Technical Memorandum

To	Thomas Holmes, DPIE	**From**	Siavash Shahsavaripour, Cardno Karan Khanna, Cardno
Project	80018022 Glenfield Precinct TMAP	**Date**	04 June 2021
Subject	SIDRA Modelling Assessment – Base and Future Year Scenarios		

1 Introduction

The NSW Government, through the joint land use and transport infrastructure strategies (Our Greater Sydney 2056 – A Metropolis of Three Cities and Future Transport Strategy 2056) has identified urban renewal opportunities for the Glenfield Precinct (the Precinct). The NSW Government is seeking to create a vibrant, attractive and well-connected community in Glenfield.

The Department of Planning, Industry and Environment (DPIE) has commissioned Cardno to develop a Transport Management and Accessibility Plan (TMAP) to support and inform the future uplift for the Glenfield Precinct. It is anticipated that the Precinct will include up to 7500 new dwellings, 55,000m2 of commercial and retail floor space and two supermarkets. The Precinct will be accessible via two new roads adjoining the proposed extension of Cambridge Avenue.

1.1 Previous works

The traffic modelling works completed previously by Cardno for this project are listed below.

Transport Management and Accessibility Plan - Glenfield Precinct (November 2020)

The TMAP supports the Glenfield Precinct Plan by assessing the impacts to the transport network within and around the Precinct as a result of different development yield scenarios proposed over a 20-year timeframe. The TMAP identifies opportunities and further actions for improvements that balance local and community place needs with movement. This includes initiatives for new or adjusted services and infrastructure to reduce reliance on private vehicles and encourage people to use alternative transport modes such as walking, cycling and public transport. This will help manage travel demand and performance of the transport network, and future-proof travel capacity to and from the Precinct as it develops.

Target Mode Share Technical Memorandum (May 2021)

The Target Mode Share tech memo establishes realistic mode share targets for the Glenfield Precinct by using 2018/19 Household Travel Survey data obtained from comparable sites. The assessment considered survey results from a range of local government areas including Campbelltown, Sutherland – Menai – Heathcote, Penrith, Ku-ring-gai and Blacktown.

Glenfield Precinct Trip Generation Assumptions (May 2021)

This tech memo estimates the total traffic generated by the Precinct based on the proposed number of dwellings and land uses. References to previous trip generation surveys and comparable sites were used to establish acceptable trip generation rates for the Precinct. Land uses considered in the assessment included dwellings (low, medium and high density), office, commercial, retail, schools and supermarkets.

Glenfield Internal Access Road Options Assessment (May 2021)

This tech memo assessed the two proposed internal access layouts provided by DPIE. Consideration was made to the impacts on traffic distribution, safety, active transport users, public transport, heavy vehicles, cars and parking associated with the proposed internal layouts.

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1.2 This memorandum

DPIE commissioned Cardno to:

- Review the existing traffic and transport conditions and identify areas of concern
- Undertake intersection modelling using SIDRA to replicate existing traffic conditions
- Estimate future year traffic demands for 2036 using strategic model outputs provided by TfNSW
- Develop future year traffic models to assess the performance of key intersections after the development of the Precinct.

This tech memo summarises the calibration and validation of the base models, as well as presenting the future year 2036 intersection performance, 10 years after the opening of the Precinct.

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2 Existing conditions

This section describes the existing traffic conditions in the study area, including road conditions, surveyed traffic volumes and queues, and congestion locations.

2.1 Study area

Three existing intersections located in the study area will provide access to the Precinct and have been assessed as part of this study. **Figure 2-1** shows the study area and modelled intersections for the Glenfield Precinct study, along with the control type for each modelled intersection.

Cambridge Avenue is proposed to be extended up to Campbelltown Road before the opening of the Glenfield Precinct. The Precinct is proposed to have two access points along the proposed extension, with the western access connecting near the existing Roy Watts Road and the eastern access connecting to the Glenfield Road / Access Road roundabout. The performance of these two access intersections has been assessed as part of the Glenfield Precinct TMAP to ensure satisfactory operation in 2036. As these two intersections do not currently exist, an existing year calibration and validation of these two intersections was not possible.

The two Precinct accesses are shown as intersections **4** and **5** in **Figure 2-1** below along with the proposed Cambridge Avenue extension.

Figure 2-1 Glenfield Precinct Study area

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The name and control type of the modelled intersections highlighted in **Figure 2-1** are as follows:

1. **Campbelltown Road / Beech Road / Access Road**: Signalised intersection
2. **Glenfield Road / Access Road**: Roundabout
3. **Canterbury Road / Railway Parade / Cambridge Avenue / Glenfield Road**: Roundabout
4. **Cambridge Avenue / Eastern Access (Proposed)**: Signalised intersection
5. **Cambridge Avenue / Western Access (Proposed)**: Signalised intersection

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2.2 Speed limits

Table 2-1 and **Figure 2-2** show the existing speed limits on the approaches to the three intersections.

Table 2-1 Speed restrictions

Intersection name	Approach	Road name	Speed restriction
Campbelltown Road / Beech Road	NE	Campbelltown Road	80km/h
	SE	Access road	50km/h
	SW	Campbelltown Road	80km/h
	NW	Beech Road	50km/h
Glenfield Road / access road	N	Glenfield Road	60km/h
	E	Glenfield Road	50km/h
	S	Access road	40km/h between 8:00am-9:30am and 2:30pm-4:00pm on school days 60km/h at other times
	W	Access road	50km/h
Canterbury Rd / Railway Parade / Cambridge Avenue	N	Railway Parade	60km/h
	E	Cambridge Avenue	60km/h
	S	Cambridge Avenue	60km/h
	W	Cambridge Avenue	60km/h

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Figure 2-2 Speed limits

2.3 Public transport

Several bus services travel through the Glenfield Road / access road and Canterbury Rd / Railway Parade / Cambridge Avenue intersections. **Table 2-2** lists the bus routes that travel through these intersections.

Table 2-2 Bus services

Route number	Route name
864	Carnes Hill to Glenfield
867	Prestons to Glenfield
870	Campbelltown to Liverpool
871	Campbelltown to Liverpool
872	Campbelltown to Liverpool

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2.4 Traffic data

2.4.1 Classified intersection counts

Classified intersection counts (CICs) record the vehicle turning movements at an intersection. These counts are used in the development of the Base Models to ensure that the modelled volumes are realistic.

CICs were conducted on the weekdays from Tuesday 28th May to Monday 3rd June 2019. All CICs were recorded on days where the weather was fine. The surveys were conducted for the following intersections:

- Campbelltown Road / Beech Road
- Glenfield Road / access road
- Canterbury Road / Railway Parade / Cambridge Avenue

The surveys were conducted for the AM and PM peak periods for the weekday. The surveyed periods were:

- Weekday AM peak period – 6:00am to 10:00am
- Weekday PM peak period – 3:00pm to 7:00pm

The CIC surveys captured the number of light vehicles and heavy vehicles performing each manoeuvre at the intersections in 15-minute intervals.

2.4.2 Queue length surveys

Queue length surveys capture the maximum queue lengths that form at an approach to an intersection within a defined time period. The *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013) specifies that data used for validation of the base model must be independent of data used in model calibration. The queue length surveys provide a dataset separate to the CICs which are used for base model validation.

Video footage of queue lengths was collected at the same time and location as the CICs, on the weekdays from Tuesday 28th May to Monday 3rd June 2019. The queue length survey periods covered the following times:

- Weekday AM peak period – 6:45am to 8:45am
- Weekday PM peak period – 3:30pm to 5:30pm

The queue lengths captured were the maximum queues that occurred in five-minute intervals within the peak periods.

2.5 Traffic profile

Traffic counts from the CICs were used to determine the AM and PM peak hours to be replicated in the base model. The AM and PM peak hours were determined by first determining the day with the highest total traffic volume across all three intersections, which was the peak day.

Total weekday traffic volume across the surveyed intersections ranged between 45,419 and 47,970 vehicles per day. Based on the daily traffic profile, the peak day is Wednesday, 29th May 2019. The daily traffic profile is shown in **Figure 2-3**, with the peak day highlighted in orange.

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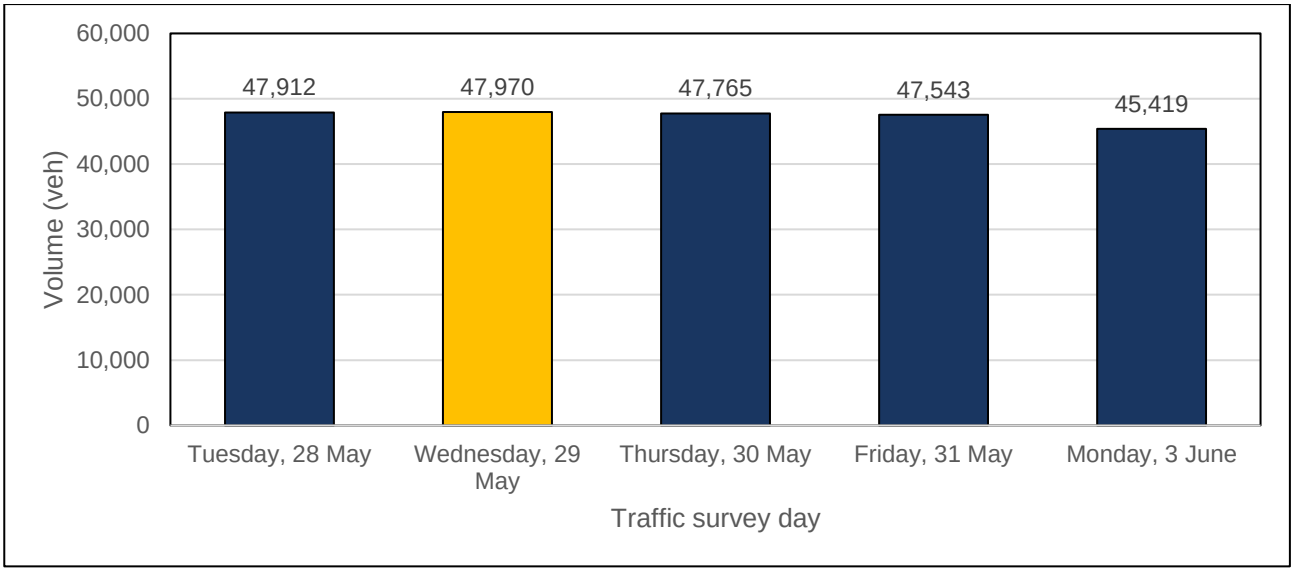

Figure 2-3 Daily traffic profile

The AM and PM peak hours are defined as the one-hour period on the peak day with the highest hourly traffic volumes across all three intersections.

On the peak day, total traffic volume across the surveyed intersections ranged between 3,776 vehicles and 7,191 vehicles per hour. Based on the traffic profile, the peak hours are:

- AM peak hour – total of 6,977 vehicles between 7:15am and 8:15am
- PM peak hour – total of 7,191 vehicles between 4:15pm and 5:15pm

Figure 2-4 shows the AM traffic profile and **Figure 2-5** shows the PM traffic profile, with the peak hour of each period highlighted in orange.

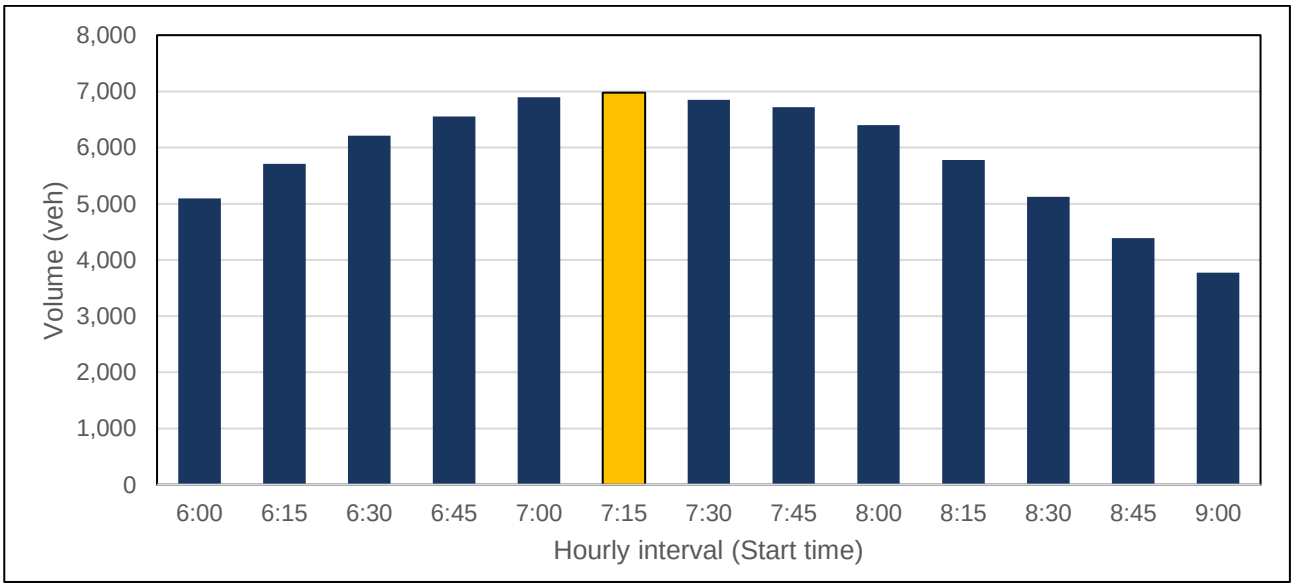

Figure 2-4 AM traffic profile per hourly interval

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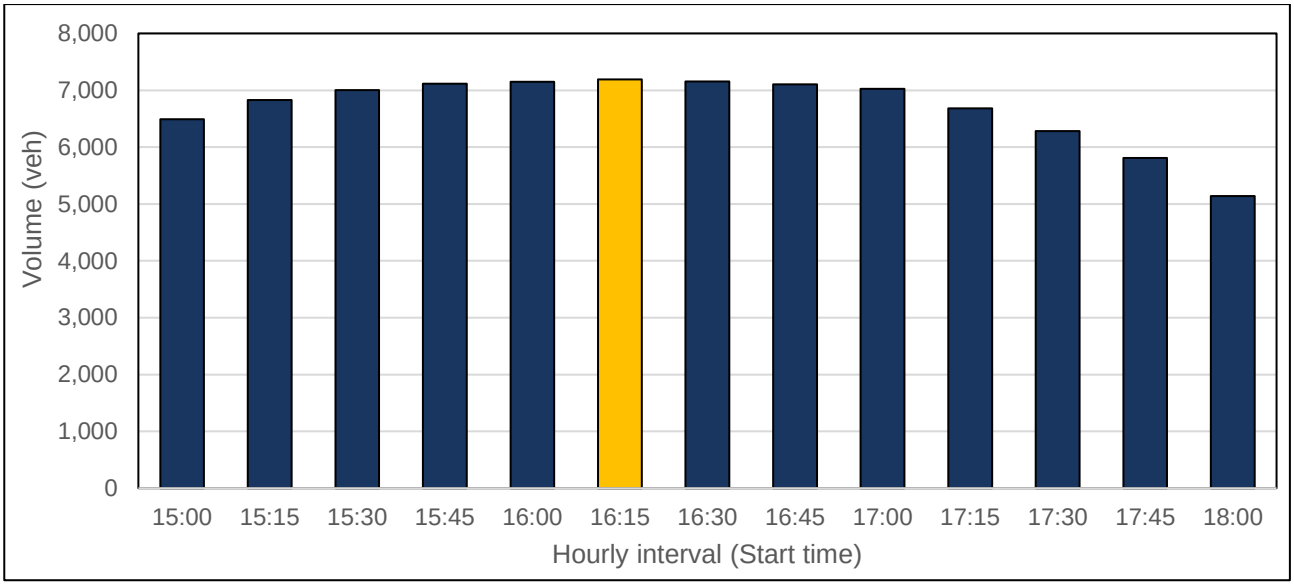

Figure 2-5 PM traffic profile per hourly interval

2.6 Queue lengths

The longest queue length at the Campbelltown Road / Beech Road intersection was 19 vehicles on the Beech Road approach in the PM. The queue remained relatively low, and did not impact the roundabout located upstream. Queues on Campbelltown road were also low, no more than 9 vehicles long

The longest queue on the Glenfield Road / Access Road intersection was 18 vehicles on the northern approach during the AM, and the longest queue on the Canterbury Road / Railway Parade / Cambridge Avenue intersection was 12 vehicles on the Canterbury Road approach in the AM. The queue lengths at these intersections were low, and did not impact surrounding intersections or property accesses.

The observed queue lengths indicate that congestion is not high at the three surveyed intersections, and is similar between the AM and PM peaks.

The maximum observed queue lengths for each studied intersection are shown in **Figure 2-6.**

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Figure 2-6 Maximum observed queue lengths

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3 Model development

3.1 Assumptions

During the development of the Base Models, assumptions about the software package, vehicle and network parameters and network coding have been made. These assumptions are documented in this section.

3.1.1 Software package

The traffic modelling software used in this study was SIDRA Intersection 9 (Version 9.0.1.9664).

3.1.2 Model inputs

The Base Models depended on a number of inputs to inform the model development, including:

- Classified intersection counts
- Queue length surveys
- Aerial photography.

3.1.3 Vehicle types

Two vehicle types were used in the models – light and heavy vehicles. The default SIDRA parameters for all vehicle types were adopted.

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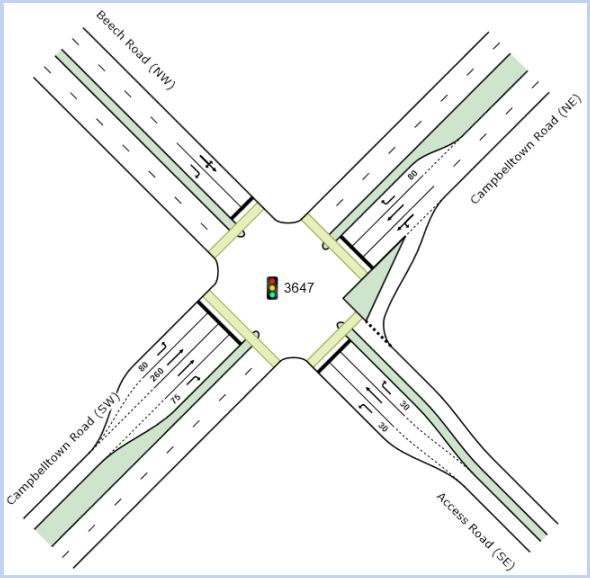
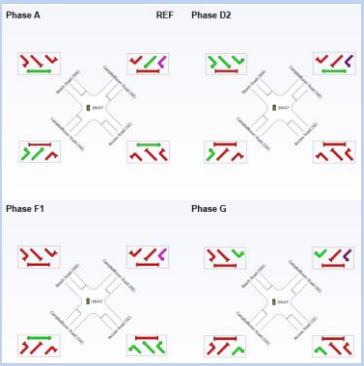
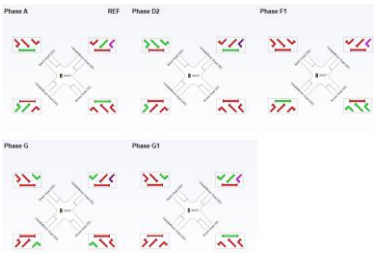
3.2 Intersection layouts

3.2.1 Campbelltown Road / Beech Road

Table 3-1 shows the base model intersection layout and signal phasing for the existing Campbelltown Road / Beech Road intersection.

Table 3-1 Campbelltown Road / Beech Road intersection layout and signal phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM Peak			150
PM Peak			150

Only the right lane at the Beech Road (NW) approach to the intersection is marked as a right-turn lane. The left lane includes no markings and drivers were observed to be using both lanes on the approach to turn right. Both lanes were coded to allow right turns in the Base Models.

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SCATS Data

Figure 3-1 shows the signal phases of the intersection obtained from SCATS. In both the AM and PM peak hours, demand on the access road approach to the intersection road was close to zero, and it was observed that the D2 phase ran over the D or D1 phases in most instances. The F1 phase was added and coded with a phase frequency of 10 per cent and a phase time of 11 seconds in both peaks. This was done to replicate the minimal time these movements were observed to run while also satisfying the minimum 6 second green time required for the pedestrian movements crossing Campbelltown Road.

In the PM peak hour, it was observed that low demand for the right turn movements off Campbelltown Road resulted in the G1 phase being called over the G phase in most instances. The G phase was coded with a phase frequency of 10 per cent to replicate the low call frequency for this phase.

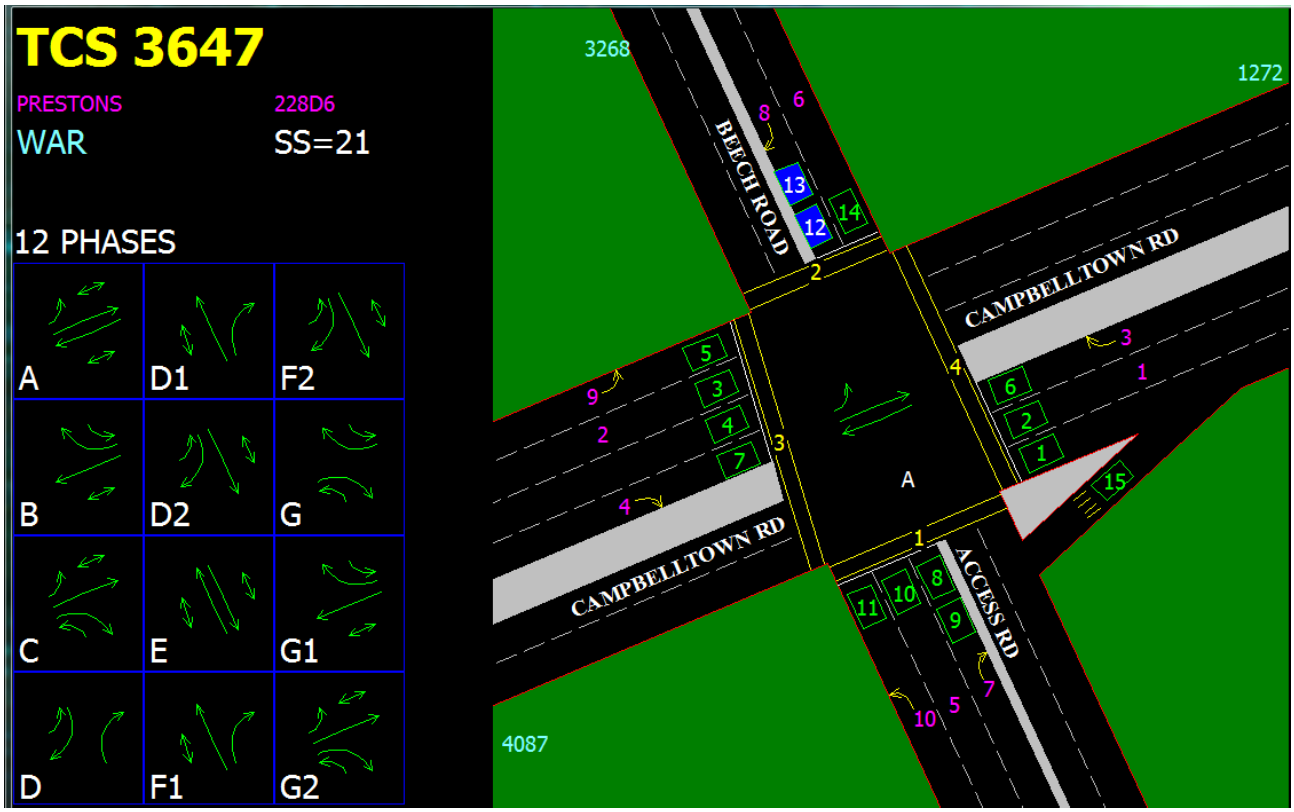

Figure 3-1 Signal phases of Campbelltown Road / Beech Road intersection

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3.2.2 Glenfield Road / Access Road

Figure 3-2 shows the base model intersection layout for the Glenfield Road / Access Road intersection.

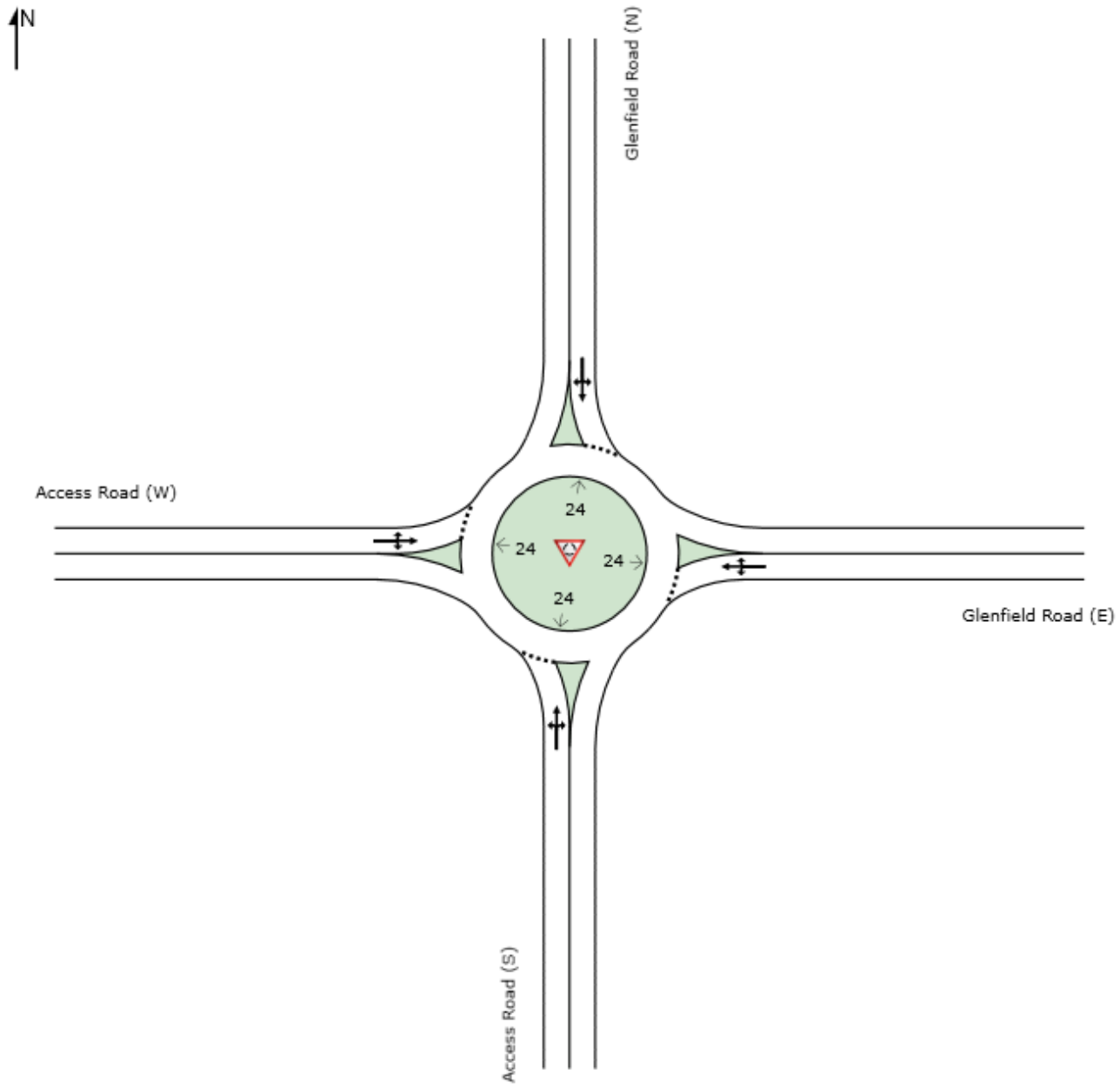

Figure 3-2 Glenfield Road / access road base model layout

The school zone on the southern approach to the intersection is active between 2:30pm-4:00pm, which is outside of the modelled PM peak hour of 4:15pm-5:15pm by 15 minutes. In the Base Model, the speed limit on the southern approach to the intersection was set to 60 kilometres per hour for the whole modelled hour.

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3.2.3 Canterbury Road / Railway Parade / Cambridge Avenue

Figure 3-3 shows the base model intersection layout for the Canterbury Road / Railway Parade / Cambridge Avenue intersection.

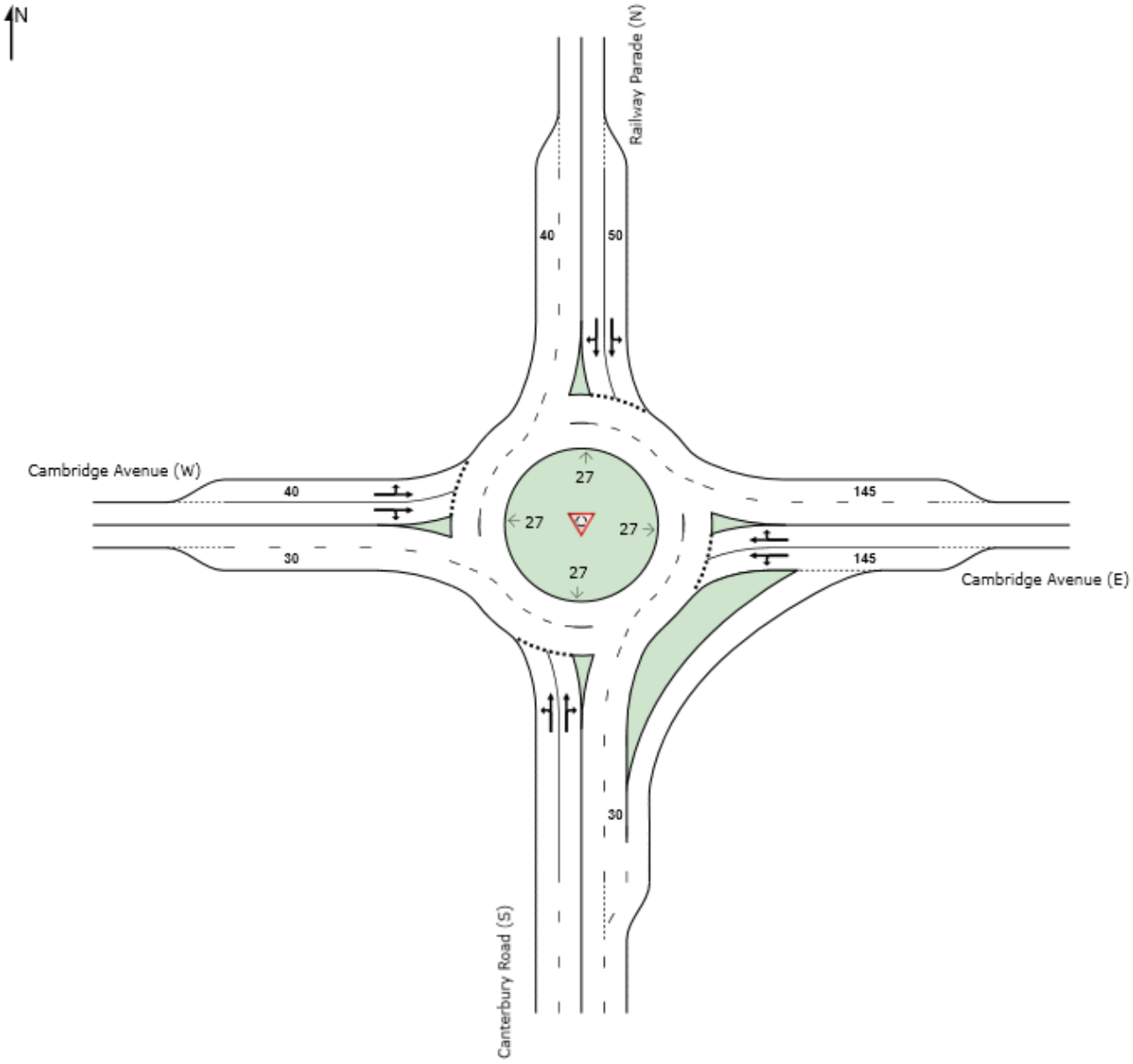

Figure 3-3 Canterbury Road / Railway Parade / Cambridge Avenue base model layout

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3.3 Base Model calibration and validation results

3.3.1 Calibration results

The Base Models were calibrated in accordance with the *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013). The models were coded based on high-quality recent aerial photography from *NearMap* and each intersection layout accurately represents the existing configuration. The base model calibration considered many factors, such as lane widths, lane movements, speed limits, signal coding and priority rules.

The models were also calibrated to closely match the existing turning volume counts obtained from the CIC surveys discussed in **Section 2.4**. **Figure 3-4** and **Figure 3-5** show a comparison between the surveyed turning counts and the modelled survey counts for all intersections in the AM peak and PM peak, respectively.

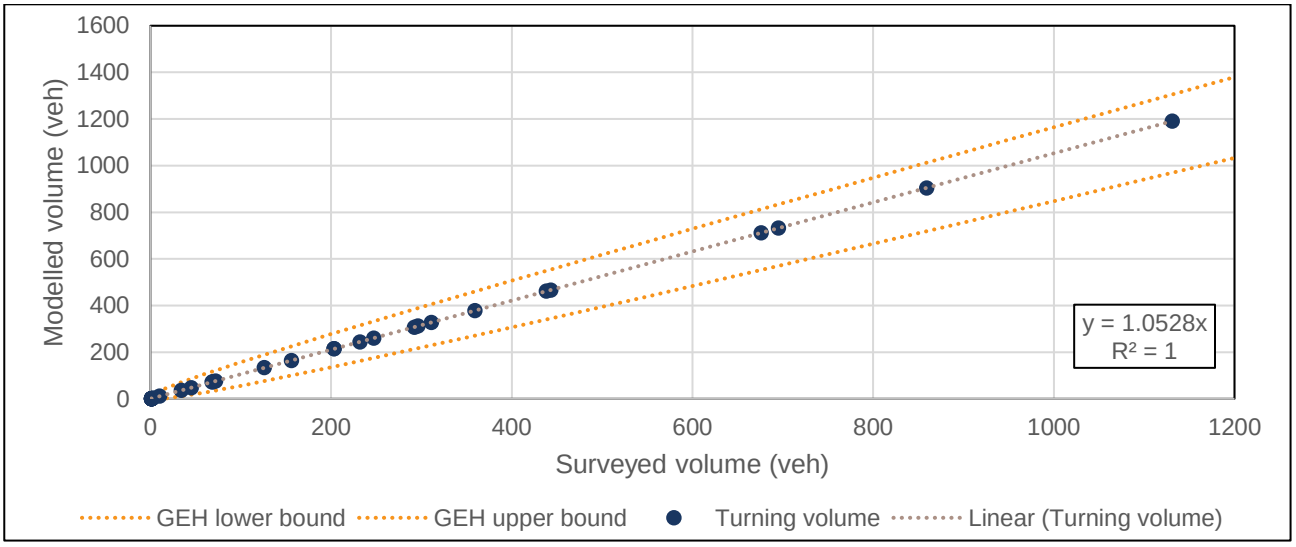

Figure 3-4 AM peak calibration results for all intersections

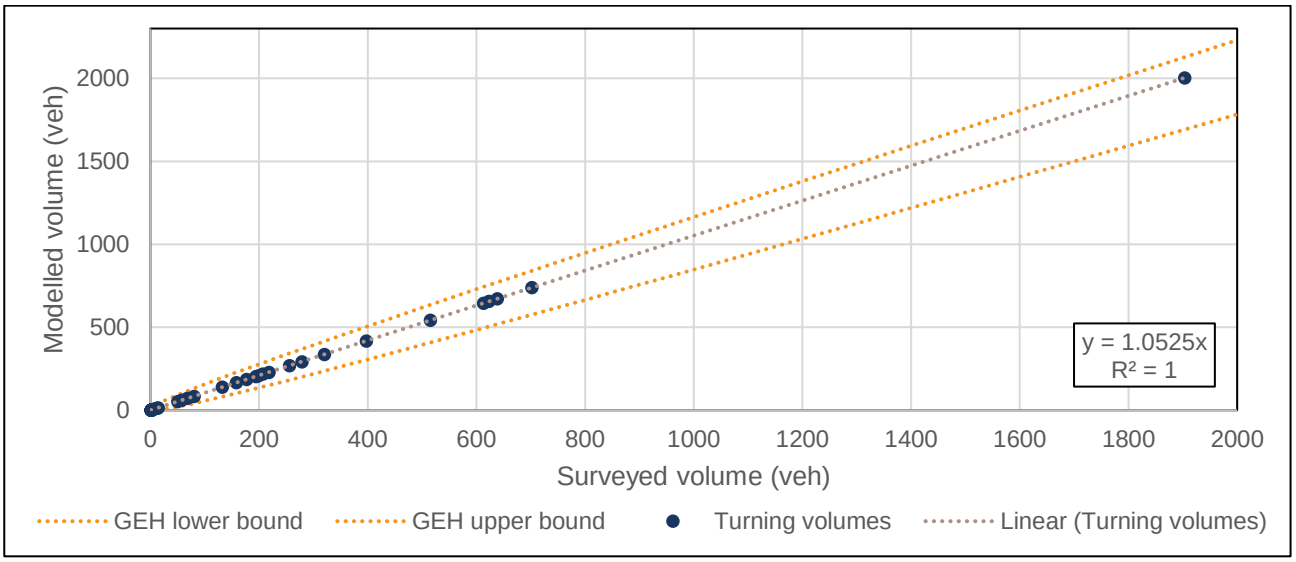

Figure 3-5 PM peak calibration results for all intersections

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3.3.2 Validation results

The default SIDRA values were used for all parameters as a starting point in the Base Models. The parameters for roundabouts were calibrated to local traffic behaviours using the Environment Factor at the Glenfield Road / Access Road and Canterbury Road / Railway Parade / Glenfield Road / Cambridge Avenue intersections as allowed for in the *RMS Traffic Modelling Guidelines* (2013). This factor is used to calibrate the SIDRA roundabout capacity depending on the environment. It represents a range of real-world factors including visibility, grades, operating speeds, driver aggressiveness, driver response time and pedestrians. The roundabout capacity increases with a decreasing value of the environment factor.

The Base Models were validated by comparing observed maximum queue lengths to the 95th percentile queue lengths produced by the model. A comparison between the observed queues and the modelled queues are shown in **Table 3-2**.

Table 3-2 Queue validation results

Intersection	Approach		AM		PM	
			Observed	Modelled	Observed	Modelled
Campbelltown Road / Beech Road	SE	Access road	0	0	0	0
	NE	Campbelltown Road	7	8	6	5
	NW	Beech Road	9	11	19	22
	SW	Campbelltown Road	9	13	6	8
Glenfield Road / access road	S	Access road	13	12	12	12
	E	Glenfield Road	15	15	15	14
	N	Glenfield Road	18	17	9	9
	W	Access road	0	0	0	0
Canterbury Road / Railway Parade / Cambridge Avenue	S	Canterbury Road	12	11	10	8
	E	Cambridge Avenue	1	1	10	10
	N	Railway Parade	5	3	4	3
	W	Cambridge Avenue	6	6	6	6

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4 Future Model development

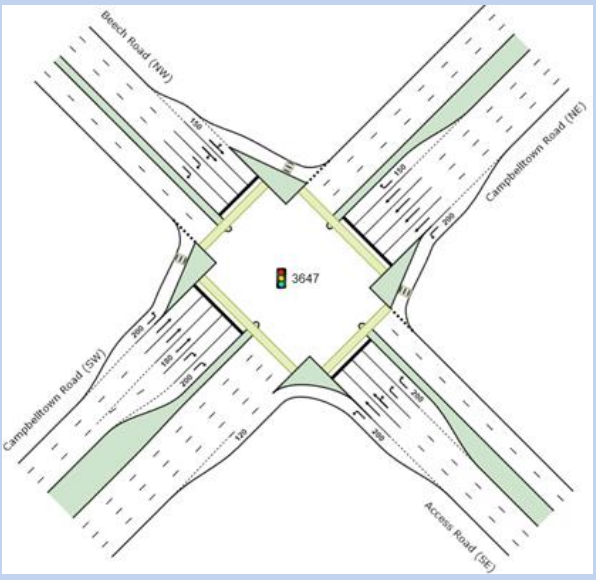
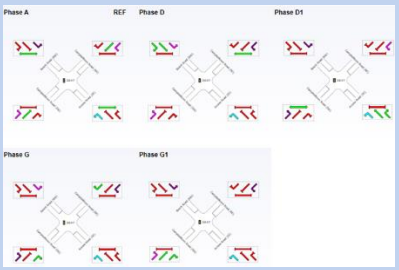
4.1 Future intersection layouts

4.1.1 Campbelltown Road / Beech Road / Access Road

It is understood that TfNSW have plans to upgrade the two boundary intersections within the study area – Campbelltown Road / Beech Road / Access Road to the west and Canterbury Road / Cambridge Avenue / Railway Parade / Glenfield Road to the east. The intersection layouts modelled in SIDRA for these two intersections are conceptual designs only and subject to further detailed design as part of the future stages of planning for Cambridge Avenue.

The intersection layout and signal phasing adopted for the Campbelltown Road / Beech Road / Access Road is shown in **Table 4-1**.

Table 4-1 Campbelltown Road / Beech Road / Access Road future modelled layout and signal phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM Peak			150
PM Peak			150

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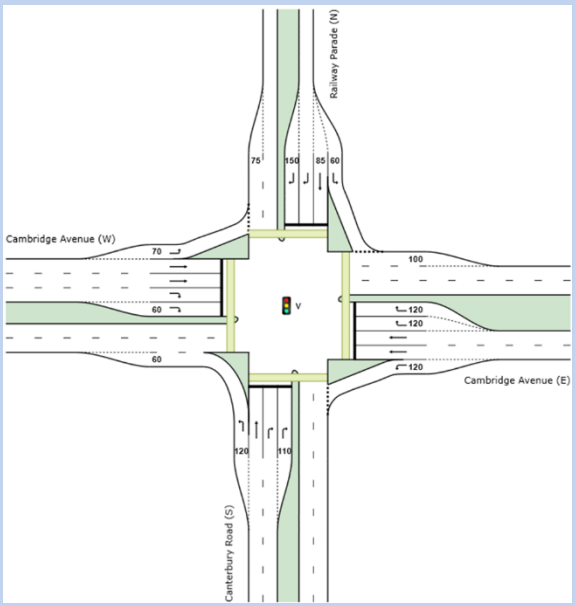
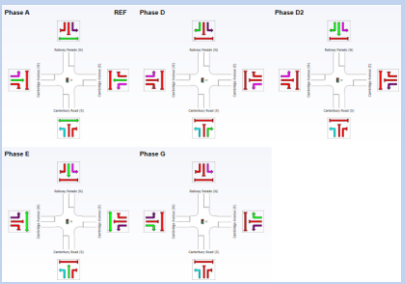
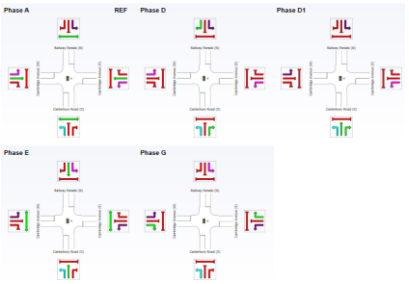
4.1.2 Canterbury Avenue / Cambridge Avenue / Railway Parade

As discussed in **Section 4.2.1**, the intersection layout used to model the Canterbury Avenue / Cambridge Avenue / Railway Parade intersection is a conceptual design, with further detailed design to be undertaken by TfNSW in future. The signal phasing adopted for the intersection is shown in **Table 4-2**, with a cycle time of 150 seconds used to align with the existing cycle time at Campbelltown Road / Beech Road / Access Road.

Table 4-2 Canterbury Road / Cambridge Avenue / Railway Parade future modelled intersection layout and signal phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM Peak			150
PM Peak			150

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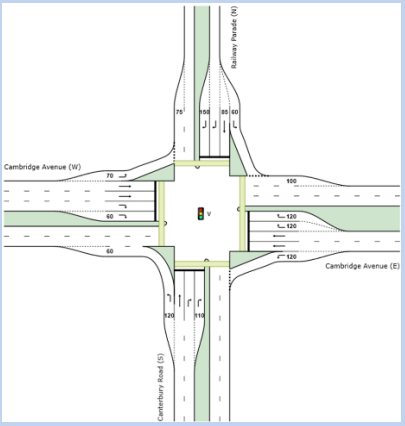
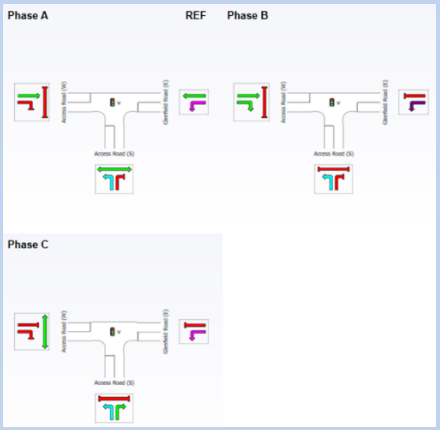
4.1.3 Glenfield Road / Access Road

The Glenfield Road / Access Road intersection will be required to be upgraded from its existing roundabout configuration to a signalised intersection. The upgraded intersection will have three approaches, with the existing northern connection to the Glenfield Road bridge removed and the western leg adjoining the future Western Access Intersection. The intersection layout modelled in SIDRA to represent this intersection and the signal coding used in each peak is shown in **Table 4-3**. The cycle time used at this intersection was 150 seconds in both peaks in order to keep coordination with the traffic signals at Campbelltown Road / Beech Road / Access Road.

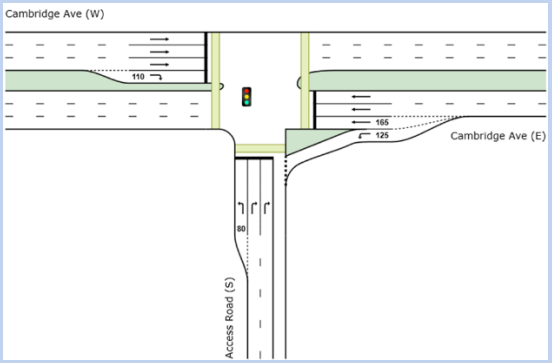
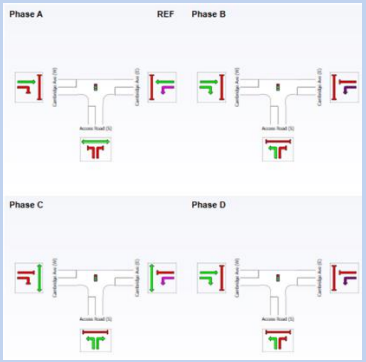
Table 4-3 Glenfield Road / Access Road future intersection layout and phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM & PM Peaks			150

4.1.4 Eastern Access Intersection

The Eastern Access Intersection is proposed to be a signalised intersection that allows all movements between the Access Road and Cambridge Avenue. The intersection layout and signal phasing modelled in SIDRA to represent this intersection is shown in **Table 4-4**.

Table 4-4 Eastern Access intersection layout and phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM & PM Peaks			150

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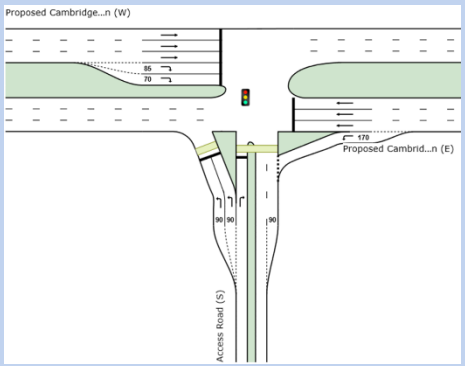
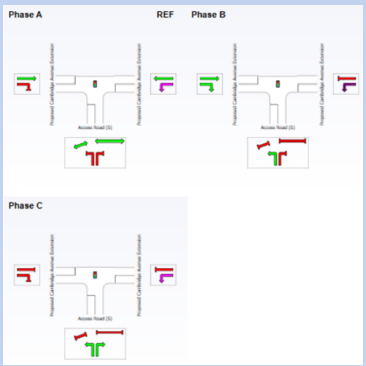
4.1.5 Western Access Intersection

The Western Access Intersection is proposed to be a signalised intersection that allows all movements between the Access Road and Cambridge Avenue. The intersection layout and signal phasing modelled in SIDRA to represent this intersection is shown in **Table 4-5**.

Table 4-5 Western Access intersection layout and phasing

Time Period	Layout	Signal Phasing	Cycle Time (s)
AM & PM Peaks			150

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4.2 Future demand development

The future traffic demand for each movement was estimated using outputs from the Sydney Traffic Forecasting Model (STFM). The STFM forecasts the traffic demand in five-yearly intervals from the latest Census (2016) to a 30-year horizon. For this study, STFM link flow volumes from 2019 and 2036 were used along the following roads:

- Beech Road
- Campbelltown Road
- Cambridge Avenue (proposed extension)
- Cambridge Avenue
- Glenfield Road
- Canterbury Road
- Railway Parade.

The 2036 STFM model outputs includes forecasts for the traffic generated by the Glenfield Precinct. The 2019 link flow volumes were subtracted from the 2036 traffic volumes to establish the growth predicted by the STFM. The growth from the link flow volumes at the three existing intersections was applied proportionally to each turning movement based on the surveyed traffic volumes from May 2019. The 2036 intersection volumes to be used in SIDRA were obtained by adding the STFM growth to the traffic volumes used in the calibrated 2019 Base Models. Traffic volumes at the future intersections were estimated based on the traffic volume distribution at each approach in the 2036 STFM model outputs.

Figure 4-1 shows the Glenfield Precinct corridor area from the 2036 STFM, with the 2019 STFM model of the corridor shown in the smaller window.

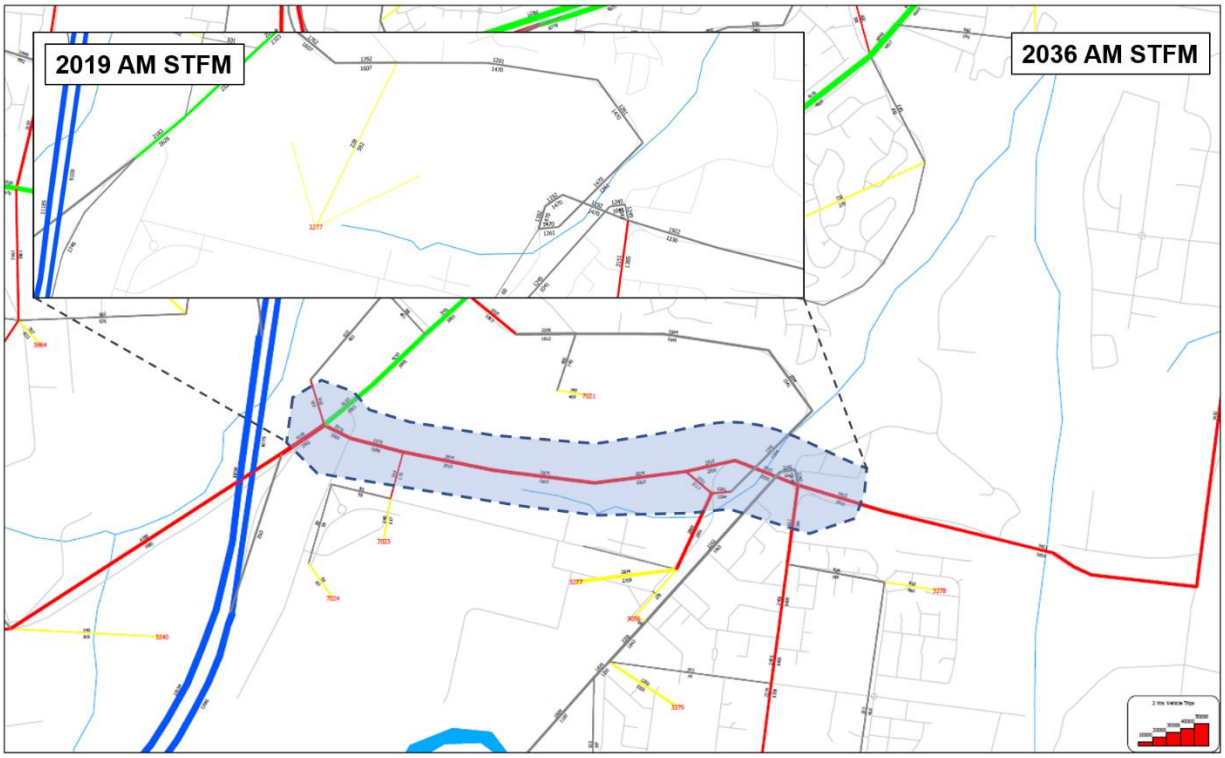

Figure 4-1 STFM model network for the Glenfield area

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The procedure to generate the future-year demands is outlined below:

1. Calculate the STFM growth rate for each approach from 2019-2036
2. Adopt the STFM traffic distribution for any intersections or approaches that don't exist in 2019
3. Assume no growth reduction on any approach (*i.e.* set negative growth to zero)
4. Disaggregate the growth by vehicle type and turn movement based on the proportions on each existing turn from the CICs
5. Apply the growth to the 2019 volumes.

Table 4-6 summarises the future demands for vehicles that enter into the Glenfield Precinct corridor.

Table 4-6 Future traffic demand summary

Intersection	**2019 AM volume** (veh)	**2036 AM volume** (veh)	**2019 PM volume** (veh)	**2036 PM volume** (veh)
Traffic volume through the Study Area	10,803	21,017	11,069	22,158

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5 Operational performance assessment

This section outlines the performance criteria and results for the assessment of the three existing and five future Glenfield Precinct intersections.

5.1 Performance criteria

Intersection performance is assessed based on the following performance metrics:

- **Degree of saturation (DOS)**: The ratio of demand relative to the capacity of an intersection
- **Delay time**: Delay experienced by vehicles at the intersection
- **Level of service (LOS)**: An intersection performance measure that is based on the delay per vehicle
- **Queue length**: The 95th percentile queue length per approach.

5.1.1 Degree of saturation

Table 5-1 shows the degree of saturation thresholds adopted for intersections in NSW from *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013). Where the threshold of an intersection is exceeded, intersection treatment is required to attain an acceptable degree of saturation.

Table 5-1 Degree of saturation thresholds

Intersection treatment	Saturation threshold
Signals	Less than 0.90
Roundabout	Less than 0.85
Priority controlled	Less than 0.80

Source: Traffic Modelling Guidelines (Roads and Maritime Services, 2013)

5.1.2 Delay time and level of service

Table 5-2 shows the level of service categories used in NSW from *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013). For signalised intersections, level of service is based on the weighted average delay of all approaches. For unsignalised intersections including roundabouts, level of service is based on the maximum delay across all approaches.

LOS D was considered to be the acceptable limit for intersection operation in this study.

Table 5-2 Level of service criteria for intersections

Level of service	Description	Critical delay
A	Good operation	Less than 14 seconds
B	Good with acceptable delays and spare capacity	15 – 28 seconds
C	Satisfactory operation	29 – 42 seconds
D	Near capacity	43 – 56 seconds
E	At capacity	57 – 70 seconds
F	Capacity exceeded	Greater than 70 seconds

Source: Traffic Modelling Guidelines (Roads and Maritime Services, 2013)

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5.1.3 Queue length

The 95th percentile queue is commonly reported from SIDRA which represents the queue length for which five per cent of queues were longer and 95 per cent of queues were shorter. This provides an indication of the maximum queue length while accounting for abnormally long queues that only occur briefly. From a network perspective, excessive queue lengths have the potential to impact on the performance of adjacent intersections and local accesses and need to be considered in the performance analysis.

5.2 Base Model performance

The model performance for the three Base Model intersections is summarized in **Table 5-3**. Full SIDRA results outputs are provided in **Appendix A**. The Base Model performance results indicate that:

- The LoS results are satisfactory in the Base Models, with LoS C or better achieved in all peaks.
- The intersection of Glenfield Road / Access Road is over capacity in both peaks, with the Degree of Saturation exceeding the recommended value of 0.85 for roundabouts. This intersection requires an upgrade to cater for the existing traffic volumes.
- The queue lengths at all three intersections do not impact the performance of nearby intersections, with the longest queue modelled as 22 vehicles at the Beech Road approach of the signalised intersection of Campbelltown Road / Beech Road.

Table 5-3 Base Model performance summary

Intersection	Peak	Volume (veh)	DOS	Delay (s)	LOS	Queue length (veh)
Campbelltown Road / Beech Road / Access Road	AM Peak	2715	0.602	16	B	13
	PM Peak	3339	0.722	16.6	B	22
Glenfield Road / Access Road	AM Peak	2104	0.887	37.7	C	17
	PM Peak	1696	0.856	39.3	C	14
Canterbury Road / Railway Parade / Cambridge Avenue	AM Peak	2529	0.798	20.3	B	11
	PM Peak	2537	0.831	29.9	C	10

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5.3 Future Model performance

The Future Model assessment includes the three existing intersections assessed in the Base Model scenario and the two proposed Glenfield Precinct accesses. Full SIDRA results outputs are provided in **Appendix A**. **Table 5-4** shows the Future Model performance results, which indicate that:

- The intersection of Campbelltown Road / Beech Road / Access Road operates at an acceptable level during both peak periods at an LoS of D. The DoS exceeds the recommended guideline of 0.9 in the PM peak and indicates that the intersection would have reached its capacity by 2036. The queue lengths reach a maximum of 56 vehicles during the PM peak at the Campbelltown Road (NE) approach, and does not impact any upstream intersections.
- The upgrade of Glenfield Road / Access Road to a signalised intersection produces favourable intersection performance results in 2036, with LoS B achieved in both peak periods and 95th percentile queues of 31 vehicles. The DoS remains below the recommended guideline of 0.9 for signalised intersections in both peak periods.
- The intersection of Canterbury Road / Campbelltown Road / Railway Parade performs at an acceptable LoS D in both peak periods in 2036, with queues of 33 vehicles. The DoS indicates that the intersection may need an upgrade in 2036, with results of 0.89 and 0.87 in the AM and PM peaks respectively.
- The Cambridge Avenue / Eastern Access intersection performs well in the AM peak, with delays of 28 seconds and queues of 28 vehicles. The PM peak performance is acceptable at LoS C and queues of up to 38 vehicles. The DoS is 0.884 in the PM peak, suggesting that the intersection is nearing capacity by 2036.
- The Cambridge Avenue / Western Access intersection performs excellently in both peaks, with LoS A achieved in both peaks and DoS of less than 0.5. Queues reach 13 vehicles in the AM peak and approach 19 vehicles in the PM peak.

Table 5-4 2036 intersection performance summary

Year	Peak	Volume (veh)	DOS	Delay (s)	LOS	Queue length (veh)
Campbelltown Road / Beech Road / Access Road	AM Peak	7371	0.80	42.8	D	33
	PM Peak	8541	0.98	49.5	D	56
Glenfield Road / Access Road	AM Peak	3506	0.85	25.8	B	28
	PM Peak	3924	0.80	25.6	B	31
Canterbury Road / Railway Parade / Cambridge Avenue	AM Peak	5462	0.89	48.3	D	32
	PM Peak	5946	0.88	52.9	D	33
Cambridge Avenue / Eastern Access	AM Peak	4332	0.76	28	B	28
	PM Peak	5043	0.88	39.2	C	38
Cambridge Avenue / Western Access	AM Peak	3468	0.38	9.6	A	13
	PM Peak	3698	0.45	11.3	A	19

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6 Conclusion

This memorandum has documented the traffic modelling process undertaken for the Glenfield Precinct and provided to DPIE.

Traffic survey data including intersection counts, queue length surveys and signal timing (SCATS) data was collated for the following three intersections:

- Campbelltown Road / Beech Road / Access Road
- Glenfield Road / Access Road
- Cambridge Avenue / Canterbury Road / Glenfield Road / Railway Parade.

The AM and PM peak hours were determined from the traffic counts and base year traffic models for each intersection were developed using SIDRA Intersection 9.

The calibration and validation processes were in accordance with *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013). There was an acceptable correlation between the surveyed and modelled queue lengths. The Base Models are considered to provide a realistic replication of existing conditions at this intersection and therefore fit for the purpose of assessing potential intersection treatment options.

The existing performance of the three intersection was assessed using the recommended metrics of degree of saturation, average delay, level of service and queue length in accordance with *Traffic Modelling Guidelines* Roads and Maritime Services, 2013). The Base Models indicated that:

- The three intersections are currently operating with acceptable levels of service in both peak periods
- The DoS at the Glenfield Road / Access Road roundabout is above the recommended values in both peak periods.

Future year demands for the forecast year of 2036 were developed based on strategic model outputs from the STFM and provided by TfNSW. Cardno established the expected growth from 2019 to 2036 from the STFM and applied this growth to the calibrated 2019 Base Models to create the 2036 Future Models. The 2036 SIDRA models were run and assessed for the three intersections, as well as two proposed intersections to be installed to provide access to the Glenfield Precinct from Cambridge Avenue.

Assessment of the intersection performance in the 2036 future year scenario indicates that all intersections will perform at an acceptable level, with LoS of C or better achieved at the Glenfield Precinct access intersections. The boundary intersections still perform acceptably at LoS D, but show signs of reaching capacity with high degree of saturation results.

The intersection layouts used for the Campbelltown Road / Beech Road / Access Road intersection and Canterbury Road / Cambridge Avenue / Railway Parade intersections are conceptual designs only, and will be further developed in later stages of the ongoing Cambridge Avenue planning studies. The high DoS and LoS results suggest that the designs considered in future studies may need to have more capacity than the conceptual layouts used in this assessment to cater for the expected future traffic demands.

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APPENDIX A

SIDRA MOVEMENT SUMMARIES

MOVEMENT SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM (Site Folder: Base)]

Base AM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access Road (SE)														
21	L2	1	0	1	0.0	0.017	83.0	LOS F	0.1	0.5	0.98	0.58	0.98	25.1
22	T1	1	0	1	0.0	0.040	86.3	LOS F	0.1	0.6	1.00	0.57	1.00	18.1
23	R2	1	0	1	0.0	0.043	91.2	LOS F	0.1	0.6	1.00	0.58	1.00	23.7
Approach		3	0	3	0.0	0.043	86.8	LOS F	0.1	0.6	0.99	0.58	0.99	22.4
NorthEast: Campbelltown Road (NE)														
24	L2	1	0	1	0.0	0.491	12.1	LOS A	7.9	60.9	0.20	0.19	0.20	57.3
25	T1	1131	126	1191	11.1	* 0.491	4.9	LOS A	8.4	64.5	0.21	0.19	0.21	72.3
26	R2	34	7	36	20.6	0.552	90.0	LOS F	2.8	23.0	1.00	0.74	1.05	19.1
Approach		1166	133	1227	11.4	0.552	7.4	LOS A	8.4	64.5	0.23	0.21	0.23	68.5
NorthWest: Beech Road (NW)														
27	L2	10	4	11	40.0	* 0.602	68.6	LOS E	10.9	83.4	0.98	0.82	0.98	20.6
28	T1	1	0	1	0.0	* 0.602	63.6	LOS E	10.9	83.4	0.98	0.82	0.98	20.8
29	R2	292	27	307	9.2	0.602	68.9	LOS E	11.2	84.3	0.98	0.82	0.98	22.2
Approach		303	31	319	10.2	0.602	68.8	LOS E	11.2	84.3	0.98	0.82	0.98	22.2
SouthWest: Campbelltown Road (SW)														
30	L2	247	12	260	4.9	0.171	9.2	LOS A	3.3	24.1	0.19	0.68	0.19	54.1
31	T1	859	41	904	4.8	0.299	4.2	LOS A	4.9	35.4	0.16	0.14	0.16	73.3
32	R2	1	0	1	0.0	0.014	83.7	LOS F	0.1	0.5	0.98	0.59	0.98	25.6
Approach		1107	53	1165	4.8	0.299	5.4	LOS A	4.9	35.4	0.17	0.26	0.17	69.3
All Vehicles		2579	217	2715	8.4	0.602	13.8	LOS A	11.2	84.3	0.29	0.30	0.30	58.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Access Road (SE)												
P5	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	236.3	217.2	0.92
NorthEast: Campbelltown Road (NE)												
P6	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	238.9	220.5	0.92
NorthWest: Beech Road (NW)												

P7	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	236.3	217.2	0.92
SouthWest: Campbelltown Road (SW)												
P8	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	238.3	219.7	0.92

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

MOVEMENT SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM (Site Folder: Base)]

Base PM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access Road (SE)														
21	L2	1	0	1	0.0	0.021	85.0	LOS F	0.1	0.6	0.99	0.58	0.99	24.7
22	T1	1	0	1	0.0	0.040	86.3	LOS F	0.1	0.6	1.00	0.57	1.00	18.1
23	R2	2	1	2	50.0	0.115	95.7	LOS F	0.2	1.8	1.00	0.61	1.00	21.2
Approach		4	1	4	25.0	0.115	90.7	LOS F	0.2	1.8	1.00	0.59	1.00	21.3
NorthEast: Campbelltown Road (NE)														
24	L2	2	1	2	50.0	0.722	9.3	LOS A	5.0	35.9	0.08	0.07	0.08	59.8
25	T1	1903	63	2003	3.3	* 0.722	1.1	LOS A	5.0	35.9	0.08	0.07	0.08	78.1
26	R2	50	7	53	14.0	0.584	87.0	LOS F	4.0	31.5	1.00	0.77	1.05	19.6
Approach		1955	71	2058	3.6	0.722	3.3	LOS A	5.0	35.9	0.10	0.09	0.10	74.3
NorthWest: Beech Road (NW)														
27	L2	14	1	15	7.1	0.671	56.6	LOS E	21.7	155.2	0.95	0.85	0.95	25.1
28	T1	1	0	1	0.0	* 0.671	51.9	LOS D	21.7	155.2	0.95	0.85	0.95	23.2
29	R2	623	13	656	2.1	0.671	56.6	LOS E	21.8	155.4	0.95	0.85	0.95	25.6
Approach		638	14	672	2.2	0.671	56.6	LOS E	21.8	155.4	0.95	0.85	0.95	25.6
SouthWest: Campbelltown Road (SW)														
30	L2	177	4	186	2.3	0.123	9.6	LOS A	2.5	18.1	0.21	0.68	0.21	53.8
31	T1	397	8	418	2.0	0.206	14.3	LOS A	5.2	37.0	0.37	0.32	0.37	60.9
32	R2	1	0	1	0.0	* 0.043	93.8	LOS F	0.1	0.6	1.00	0.58	1.00	23.9
Approach		575	12	605	2.1	0.206	13.0	LOS A	5.2	37.0	0.32	0.43	0.32	59.0
All Vehicles		3172	98	3339	3.1	0.722	15.9	LOS B	21.8	155.4	0.31	0.30	0.31	55.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Access Road (SE)												
P5	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	236.3	217.2	0.92
NorthEast: Campbelltown Road (NE)												
P6	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	238.9	220.5	0.92
NorthWest: Beech Road (NW)												

P7	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	236.3	217.2	0.92
SouthWest: Campbelltown Road (SW)												
P8	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	238.3	219.7	0.92

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

MOVEMENT SUMMARY

Site: [02 - Glenfield Road / access road AM (Site Folder: Base)]

Base AM
Site Category: Base Year 2019
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	1	0	1	0.0	0.852	32.4	LOS C	12.1	86.1	1.00	1.38	2.05	35.9
2	T1	72	1	76	1.4	0.852	32.6	LOS C	12.1	86.1	1.00	1.38	2.05	38.3
3	R2	296	5	312	1.7	0.852	37.7	LOS C	12.1	86.1	1.00	1.38	2.05	36.7
Approach		369	6	388	1.6	0.852	36.7	LOS C	12.1	86.1	1.00	1.38	2.05	37.0
East: Glenfield Road (E)														
4	L2	443	4	466	0.9	0.804	3.6	LOS A	15.0	107.1	0.69	0.50	0.69	41.1
5	T1	1	0	1	0.0	0.804	3.4	LOS A	15.0	107.1	0.69	0.50	0.69	46.2
6	R2	676	26	712	3.8	0.804	8.4	LOS A	15.0	107.1	0.69	0.50	0.69	49.2
Approach		1120	30	1179	2.7	0.804	6.5	LOS A	15.0	107.1	0.69	0.50	0.69	45.6
North: Glenfield Road (N)														
7	L2	438	22	461	5.0	0.887	24.4	LOS B	16.9	123.5	1.00	1.27	1.75	40.1
8	T1	68	3	72	4.4	0.887	24.4	LOS B	16.9	123.5	1.00	1.27	1.75	37.6
9	R2	1	0	1	0.0	0.887	29.2	LOS C	16.9	123.5	1.00	1.27	1.75	41.2
Approach		507	25	534	4.9	0.887	24.4	LOS B	16.9	123.5	1.00	1.27	1.75	39.8
West: Access Road (W)														
10	L2	1	0	1	0.0	0.007	11.9	LOS A	0.0	0.3	0.89	0.65	0.89	45.1
11	T1	1	0	1	0.0	0.007	11.6	LOS A	0.0	0.3	0.89	0.65	0.89	43.4
12	R2	1	0	1	0.0	0.007	16.6	LOS B	0.0	0.3	0.89	0.65	0.89	40.3
Approach		3	0	3	0.0	0.007	13.4	LOS A	0.0	0.3	0.89	0.65	0.89	42.8
All Vehicles		1999	61	2104	3.1	0.887	16.6	LOS B	16.9	123.5	0.83	0.86	1.21	42.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [02 - Glenfield Road / access road PM (Site Folder: Base)]

Base PM
Site Category: Base Year 2019
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	1	0	1	0.0	0.856	34.1	LOS C	11.6	81.5	1.00	1.37	2.05	35.3
2	T1	57	0	60	0.0	0.856	34.2	LOS C	11.6	81.5	1.00	1.37	2.05	37.7
3	R2	276	0	291	0.0	0.856	39.3	LOS C	11.6	81.5	1.00	1.37	2.05	36.1
Approach		334	0	352	0.0	0.856	38.4	LOS C	11.6	81.5	1.00	1.37	2.05	36.4
East: Glenfield Road (E)														
4	L2	132	1	139	0.8	0.763	3.2	LOS A	14.2	101.0	0.39	0.48	0.39	45.3
5	T1	1	0	1	0.0	0.763	3.0	LOS A	14.2	101.0	0.39	0.48	0.39	46.3
6	R2	515	12	542	2.3	0.763	8.0	LOS A	14.2	101.0	0.39	0.48	0.39	49.4
Approach		648	13	682	2.0	0.763	7.0	LOS A	14.2	101.0	0.39	0.48	0.39	48.5
North: Glenfield Road (N)														
7	L2	613	19	645	3.1	0.727	9.4	LOS A	9.4	67.5	0.90	0.86	1.06	48.0
8	T1	12	0	13	0.0	0.727	9.3	LOS A	9.4	67.5	0.90	0.86	1.06	49.2
9	R2	1	0	1	0.0	0.727	14.4	LOS A	9.4	67.5	0.90	0.86	1.06	49.6
Approach		626	19	659	3.0	0.727	9.4	LOS A	9.4	67.5	0.90	0.86	1.06	48.0
West: Access Road (W)														
10	L2	1	0	1	0.0	0.005	8.3	LOS A	0.0	0.2	0.78	0.59	0.78	47.2
11	T1	1	0	1	0.0	0.005	8.0	LOS A	0.0	0.2	0.78	0.59	0.78	45.3
12	R2	1	0	1	0.0	0.005	13.0	LOS A	0.0	0.2	0.78	0.59	0.78	45.6
Approach		3	0	3	0.0	0.005	9.8	LOS A	0.0	0.2	0.78	0.59	0.78	46.0
All Vehicles		1611	32	1696	2.0	0.856	14.4	LOS A	14.2	101.0	0.72	0.81	1.00	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [03 - Canterbury Rd / Railway Parade / Cambridge Ave AM (Site Folder: Base)]

Base AM
Site Category: Base Year 2019
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Canterbury Road (S)														
1	L2	311	9	327	2.9	0.487	7.6	LOS A	3.0	21.4	0.61	0.71	0.63	53.3
2	T1	1	0	1	0.0	0.798	9.9	LOS A	10.8	77.5	0.87	0.90	1.07	49.4
3	R2	695	17	732	2.4	0.798	15.4	LOS B	10.8	77.5	0.87	0.90	1.07	49.5
Approach		1007	26	1060	2.6	0.798	13.0	LOS A	10.8	77.5	0.79	0.85	0.93	50.6
East: Cambridge Avenue (E)														
4	L2	203	3	214	1.5	0.112	3.3	LOS A	0.0	0.0	0.00	0.42	0.00	56.7
5	T1	69	5	73	7.2	0.131	5.4	LOS A	0.7	5.0	0.50	0.62	0.50	54.0
6	R2	45	7	47	15.6	0.131	11.0	LOS A	0.7	5.0	0.50	0.62	0.50	53.8
Approach		317	15	334	4.7	0.131	4.8	LOS A	0.7	5.0	0.18	0.49	0.18	55.7
North: Railway Parade (N)														
7	L2	203	7	214	3.4	0.392	16.6	LOS B	3.3	23.5	1.00	0.97	1.03	48.8
8	T1	3	0	3	0.0	0.340	14.3	LOS A	2.3	17.5	0.95	0.98	0.95	46.6
9	R2	126	11	133	8.7	0.340	20.3	LOS B	2.3	17.5	0.95	0.98	0.95	46.5
Approach		332	18	349	5.4	0.392	18.0	LOS B	3.3	23.5	0.98	0.98	1.00	47.8
West: Cambridge Avenue (W)														
10	L2	359	11	378	3.1	0.648	14.3	LOS A	6.3	45.2	0.96	1.11	1.29	48.3
11	T1	156	12	164	7.7	0.639	13.3	LOS A	6.4	46.6	0.97	1.11	1.27	48.5
12	R2	232	5	244	2.2	0.639	18.5	LOS B	6.4	46.6	0.97	1.11	1.27	48.7
Approach		747	28	786	3.7	0.648	15.4	LOS B	6.4	46.6	0.97	1.11	1.28	48.5
All Vehicles		2403	87	2529	3.6	0.798	13.3	LOS A	10.8	77.5	0.79	0.90	0.95	50.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [03 - Canterbury Rd / Railway Parade / Cambridge Ave PM (Site Folder: Base)]

Base PM
Site Category: Base Year 2019
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Canterbury Road (S)														
1	L2	256	2	269	0.8	0.815	29.9	LOS C	7.9	55.4	0.94	1.22	1.70	40.4
2	T1	1	0	1	0.0	0.706	22.0	LOS B	5.4	38.7	0.88	1.11	1.35	42.7
3	R2	218	5	229	2.3	0.706	27.6	LOS B	5.4	38.7	0.88	1.11	1.35	42.8
Approach		475	7	500	1.5	0.815	28.8	LOS C	7.9	55.4	0.91	1.17	1.54	41.5
East: Cambridge Avenue (E)														
4	L2	702	16	739	2.3	0.390	3.4	LOS A	0.0	0.0	0.00	0.42	0.00	56.6
5	T1	198	3	208	1.5	0.831	21.5	LOS B	10.1	71.4	0.96	1.24	1.66	44.2
6	R2	207	2	218	1.0	0.831	26.9	LOS B	10.1	71.4	0.96	1.24	1.66	44.3
Approach		1107	21	1165	1.9	0.831	11.0	LOS A	10.1	71.4	0.35	0.72	0.61	51.2
North: Railway Parade (N)														
7	L2	80	1	84	1.3	0.287	13.8	LOS A	1.2	8.2	0.69	0.84	0.71	48.9
8	T1	8	0	8	0.0	0.495	14.0	LOS A	2.6	19.3	0.75	0.98	0.95	46.8
9	R2	158	10	166	6.3	0.495	20.0	LOS B	2.6	19.3	0.75	0.98	0.95	46.8
Approach		246	11	259	4.5	0.495	17.8	LOS B	2.6	19.3	0.73	0.93	0.87	47.4
West: Cambridge Avenue (W)														
10	L2	194	6	204	3.1	0.550	12.2	LOS A	3.7	26.4	0.75	0.92	0.92	50.0
11	T1	68	1	72	1.5	0.550	12.0	LOS A	3.7	26.4	0.75	0.92	0.92	51.5
12	R2	320	5	337	1.6	0.667	19.5	LOS B	5.5	38.9	0.82	1.05	1.11	47.0
Approach		582	12	613	2.1	0.667	16.2	LOS B	5.5	38.9	0.79	0.99	1.03	48.4
All Vehicles		2410	51	2537	2.1	0.831	16.5	LOS B	10.1	71.4	0.61	0.89	0.92	47.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: v [02 - Glenfield Road / access road AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 75 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	792	28	834	3.5	0.444	5.9	LOS A	0.0	0.0	0.00	0.53	0.00	54.6
3	R2	809	29	852	3.6	* 0.810	37.8	LOS C	16.4	118.0	0.99	0.94	1.17	36.7
Approach		1601	57	1685	3.6	0.810	22.0	LOS B	16.4	118.0	0.50	0.74	0.59	43.9
East: Glenfield Road (E)														
4	L2	835	30	879	3.6	0.851	21.6	LOS B	28.1	202.4	0.91	0.94	1.03	43.9
5	T1	56	2	59	3.6	* 0.070	25.6	LOS B	0.9	6.3	0.83	0.61	0.83	42.3
Approach		891	32	938	3.6	0.851	21.8	LOS B	28.1	202.4	0.90	0.92	1.02	43.8
West: Access Road (W)														
11	T1	53	2	56	3.8	0.051	5.2	LOS A	0.5	3.8	0.28	0.21	0.28	55.3
12	R2	786	28	827	3.6	* 0.826	39.5	LOS C	16.3	117.7	1.00	0.96	1.21	36.2
Approach		839	30	883	3.6	0.826	37.4	LOS C	16.3	117.7	0.95	0.91	1.15	37.0
All Vehicles		3331	119	3506	3.6	0.851	25.8	LOS B	28.1	202.4	0.72	0.83	0.85	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	31.8	LOS D	0.1	0.1	0.92	0.92	201.0	220.0	1.09
West: Access Road (W)												
P4	Full	50	53	31.8	LOS D	0.1	0.1	0.92	0.92	205.7	226.1	1.10
All Pedestrians		0	105	31.8	LOS D	0.1	0.1	0.92	0.92	203.4	223.1	1.10

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

MOVEMENT SUMMARY

Site: v [02 - Glenfield Road / access road PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	1421	51	1496	3.6	0.797	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	53.8
3	R2	800	29	842	3.6	* 0.725	50.6	LOS D	26.0	187.6	0.91	0.85	0.91	32.6
Approach		2221	80	2338	3.6	0.797	22.5	LOS B	26.0	187.6	0.33	0.64	0.33	43.6
East: Glenfield Road (E)														
4	L2	835	30	879	3.6	0.732	12.7	LOS A	31.2	224.8	0.61	0.78	0.61	49.0
5	T1	67	2	71	3.0	* 0.067	43.4	LOS D	1.9	13.6	0.78	0.59	0.78	35.2
Approach		902	32	949	3.5	0.732	14.9	LOS B	31.2	224.8	0.62	0.76	0.62	47.6
West: Access Road (W)														
11	T1	45	2	47	4.4	0.042	8.8	LOS A	0.8	5.7	0.25	0.19	0.25	52.5
12	R2	560	20	589	3.6	* 0.719	56.4	LOS D	18.6	134.4	0.92	0.83	0.93	31.1
Approach		605	22	637	3.6	0.719	52.8	LOS D	18.6	134.4	0.87	0.78	0.88	32.1
All Vehicles		3728	134	3924	3.6	0.797	25.6	LOS B	31.2	224.8	0.49	0.69	0.49	42.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	238.5	220.0	0.92
West: Access Road (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	243.2	226.1	0.93
All Pedestrians		0	105	69.3	LOS F	0.2	0.2	0.96	0.96	240.8	223.1	0.93

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

MOVEMENT SUMMARY

Site: [04 - Cambridge Avenue / eastern access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	407	6	428	1.5	0.393	22.6	LOS B	16.2	115.1	0.57	0.76	0.57	42.9
3	R2	422	6	444	1.4	* 0.755	73.4	LOS F	16.2	114.5	1.00	0.86	1.07	27.0
Approach		829	12	873	1.4	0.755	48.4	LOS D	16.2	115.1	0.79	0.81	0.83	33.0
East: Cambridge Ave (E)														
4	L2	413	6	435	1.5	0.349	12.4	LOS A	10.5	74.6	0.41	0.69	0.41	49.3
5	T1	1329	20	1399	1.5	* 0.739	47.9	LOS D	30.1	213.1	0.95	0.84	0.95	33.6
Approach		1742	26	1834	1.5	0.739	39.4	LOS C	30.1	213.1	0.82	0.80	0.82	36.4
West: Cambridge Ave (W)														
11	T1	1353	20	1424	1.5	0.341	8.2	LOS A	12.5	88.8	0.40	0.36	0.40	52.9
12	R2	408	6	429	1.5	* 0.746	31.8	LOS C	16.9	119.9	0.96	0.85	0.96	39.0
Approach		1761	26	1854	1.5	0.746	13.6	LOS A	16.9	119.9	0.53	0.47	0.53	48.9
All Vehicles		4332	64	4560	1.5	0.755	30.7	LOS C	30.1	213.1	0.70	0.67	0.70	39.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	96.3	35.2	0.37
East: Cambridge Ave (E)												
P2	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	105.4	47.1	0.45
West: Cambridge Ave (W)												
P4	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	105.4	47.1	0.45
All Pedestrians		90	95	69.2	LOS F	0.2	0.2	0.96	0.96	100.4	40.5	0.40

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

MOVEMENT SUMMARY

Site: [04 - Cambridge Avenue / eastern access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	658	13	693	2.0	0.788	21.4	LOS B	28.1	200.4	0.62	0.78	0.62	43.5
3	R2	806	16	848	2.0	* 0.862	63.1	LOS E	38.2	272.0	0.95	0.92	1.08	29.2
Approach		1464	29	1541	2.0	0.862	44.3	LOS D	38.2	272.0	0.80	0.86	0.87	34.3
East: Cambridge Ave (E)														
4	L2	288	6	303	2.1	0.233	10.3	LOS A	5.4	38.4	0.37	0.66	0.37	50.7
5	T1	1320	26	1389	2.0	* 0.888	67.0	LOS E	36.7	261.1	1.00	1.01	1.16	28.6
Approach		1608	32	1693	2.0	0.888	56.9	LOS E	36.7	261.1	0.89	0.95	1.02	31.0
West: Cambridge Ave (W)														
11	T1	1412	28	1486	2.0	0.465	21.2	LOS B	21.3	151.8	0.65	0.58	0.65	44.5
12	R2	307	6	323	2.0	* 0.882	49.6	LOS D	15.9	113.1	1.00	0.94	1.21	32.8
Approach		1719	34	1809	2.0	0.882	26.3	LOS B	21.3	151.8	0.71	0.64	0.75	41.8
All Vehicles		4791	95	5043	2.0	0.888	42.1	LOS C	38.2	272.0	0.80	0.81	0.88	35.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	96.3	35.2	0.37
East: Cambridge Ave (E)												
P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	105.5	47.1	0.45
West: Cambridge Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	105.5	47.1	0.45
All Pedestrians		150	158	69.3	LOS F	0.2	0.2	0.96	0.96	102.5	43.1	0.42

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

MOVEMENT SUMMARY

Site: [05 - Cambridge Avenue / western access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	146	2.0	154	2.0	0.242	63.4	LOS E	4.9	34.7	0.90	0.76	0.90	29.3
3	R2	31	2.0	33	2.0	* 0.382	84.9	LOS F	2.5	17.5	1.00	0.72	1.00	25.0
Approach		177	2.0	186	2.0	0.382	67.2	LOS E	4.9	34.7	0.92	0.75	0.92	28.4
East: Proposed Cambridge Avenue Extension (E)														
4	L2	8	2.0	8	2.0	0.005	6.2	LOS A	0.0	0.3	0.11	0.56	0.11	53.8
5	T1	1506	2.0	1585	2.0	* 0.368	6.9	LOS A	13.1	93.4	0.38	0.34	0.38	53.9
Approach		1514	2.0	1594	2.0	0.368	6.9	LOS A	13.1	93.4	0.38	0.34	0.38	53.9
West: Proposed Cambridge Avenue Extension (W)														
11	T1	1518	2.0	1598	2.0	0.317	1.7	LOS A	6.6	47.1	0.19	0.17	0.19	58.3
12	R2	86	2.0	91	2.0	* 0.373	76.9	LOS F	4.2	30.1	0.98	0.75	0.98	26.4
Approach		1604	2.0	1688	2.0	0.373	5.8	LOS A	6.6	47.1	0.23	0.20	0.23	54.8
All Vehicles		3295	2.0	3468	2.0	0.382	9.6	LOS A	13.1	93.4	0.34	0.30	0.34	51.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	234.1	214.3	0.92
P1B	Slip/ Bypass	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	229.0	207.6	0.91
All Pedestrians		50	105	69.3	LOS F	0.2	0.2	0.96	0.96	231.5	211.0	0.91

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

MOVEMENT SUMMARY

Site: [05 - Cambridge Avenue / western access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access Road (S)														
1	L2	92	2.0	97	2.0	0.120	55.7	LOS D	2.8	20.1	0.84	0.73	0.84	31.2
3	R2	45	2.0	47	2.0	* 0.431	82.5	LOS F	3.5	25.0	1.00	0.75	1.00	25.4
Approach		137	2.0	144	2.0	0.431	64.5	LOS E	3.5	25.0	0.89	0.74	0.89	29.0
East: Proposed Cambridge Avenue Extension (E)														
4	L2	15	2.0	16	2.0	0.010	6.5	LOS A	0.1	0.7	0.13	0.57	0.13	53.6
5	T1	1720	2.0	1811	2.0	* 0.448	10.3	LOS A	18.8	133.8	0.47	0.43	0.47	51.4
Approach		1735	2.0	1826	2.0	0.448	10.3	LOS A	18.8	133.8	0.47	0.43	0.47	51.4
West: Proposed Cambridge Avenue Extension (W)														
11	T1	1502	2.0	1581	2.0	0.318	2.1	LOS A	7.2	51.3	0.21	0.19	0.21	58.0
12	R2	139	2.0	146	2.0	* 0.436	72.3	LOS F	6.6	47.3	0.96	0.77	0.96	27.3
Approach		1641	2.0	1727	2.0	0.436	8.1	LOS A	7.2	51.3	0.27	0.24	0.27	52.9
All Vehicles		3513	2.0	3698	2.0	0.448	11.3	LOS A	18.8	133.8	0.39	0.35	0.39	50.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Access Road (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	234.1	214.3	0.92
P1B	Slip/ Bypass	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	229.0	207.6	0.91
All Pedestrians		50	105	69.3	LOS F	0.2	0.2	0.96	0.96	231.5	211.0	0.91

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

MOVEMENT SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM - Solution (Site Folder: Future 2036 - Alternative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access Road (SE)														
21	L2	752	9	792	1.2	0.430	7.8	LOS A	0.0	0.0	0.00	0.53	0.00	54.7
22	T1	771	2	812	0.3	* 0.791	57.1	LOS E	28.0	196.1	0.96	0.87	0.98	24.8
23	R2	784	9	825	1.1	0.791	62.1	LOS E	27.9	196.1	0.99	0.89	1.03	31.1
Approach		2307	20	2428	0.9	0.791	42.7	LOS D	28.0	196.4	0.66	0.76	0.68	34.4
NorthEast: Campbelltown Road (NE)														
24	L2	267	3	281	1.1	0.195	7.7	LOS A	0.4	3.0	0.03	0.62	0.03	59.4
25	T1	1488	130	1566	8.7	* 0.796	43.0	LOS D	25.1	188.6	0.92	0.82	0.94	41.4
26	R2	115	8	121	7.0	0.733	83.2	LOS F	9.1	67.7	1.00	0.84	1.11	20.7
Approach		1870	141	1968	7.5	0.796	40.4	LOS C	25.1	188.6	0.80	0.79	0.82	41.5
NorthWest: Beech Road (NW)														
27	L2	126	5	133	4.0	0.515	47.5	LOS D	8.2	58.8	0.94	0.87	0.94	28.7
28	T1	84	1	88	1.2	* 0.515	50.1	LOS D	10.4	76.6	0.95	0.84	0.95	26.1
29	R2	404	28	425	6.9	0.515	66.5	LOS E	10.4	76.6	0.96	0.80	0.96	23.2
Approach		614	34	646	5.5	0.515	60.4	LOS E	10.4	76.6	0.96	0.82	0.96	24.5
SouthWest: Campbelltown Road (SW)														
30	L2	372	13	392	3.5	0.385	17.5	LOS B	12.0	86.7	0.48	0.73	0.48	46.7
31	T1	1430	48	1505	3.4	0.787	35.2	LOS C	33.1	238.4	0.87	0.77	0.88	45.4
32	R2	409	5	431	1.2	* 0.759	77.4	LOS F	17.1	120.9	1.00	0.86	1.08	28.2
Approach		2211	66	2327	3.0	0.787	40.0	LOS C	33.1	238.4	0.83	0.78	0.85	40.7
All Vehicles		7002	261	7371	3.7	0.796	42.8	LOS D	33.1	238.4	0.77	0.78	0.80	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Access Road (SE)												
P5	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
NorthEast: Campbelltown Road (NE)												
P6	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	246.5	230.4	0.93

NorthWest: Beech Road (NW)												
P7	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
SouthWest: Campbelltown Road (SW)												
P8	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	251.6	237.0	0.94
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	245.2	228.8	0.93

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

MOVEMENT SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM - Solution (Site Folder: Future 2036 - Alternative Layouts)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access Road (SE)														
21	L2	985	19	1037	1.9	0.566	19.8	LOS B	0.0	0.0	0.00	0.53	0.00	54.5
22	T1	244	4	257	1.6	* 0.608	60.5	LOS E	15.1	107.2	0.93	0.79	0.93	23.9
23	R2	614	14	646	2.3	0.608	64.8	LOS E	14.4	102.8	0.93	0.82	0.93	30.4
Approach		1843	37	1940	2.0	0.608	40.2	LOS C	15.1	107.2	0.43	0.66	0.43	39.1
NorthEast: Campbelltown Road (NE)														
24	L2	1106	23	1164	2.1	0.827	8.4	LOS A	8.2	58.3	0.12	0.65	0.12	58.8
25	T1	2539	75	2673	3.0	* 0.967	51.0	LOS D	56.0	401.9	0.99	1.03	1.18	38.0
26	R2	151	9	159	6.0	0.558	37.2	LOS C	6.3	46.2	0.91	0.79	0.91	33.9
Approach		3796	107	3996	2.8	0.967	38.0	LOS C	56.0	401.9	0.73	0.91	0.86	42.3
NorthWest: Beech Road (NW)														
27	L2	159	4	167	2.5	0.939	87.0	LOS F	25.9	184.6	1.00	1.13	1.36	19.9
28	T1	246	5	259	2.0	* 0.939	84.8	LOS F	27.5	195.9	1.00	1.11	1.35	19.2
29	R2	780	16	821	2.1	0.939	92.7	LOS F	27.5	195.9	1.00	1.06	1.35	18.8
Approach		1185	25	1247	2.1	0.939	90.3	LOS F	27.5	195.9	1.00	1.08	1.35	19.0
SouthWest: Campbelltown Road (SW)														
30	L2	251	5	264	2.0	0.204	12.4	LOS A	5.1	36.4	0.33	0.69	0.33	51.9
31	T1	722	14	760	1.9	0.519	51.6	LOS D	15.9	113.0	0.91	0.77	0.91	37.8
32	R2	317	6	334	1.9	* 0.976	113.7	LOS F	15.5	110.1	1.00	1.04	1.57	22.1
Approach		1290	25	1358	1.9	0.976	59.3	LOS E	15.9	113.0	0.82	0.82	0.96	32.9
All Vehicles		8114	194	8541	2.4	0.976	49.5	LOS D	56.0	401.9	0.72	0.86	0.85	35.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Access Road (SE)												
P5	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
NorthEast: Campbelltown Road (NE)												
P6	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	246.5	230.4	0.93

NorthWest: Beech Road (NW)												
P7	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	241.4	223.8	0.93
SouthWest: Campbelltown Road (SW)												
P8	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	251.6	237.0	0.94
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	245.2	228.8	0.93

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

MOVEMENT SUMMARY

Site: v [03 - Canterbury Rd / Railway Parade / Cambridge Ave AM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Canterbury Road (S)														
1	L2	570	11	600	1.9	0.316	7.2	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
2	T1	330	6	347	1.8	*0.870	73.3	LOS F	27.0	192.2	1.00	0.99	1.17	26.5
3	R2	686	13	722	1.9	*0.891	79.5	LOS F	29.0	206.2	1.00	0.97	1.21	26.2
Approach		1586	30	1669	1.9	0.891	52.2	LOS D	29.0	206.2	0.64	0.81	0.77	32.3
East: Cambridge Avenue (E)														
4	L2	329	6	346	1.8	0.289	15.8	LOS B	10.3	73.0	0.47	0.69	0.47	47.1
5	T1	408	8	429	2.0	0.414	49.2	LOS D	12.9	92.1	0.88	0.74	0.88	33.4
6	R2	237	5	249	2.1	0.529	66.8	LOS E	11.3	80.4	0.95	0.79	0.95	27.7
Approach		974	19	1025	2.0	0.529	42.2	LOS C	12.9	92.1	0.76	0.74	0.76	35.1
North: Railway Parade (N)														
7	L2	457	9	481	2.0	0.516	37.2	LOS C	20.6	147.0	0.73	0.90	0.73	37.2
8	T1	306	6	322	2.0	0.848	68.7	LOS E	24.3	173.1	1.00	0.97	1.15	27.5
9	R2	379	7	399	1.8	0.492	60.3	LOS E	12.8	91.4	0.93	0.81	0.93	28.8
Approach		1142	22	1202	1.9	0.848	53.3	LOS D	24.3	173.1	0.87	0.89	0.91	31.2
West: Cambridge Avenue (W)														
10	L2	333	7	351	2.1	0.285	6.7	LOS A	0.7	4.7	0.03	0.56	0.03	50.2
11	T1	691	14	727	2.0	*0.871	47.1	LOS D	31.6	225.2	0.90	0.82	0.95	34.8
12	R2	463	9	487	1.9	*0.868	67.1	LOS E	17.5	124.6	0.97	0.89	1.10	28.6
Approach		1487	30	1565	2.0	0.871	44.3	LOS D	31.6	225.2	0.73	0.78	0.79	34.9
All Vehicles		5189	101	5462	1.9	0.891	48.3	LOS D	31.6	225.2	0.74	0.81	0.80	33.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Canterbury Road (S)												
P1	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	241.5	224.0	0.93
East: Cambridge Avenue (E)												
P2	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	247.6	232.0	0.94
North: Railway Parade (N)												

P3	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	241.5	224.0	0.93
West: Cambridge Avenue (W)												
P4	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	247.6	232.0	0.94
All Pedestrians		0	84	69.2	LOS F	0.1	0.1	0.96	0.96	244.6	228.0	0.93

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

MOVEMENT SUMMARY

Site: v [03 - Canterbury Rd / Railway Parade / Cambridge Ave PM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Canterbury Road (S)														
1	L2	304	6	320	2.0	0.157	6.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
2	T1	396	8	417	2.0	0.832	77.2	LOS F	30.4	216.8	1.00	0.93	1.08	28.1
3	R2	372	7	392	1.9	* 0.845	83.4	LOS F	15.2	108.5	1.00	0.92	1.21	25.5
Approach		1072	21	1128	2.0	0.845	59.3	LOS E	30.4	216.8	0.72	0.81	0.82	31.3
East: Cambridge Avenue (E)														
4	L2	678	14	714	2.1	0.704	30.2	LOS C	33.2	236.8	0.84	0.93	0.84	39.8
5	T1	542	11	571	2.0	0.711	62.0	LOS E	19.7	140.3	1.00	0.84	1.00	29.9
6	R2	576	12	606	2.1	0.585	51.6	LOS D	24.2	172.5	0.85	0.81	0.85	32.4
Approach		1796	37	1891	2.1	0.711	46.7	LOS D	33.2	236.8	0.89	0.87	0.89	33.9
North: Railway Parade (N)														
7	L2	208	4	219	1.9	0.163	14.0	LOS A	5.4	38.8	0.39	0.62	0.39	45.5
8	T1	319	7	336	2.2	* 0.868	70.0	LOS E	25.6	182.4	1.00	0.99	1.17	27.3
9	R2	255	5	268	2.0	0.821	84.5	LOS F	10.5	74.4	1.00	0.92	1.22	24.2
Approach		782	16	823	2.0	0.868	59.8	LOS E	25.6	182.4	0.84	0.87	0.98	29.2
West: Cambridge Avenue (W)														
10	L2	681	14	717	2.1	0.755	36.5	LOS C	25.7	183.3	0.65	0.87	0.65	40.6
11	T1	523	11	551	2.1	* 0.853	65.7	LOS E	25.3	180.3	0.97	0.87	1.04	29.2
12	R2	795	10	837	1.3	* 0.877	57.0	LOS E	25.9	183.1	0.80	0.87	0.93	31.1
Approach		1999	35	2104	1.8	0.877	52.3	LOS D	25.9	183.3	0.79	0.87	0.86	33.2
All Vehicles		5649	109	5946	1.9	0.877	52.9	LOS D	33.2	236.8	0.81	0.86	0.88	32.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Canterbury Road (S)												
P1	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	241.5	224.0	0.93
East: Cambridge Avenue (E)												
P2	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	247.6	232.0	0.94
North: Railway Parade (N)												

P3	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	241.5	224.0	0.93
West: Cambridge Avenue (W)												
P4	Full	20	21	69.2	LOS F	0.1	0.1	0.96	0.96	247.6	232.0	0.94
All Pedestrians		0	84	69.2	LOS F	0.1	0.1	0.96	0.96	244.6	228.0	0.93

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

PHASING SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM (Site Folder: Base)]

Base AM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Fixed
Reference Phase: Phase A
Input Phase Sequence: A, D2, F1, G
Output Phase Sequence: A, D2, F1, G

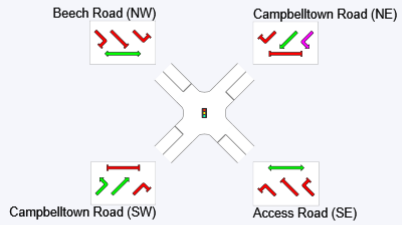
Phase Timing Summary

Phase	A	D2	F1	G
Phase Change Time (sec)	0	105	135	144
Green Time (sec)	100	23	2	6
Phase Time (sec)	107	30	2	11
Phase Split	71%	20%	1%	7%

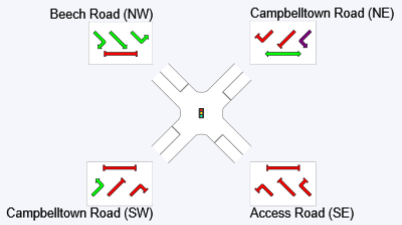
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

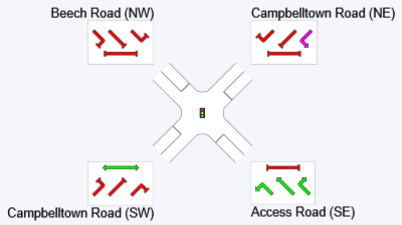
Phase A **REF**



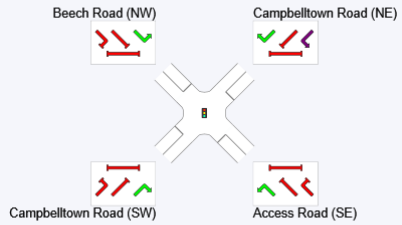
Phase D2



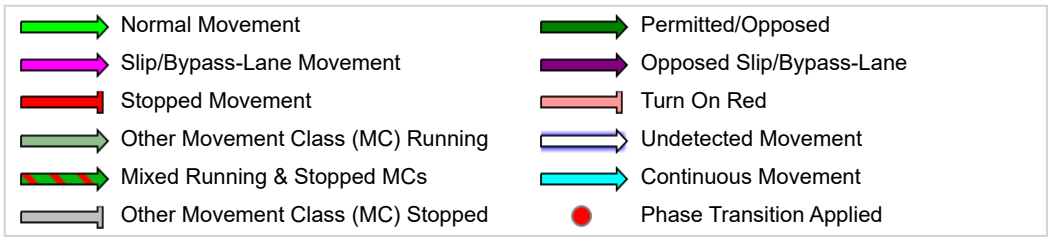
Phase F1



Phase G



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM (Site Folder: Base)]

Base PM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Fixed
Reference Phase: Phase A
Input Phase Sequence: A, D2, F1, G, G1
Output Phase Sequence: A, D2, F1, G, G1

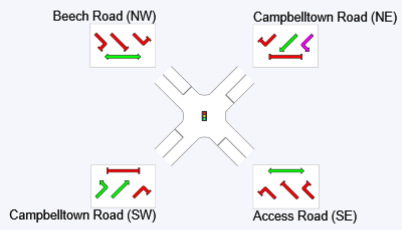
Phase Timing Summary

Phase	A	D2	F1	G	G1
Phase Change Time (sec)	0	85	133	142	144
Green Time (sec)	79	41	2	2	6
Phase Time (sec)	86	48	2	2	12
Phase Split	57%	32%	1%	1%	8%

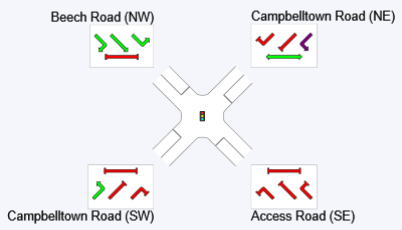
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

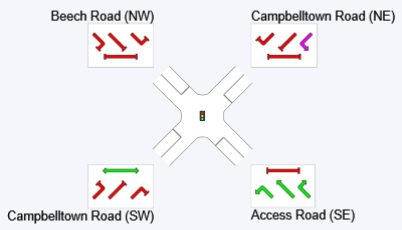
Phase A REF



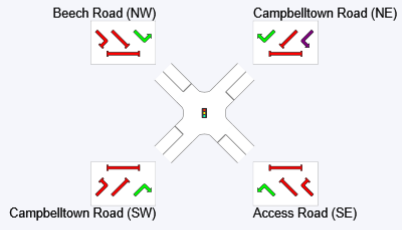
Phase D2



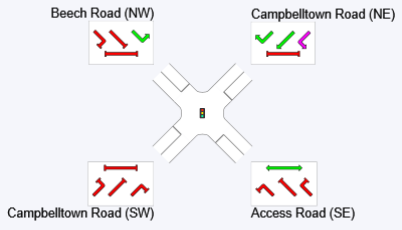
Phase F1



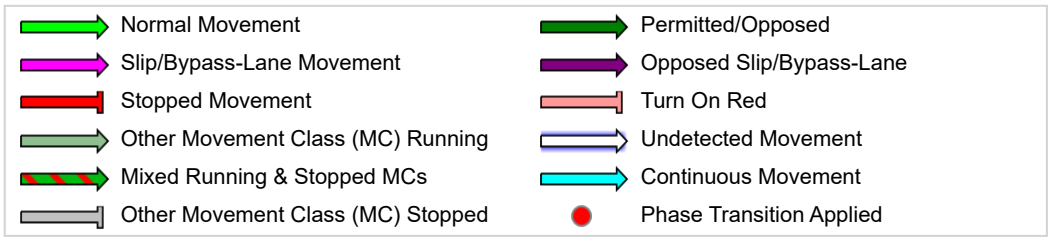
Phase G



Phase G1



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: v [02 - Glenfield Road / access road AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 75 seconds (Site User-Given Cycle Time)

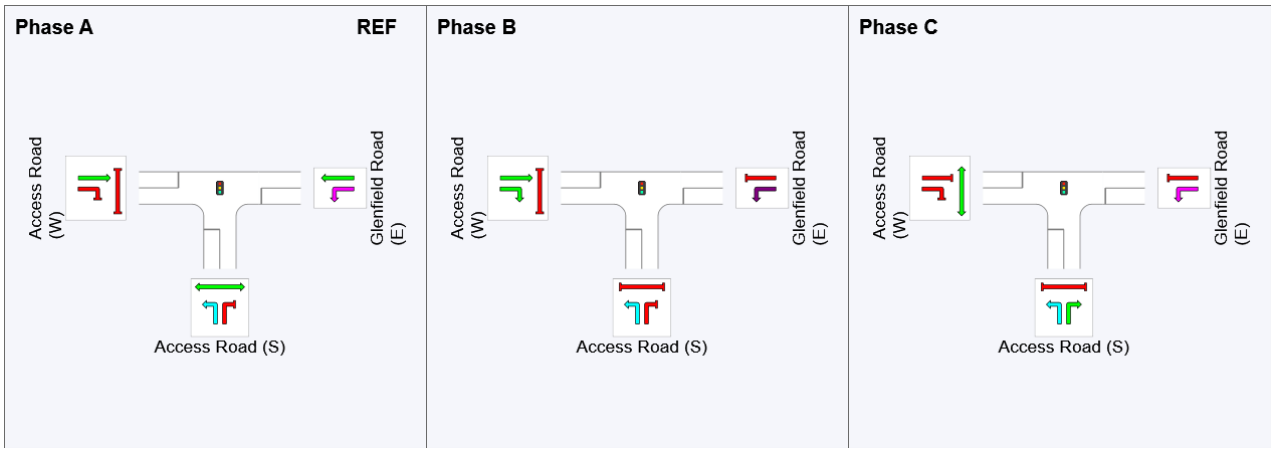
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

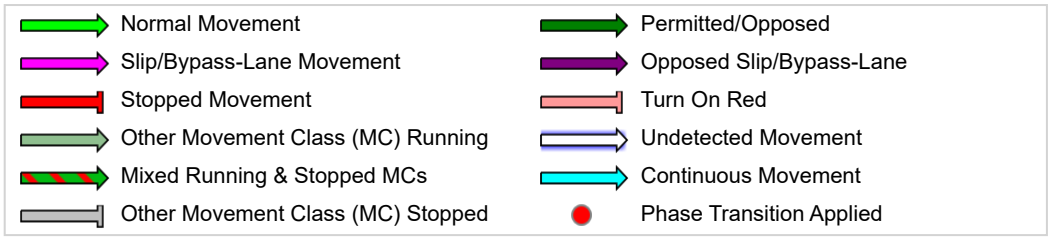
Phase	A	B	C
Phase Change Time (sec)	0	22	48
Green Time (sec)	16	20	21
Phase Time (sec)	22	26	27
Phase Split	29%	35%	36%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: v [02 - Glenfield Road / access road PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

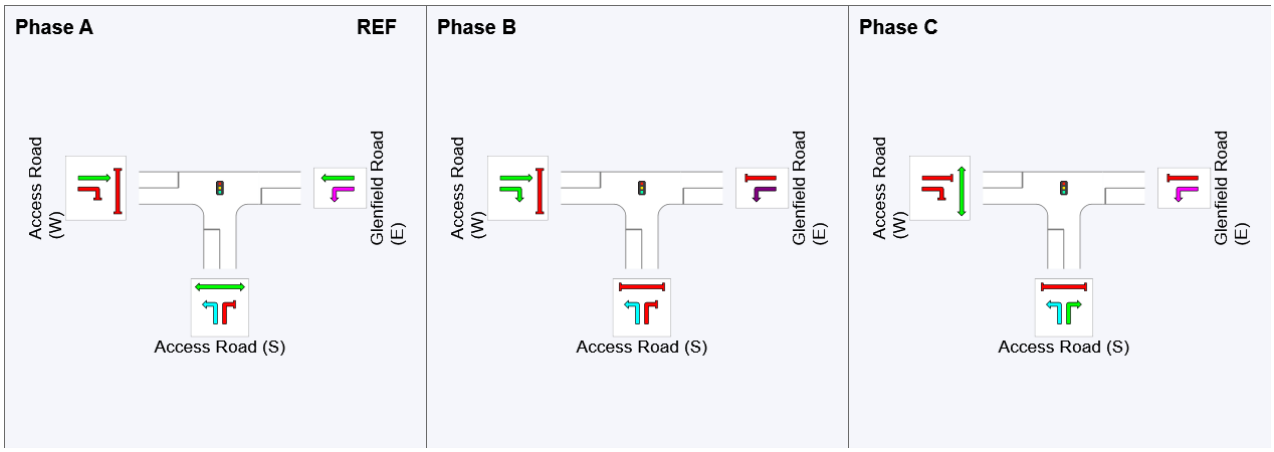
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

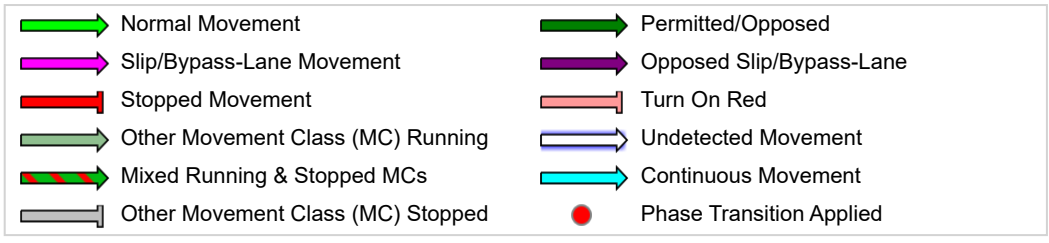
Phase	A	B	C
Phase Change Time (sec)	0	46	93
Green Time (sec)	40	41	51
Phase Time (sec)	46	47	57
Phase Split	31%	31%	38%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: [04 - Cambridge Avenue / eastern access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Three Phases
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

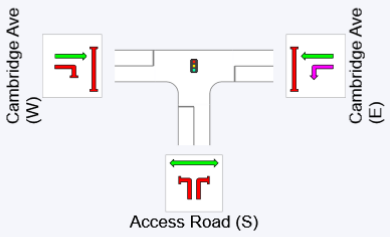
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	55	89	125
Green Time (sec)	49	28	30	19
Phase Time (sec)	55	34	36	25
Phase Split	37%	23%	24%	17%

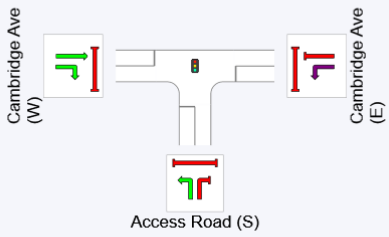
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

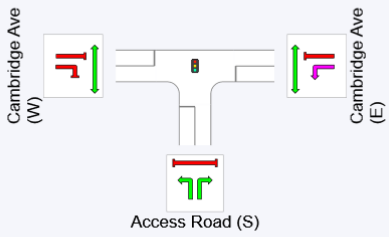
Phase A **REF**



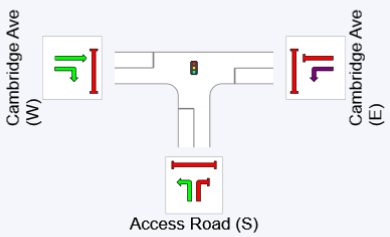
Phase B



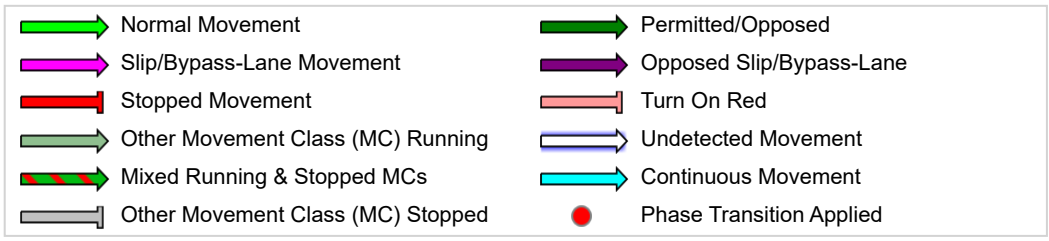
Phase C



Phase D



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: [04 - Cambridge Avenue / eastern access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Three Phases
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

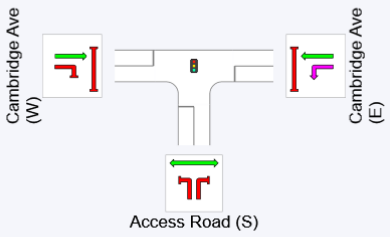
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	47	66	127
Green Time (sec)	41	13	55	17
Phase Time (sec)	47	19	61	23
Phase Split	31%	13%	41%	15%

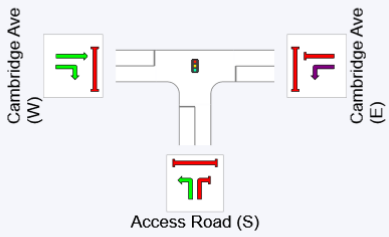
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

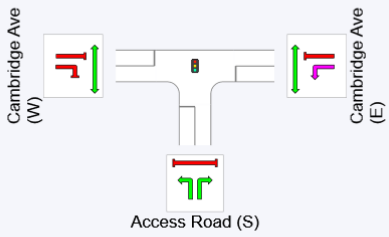
Phase A **REF**



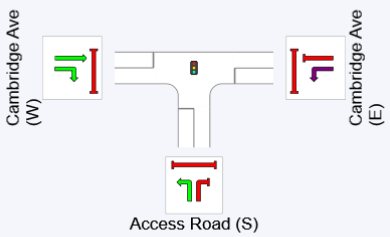
Phase B



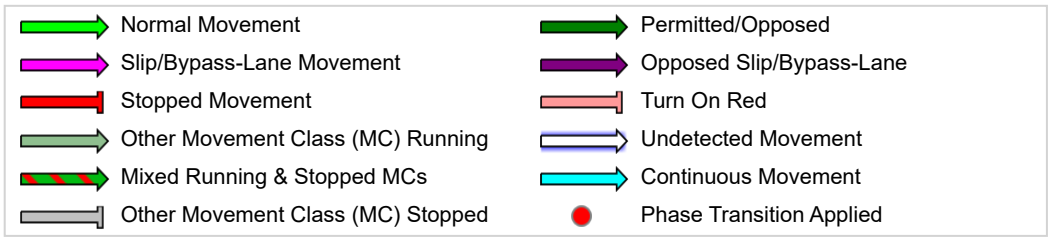
Phase C



Phase D



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: [05 - Cambridge Avenue / western access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

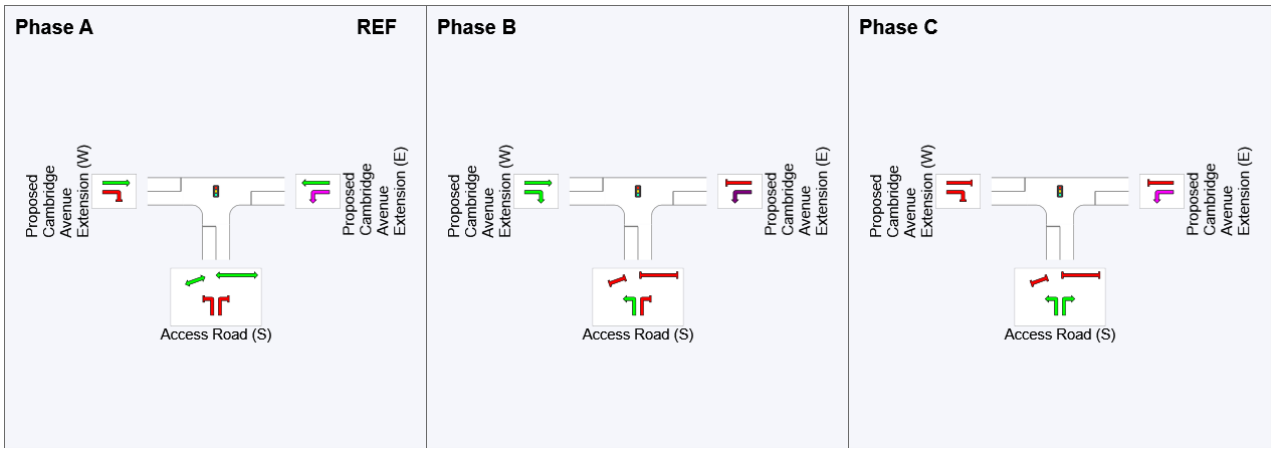
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

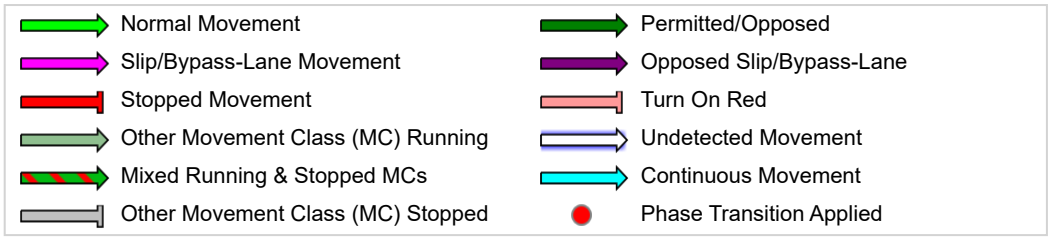
Phase	A	B	C
Phase Change Time (sec)	0	118	137
Green Time (sec)	112	13	7
Phase Time (sec)	118	19	13
Phase Split	79%	13%	9%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: [05 - Cambridge Avenue / western access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

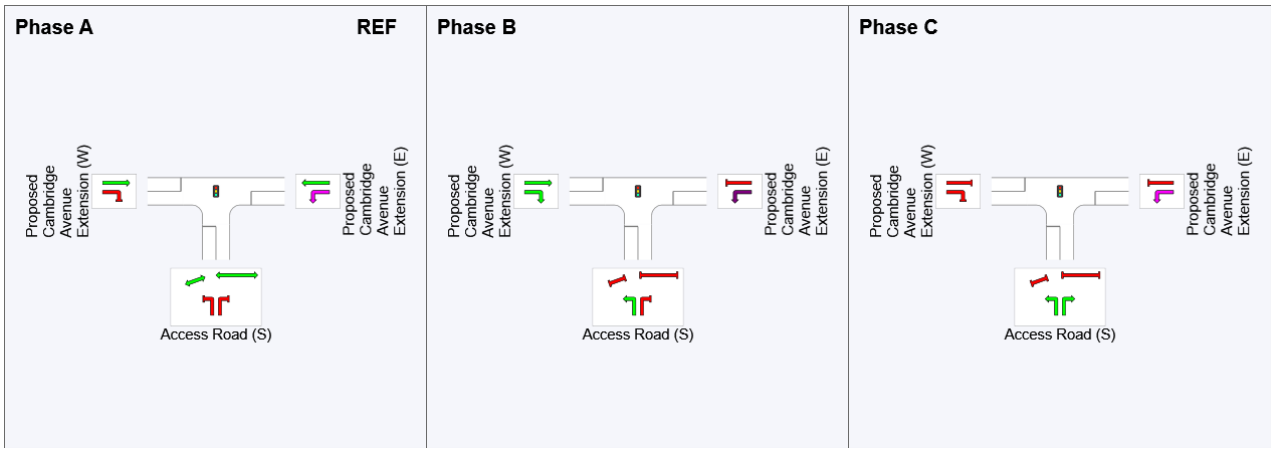
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

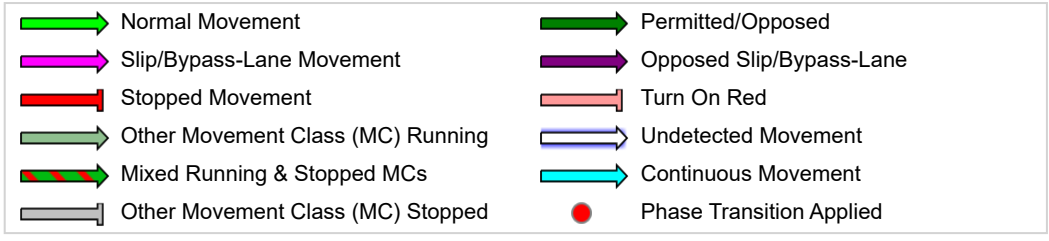
Phase	A	B	C
Phase Change Time (sec)	0	111	135
Green Time (sec)	105	18	9
Phase Time (sec)	111	24	15
Phase Split	74%	16%	10%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Fixed
Reference Phase: Phase A
Input Phase Sequence: A, D, D1, G, G1
Output Phase Sequence: A, D, D1, G, G1

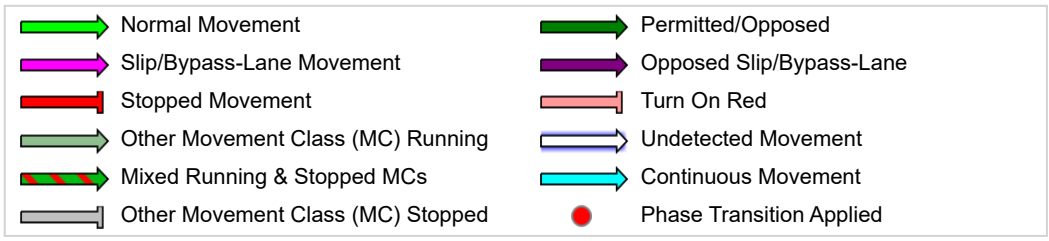
Phase Timing Summary

Phase	A	D	D1	G	G1
Phase Change Time (sec)	0	45	77	124	143
Green Time (sec)	40	25	41	14	2
Phase Time (sec)	47	31	46	19	7
Phase Split	31%	21%	31%	13%	5%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Fixed
Reference Phase: Phase A
Input Phase Sequence: A, B, D, F, G
Output Phase Sequence: A, B, D, F, G

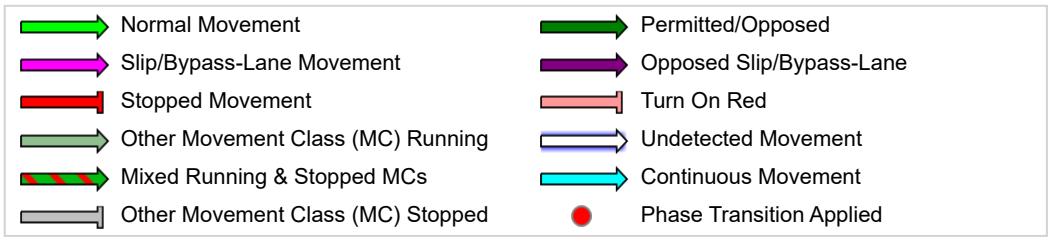
Phase Timing Summary

Phase	A	B	D	F	G
Phase Change Time (sec)	0	43	60	93	130
Green Time (sec)	38	10	27	30	14
Phase Time (sec)	45	16	34	36	19
Phase Split	30%	11%	23%	24%	13%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: v [03 - Canterbury Rd / Railway Parade / Cambridge Ave AM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

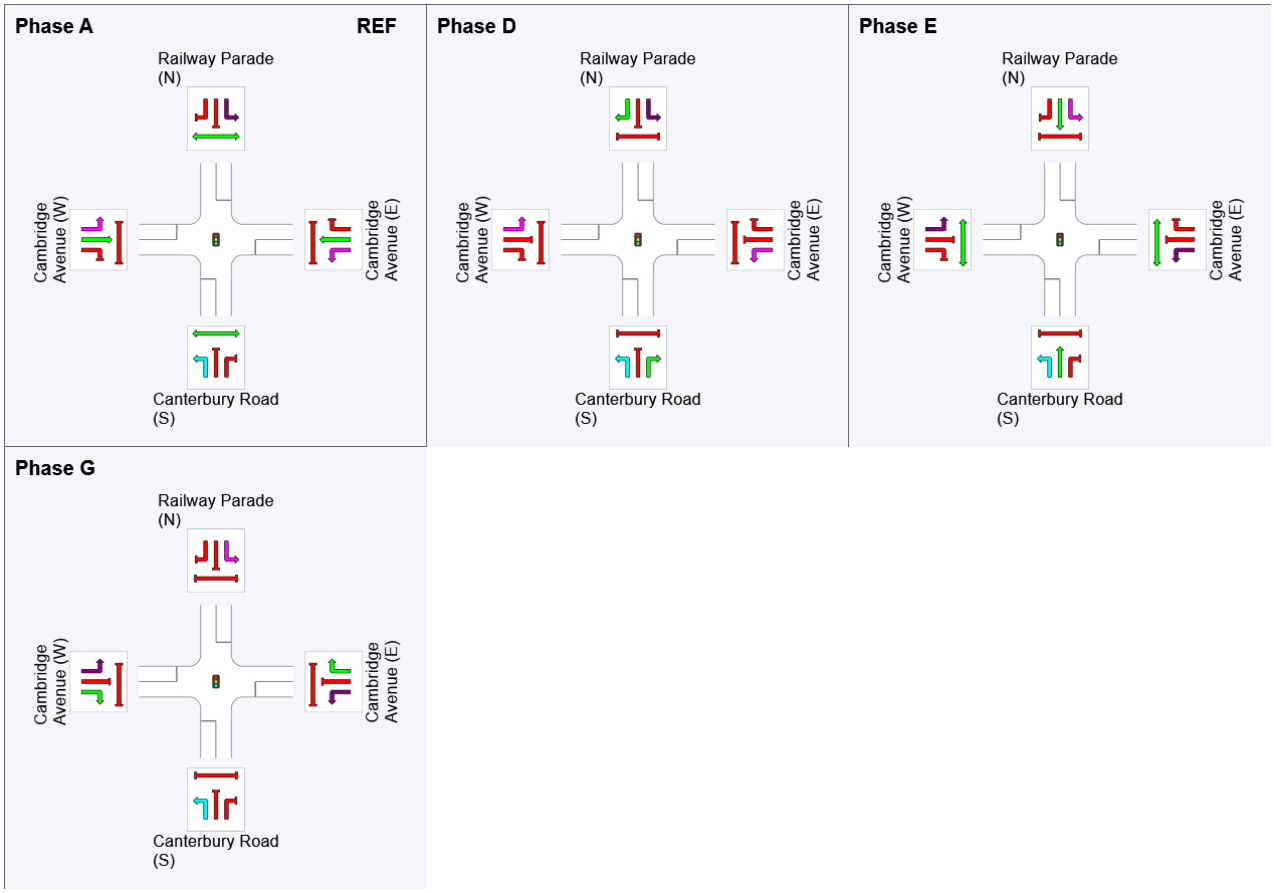
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, D, ?, E, G
Output Phase Sequence: A, D, E, G

Phase Timing Summary

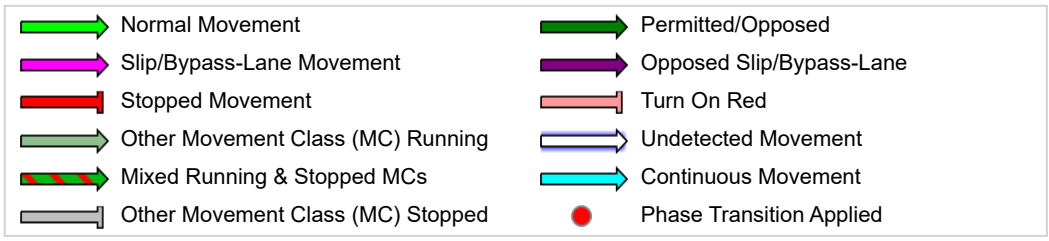
Phase	A	D	E	G
Phase Change Time (sec)	0	45	83	119
Green Time (sec)	39	32	30	25
Phase Time (sec)	45	38	36	31
Phase Split	30%	25%	24%	21%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: v [03 - Canterbury Rd / Railway Parade / Cambridge Ave PM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase A
Input Phase Sequence: A, D, ?, E, G
Output Phase Sequence: A, D, ?, E, G

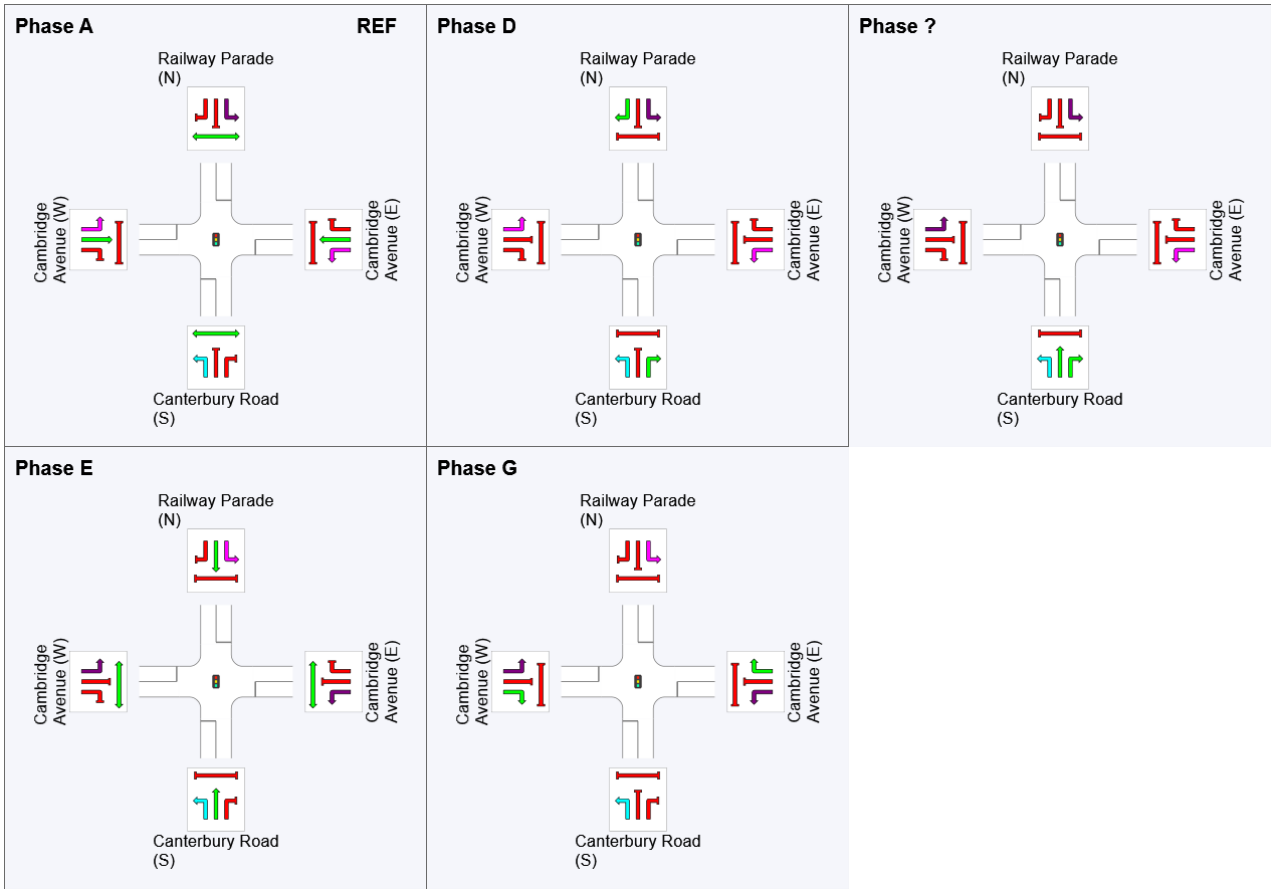
Phase Timing Summary

Phase	A	D	?	E	G
Phase Change Time (sec)	0	34	52	57	93
Green Time (sec)	28	12	***	30	51
Phase Time (sec)	34	18	5	36	57
Phase Split	23%	12%	3%	24%	38%

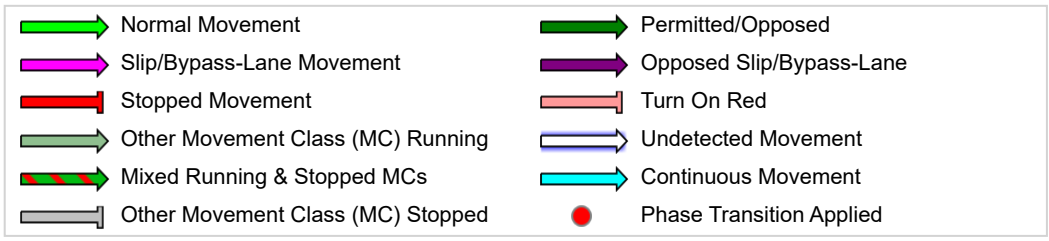
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

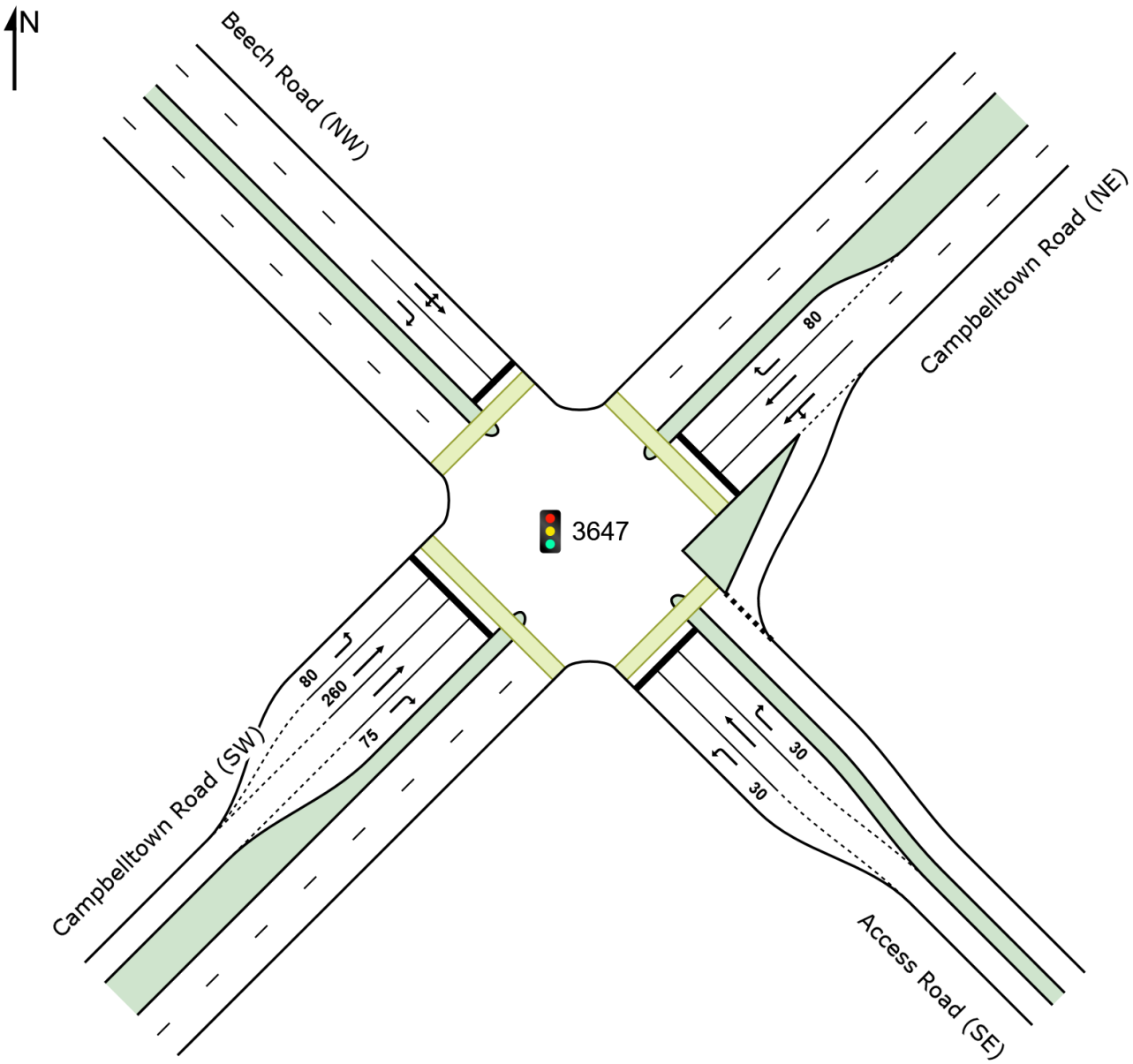


SITE LAYOUT

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM (Site Folder: Base)]

Base AM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

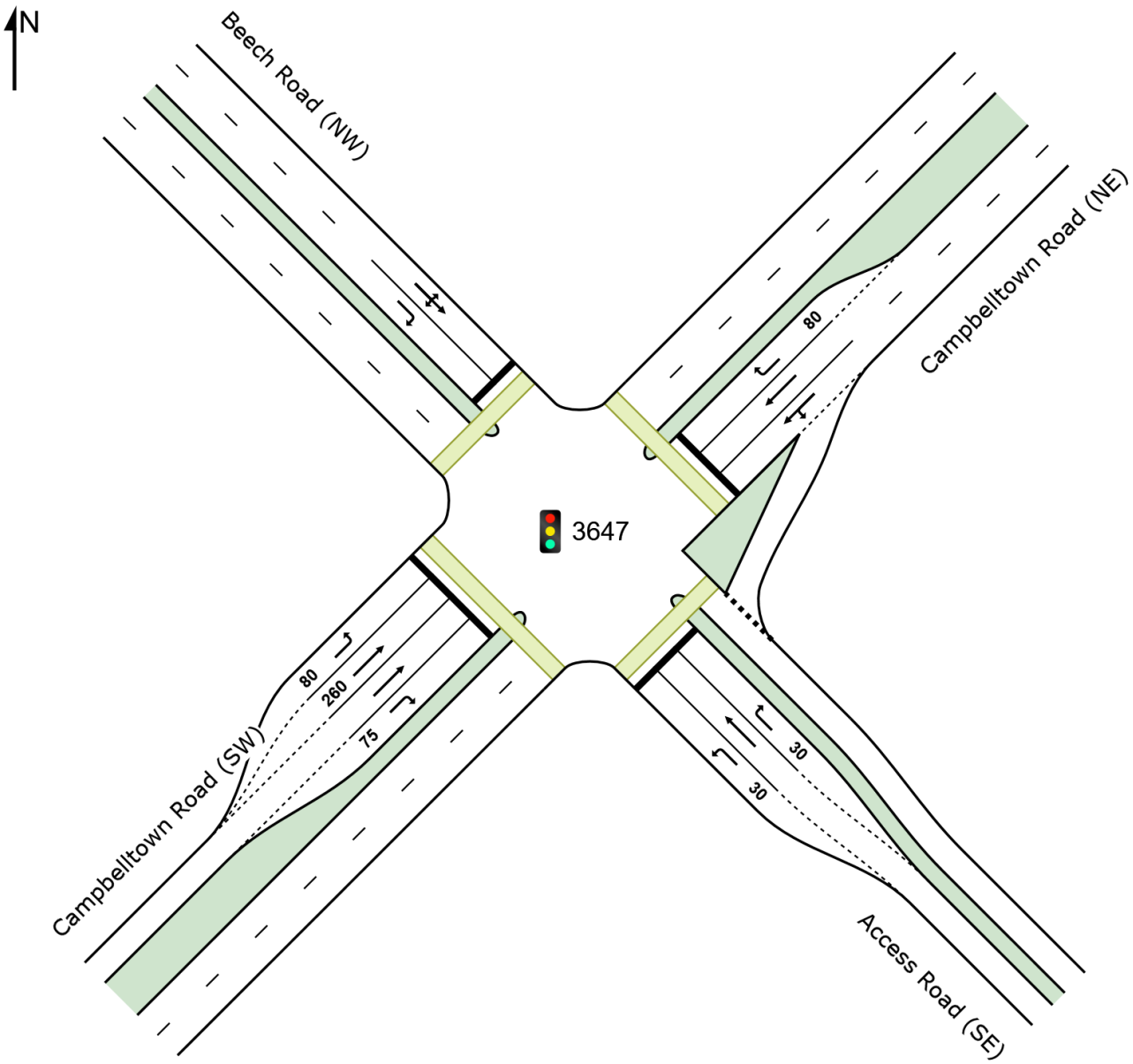


SITE LAYOUT

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM (Site Folder: Base)]

Base PM
Site Category: Base Year 2019
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



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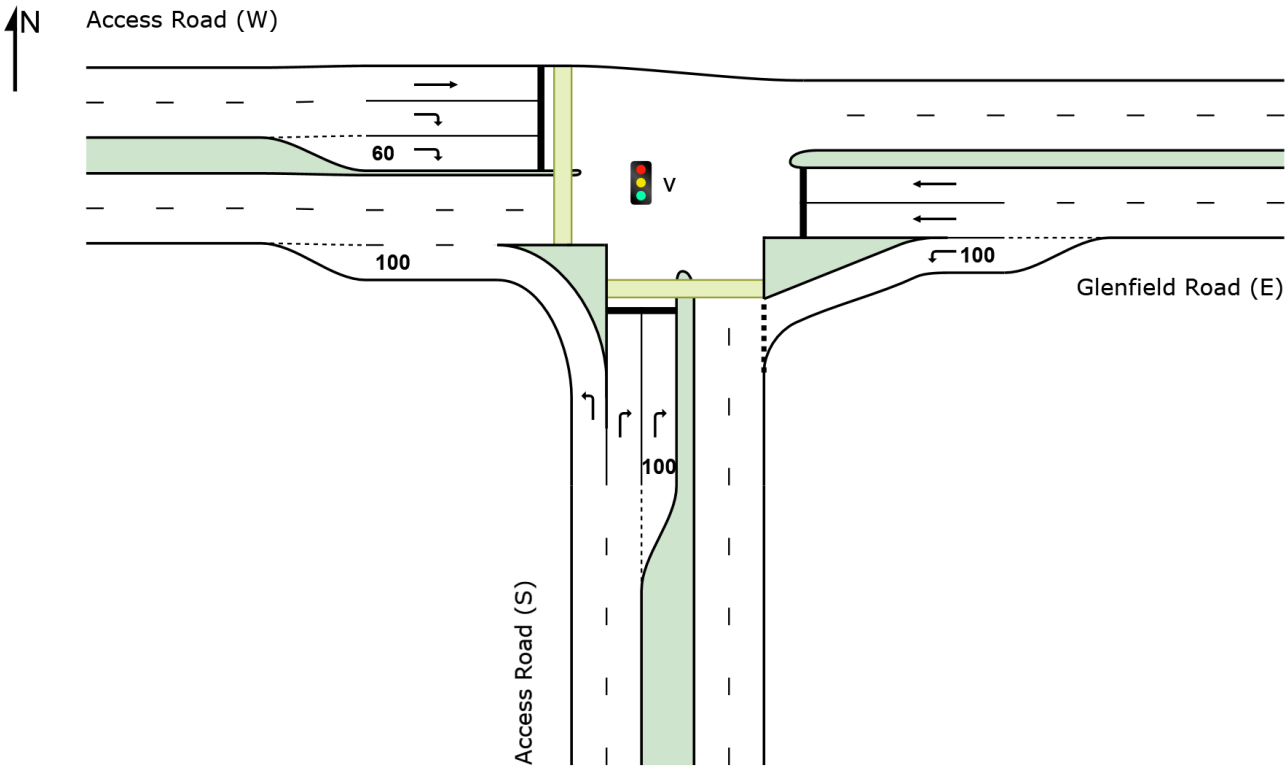
SITE LAYOUT

Site: v [02 - Glenfield Road / access road AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



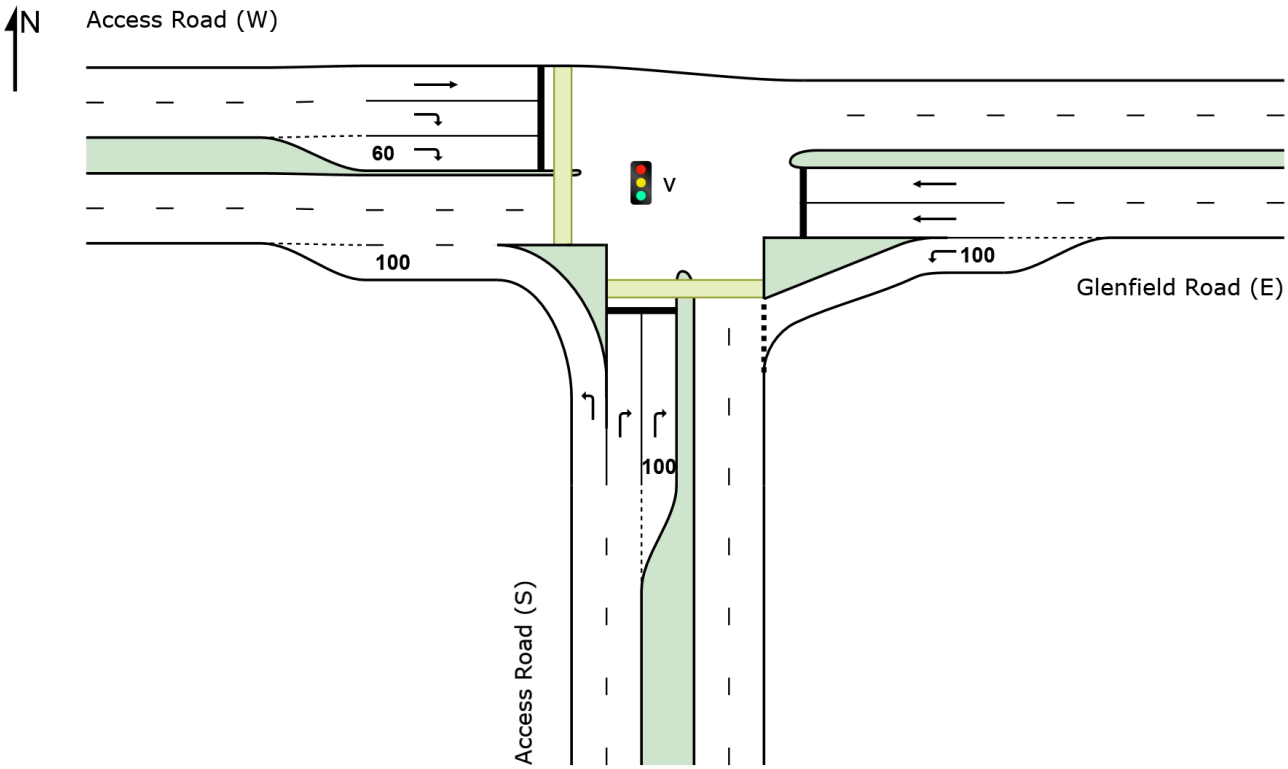
Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Created: Friday, 4 June 2021 4:17:01 PM
Project: N:\Projects\800\FY18\022_GLENFIELD TMAP\Des-An\Traffic_SIDRAs 2021 traffic update\SIDRA\2019 Base and 2036 Future.sip9

SITE LAYOUT

Site: v [02 - Glenfield Road / access road PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



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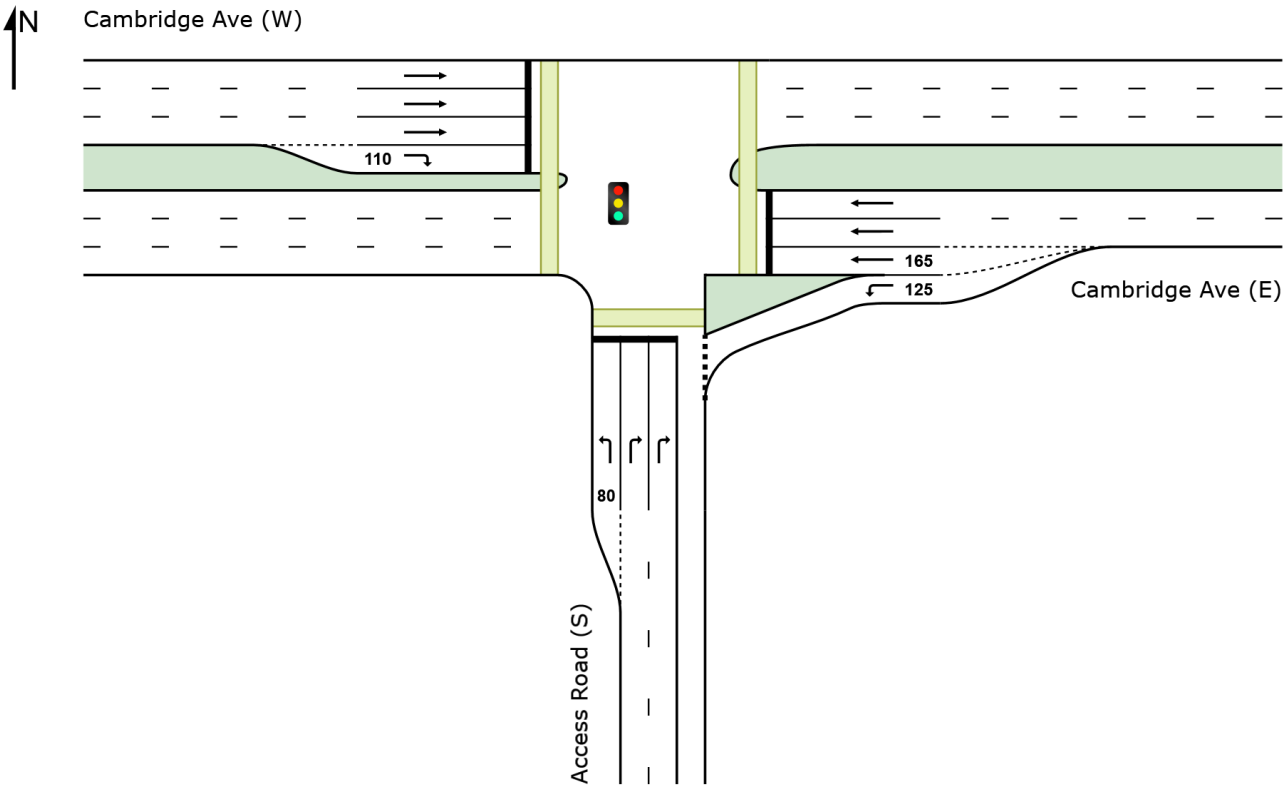
Project: N:\Projects\800\FY18\022_GLENFIELD TMAP\Des-An\Traffic_SIDRAs 2021 traffic update\SIDRA\2019 Base and 2036 Future.sip9

SITE LAYOUT

Site: [04 - Cambridge Avenue / eastern access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

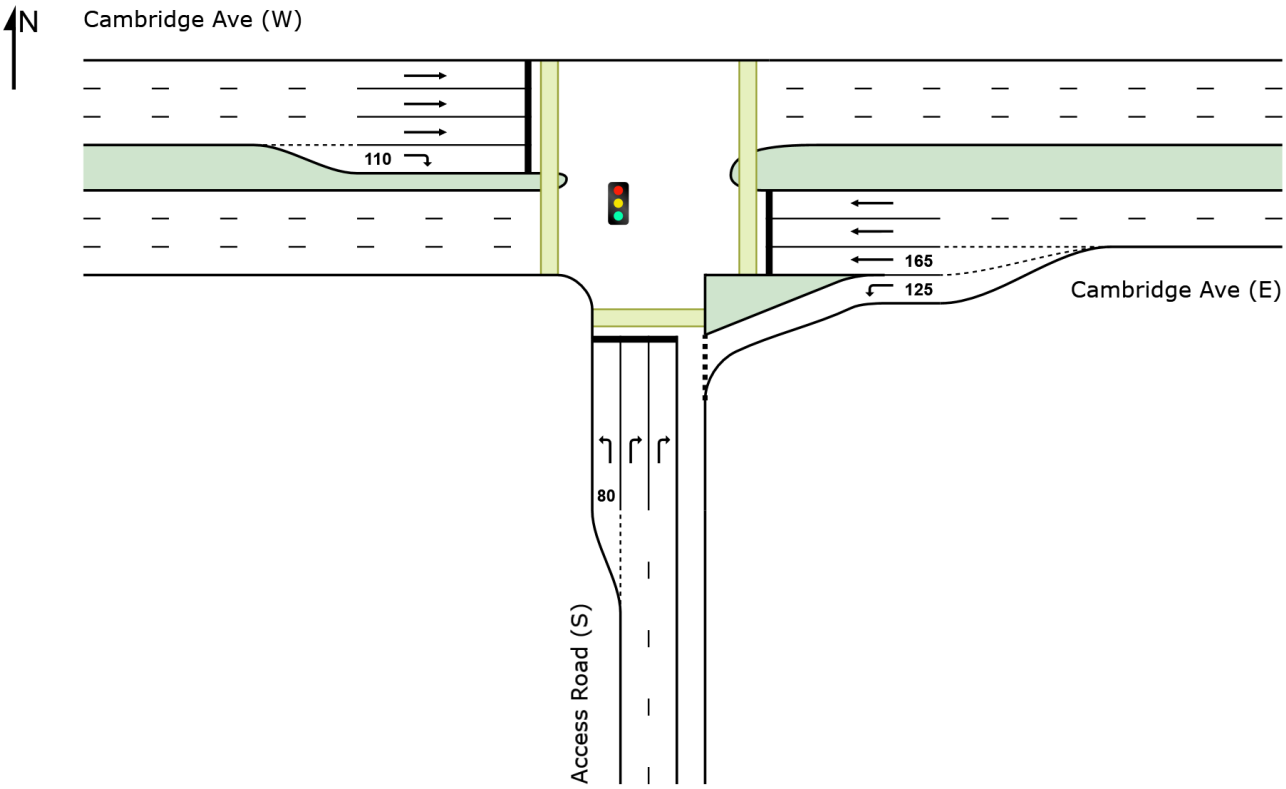


SITE LAYOUT

Site: [04 - Cambridge Avenue / eastern access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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

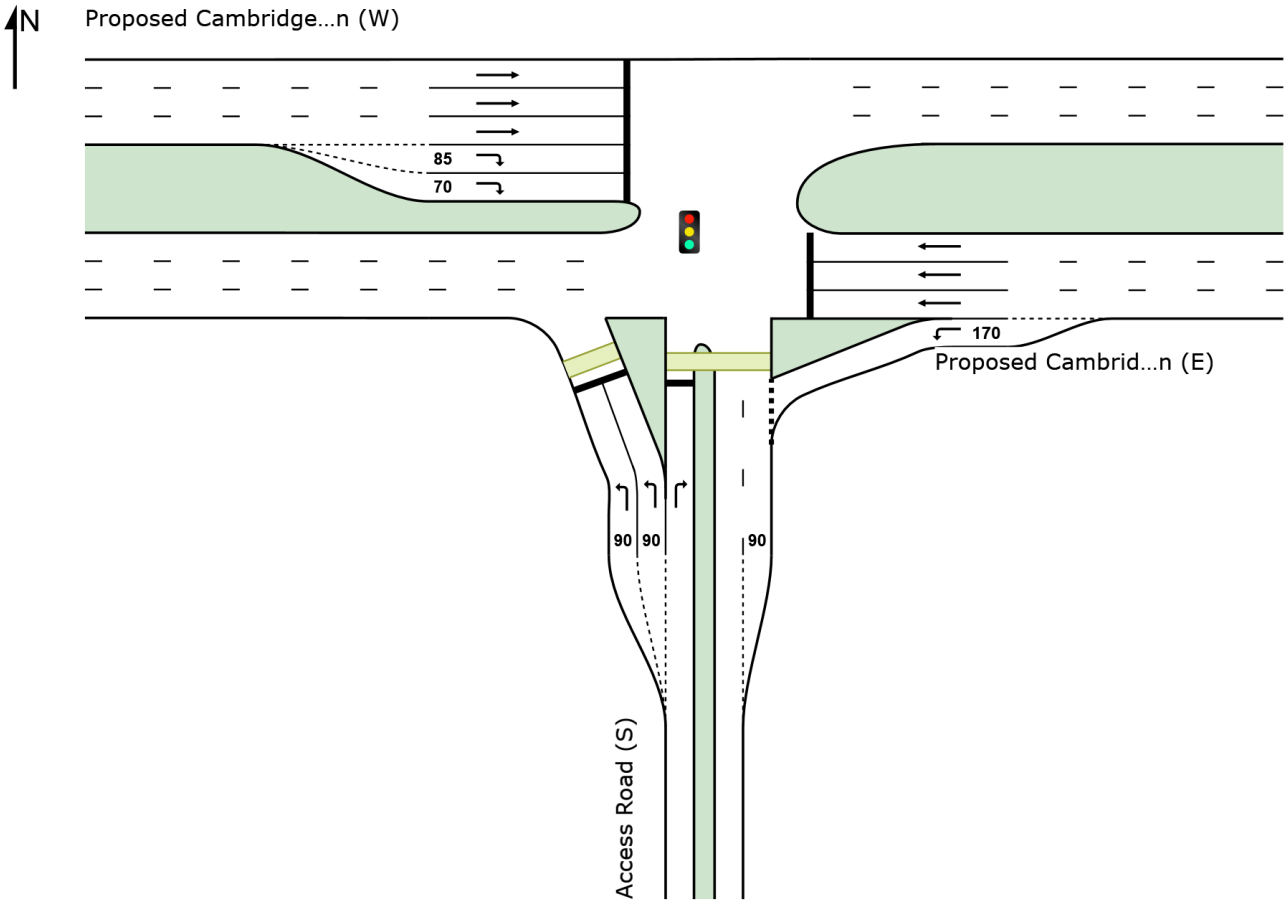


SITE LAYOUT

Site: [05 - Cambridge Avenue / western access AM (Site Folder: Future 2036)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



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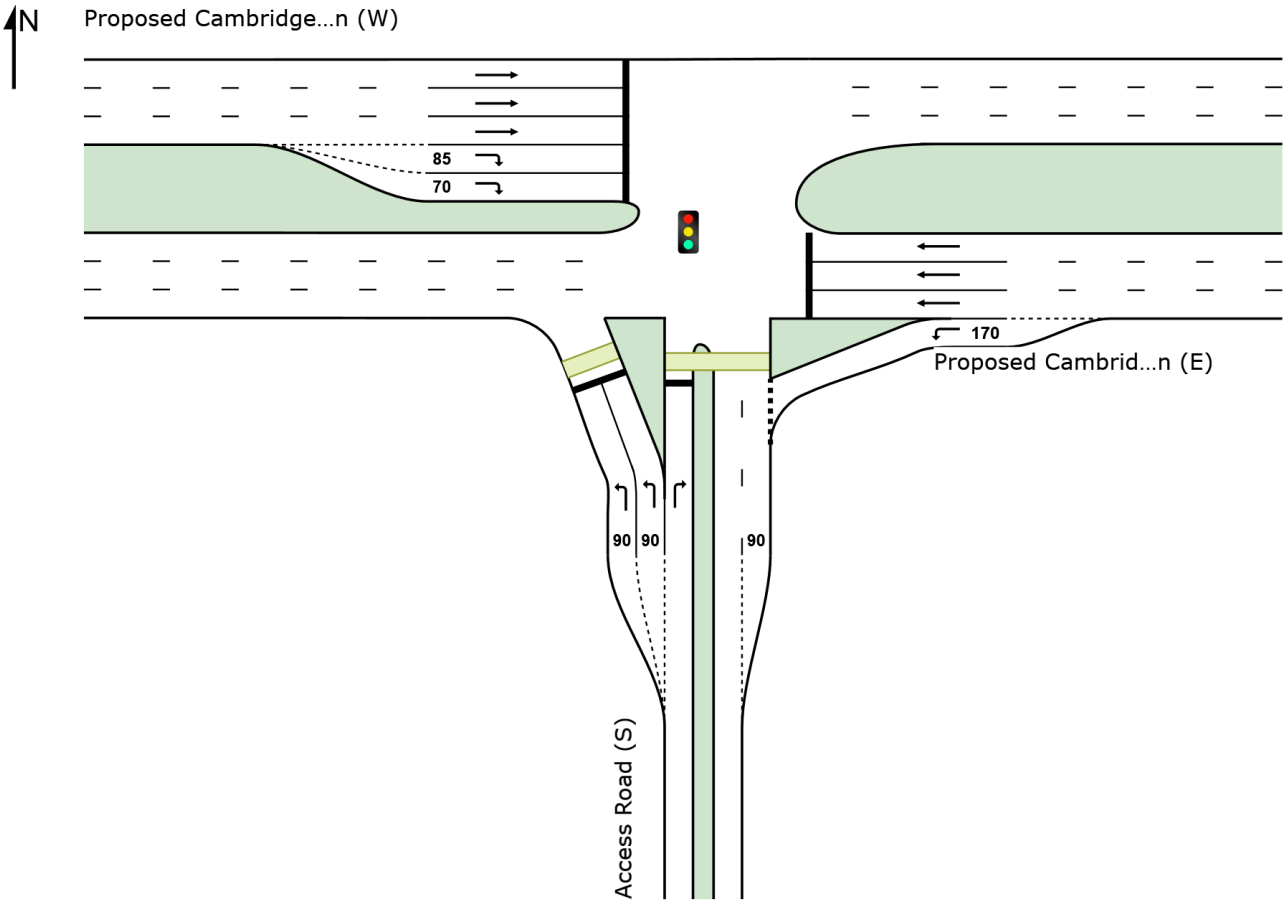
SITE LAYOUT

Site: [05 - Cambridge Avenue / western access PM (Site Folder: Future 2036)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



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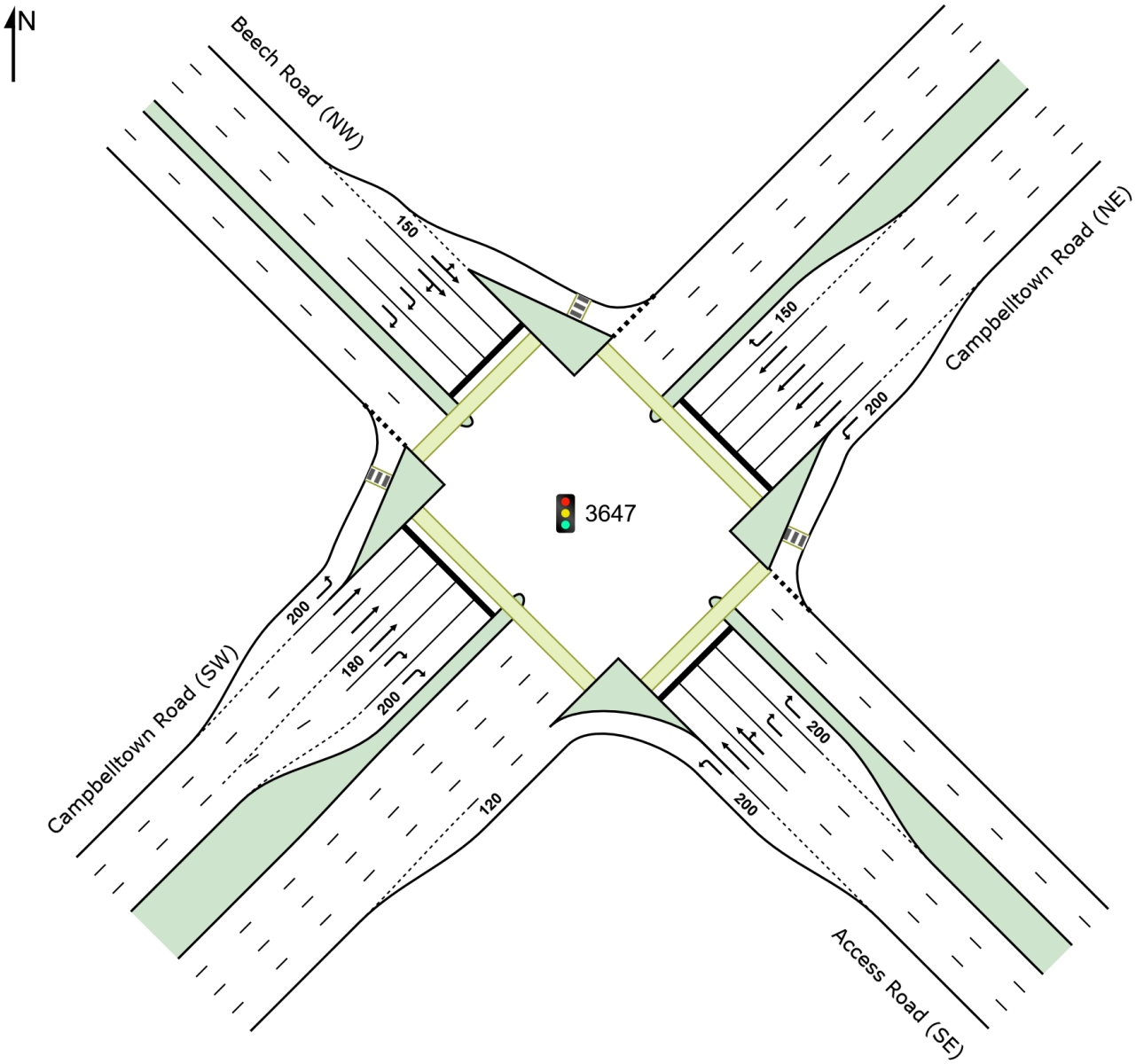
SITE LAYOUT

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road AM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

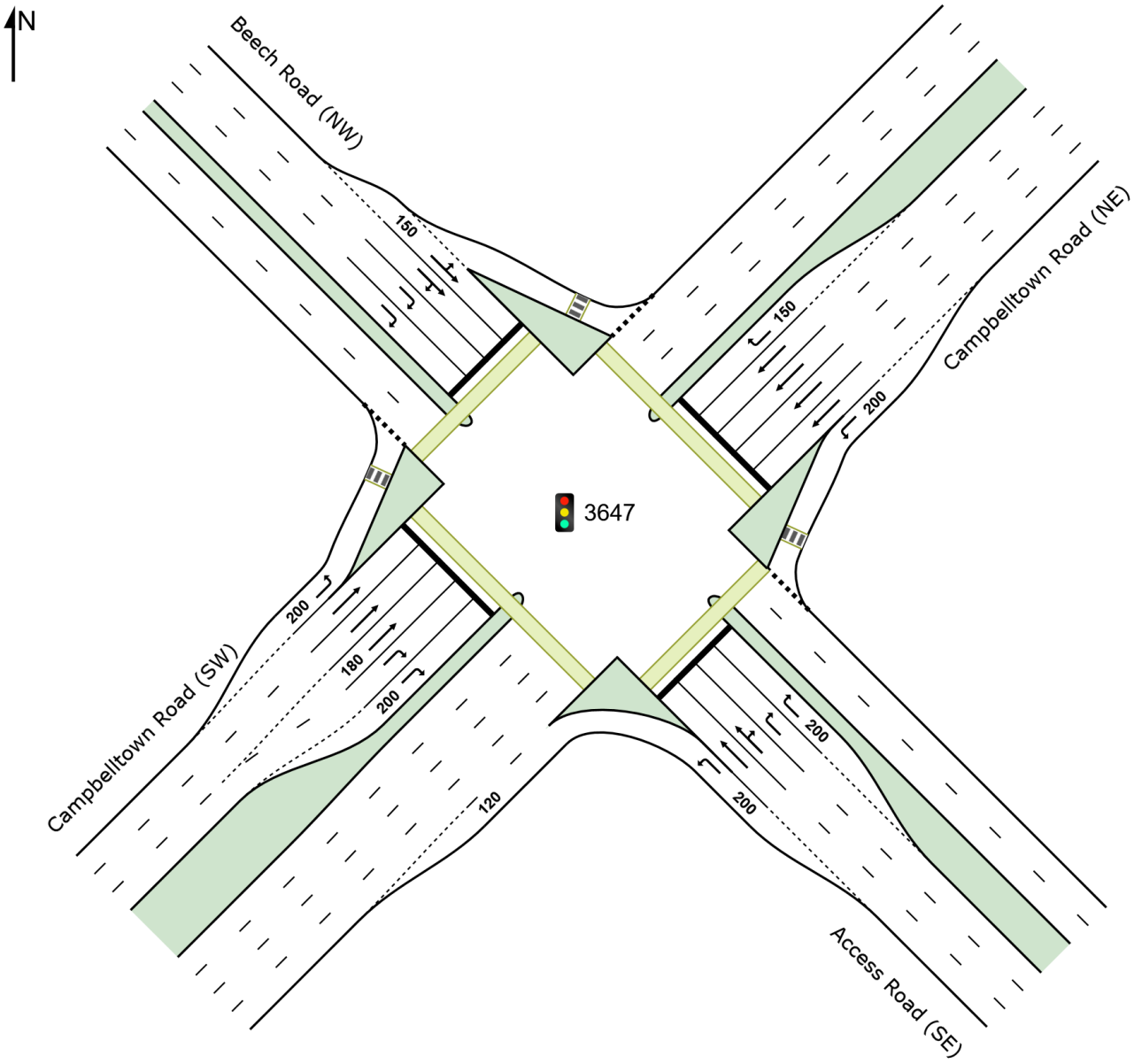


SITE LAYOUT

Site: 3647 [01 - Campbelltown Road & Beech Road & Access Road PM - Solution (Site Folder: Future 2036 - Alternative Layouts)]

2036 PM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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

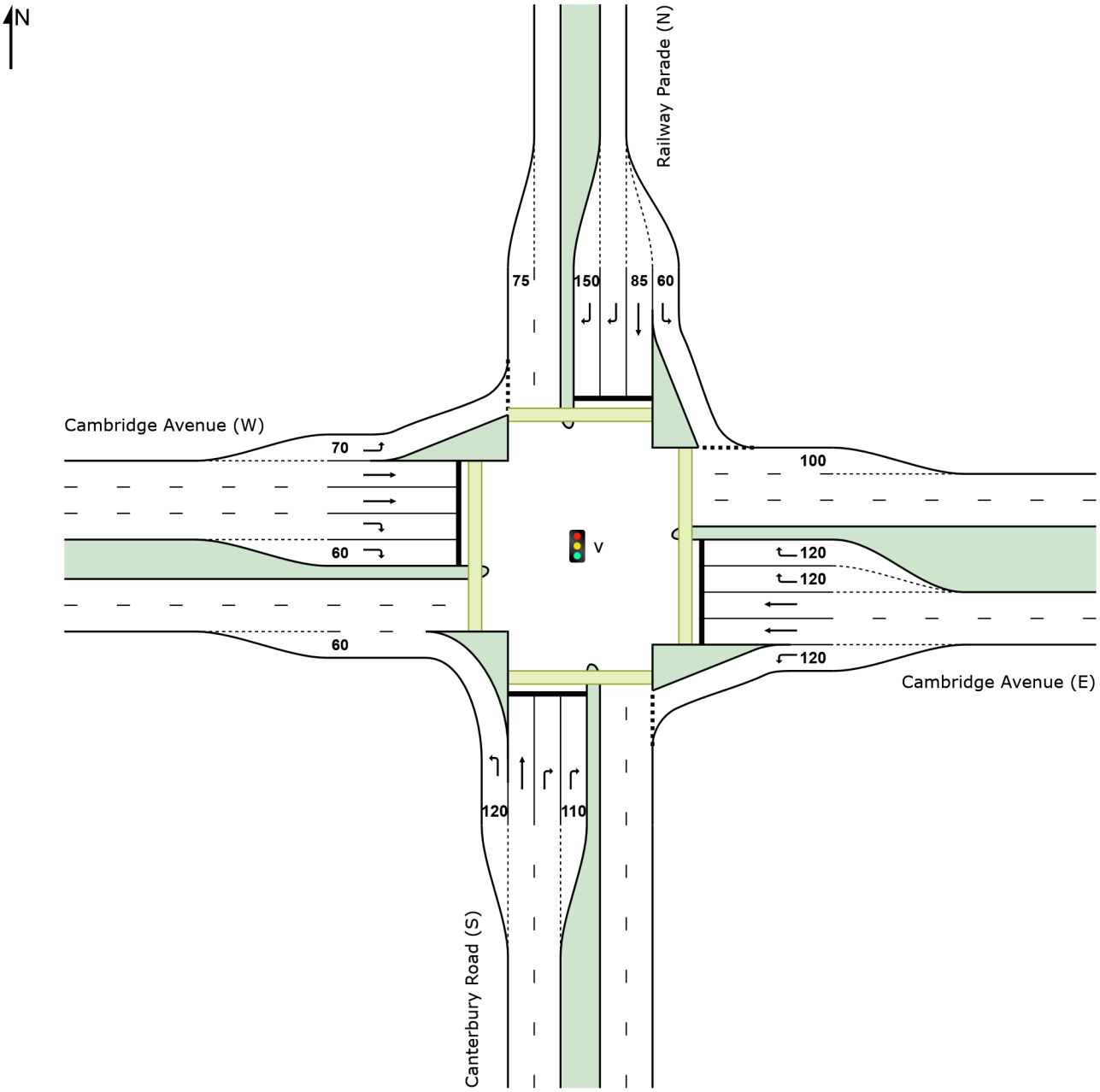


SITE LAYOUT

Site: v [03 - Canterbury Rd / Railway Parade / Cambridge Ave AM - Solution (Site Folder: Future 2036 - Atlernative Layouts)]

2036 AM
Site Category: Future Year 2036
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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



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