Client
Lara Farms Pty Ltd

Date
31 October 2024

Transport Impact Assessment – Proposed Rezoning

705-765 Princes Highway, 710 Rennie Street & 76-156 Canterbury Road East, Lara

ratio:

Project
705-765 Princes Highway, 710 Rennie Street & 76-156 Canterbury Road East, Lara

Prepared for
Lara Farms Pty Ltd

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1. Introduction

1.1. Background and Introduction

Ratio Consultants has been engaged by the Applicant to prepare a Transport Impact Assessment for the proposed rezoning of land at 705-765 Princes Highway, 610 Rennie Street & 76-156 Canterbury Road East in Lara from Farming Zone (FZ) to a mix of Industrial Zoning.

The proposed rezoning will allow for the future development of the land for an industrial business park which could reasonably be expected to accommodate circa 38.79 Ha of net developable area, with associated on-site car parking facilities, an internal road network and external connections to surrounding roads.

In addition to the industrial land, a 'possible regional sports reserve (subject to Council's purchase of the land)' intended to service the 'greater Lara area' has been considered within the following report. The possible regional sports reserve is anticipated to be in the order of up to 11.21 Ha with associated on-site car parking facilities, an internal road network and connections to the adjacent land uses (industrial to the south and residential to the north).

This report has been prepared to undertake a transport impact assessment of the proposed rezoning.

1.2. Purpose & Structure of this Report

This report sets out an assessment of the anticipated broad level transport implications of the proposed rezoning and development, including consideration of:

- The adequacy of the proposed site access arrangements for the proposed future development.
- The acceptability of the traffic impacts of the proposed rezoning and development to the surrounding road network.
- The required pedestrian, bicycle and public transport access arrangements to the site.

It is important to emphasise that a rezoning application is being sought in the first instance. The nominated development use and associated access strategy for the site are still being considered and are subject to change and future planning permit application changes.

Accordingly, the analysis contained in this report is directed at assisting the Responsible Authority in identifying key traffic development parameters, rather than involving a comprehensive analysis of a specific design which is likely to change as development details are subsequently refined in future planning application submissions.

Nevertheless, it is anticipated that the various traffic issues which have been investigated and are documented in this report will provide necessary technical information to assist with the further assessment of the site.

1.3. References

In preparing this report, reference has been made to the following:

- Concept plans for the proposed rezoning and development, provided in Appendix A of this report.
- Greater Geelong Planning Scheme.
- Australian/New Zealand Standard, Parking Facilities Part 1: Off-Street Car Parking (AS2890.1:2004).
- Transport Impact Assessment prepared by Traffix Group for the proposed rezoning of land at 76-156, 95 & 101-145 Canterbury Road East & 785-805 Princes Highway, Lara.

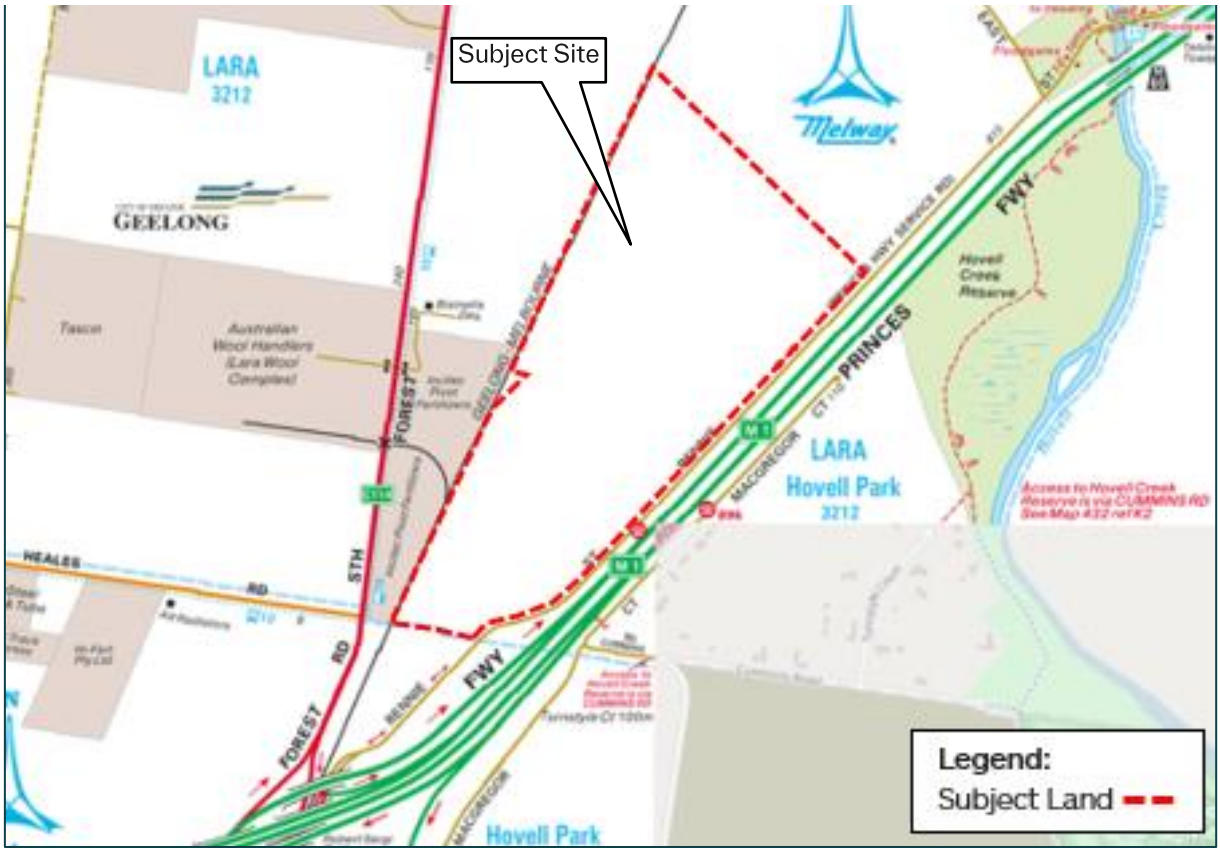
- Traffic surveys undertaken by Ratio Consultants as referenced in the context of this report.
- A desktop review of the subject site and its surrounds.
- Other documents as nominated in this report.

2. Existing Conditions

2.1. Location and Environment

The subject land is located at 705-765 Princes Highway & 610 Rennie Street in Lara. The site's location relative to the surrounding road network is shown in Figure 2-1.

Figure 2-1: Site Location



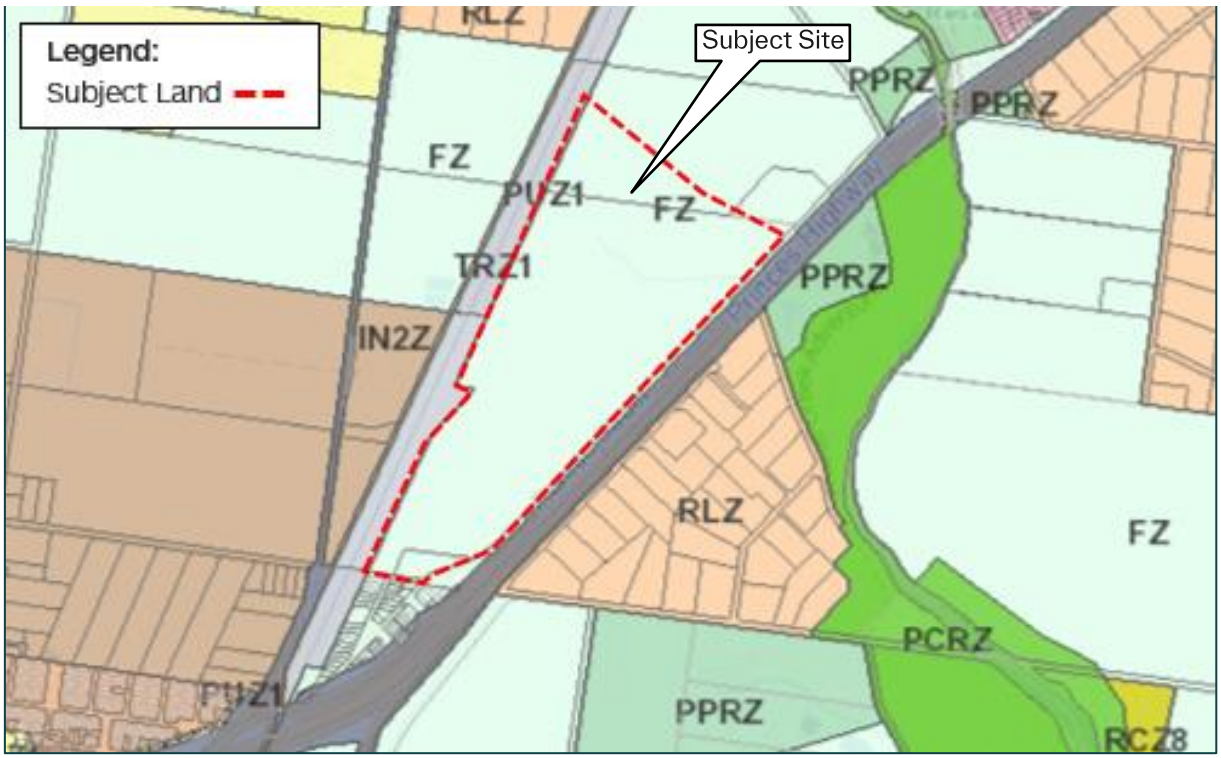
Source: Melways

The subject site is irregular in shape and has a frontage of approximately 1,792 metres to Rennie Street and a total area of approximately 78 hectares.

The subject site is currently occupied by farmland and is located within a Farming Zone (FZ).

Figure 2-2 shows the location of the site and the Greater Geelong Planning Scheme Zones.

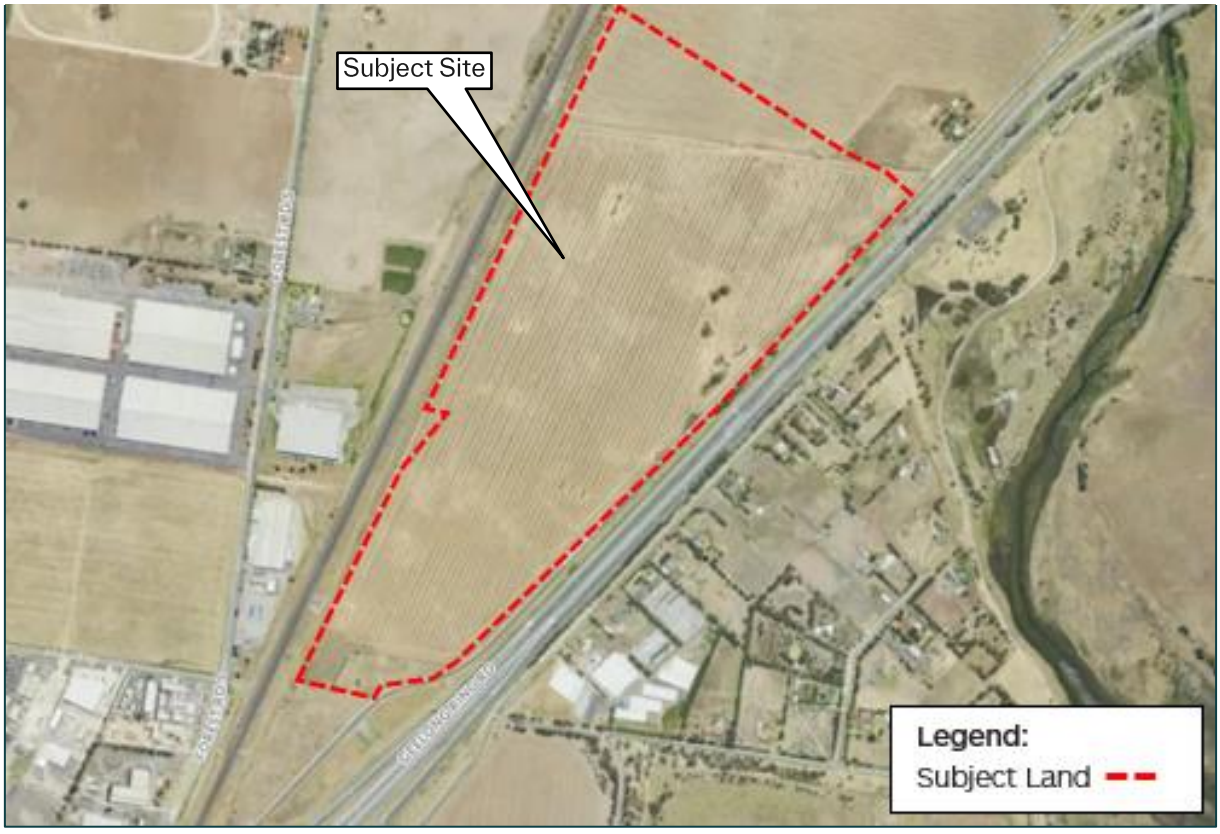
Figure 2-2: Greater Geelong Planning Scheme Zones



Source: Planning Maps Online

In order to appreciate the location of the subject site within the localised area from available aerial imagery, Figure 2-3 has been prepared to illustrate the site in the local context, with its immediate surrounds.

Figure 2-3: Aerial View of the Site and Surrounds



Source: Landchecker.com.au

2.2. Road Network

Rennie Street is aligned in a north-east to south-west direction and has a cross section of approximately 6.6 metres allowing for two-way vehicle movement and is under Council control.

Rennie Street connects to Shell Parade / MacGregor Court at the southern end and McClelland Avenue at the northern end. Rennie Street is currently posted at 100 km/hr along the site frontage. Footpaths are not provided on either side of the road.

A typical view of Rennie Street in vicinity of the site is shown in Figure 2-4.

Figure 2-4: Rennie Street Looking North

Source: www.google.com/maps

Canterbury Road East is aligned in an east to west direction and has a cross section of approximately 6.6 metres allowing for two-way vehicle movement and is under Council control.

Canterbury Road East connects to Rennie Street at the eastern end and Forest Road at the western end. Canterbury Road East is currently posted at 80 km/hr. Footpaths are not provided on either side of the road.

A typical view of Canterbury Road East in the vicinity of the site is shown in Figure 2-5.

Figure 2-5: Canterbury Road East Looking North-West

Source: www.google.com/maps

There is an existing level crossing located approximately mid-way along Canterbury Road East, along the edge of the existing urban boundary. The level crossing is controlled by boom gates and there is currently no pedestrian facility provided.

2.3. Neighbouring Development

The land located to the north-east of the site, comprising 76-156 Canterbury Road East. 785-805 Princes Highway, 95 Canterbury Road East & 101-145 Canterbury Road East, is the subject of a separate rezoning application. A Transport Impact Assessment was prepared by Traffix Group (in April 2024) to support the rezoning of this land.

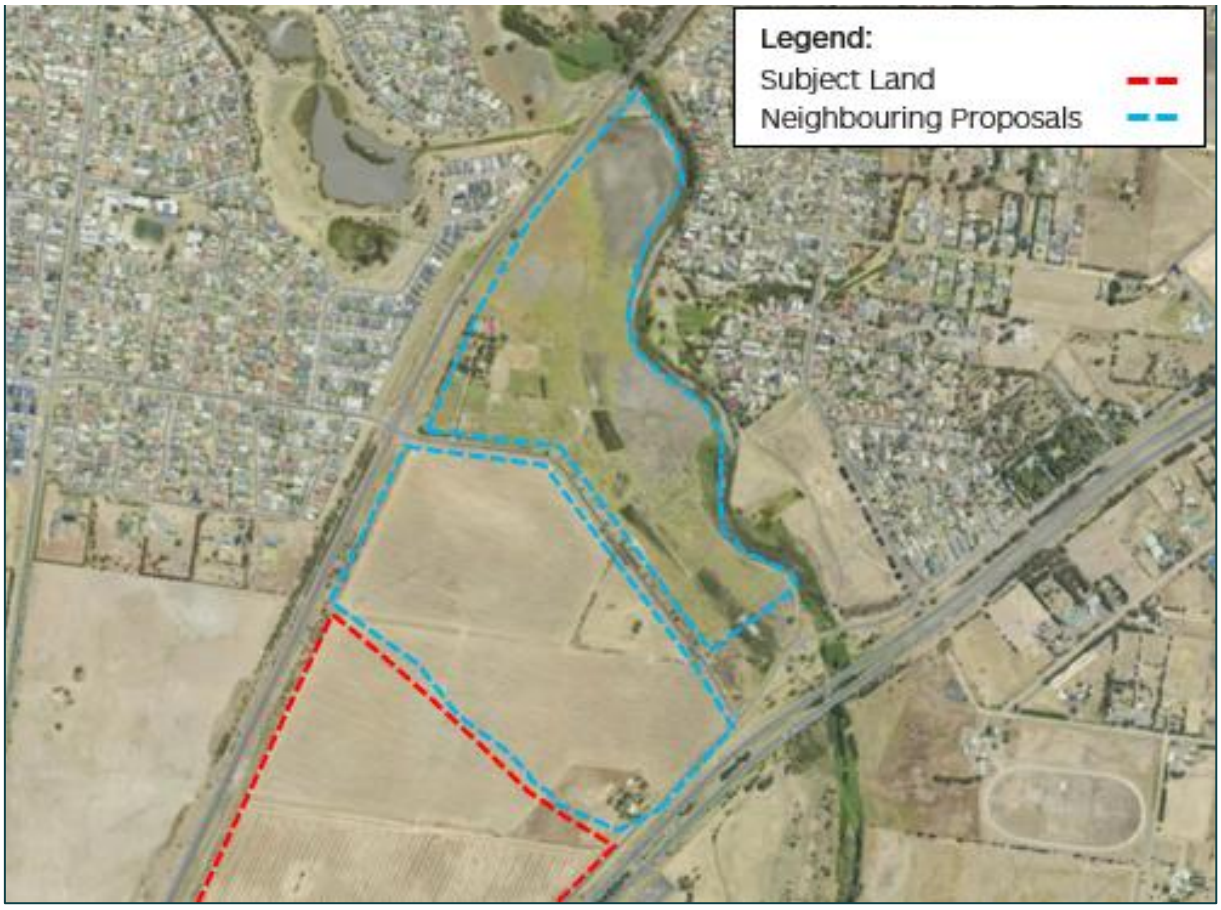
The following is noted from the Traffix report:

— The rezoning would allow for development of up to 800 residential lots having the potential to generate around 640 light vehicle movements (two-way) during the AM and PM peak periods.

— This traffic would be distributed throughout the surrounding road network with around 24% north via Rennie Street, 31% north-east towards the Freeway, 31% west via Canterbury Road East and 13% south via Rennie Street.

The location of the above sites in relation to the subject site are shown in Figure 2-6.

Figure 2-6: Location of Subject Site relative to Neighbouring Applications



Future traffic conditions with the inclusion of this rezoning were contemplated within the traffic report and form the base case scenario, further detailed in Section 5 of this report.

2.4. Sustainable Transport

Public Transport

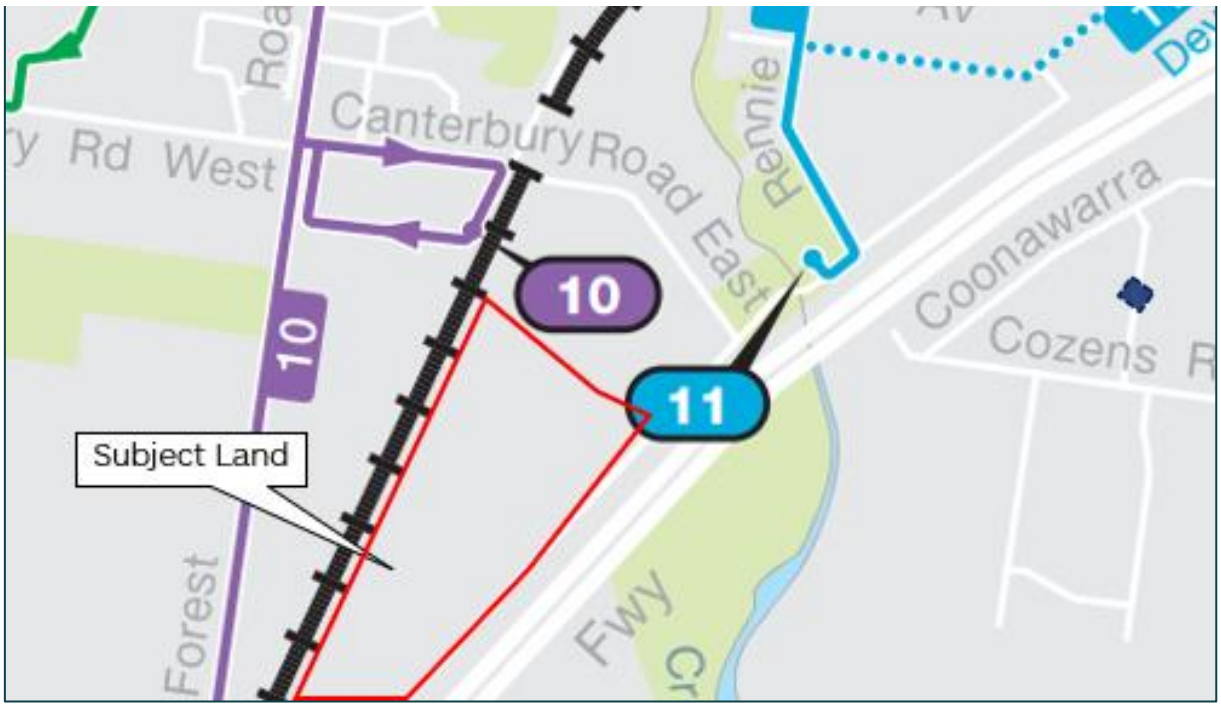
The subject site currently has reasonable access to surrounding public transport facilities.

The closest bus service (Route 11) operates along Rennie Street, with the closest bus stop located approximately 800m north of the subject site.

The closest train station is Lara Railway Station located approximately 2.6 kilometres to the north-west of the site.

Figure 2-7 shows the closest public transport services to the subject land.

Figure 2-7: Greater Geelong Public Transport Victoria Map



Source: www.ptv.vic.gov.au/assets/maps

Pedestrian and Bicycle Network

The subject land currently has limited access to pedestrian and bicycle infrastructure.

2.5. Surrounding Intersections

Key intersection in the vicinity of the site include:

— The intersection of Rennie Street / Princes Freeway on-ramp, located approximately 600m south-west from the subject site, which is priority-controlled.

— The intersection of Rennie Street / Canterbury Road East located to the north-east of the subject site, which is priority-controlled.

— The intersection of Forest Road / Canterbury Road East located approximately 1km to the north-west of the subject site, which is an existing roundabout.

2.6. Crash Analysis

A review has been conducted of VicRoads 'CrashStats' database for the five-year period of available data for any reported casualty crashes.

This database records all accidents causing injury that have occurred in Victoria since 1987 (as recorded by Victorian Police) and categorises these accidents as follows:

- *Fatal injury: at least one person was killed in the accident or died within 30 days as a result of the accident.*
- *Serious injury: at least one person as sent to Hospital as a result of the accident.*
- *Other injury: at least one person required medical treatment as a result of the accident.*

A summary of the accidents in the vicinity of the subject site for the last five-year period is presented in the Table 2-1.

Table 2-1: Summary of Crashes in the Vicinity of the Subject Site (5 Year Period)

Location	Accident No.		
	Fatality	Serious Injury	Other Injury
Site Frontage			
Rennie Street	0	0	1
Nearby Intersections			
Canterbury Road East / Rennie Street	0	0	0
Rennie Street / Princes Fwy On-Ramp	0	0	0
Total	**0**	**0**	**1**

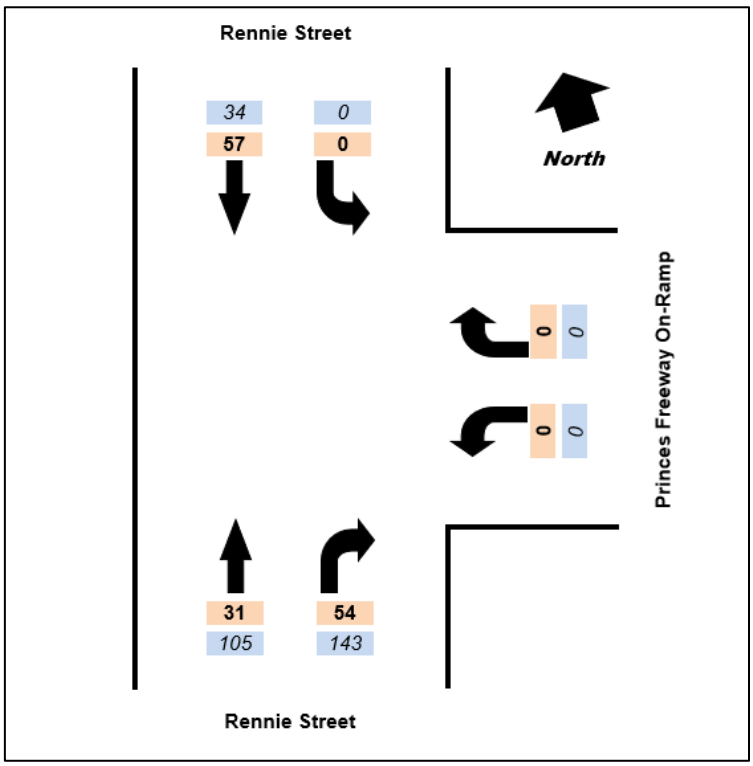
Table 2-1 indicates that over the last available five-year period, one crash was recorded in the vicinity of the subject land. Critically, only one crash was reported along the site frontage.

A review of the crash history data indicates that no fatalities have been reported and there does not appear to be any crash trends that should warrant an unconventional site access strategy. Given the road classifications and associated traffic volumes, it is considered that the road network is operating in a safe manner.

2.7. Existing Traffic Conditions

In order to determine the existing levels of traffic on the surrounding road network, peak hour traffic counts were commissioned by Ratio on Thursday 2 August 2022 at the Rennie Street / Princes Freeway on-ramp intersection between 7:00-10:00am and 4:00-7:00pm. These surveys supplement traffic surveys which were previously undertaken by Ratio in February 2022 as part of the residential rezoning application to the north. The results of the survey are shown in Figure 2-6 and provided in full in Appendix B of this report.

Figure 2-8: Existing Turning Movement Volumes



In addition to the turning movement count at the Rennie Street / Princes Freeway on-ramp intersection, weeklong tube count surveys were commissioned by Ratio from Thursday 10 February-Thursday 17 February 2022 along Rennie Street in the vicinity of the subject site.

The results of the survey are summarised in Table 2-2 and provided in full in Appendix B.

Table 2-2: Tube Count Survey Summary

Time Period	North / West Bound	South / East Bound	Two-Way
Rennie Street			
AM Peak [1]	82	34	116
PM Peak [2]	64	120	184
Daily [3]	815	885	1,700

[1] AM Peak occurred between 8:00am – 9:00am on Tuesday 15 February 2022
[2] PM Peak occurred between 5:00pm – 6:00pm on Tuesday 15 February 2022
[3] Peak Daily movements occurred on Friday 11 February 2022

Table 2-2 indicates that Rennie Street carries approximately 1,700 vehicles per day.

2.8. Existing Intersection Operation

General

An existing conditions peak hour intersection analysis has been undertaken for the Rennie Street / Canterbury Road East intersection, the Rennie Street / Princes Freeway on-ramp intersection, and the Rennie Street / Shell Parade / Princes Freeway off-ramp intersection, using the analysis program SIDRA Intersection.

SIDRA Parameters

The key parameters used to determine the operational capacity of an intersection are queue length, average delay and degree of saturation (or volume to capacity ratio).

Degree of Saturation (DOS) is a ratio of arrival (or demand) flow to capacity. DOS above 1.0 represent oversaturated conditions and a DOS below 1.0 represent undersaturated conditions.

The operational rating associated with the DOS is summarised below.

Table 2-3: Ratings of Degree of Saturation (DoS)

Degree of Saturation (DoS)	Rating
Up to 0.6	Excellent
0.61 – 0.70	Very Good
0.71 – 0.80	Good
0.81 – 0.90	Fair
0.91 – 1.00	Poor
Greater than 1.00	Very Poor

The typical target degree of saturation for sign-controlled intersections is 0.80 with a maximum of 0.85. Although operating conditions with a degree of saturation around 1.00 are undesirable, it is acknowledged that this level of congestion is typical of many metropolitan intersections during the AM and PM peak hours and could be considered acceptable under certain circumstances.

The **95th percentile queue** length is the value below which 95 percent of all observed cycle queue lengths fall, or 5 percent of all observed queue lengths exceed.

Average Delay is the average time, in seconds, that all vehicles making a particular movement can expect to wait at an intersection.

Rennie Street / Canterbury Road East

The results of the existing AM and PM peak hour SIDRA analysis are detailed in Appendix C of this report and summarised in Table 2-4 and Table 2-5.

Table 2-4: Existing AM Peak SIDRA – Rennie Street / Canterbury Road East

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.04	0	4
	Right	0.04	0	6
Canterbury Road	Left	0.08	2	6
	Right	0.08	2	6
Rennie Street (S)	Left	0.02	0	6
	Through	0.02	0	4
Intersection		**0.08**		

Table 2-5: Existing PM Peak SIDRA – Rennie Street / Canterbury Road East

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.05	0	4
	Right	0.05	0	6
Canterbury Road	Left	0.06	2	6
	Right	0.06	2	7
Rennie Street (S)	Left	0.06	0	6
	Through	0.06	0	4
Intersection		**0.06**		

As shown in the preceding tables, the Rennie Street / Canterbury Road intersection is currently operating with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays given the existing traffic currently carried on each of these roads.

Rennie Street / Princes Freeway On-Ramp

The results of the existing AM and PM peak hour SIDRA analysis are detailed in Appendix C of this report and summarised in Table 2-6 and Table 2-7.

Table 2-6: Existing AM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.02	0	0
	Right	0.04	2	7
Rennie Street (N)	Left	0.03	0	6
	Through	0.03	0	0
Intersection		**0.04**		

Table 2-7: Existing PM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.06	0	0
	Right	0.10	4	6
Rennie Street (N)	Left	0.02	0	6
	Through	0.02	0	0
Intersection		**0.10**		

As shown in the preceding tables, the Rennie Street / Princes Freeway on-ramp intersection is currently operating with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays given the existing traffic currently carried on each of these roads.

Canterbury Road / Forest Road

The results of the existing AM and PM peak hour SIDRA analysis are detailed in Appendix C of this report and summarised in Table 2-8 and Table 2-9.

As shown in the following tables, the Canterbury Road / Forest Road intersection is currently operating with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays given the existing traffic currently carried on each of these roads.

Table 2-8: Existing AM Peak SIDRA – Canterbury Road / Forest Road

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.32	15	6
	Through	0.32	15	6
	Right	0.32	15	9
Canterbury Road (E)	Left	0.24	11	10
	Through	0.24	11	9
	Right	0.24	11	13
Forest Road (N)	Left	0.04	1	5
	Through	0.42	23	6
	Right	0.42	23	10
Canterbury Road (W)	Left	0.35	15	7
	Through	0.35	15	7
	Right	0.35	15	11
Intersection		**0.42**		

Table 2-9: Existing PM Peak SIDRA – Canterbury Road / Forest Road

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.60	37	6
	Through	0.60	37	7
	Right	0.60	37	10
Canterbury Road (E)	Left	0.19	8	8
	Through	0.19	8	8
	Right	0.19	8	12
Forest Road (N)	Left	0.06	2	5
	Through	0.34	16	6
	Right	0.34	16	9
Canterbury Road (W)	Left	0.27	12	9
	Through	0.27	12	9
	Right	0.27	12	12
Intersection		**0.60**		

Rennie Street / Shell Parade / Princes Freeway Off-ramp

Intersection modelling for the existing Princes Freeway off-ramp roundabout has been undertaken based on estimated traffic volumes derived from turning movement counts at adjacent intersections as described in this report.

The results of the existing AM and PM peak hour SIDRA analysis are detailed in Appendix C of this report and summarised in Table 2-10 and Table 2-11.

As shown in the following tables, the Rennie Street / Shell Parade / Princes Freeway off-ramp intersection is currently operating with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays given the existing traffic currently carried on each of these roads.

Table 2-10: Existing AM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.05	2	4
	Right	0.05	2	9
MacGregor Court (E)	Left	0.00	0	4
	Through	0.00	0	4
Princes Freeway Off-ramp (N)	Left	0.14	6	3
	Through	0.14	6	3
	Right	0.14	6	10
Rennie Street (W)	Through	0.04	1	3
	Right	0.04	1	9
Intersection		**0.14**		**5**

Table 2-11: Existing PM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.12	5	4
	Right	0.12	5	10
MacGregor Court (E)	Left	0.00	0	4
	Through	0.00	0	4
Princes Freeway Off-ramp (N)	Left	0.12	5	3
	Through	0.12	5	4
	Right	0.12	5	9
Rennie Street (W)	Through	0.02	1	3
	Right	0.02	1	9
Intersection		**0.12**		**6**

3. Lara Structure Plan

3.1. Background

The Lara Structure Plan has been prepared by the City of Greater Geelong Council. The Structure Plan is a strategic framework for the future planning and development of the township.

The purpose of the Structure Plan is to:

- *Identify the key strategic planning issues facing the township, including the community aspirations and needs;*
- *Articulate the preferred the future directions for the townships including the location of Settlement Boundaries; and,*
- *Identify appropriate planning controls which will protect and enhance the distinctive elements of the township, biodiversity and landscape features.*

3.2. Roads

The proposed road upgrades detailed within the Lara Structure Plan that are relevant to the subject site include:

- *Canterbury Road East – widening to install on-road bicycle paths and a bicycle path connection to the freeway.*
- *Canterbury Road East – Railway crossing improvements required to improve the safety at this intersection.*
- *Forest Road South – Widening required to accommodate on-street parking, pedestrian refuges, bicycle lanes, four lanes and truck turning lanes.*

3.3. Identified Improvements to Transport & Movement Network

A number of opportunities are identified to improve the transport and movement network around Lara, including:

- *Upgrade the train station precinct to include better pedestrian access.*
- *Create a transport interchange at the train station catering for trains, buses, bicycles, pedestrians, taxis and private cars.*
- *Improve bus services through increased services and strategic stop locations.*
- *Create better pedestrian links to and from key locations in the township.*
- *Promote pedestrian and bicycle connections in and around the town by providing better and new pathways and footpaths.*

4. Development Site

4.1. Development Summary

Development Overview

Subject to the proposed rezoning, the overall site could be developed in accordance with the indicative schedule outlined in Table 4-1.

Redevelopment of the land is anticipated to take place across multiple stages. It is noted that the following development yields are rounded estimates for the purpose of the rezoning application.

The exact development schedule will be determined at the Planning Permit Stage but is expected to be generally in accordance with the below estimates for the overall site.

Table 4-1: Development Summary (Indicative Summary)

Land Use	Size / No.
Specialised Activity Centre	38.79 Ha (Net Developable Area)
Employment	

Industrial

A comparison of floor area to land size, indicates that buildings typically occupy 41.85% of the land area for industrial business park land, with the remaining site used for access, car parking, loading bays and landscape.

For the purpose of this report, it has been assumed that the proposal will be a mix of general industrial and light industrial zoning. Accordingly, the resulting building footprints are shown in Table 4-2 below.

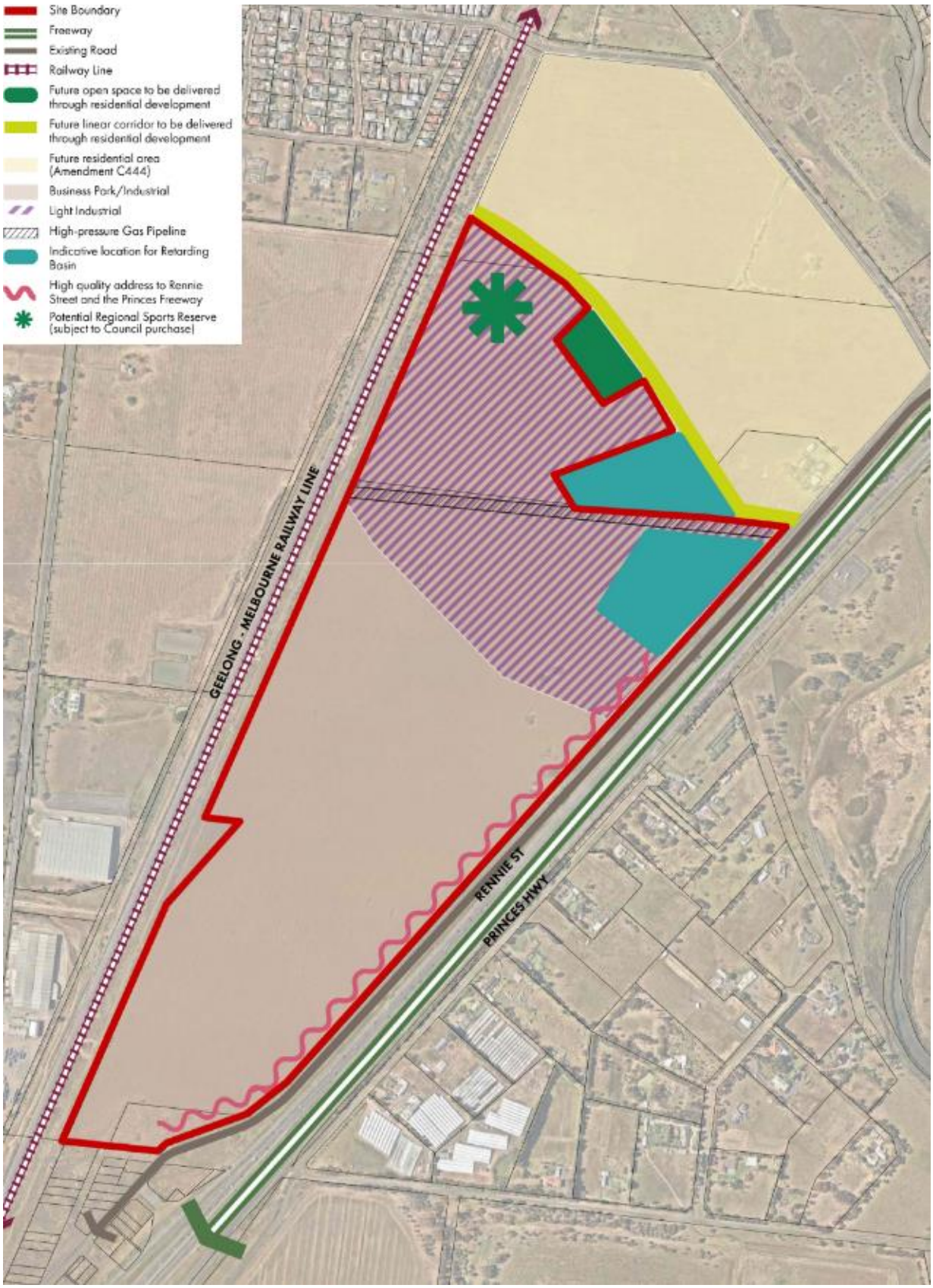
Table 4-2: Development Summary (Indicative Floor Area)

Land Use	Size / No.
Employment	162,300 sqm

A Concept Plan has been prepared by Tract and has been provided in Figure 4-1.

It should also be noted that consideration has been given to providing a road adjacent to the basin, and to provide roadway widths that are consistent with Council expectations. The internal road design will be designed to minimise cul-de-sacs.

Figure 4-1: Concept Plan (Industrial Rezoning)



4.2. Site Access Strategy

The proposed access arrangements would include a number of localised connections to Rennie Street along the eastern boundary of the subject site.

Internal connections through to the adjacent future residential subdivision to the north are also proposed to be provided to facilitate access to/from the Sports Precinct.

It is acknowledged that Schedule 50 to the Design & Development Overlay is to be applied to the rezoning proposal and it includes a requirement for *"the provision of at least two entry roads off Rennie Street."*

Whilst this traffic report has assumed that three access points will be provided off Rennie Street, we confirm that modelling and analysis by our office has confirmed that the site being provided with only two access points from Rennie Street can operate safely and efficiently with intersections performing to acceptable levels.

4.3. Road Hierarchy

Industrial

The internal road network servicing the industrial land is anticipated to primarily comprise 25-metre-wide Industrial Street cross sections. The design standard is provided in Table 4-3.

Table 4-3: Proposed Industrial Road Cross-Sections

Road	Road Reserve	Carriageway Width	Parking	Pedestrian	Bicycle
Industrial Street	25m	12.5m	On-Road	1.5m pedestrian path both sides	3m off-road path one side

All internal roads would be 'bus capable' and suitable for accommodating bus network changes should they be implemented.

Possible Regional Sports Facility

The internal road network for the possible regional sports facility will consist of accessways providing access to the various car parking areas within the sports precinct. All internal accessways will be designed to facilitate two-way movements throughout the precinct and will be designed in accordance with the Greater Geelong Planning Scheme.

4.4. Pedestrian Connectivity

The proposal is anticipated to provide excellent pedestrian facilities with footpaths provided on both sides of all streets.

Good connectivity is also required between the subject site and the wider area, with additional connections to be provided to the surrounding area in conjunction with the neighbouring developments.

4.5. Possible Regional Sports Reserve

As a rezoning application is being sought in the first instance, there is no certainty in respect to what will be built as this is still being considered and is naturally subject to change. The exact development schedule for the possible regional sports reserve will be determined at a later stage however is expected to be generally in accordance with the below estimates for the site. It should be noted that the provision of a possible regional sports reserve is subject to Council's purchase of the land, and if not purchased, will be rezoned to IN3Z, consistent with the balance of this precinct.

Table 4-4: Indicative Development Summary (Possible Regional Sports Reserve)

Land Use	Size / No.
Tennis Court	6 courts
Soccer Pitch	4 pitches [1]
Cricket Pitch	2 pitches
Active Play	Indicative Area Only
Car Parking	380 spaces

[1] The 4 soccer pitches are proposed to function as dual purpose also catering for 2 football pitches.

5. Traffic Impact Assessment

5.1. Preamble

The following traffic assessment has been completed assuming full development of the overall site land.

The impact of the site generated traffic on the following intersections during the AM and PM peak hours has been assessed using SIDRA Intersection 9.1:

- Rennie Street / Northern Site Access;
- Rennie Street / Central Site Access;
- Rennie Street / Southern Site Access;
- Rennie Street / Canterbury Road;
- Rennie Street / Princes Freeway On-Ramp; and,
- Rennie Street / Shell Parade / Princes Freeway Off-Ramp.

5.2. Traffic Generation

Industrial

Ratio undertook a case study in March 2019, of the traffic generation characteristics of a large industrial estate in Truganina. The total area surveyed is approximately 92.2ha, with a range of warehouse and light industrial uses occupying approximately 385,840sqm of floor area.

A comparison of floor area to land size, indicates that buildings typically occupy 41.85% of the land area, with the remaining site used for access, car parking, loading bays and landscape. The case study was conducted using automatic tube counts at the entry points to the estate, in order to record traffic volumes over a one-week period.

The AM Peak hour occurred between 6:00-7:00am, whilst the PM Peak hour occurred between 3:00-4:00pm. It is noted that the peak hours occurred earlier than the typical commuter peak hour on the adjacent road network. The highest traffic generation during the survey period occurred on the Tuesday.

The case study indicates that vehicle movements during the AM and PM peak hours were almost identical, with a variation of only 60 movements between the two peak periods.

The case study data found the following daily and peak hour traffic generation rates:

Table 5-1: Industrial Case Study Data

Time Frame	Traffic Generation Rate	Inbound & Outbound Movements
AM Peak (6:00-7:00pm)	0.49 vehicle movements per 100sqm	60% inbound / 40% outbound
PM Peak (3:00-4:00pm)	0.47 vehicle movements per 100sqm	40% inbound / 60% outbound
Daily	5.05 vehicle movements per 100sqm	50% inbound / 50% outbound

On the basis of the preceding case study data, a daily rate of five vehicle movements per day per 100sqm has been adopted and a rate of 0.5 vehicle movements per 100sqm during the AM and PM peak hours.

The results of the case study are consistent with the RTA Guide to Traffic Generating Developments, which outlines a rate of five vehicle movements per 100sqm per day. Over the course of the survey, approximately 20% of traffic generation was the result of heavy vehicles, with reduced proportion of heavy vehicles during the peak hours.

Applying the preceding assumptions to the proposed light industrial floor area associated with the proposal result in the following traffic movements.

Table 5-2: Projected Traffic Generation – Light Industrial Land Use

Time	Direction	Total
		162,300 sqm
AM Peak	Inbound (vph)	487 vph
	Outbound (vph)	235 vph
	Two Way	812 vph
PM Peak	Inbound (vph)	325 vph
	Outbound (vph)	487 vph
	Two Way	812 vph
Daily	Two Way	8,115 vpd

On the basis of the above, it is anticipated that the industrial component of the development will generate traffic at a rate of 812 vehicle movements during the AM and PM peak hours and 8,115 daily vehicle movements. Approximately 10% of peak hour activity is assumed to be heavy vehicles, primarily light to medium rigid trucks.

Possible Regional Sports Reserve

In order to determine the amount of traffic generated by the possible sports reserve a first principles assessment has been undertaken reviewing the anticipated number of players, officials and spectators for each of the sports fields / courts.

Sports fields / courts typically generate peak traffic associated with training periods and matches. The anticipated patronage generated by each of the sports fields / courts are shown in the table below.

Table 5-3: Projected Patronage Per Field / Court

Sport	Game Day		Training
	Players / Officials	Spectators	Participants
Soccer	35	70	20
Football	60	200	30
Tennis	4	3	4
Cricket	30	50	15

As a rule of thumb, typical car occupancy for training / tennis is projected to be 1.5 people per vehicle with a slightly higher occupancy for game days 2.2 people per vehicle.

Based on the above adopted car occupancy rates and the projected patronage for each sport, the following peak hour traffic volumes are anticipated. The peak hour traffic considers two scenarios, which are projected to be the highest traffic generating events.

Table 5-4: Projected Traffic Generation – Possible Regional Sports Reserve

Peak Hour	Scenario	Peak Hour Traffic	Inbound / Outbound
Weekday PM Peak Hour	1 football match All tennis courts occupied Allowance of 10 vehicle movements generated by ad-hoc use of play space, walking tracks etc.	170 two-way vehicle movements	50% inbound / 50% outbound
Weekend Peak Hour	2 football matches All tennis courts occupied Allowance of 10 vehicle movements generated by ad-hoc use of play space, walking tracks etc.	486 two-way vehicle movements	50% inbound / 50% outbound

The above peak hour traffic volumes consider a conservative adopting of a 90% car mode share.

Noting the industrial land use is anticipated to generate minimal traffic during the weekend periods, the following assessment of the possible sports precinct only considers traffic generated during the PM peak period.

It should be noted that the above traffic volumes are for the seasonal peak period, such as key matches when the various sports are anticipated to generate a lot of spectators. For the majority of the season, the volumes are anticipated to be significantly lower.

5.3. Traffic Distribution

Industrial

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i Configuration of the arterial road network in the immediate vicinity of the land;

ii Existing operation of intersections providing access between the local and arterial road network;

iii Distribution of households in the vicinity of the land;

iv Surrounding employment centres, retail centres and schools in relation to the land;

v Likely distribution of employee's residences in relation to the land; and,

vi Configuration of access points to the land.

It is anticipated that 100% of the trips generated by the industrial site will be to/from the external road network.

Having consideration to the above factors and the existing surveyed vehicle distributions, the following directional distributions have been assumed through the site access points, as summarised in Table 5-5.

It should be noted that due to the load limits on the surrounding road network, alternative light vehicle and heavy vehicle distributions have been determined.

Table 5-5: Directions Distributions of Traffic

Entry / Exit	Movement [1]	AM Peak		PM Peak	
		Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Entry Movements	Rennie Street Left-In	70%	100%	75%	100%
	Rennie Street Right-In	30%	0%	25%	0%
Exit Movements	Rennie Street Left-Out	25%	0%	30%	0%
	Rennie Street Right-Out	75%	100%	70%	100%

[1] Traffic Movements at the Rennie Street Accesses distributed equally across each of the three accesses.

Possible Regional Sports Reserve

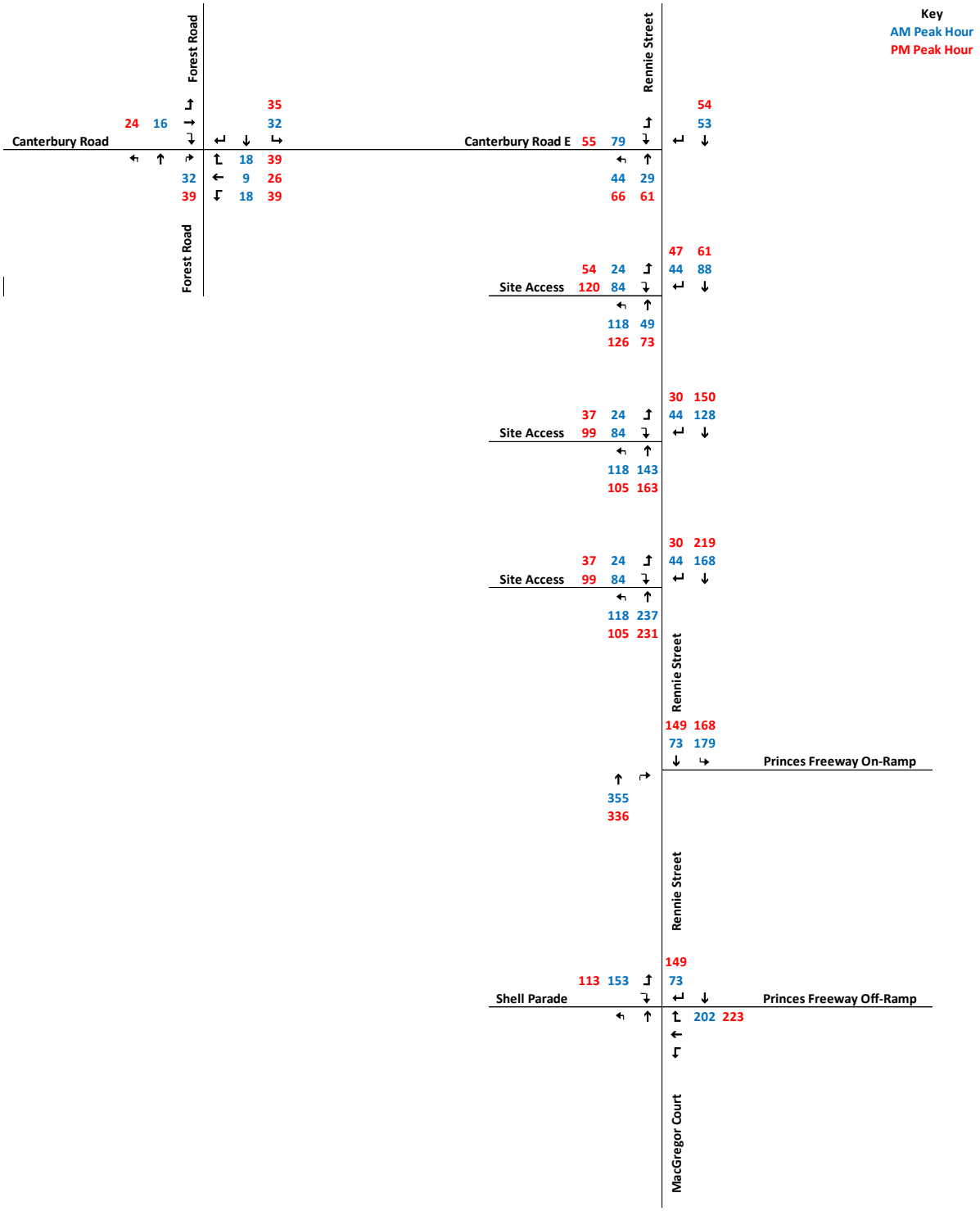
Based on a review of the wider road network and residential catchments within the surround area, the following traffic distribution has been adopted for the possible regional sports reserve:

- 45% to/from Canterbury Road (west of rail).
- 45% to/from Rennie Street, with 20% from Lara and 25% from Corio.
- 10% Internal Trips.

Overview

Based on the above, Figure 5-1 and Figure 5-2 have been prepared to show the estimated site generated turning movements in the vicinity of the subject land following full site development.

Figure 5-1: Peak Hour Site Generated Traffic Volumes



5.4. Traffic Volumes

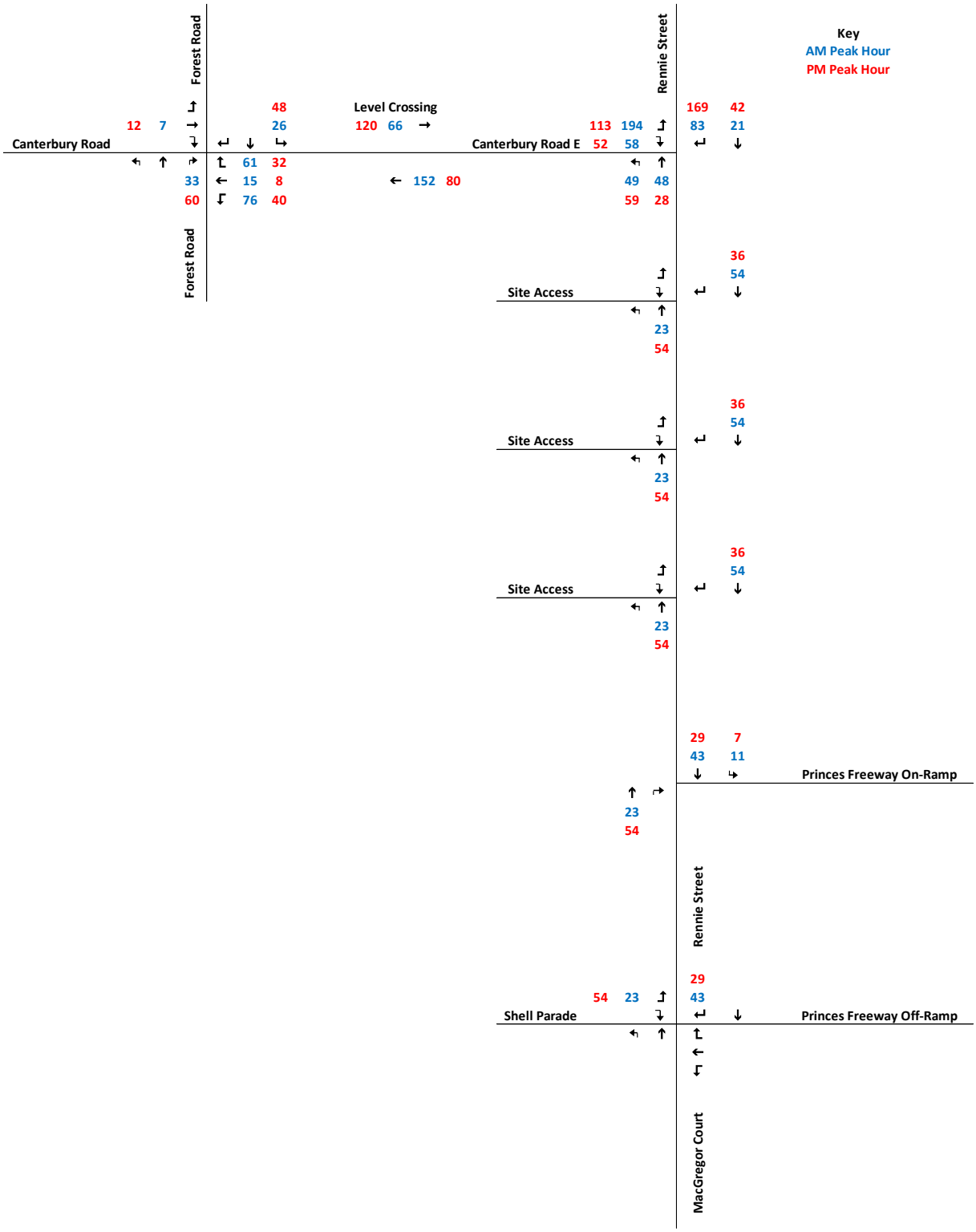
Base Case Conditions

As discussed in Section 2.3, a separate rezoning of land is proposed at 76-156 Canterbury Road East, 785-805 Princes Highway, 95 Canterbury Road East & 101-145 Canterbury Road East in Lara. The expected yield of this land is 800 residential lots. The traffic considerations of this rezoning are outlined in the Transport Impact Assessment prepared by Traffix Group.

The AM and PM peak hour traffic volumes generated by the rezoning have been estimated based on a rate of 0.8 vehicles per hour per lot and a traffic distribution as described in the Traffix report.

The resulting traffic volumes are shown in Figure 5-2.

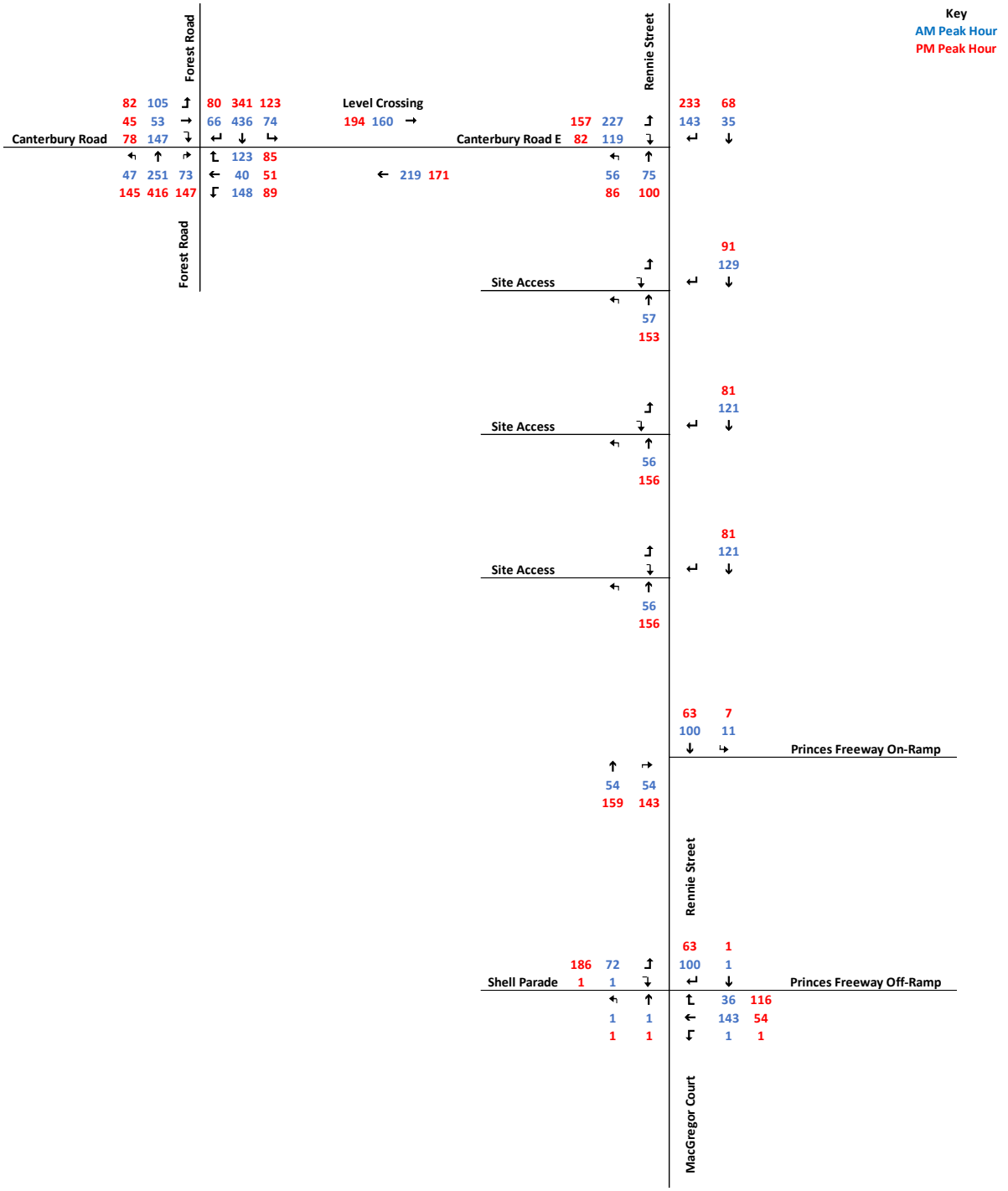
Figure 5-2: Peak Hour Residential Rezoning Generated Traffic Volumes



It should be noted that the traffic impact of the residential rezoning on the Rennie Street / Princes Freeway On-Ramp was not assessed previously. Accordingly, traffic at this intersection has been distributed assuming 20% of traffic to the Princes Freeway on-ramp with the remaining 80% traffic heading south to/from Geelong via Shell Parade.

By adding the Residential Rezoning traffic to the Base Case traffic flows the Base Case traffic volumes can be calculated. These Base Case development traffic volumes are outlined in Figure 5-3.

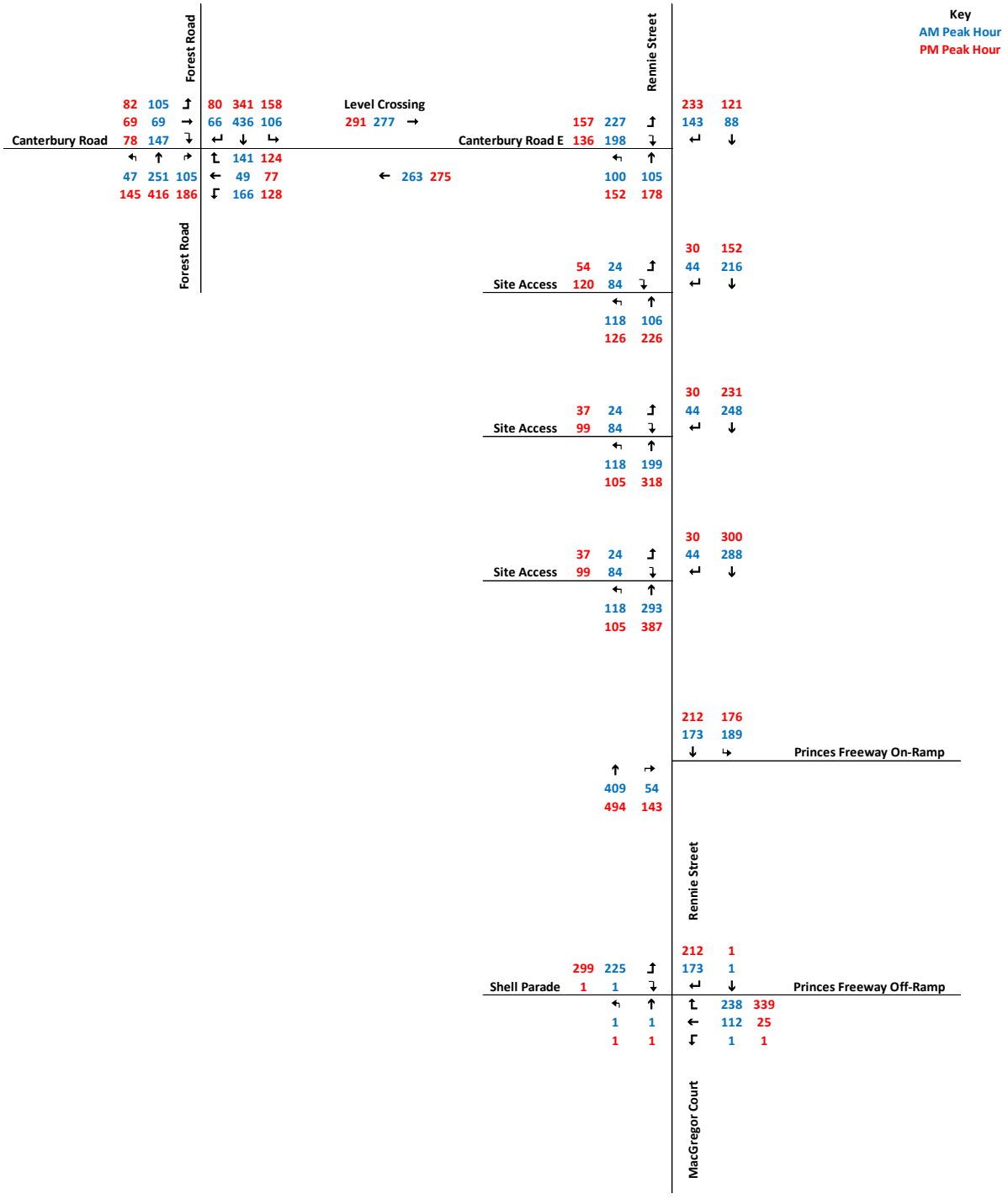
Figure 5-3: Base Case Development Peak Hour Traffic Volumes



Post Development Conditions

By adding the development traffic to the Base Case traffic flows we can obtain the 'Design' or Post-Development traffic volumes. These post development traffic volumes are outlined in Figure 5-4.

Figure 5-4: Post Development Peak Hour Traffic Volumes



5.5. SIDRA Traffic Analysis

A peak hour intersection analysis has been undertaken of the following intersections, using the intersection analysis program SIDRA.

- Forest Road / Canterbury Road East
- Rennie Street / Northern Site Access;
- Rennie Street / Central Site Access;
- Rennie Street / Southern Site Access;
- Rennie Street / Canterbury Road; and,
- Rennie Street / Princes Freeway On-Ramp.

5.6. Base Case Model Scenario - Existing Intersections

Forest Road / Canterbury Road East

The results of the base case AM and PM peak hour SIDRA analysis are detailed in Appendix D of this report and summarised in Table 5-4 and Table 5-5.

Table 5-6: Base Case AM Peak SIDRA – Forest Road / Canterbury Road East

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.39	20	6
	Through	0.39	20	7
	Right	0.39	20	10
Canterbury Road (E)	Left	0.47	26	11
	Through	0.47	26	11
	Right	0.47	26	15
Forest Road (N)	Left	0.06	2	5
	Through	0.44	24	7
	Right	0.44	24	10
Canterbury Road (W)	Left	0.39	18	8
	Through	0.39	18	8
	Right	0.39	18	12
Intersection		**0.47**		

Table 5-7: Base Case PM Peak SIDRA – Forest Road / Canterbury Road East

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.68	53	8
	Through	0.68	53	8
	Right	0.68	53	11
Canterbury Road (E)	Left	0.29	13	8
	Through	0.29	13	8
	Right	0.29	13	12
Forest Road (N)	Left	0.10	4	5
	Through	0.36	17	6
	Right	0.36	17	10
Canterbury Road (W)	Left	0.33	16	10
	Through	0.33	16	10
	Right	0.33	16	13
Intersection		**0.68**		

As shown in the preceding tables, the Forest Road / Canterbury Road intersection is anticipated to continue to operate with 'Excellent' conditions during the AM peak hour, with minimal queues and delays. During the PM peak hour, the intersection is anticipated to operate with 'Very Good' conditions. Minimal queues and delays are also expected during the PM peak.

Rennie Street / Canterbury Road

The results of the base case AM and PM peak hour SIDRA analysis are detailed in Appendix D of this report and summarised in Table 5-8 and Table 5-9.

Table 5-8: Base Case AM Peak SIDRA – Rennie Street / Canterbury Road East

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.10	0	4
	Right	0.10	0	6
Canterbury Road	Left	0.31	10	6
	Right	0.31	10	8
Rennie Street (S)	Left	0.07	0	6
	Through	0.07	0	4
Intersection		**0.31**		

Table 5-9: Base Case PM Peak SIDRA – Rennie Street / Canterbury Road East

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.17	0	4
	Right	0.17	0	6
Canterbury Road	Left	0.24	7	6
	Right	0.24	7	9
Rennie Street (S)	Left	0.11	0	6
	Through	0.11	0	4
Intersection		**0.24**		

As shown in the preceding tables, the Rennie Street / Canterbury Road intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Rennie Street / Princes Freeway On-Ramp

The results of the base case AM and PM peak hour SIDRA analysis are detailed in Appendix D of this report and summarised in Table 5-10 and Table 5-11.

Table 5-10: Base Case AM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.03	0	0
	Right	0.04	2	7
Rennie Street (N)	Left	0.06	0	6
	Through	0.06	0	0
Intersection		**0.06**		

Table 5-11: Base Case PM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.09	0	0
	Right	0.10	4	6
Rennie Street (N)	Left	0.04	0	6
	Through	0.04	0	0
Intersection		**0.10**		

As shown in the preceding tables, the Rennie Street / Princes Freeway On-Ramp intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Rennie Street / Shell Parade / Princes Freeway Off-ramp

The results of the base case AM and PM peak hour SIDRA analysis are detailed in Appendix D of this report and summarised in Table 5-12 and Table 5-13.

As shown in the following tables, the Rennie Street / Shell Parade / Princes Freeway off-ramp intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Table 5-12: Base Case AM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.06	3	4
	Right	0.06	3	9
MacGregor Court (E)	Left	0.00	0	4
	Through	0.00	0	4
Princes Freeway Off-ramp (N)	Left	0.15	6	4
	Through	0.15	6	4
	Right	0.15	6	10
Rennie Street (W)	Through	0.06	2	3
	Right	0.06	2	9
Intersection		**0.15**		**6**

Table 5-13: Base Case PM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.16	7	4
	Right	0.16	7	10
MacGregor Court (E)	Left	0.00	0	4
	Through	0.00	0	4
Princes Freeway Off-ramp (N)	Left	0.13	5	4
	Through	0.13	5	4
	Right	0.13	5	10
Rennie Street (W)	Through	0.04	1	3
	Right	0.04	1	9
Intersection		**0.16**		**6**

5.7. Future Proposed Model Scenario - Existing Intersections

Forest Road / Canterbury Road East

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E of this report and summarised in Table 5-12 and Table 5-13.

Table 5-14: Future AM Peak SIDRA – Forest Road / Canterbury Road East

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.44	23	7
	Through	0.44	23	7
	Right	0.44	23	10
Canterbury Road (E)	Left	0.54	34	12
	Through	0.54	34	12
	Right	0.54	34	16
Forest Road (N)	Left	0.09	3	5
	Through	0.46	25	7
	Right	0.46	25	10
Canterbury Road (W)	Left	0.43	21	9
	Through	0.43	21	9
	Right	0.43	21	12
Intersection		**0.54**		

Table 5-15: Future PM Peak SIDRA – Forest Road / Canterbury Road East

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Forest Road (S)	Left	0.78	83	11
	Through	0.78	83	12
	Right	0.78	83	15
Canterbury Road (E)	Left	0.43	21	8
	Through	0.43	21	9
	Right	0.43	21	12
Forest Road (N)	Left	0.14	6	6
	Through	0.39	19	7
	Right	0.39	19	10
Canterbury Road (W)	Left	0.42	22	11
	Through	0.42	22	12
	Right	0.42	22	15
Intersection		**0.78**		

As shown in the preceding tables, the Forest Road / Canterbury Road intersection is anticipated to continue to operate with 'Excellent' conditions during the AM peak hour, with minimal queues and delays.

During the PM peak hour, the intersection is anticipated to operate with 'Good' conditions with maximum queues of 83m and maximum delays of 15 seconds. The maximum 95th percentile queue of 83m, approximately 11 vehicles, is considered to be satisfactory noting that the queue does not restrict access to any neighbouring roads.

Additionally, the maximum average movement delay of 15 seconds is not anticipated to result in unsafe driver behaviour.

Rennie Street / Canterbury Road

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E of this report and summarised in Table 5-14 and Table 5-15.

Table 5-16: Future AM Peak SIDRA – Rennie Street / Canterbury Road

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.13	0	4
	Right	0.13	0	6
Canterbury Road	Left	0.50	26	8
	Right	0.50	26	12
Rennie Street (S)	Left	0.16	0	6
	Through	0.16	0	4
Intersection		**0.50**		

Table 5-17: Future PM Peak SIDRA – Rennie Street / Canterbury Road

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.20	0	4
	Right	0.20	0	6
Canterbury Road	Left	0.39	15	7
	Right	0.39	15	12
Rennie Street (S)	Left	0.18	0	6
	Through	0.18	0	4
Intersection		**0.39**		

As shown in the preceding tables, the Rennie Street / Canterbury Road intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Rennie Street / Princes Freeway On-Ramp

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E of this report and summarised in Table 5-16 and Table 5-17.

Table 5-18: Future AM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.24	0	1
	Right	0.07	3	9
Rennie Street (N)	Left	0.21	0	6
	Through	0.21	0	1
Intersection		**0.24**		

Table 5-19: Future PM Peak SIDRA – Rennie Street / Princes Highway On-Ramp

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (S)	Through	0.28	0	1
	Right	0.15	6	8
Rennie Street (N)	Left	0.23	0	6
	Through	0.23	0	1
Intersection		**0.28**		

As shown in the preceding tables, the Rennie Street / Princes Freeway On-Ramp intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

As demonstrated above, it is evident that the existing Rennie Street / Princes Freeway On-Ramp intersection can readily cater for the traffic generated by the residential subdivision and by the proposed development without the need for any improvements (i.e. turn lane treatments). Furthermore, the ability to provide any turn lane treatments at this location (such as a left turn lane) is restricted in this location due to the location of the bridge support.

Accordingly, it is not considered necessary to provide any upgrades to the existing Rennie Street / Princes Freeway On-Ramp intersection.

Rennie Street / Shell Parade / Princes Freeway Off-ramp

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E of this report and summarised in Table 5-20 and Table 5-21.

Table 5-20: Future AM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.23	11	5
	Right	0.23	11	11
MacGregor Court (E)	Left	0.00	0	6
	Through	0.00	0	6
Princes Freeway Off-ramp (N)	Left	0.33	16	4
	Through	0.33	16	4
	Right	0.33	16	11
Rennie Street (W)	Through	0.11	5	3
	Right	0.11	5	9
Intersection		**0.33**		**8**

Table 5-21: Future PM Peak SIDRA – Rennie Street / Shell Parade / Freeway Off-ramp

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Shell Parade (S)	Left	0.32	16	6
	Right	0.32	16	11
MacGregor Court (E)	Left	0.00	0	6
	Through	0.00	0	6
Princes Freeway Off-ramp (N)	Left	0.35	17	5
	Through	0.35	17	5
	Right	0.35	17	11
Rennie Street (W)	Through	0.13	6	3
	Right	0.13	6	9
Intersection		**0.35**		**8**

As shown in the preceding tables, the existing Rennie Street / Shell Parade / Princes Freeway Off-Ramp intersection is anticipated to continue to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Accordingly, it is not considered necessary to provide any upgrades to the existing roundabout.

5.8. Future Proposed Model Scenario - Site Access Intersections

Rennie Street / Northern Site Access intersection

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E and summarised in Table 5-22 and Table 5-23.

Table 5-22: Future AM Peak SIDRA – Rennie Street / Northern Site Access

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.14	0	4
	Right	0.14	0	6
Site Access	Left	0.16	4	6
	Right	0.16	4	9
Rennie Street (S)	Left	0.13	0	6
	Through	0.13	0	4
Intersection		**0.16**		

Table 5-23: Future PM Peak SIDRA – Rennie Street / Northern Site Access

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.10	0	4
	Right	0.10	0	6
Site Access	Left	0.27	8	7
	Right	0.27	8	10
Rennie Street (S)	Left	0.20	0	6
	Through	0.20	0	4
Intersection		**0.27**		

As shown in the preceding tables, the Rennie Street / Northern Site Access intersection is anticipated to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

Rennie Street / Central Site Access intersection

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E and summarised in Table 5-24 and Table 5-25.

Table 5-24: Future AM Peak SIDRA – Rennie Street / Central Site Access

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.16	0	4
	Right	0.16	0	6
Site Access	Left	0.20	5	6
	Right	0.20	5	11
Rennie Street (S)	Left	0.19	0	6
	Through	0.19	0	4
Intersection		**0.20**		

Table 5-25: Future PM Peak SIDRA – Rennie Street / Central Site Access

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.15	0	4
	Right	0.15	0	6
Site Access	Left	0.28	8	7
	Right	0.28	8	13
Rennie Street (S)	Left	0.24	0	6
	Through	0.24	0	4
Intersection		**0.28**		

As shown in the preceding tables, the Rennie Street / Central Site Access intersection is anticipated to operate with 'Excellent' conditions during the AM peak hour and PM Peak hour, with minimal queues and delays.

Rennie Street / Southern Site Access intersection

The results of the post development AM and PM peak hour SIDRA analysis are detailed in Appendix E and summarised in Table 5-26 and Table 5-27.

Table 5-26: Future AM Peak SIDRA – Rennie Street / Southern Site Access

Approach	Movement	AM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.19	0	4
	Right	0.19	0	6
Site Access	Left	0.25	7	7
	Right	0.25	7	14
Rennie Street (S)	Left	0.24	0	6
	Through	0.24	0	4
Intersection		**0.25**		

Table 5-27: Future PM Peak SIDRA – Rennie Street / Southern Site Access

Approach	Movement	PM Peak		
		DoS	95%ile Queue (m)	Avg. Delay (s)
Rennie Street (N)	Through	0.19	0	4
	Right	0.19	0	6
Site Access	Left	0.36	11	9
	Right	0.36	11	18
Rennie Street (S)	Left	0.29	0	6
	Through	0.29	0	4
Intersection		**0.36**		

As shown in the preceding tables, the Rennie Street / Southern Site Access intersection is anticipated to operate with 'Excellent' conditions during the AM and PM Peak hour, with minimal queues and delays.

5.9. Site Access Intersection Layouts

The modelled layout of the site access intersections do not include left or right turn lanes. The operation of the intersections does not require the provision of turn lanes as demonstrated in the tables above.

Based on the anticipated operation of the three site access intersections to Rennie Street, the proposed provision of three site access intersections to the wider road network is considered to be appropriate.

5.10. Assessment of Freeway On-Ramp

An investigation has been undertaken in respect to any potential impact to the operation of the Princes Freeway eastbound on-ramp (located at Rennie Street to the south of the site) as a result of the proposed rezoning.

In this respect, it is understood that the existing ramp is slightly deficient with respect to merge length as outlined in Table 5-28.

Table 5-28: Freeway On-Ramp Assessment – Merge Length

Parameter	Existing Measurement	Department of Transport Requirement (from Figure V11.1 of Supplement to AGRD Part 4C)
Nose to parallel section	140m	140m
Length of parallel section	70m	80m
Length of taper	90m	100m
Total length	300m	320m

Based on the above table, the existing merge is approximately 20 metres (around 6%) shorter than the distances set out in the DTP Supplement.

Section 11.3.3 of the Supplement also states: *"In general, the length and geometry of an entry ramp should allow for vehicles to be doing at least 80 km/hr at the nose where the operating speed of the main freeway carriageway is 100 km/hr or greater."* Given that the speed limit on the Princes Freeway is 100 km/hr at the merge point, it is desirable for vehicles to accelerate to 80 km/hr prior to merging.

There is limited distance between the intersection at Rennie Street and the Freeway on-ramp merge with 285 metres available for acceleration. It is also noted that the ramp is on a slight up-grade with an estimated gradient of around 1%. This gradient does not significantly impact on the ability of cars and trucks to accelerate.

Typical acceleration rates for cars have been obtained from Commentary 2 of Austroads Guide to Road Design Part 4A and are provided in Table 5-29.

Table 5-29: Typical Acceleration Rates for Cars

Travel speed		Acceleration rate	
(km/h)	(m/s)	(km/h/s)	(m/s^2)
40	11.11	4.7	1.3
50	13.88	4.3	1.2
60	16.66	3.6	1.0
70	19.44	3.2	0.9
80	22.22	2.9	0.8
90	25.00	2.5	0.7
100	27.77	2.1	0.6
110	30.55	1.8	0.5

Furthermore, typical acceleration rates for different types of trucks have been obtained from *Austroads Research Report AP-R609-19 Improving the Reliability of Heavy Vehicle Parameters to Support More Accurate Traffic Modelling in Australia and New Zealand* (published November 2019).

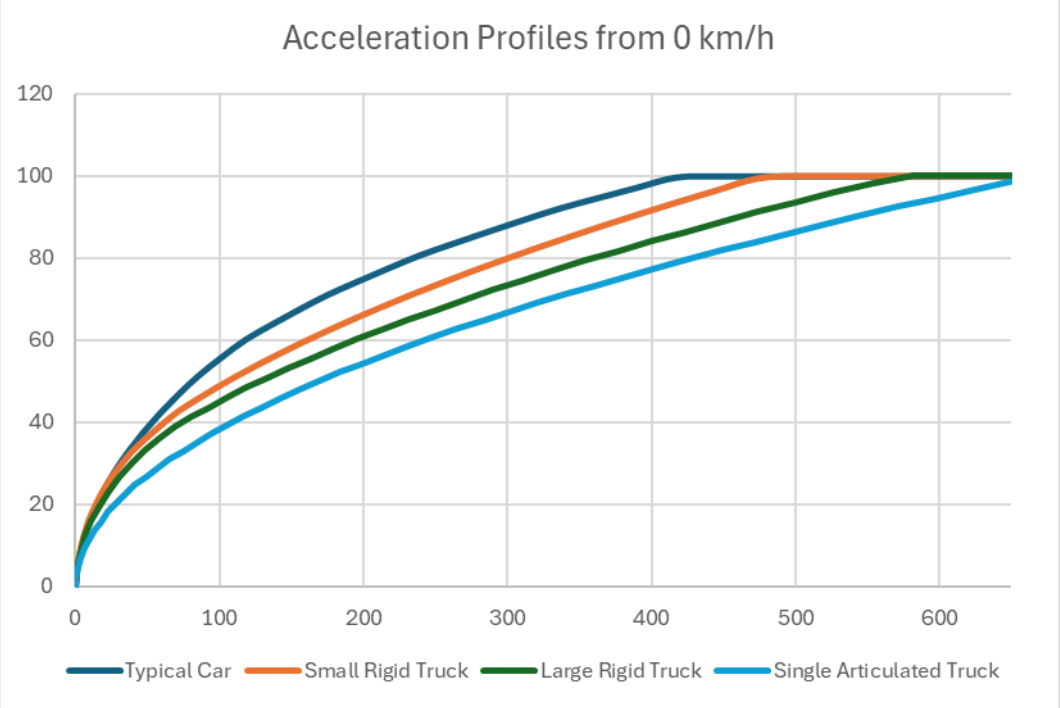
The above is shown in Table 5-28.

Table 5-30: Truck Acceleration Rates on an Entry Ramp – Rigid and Single Articulated Trucks

Vehicle type	Acceleration by segment (distance from start), m/s²							
	0 to 6 m	6 to15 m	15 to 30 m	30 to 60 m	60 to 90 m	90 to 120 m	0 to 150 m	
							Mean	Standard deviation
Rigid truck (small)	1.46	1.23	1.09	0.93	0.79	0.79	0.89	0.26
Rigid truck (large)	1.15	1.01	0.97	0.81	0.66	0.66	0.77	0.21
Single articulated truck	0.65	0.60	0.62	0.58	0.59	0.59	0.59	0.13

Acceleration profiles from a start position of 0 km/hr have been developed based on the above rates and are provided in Figure 5-5.

Figure 5-5: Typical Acceleration Profiles



The speeds of vehicles at points along the entry ramp are outlined below.

Table 5-31: Freeway On-Ramp Assessment – Vehicle Speeds

Vehicle type	Speed at nose (285m)	Speed at start of parallel section (375m)	Speed at start of taper (445m)	Speed at end of taper (585m)
Typical car	86 km/hr	95 km/hr	100 km/hr	100 km/hr
Small rigid truck	78 km/hr	89 km/hr	97 km/hr	100 km/hr
Large rigid truck	71 km/hr	82 km/hr	87 km/hr	100 km/hr
Single articulated truck	65 km/hr	74 km/hr	81 km/hr	94 km/hr

Based on the above results trucks are generally unable to reach 80 km/hr at the nose of the Freeway on-ramp due to limited acceleration distance available from the intersection at Rennie Street. There is limited scope to increase this distance due to the merging of the Geelong Ring Road with the Princes Freeway located a short distance further downstream.

The slight existing on-ramp deficiency is considered acceptable in impact based on the following:

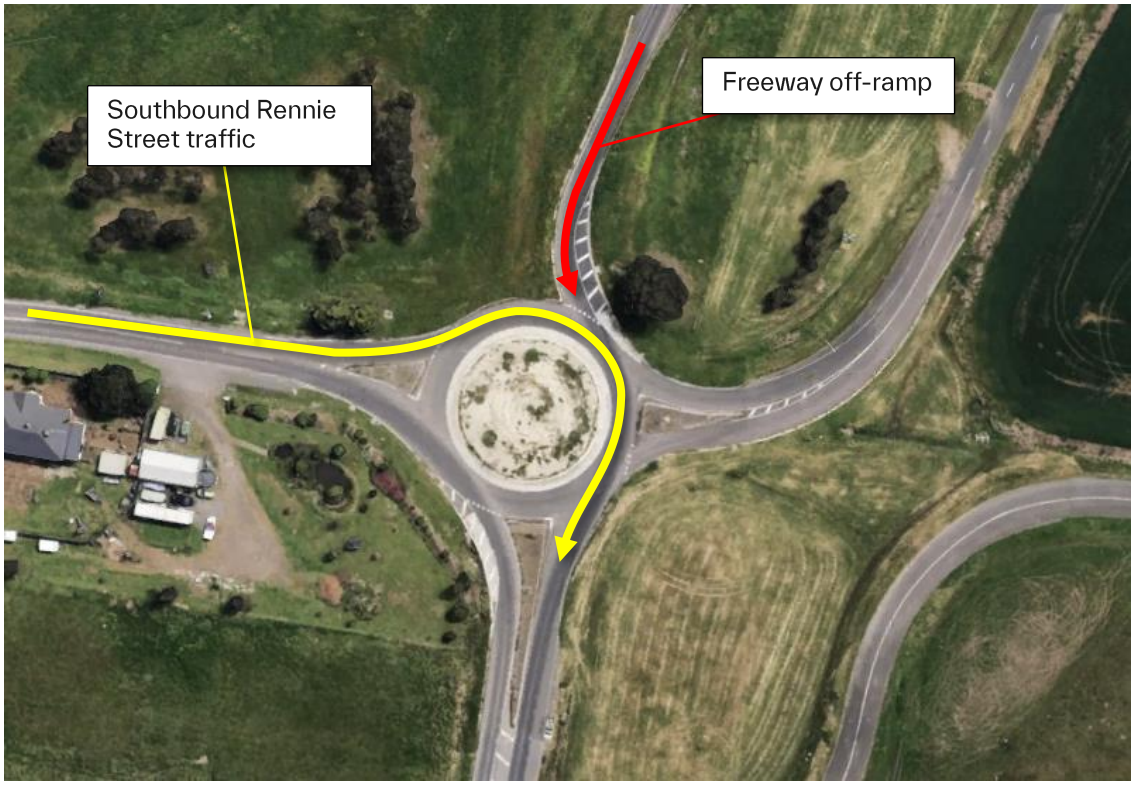
- With the exception of articulated trucks, vehicles can typically reach greater than 80 km/hr in speed at the start of the parallel section, and can be travelling at 100 km/hr at the end of the merge taper.
- The majority of trucks that would be generated on a regular basis by the proposed development would be small to medium rigid trucks. While articulated vehicle movements may result, these would be relatively infrequent.
- The existing on-ramp already accommodates some 29-31 truck movements per hour during peak periods as indicated through traffic surveys and truck movements at this location are expected by other road users.
- Trucks approaching the merge point are clearly visible to approaching traffic on the Freeway due to the downgrade on the mainline approach and clear sight lines such that drivers are able to adjust their speed as appropriate.

5.11. Assessment of Freeway Off-Ramp

A further investigation has been undertaken to determine if the proposed rezoning has the potential to increase traffic volumes at the intersection of Rennie Street, Shell Parade and the Princes Freeway off-ramp, which is an existing four-leg roundabout.

Movements at the off-ramp are opposed by vehicles travelling southbound along Rennie Street and turning right onto Shell Parade. It is noted that this volume comprises the entirety of opposing movements for the off-ramp approach to the roundabout as shown in Figure 5-6.

Figure 5-6: Existing Freeway Off-Ramp Roundabout



Source: www.google.com/maps

The roundabout has been modelled using SIDRA Intersection 9.1 and the results under the existing conditions, baseline volumes and future proposed volumes are presented in Sections 2.8, 5.6 and 0 of this report. The modelling indicates that the roundabout will continue to perform under 'Excellent' conditions under the forecast traffic volumes.

5.12. Assessment of Canterbury Road East Level Crossing

The level of traffic crossing the existing level crossing on Canterbury Road East is likely to increase as a result of the proposed rezoning. The existing and future traffic volumes are outlined as follows:

Table 5-32: Existing Level Crossing – Proposed Traffic Volumes (vehicles per hour)

Scenario	AM Peak		PM Peak	
	Northbound	Southbound	Northbound	Southbound
Existing	67	94	91	74
Future base (inclusive of residential rezoning)	219	160	171	194
Future proposed	263	277	275	291

The Melbourne to Geelong rail line accommodates an average of four services per hour in each direction, operating at 10-20 minute frequencies, during the AM and PM peak periods. This results in a total of 8 boom gate activations per hour. Typical downtime is around 1.5 to 2 minutes for the passage of a train.

A first principles assessment of queuing has been undertaken based random arrivals and an average boom gate downtime of 105 seconds. The results are presented in Table 5-33 and Table 5-34.

Table 5-33: Existing Level Crossing – Northbound Performance

Parameter	Existing		Future base		Future proposed	
	AM	PM	AM	PM	AM	PM
Arrival rate	67 veh/hr	91 veh/hr	219 veh/hr	171 veh/hr	263 veh/hr	275 veh/hr
Typical queue	2 veh	3 veh	6 veh	5 veh	8 veh	7 veh
95th percentile queue	5 veh	6 veh	13 veh	13 veh	15 veh	16 veh

Table 5-34: Existing Level Crossing – Southbound Performance

Parameter	Existing		Future base		Future proposed	
	AM	PM	AM	PM	AM	PM
Arrival rate	94 veh/hr	74 veh/hr	160 veh/hr	194 veh/hr	277 veh/hr	291 veh/hr
Typical queue	3 veh	2 veh	5 veh	6 veh	8 veh	8 veh
95th percentile queue	6 veh	5 veh	13 veh	12 veh	17 veh	15 veh

Based on the above analysis, queue lengths are expected to increase marginally as a result of the proposed rezoning, with typical queues increasing by 2-3 vehicles and 95th percentile queues increasing by 2-4 vehicles.

Given boom gate activations on average every 8 minutes there should be no concerns with residual queuing, and the largest queue expected at the gate (17 vehicles) should typically be able to clear in less than 1 minute.

It is further noted that the Traffix report for the residential rezoning to the north of this subject site has identified a need to upgrade of the level crossing to provide an active gated control system in order to improve safety for pedestrians and cyclists associated with the residential development.

It is considered that this upgrade would be suitable to mitigate any risk associated with this proposed industrial rezoning given that the rezoning would generate minimal pedestrian and cyclist traffic to Canterbury Road.

5.13. Summary of Traffic Impacts

Based on the above assessments, the site access intersections are expected to operate adequately following full development of the site with no mitigating works required based on the traffic modelling outputs given the capacity within the road network to accommodate the traffic expected in this PSP area.

Similarly, the intersections of Forest Road / Canterbury Road East and Rennie Street / Canterbury Road East are expected to operate under satisfactory conditions based on traffic modelling undertaken and documented in this report.

It is acknowledged that the existing freeway on-ramp located south of the site is currently slightly deficient with respect to merge length and acceleration length. However, the impact is considered acceptable based on the existing geometry, expected truck acceleration behaviour, and the site generating predominantly light to medium rigid trucks rather than large articulated vehicles.

It is expected that queue lengths at the existing level crossing would increase marginally as a result of the additional traffic using Canterbury Road east, however this impact is not significant and queues are typically expected to be able to clear between boom gate activations without any residual effects. It is noted that no heavy vehicles are anticipated to be generated onto Canterbury Road East as discussed in Section 5.3 and this rezoning would generate minimal pedestrian and cyclist traffic.

6. Other Considerations

6.1. Walking and Cycling Network

External

There are no pedestrian paths located along the site frontage.

The nearest pedestrian paths are provided on both sides of Canterbury Road to the west of the level crossing, connecting the site to Lara.

Internal

The subject site will be provided with a network of internal pathways that will allow a good level of connectivity throughout the site land.

Furthermore, all internal roadways will also provide pedestrian connections to the external network as per the cross-section information contained within Section 4.3 of this report.

6.2. Public Transport

As previously outlined in Section 2.4 of this report, the subject land has reasonable access to public transport options.

The closest bus service (Route 11) operates along Rennie Street, with the closest bus stop located approximately 800 metres north of the subject land.

This service has an ability to serve the future employees of the subject land.

6.3. Car Parking Requirements

It is anticipated that car parking will generally be provided in accordance with the statutory car parking requirements set out in Clause 52.06 of the Greater Geelong Planning Scheme, unless otherwise supported by empirical evidence.

For reference, the statutory car parking rates for the proposed land uses are outlined below:

Industrial Land Use

- 2.9 spaces to each 100sqm of net floor area.

Warehouse Land Use

- 2 spaces to each tenancy plus 1.5 spaces to each 100sqm of net floor area.

Office Land Use

- 3.5 spaces to each 100sqm of net floor area.

Retail Land Use

- 4 spaces to each 100sqm of leasable floor area.

Tennis Court Land Use

- 4 spaces to each court plus 50% of the requirement of any ancillary use.

Football / Soccer / Cricket Pitch Land Use

- To the satisfaction of the Responsible Authority.

6.4. Bicycle Parking Requirements

It is anticipated that bicycle parking will be provided in accordance with the statutory rates set out in Clause 52.34 of the Greater Geelong Planning Scheme.

For reference, the statutory car parking rates for the proposed land uses are outlined below:

Industrial Land Use

- 1 space to each 1,000sqm of net floor area.

Office Land Use

- 1 space to each 300sqm of net floor area if the net floor area exceeds 1,000sqm.
- 1 space to each 1,000sqm of net floor area if the net floor area exceeds 1,000sqm.

Retail Land Use

- 1 space to each 300sqm of leasable floor area.
- 1 space to each 500sqm of leasable floor area.

Minor Sports & Recreation Facility Land Use

- 1 space to each 4 employees.
- 1 space to each 200sqm of net floor area.

6.5. Loading and Waste Collection

Waste collection is expected to occur on-site for the subject site, however, will also be considered as part of the Planning Permit applications for each stage.

The subject site will consist of a mix of general industrial and light industrial tenancies, as well as the possible regional sports facility. Accordingly, the site is anticipated to generate a number of heavy vehicle movements.

Noting the residential nature of land uses to the north, the development will seek to attempt to control commercial traffic, including heavy vehicle movements, from using Canterbury Road East and crossing the Rennie Street ford and into existing residential areas.

Commercial vehicles will be guided to access / egress the site to / from the wider road network via Shell Parade, and roundabout, and the Rennie Street on-ramp to head towards Melbourne.

No upgrades will be required to facilitate heavy vehicle movements to / from the wider road network using the above route.

6.6. Internal Road Layout

The internal road layout will be designed to provide convenient access through the subject site and will seek to avoid creating dead end roads, where possible.

In addition to the above, the development will seek to provide a road adjacent to the basin.

6.7. Rennie Street Upgrade

It is anticipated that Rennie Street, outside of the development, will be required to be upgraded to include kerb and channel on the northern side and, if possible, a parking lane.

It is not anticipated that kerb and channel will be required on the southern side. However, a review of efforts to dissuade car parking along the grass verge along the southern side will be required.

The existing posted speed limit on Rennie Street (100 km/hr) is unlikely to be suitable in the future given the proposed intensification of use and access points along its length. A review of the speed limit should be undertaken with an aim to set a more reasonable speed limit of 70 km/hr or 80 km/hr in conjunction with changes to the road environment.

7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The site is expected to generate up to 982 vehicle movements in the AM and PM peak hours, with approximately 10% of these movements expected to be heavy vehicles consisting of light to medium rigid trucks. During the weekend peak hours a reduced level of traffic is anticipated to be generated noting the majority of industrial land uses are anticipated to be closed.
- The proposals access arrangements are proposed to include a number of localised connections to Rennie Street along the eastern boundary of the subject site.
- It is acknowledged that Schedule 50 to the Design & Development Overlay is to be applied as part of the rezoning proposal and it includes a requirement for *"the provision of at least two entry roads off Rennie Street."*
- Whilst this traffic report has assumed that three access points will be provided off Rennie Street, we confirm that modelling and analysis by our office has confirmed that the Industrial Business Park and possible regional sports facility being provided with either three or two access points from Rennie Street can operate safely and efficiently with intersections performing to acceptable levels.
- The anticipated site generated traffic is expected to have a minimal impact on the operation of the Rennie Street / Princes Freeway On-Ramp intersection under an overall development scenario.
- While car parking, bicycle parking and loading provisions will all be considered at the Planning Permit stages, it is expected that these components will be provided in accordance with the statutory requirements, unless there is empirical evidence to support otherwise.

It is concluded that the proposed rezoning is appropriate and will not result in any significant traffic or safety impacts that are insurmountable from a traffic perspective.

Further details can be resolved with during the Development Plan / Permit Application phases of the project.

Appendix A – South East Lara Framework Plan

Tract

LEGEND

- Site Boundary
- Freeway
- Existing Road
- Railway Line
- Future open space to be delivered through residential development
- Future linear corridor to be delivered through residential development
- Future residential area (Amendment C444)
- Business Park/Industrial
- Light Industrial
- High-pressure Gas Pipeline
- Indicative location for Retarding Basin
- High quality address to Rennie Street and the Princes Freeway
- Potential Regional Sports Reserve (subject to Council purchase)

GEELONG - MELBOURNE RAILWAY LINE

RENNIE ST

PRINCES HWY

Drawing Title	Project Name	Drawing No.	Revision	Date	Drawn	Checked	Project Principal	Scale
Development Plan	76-156 Canterbury Rd Princes Hwy Lara	322-0029-00-U-00-DR07	03	23.10.2024	MH	MN	MN	1:6,000 (A3) 0 60 120 240

Appendix B – Traffic Survey Results

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Rennie Street and Princes Freeway On-Ra

GPS *-38.055927,144.390062*

Date:	Tue 02/08/22
Weather:	Fine
Suburban:	Corio
Customer:	Ratio

North:	Rennie Street
East:	Princes Freeway On-Ramp
South:	Rennie Street
West:	N/A

Survey Period	AM:	7:00 AM-9:00 AM
	PM:	4:00 PM-6:00 PM
Traffic Peak	AM:	7:45 AM-8:45 AM
	PM:	4:30 PM-5:30 PM

All Vehicles

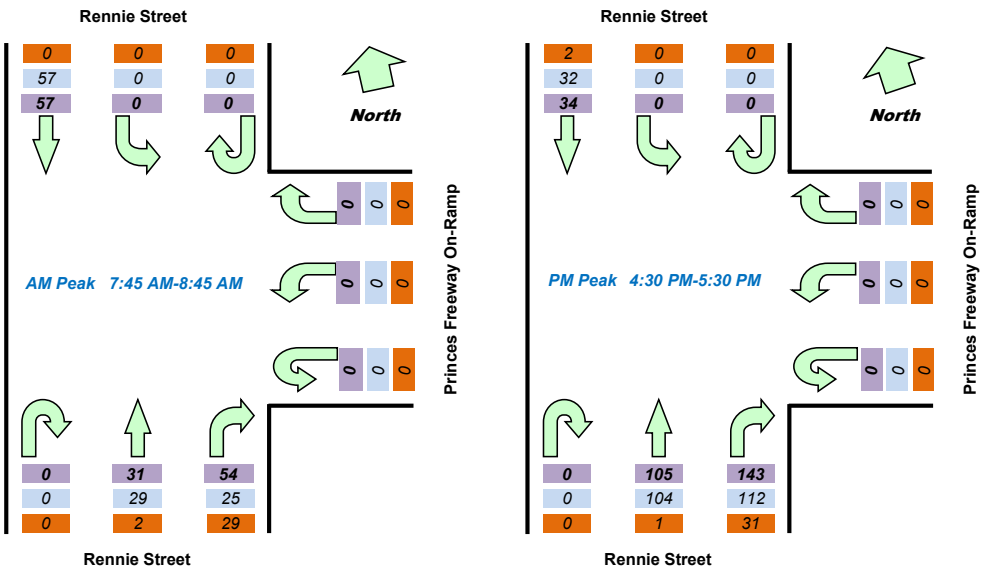
Time		North Approach Rennie Stree			Approach Princes Freeway On			South Approach Rennie Stree			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
7:00	7:15	0	10	1	0	0	0	0	11	7	131	
7:15	7:30	0	17	0	0	0	0	0	16	4	133	
7:30	7:45	0	19	0	0	0	0	0	9	3	135	
7:45	8:00	0	14	0	0	0	0	0	12	8	142	Peak
8:00	8:15	0	12	0	0	0	0	0	11	8	139	
8:15	8:30	0	16	0	0	0	0	0	16	7		
8:30	8:45	0	15	0	0	0	0	0	15	8		
8:45	9:00	0	18	0	0	0	0	0	9	4		
16:00	16:15	0	14	0	0	0	0	0	26	22	280	
16:15	16:30	0	12	0	0	0	0	0	35	28	275	
16:30	16:45	0	9	0	0	0	0	0	39	31	282	Peak
16:45	17:00	0	7	0	0	0	0	0	34	23	268	
17:00	17:15	0	7	0	0	0	0	0	31	19	259	
17:15	17:30	0	11	0	0	0	0	0	39	32		
17:30	17:45	0	14	0	0	0	0	0	25	26		
17:45	18:00	0	15	2	0	0	0	0	11	27		

Peak Time		North Approach Rennie Stree			Approach Princes Freeway On			South Approach Rennie Stree			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
7:45	8:45	0	57	0	0	0	0	0	54	31	142
16:30	17:30	0	34	0	0	0	0	0	143	105	282

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy



TRANS TRAFFIC SURVEY

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AUTOMATIC COUNT SUMMARY

Street Name :	Canterbury Rd E	**Location :**	North of Rennie St
Suburb :	Lara	**Start Date :**	00:00 Thu 10/February/2022
Machine ID:	CX79WAH3	**Finish Date :**	00:00 Thu 17/February/2022
Site ID:	12552	**Speed Zone :**	80 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information		Lat 38° 2' 17.20 South Long 144° 24' 32.17 East	Direction of Travel		
			Both directions	**Northbound**	**Southbound**
Traffic Volume :		Weekdays Average	1,642	788	854
(Vehicles/Day)		7 Day Average	1,498	725	773
Weekday	**AM**	08:00	161	67	94
Peak hour starts	**PM**	15:00	180	90	90
Speeds :		85th Percentile	80.4	80.3	80.4
(Km/Hr)		Average	72.9	73.2	72.5
Classification % :		Light Vehicles up to 5.5m	97.5%	97.9%	97.0%

Location

GPS Information	Load Google Map (internet required)
(Latitude, Longitude)	-38.038110, 144.408937

Speed Data	Speed Graph	Speed Bin
Volume Data	Volume Graph	Classification

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001
SAFETY SYSTEM CERTIFICATION DNV·GL AS/NZS 4801
ENVIRONMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

Status of movement – Covid 19

"Traffic behaviour is not the same as pre-pandemic (traditional morning/afternoon peak is much less pronounced and school start/finish times are much more pronounced), the current patterns are close enough to what probably is going to be a 'COVID normal' situation for at least the next year or two. Workplaces are currently not all yet open.
These results should be used for indicative assessment only."

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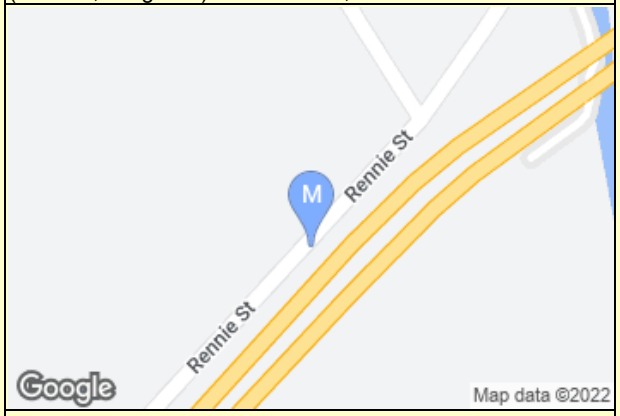
AUTOMATIC COUNT SUMMARY

Street Name :	Rennie St	**Location :**	West of Canterbury Rd E
Suburb :	Lara	**Start Date :**	00:00 Thu 10/February/2022
Machine ID:	L6931BGJ	**Finish Date :**	00:00 Thu 17/February/2022
Site ID:	12553	**Speed Zone :**	80 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information		Lat 38° 2' 28.08 South Long 144° 24' 34.25 East	Direction of Travel		
			Both directions	**Westbound**	**Eastbound**
Traffic Volume :		Weekdays Average	1,615	785	830
(Vehicles/Day)		7 Day Average	1,501	733	768
Weekday	**AM**	08:00	109	75	34
Peak hour start	**PM**	15:00	160	62	98
Speeds :		85th Percentile	85.6	84.4	86.7
(Km/Hr)		Average	77.5	76.5	78.5
Classification % :		Light Vehicles up to 5.5m	91.4%	91.8%	91.0%

Location

GPS Information Load Google Map (internet required)
(Latitude, Longitude) -38.041133, 144.409515



Speed Data | Speed Graph | Speed Bin
Volume Data | Volume Graph | Classification

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

Status of movement – Covid 19
"Traffic behaviour is not the same as pre-pandemic (traditional morning/afternoon peak is much less pronounced and school start/finish times are much more pronounced), the current patterns are close enough to what probably is going to be a 'COVID normal' situation for at least the next year or two. Workplaces are currently not all yet open.
These results should be used for indicative assessment only."

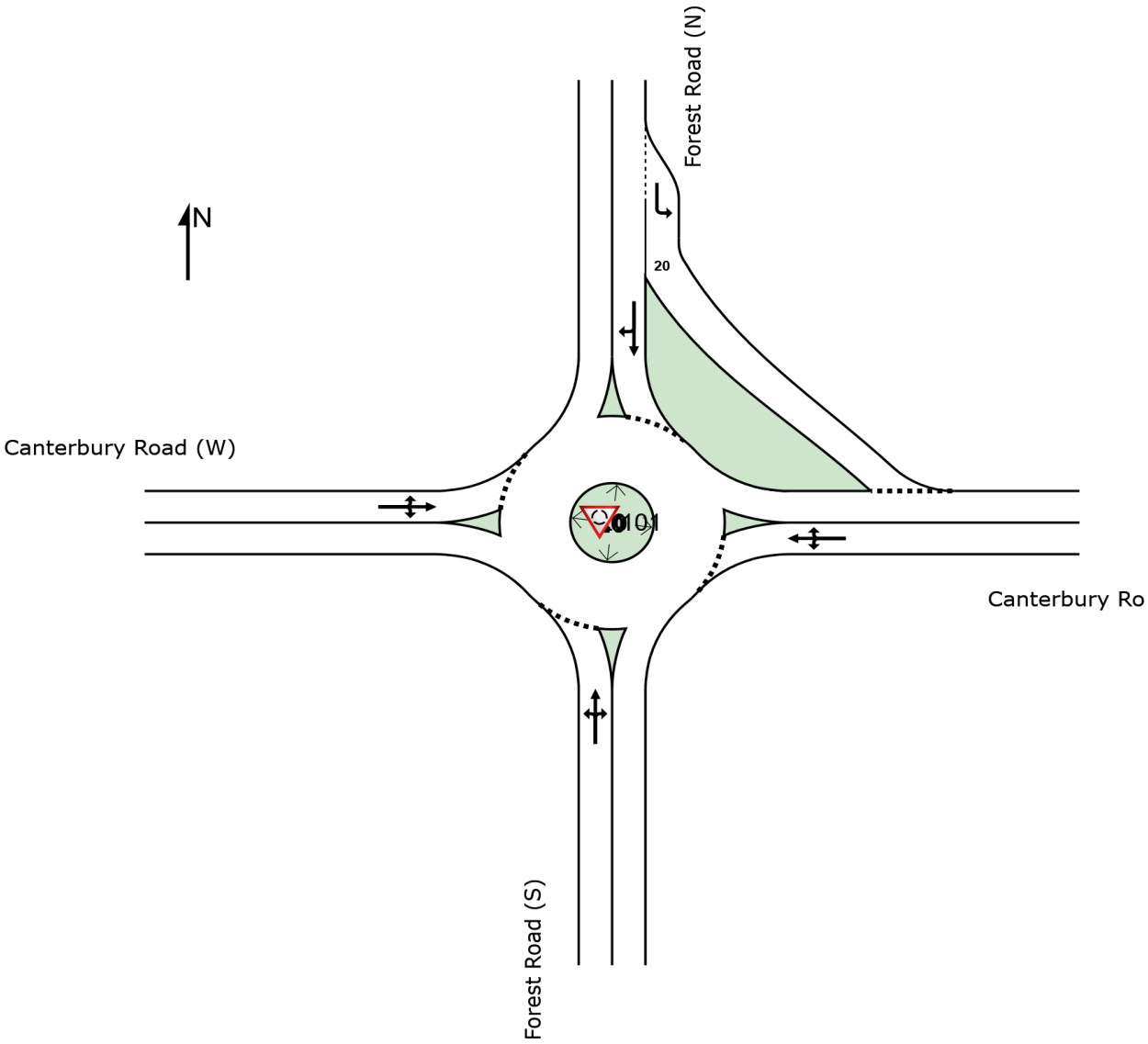
Appendix C – SIDRA Results – Existing Conditions

SITE LAYOUT

Site: 101 [Canterbury Road / Forest Road - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Canterbury Road / Forest Road - AM Peak - Existing
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Thursday, April 18, 2024 5:09:07 PM
Project: C:\Users\samuell\Ratio Consultants\19346T - General\Work\Analysis\SIDRA\19346T - SIDRA - Amended Distribution - 2024 Assessment.sip9

MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - AM Peak - Existing
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	49	4.3	49	4.3	0.322	5.7	LOS A	2.1	15.3	0.43	0.53	0.43	51.8
2	T1	All MCs	264	6.0	264	6.0	0.322	5.9	LOS A	2.1	15.3	0.43	0.53	0.43	52.2
3	R2	All MCs	42	5.0	42	5.0	0.322	9.3	LOS A	2.1	15.3	0.43	0.53	0.43	51.4
Approach			356	5.6	356	5.6	0.322	6.3	LOS A	2.1	15.3	0.43	0.53	0.43	52.0
East: Canterbury Road (E)															
4	L2	All MCs	76	5.6	76	5.6	0.241	9.5	LOS A	1.5	10.8	0.75	0.74	0.75	49.2
5	T1	All MCs	26	0.0	26	0.0	0.241	9.4	LOS A	1.5	10.8	0.75	0.74	0.75	49.8
6	R2	All MCs	65	3.2	65	3.2	0.241	12.9	LOS B	1.5	10.8	0.75	0.74	0.75	49.0
Approach			167	3.8	167	3.8	0.241	10.8	LOS B	1.5	10.8	0.75	0.74	0.75	49.2
North: Forest Road (N)															
7	L2	All MCs	51	6.3	51	6.3	0.037	4.8	LOS A	0.2	1.4	0.23	0.51	0.23	53.1
8	T1	All MCs	459	4.4	459	4.4	0.424	6.2	LOS A	3.1	22.7	0.55	0.56	0.55	51.7
9	R2	All MCs	69	1.5	69	1.5	0.424	9.5	LOS A	3.1	22.7	0.55	0.56	0.55	51.1
Approach			579	4.2	579	4.2	0.424	6.5	LOS A	3.1	22.7	0.52	0.56	0.52	51.8
West: Canterbury Road (W)															
10	L2	All MCs	111	1.9	111	1.9	0.345	7.2	LOS A	2.2	15.3	0.62	0.67	0.62	50.5
11	T1	All MCs	48	0.0	48	0.0	0.345	7.4	LOS A	2.2	15.3	0.62	0.67	0.62	51.0
12	R2	All MCs	155	1.4	155	1.4	0.345	10.8	LOS B	2.2	15.3	0.62	0.67	0.62	50.2
Approach			314	1.3	314	1.3	0.345	9.0	LOS A	2.2	15.3	0.62	0.67	0.62	50.4
All Vehicles			1416	3.9	1416	3.9	0.424	7.5	LOS A	3.1	22.7	0.55	0.60	0.55	51.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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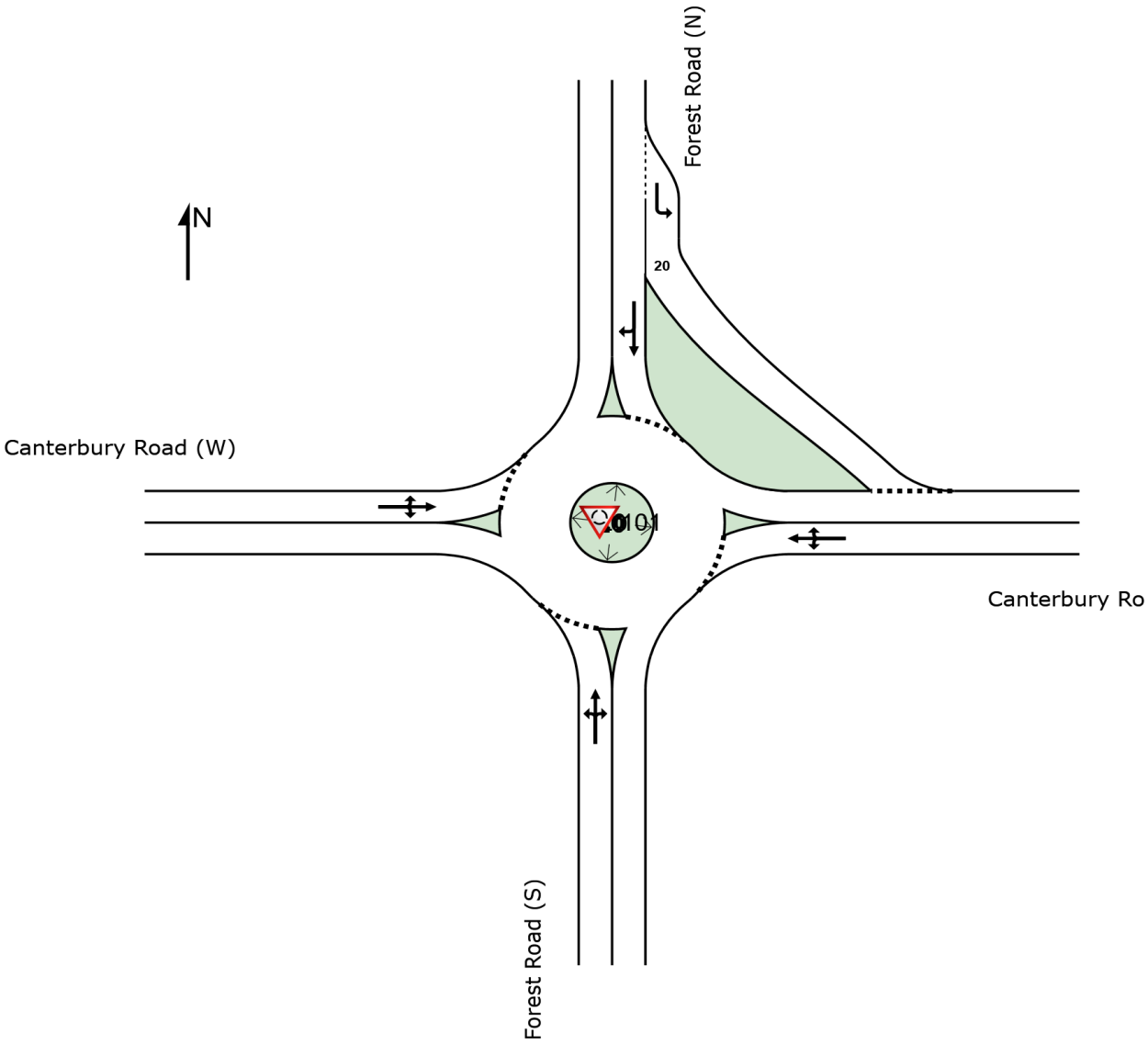
SITE LAYOUT

Site: 101 [Canterbury Road / Forest Road - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Canterbury Road / Forest Road - PM Peak - Existing
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - PM Peak - Existing
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	153	0.0	153	0.0	0.596	6.2	LOS A	5.2	37.1	0.61	0.57	0.61	51.4
2	T1	All MCs	438	1.9	438	1.9	0.596	6.5	LOS A	5.2	37.1	0.61	0.57	0.61	51.7
3	R2	All MCs	92	3.4	92	3.4	0.596	9.9	LOS A	5.2	37.1	0.61	0.57	0.61	50.9
Approach			682	1.7	682	1.7	0.596	6.9	LOS A	5.2	37.1	0.61	0.57	0.61	51.6
East: Canterbury Road (E)															
4	L2	All MCs	52	4.1	52	4.1	0.187	7.8	LOS A	1.1	7.8	0.64	0.69	0.64	50.4
5	T1	All MCs	45	0.0	45	0.0	0.187	7.9	LOS A	1.1	7.8	0.64	0.69	0.64	50.9
6	R2	All MCs	56	7.5	56	7.5	0.187	11.5	LOS B	1.1	7.8	0.64	0.69	0.64	49.9
Approach			153	4.1	153	4.1	0.187	9.2	LOS A	1.1	7.8	0.64	0.69	0.64	50.4
North: Forest Road (N)															
7	L2	All MCs	79	8.0	79	8.0	0.060	5.0	LOS A	0.3	2.4	0.29	0.52	0.29	52.9
8	T1	All MCs	359	0.9	359	0.9	0.337	5.8	LOS A	2.3	15.9	0.46	0.54	0.46	52.1
9	R2	All MCs	84	0.0	84	0.0	0.337	9.1	LOS A	2.3	15.9	0.46	0.54	0.46	51.4
Approach			522	1.8	522	1.8	0.337	6.2	LOS A	2.3	15.9	0.43	0.54	0.43	52.1
West: Canterbury Road (W)															
10	L2	All MCs	86	0.0	86	0.0	0.274	8.5	LOS A	1.7	12.2	0.73	0.72	0.73	49.9
11	T1	All MCs	35	0.0	35	0.0	0.274	8.8	LOS A	1.7	12.2	0.73	0.72	0.73	50.3
12	R2	All MCs	82	0.0	82	0.0	0.274	12.1	LOS B	1.7	12.2	0.73	0.72	0.73	49.6
Approach			203	0.0	203	0.0	0.274	10.0	LOS B	1.7	12.2	0.73	0.72	0.73	49.9
All Vehicles			1560	1.8	1560	1.8	0.596	7.3	LOS A	5.2	37.1	0.57	0.59	0.57	51.4

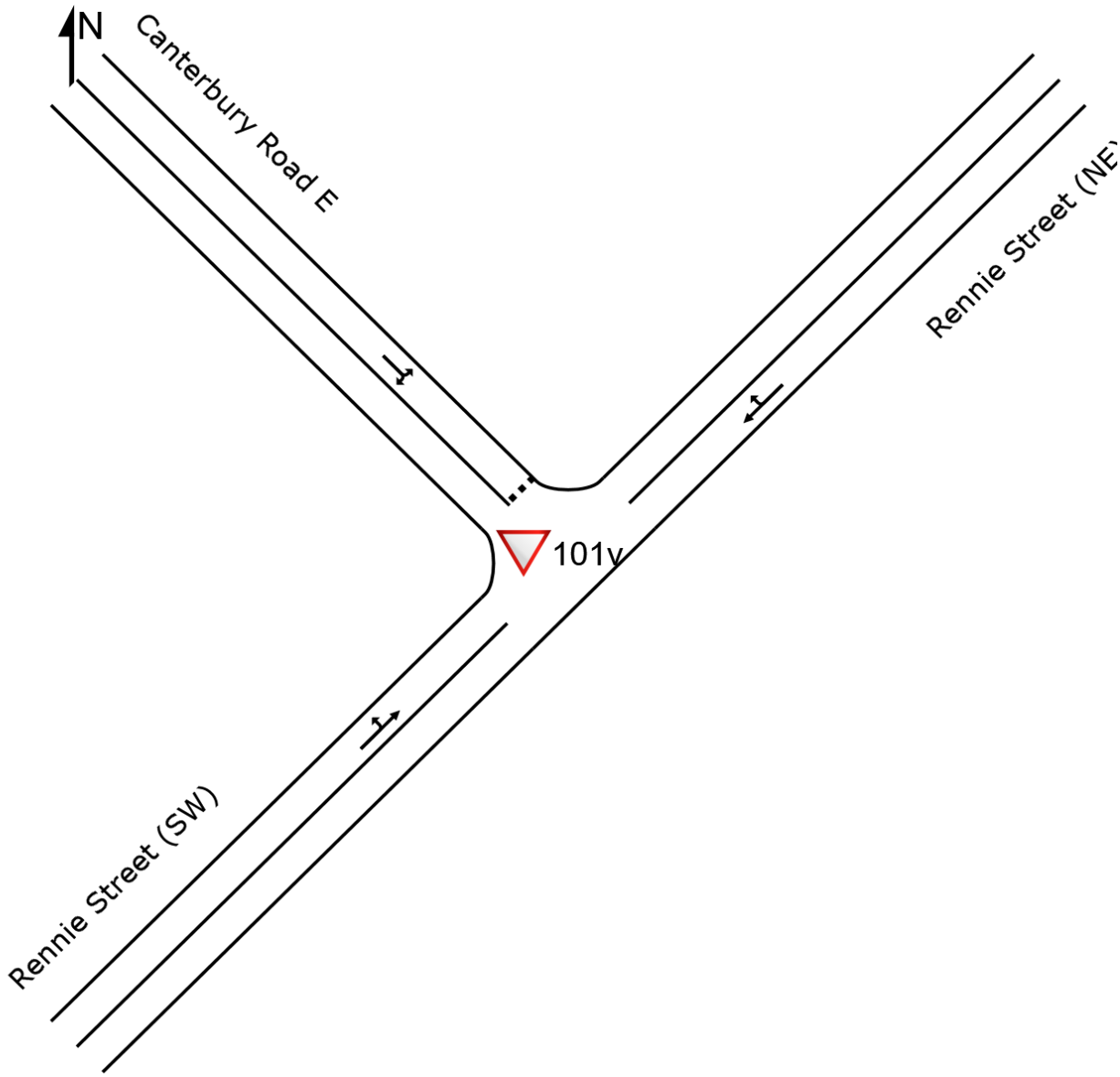
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Existing (Site Folder: Existing - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	15	14.3	15	14.3	0.043	4.3	LOS A	0.0	0.0	0.00	0.59	0.00	53.0
26	R2	All MCs	63	1.7	63	1.7	0.043	5.5	LOS A	0.0	0.0	0.00	0.59	0.00	52.7
Approach			78	4.1	78	4.1	0.043	5.3	NA	0.0	0.0	0.00	0.59	0.00	52.8
NorthWest: Canterbury Road E															
27	L2	All MCs	35	0.0	35	0.0	0.086	5.6	LOS A	0.3	2.2	0.15	0.56	0.15	52.5
29	R2	All MCs	64	1.6	64	1.6	0.086	6.0	LOS A	0.3	2.2	0.15	0.56	0.15	52.2
Approach			99	1.1	99	1.1	0.086	5.9	LOS A	0.3	2.2	0.15	0.56	0.15	52.3
SouthWest: Rennie Street (SW)															
30	L2	All MCs	7	0.0	7	0.0	0.020	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.7
31	T1	All MCs	28	14.8	28	14.8	0.020	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.6
Approach			36	11.8	36	11.8	0.020	4.5	NA	0.0	0.0	0.00	0.54	0.00	53.6
All Vehicles			213	4.0	213	4.0	0.086	5.4	NA	0.3	2.2	0.07	0.57	0.07	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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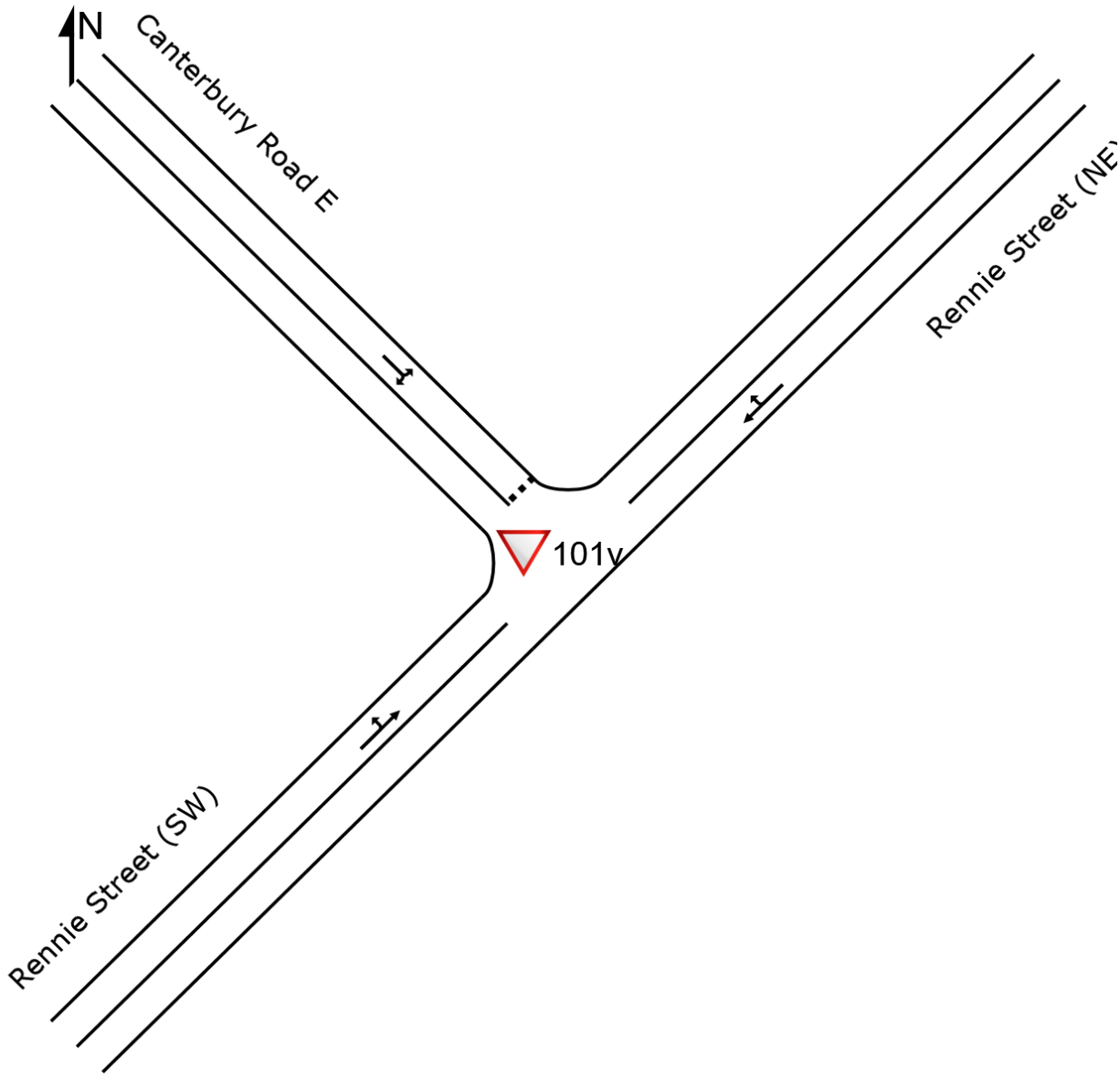
SITE LAYOUT

Site: 101v [Canterbury Road E / Rennie Street - PM Peak - Existing (Site Folder: Existing - PM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	26	16.0	26	16.0	0.051	4.3	LOS A	0.0	0.0	0.00	0.58	0.00	53.0
26	R2	All MCs	66	1.6	66	1.6	0.051	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
Approach			93	5.7	93	5.7	0.051	5.1	NA	0.0	0.0	0.00	0.58	0.00	52.9
NorthWest: Canterbury Road E															
27	L2	All MCs	46	4.5	46	4.5	0.066	5.8	LOS A	0.2	1.8	0.21	0.56	0.21	52.1
29	R2	All MCs	32	6.7	32	6.7	0.066	6.5	LOS A	0.2	1.8	0.21	0.56	0.21	51.7
Approach			78	5.4	78	5.4	0.066	6.1	LOS A	0.2	1.8	0.21	0.56	0.21	52.0
SouthWest: Rennie Street (SW)															
30	L2	All MCs	29	3.6	29	3.6	0.058	5.6	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
31	T1	All MCs	75	14.1	75	14.1	0.058	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			104	11.1	104	11.1	0.058	4.7	NA	0.0	0.0	0.00	0.54	0.00	53.5
All Vehicles			275	7.7	275	7.7	0.066	5.2	NA	0.2	1.8	0.06	0.56	0.06	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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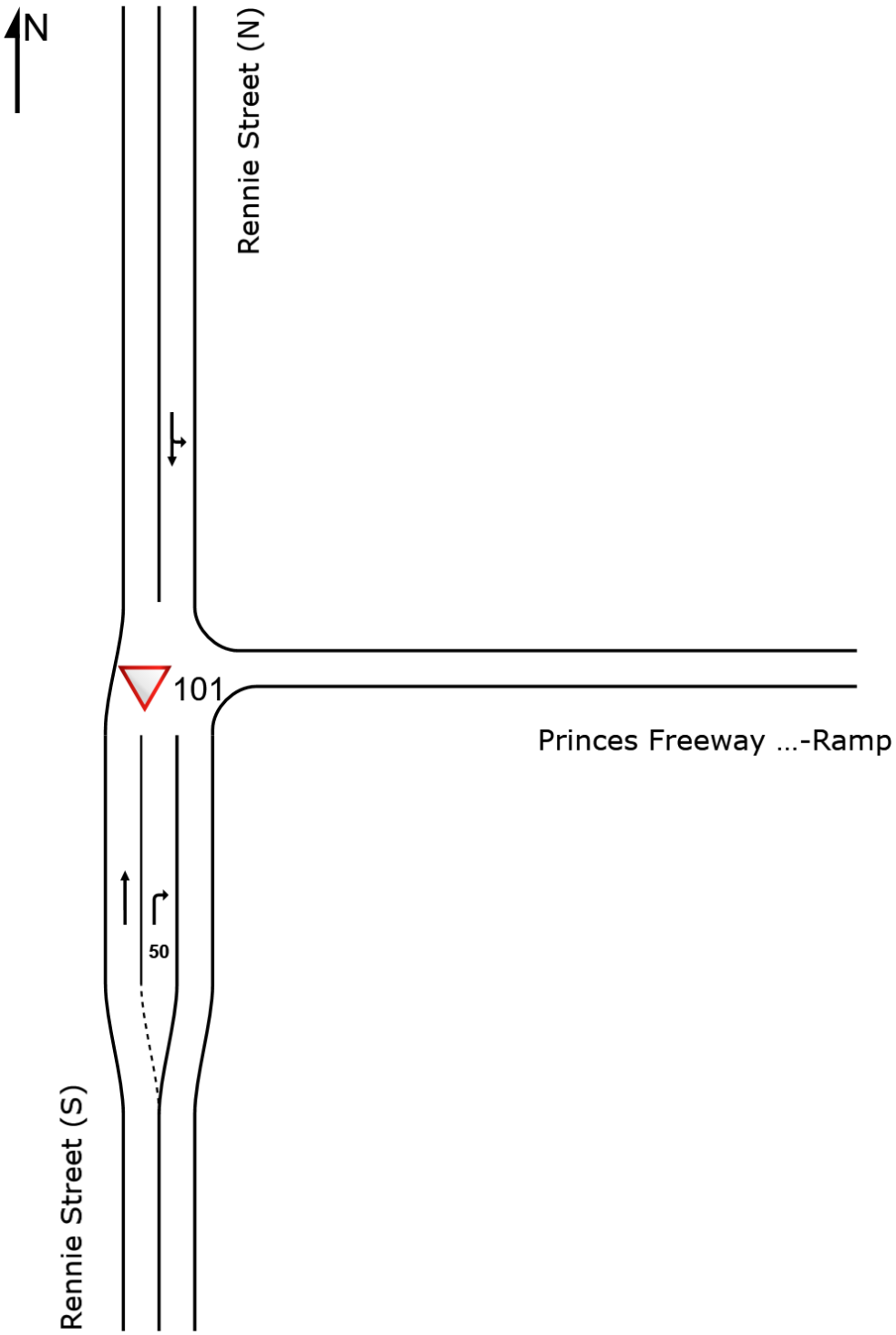
SITE LAYOUT

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	33	6.5	33	6.5	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	All MCs	57	53.7	57	53.7	0.043	6.6	LOS A	0.2	2.0	0.17	0.58	0.17	49.6
Approach			89	36.5	89	36.5	0.043	4.2	NA	0.2	2.0	0.11	0.37	0.11	52.9
North: Rennie Street (N)															
7	L2	All MCs	1	0.0	1	0.0	0.031	5.5	LOS A	0.0	0.0	0.00	0.01	0.00	57.4
8	T1	All MCs	60	0.0	60	0.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach			61	0.0	61	0.0	0.031	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles			151	21.7	151	21.7	0.043	2.5	NA	0.2	2.0	0.07	0.22	0.07	55.5

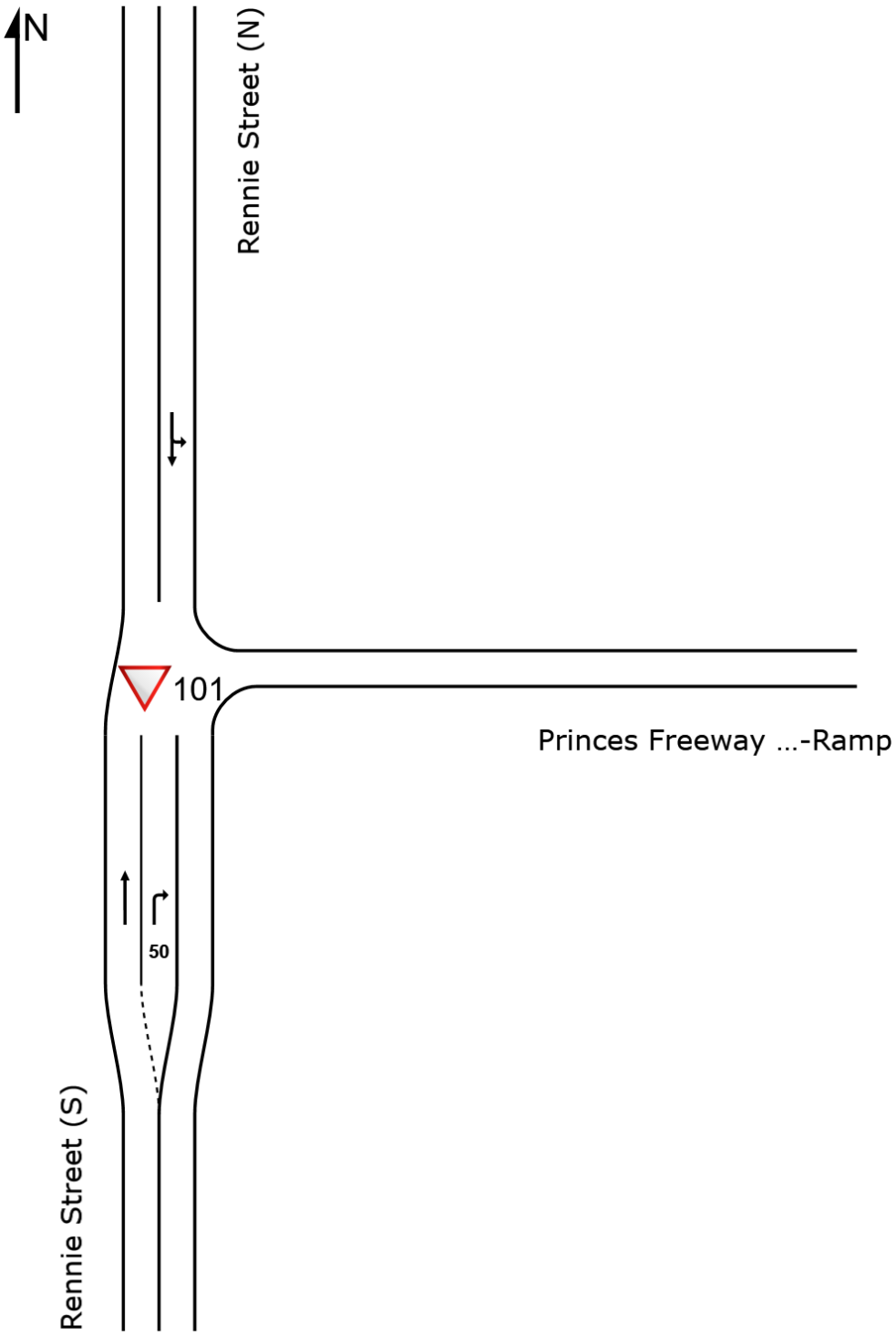
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101 [Rennie Street / Freeway On-Ramp - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	111	1.0	111	1.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	All MCs	151	21.7	151	21.7	0.096	6.1	LOS A	0.5	3.9	0.13	0.58	0.13	51.1
Approach			261	12.9	261	12.9	0.096	3.5	NA	0.5	3.9	0.07	0.34	0.07	54.5
North: Rennie Street (N)															
7	L2	All MCs	1	0.0	1	0.0	0.020	5.5	LOS A	0.0	0.0	0.00	0.02	0.00	57.3
8	T1	All MCs	36	5.9	36	5.9	0.020	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.8
Approach			37	5.7	37	5.7	0.020	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.8
All Vehicles			298	12.0	298	12.0	0.096	3.1	NA	0.5	3.9	0.06	0.30	0.06	55.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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SITE LAYOUT

Site: 101 [Rennie Street / Shell Parade - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Rennie Street / Shell Parade - AM Peak - Existing
Site Category: (None)
Roundabout

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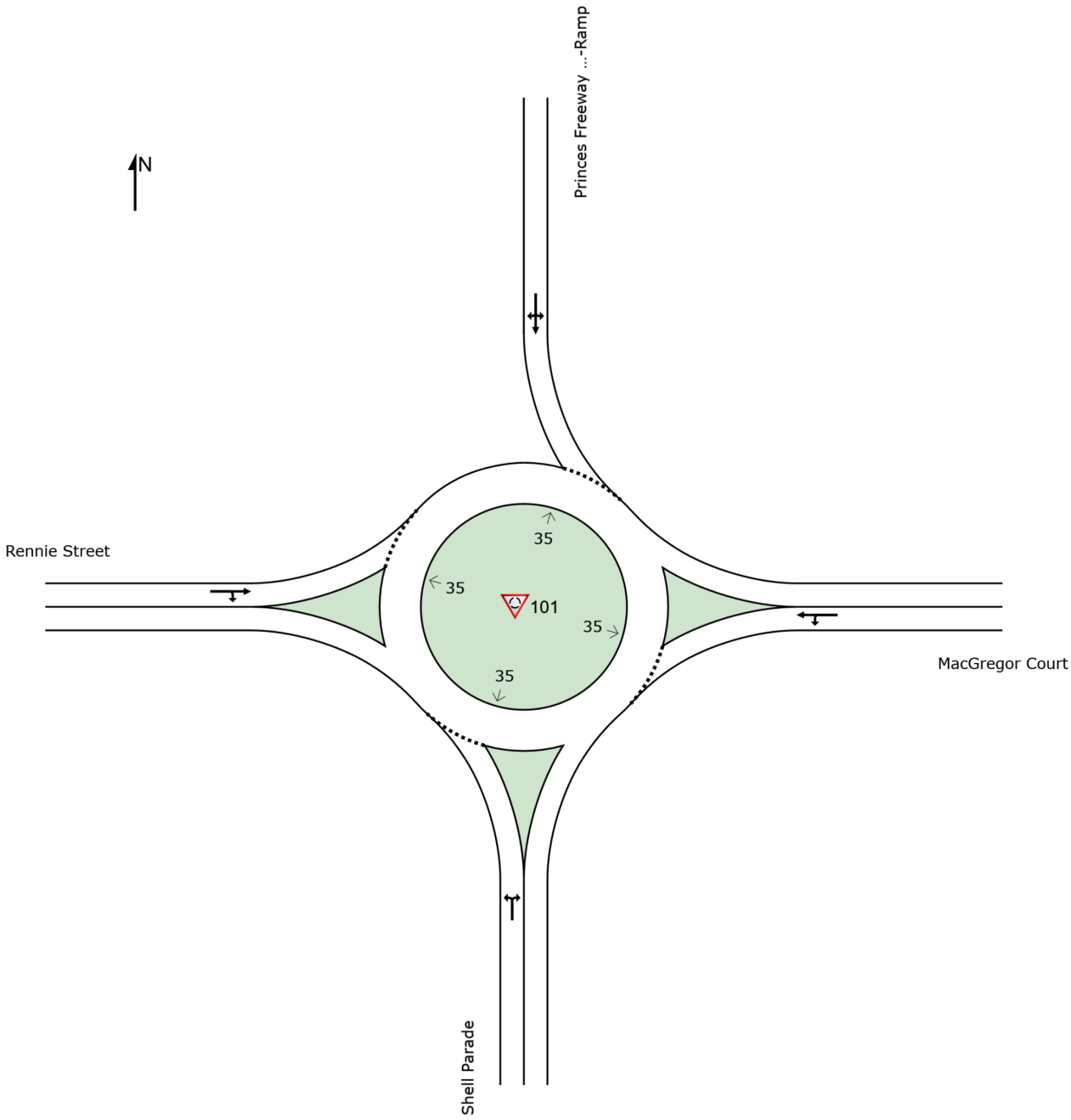

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MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - AM Peak - Existing (Site Folder: Existing - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Shell Parade - AM Peak - Existing
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	57	53.7	57	53.7	0.050	3.8	LOS A	0.2	2.4	0.15	0.40	0.15	54.1
3	R2	All MCs	1	0.0	1	0.0	0.050	9.4	LOS A	0.2	2.4	0.15	0.40	0.15	54.6
Approach			58	52.7	58	52.7	0.050	3.9	LOS A	0.2	2.4	0.15	0.40	0.15	54.1
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	4.1	LOS A	0.0	0.1	0.37	0.38	0.37	54.5
5	T1	All MCs	1	0.0	1	0.0	0.002	3.9	LOS A	0.0	0.1	0.37	0.38	0.37	54.9
Approach			2	0.0	2	0.0	0.002	4.0	LOS A	0.0	0.1	0.37	0.38	0.37	54.7
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.137	3.4	LOS A	0.7	5.5	0.19	0.39	0.19	54.4
8	T1	All MCs	151	21.7	151	21.7	0.137	3.4	LOS A	0.7	5.5	0.19	0.39	0.19	54.6
9	R2	All MCs	33	6.5	33	6.5	0.137	9.6	LOS A	0.7	5.5	0.19	0.39	0.19	53.6
Approach			184	18.9	184	18.9	0.137	4.5	LOS A	0.7	5.5	0.19	0.39	0.19	54.4
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.035	2.9	LOS A	0.2	1.2	0.01	0.64	0.01	52.1
12	R2	All MCs	60	0.0	60	0.0	0.035	9.3	LOS A	0.2	1.2	0.01	0.64	0.01	51.2
Approach			61	0.0	61	0.0	0.035	9.1	LOS A	0.2	1.2	0.01	0.64	0.01	51.2
All Vehicles			305	21.4	305	21.4	0.137	5.3	LOS A	0.7	5.5	0.15	0.44	0.15	53.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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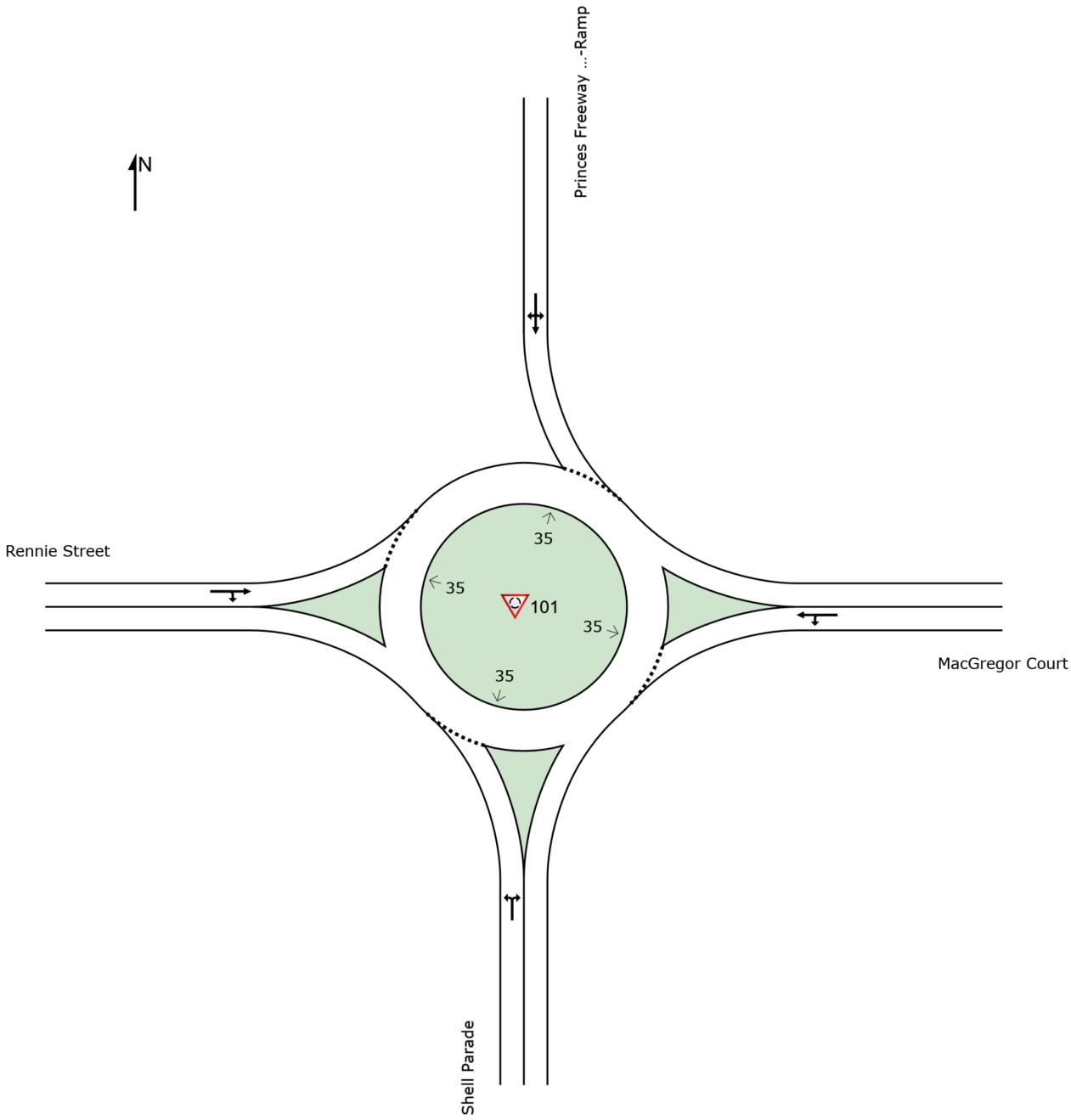
SITE LAYOUT

Site: 101 [Rennie Street / Shell Parade - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Rennie Street / Shell Parade - PM Peak - Existing
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - PM Peak - Existing (Site Folder: Existing - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Shell Parade - PM Peak - Existing
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	151	21.7	151	21.7	0.124	3.9	LOS A	0.6	5.2	0.28	0.42	0.28	54.4
3	R2	All MCs	1	0.0	1	0.0	0.124	9.7	LOS A	0.6	5.2	0.28	0.42	0.28	54.3
Approach			152	21.5	152	21.5	0.124	4.0	LOS A	0.6	5.2	0.28	0.42	0.28	54.4
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	4.0	LOS A	0.0	0.1	0.34	0.37	0.34	54.6
5	T1	All MCs	1	0.0	1	0.0	0.002	3.7	LOS A	0.0	0.1	0.34	0.37	0.34	55.0
Approach			2	0.0	2	0.0	0.002	3.8	LOS A	0.0	0.1	0.34	0.37	0.34	54.8
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.120	3.3	LOS A	0.6	4.8	0.14	0.54	0.14	52.1
8	T1	All MCs	57	53.7	57	53.7	0.120	3.5	LOS A	0.6	4.8	0.14	0.54	0.14	51.9
9	R2	All MCs	111	1.0	111	1.0	0.120	9.4	LOS A	0.6	4.8	0.14	0.54	0.14	51.5
Approach			168	18.8	168	18.8	0.120	7.4	LOS A	0.6	4.8	0.14	0.54	0.14	51.6
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.022	2.9	LOS A	0.1	0.8	0.02	0.63	0.02	52.1
12	R2	All MCs	36	5.9	36	5.9	0.022	9.3	LOS A	0.1	0.8	0.02	0.63	0.02	51.0
Approach			37	5.7	37	5.7	0.022	9.1	LOS A	0.1	0.8	0.02	0.63	0.02	51.1
All Vehicles			359	18.5	359	18.5	0.124	6.1	LOS A	0.6	5.2	0.19	0.50	0.19	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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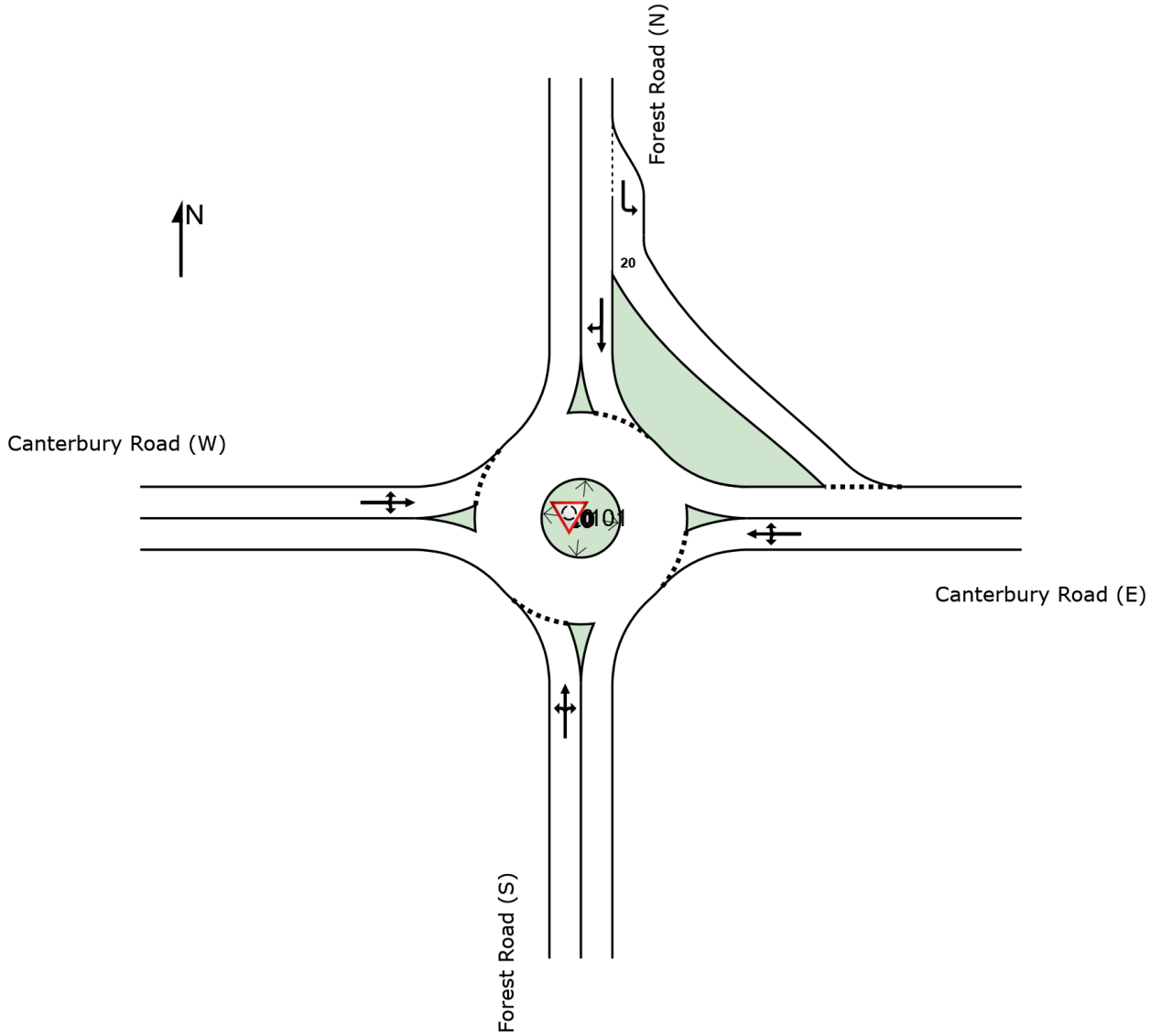
Appendix D - SIDRA Results – Base Case

SITE LAYOUT

Site: 101 [Canterbury Road / Forest Road - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Canterbury Road / Forest Road - AM Peak - Base Case
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - AM Peak - Base Case
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	49	4.3	49	4.3	0.392	6.4	LOS A	2.7	19.9	0.57	0.59	0.57	51.2
2	T1	All MCs	264	6.0	264	6.0	0.392	6.7	LOS A	2.7	19.9	0.57	0.59	0.57	51.5
3	R2	All MCs	77	2.7	77	2.7	0.392	9.9	LOS A	2.7	19.9	0.57	0.59	0.57	50.9
Approach			391	5.1	391	5.1	0.392	7.3	LOS A	2.7	19.9	0.57	0.59	0.57	51.4
East: Canterbury Road (E)															
4	L2	All MCs	156	2.7	156	2.7	0.468	11.1	LOS B	3.6	25.8	0.85	0.81	0.95	48.2
5	T1	All MCs	42	0.0	42	0.0	0.468	11.1	LOS B	3.6	25.8	0.85	0.81	0.95	48.7
6	R2	All MCs	129	1.6	129	1.6	0.468	14.6	LOS B	3.6	25.8	0.85	0.81	0.95	48.0
Approach			327	1.9	327	1.9	0.468	12.4	LOS B	3.6	25.8	0.85	0.81	0.95	48.2
North: Forest Road (N)															
7	L2	All MCs	78	4.1	78	4.1	0.058	5.0	LOS A	0.3	2.2	0.29	0.52	0.29	53.0
8	T1	All MCs	459	4.4	459	4.4	0.441	6.5	LOS A	3.3	23.8	0.59	0.58	0.59	51.5
9	R2	All MCs	69	1.5	69	1.5	0.441	9.7	LOS A	3.3	23.8	0.59	0.58	0.59	50.9
Approach			606	4.0	606	4.0	0.441	6.7	LOS A	3.3	23.8	0.55	0.57	0.55	51.7
West: Canterbury Road (W)															
10	L2	All MCs	111	1.9	111	1.9	0.386	8.1	LOS A	2.5	17.8	0.70	0.70	0.70	50.0
11	T1	All MCs	56	0.0	56	0.0	0.386	8.2	LOS A	2.5	17.8	0.70	0.70	0.70	50.4
12	R2	All MCs	155	1.4	155	1.4	0.386	11.6	LOS B	2.5	17.8	0.70	0.70	0.70	49.7
Approach			321	1.3	321	1.3	0.386	9.8	LOS A	2.5	17.8	0.70	0.70	0.70	49.9
All Vehicles			1645	3.3	1645	3.3	0.468	8.6	LOS A	3.6	25.8	0.64	0.65	0.66	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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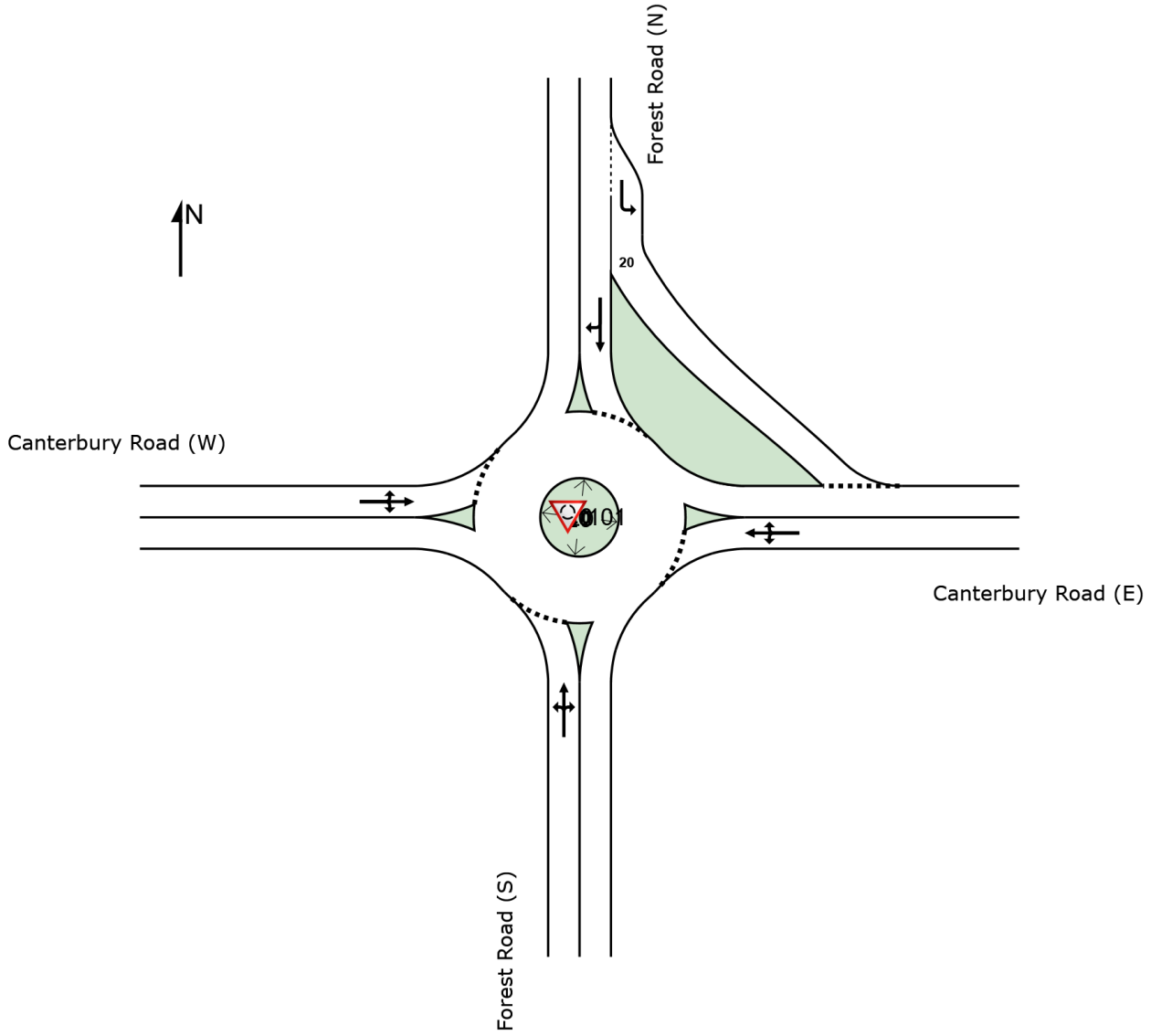
SITE LAYOUT

Site: 101 [Canterbury Road / Forest Road - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Canterbury Road / Forest Road - PM Peak - Base Case

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - PM Peak - Base Case

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	153	0.0	153	0.0	0.684	7.6	LOS A	7.4	52.8	0.74	0.64	0.79	50.7
2	T1	All MCs	438	1.9	438	1.9	0.684	7.9	LOS A	7.4	52.8	0.74	0.64	0.79	51.0
3	R2	All MCs	155	2.0	155	2.0	0.684	11.2	LOS B	7.4	52.8	0.74	0.64	0.79	50.3
Approach			745	1.6	745	1.6	0.684	8.5	LOS A	7.4	52.8	0.74	0.64	0.79	50.8
East: Canterbury Road (E)															
4	L2	All MCs	94	2.2	94	2.2	0.291	8.0	LOS A	1.8	13.0	0.69	0.70	0.69	50.3
5	T1	All MCs	54	0.0	54	0.0	0.291	8.1	LOS A	1.8	13.0	0.69	0.70	0.69	50.7
6	R2	All MCs	89	4.7	89	4.7	0.291	11.7	LOS B	1.8	13.0	0.69	0.70	0.69	49.8
Approach			237	2.7	237	2.7	0.291	9.4	LOS A	1.8	13.0	0.69	0.70	0.69	50.2
North: Forest Road (N)															
7	L2	All MCs	129	4.9	129	4.9	0.104	5.3	LOS A	0.6	4.3	0.39	0.54	0.39	52.7
8	T1	All MCs	359	0.9	359	0.9	0.361	6.3	LOS A	2.5	17.3	0.54	0.58	0.54	51.8
9	R2	All MCs	84	0.0	84	0.0	0.361	9.6	LOS A	2.5	17.3	0.54	0.58	0.54	51.1
Approach			573	1.7	573	1.7	0.361	6.5	LOS A	2.5	17.3	0.50	0.57	0.50	51.9
West: Canterbury Road (W)															
10	L2	All MCs	86	0.0	86	0.0	0.330	9.6	LOS A	2.2	15.6	0.81	0.76	0.81	49.3
11	T1	All MCs	47	0.0	47	0.0	0.330	9.8	LOS A	2.2	15.6	0.81	0.76	0.81	49.6
12	R2	All MCs	82	0.0	82	0.0	0.330	13.1	LOS B	2.2	15.6	0.81	0.76	0.81	49.0
Approach			216	0.0	216	0.0	0.330	11.0	LOS B	2.2	15.6	0.81	0.76	0.81	49.2
All Vehicles			1771	1.5	1771	1.5	0.684	8.3	LOS A	7.4	52.8	0.67	0.64	0.69	50.9

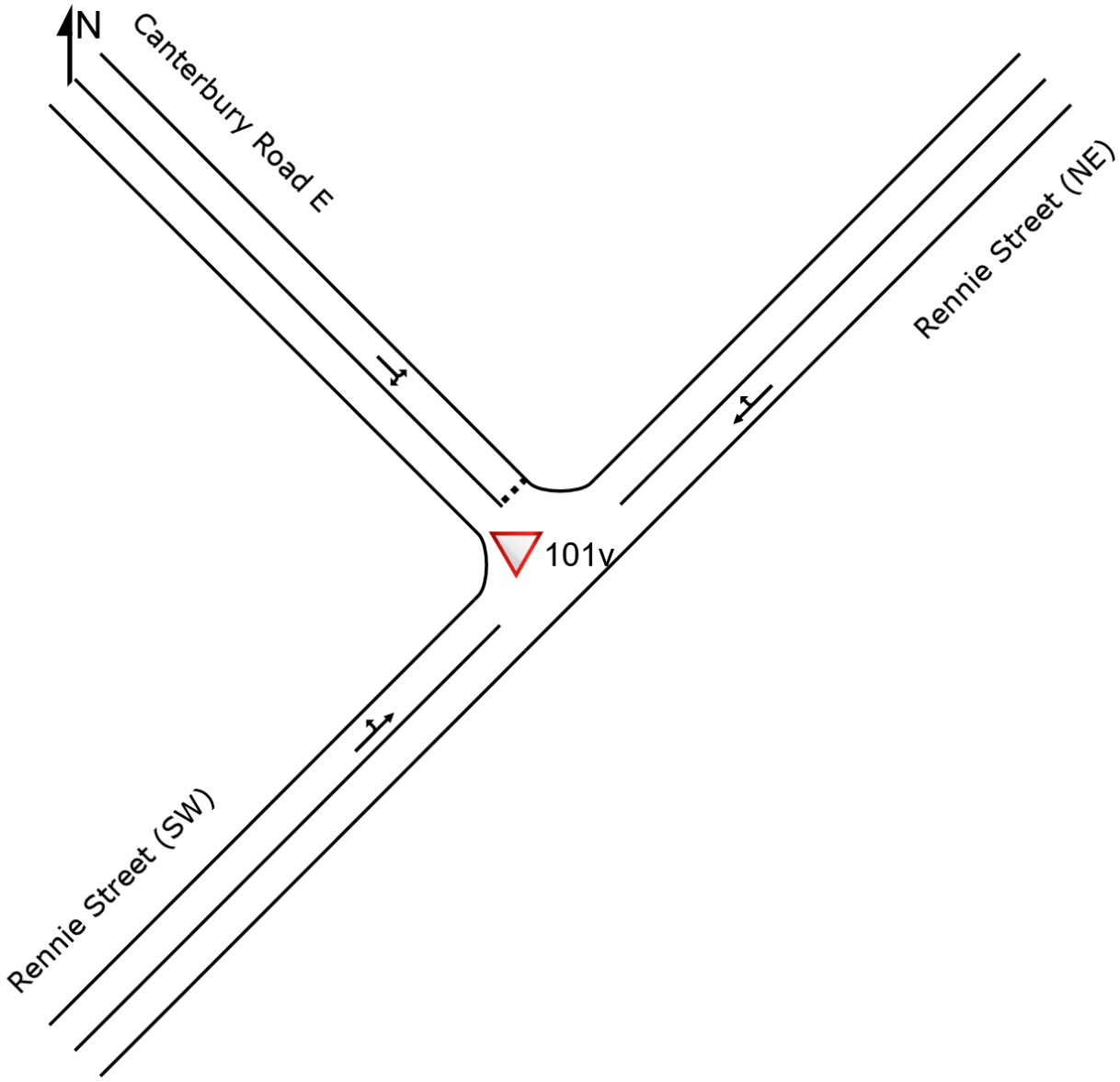
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	37	5.7	37	5.7	0.101	4.2	LOS A	0.0	0.0	0.00	0.59	0.00	53.3
26	R2	All MCs	151	0.7	151	0.7	0.101	5.5	LOS A	0.0	0.0	0.00	0.59	0.00	52.8
Approach			187	1.7	187	1.7	0.101	5.2	NA	0.0	0.0	0.00	0.59	0.00	52.9
NorthWest: Canterbury Road E															
27	L2	All MCs	239	0.0	239	0.0	0.310	5.9	LOS A	1.5	10.3	0.27	0.56	0.27	52.1
29	R2	All MCs	126	0.8	126	0.8	0.310	7.7	LOS A	1.5	10.3	0.27	0.56	0.27	51.8
Approach			365	0.3	365	0.3	0.310	6.5	LOS A	1.5	10.3	0.27	0.56	0.27	52.0
SouthWest: Rennie Street (SW)															
30	L2	All MCs	59	0.0	59	0.0	0.074	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.5
31	T1	All MCs	79	5.3	79	5.3	0.074	4.2	LOS A	0.0	0.0	0.00	0.55	0.00	53.7
Approach			138	3.1	138	3.1	0.074	4.8	NA	0.0	0.0	0.00	0.55	0.00	53.6
All Vehicles			691	1.2	691	1.2	0.310	5.8	NA	1.5	10.3	0.14	0.57	0.14	52.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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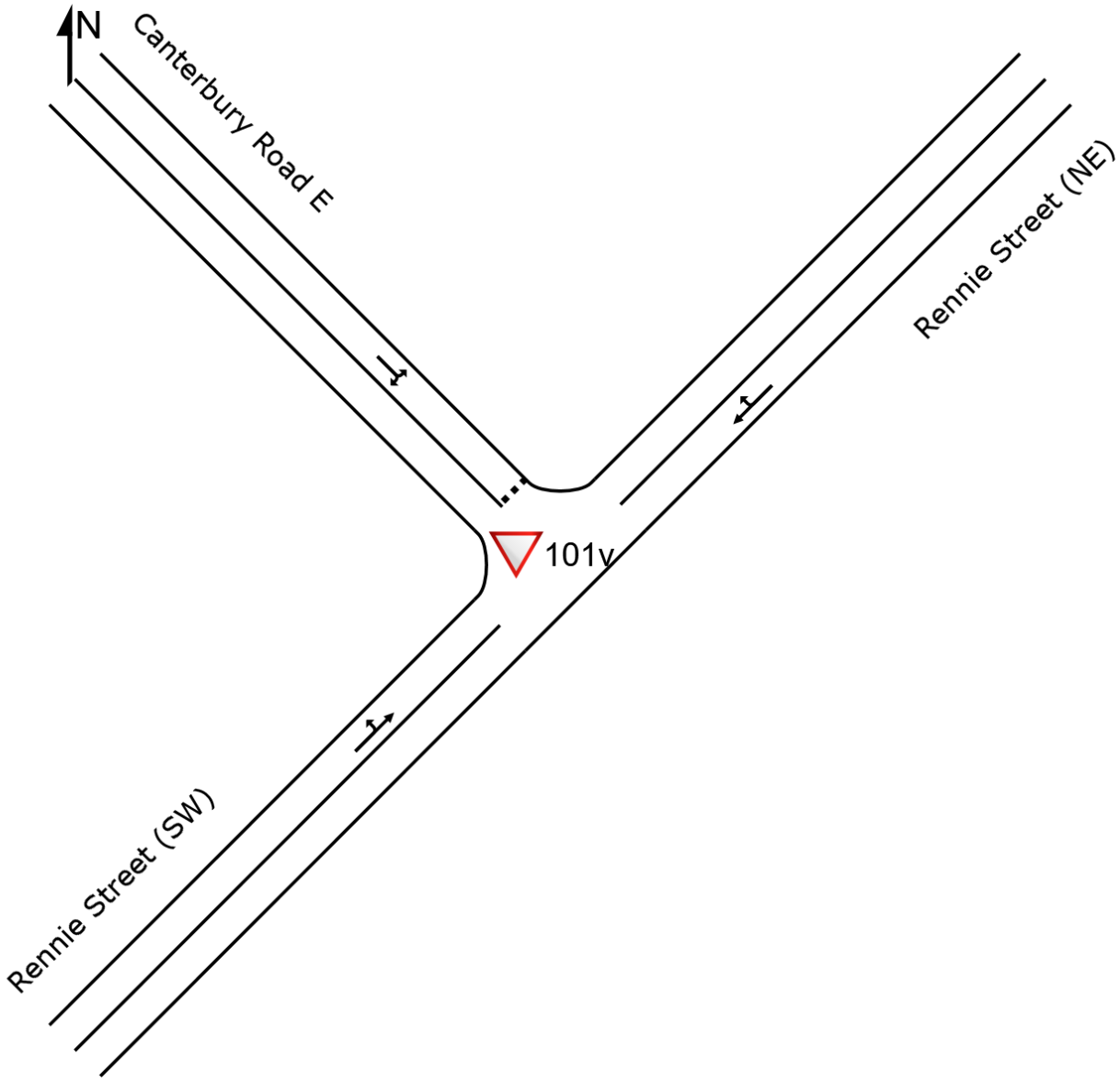
SITE LAYOUT

Site: 101v [Canterbury Road E / Rennie Street - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\Users\samuell\Ratio Consultants\19346T - Documents\General\Work\Analysis\SIDRA\19346T - SIDRA - Amended Distribution - 2024 Assessment.sip9

MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	71	6.0	71	6.0	0.169	4.2	LOS A	0.0	0.0	0.00	0.59	0.00	53.3
26	R2	All MCs	244	0.4	244	0.4	0.169	5.5	LOS A	0.0	0.0	0.00	0.59	0.00	52.8
Approach			315	1.7	315	1.7	0.169	5.2	NA	0.0	0.0	0.00	0.59	0.00	52.9
NorthWest: Canterbury Road E															
27	L2	All MCs	165	1.3	165	1.3	0.244	6.0	LOS A	1.0	7.4	0.33	0.58	0.33	51.7
29	R2	All MCs	86	2.4	86	2.4	0.244	9.2	LOS A	1.0	7.4	0.33	0.58	0.33	51.4
Approach			252	1.7	252	1.7	0.244	7.1	LOS A	1.0	7.4	0.33	0.58	0.33	51.6
SouthWest: Rennie Street (SW)															
30	L2	All MCs	92	1.1	92	1.1	0.107	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.4
31	T1	All MCs	104	10.1	104	10.1	0.107	4.3	LOS A	0.0	0.0	0.00	0.55	0.00	53.5
Approach			196	5.9	196	5.9	0.107	4.9	NA	0.0	0.0	0.00	0.55	0.00	53.4
All Vehicles			762	2.8	762	2.8	0.244	5.7	NA	1.0	7.4	0.11	0.57	0.11	52.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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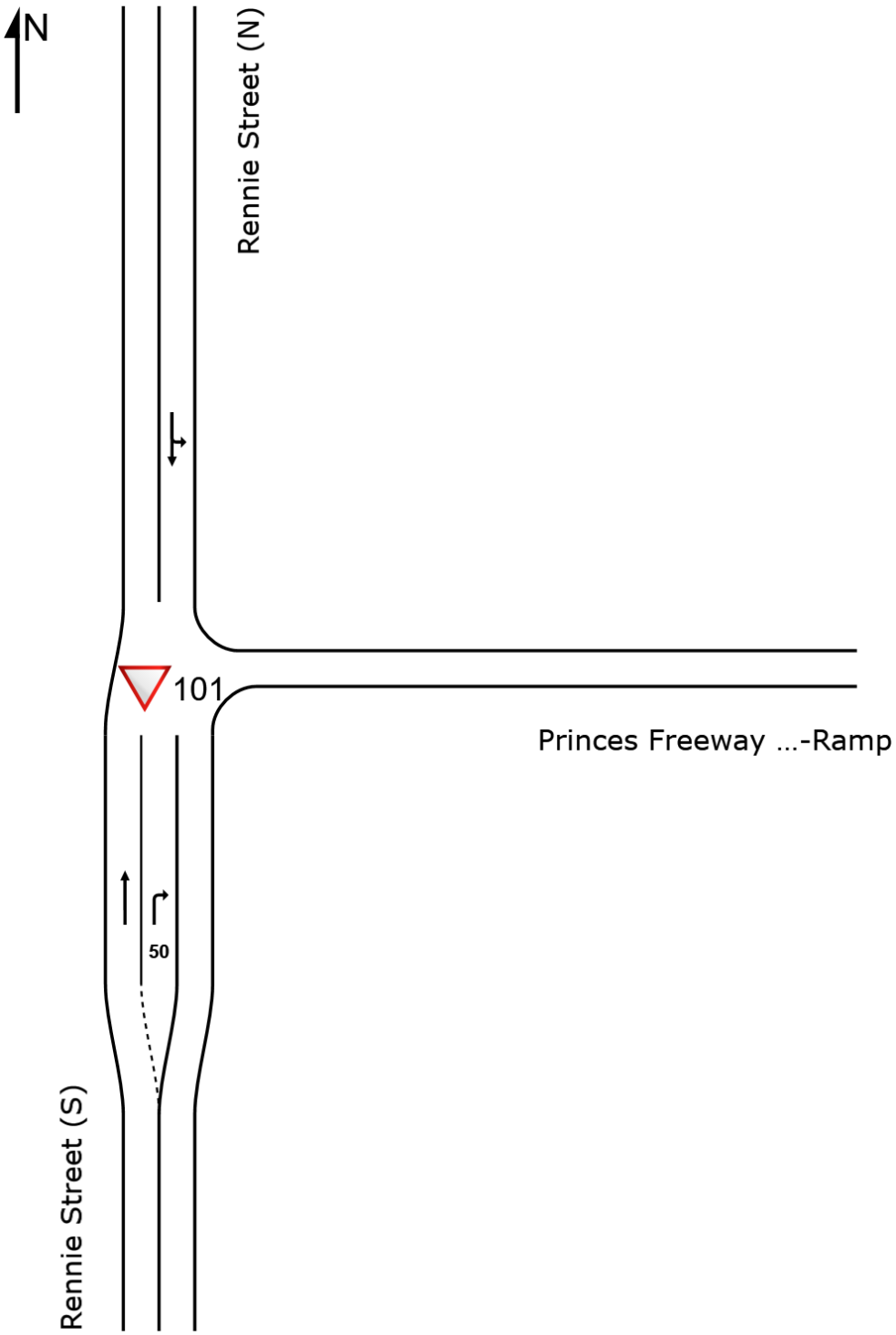
SITE LAYOUT

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	57	3.7	57	3.7	0.030	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	All MCs	57	53.7	57	53.7	0.046	6.9	LOS A	0.2	2.1	0.26	0.58	0.26	49.4
Approach			114	28.7	114	28.7	0.046	3.5	NA	0.2	2.1	0.13	0.29	0.13	54.2
North: Rennie Street (N)															
7	L2	All MCs	12	0.0	12	0.0	0.060	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.0
8	T1	All MCs	105	0.0	105	0.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
Approach			117	0.0	117	0.0	0.060	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles			231	14.2	231	14.2	0.060	2.0	NA	0.2	2.1	0.06	0.17	0.06	56.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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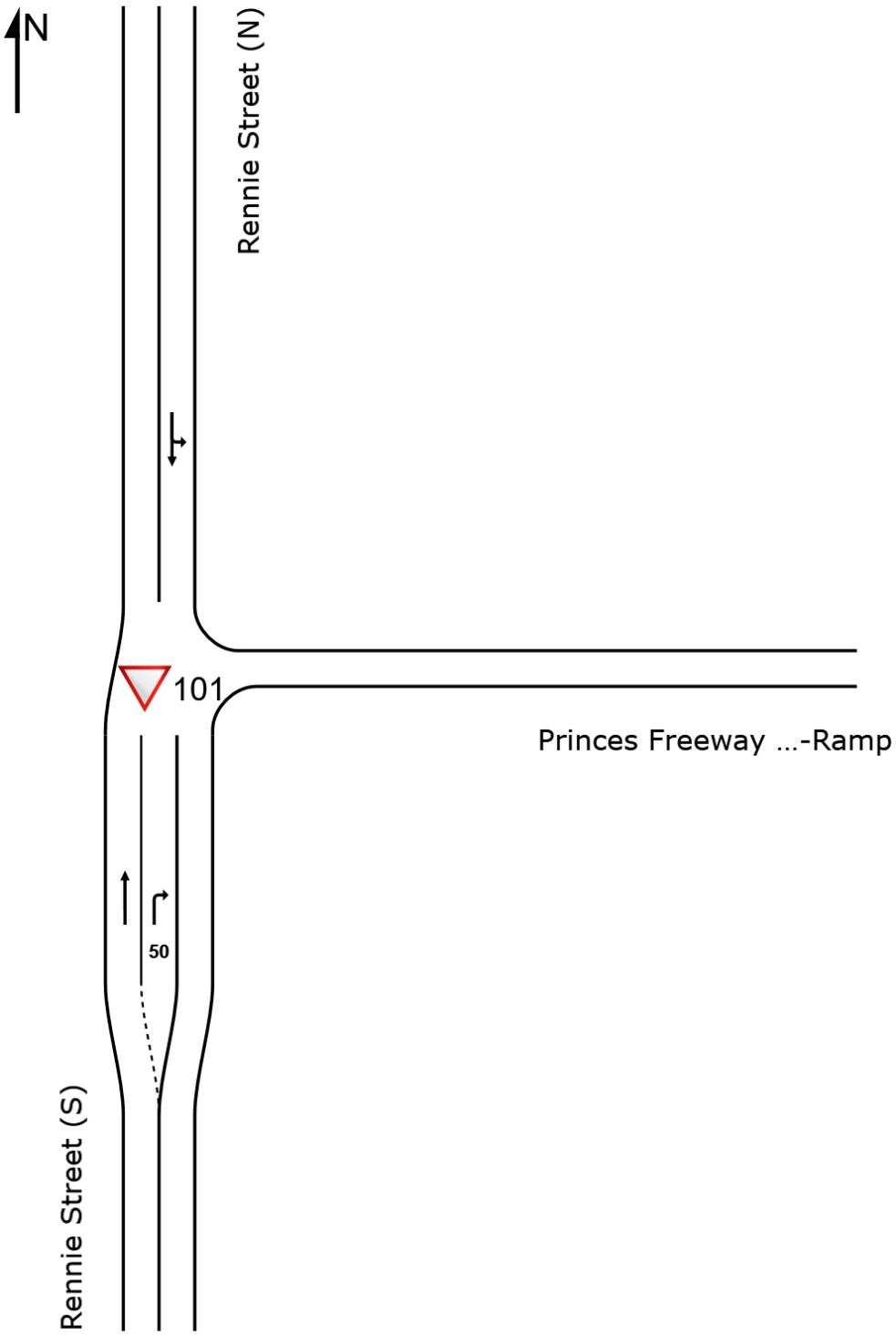
SITE LAYOUT

Site: 101 [Rennie Street / Freeway On-Ramp - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	167	0.6	167	0.6	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	All MCs	151	21.7	151	21.7	0.100	6.2	LOS A	0.5	4.0	0.19	0.58	0.19	50.9
Approach			318	10.6	318	10.6	0.100	3.0	NA	0.5	4.0	0.09	0.28	0.09	55.3
North: Rennie Street (N)															
7	L2	All MCs	7	0.0	7	0.0	0.039	5.5	LOS A	0.0	0.0	0.00	0.06	0.00	57.0
8	T1	All MCs	66	3.2	66	3.2	0.039	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
Approach			74	2.9	74	2.9	0.039	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles			392	9.1	392	9.1	0.100	2.5	NA	0.5	4.0	0.07	0.23	0.07	56.0

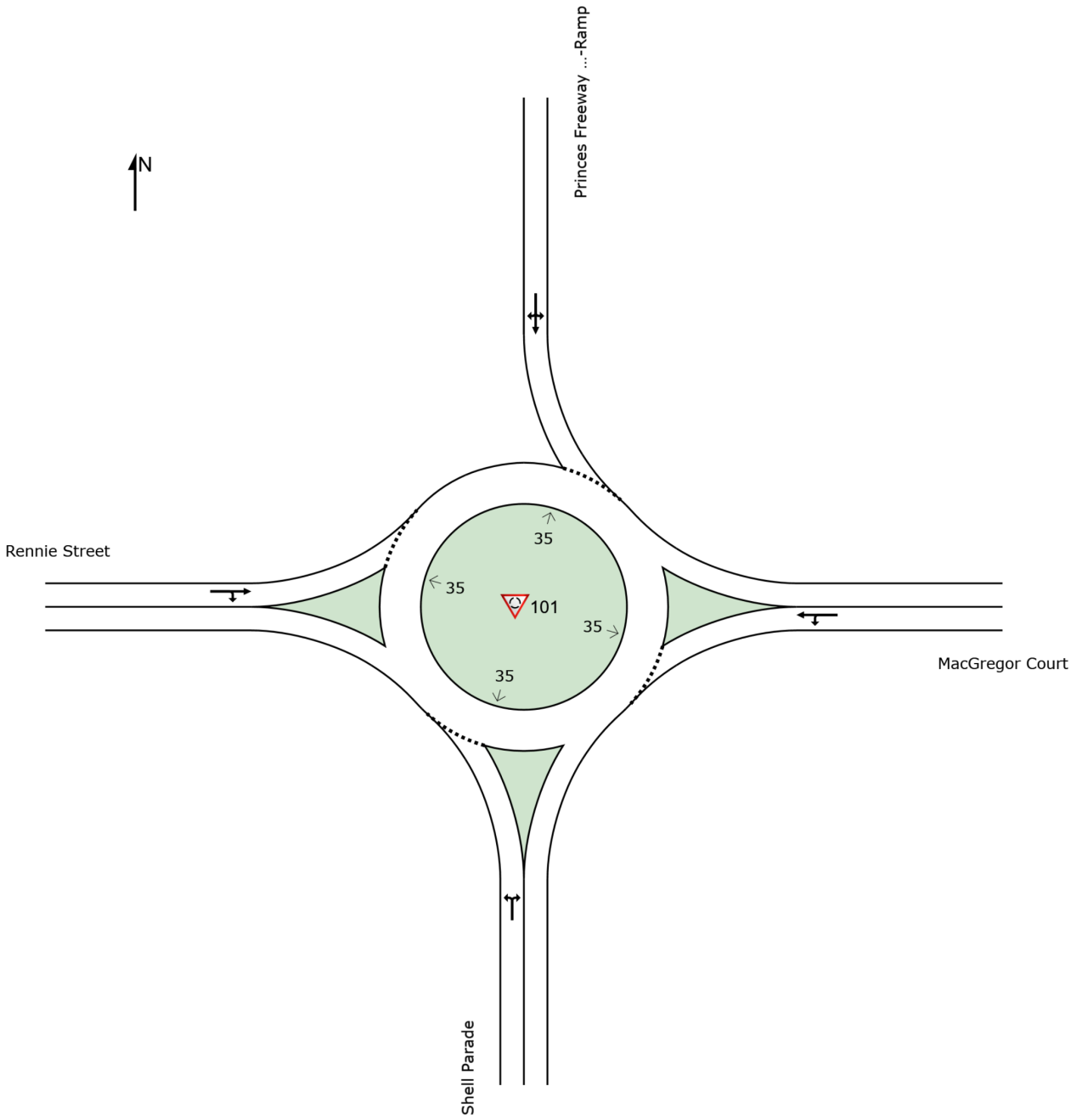
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101 [Rennie Street / Shell Parade - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Rennie Street / Shell Parade - AM Peak - Base Case
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - AM Peak - Base Case (Site Folder: Baseline - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Rennie Street / Shell Parade - AM Peak - Base Case
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	76	40.3	76	40.3	0.063	3.7	LOS A	0.3	2.9	0.16	0.40	0.16	54.4
3	R2	All MCs	1	0.0	1	0.0	0.063	9.4	LOS A	0.3	2.9	0.16	0.40	0.16	54.6
Approach			77	39.7	77	39.7	0.063	3.8	LOS A	0.3	2.9	0.16	0.40	0.16	54.4
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	4.3	LOS A	0.0	0.1	0.41	0.39	0.41	54.3
5	T1	All MCs	1	0.0	1	0.0	0.002	4.1	LOS A	0.0	0.1	0.41	0.39	0.41	54.7
Approach			2	0.0	2	0.0	0.002	4.2	LOS A	0.0	0.1	0.41	0.39	0.41	54.5
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.149	3.7	LOS A	0.8	6.1	0.26	0.41	0.26	54.0
8	T1	All MCs	151	21.7	151	21.7	0.149	3.6	LOS A	0.8	6.1	0.26	0.41	0.26	54.1
9	R2	All MCs	38	5.6	38	5.6	0.149	9.8	LOS A	0.8	6.1	0.26	0.41	0.26	53.2
Approach			189	18.3	189	18.3	0.149	4.9	LOS A	0.8	6.1	0.26	0.41	0.26	54.0
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.060	2.9	LOS A	0.3	2.1	0.01	0.64	0.01	52.0
12	R2	All MCs	105	0.0	105	0.0	0.060	9.3	LOS A	0.3	2.1	0.01	0.64	0.01	51.1
Approach			106	0.0	106	0.0	0.060	9.2	LOS A	0.3	2.1	0.01	0.64	0.01	51.1
All Vehicles			375	17.4	375	17.4	0.149	5.9	LOS A	0.8	6.1	0.17	0.47	0.17	53.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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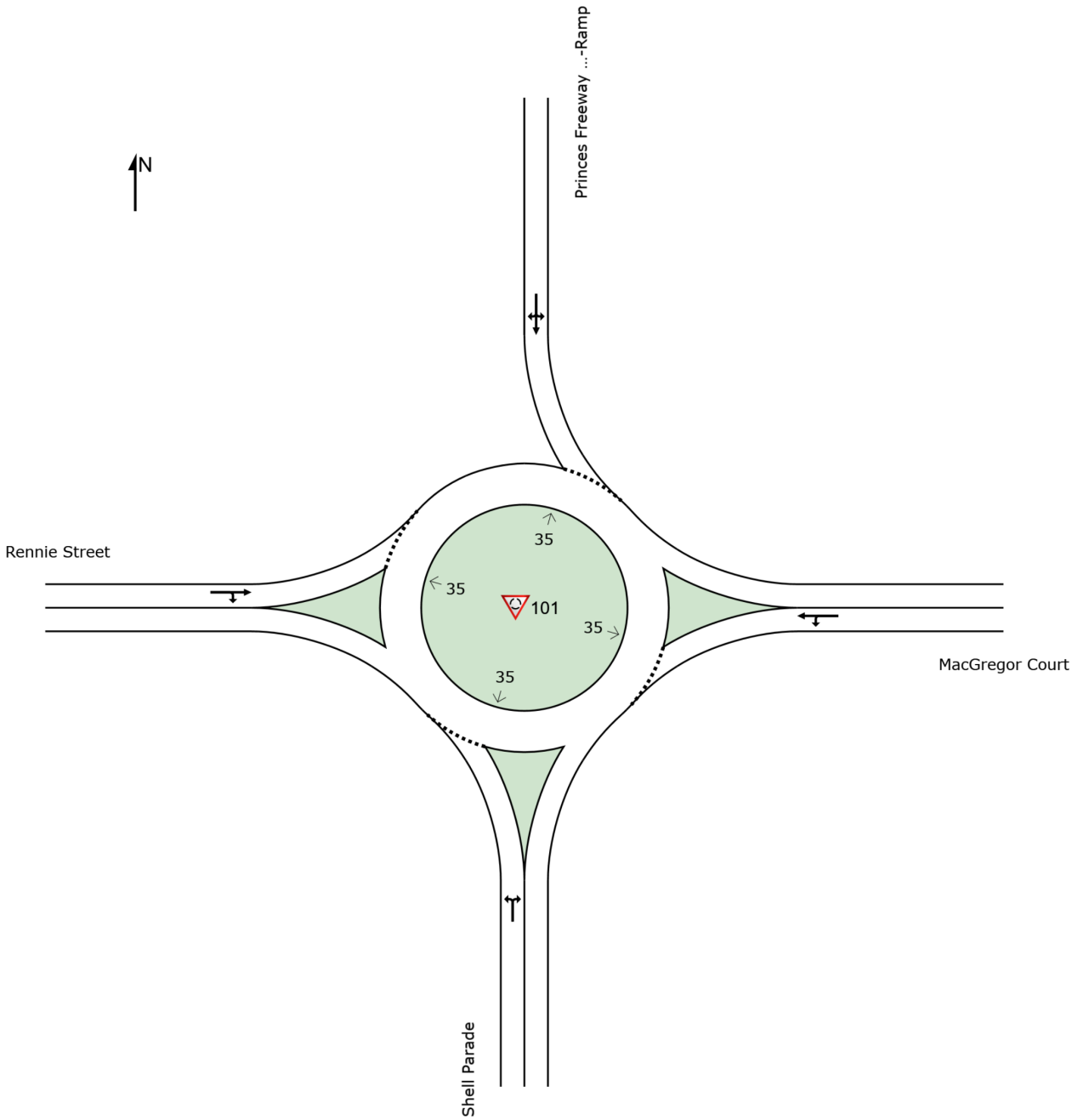
SITE LAYOUT

Site: 101 [Rennie Street / Shell Parade - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Rennie Street / Shell Parade - PM Peak - Base Case
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - PM Peak - Base Case (Site Folder: Baseline - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Rennie Street / Shell Parade - PM Peak - Base Case
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	196	16.7	196	16.7	0.157	4.0	LOS A	0.8	6.7	0.30	0.43	0.30	54.5
3	R2	All MCs	1	0.0	1	0.0	0.157	9.8	LOS A	0.8	6.7	0.30	0.43	0.30	54.2
Approach			197	16.6	197	16.6	0.157	4.0	LOS A	0.8	6.7	0.30	0.43	0.30	54.5
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	4.1	LOS A	0.0	0.1	0.38	0.38	0.38	54.5
5	T1	All MCs	1	0.0	1	0.0	0.002	3.9	LOS A	0.0	0.1	0.38	0.38	0.38	54.9
Approach			2	0.0	2	0.0	0.002	4.0	LOS A	0.0	0.1	0.38	0.38	0.38	54.7
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.134	3.5	LOS A	0.7	5.4	0.20	0.54	0.20	51.9
8	T1	All MCs	57	53.7	57	53.7	0.134	3.7	LOS A	0.7	5.4	0.20	0.54	0.20	51.6
9	R2	All MCs	122	0.9	122	0.9	0.134	9.5	LOS A	0.7	5.4	0.20	0.54	0.20	51.3
Approach			180	17.5	180	17.5	0.134	7.7	LOS A	0.7	5.4	0.20	0.54	0.20	51.4
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.039	2.9	LOS A	0.2	1.4	0.02	0.64	0.02	52.1
12	R2	All MCs	66	3.2	66	3.2	0.039	9.3	LOS A	0.2	1.4	0.02	0.64	0.02	51.1
Approach			67	3.1	67	3.1	0.039	9.2	LOS A	0.2	1.4	0.02	0.64	0.02	51.1
All Vehicles			446	14.9	446	14.9	0.157	6.3	LOS A	0.8	6.7	0.22	0.50	0.22	52.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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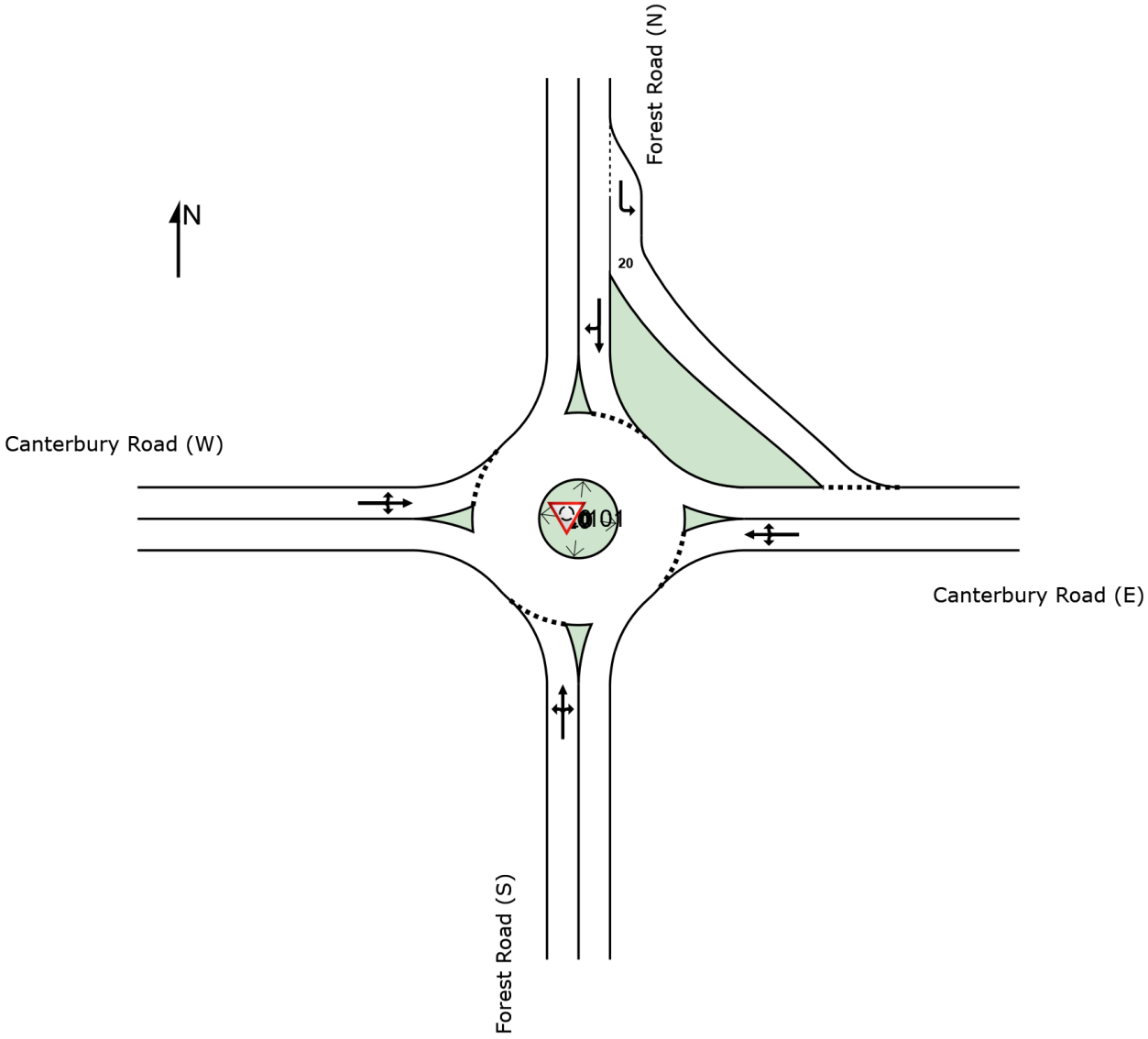
Appendix E - SIDRA Results – Post Development

SITE LAYOUT

Site: 101 [Canterbury Road / Forest Road - AM Peak - Future (Site Folder: Future - AM Peak)]

Canterbury Road / Forest Road - AM Peak - Future
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - AM Peak - Future
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	49	4.3	49	4.3	0.439	6.7	LOS A	3.2	23.2	0.62	0.61	0.62	50.9
2	T1	All MCs	264	6.0	264	6.0	0.439	7.0	LOS A	3.2	23.2	0.62	0.61	0.62	51.2
3	R2	All MCs	111	1.9	111	1.9	0.439	10.2	LOS B	3.2	23.2	0.62	0.61	0.62	50.6
Approach			424	4.7	424	4.7	0.439	7.8	LOS A	3.2	23.2	0.62	0.61	0.62	51.0
East: Canterbury Road (E)															
4	L2	All MCs	175	2.4	175	2.4	0.540	12.3	LOS B	4.7	33.5	0.88	0.85	1.07	47.5
5	T1	All MCs	52	0.0	52	0.0	0.540	12.4	LOS B	4.7	33.5	0.88	0.85	1.07	47.9
6	R2	All MCs	148	1.4	148	1.4	0.540	15.8	LOS B	4.7	33.5	0.88	0.85	1.07	47.2
Approach			375	1.7	375	1.7	0.540	13.7	LOS B	4.7	33.5	0.88	0.85	1.07	47.4
North: Forest Road (N)															
7	L2	All MCs	112	2.8	112	2.8	0.086	5.2	LOS A	0.5	3.3	0.35	0.53	0.35	52.9
8	T1	All MCs	459	4.4	459	4.4	0.461	6.9	LOS A	3.5	25.1	0.64	0.61	0.64	51.3
9	R2	All MCs	69	1.5	69	1.5	0.461	10.1	LOS B	3.5	25.1	0.64	0.61	0.64	50.7
Approach			640	3.8	640	3.8	0.461	6.9	LOS A	3.5	25.1	0.59	0.59	0.59	51.5
West: Canterbury Road (W)															
10	L2	All MCs	111	1.9	111	1.9	0.428	8.7	LOS A	2.9	20.7	0.75	0.73	0.76	49.6
11	T1	All MCs	73	0.0	73	0.0	0.428	8.9	LOS A	2.9	20.7	0.75	0.73	0.76	50.1
12	R2	All MCs	155	1.4	155	1.4	0.428	12.3	LOS B	2.9	20.7	0.75	0.73	0.76	49.3
Approach			338	1.2	338	1.2	0.428	10.4	LOS B	2.9	20.7	0.75	0.73	0.76	49.6
All Vehicles			1777	3.1	1777	3.1	0.540	9.2	LOS A	4.7	33.5	0.69	0.68	0.73	50.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Canterbury Road / Forest Road - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Canterbury Road / Forest Road - PM Peak - Future

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forest Road (S)															
1	L2	All MCs	153	0.0	153	0.0	0.784	11.1	LOS B	11.6	82.5	0.92	0.80	1.14	48.5
2	T1	All MCs	438	1.9	438	1.9	0.784	11.5	LOS B	11.6	82.5	0.92	0.80	1.14	48.8
3	R2	All MCs	196	1.6	196	1.6	0.784	14.8	LOS B	11.6	82.5	0.92	0.80	1.14	48.1
Approach			786	1.5	786	1.5	0.784	12.2	LOS B	11.6	82.5	0.92	0.80	1.14	48.6
East: Canterbury Road (E)															
4	L2	All MCs	135	1.6	135	1.6	0.427	8.4	LOS A	2.9	20.9	0.76	0.72	0.76	50.0
5	T1	All MCs	81	0.0	81	0.0	0.427	8.6	LOS A	2.9	20.9	0.76	0.72	0.76	50.4
6	R2	All MCs	131	3.2	131	3.2	0.427	12.0	LOS B	2.9	20.9	0.76	0.72	0.76	49.6
Approach			346	1.8	346	1.8	0.427	9.8	LOS A	2.9	20.9	0.76	0.72	0.76	50.0
North: Forest Road (N)															
7	L2	All MCs	166	3.8	166	3.8	0.140	5.6	LOS A	0.8	6.1	0.47	0.56	0.47	52.5
8	T1	All MCs	359	0.9	359	0.9	0.385	6.7	LOS A	2.7	19.2	0.61	0.61	0.61	51.5
9	R2	All MCs	84	0.0	84	0.0	0.385	10.0	LOS A	2.7	19.2	0.61	0.61	0.61	50.8
Approach			609	1.6	609	1.6	0.385	6.8	LOS A	2.7	19.2	0.57	0.59	0.57	51.7
West: Canterbury Road (W)															
10	L2	All MCs	86	0.0	86	0.0	0.421	11.3	LOS B	3.2	22.3	0.90	0.81	0.96	48.2
11	T1	All MCs	73	0.0	73	0.0	0.421	11.6	LOS B	3.2	22.3	0.90	0.81	0.96	48.6
12	R2	All MCs	82	0.0	82	0.0	0.421	14.9	LOS B	3.2	22.3	0.90	0.81	0.96	47.9
Approach			241	0.0	241	0.0	0.421	12.6	LOS B	3.2	22.3	0.90	0.81	0.96	48.2
All Vehicles			1983	1.4	1983	1.4	0.784	10.2	LOS B	11.6	82.5	0.78	0.72	0.88	49.7

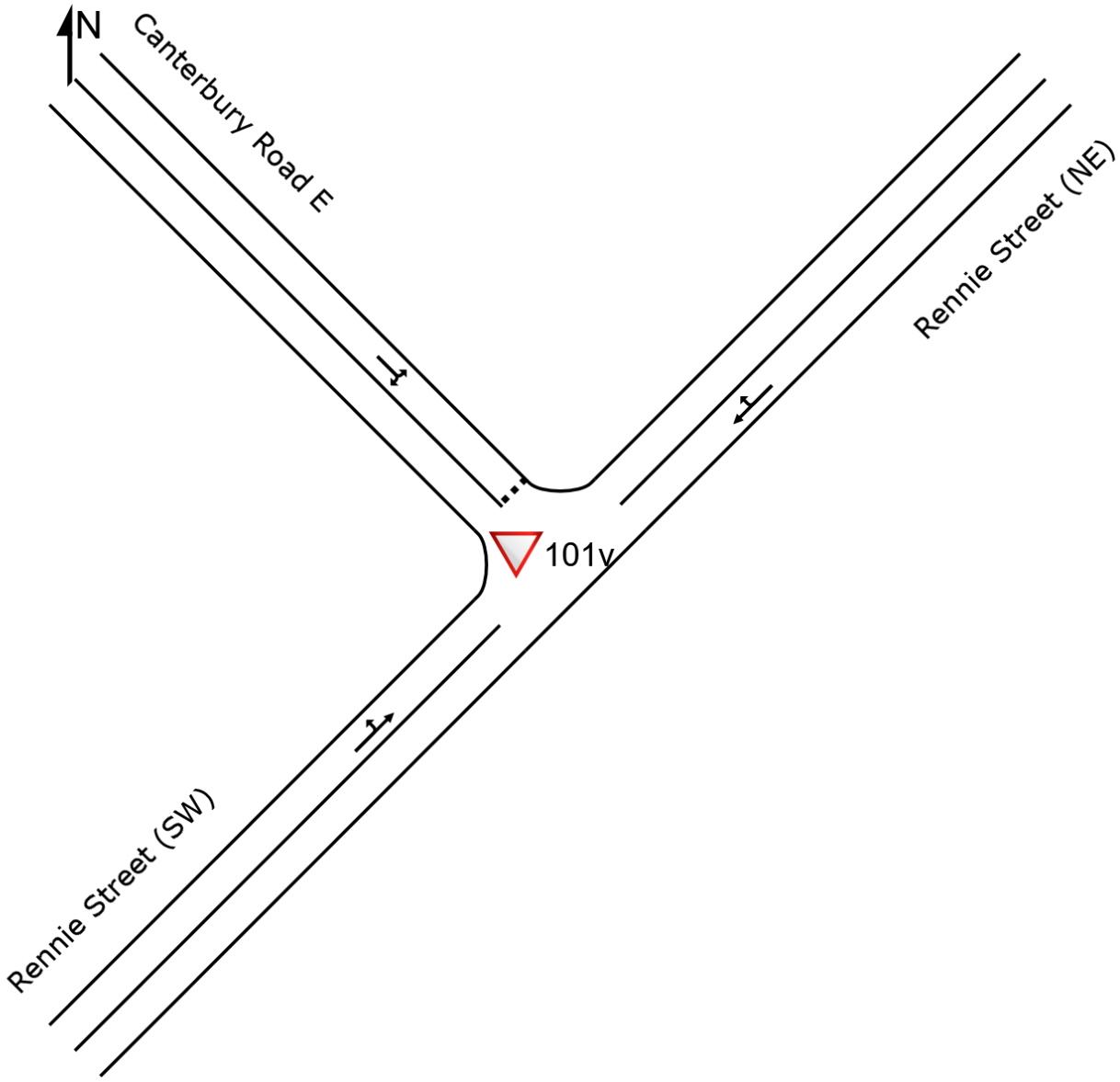
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Future (Site Folder: Future - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	92	2.3	92	2.3	0.129	4.2	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
26	R2	All MCs	151	0.7	151	0.7	0.129	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.0
Approach			242	1.3	242	1.3	0.129	5.0	NA	0.0	0.0	0.00	0.58	0.00	53.2
NorthWest: Canterbury Road E															
27	L2	All MCs	239	0.0	239	0.0	0.500	7.6	LOS A	3.7	26.1	0.55	0.75	0.75	50.1
29	R2	All MCs	209	0.5	209	0.5	0.500	11.5	LOS B	3.7	26.1	0.55	0.75	0.75	49.8
Approach			448	0.2	448	0.2	0.500	9.4	LOS A	3.7	26.1	0.55	0.75	0.75	50.0
SouthWest: Rennie Street (SW)															
30	L2	All MCs	104	0.0	104	0.0	0.163	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.5
31	T1	All MCs	205	2.1	205	2.1	0.163	4.2	LOS A	0.0	0.0	0.00	0.55	0.00	53.9
Approach			309	1.4	309	1.4	0.163	4.7	NA	0.0	0.0	0.00	0.55	0.00	53.8
All Vehicles			1000	0.8	1000	0.8	0.500	6.9	NA	3.7	26.1	0.25	0.64	0.34	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [Canterbury Road E / Rennie Street - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	127	3.3	127	3.3	0.199	4.2	LOS A	0.0	0.0	0.00	0.58	0.00	53.5
26	R2	All MCs	244	0.4	244	0.4	0.199	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
Approach			372	1.4	372	1.4	0.199	5.1	NA	0.0	0.0	0.00	0.58	0.00	53.1
NorthWest: Canterbury Road E															
27	L2	All MCs	165	1.3	165	1.3	0.388	6.8	LOS A	2.2	15.4	0.52	0.69	0.61	50.1
29	R2	All MCs	144	1.5	144	1.5	0.388	12.3	LOS B	2.2	15.4	0.52	0.69	0.61	49.8
Approach			309	1.4	309	1.4	0.388	9.4	LOS A	2.2	15.4	0.52	0.69	0.61	50.0
SouthWest: Rennie Street (SW)															
30	L2	All MCs	160	0.7	160	0.7	0.176	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.3
31	T1	All MCs	168	6.3	168	6.3	0.176	4.2	LOS A	0.0	0.0	0.00	0.55	0.00	53.6
Approach			328	3.5	328	3.5	0.176	4.9	NA	0.0	0.0	0.00	0.55	0.00	53.5
All Vehicles			1009	2.1	1009	2.1	0.388	6.3	NA	2.2	15.4	0.16	0.60	0.19	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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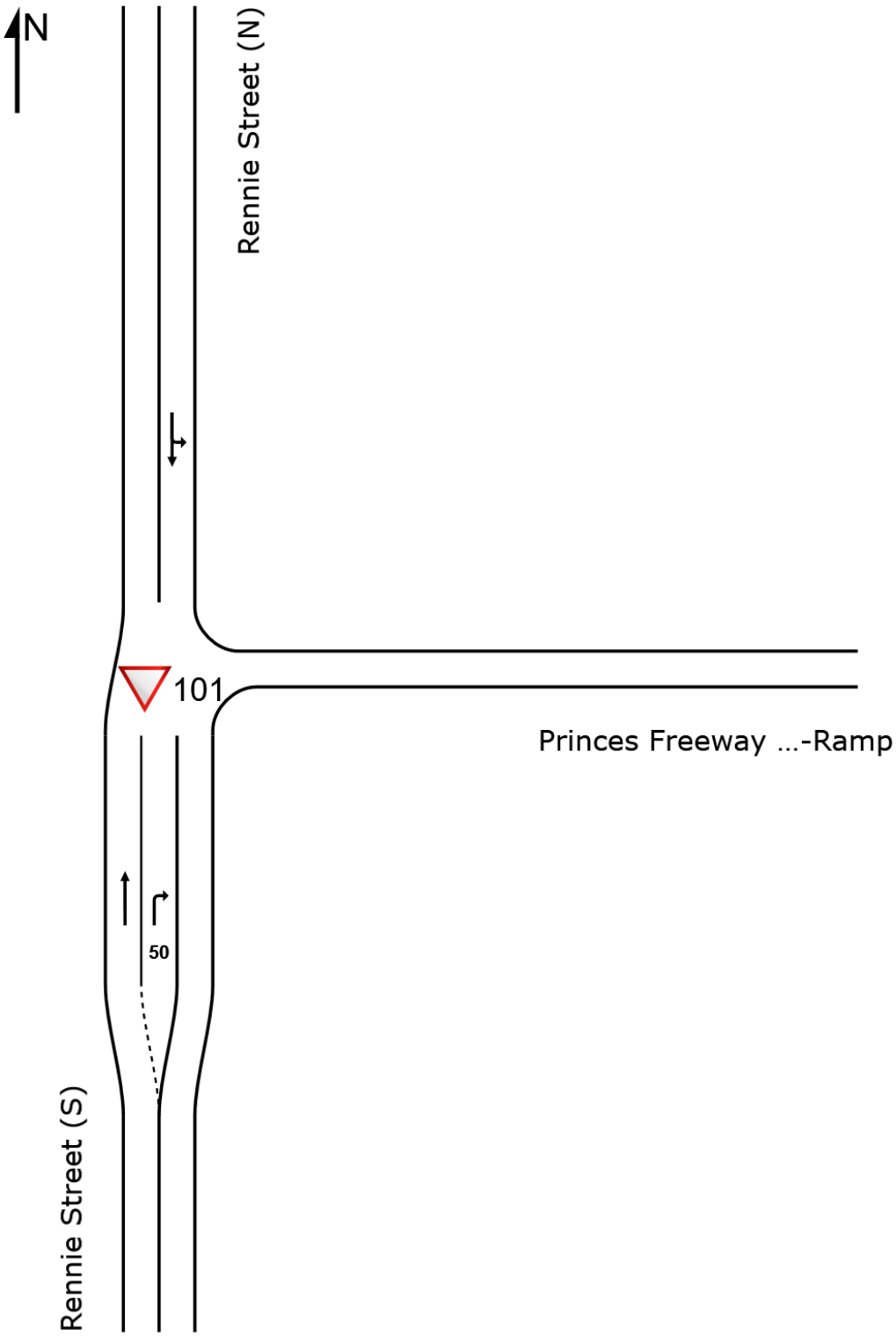
SITE LAYOUT

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Future (Site Folder: Future - AM Peak)]

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	432	12.4	432	12.4	0.239	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	All MCs	57	53.7	57	53.7	0.068	9.0	LOS A	0.3	2.9	0.50	0.69	0.50	48.3
Approach			488	17.2	488	17.2	0.239	1.1	NA	0.3	2.9	0.06	0.08	0.06	58.2
North: Rennie Street (N)															
7	L2	All MCs	199	9.5	199	9.5	0.213	5.7	LOS A	0.0	0.0	0.00	0.31	0.00	54.5
8	T1	All MCs	182	8.7	182	8.7	0.213	0.1	LOS A	0.0	0.0	0.00	0.31	0.00	57.2
Approach			381	9.1	381	9.1	0.213	3.0	NA	0.0	0.0	0.00	0.31	0.00	55.7
All Vehicles			869	13.7	869	13.7	0.239	1.9	NA	0.3	2.9	0.03	0.18	0.03	57.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\samuell\OneDrive - Ratio Consultants\Desktop\19346T - SIDRA - Amended Distribution - 2024 Assessment.sip9

MOVEMENT SUMMARY

Site: 101 [Rennie Street / Freeway On-Ramp - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Freeway On-Ramp - AM Peak - Existing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Rennie Street (S)															
2	T1	All MCs	521	8.5	521	8.5	0.282	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	151	21.7	151	21.7	0.152	8.2	LOS A	0.7	5.5	0.51	0.72	0.51	49.8
Approach			672	11.4	672	11.4	0.282	1.9	NA	0.7	5.5	0.12	0.16	0.12	57.2
North: Rennie Street (N)															
7	L2	All MCs	184	12.6	184	12.6	0.229	5.7	LOS A	0.0	0.0	0.00	0.27	0.00	54.7
8	T1	All MCs	222	9.5	222	9.5	0.229	0.1	LOS A	0.0	0.0	0.00	0.27	0.00	57.5
Approach			406	10.9	406	10.9	0.229	2.6	NA	0.0	0.0	0.00	0.27	0.00	56.2
All Vehicles			1078	11.2	1078	11.2	0.282	2.2	NA	0.7	5.5	0.07	0.20	0.07	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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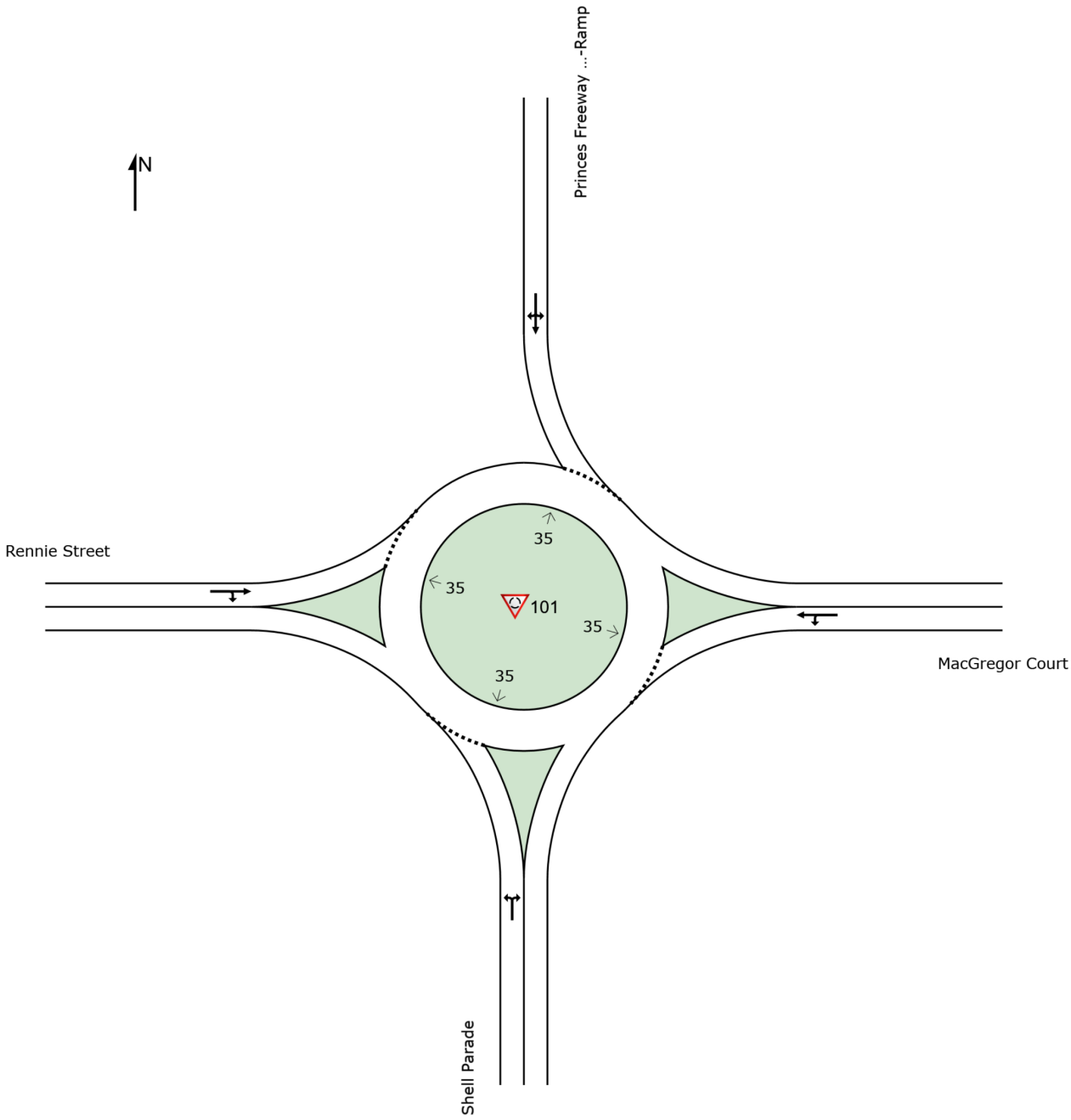
Project: C:\Users\samuell\OneDrive - Ratio Consultants\Desktop\19346T - SIDRA - Amended Distribution - 2024 Assessment.sip9

SITE LAYOUT

Site: 101 [Rennie Street / Shell Parade - AM Peak - Future (Site Folder: Future - AM Peak)]

Rennie Street / Shell Parade - AM Peak - Future
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Shell Parade - AM Peak - Future
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	237	22.7	237	22.7	0.228	5.0	LOS A	1.3	11.1	0.49	0.51	0.49	53.6
3	R2	All MCs	1	0.0	1	0.0	0.228	10.5	LOS B	1.3	11.1	0.49	0.51	0.49	53.5
Approach			238	22.6	238	22.6	0.228	5.0	LOS A	1.3	11.1	0.49	0.51	0.49	53.6
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	5.9	LOS A	0.0	0.1	0.61	0.46	0.61	53.4
5	T1	All MCs	1	0.0	1	0.0	0.002	5.6	LOS A	0.0	0.1	0.61	0.46	0.61	53.8
Approach			2	0.0	2	0.0	0.002	5.7	LOS A	0.0	0.1	0.61	0.46	0.61	53.6
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.332	4.2	LOS A	2.0	15.8	0.41	0.56	0.41	51.8
8	T1	All MCs	151	21.7	151	21.7	0.332	4.3	LOS A	2.0	15.8	0.41	0.56	0.41	52.0
9	R2	All MCs	251	12.2	251	12.2	0.332	10.5	LOS B	2.0	15.8	0.41	0.56	0.41	50.9
Approach			402	15.7	402	15.7	0.332	8.2	LOS A	2.0	15.8	0.41	0.56	0.41	51.3
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.107	2.9	LOS A	0.6	4.7	0.02	0.63	0.02	52.0
12	R2	All MCs	182	8.7	182	8.7	0.107	9.3	LOS A	0.6	4.7	0.02	0.63	0.02	50.9
Approach			183	8.6	183	8.6	0.107	9.3	LOS A	0.6	4.7	0.02	0.63	0.02	50.9
All Vehicles			825	16.1	825	16.1	0.332	7.5	LOS A	2.0	15.8	0.35	0.56	0.35	51.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Rennie Street / Shell Parade - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Rennie Street / Shell Parade - PM Peak - Future
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shell Parade															
1	L2	All MCs	314	16.4	314	16.4	0.318	5.6	LOS A	2.0	16.2	0.60	0.57	0.60	53.4
3	R2	All MCs	1	0.0	1	0.0	0.318	11.2	LOS B	2.0	16.2	0.60	0.57	0.60	53.1
Approach			315	16.4	315	16.4	0.318	5.6	LOS A	2.0	16.2	0.60	0.57	0.60	53.4
East: MacGregor Court															
4	L2	All MCs	1	0.0	1	0.0	0.002	6.2	LOS A	0.0	0.1	0.64	0.47	0.64	53.3
5	T1	All MCs	1	0.0	1	0.0	0.002	5.9	LOS A	0.0	0.1	0.64	0.47	0.64	53.7
Approach			2	0.0	2	0.0	0.002	6.1	LOS A	0.0	0.1	0.64	0.47	0.64	53.5
North: Princes Freeway Off-Ramp															
7	L2	All MCs	1	0.0	1	0.0	0.352	4.5	LOS A	2.1	16.7	0.46	0.61	0.46	50.6
8	T1	All MCs	57	53.7	57	53.7	0.352	5.3	LOS A	2.1	16.7	0.46	0.61	0.46	50.4
9	R2	All MCs	357	6.8	357	6.8	0.352	10.7	LOS B	2.1	16.7	0.46	0.61	0.46	49.9
Approach			415	13.2	415	13.2	0.352	9.9	LOS A	2.1	16.7	0.46	0.61	0.46	49.9
West: Rennie Street															
11	T1	All MCs	1	0.0	1	0.0	0.131	2.9	LOS A	0.8	6.2	0.02	0.63	0.02	52.0
12	R2	All MCs	223	9.4	223	9.4	0.131	9.4	LOS A	0.8	6.2	0.02	0.63	0.02	50.8
Approach			224	9.4	224	9.4	0.131	9.3	LOS A	0.8	6.2	0.02	0.63	0.02	50.8
All Vehicles			956	13.3	956	13.3	0.352	8.4	LOS A	2.1	16.7	0.41	0.60	0.41	51.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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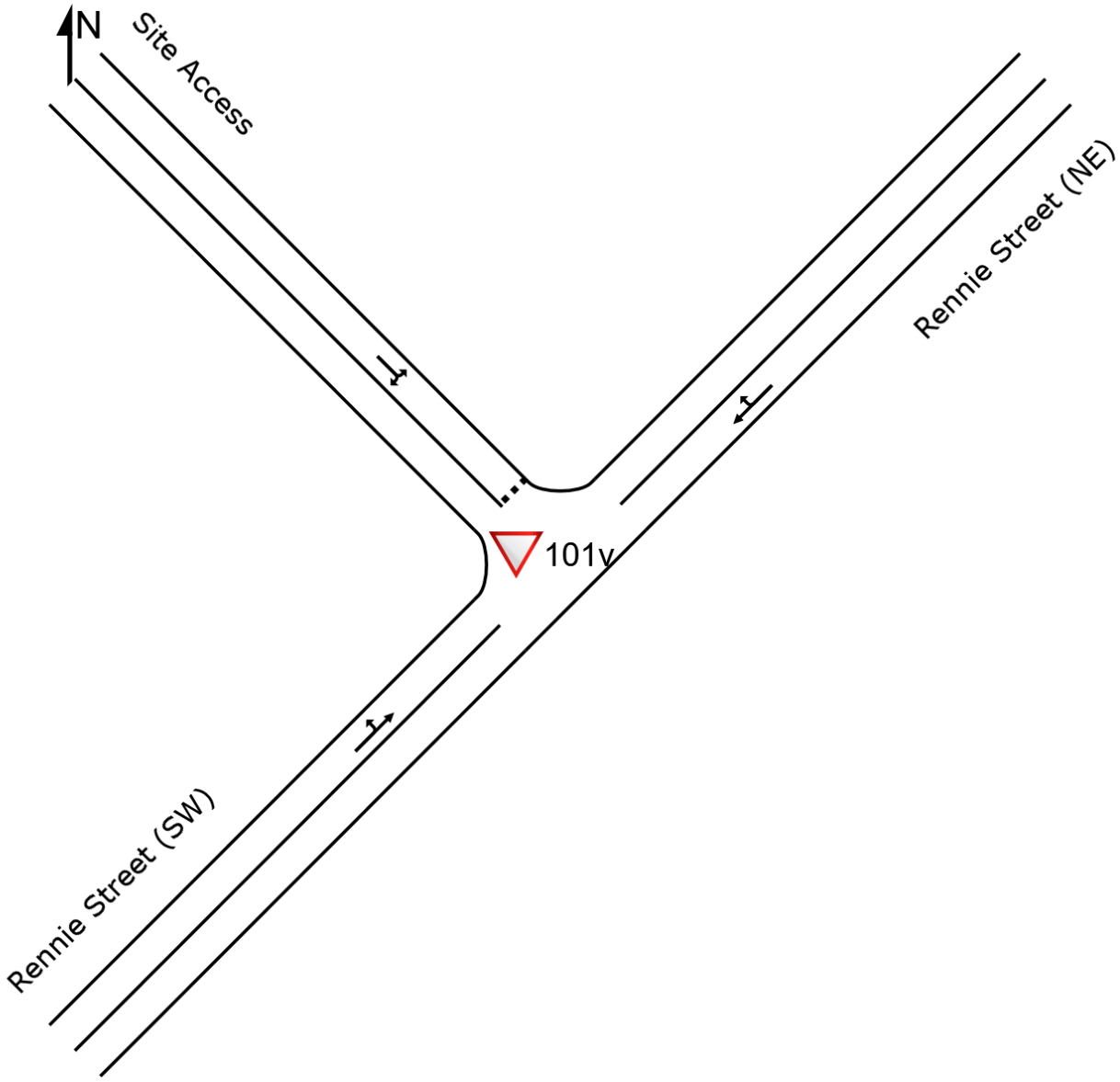
SITE LAYOUT

Site: 101v [Site Access / Rennie Street (Northern) - AM Peak - Future (Site Folder: Future - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Northern) - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	227	1.4	227	1.4	0.143	4.2	LOS A	0.0	0.0	0.00	0.54	0.00	54.1
26	R2	All MCs	46	0.0	46	0.0	0.143	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			274	1.2	274	1.2	0.143	4.4	NA	0.0	0.0	0.00	0.54	0.00	54.0
NorthWest: Site Access															
27	L2	All MCs	25	0.0	25	0.0	0.162	5.9	LOS A	0.6	4.4	0.43	0.66	0.43	50.8
29	R2	All MCs	88	13.1	88	13.1	0.162	9.2	LOS A	0.6	4.4	0.43	0.66	0.43	50.0
Approach			114	10.2	114	10.2	0.162	8.5	LOS A	0.6	4.4	0.43	0.66	0.43	50.2
SouthWest: Rennie Street (SW)															
30	L2	All MCs	124	13.6	124	13.6	0.132	5.7	LOS A	0.0	0.0	0.00	0.55	0.00	52.8
31	T1	All MCs	112	3.8	112	3.8	0.132	4.2	LOS A	0.0	0.0	0.00	0.55	0.00	53.7
Approach			236	8.9	236	8.9	0.132	5.0	NA	0.0	0.0	0.00	0.55	0.00	53.2
All Vehicles			623	5.7	623	5.7	0.162	5.4	NA	0.6	4.4	0.08	0.57	0.08	53.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Northern) - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	160	3.9	160	3.9	0.101	4.2	LOS A	0.0	0.0	0.00	0.54	0.00	54.0
26	R2	All MCs	32	0.0	32	0.0	0.101	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			192	3.3	192	3.3	0.101	4.4	NA	0.0	0.0	0.00	0.54	0.00	54.0
NorthWest: Site Access															
27	L2	All MCs	57	0.0	57	0.0	0.265	6.5	LOS A	1.0	7.7	0.51	0.73	0.52	50.4
29	R2	All MCs	126	11.7	126	11.7	0.265	10.2	LOS B	1.0	7.7	0.51	0.73	0.52	49.7
Approach			183	8.0	183	8.0	0.265	9.0	LOS A	1.0	7.7	0.51	0.73	0.52	49.9
SouthWest: Rennie Street (SW)															
30	L2	All MCs	134	11.0	134	11.0	0.203	5.7	LOS A	0.0	0.0	0.00	0.55	0.00	53.1
31	T1	All MCs	238	4.9	238	4.9	0.203	4.2	LOS A	0.0	0.0	0.00	0.55	0.00	53.8
Approach			372	7.1	372	7.1	0.203	4.8	NA	0.0	0.0	0.00	0.55	0.00	53.5
All Vehicles			746	6.3	746	6.3	0.265	5.7	NA	1.0	7.7	0.13	0.59	0.13	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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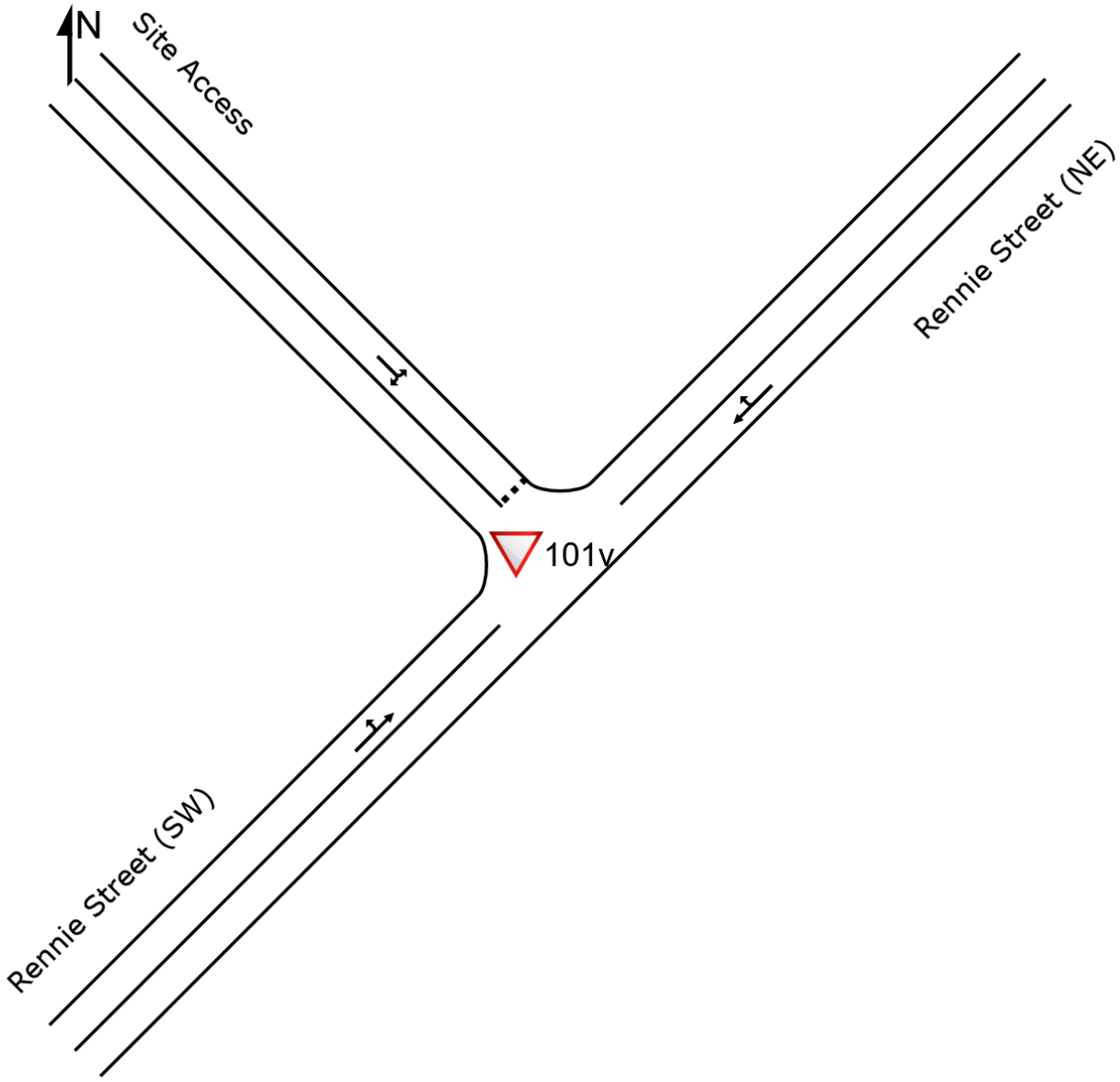
SITE LAYOUT

Site: 101v [Site Access / Rennie Street (Central) - AM Peak - Future (Site Folder: Future - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Central) - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	262	5.2	262	5.2	0.164	4.2	LOS A	0.0	0.0	0.00	0.54	0.00	54.0
26	R2	All MCs	46	0.0	46	0.0	0.164	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			308	4.4	308	4.4	0.164	4.4	NA	0.0	0.0	0.00	0.54	0.00	53.9
NorthWest: Site Access															
27	L2	All MCs	25	0.0	25	0.0	0.197	6.3	LOS A	0.7	5.2	0.54	0.75	0.54	49.8
29	R2	All MCs	88	13.1	88	13.1	0.197	11.0	LOS B	0.7	5.2	0.54	0.75	0.54	49.0
Approach			114	10.2	114	10.2	0.197	10.0	LOS A	0.7	5.2	0.54	0.75	0.54	49.2
SouthWest: Rennie Street (SW)															
30	L2	All MCs	124	13.6	124	13.6	0.187	5.7	LOS A	0.0	0.0	0.00	0.55	0.00	52.9
31	T1	All MCs	209	9.5	209	9.5	0.187	4.3	LOS A	0.0	0.0	0.00	0.55	0.00	53.6
Approach			334	11.0	334	11.0	0.187	4.8	NA	0.0	0.0	0.00	0.55	0.00	53.3
All Vehicles			756	8.2	756	8.2	0.197	5.4	NA	0.7	5.2	0.08	0.58	0.08	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Central) - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	244	7.8	244	7.8	0.149	4.2	LOS A	0.0	0.0	0.00	0.54	0.00	53.9
26	R2	All MCs	32	0.0	32	0.0	0.149	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			276	6.9	276	6.9	0.149	4.4	NA	0.0	0.0	0.00	0.54	0.00	53.9
NorthWest: Site Access															
27	L2	All MCs	39	0.0	39	0.0	0.281	7.3	LOS A	1.1	8.3	0.60	0.85	0.70	48.6
29	R2	All MCs	104	14.1	104	14.1	0.281	13.4	LOS B	1.1	8.3	0.60	0.85	0.70	47.8
Approach			143	10.3	143	10.3	0.281	11.7	LOS B	1.1	8.3	0.60	0.85	0.70	48.0
SouthWest: Rennie Street (SW)															
30	L2	All MCs	111	13.3	111	13.3	0.244	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	53.1
31	T1	All MCs	336	6.3	336	6.3	0.244	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.8
Approach			446	8.0	446	8.0	0.244	4.6	NA	0.0	0.0	0.00	0.54	0.00	53.6
All Vehicles			865	8.0	865	8.0	0.281	5.7	NA	1.1	8.3	0.10	0.59	0.12	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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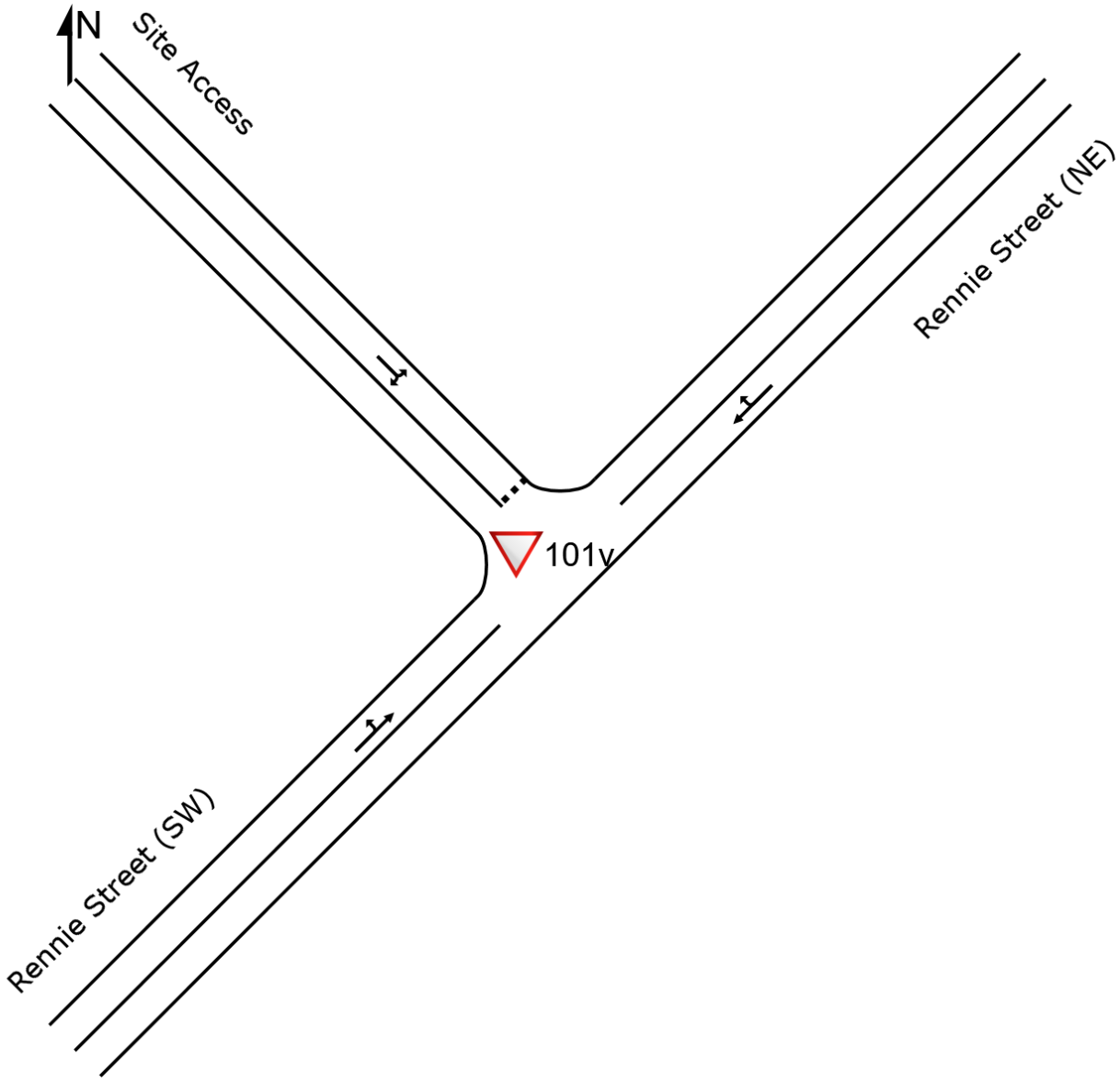
SITE LAYOUT

Site: 101v [Site Access / Rennie Street (Southern) - AM Peak - Future (Site Folder: Future - AM Peak)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Southern) - AM Peak - Future (Site Folder: Future - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	304	8.3	304	8.3	0.189	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.9
26	R2	All MCs	46	0.0	46	0.0	0.189	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			351	7.2	351	7.2	0.189	4.4	NA	0.0	0.0	0.00	0.54	0.00	53.8
NorthWest: Site Access															
27	L2	All MCs	25	0.0	25	0.0	0.250	7.1	LOS A	0.9	6.8	0.62	0.86	0.68	48.1
29	R2	All MCs	88	13.1	88	13.1	0.250	14.0	LOS B	0.9	6.8	0.62	0.86	0.68	47.4
Approach			114	10.2	114	10.2	0.250	12.5	LOS B	0.9	6.8	0.62	0.86	0.68	47.6
SouthWest: Rennie Street (SW)															
30	L2	All MCs	124	13.6	124	13.6	0.244	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	53.0
31	T1	All MCs	308	11.9	308	11.9	0.244	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.6
Approach			433	12.4	433	12.4	0.244	4.7	NA	0.0	0.0	0.00	0.54	0.00	53.4
All Vehicles			897	10.1	897	10.1	0.250	5.6	NA	0.9	6.8	0.08	0.58	0.09	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [Site Access / Rennie Street (Southern) - PM Peak - Future (Site Folder: Future - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Rennie Street (NE)															
25	T1	All MCs	316	10.3	316	10.3	0.190	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.8
26	R2	All MCs	32	0.0	32	0.0	0.190	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.5
Approach			347	9.4	347	9.4	0.190	4.4	NA	0.0	0.0	0.00	0.54	0.00	53.8
NorthWest: Site Access															
27	L2	All MCs	39	0.0	39	0.0	0.362	8.6	LOS A	1.4	11.0	0.70	0.95	0.92	46.4
29	R2	All MCs	104	14.1	104	14.1	0.362	17.8	LOS C	1.4	11.0	0.70	0.95	0.92	45.7
Approach			143	10.3	143	10.3	0.362	15.3	LOS C	1.4	11.0	0.70	0.95	0.92	45.9
SouthWest: Rennie Street (SW)															
30	L2	All MCs	111	13.3	111	13.3	0.286	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	53.1
31	T1	All MCs	407	8.5	407	8.5	0.286	4.3	LOS A	0.0	0.0	0.00	0.54	0.00	53.7
Approach			518	9.6	518	9.6	0.286	4.6	NA	0.0	0.0	0.00	0.54	0.00	53.6
All Vehicles			1008	9.6	1008	9.6	0.362	6.0	NA	1.4	11.0	0.10	0.60	0.13	52.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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