.2	1.2	0.55	0.71	28.1
8	T1	1	10.0	1	10.0	0.043	14.2	LOS A	0.2	1.2	0.55	0.71	38.5
Approach		32	10.0	32	10.0	0.043	8.0	LOS A	0.2	1.2	0.55	0.71	28.5
West: Raymond St													
10	L2	5	10.0	5	10.0	0.333	4.0	LOS A	0.0	0.2	0.00	0.01	47.2
11	T1	603	10.0	603	10.0	0.333	0.0	LOS A	0.0	0.2	0.00	0.01	49.6
12	R2	1	10.0	1	10.0	0.333	6.4	LOS A	0.0	0.2	0.00	0.01	45.5
Approach		609	10.0	609	10.0	0.333	0.1	NA	0.0	0.2	0.00	0.01	49.5
All Vehicles		1113	10.0	1113	10.0	0.333	0.8	NA	0.5	3.5	0.07	0.05	43.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 01. Raymond-Church FU_6.9 FSR AM

Network: Raymond St FU_6.9 FSR AM

Raymond Street - Church Street - Boundary Street
Scenario: Future - 6.9:1 FSR Scheme
Period: AM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1315	10.0	1315	10.0	0.567	10.1	LOS A	16.4	124.4	0.62	0.56	42.8
3	R2	446	9.6	446	9.6	0.597	26.3	LOS B	12.6	95.6	0.82	0.93	17.3
Approach		1761	9.9	1761	9.9	0.597	14.2	LOS A	16.4	124.4	0.67	0.65	36.1
East: Raymond St													
4	L2	187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
Approach		187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
North: Church St													
7	L2	65	9.2	65	9.2	0.589	41.0	LOS C	9.1	69.2	0.95	0.80	17.8
8	T1	615	10.0	615	10.0	0.589	35.3	LOS C	9.2	70.3	0.95	0.79	24.8
Approach		680	9.9	680	9.9	0.589	35.9	LOS C	9.2	70.3	0.95	0.79	24.2
West: Boundary St													
10	L2	14	10.0	14	10.0	0.591	38.4	LOS C	10.0	76.3	0.94	0.79	27.2
11	T1	238	10.0	238	10.0	0.591	33.8	LOS C	10.0	76.3	0.94	0.79	20.3
12	R2	133	10.0	133	10.0	0.164	34.7	LOS C	2.4	17.9	0.83	0.73	24.6
Approach		384	10.0	384	10.0	0.591	34.2	LOS C	10.0	76.3	0.90	0.77	22.2
All Vehicles		3013	9.9	3013	9.9	0.597	22.5	LOS B	16.4	124.4	0.77	0.71	29.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	32.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	35.7	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High FU_6.9 FSR AM

Network: Raymond St FU_6.9 FSR AM

Raymond Street - High Street
Scenario: Future - 6.9:1 FSR Scheme
Period: AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	3	10.0	3	10.0	0.071	6.1	LOS A	0.4	3.0	0.52	0.64	33.0
2	T1	12	10.0	12	10.0	0.071	6.0	LOS A	0.4	3.0	0.52	0.64	40.0
3	R2	46	10.0	46	10.0	0.071	9.2	LOS A	0.4	3.0	0.52	0.64	33.0
Approach		61	10.0	61	10.0	0.071	8.4	LOS A	0.4	3.0	0.52	0.64	35.0
East: Raymond St													
4	L2	17	10.0	17	10.0	0.224	2.8	LOS A	1.7	12.9	0.20	0.49	38.6
5	T1	166	10.0	166	10.0	0.224	2.8	LOS A	1.7	12.9	0.20	0.49	25.2
6	R2	115	10.0	115	10.0	0.224	5.8	LOS A	1.7	12.9	0.20	0.49	41.0
Approach		298	10.0	298	10.0	0.224	4.0	LOS A	1.7	12.9	0.20	0.49	36.1
North: High St													
7	L2	91	10.0	91	10.0	0.183	10.1	LOS A	1.4	11.0	0.82	0.74	31.8
8	T1	5	10.0	5	10.0	0.183	10.0	LOS A	1.4	11.0	0.82	0.74	37.8
9	R2	20	10.0	20	10.0	0.183	13.1	LOS A	1.4	11.0	0.82	0.74	31.8
Approach		116	10.0	116	10.0	0.183	10.6	LOS A	1.4	11.0	0.82	0.74	32.2
West: Raymond St													
10	L2	131	10.0	131	10.0	0.666	6.4	LOS A	6.2	47.4	0.49	0.57	39.1
11	T1	579	9.6	579	9.6	0.666	6.2	LOS A	6.2	47.4	0.49	0.57	29.4
12	R2	6	10.0	6	10.0	0.666	9.4	LOS A	6.2	47.4	0.49	0.57	38.9
Approach		716	9.7	716	9.7	0.666	6.3	LOS A	6.2	47.4	0.49	0.57	32.8
All Vehicles		1191	9.8	1191	9.8	0.666	6.2	LOS A	6.2	47.4	0.45	0.57	33.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway FU_6.9 FSR AM

Network: Raymond St FU_6.9 FSR AM

Raymond Street - Laneway
Scenario: Future - 6.9:1 FSR Scheme
Period AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.009	5.7	LOS A	0.0	0.2	0.63	0.70	27.7
2	T1	1	10.0	1	10.0	0.009	13.5	LOS A	0.0	0.2	0.63	0.70	34.5
3	R2	1	10.0	1	10.0	0.009	17.8	LOS B	0.0	0.2	0.63	0.70	27.9
Approach		3	10.0	3	10.0	0.009	12.3	LOS A	0.0	0.2	0.63	0.70	30.5
East: Raymond St													
4	L2	1	10.0	1	10.0	0.194	8.3	LOS A	0.4	2.9	0.14	0.05	44.6
5	T1	302	10.0	302	10.0	0.194	0.7	LOS A	0.4	2.9	0.14	0.05	37.6
6	R2	21	3.5	21	3.5	0.194	8.3	LOS A	0.4	2.9	0.14	0.05	45.3
Approach		324	9.6	324	9.6	0.194	1.2	NA	0.4	2.9	0.14	0.05	39.3
North: Laneway													
7	L2	27	6.2	27	6.2	0.083	9.0	LOS A	0.3	2.0	0.66	0.83	27.2
8	T1	15	0.7	15	0.7	0.083	13.1	LOS A	0.3	2.0	0.66	0.83	39.1
Approach		42	4.3	42	4.3	0.083	10.4	LOS A	0.3	2.0	0.66	0.83	31.7
West: Raymond St													
10	L2	27	1.9	27	1.9	0.391	3.5	LOS A	0.0	0.2	0.00	0.03	50.5
11	T1	687	10.0	687	10.0	0.391	0.0	LOS A	0.0	0.2	0.00	0.03	48.8
12	R2	1	10.0	1	10.0	0.391	5.4	LOS A	0.0	0.2	0.00	0.03	45.3
Approach		716	9.7	716	9.7	0.391	0.2	NA	0.0	0.2	0.00	0.03	49.0
All Vehicles		1085	9.4	1085	9.4	0.391	0.9	NA	0.4	2.9	0.07	0.07	43.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 01. Raymond-Church FU_6.9 FSR PM

Network: Raymond St FU_6.9 FSR PM

Raymond Street - Church Street - Boundary Street
Scenario: Future - 6.9:1 FSR Scheme
Period: PM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1081	10.0	1081	10.0	0.415	5.7	LOS A	9.6	73.0	0.44	0.40	49.0
3	R2	354	9.7	354	9.7	0.515	23.7	LOS B	10.8	81.9	0.81	0.88	18.6
Approach		1435	9.9	1435	9.9	0.515	10.1	LOS A	10.8	81.9	0.53	0.52	40.9
East: Raymond St													
4	L2	243	10.0	243	10.0	0.468	32.6	LOS C	8.8	67.0	0.86	0.80	18.9
Approach		243	10.0	243	10.0	0.468	32.6	LOS C	8.8	67.0	0.86	0.80	18.9
North: Church St													
7	L2	26	8.4	26	8.4	0.521	31.2	LOS C	11.6	88.0	0.85	0.74	22.4
8	T1	959	10.0	959	10.0	0.521	25.6	LOS B	11.6	88.4	0.85	0.73	29.6
Approach		985	10.0	985	10.0	0.521	25.7	LOS B	11.6	88.4	0.85	0.73	29.5
West: Boundary St													
10	L2	19	10.0	19	10.0	0.447	43.1	LOS D	5.2	39.6	0.95	0.76	25.4
11	T1	107	10.0	107	10.0	0.447	38.5	LOS C	5.2	39.6	0.95	0.76	18.6
12	R2	89	10.0	89	10.0	0.166	41.1	LOS C	1.8	13.3	0.90	0.73	22.5
Approach		216	10.0	216	10.0	0.447	40.0	LOS C	5.2	39.6	0.93	0.75	21.1
All Vehicles		2879	10.0	2879	10.0	0.521	19.6	LOS B	11.6	88.4	0.70	0.63	31.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	22.8	LOS C	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	31.0	LOS D			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High FU_6.9 FSR PM

Network: Raymond St FU_6.9 FSR PM

Raymond Street - High Street
Scenario: Future - 6.9:1 FSR Scheme
Period: PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	1	10.0	1	10.0	0.027	6.6	LOS A	0.1	1.1	0.57	0.63	32.4
2	T1	4	10.0	4	10.0	0.027	6.5	LOS A	0.1	1.1	0.57	0.63	39.6
3	R2	16	10.0	16	10.0	0.027	9.6	LOS A	0.1	1.1	0.57	0.63	32.4
Approach		21	10.0	21	10.0	0.027	8.9	LOS A	0.1	1.1	0.57	0.63	34.6
East: Raymond St													
4	L2	66	10.0	66	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	38.3
5	T1	209	10.0	209	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	24.4
6	R2	134	10.0	134	10.0	0.328	6.1	LOS A	2.7	20.4	0.32	0.49	40.6
Approach		409	10.0	409	10.0	0.328	4.1	LOS A	2.7	20.4	0.32	0.49	35.8
North: High St													
7	L2	158	10.0	158	10.0	0.276	8.3	LOS A	2.2	16.5	0.74	0.71	34.0
8	T1	19	10.0	19	10.0	0.276	8.2	LOS A	2.2	16.5	0.74	0.71	39.4
9	R2	34	10.0	34	10.0	0.276	11.4	LOS A	2.2	16.5	0.74	0.71	34.0
Approach		211	10.0	211	10.0	0.276	8.8	LOS A	2.2	16.5	0.74	0.71	34.7
West: Raymond St													
10	L2	55	10.0	55	10.0	0.466	5.5	LOS A	3.3	25.4	0.39	0.52	39.9
11	T1	438	9.7	438	9.7	0.466	5.4	LOS A	3.3	25.4	0.39	0.52	30.9
12	R2	8	10.0	8	10.0	0.466	8.6	LOS A	3.3	25.4	0.39	0.52	39.8
Approach		501	9.7	501	9.7	0.466	5.4	LOS A	3.3	25.4	0.39	0.52	33.1
All Vehicles		1142	9.9	1142	9.9	0.466	5.6	LOS A	3.3	25.4	0.43	0.55	34.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway FU_6.9 FSR PM

Network: Raymond St FU_6.9 FSR PM

Raymond Street - Laneway
Scenario: Future - 6.9:1 FSR Scheme
Period PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.020	6.3	LOS A	0.1	0.5	0.74	0.83	24.7
2	T1	1	10.0	1	10.0	0.020	14.1	LOS A	0.1	0.5	0.74	0.83	31.9
3	R2	3	10.0	3	10.0	0.020	19.4	LOS B	0.1	0.5	0.74	0.83	25.2
Approach		5	10.0	5	10.0	0.020	15.7	LOS B	0.1	0.5	0.74	0.83	26.8
East: Raymond St													
4	L2	26	10.0	26	10.0	0.283	6.7	LOS A	0.7	5.3	0.16	0.07	44.1
5	T1	420	10.0	420	10.0	0.283	0.7	LOS A	0.7	5.3	0.16	0.07	35.7
6	R2	32	6.3	32	6.3	0.283	7.9	LOS A	0.7	5.3	0.16	0.07	43.7
Approach		478	9.8	478	9.8	0.283	1.5	NA	0.7	5.3	0.16	0.07	38.6
North: Laneway													
7	L2	41	7.4	41	7.4	0.118	8.3	LOS A	0.4	2.9	0.64	0.81	27.2
8	T1	21	0.5	21	0.5	0.118	14.0	LOS A	0.4	2.9	0.64	0.81	39.2
Approach		62	5.1	62	5.1	0.118	10.2	LOS A	0.4	2.9	0.64	0.81	31.7
West: Raymond St													
10	L2	19	2.8	19	2.8	0.341	3.6	LOS A	0.0	0.2	0.00	0.02	50.2
11	T1	603	10.0	603	10.0	0.341	0.0	LOS A	0.0	0.2	0.00	0.02	49.0
12	R2	1	10.0	1	10.0	0.341	6.5	LOS A	0.0	0.2	0.00	0.02	45.3
Approach		623	9.8	623	9.8	0.341	0.1	NA	0.0	0.2	0.00	0.02	49.0
All Vehicles		1168	9.5	1168	9.5	0.341	1.3	NA	0.7	5.3	0.11	0.09	41.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 01. Raymond-Church FU_11.5 FSR AM

Network: Raymond St FU_11.5 FSR AM

Raymond Street - Church Street - Boundary Street
Scenario: Future - 11.5:1 FSR Scheme
Period: AM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1315	10.0	1315	10.0	0.567	10.1	LOS A	16.4	124.4	0.62	0.56	42.8
3	R2	447	9.6	447	9.6	0.598	26.3	LOS B	12.6	95.8	0.82	0.93	17.3
Approach		1762	9.9	1762	9.9	0.598	14.2	LOS A	16.4	124.4	0.67	0.65	36.1
East: Raymond St													
4	L2	187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
Approach		187	10.0	187	10.0	0.304	27.3	LOS B	6.0	45.4	0.77	0.76	21.0
North: Church St													
7	L2	65	9.2	65	9.2	0.589	41.0	LOS C	9.1	69.2	0.95	0.80	17.8
8	T1	615	10.0	615	10.0	0.589	35.3	LOS C	9.2	70.3	0.95	0.79	24.8
Approach		680	9.9	680	9.9	0.589	35.9	LOS C	9.2	70.3	0.95	0.79	24.2
West: Boundary St													
10	L2	14	10.0	14	10.0	0.591	38.4	LOS C	10.0	76.3	0.94	0.79	27.2
11	T1	238	10.0	238	10.0	0.591	33.8	LOS C	10.0	76.3	0.94	0.79	20.3
12	R2	133	10.0	133	10.0	0.164	34.7	LOS C	2.4	17.9	0.83	0.73	24.6
Approach		384	10.0	384	10.0	0.591	34.2	LOS C	10.0	76.3	0.90	0.77	22.2
All Vehicles		3014	9.9	3014	9.9	0.598	22.5	LOS B	16.4	124.4	0.77	0.71	29.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	32.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	35.7	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High FU_11.5 FSR AM

Network: Raymond St FU_11.5 FSR AM

Raymond Street - High Street
Scenario: Future - 11.5:1 FSR Scheme
Period: AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	3	10.0	3	10.0	0.071	6.1	LOS A	0.4	3.0	0.52	0.64	33.0
2	T1	12	10.0	12	10.0	0.071	6.0	LOS A	0.4	3.0	0.52	0.64	40.0
3	R2	46	10.0	46	10.0	0.071	9.2	LOS A	0.4	3.0	0.52	0.64	33.0
Approach		61	10.0	61	10.0	0.071	8.4	LOS A	0.4	3.0	0.52	0.64	35.0
East: Raymond St													
4	L2	17	10.0	17	10.0	0.224	2.8	LOS A	1.7	12.9	0.20	0.49	38.6
5	T1	166	10.0	166	10.0	0.224	2.8	LOS A	1.7	12.9	0.20	0.49	25.2
6	R2	115	10.0	115	10.0	0.224	5.8	LOS A	1.7	12.9	0.20	0.49	41.0
Approach		298	10.0	298	10.0	0.224	4.0	LOS A	1.7	12.9	0.20	0.49	36.1
North: High St													
7	L2	91	10.0	91	10.0	0.183	10.1	LOS A	1.4	11.0	0.82	0.74	31.8
8	T1	5	10.0	5	10.0	0.183	10.0	LOS A	1.4	11.0	0.82	0.74	37.8
9	R2	20	10.0	20	10.0	0.183	13.2	LOS A	1.4	11.0	0.82	0.74	31.8
Approach		116	10.0	116	10.0	0.183	10.6	LOS A	1.4	11.0	0.82	0.74	32.2
West: Raymond St													
10	L2	131	10.0	131	10.0	0.667	6.4	LOS A	6.3	47.5	0.49	0.57	39.1
11	T1	580	9.6	580	9.6	0.667	6.2	LOS A	6.3	47.5	0.49	0.57	29.4
12	R2	6	10.0	6	10.0	0.667	9.4	LOS A	6.3	47.5	0.49	0.57	38.9
Approach		717	9.7	717	9.7	0.667	6.3	LOS A	6.3	47.5	0.49	0.57	32.8
All Vehicles		1192	9.8	1192	9.8	0.667	6.2	LOS A	6.3	47.5	0.45	0.57	33.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway FU_11.5 FSR AM

Network: Raymond St FU_11.5 FSR AM

Raymond Street - Laneway
Scenario: Future - 11.5:1 FSR Scheme
Period AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.009	5.7	LOS A	0.0	0.2	0.63	0.70	27.6
2	T1	1	10.0	1	10.0	0.009	13.6	LOS A	0.0	0.2	0.63	0.70	34.3
3	R2	1	10.0	1	10.0	0.009	18.2	LOS B	0.0	0.2	0.63	0.70	27.7
Approach		3	10.0	3	10.0	0.009	12.5	LOS A	0.0	0.2	0.63	0.70	30.4
East: Raymond St													
4	L2	1	10.0	1	10.0	0.197	8.3	LOS A	0.4	3.1	0.15	0.06	44.4
5	T1	302	10.0	302	10.0	0.197	0.8	LOS A	0.4	3.1	0.15	0.06	36.8
6	R2	23	3.2	23	3.2	0.197	8.3	LOS A	0.4	3.1	0.15	0.06	45.2
Approach		326	9.5	326	9.5	0.197	1.3	NA	0.4	3.1	0.15	0.06	38.8
North: Laneway													
7	L2	34	5.0	34	5.0	0.113	9.1	LOS A	0.4	2.7	0.67	0.85	27.1
8	T1	22	0.5	22	0.5	0.113	13.4	LOS A	0.4	2.7	0.67	0.85	39.0
Approach		56	3.2	56	3.2	0.113	10.8	LOS A	0.4	2.7	0.67	0.85	32.2
West: Raymond St													
10	L2	28	1.9	28	1.9	0.392	3.5	LOS A	0.0	0.2	0.00	0.03	50.5
11	T1	687	10.0	687	10.0	0.392	0.0	LOS A	0.0	0.2	0.00	0.03	48.8
12	R2	1	10.0	1	10.0	0.392	5.4	LOS A	0.0	0.2	0.00	0.03	45.2
Approach		717	9.7	717	9.7	0.392	0.2	NA	0.0	0.2	0.00	0.03	48.9
All Vehicles		1102	9.3	1102	9.3	0.392	1.1	NA	0.4	3.1	0.08	0.08	43.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 01. Raymond-Church FU_11.5 FSR PM

Network: Raymond St FU_11.5 FSR PM

Raymond Street - Church Street - Boundary Street
Scenario: Future - 11.5:1 FSR Scheme
Period: PM Peak
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church St													
2	T1	1081	10.0	1081	10.0	0.415	5.7	LOS A	9.6	73.0	0.44	0.40	49.0
3	R2	356	9.7	356	9.7	0.518	23.8	LOS B	10.9	82.3	0.81	0.89	18.6
Approach		1437	9.9	1437	9.9	0.518	10.1	LOS A	10.9	82.3	0.53	0.52	40.8
East: Raymond St													
4	L2	243	10.0	243	10.0	0.468	32.6	LOS C	8.8	67.0	0.86	0.80	18.9
Approach		243	10.0	243	10.0	0.468	32.6	LOS C	8.8	67.0	0.86	0.80	18.9
North: Church St													
7	L2	28	7.8	28	7.8	0.522	31.2	LOS C	11.6	88.2	0.85	0.74	22.4
8	T1	959	10.0	959	10.0	0.522	25.6	LOS B	11.7	88.6	0.85	0.73	29.6
Approach		987	9.9	987	9.9	0.522	25.7	LOS B	11.7	88.6	0.85	0.73	29.4
West: Boundary St													
10	L2	19	10.0	19	10.0	0.447	43.1	LOS D	5.2	39.6	0.95	0.76	25.4
11	T1	107	10.0	107	10.0	0.447	38.5	LOS C	5.2	39.6	0.95	0.76	18.6
12	R2	89	10.0	89	10.0	0.166	41.1	LOS C	1.8	13.3	0.90	0.73	22.5
Approach		216	10.0	216	10.0	0.447	40.0	LOS C	5.2	39.6	0.93	0.75	21.1
All Vehicles		2883	9.9	2883	9.9	0.522	19.6	LOS B	11.7	88.6	0.70	0.63	31.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	22.8	LOS C	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		105	31.0	LOS D			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 02. Raymond-High FU_11.5 FSR PM

Network: Raymond St FU_11.5 FSR PM

Raymond Street - High Street
Scenario: Future - 11.5:1 FSR Scheme
Period: PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: High St													
1	L2	1	10.0	1	10.0	0.027	6.6	LOS A	0.1	1.1	0.57	0.63	32.4
2	T1	4	10.0	4	10.0	0.027	6.5	LOS A	0.1	1.1	0.57	0.63	39.6
3	R2	16	10.0	16	10.0	0.027	9.6	LOS A	0.1	1.1	0.57	0.63	32.4
Approach		21	10.0	21	10.0	0.027	8.9	LOS A	0.1	1.1	0.57	0.63	34.6
East: Raymond St													
4	L2	66	10.0	66	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	38.3
5	T1	209	10.0	209	10.0	0.328	3.1	LOS A	2.7	20.4	0.32	0.49	24.3
6	R2	134	10.0	134	10.0	0.328	6.1	LOS A	2.7	20.4	0.32	0.49	40.6
Approach		409	10.0	409	10.0	0.328	4.1	LOS A	2.7	20.4	0.32	0.49	35.8
North: High St													
7	L2	158	10.0	158	10.0	0.277	8.4	LOS A	2.2	16.6	0.74	0.71	33.9
8	T1	19	10.0	19	10.0	0.277	8.2	LOS A	2.2	16.6	0.74	0.71	39.4
9	R2	34	10.0	34	10.0	0.277	11.4	LOS A	2.2	16.6	0.74	0.71	33.9
Approach		211	10.0	211	10.0	0.277	8.9	LOS A	2.2	16.6	0.74	0.71	34.6
West: Raymond St													
10	L2	55	10.0	55	10.0	0.470	5.5	LOS A	3.4	25.7	0.39	0.52	39.9
11	T1	442	9.6	442	9.6	0.470	5.4	LOS A	3.4	25.7	0.39	0.52	30.9
12	R2	8	10.0	8	10.0	0.470	8.6	LOS A	3.4	25.7	0.39	0.52	39.8
Approach		505	9.6	505	9.6	0.470	5.5	LOS A	3.4	25.7	0.39	0.52	33.1
All Vehicles		1146	9.8	1146	9.8	0.470	5.7	LOS A	3.4	25.7	0.43	0.55	34.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 03. Raymond-Laneway FU_11.5 FSR PM

Network: Raymond St FU_11.5 FSR PM

Raymond Street - Laneway
Scenario: Future - 11.5:1 FSR Scheme
Period PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Laneway													
1	L2	1	10.0	1	10.0	0.020	6.3	LOS A	0.1	0.5	0.75	0.83	24.5
2	T1	1	10.0	1	10.0	0.020	14.3	LOS A	0.1	0.5	0.75	0.83	31.7
3	R2	3	10.0	3	10.0	0.020	19.6	LOS B	0.1	0.5	0.75	0.83	25.1
Approach		5	10.0	5	10.0	0.020	15.9	LOS B	0.1	0.5	0.75	0.83	26.6
East: Raymond St													
4	L2	26	10.0	26	10.0	0.290	6.9	LOS A	0.8	6.2	0.19	0.08	43.6
5	T1	420	10.0	420	10.0	0.290	0.8	LOS A	0.8	6.2	0.19	0.08	34.3
6	R2	38	5.3	38	5.3	0.290	7.9	LOS A	0.8	6.2	0.19	0.08	43.6
Approach		484	9.6	484	9.6	0.290	1.7	NA	0.8	6.2	0.19	0.08	37.7
North: Laneway													
7	L2	42	7.3	42	7.3	0.123	8.3	LOS A	0.4	3.1	0.64	0.81	27.1
8	T1	22	0.5	22	0.5	0.123	14.2	LOS A	0.4	3.1	0.64	0.81	39.1
Approach		64	4.9	64	4.9	0.123	10.3	LOS A	0.4	3.1	0.64	0.81	31.7
West: Raymond St													
10	L2	23	2.3	23	2.3	0.343	3.6	LOS A	0.0	0.2	0.00	0.03	50.4
11	T1	603	10.0	603	10.0	0.343	0.0	LOS A	0.0	0.2	0.00	0.03	48.8
12	R2	1	10.0	1	10.0	0.343	6.5	LOS A	0.0	0.2	0.00	0.03	45.2
Approach		627	9.7	627	9.7	0.343	0.2	NA	0.0	0.2	0.00	0.03	48.9
All Vehicles		1181	9.4	1181	9.4	0.343	1.4	NA	0.8	6.2	0.12	0.10	41.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.