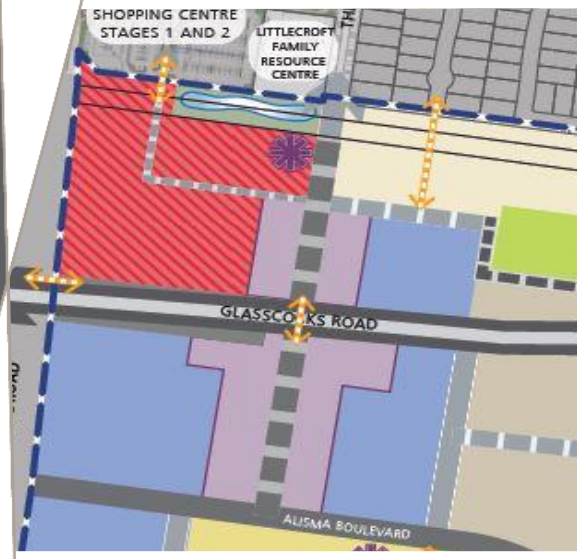
Traffic Modelling Report

Casey Central Town Centre

CG150713



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1 Introduction

1.1 Overview

Cardno has been engaged by the Metropolitan Planning Authority to undertake a first principles assessment of two intersections within the Casey Town Centre Precinct Structure Plan (PSP) area. The intersections assessed are as follows:

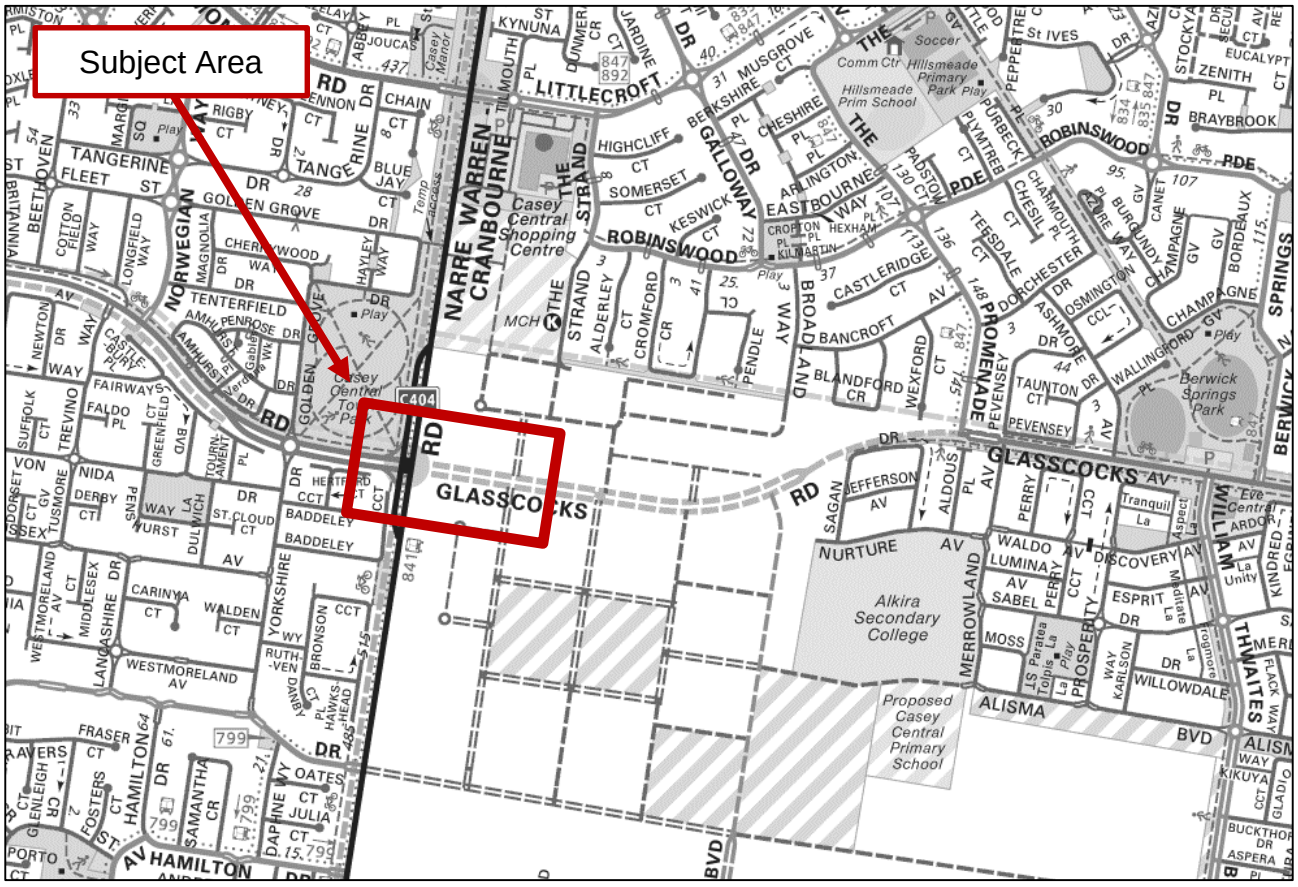
- Narre Warren-Cranbourne Road / Glasscocks Road; and
- Glasscocks Road / The Strand.

The need for this assessment arose from concerns raised by VicRoads in relation to the impacts on the arterial road network operation resulting from the development of the PSP area. To address the concerns raised by VicRoads both the interim (2026) and ultimate (2046) development scenarios were assessed for the AM and PM commuter peak hours.

In additional Cardno also undertook a review of the suitability of service vehicles accessing the proposed transitional retail area along the Narre Warren-Cranbourne site frontage to the north of Glasscocks Road.

The location of the subject area is shown in Figure 1-1.

Figure 1-1 Site Locality



1.2 Casey Central Precinct Structure Plan

The draft Future Urban Structure for the PSP is outlined in Figure 1-2 with an enlarged copy provided in Appendix A.

Figure 1-2 Casey Central Town Centre PSP: draft Future Urban Structure

As outlined in Figure 1-2, the PSP area is bounded by Narre Warren-Cranbourne Road to the west Rosebank Drive to the south, Bray Boulevard to the east and residential / Casey Central Shopping Centre areas to the north. The area is also bisected by Glasscocks Road (a Secondary Arterial Road) and Alisma Boulevard (a Connector Street).

Information has been provided by the MPA with regards to expected land use and road network layout hierarchy, this information is included in Appendix A.

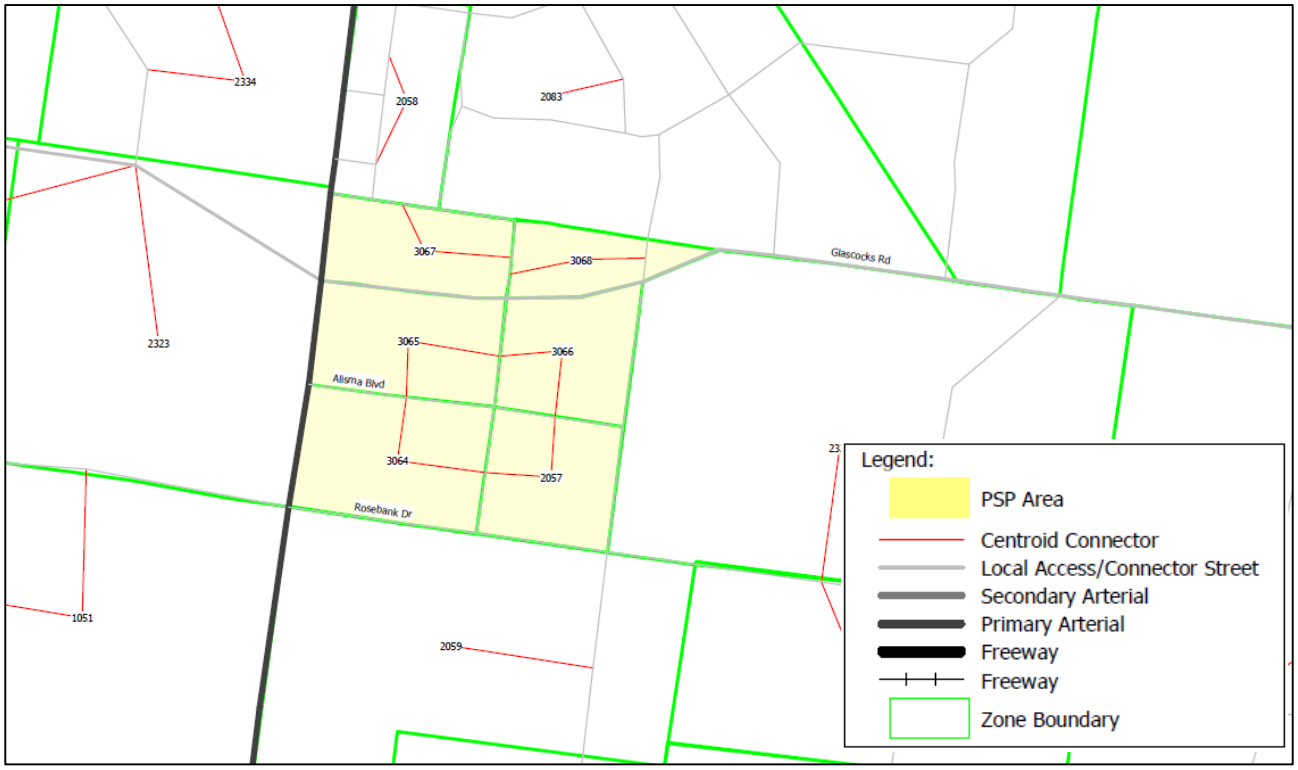
It is envisaged that in the interim (2026) development scenario that the PSP area to the north of Glasscocks Road only is developed, whilst the ultimate (2046) scenario assumes full development of the PSP site.

2 Background Traffic Volumes

2.1 The Victorian Integrated Transport Model

The subject area has previously been included in the Victorian Integrated Transport Model (VITM) South East Growth Area model. The latest available version of this model, developed to assess the McPherson, Croskell and Minta Farm PSPs was used to extract background traffic volumes and assess traffic distributions for the study area. The current zone structure and node layout of the PSP area as modelled in VITM (for the base case, 2026 and 2046) is shown in Figure 2-1.

Figure 2-1 Current VITM zoning



It is noted that the zone structure in VITM has been set up to best represent the ultimate conditions, land uses in some of the base case and 2026 zones are modelled as “zero” to reflect existing and interim land uses.

2.2 Background Traffic Volumes

A select link analysis was run using VITM to determine the amount of traffic utilising Narre-Warren Cranbourne Road and Glasscocks Road for the years 2026 (the interim development scenario) and 2046 (ultimate development scenario). The select link analysis is able to differentiate between precinct generated traffic (i.e. the traffic to/from the Casey Town Centre Precinct) and non-precinct traffic generation (background traffic volumes).

The background traffic volumes during the AM and PM 1-hour commuter peak[1] for Narre-Warren Cranbourne Road, Glasscocks Road and The Strand are shown in Figure 2-2 and Figure 2-3.

[1] A factor of 0.55 was applied to the 2-hour VITM outputs to determine the 1-hour peak traffic volumes.

Figure 2-2 1-Hour Peak Background Traffic Volumes (Excludes Casey Town Centre Precinct) 2026

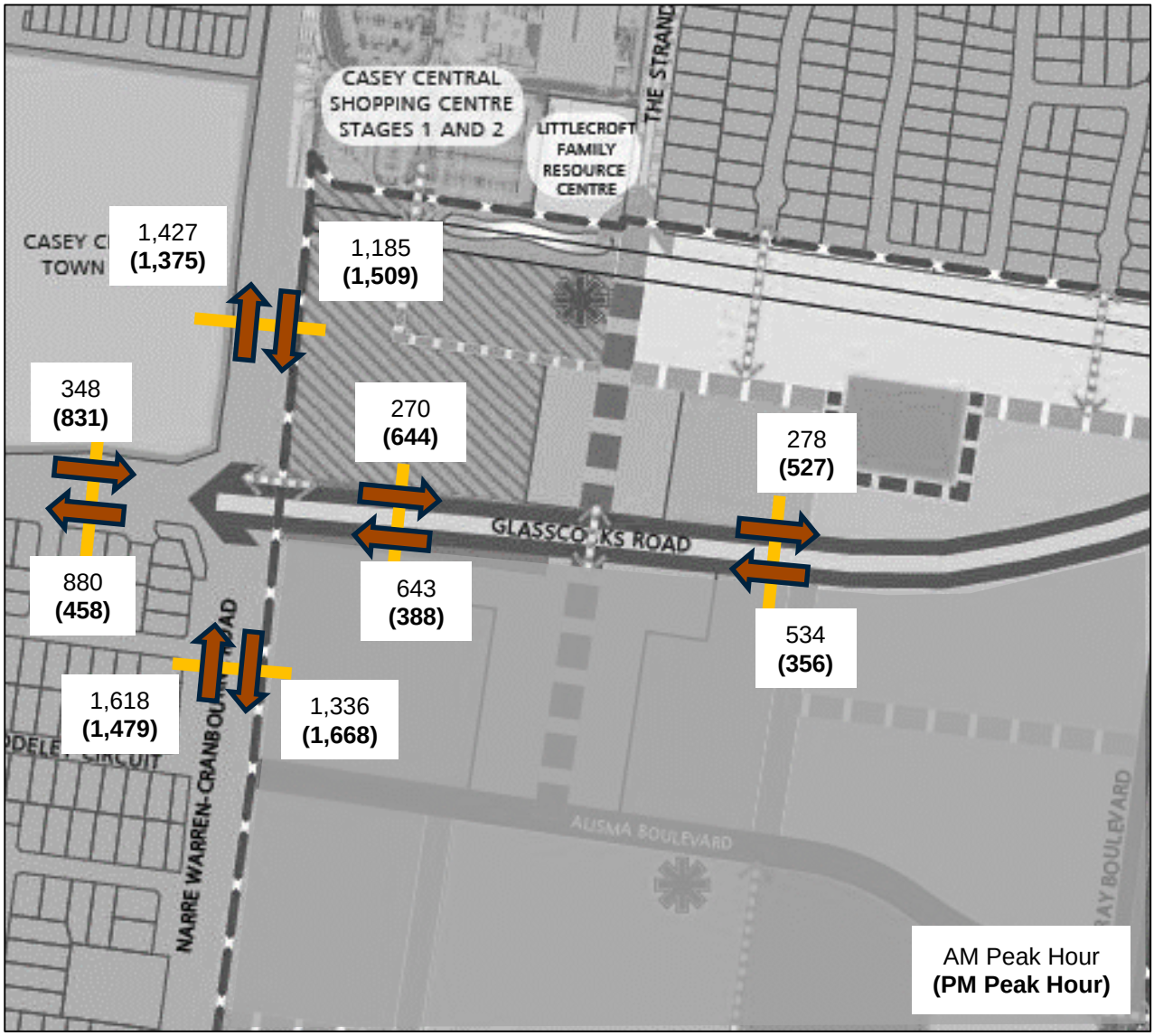


Figure 2-3 1-Hour Peak Background Traffic Volumes (Excludes Casey Town Centre Precinct) 2046

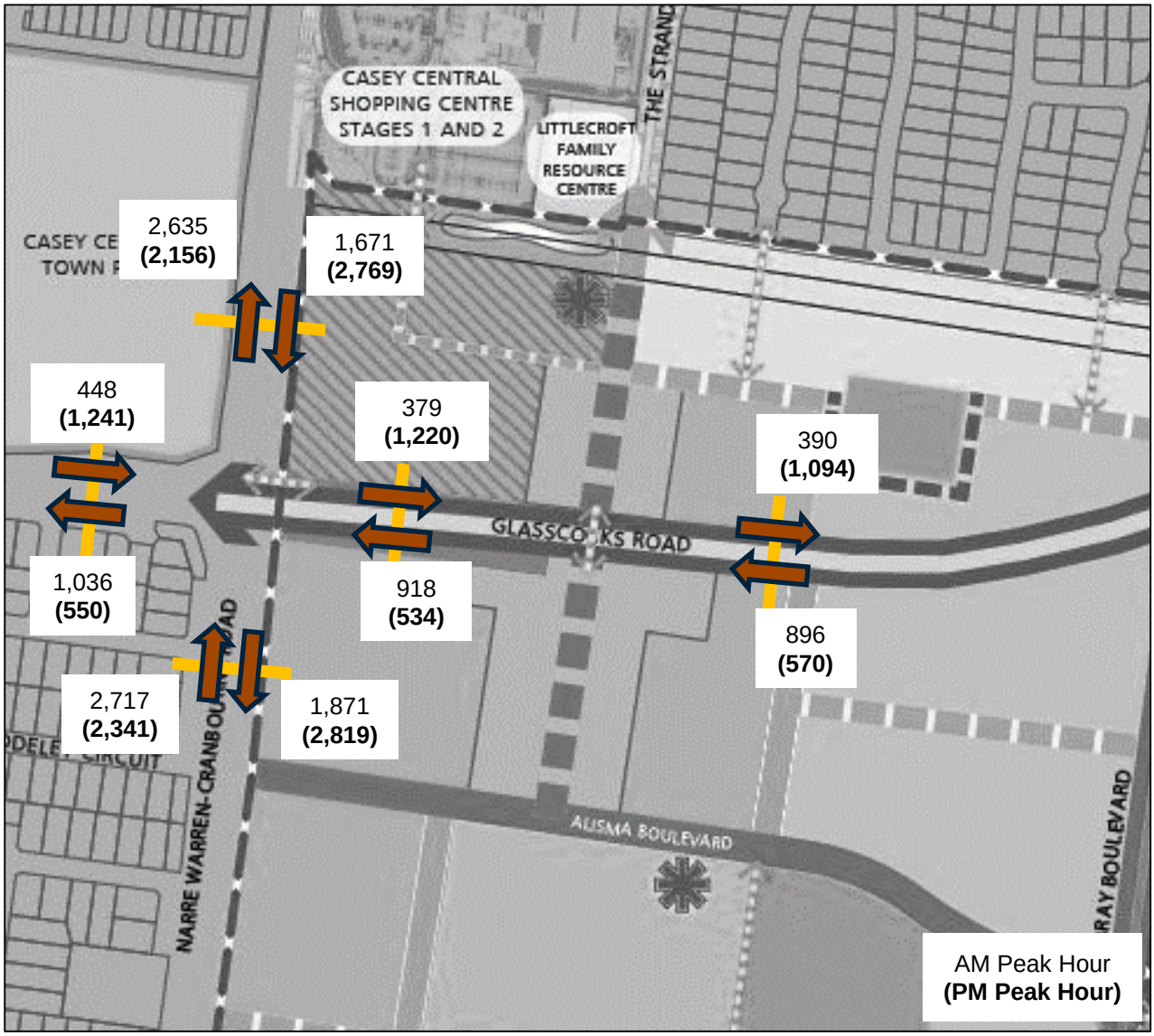


Figure 2-3 indicates that the background traffic volumes on Narre Warren-Cranbourne Road are expected to be in excess 2,700 vehicles per hour in each direction during the PM peak under ultimate operating conditions.

2.3 Background Traffic Volumes on Narre Warren-Cranbourne Road

As outlined in Section 2.2, by 2046 VITM indicates that the background traffic volumes on Narre Warren-Cranbourne Road are expected to be in excess of 2,700 vehicles per hour in each direction during the PM peak.

The Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis notes that the typical midblock capacity for urban roads with interrupted flow is in the order of 900-1000 vehicles per hour per lane indicating that Narre-Warren-Cranbourne Road will be operating very to capacity even without the development of the subject PSP area under ultimate conditions.

In addition, recent research[2] indicates that the capacity of a traffic lane for an urban road in Melbourne operating under interrupted flow conditions is in the order of 850-900 vehicles per hour per lane.

[2] *Measuring and Assessing Traffic Congestion: A Case Study* paper (2014) by C. Yumlu, S. Moridpour and R. Akcelik, presented at the AITPM 2014 Nation Conference; and *City Road Masterplan: Traffic and Access Study Issues and Opportunities* report, prepared for the City of Melbourne by GHD, dated May 2014.

The near-capacity ultimate background traffic volumes on Narre Warren-Cranbourne Road during the PM peak hour are attributed to the expansion of the Urban Growth Boundary rather than the development of the Casey Central Town Centre alone. In order to manage the expected background traffic volume growth on Narre Warren-Cranbourne Road consideration should be given to providing extra capacity (i.e. four through traffic lanes in each direction).

3 Traffic Generation

3.1 Adopted First Principles Traffic Generation Rates

The draft Future Urban Structure Plan for Casey Central Town Centre was sourced from the MPA along with expected floor areas and land use yields for each area. The anticipated ultimate development yields for sub precincts within the PSP are summarised in Figure 3-1 and Table 3-1.

Figure 3-1 PSP Sub-Precincts

Table 3-1 Anticipated Ultimate Land Use Yields

Sub-Precinct	Yield	Sub-Precinct	Yield
TR1	13,865m^2	HD2	385 dwelling
CR1	1,865m^2	HD3	552 dwelling
CR2	1,865m^2	CC3	16,772m^2
CC1	14,045m^2	ICF1	1 unit
MD1	174 dwellings	ISF1	1 unit
HD1	107 dwellings	MU1	303 apartments
CC2	30,778m^2	MU2	6,188m^2
CR3	4,452m^2	HD4	579 dwelling
CR4	4,452m^2	HD5	454 dwelling
CC2	26,020m^2	MD2	46 dwelling

Cardno sourced traffic generation rates for each of the land uses from the New South Wales Road and Traffic Authority "Guide to Traffic Generating Developments" document (the RTA Guide) and case study data held by Cardno. The adopted traffic generation rates are summarised in Table 3-2.

Table 3-2 Adopted Traffic Generation Rates and Resulting Traffic Generation

Use	MPA land use codes	AM Rate	PM Rate
Bulky Goods	TR1	1.35 veh / 100m^2 GFA	2.7 veh / 100m^2 GFA
Specialty Retail	CR2, CR4	4 veh / 100m^2 NLA	8 veh / 100m^2 NLA
Office	CC1, CC2, CC3	2.1 veh / 100m^2 NLA	1.75 veh / 100m2 NLA
Shop top office	CR1, CR3	1.6 veh / 100m^2 NLA	1.3 veh / 100m2
Medium Density Residential	MD1, MD2	0.8 veh / dwelling	0.8 veh / dwelling
High Density Residential	HD1, HD2, HD3, HD4, HD5	0.7 veh / dwelling	0.7 veh / dwelling
Residential - Apartments	MU1, MU2	0.7 veh/dwelling	0.7 veh / dwelling
Community facility	ICF1 and ISF1	15 veh	150 veh

Based on the generation rates outlined in Table 3-2, the PSP area is expected to generated 1,009 trips in the interim and ultimately 4,601 vehicle trips during the PM peak hour (the busiest peak hour for the PSP area).

The traffic generated by each precinct is attached as Appendix B to this report.

3.2 Comparison of VITM verses the First Principles Traffic Generation

The traffic generated by the first principles assessment for the ultimate scenario was compared to VITM trip generation for the PSP area, the results of which are provided in Table 3-3.

Table 3-3 Trip Generation Comparison - 2046

VITM Node	AM Peak			PM Peak		
	VITM trips	1st Principle Trips	Difference ±	VITM trips	1st Principle Trips	Difference ±
3067	280	291	+11	459	458	+89
3068	165	508	+343	203	461	+258
3065	499	1169	+670	664	1182	+518
3066	548	930	+382	671	885	+214
3064 + 2057	1081	1483	+402	1320	1552	+232

A review of Table 3-3 indicates that the first principles traffic generation exceeds the VITM trip generation, and as such provides a conservative assessment of the trips generated by the PSP area.

4 Traffic Distribution

4.1 VITM distribution

In order to ascertain the traffic distribution patterns for the PSP area, a VITM select link analysis for each of the VITM zone nodes was undertaken to determine traffic volumes to/from the PSP area to/from Narre Warren – Cranbourne Road, Glasscocks Road and other surrounding areas. The resulting VITM distributions are summarised in Table 4-1.

Table 4-1 VITM traffic distribution – Casey Town Centre Precinct

Direction	Year 2026		Year 2046	
	AM Peak	PM Peak	AM Peak	PM Peak
North (Narre Warren-Cranbourne Road)	20%	19%	20%	20%
South (Narre Warren-Cranbourne Road)	19%	16%	20%	20%
East (Glasscocks Road)	12%	10%	15%	15%
West (Glasscocks Road)	4%	4%	4%	4%
Other (internal trips and local area trips)	45%	50%	41%	41%

The “other” trips outlined in Table 4-1 represent internal trips, local road trips to the adjoining Cranbourne North Stage 1 PSP (interim and ultimate), and ultimately trips via Bray Boulevard, Rosebank Drive, Alisma Boulevard.

Having consideration for the local and arterial road network, and characteristics of the surrounding and internal land uses, the VITM distributions are considered to be generally representative of the likely traffic distributions of the PSP area.

However, it is noted that Narre Warren-Cranbourne Road is expected to be operating at/close to capacity by 2046 even without the development of the subject PSP area. As such a more balanced distribution between the three key external directions (Narre Warren-Cranbourne Road north and south, Glasscocks Road east) is to be expected.

The following traffic distributions have therefore been adopted for the purposes of spreadsheet modelling (refer to Section 5).

Table 4-2 Adopted Traffic Distribution – Casey Town Centre Precinct

	Direction	Year 2026	Year 2046
External Trips	Narre Warren-Cranbourne Road (North)	22.5%	19%
	Narre Warren-Cranbourne Road (South)	22.5%	19%
	Glasscocks Road (East)	24.5%	18%
	Glasscocks Road (West)	4.5%	4%
	Rosebank Drive (West)	1%	1%
	Bray Boulevard (South)	0%	1%
	Rosebank Drive (East)	0%	1%
	Alisma Blvd (East)	0%	1%
	Broadland Way (North)	1%	1%
	The Strand (North)	1%	1%
Internal Trips	Precinct 1	3%	3%
	Precinct 2	3%	3%
	Precinct 3	1%	1%
	Precinct 4	3%	3%
	Precinct 5	3%	3%
	Precinct 6	0%	3%
	Precinct 7	0%	1%
	Precinct 8	0%	3%
	Precinct 9	0%	4%
Local Trips	Casey Central Shopping Centre (North)	10%	10%

5 Spreadsheet Analysis

5.1 Spreadsheet Analysis

In order to assess the PSP area traffic generation, a spreadsheet model was prepared. The spreadsheet analysis methodology is summarised as follows:

- The PSP area was divided up into nine precincts total for this study;
- The trip generation rates were input for each land use (as per Table 3-2);
- Trips were split between inbound and outbound based on standard distributions[3];
- Trips were distributed to the external or internal destinations (as per Table 4-1);
- Route choice is determined by the modeller based on road hierarchy and intersections constraints (such as banned movements).

In addition other key assumptions used in the development of the spreadsheet models are as follows:

- Each of the land uses is conservatively considered to peak at the same time in each peak hour;
- The two commercial sites which abut Glasscocks Road (east of The Strand) will take access from Glasscocks Road and be restricted to left-in / left-out.
- The unsignalised intersection of Narre Warren-Cranbourne Road / Alisma Boulevard will be restricted to left-in / left-out.
- That infiltration of Casey Central Shopping Centre traffic into the Town Centre will be minor and is included in the background traffic volumes extracted from VITM.

The modelling approach is considered conservative on the basis that the peak traffic generation for all onsite uses is assumed to coincide, and that the analysis is based on empirical traffic generation rates. As the network becomes increasingly busy during peak times, peak spreading, trip linking and people's travel behaviour (time and transport mode) are anticipated to change as is currently being demonstrated in Melbourne Inner suburbs[4].

5.2 Intersection Volumes

Based on the preceding assumptions and analysis, the traffic volumes at the intersections of Narre Warren-Cranbourne Road / Glasscocks Road and Glasscocks Road / The Strand was determined. The post-development (ie background + development generated) turning movements derived for the commuter peak hours for the interim and ultimate development scenarios are outlined in Figure 5-1 to Figure 5-4.

[3]

Use	AM Inbound	AM Outbound	PM Inbound	PM Outbound
Residential	20%	80%	60%	40%
Office	90%	10%	10%	90%
Retail	50%	50%	50%	50%
Community Facilities	50%	50%	50%	50%

[4] *Refer to the VicRoads Traffic Monitor 2012-2013 report, dated September 2014.*

Figure 5-1 Intersection Volumes – Interim (2026) AM Peak Hour

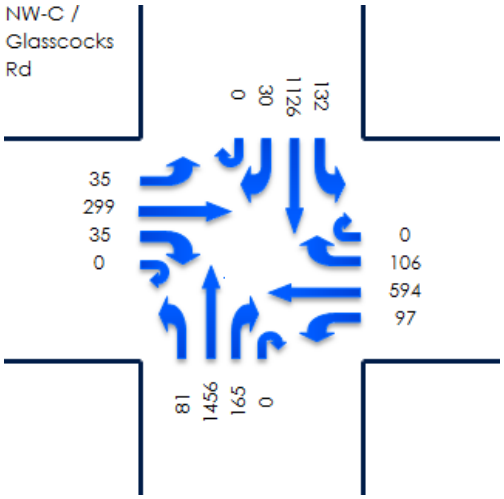
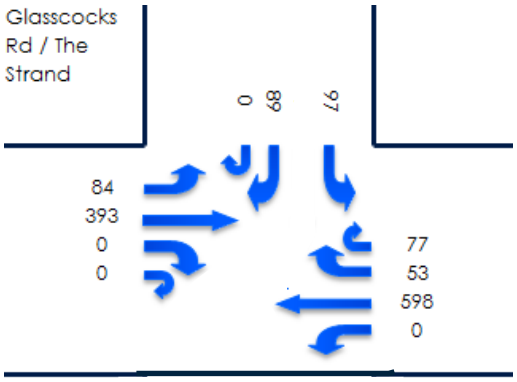
Narre Warren Cranbourne Rd / Glasscocks Rd	Glasscocks Road / The Strand
	

Figure 5-2 Intersection Volumes – Interim (2026) PM Peak Hour

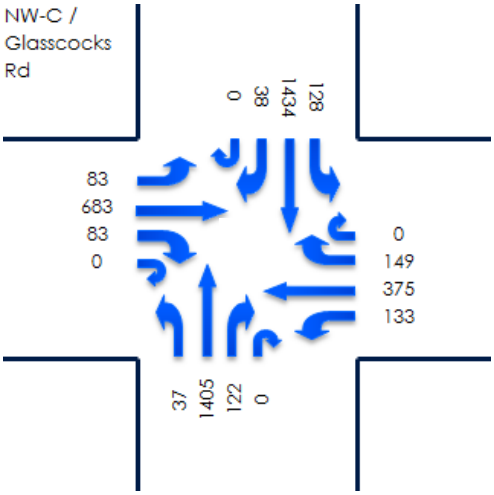
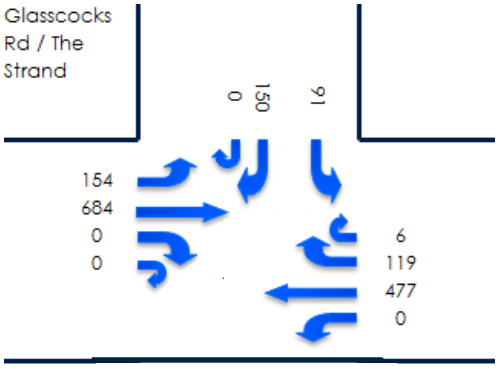
Narre Warren Cranbourne Rd / Glasscocks Rd	Glasscocks Road / The Strand
	

Figure 5-3 Intersection Volumes – Ultimate (2046) AM Peak Hour

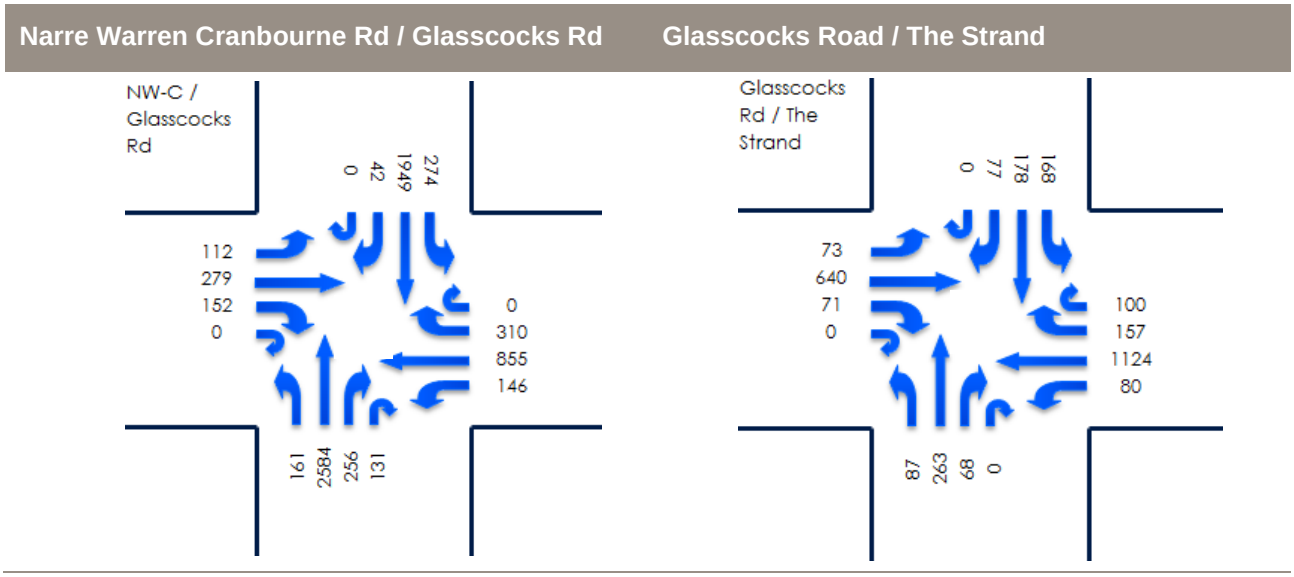
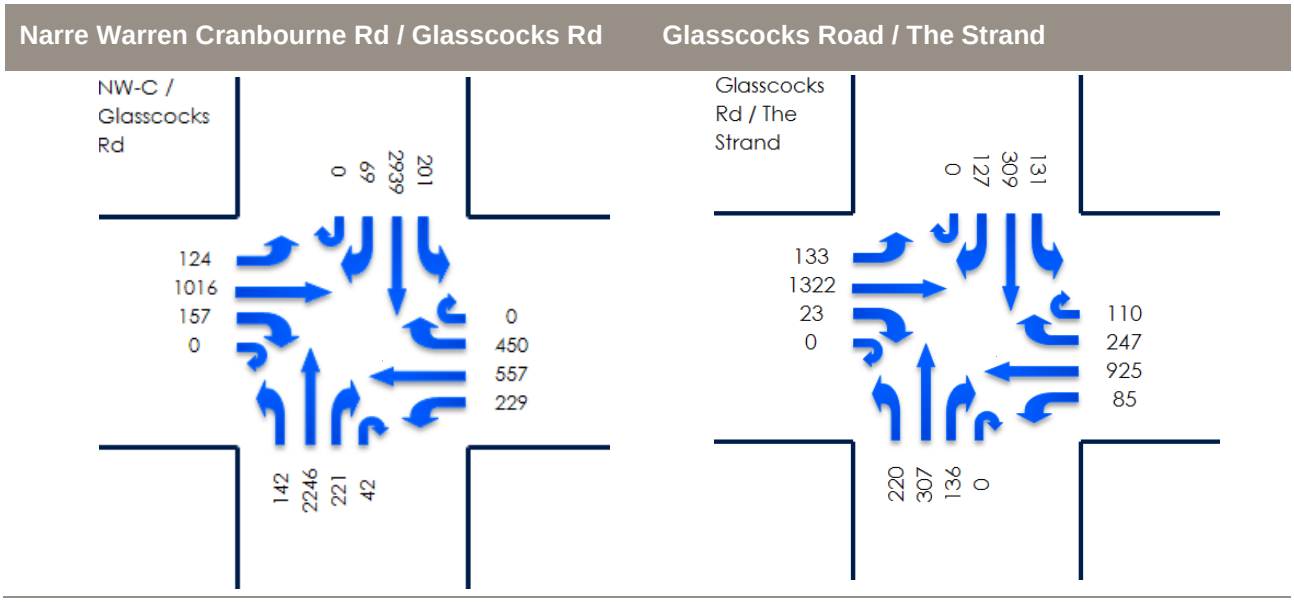


Figure 5-4 Intersection Volumes – Ultimate (2046) PM Peak Hour



6 Proposed Intersection Layouts and Analysis Overview

6.1 Intersection Layouts

The following drawings were provided as part of the project brief:

- VicRoads Interim Alignment drawings – Narre Warren-Cranbourne Road (dated 30/10/12);
- MPA template intersection for Glasscocks Road / The Strand.

Cardno was also provided with DCP drawings for the Town Centre PSP. It is noted that the treatment shown for the intersection of Narre Warren-Cranbourne Road / Glasscocks Road was not consistent with what has recently been constructed onsite, Cardno considered the as-built improvements. The adopted intersection layouts are outlined in Figure 6-1 to Figure 6-4.

Figure 6-1 Narre Warren-Cranbourne Road / Glasscocks Road – Interim (2026)

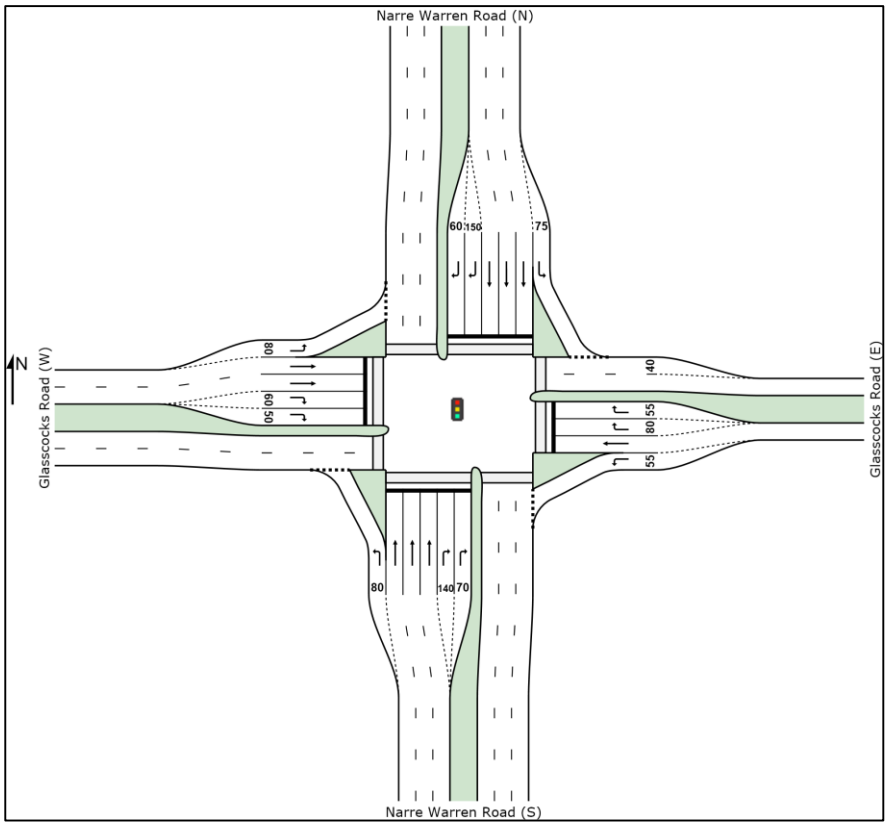


Figure 6-2 Narre Warren-Cranbourne Road / Glasscocks Road – Ultimate (2046)

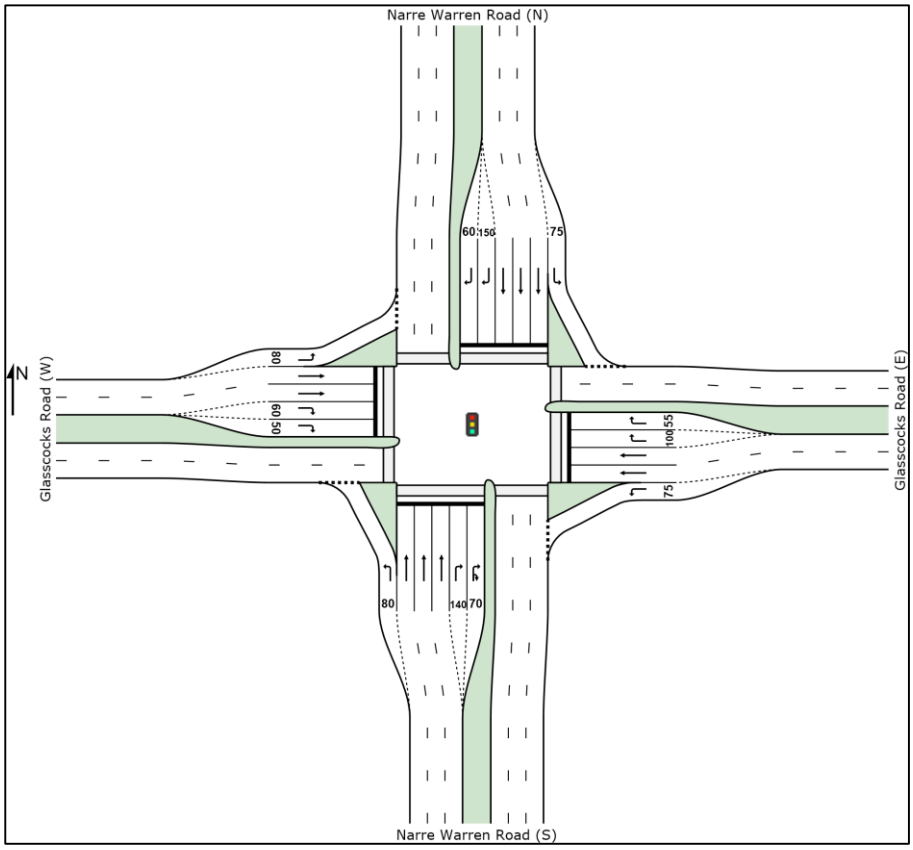


Figure 6-3 Glasscocks Road / The Strand – Interim (2026)

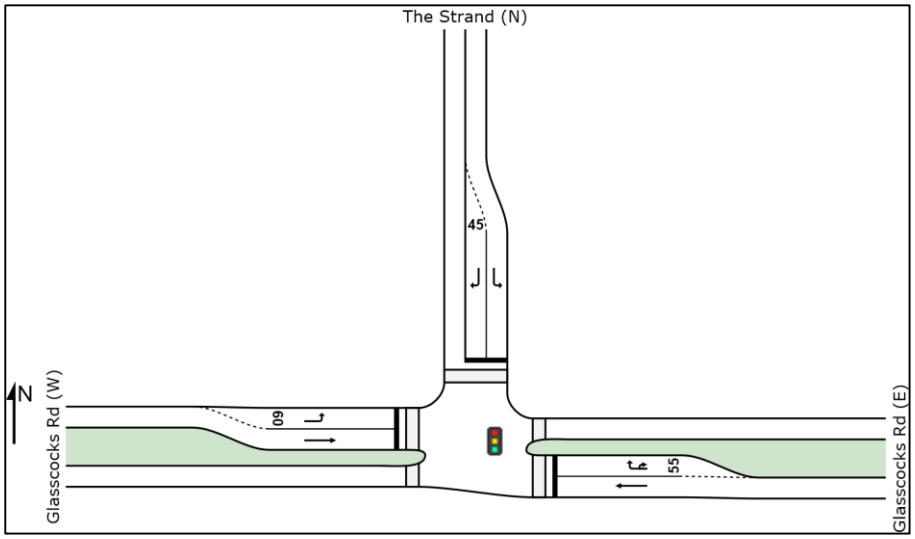
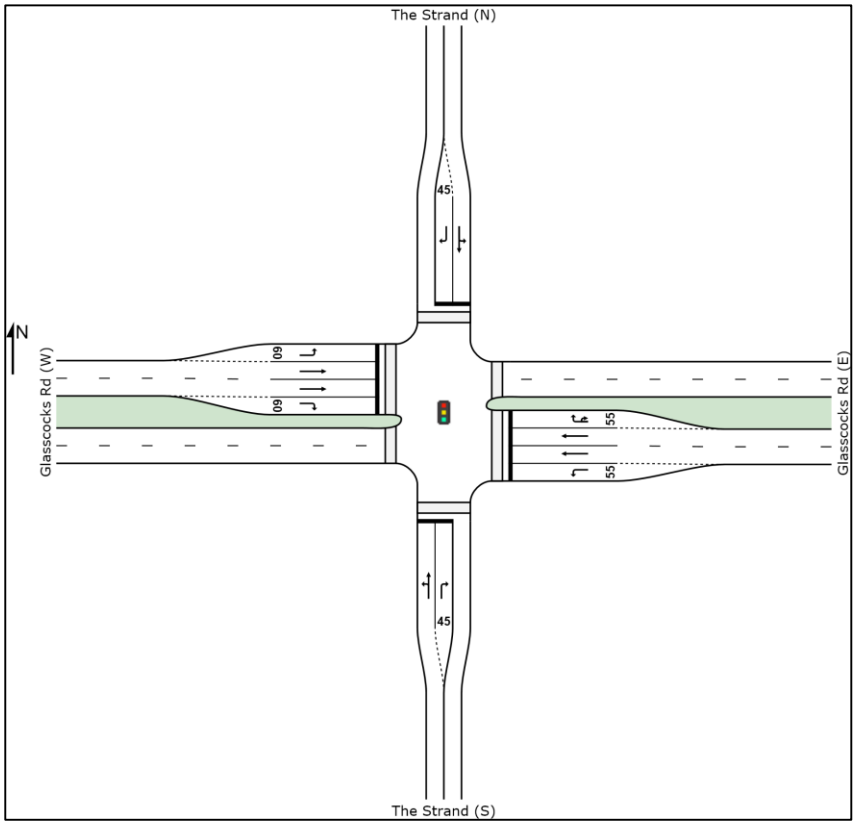


Figure 6-4 Glasscocks Road / The Strand – Ultimate (2046)



6.2 Intersection Analysis Overview

6.2.1 General

The operation of Narre Warren-Cranbourne Road / Glasscocks Road and Glasscocks Road / The Strand intersections were analysed using SIDRA Intersection 6.1. This computer package, originally developed by the Australian Road Research Board, provides information about the capacity of an intersection in terms of a range of parameters, as described below:

Degree of Saturation (DOS.) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 6-1.

Table 6-1 Rating of Degrees of Saturation

D.O.S.	Rating
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

The ***95th Percentile (95%ile) Queue*** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

It is noted that a linked network model was adopted for this analysis. SIDRA employs capacity constraints for linked intersections to model the backwards spread of congestion in saturated intersections.

Sidra default values were typically adopted for the analysis with the following exceptions

- Peak Flow Factor was set to 100% (from the default 95%). Given the precinct is mixed use a spreading of peak loading across the peak hour is to be expected.
- In the ultimate scenario (Year 2046) the following through lane capacities have been adopted:
    - Narre Warren-Cranbourne Road through traffic: 2,300vph
    - Glasscocks Road through traffic: 2,100vph[5]

It is further noted that a number of major suburban signalised intersections in Melbourne effectively operate with a DOS greater 1.0 during peak times resulting in vehicles taking more than one traffic signal cycle to clear the intersection. The proportion of intersections in Melbourne operating with a DOS greater than 1.0 is only expected to increase as development continues given there is limited available road space to make continual capacity improvements.

[5] The capacity of Glasscocks Road has been modelled slightly less than that of Narre-Warren Cranbourne Road to reflect that Narre-Warren Cranbourne Road is a higher order road and accordingly have greater SCATS coordination operation at the signalised intersection along its length allowing for greater throughput along the Narre-Warren Cranbourne Road corridor route.

7 Interim (2026) Intersection Analysis

The interim (2026) results of the SIDRA analysis are summarised in Table 7-1 and Table 7-2 with a detailed summary of the results including intersections phasing included in Appendix C.

It should be noted that both intersections were modelled as a linked network with a cycle time of 120 seconds (which must be the same for both intersections when modelling as a linked network in SIDRA).

Table 7-1 SIDRA Intersection Analysis Summary – 2026 AM Peak Hour

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren–Cranbourne Road (S)	0.61	138	29
	Glasscocks Rd (E)	0.63	105	42
	Narre Warren–Cranbourne Road (N)	0.47	115	26
	Glasscocks Rd (W)	0.33	55	39
	Intersection	**0.63**	**138**	**31**
Glasscocks Rd / The Strand	Glasscocks Rd (E)	0.84	60	17
	The Strand (N)	0.70	42	66
	Glasscocks Rd (W)	0.32	20	4
	Intersection	**0.84**	**60**	**19**

Table 7-2 SIDRA Intersection Analysis Summary – 2026 PM Peak Hour

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren–Cranbourne Road (S)	0.86	207	51
	Glasscocks Rd (E)	0.61	107	32
	Narre Warren–Cranbourne Road (N)	0.91	243	57
	Glasscocks Rd (W)	0.89	232	47
	Intersection	**0.91**	**243**	**50**
Glasscocks Rd / The Strand	Glasscocks Rd (E)	0.69	93	22
	The Strand (N)	0.81	67	67
	Glasscocks Rd (W)	0.55	35	3
	Intersection	**0.81**	**93**	**19**

Table 7-1 and Table 7-2 indicate that both intersections will operate satisfactorily in the interim assessment year, with acceptable levels of queuing and delay.

8 Ultimate Intersection (2046) Analysis

8.1 Operation of Proposed Intersection Layouts

The ultimate (2046) results of the SIDRA analysis are summarised in Table 8-1 and Table 8-2.

It is noted that both intersections were modelled as a linked network with a cycle time of 140 seconds. A 140 second cycle time was adopted on the basis that the anticipated background traffic volumes will require a longer cycle time than the 120 seconds generally adopted when assessing existing signalised intersections in Metropolitan Melbourne. The adopted cycle time is consistent with the cycle times of 130-150 seconds adopted in the assessments of other PSPs (e.g. Rockbank North and Diggers Rest) where the background traffic volumes also warranted the use of longer cycle times.

In addition it is noted that there are currently a number of signalised intersections within Metropolitan Melbourne currently operating with a cycle time greater than 120 seconds (e.g. intersections along Hoddle Street, Melbourne).

Table 8-1 SIDRA Intersection Analysis Summary – 2046 AM Peak Hour

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren–Cranbourne Road (S)	1.10	753	118
	Glasscocks Rd (E)	0.91	236	61
	Narre Warren–Cranbourne Road (N)	1.09	613	149
	Glasscocks Rd (W)	0.96	62	65
	Intersection	**1.10**	**753**	**113**
Glasscocks Rd / The Strand	The Strand (S)	0.91	189	75
	Glasscocks Rd (E)	0.91	136	34
	The Strand (N)	0.94	190	80
	Glasscocks Rd (W)	0.91	173	77
	Intersection	**0.94**	**211**	**57**

Table 8-2 SIDRA Intersection Analysis Summary – 2046 PM Peak Hour

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren–Cranbourne Road (S)	0.79	325	32
	Glasscocks Rd (E)	1.18	250	148
	Narre Warren–Cranbourne Road (N)	1.22	1155	243
	Glasscocks Rd (W)	1.69	912	561
	Intersection	**1.69**	**1155**	**212**
Glasscocks Rd / The Strand	The Strand (S)	1.41	734	436
	Glasscocks Rd (E)	1.36	474	129
	The Strand (N)	1.44	421	287
	Glasscocks Rd (W)	0.90	249	54
	Intersection	**1.44**	**736**	**187**

A review of the above tables show that in the AM peak hour that the Glasscocks Road / The Strand will operate with a DOS of less than 1.0. The Narre Warren-Cranbourne Road / Glasscocks Road is expected to operate with a DOS 1.10, a review of the associated average delay times indicate the intersection will still clear within two cycles and not result in the failure of the wider road network.

During the PM peak hour both Narre Warren-Cranbourne Road / Glasscocks Road and Glasscocks Road / The Strand will be oversaturated with a DOS of 1.7 and 1.4, respectively. The PM peak modelling further indicates that through traffic volumes on the Narre Warren-Cranbourne Road north approach will take two cycles to clear the intersection (which is not uncommon for existing busy arterial road intersections during peak times), whilst traffic on the Glasscocks Road approaches are expected to take between two and four cycles to clear the intersection.

The PM peak results for the Glasscocks Road / The Strand intersection indicate that vehicles on The Strand south approach will take on average three cycles to clear the intersection.

8.2 Assessment of Alternative Ultimate Access Arrangements

Based on the above findings, additional ultimate access scenarios were tested as outlined in Table 8-3:

Table 8-3 Additional Ultimate Access Scenarios Tested

Scenario No	Scenario Name	Scenario Description
1	Signalisation of Alisma Boulevard Scenario	The signalisation of the Alsima Boulevard / Narre Warren-Cranbourne Road intersection in conjunction with the proposed works at the Glasscocks Road / Narre Warren – Cranbourne Road intersection.
2	Capacity Improvements on Glasscocks Road Scenario	Capacity improvements to the intersections along Glasscocks Road and no signalisation of the Alsima Boulevard / Narre Warren-Cranbourne Road intersection
3	Capacity Improvements on Glasscocks Road + Signalised Alisma Boulevard Scenario	Scenario 1 plus Scenario 2.

The outcomes of the scenario testing are outlined in the following sub sections.

8.2.2 Scenario 1: Signalisation of Alisma Boulevard

This scenario tested signalising the intersection of Narre Warren-Cranbourne Road / Alisma Boulevard to provide fully directional turning movements (noting the intersection would only have three legs). For this scenario alternate route choices were modelled, resulting in revised (reduced) turning movements on Glasscocks Road. The resultant turning movement volumes for analysis of the signalised Alisma scenario are provided in Figure 8-1 and Figure 8-2.

Figure 8-1 Intersection Volumes – 2046 AM Peak Hour

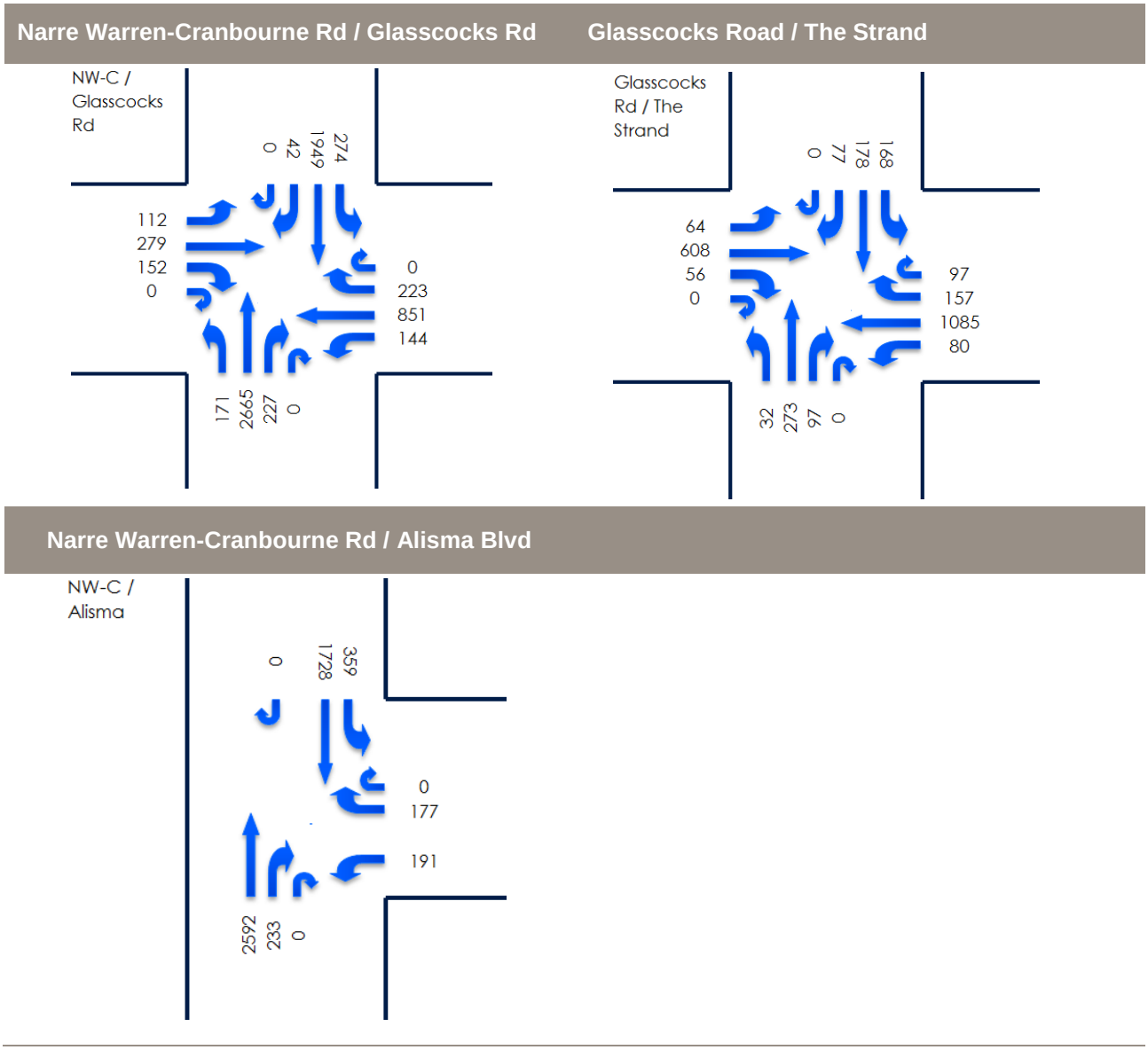
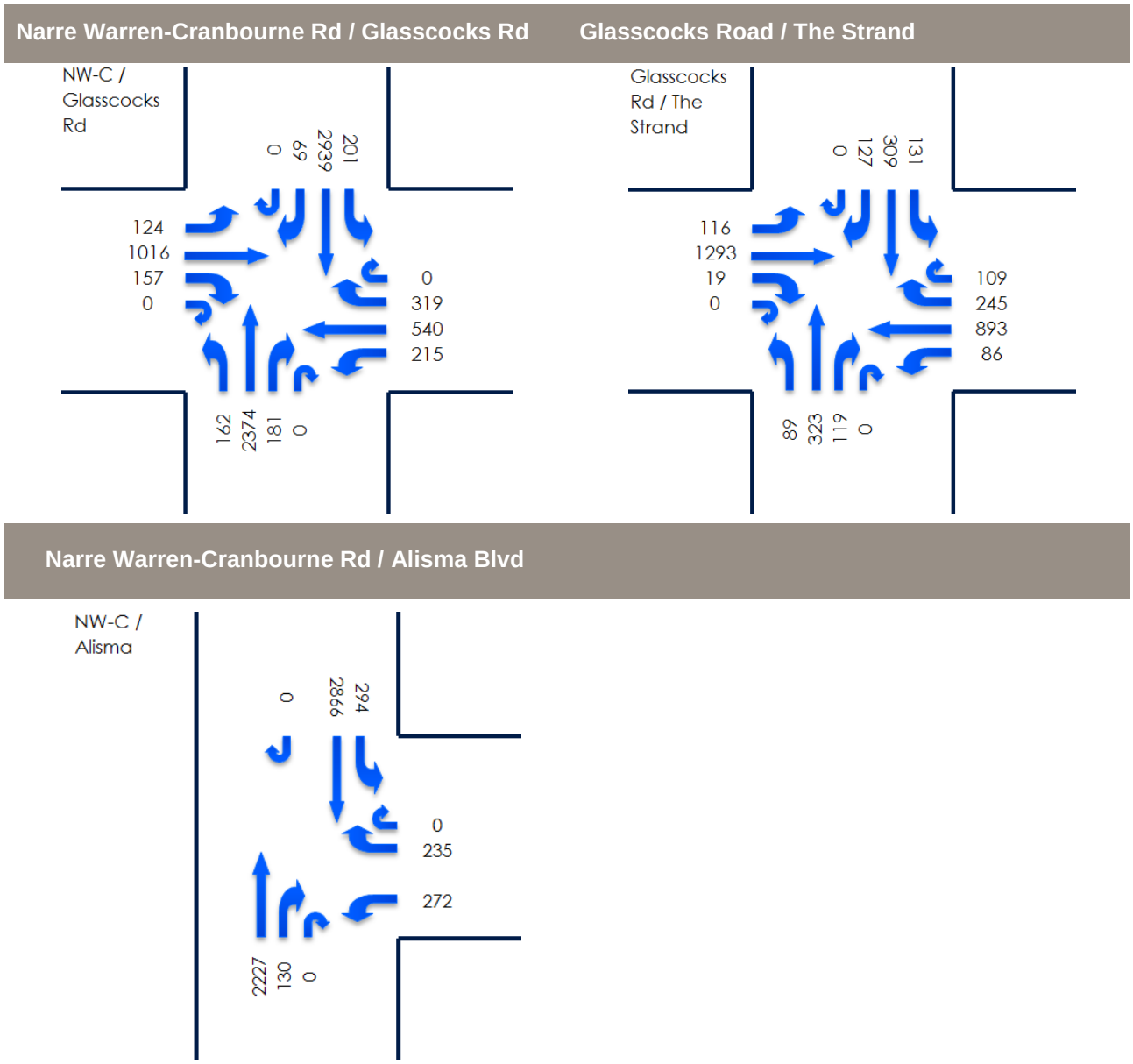


Figure 8-2 Intersection Volumes – 2046 PM Peak Hour



The results of the SIDRA analysis for the Scenario 1 are provided in Table 8-4 and Table 8-5.

Table 8-4 SIDRA Intersection Analysis Summary – 2046 AM Peak Hour – Scenario 1: Signalisation of Alisma Boulevard

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren – Cranbourne Road (S)	1.02	668	83
	Glasscocks Rd (E)	1.00	286	65
	Narre Warren – Cranbourne Road (N)	0.815	299	33
	Glasscocks Rd (W)	0.96	62	64
	Intersection	**1.02**	**668**	**63**
Glasscocks Rd / The Strand	The Strand (S)	0.82	142	64
	Glasscocks Rd (E)	0.91	248	38
	The Strand (N)	0.92	189	79
	Glasscocks Rd (W)	0.91	166	79
	Intersection	**0.92**	**248**	**57**
Narre Warren-Cranbourne Rd / Alisma Boulevard[1]	Narre Warren – Cranbourne Road (S)	0.84	379	**36**
	Alisma Boulevard (E)	0.46	43	**40**
	Narre Warren – Cranbourne Road (N)	0.57	153	**16**
	Intersection	**0.84**	**379**	**28**

[1]*Intersection was modelled as an isolated intersection*

Table 8-5 SIDRA Intersection Analysis Summary – 2046 PM Peak Hour Scenario 1: Signalisation of Alisma Boulevard

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren – Cranbourne Road (S)	0.83	353	32
	Glasscocks Rd (E)	1.18	259	145
	Narre Warren – Cranbourne Road (N)	1.22	1147	240
	Glasscocks Rd (W)	1.58	836	488
	Intersection	**1.58**	**1147**	**199**
Glasscocks Rd / The Strand	The Strand (S)	1.25	472	267
	Glasscocks Rd (E)	1.24	404	101
	The Strand (N)	1.32	556	362
	Glasscocks Rd (W)	0.91	226	41
	Intersection	**1.32**	**556**	**151**
Narre Warren-Cranbourne Rd / Alisma Boulevard[1]	Narre Warren – Cranbourne Road (S)	0.88	273	28
	Alisma Boulevard (E)	0.60	87	50
	Narre Warren – Cranbourne Road (N)	0.89	424	22
	Intersection	**0.89**	**424**	**27**

[1]*Intersection was modelled as an isolated intersection*

The PM peak hour results of the Scenario 1 SIDRA modelling indicate that vehicles on the Narre Warren-Cranbourne Road north approach at the Narre Warren-Cranbourne / Glasscocks Road intersection will still take on average two cycles to clear the intersection and that vehicles on the Glasscocks Road west approach would still on average take over three cycles to clear the intersection.

In addition the PM peak results indicate that vehicles on The Strand approaches at its intersection with Glasscocks Road would on average take between two and three cycles to clear the intersection.

The above findings indicate that even with the signalisation of the Alisma Boulevard / Narre Warren-Cranbourne Road intersection that additional capacity is still required at both intersections on Glasscocks Road.

8.2.3 Scenario 2: Capacity Improvements on Glasscocks Road

This scenario involved testing the impact of capacity improvements at the Glasscocks Road intersections with The Strand and Narre Warren-Cranbourne Road. The modelled capacity improvements are outlined in Figure 8-3 and Figure 8-4.

Figure 8-3 Narre Warren-Cranbourne Road / Glasscocks Road – with intersection works

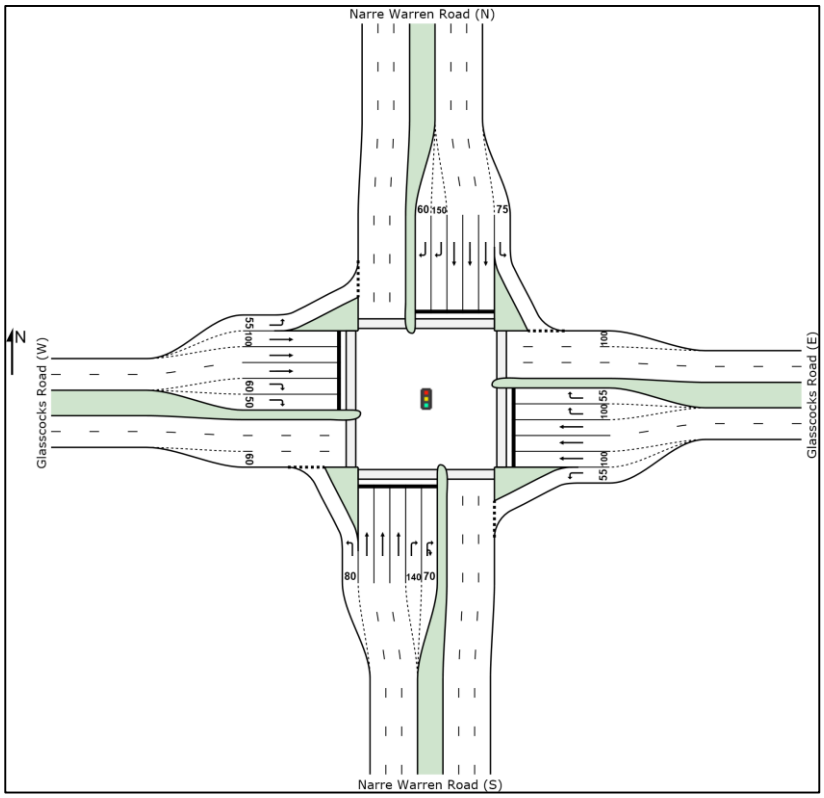


Figure 8-3 shows the provision of an additional through traffic lane (100m length) on both the east and west approaches. A corresponding shortened departure lane is also provided.

Figure 8-4 Glasscocks Road / The Strand – with intersection works

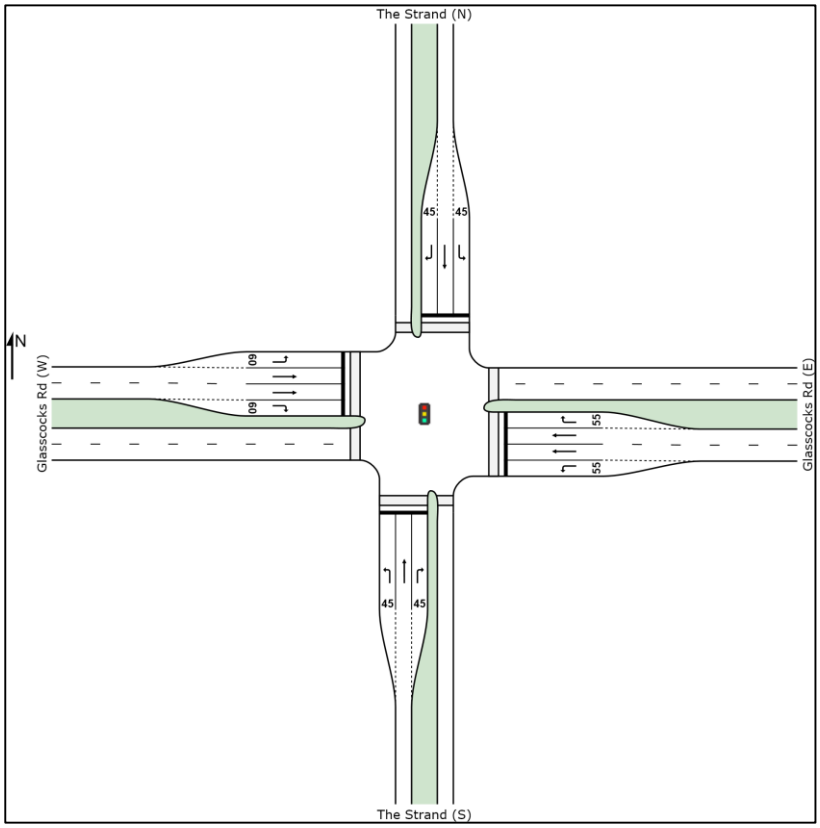


Figure 8-4 shows an additional left turn lane (45m length) provided on both the north and south approaches.

The results Scenario 2 SIDRA modelling are summarised in Table 8-6 for the critical PM peak hour.

Table 8-6 SIDRA Intersection Analysis Summary – 2046 PM Peak Hour: Scenario 2: Capacity Improvements on Glasscocks Road

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren – Cranbourne Road (S)	0.79	327	33
	Glasscocks Rd (E)	1.31	191	116
	Narre Warren – Cranbourne Road (N)	1.22	1139	238
	Glasscocks Rd (W)	1.39	581	279
	Intersection	**1.39**	**1139**	**161**
Glasscocks Rd / The Strand	The Strand (S)	1.30	353	275
	Glasscocks Rd (E)	1.21	388	91
	The Strand (N)	1.20	314	220
	Glasscocks Rd (W)	0.89	296	51
	Intersection	**1.29**	**388**	**128**

Table 8-6 indicates that the suggested capacity improvements at The Strand/Glasscocks Road intersection result in improved operation during the PM peak hour. Vehicles on The Strand south approach will however on average take two cycles to clear the intersection which is not uncommon for a Local Street or Connector

Street intersection with an Arterial Road in an Activity Centre during peak times. The average delays indicate that vehicles on the Glasscocks Road approaches to the intersection will on average clear every cycle.

Table 8-6 further indicates that vehicles on the north and west approaches to the Glasscocks Road / Narre Warren Road intersection will on average take up to two cycles which is not uncommon for existing busy suburban Arterial Road / Arterial Road intersections.

8.2.4 Scenario 3: Capacity Improvements on Glasscocks Road + Signalised Alisma Boulevard

This scenario involved testing the Scenario 1 plus Scenario 2 improvements. The results Scenario 3 SIDRA modelling are summarised in Table 8-7 for the critical PM peak hour.

Table 8-7 SIDRA Intersection Analysis Summary – 2046 PM Peak Hour –Scenario 3 (Scenario 1 + Scenario 2)

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
Narre Warren-Cranbourne Rd / Glasscocks Rd	Narre Warren – Cranbourne Road (S)	0.83	352	32
	Glasscocks Rd (E)	0.81	85	52
	Narre Warren – Cranbourne Road (N)	1.22	1139	238
	Glasscocks Rd (W)	1.13	377	140
	Intersection	**1.22**	**1139**	**131**
Glasscocks Rd / The Strand	The Strand (S)	1.27	374	260
	Glasscocks Rd (E)	1.27	417	100
	The Strand (N)	1.22	336	239
	Glasscocks Rd (W)	0.90	233	22
	Intersection	**1.27**	**417**	**116**
Narre Warren-Cranbourne Rd / Alisma Boulevard[1]	Narre Warren – Cranbourne Road (S)	0.88	273	28
	Alisma Boulevard (E)	0.60	87	50
	Narre Warren – Cranbourne Road (N)	0.89	424	22
	Intersection	**0.89**	**424**	**27**

[1]*Intersection was not modelled as an isolated intersection*

When the results outlined in Table 8-5 and Table 8-7 are compared it is evident that there are benefits associated with signalising the Alisma Boulevard / Narre-Warren Cranbourne Road intersection in addition to providing capacity improvements at the Glasscocks Road intersections with The Strand and Narre Warren-Cranbourne Road. The key benefit being that the DOS at the Glasscocks Road / Narre-Warren Cranbourne Road intersection reduces by 0.17, it is however noted that the intersection will still be oversaturated indicated the clear need for additional capacity on the Narre-Warren-Cranbourne Road approaches to the intersection.

8.3 Summary

A summary of the expected 2046 Degree of Saturations for the various scenarios tested is provided in Table 8-8.

Table 8-8 Summary Intersection Degree of Saturation

Year	Scenario	Narre Warren-Cranbourne Road / Glasscocks Road		Glasscocks Road / The Strand	
		AM Peak Hour	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**
Year 2046	Proposed Works	1.10	1.69	0.94	1.44
	Scenario 1: Signalised Alisma Boulevard	1.02	1.58	0.91	1.32
	Scenario 2: Capacity Improvements on Glasscocks Road)	-	1.39	-	1.29
	Scenario 3: Capacity Improvements on Glasscocks Road + Signalised Alisma Boulevard	-	1.22	-	1.27

Table 8-8 indicates that the DOS at the Narre Warren-Cranbourne Road / Glasscocks Road and the Glasscocks Road / The Strand improve as the various scenario improvements are implemented.

It is however noted that even with all the proposed improvements (i.e. Scenario 3) that vehicles on the Narre Warren-Cranbourne Road north approach will still take on average two cycles to clear the intersection in the PM peak hour.

It is highlighted that the oversaturation of the Narre Warren-Cranbourne Road / Glasscocks Road intersection is driven by the background traffic volumes on Narre Warren-Cranbourne Road. As outlined in Section 2.3, the near /at capacity ultimate background traffic volumes on Narre Warren-Cranbourne Road are attributed to the expansion of the Urban Growth Boundary rather than the development of the Casey Central Town Centre alone. In order to manage the expected background traffic volume growth on Narre Warren-Cranbourne Road consideration should be given to providing extra capacity (i.e. four through traffic lanes in each direction).

In addition it is noted that the signalisation of the Alisma Boulevard / Narre Warren-Cranbourne Road does not result in significant improvements to the operation of the surrounding road network, and moreover would increase delays to through traffic on Narre Warren-Cranbourne Road. The signalisation of this intersection is therefore not warranted.

Furthermore, it is noted that vehicles on The Strand approaches to the intersection with Glasscocks Road will still also take on average two cycles to clear the intersection in the PM peak hour. This delay is not uncommon for a Local Street or Connector Street intersection with an Arterial Road in an Activity Centre during peak times and is considered acceptable given that the oversaturation on The Strand Road to the intersection does not result in the failure of the operation of the surrounding Arterial Road network.

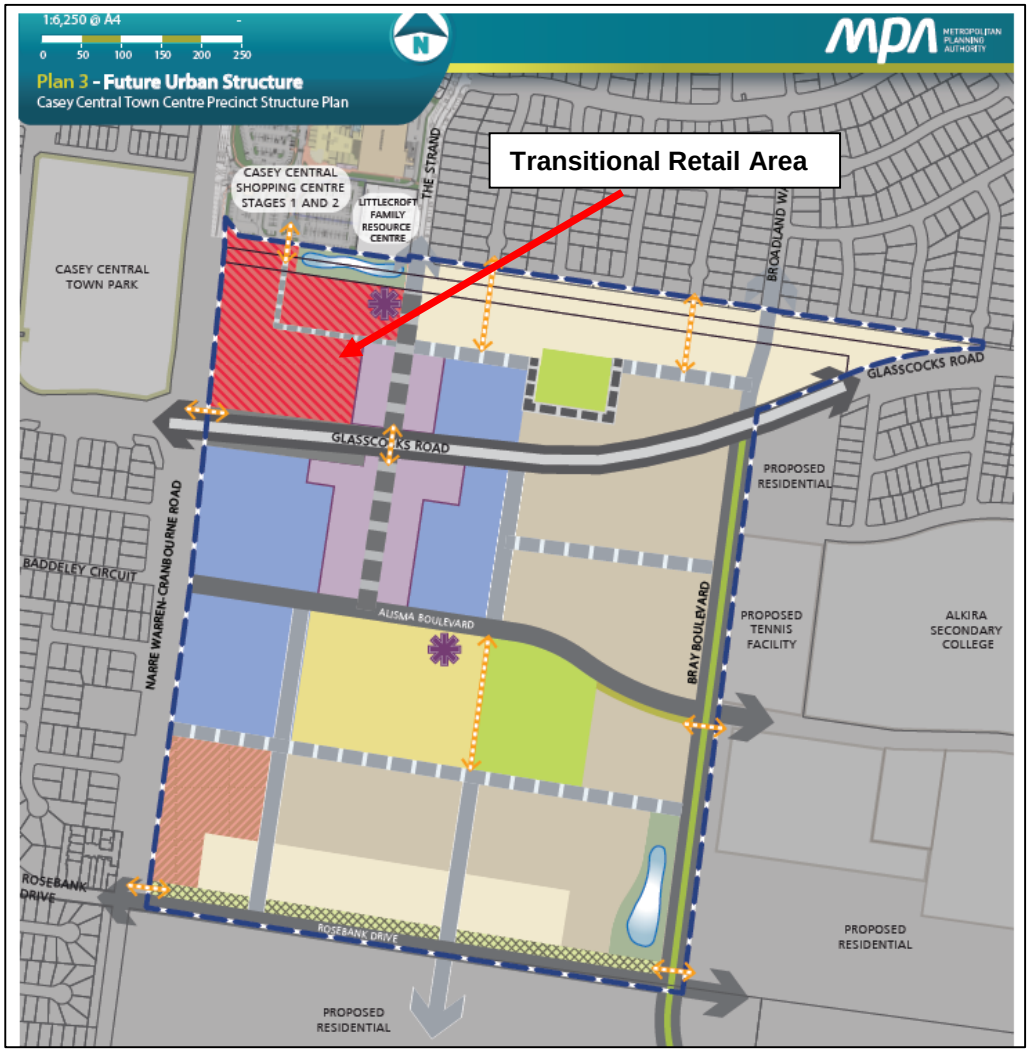
Finally it is noted that a number of major suburban signalised intersections in Melbourne operate with a DOS greater 1.0 during peak times resulting in vehicles taking more than one traffic signal cycle to clear the intersection. The expected performance of the assessed intersections are therefore considered reasonable given the conservative assessment approach and the expected ultimate background traffic volumes on Narre Warren-Cranbourne Road.

9 Transitional Retail Area Access

9.1 Overview

It is understood that there is a desire for service vehicle access to the Transitional Retail area within the PSP from Narre Warren-Cranbourne Road. The location of the PSP area is outlined in Figure 9-1.

Figure 9-1 Location of the Transitional Retail Area



It is also noted that Narre Warren-Cranbourne Road has recently been duplicated and an additional signalised access to Casey Central Shopping Centre has also been constructed.

9.2 AustRoads Guidelines

Part 4A: Unsignalised and Signalised Intersections of Austroads Guide to Road Design provides guidance on intersection types and turn treatments for arterial roads.

It is assumed that Narre Warren-Cranbourne Road will operate at a posted speed limit of 80km/h in the future, and in this regard reference is made to AustRoads Part 4A which indicates a requirement to provide a 95 metre length left turn lane for a possible service vehicle access to the Transitional Retail area from Narre Warren-Cranbourne Road.

A review of the existing offsets between the Casey Central Shopping Centre access (to the north) and the left turn lane at the intersection of Glasscocks Road reveals an uninterrupted midblock section length of 150 metres. As such there is suitable provision for a left turn deceleration lane of 95 metre length to be provided.

9.3 Access Management

In order for access from Narre Warren-Cranbourne Road to be restricted to service vehicles only, appropriate signage will need to be provided along Narre Warren-Cranbourne Road.

Furthermore the layout of the Transitional Retail site area should be provided such that no through access to customer car parking is provided to prevent 'rat-running' through the loading areas.

Access to Narre Warren-Cranbourne Road will ultimately be subject to the approval of VicRoads. Whilst it is considered that a suitable deccelartion turn lane can be provided into the site, it is noted that the left-out movement will be in-line with the right turn lane at the intersection of Narre Warren-Cranbourne Road / Glasscocks Road. The interaction between the left-out movement and the Narre Warren-Cranbourne Road / Glasscocks Road right turn lane could be managed through "Keep Clear" pavement markings.

Two examples of existing service vehicle only access for loading areas are provided on Wurundjeri Way, which services both Etihad Stadium and 700 Bourke Road. A combination of signage and linemarking is employed to control the service vehicle access.

Figure 9-2 Wurundjeri Way – Service Vehicle Only Access

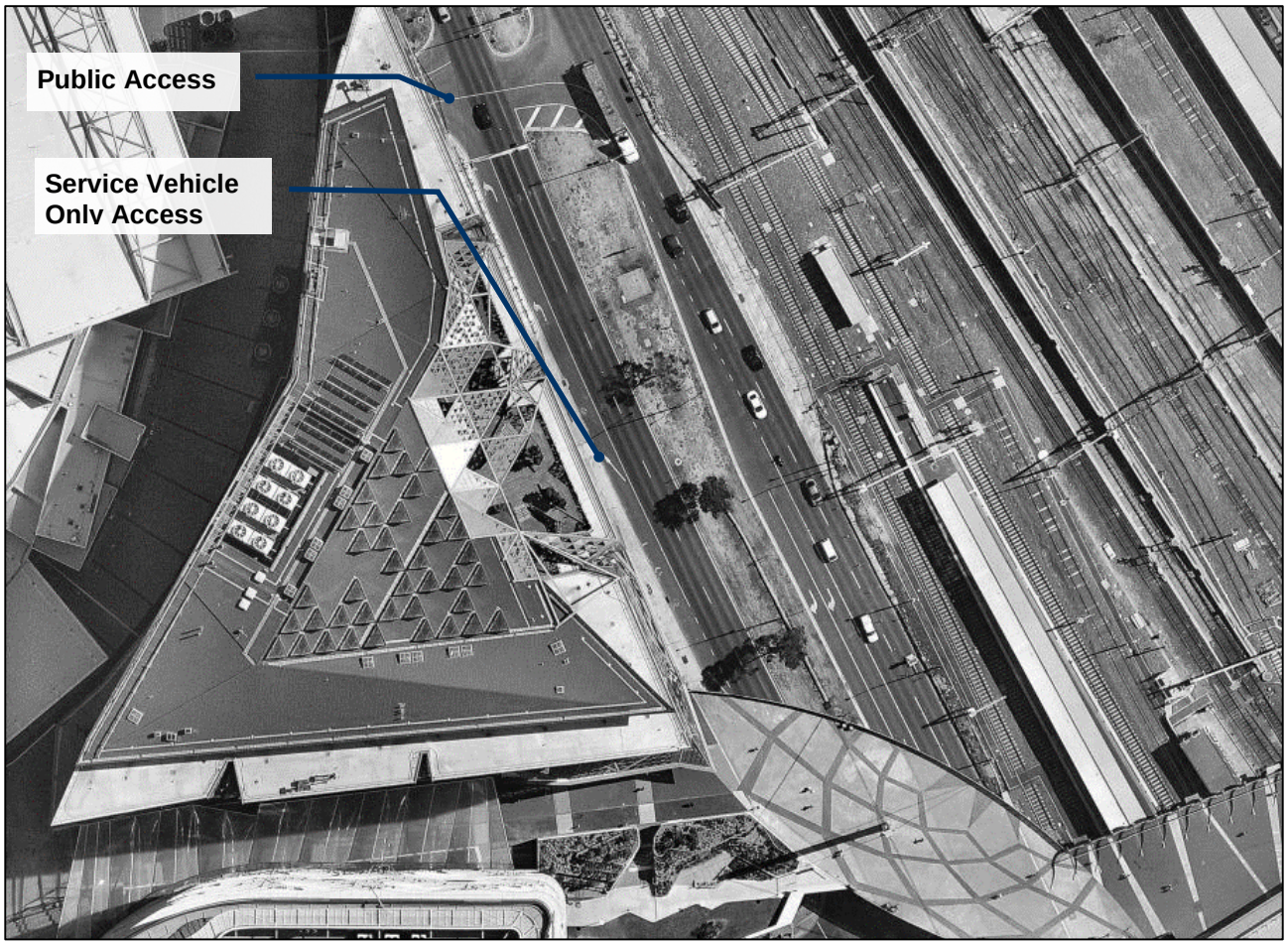
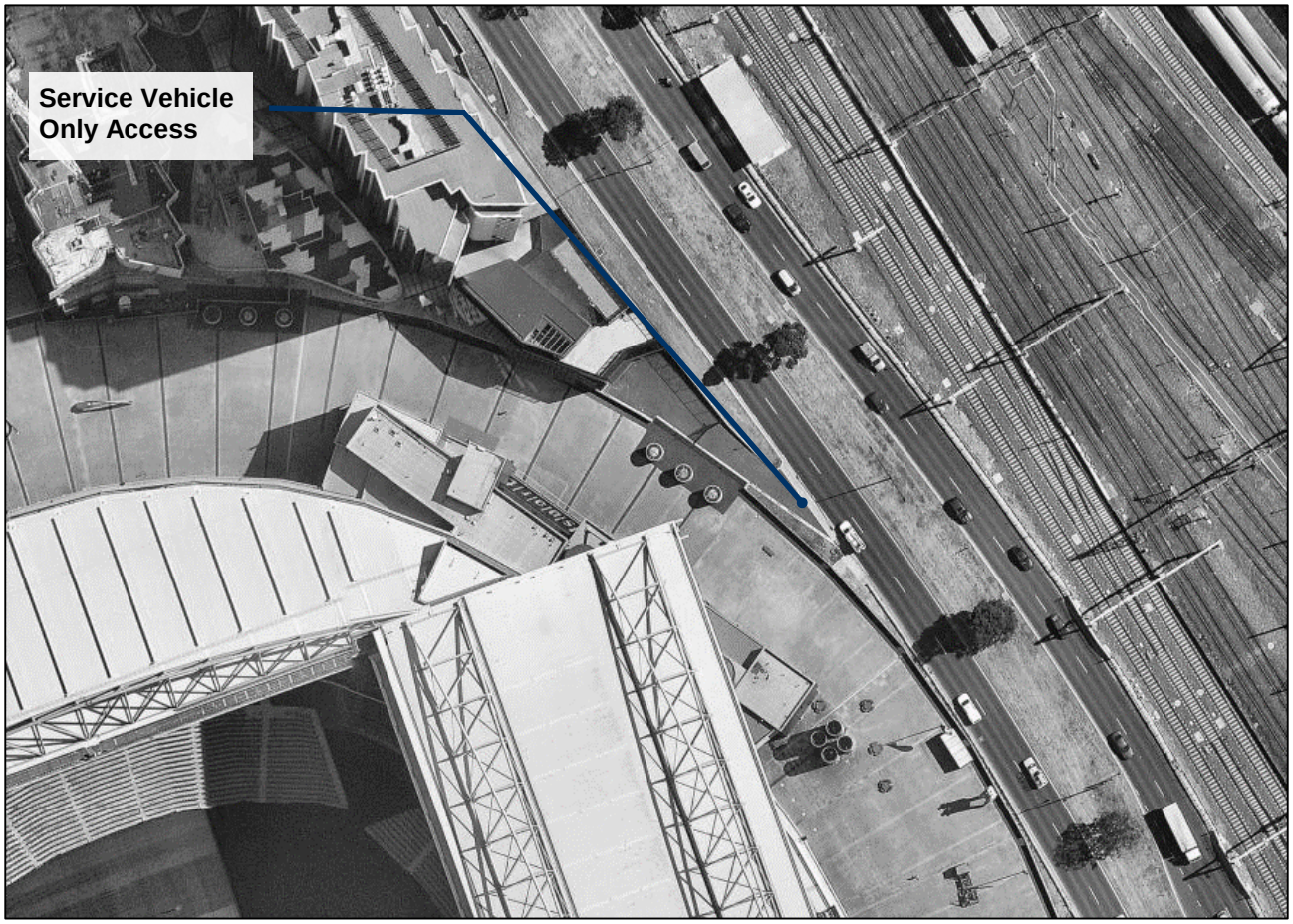


Figure 9-3 Wurundjeri Way – Service Vehicle Only Access



10 Summary

The discussions and analysis presented within this report are summarised as follows:

Interim Analysis

1. The proposed interim access intersection layouts of the Narre Warren-Cranbourne Road / Glasscocks Road and the Glasscocks Road / The Strand intersections are suitable for catering for the traffic generated by the interim development of the Casey Central Town Centre PSP area.

Ultimate Analysis

1. With the MPA proposed ultimate access arrangements, during the PM peak hour, both Narre Warren-Cranbourne Road / Glasscocks Road and Glasscocks Road / The Strand will be oversaturated with a DOS of 1.7 and 1.4, respectively. The PM peak modelling further indicates that through traffic volumes on the Narre Warren-Cranbourne Road north approach will take two cycles to clear the intersection, whilst traffic on the Glasscocks Road approaches are expected to take between two and four cycles to clear the intersection. The PM peak results for the Glasscocks Road / The Strand intersection indicate that vehicles on The Strand south approach will take on average three cycles to clear the intersection.
2. The background traffic volumes on Narre Warren-Cranbourne Road are expected to be in excess 2,700 vehicles per hour in each direction during the PM peak under ultimate operating conditions. The Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis notes that the typical midblock capacity for urban roads with interrupted flow is in the order of 900-1000 vehicles per hour per lane indicating that Narre-Warren-Cranbourne Road will be operating very at capacity even without the development of the subject PSP area under ultimate conditions. The near /at capacity ultimate background traffic volumes on Narre Warren-Cranbourne Road are attributed to the expansion of the Urban Growth Boundary rather than the development of the Casey Central Town Centre alone. In order to manage the expected background traffic volume growth on Narre Warren-Cranbourne Road consideration should be given to providing extra capacity (i.e. four through traffic lanes in each direction).
3. The signalisation of the Alisma Boulevard / Narre Warren-Cranbourne Road does not result in significant improvements to the operation of the surrounding road network, and moreover would increase delays to through traffic on Narre Warren-Cranbourne Road. The signalisation of this intersection is therefore not warranted.
4. With the proposed capacity improvements at the Glasscocks Road/The Strand intersection outlined in this report, vehicles on The Strand approaches to the intersection with Glasscocks Road will take on average two cycles to clear the intersection. This delay is not uncommon for a Local Street or Connector Street intersection with an Arterial Road in an Activity Centre during peak times and is considered acceptable given that the oversaturation on The Strand Road to the intersection does not result in the failure of the operation of the surrounding Arterial Road network.
5. Finally it is noted that a number of major suburban signalised intersections in Melbourne operate with a DOS greater 1.0 during peak times resulting in vehicles taking more than one traffic signal cycle to clear the intersection. The expected performance of the assessed intersections are therefore considered reasonable given the conservative assessment approach and the expected ultimate background traffic volumes on Narre Warren-Cranbourne Road.

Transitional Retail Area Access

6. Service vehicle access to / from the proposed Transitional Retail Area from Narre Warren-Cranbourne Road will ultimately be subject to the approval of VicRoads. Whilst it is considered that a suitable deccelartion turn lane can be provided into the site, it is noted that the left-out movement will be in-line with the right turn lane at the intersection of Narre Warren-Cranbourne Road / Glasscocks Road, the interaction betwwen the left-out movement and the Narre Warren-Cranbourne Road / Glasscocks Road could howvever be managed through “Keep Clear” pavement markings.

Casey Central Town Centre

APPENDIX A

FUTURE URBAN STRUCTURE PLAN

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1:6,250 @ A4

0 50 100 150 200 250

Plan 3 - Future Urban Structure

Casey Central Town Centre Precinct Structure Plan

- precinct area
- core retail
- transitional retail
- mixed use
- corporate centre (office/commercial)
- high density residential
- medium density residential
- urban plaza
- civic facilities (inc. indoor sports facility)
- local park
- linear park
- retarding basin
- gas easement / linear park
- existing urban
- secondary arterial road
- boulevard connector
- connector road
- main street
- local access street level 2
- local access street level 1
- local access street (park)
- laneway
- pedestrian connection

Casey Central Town Centre

APPENDIX B

TRIP GENERATION

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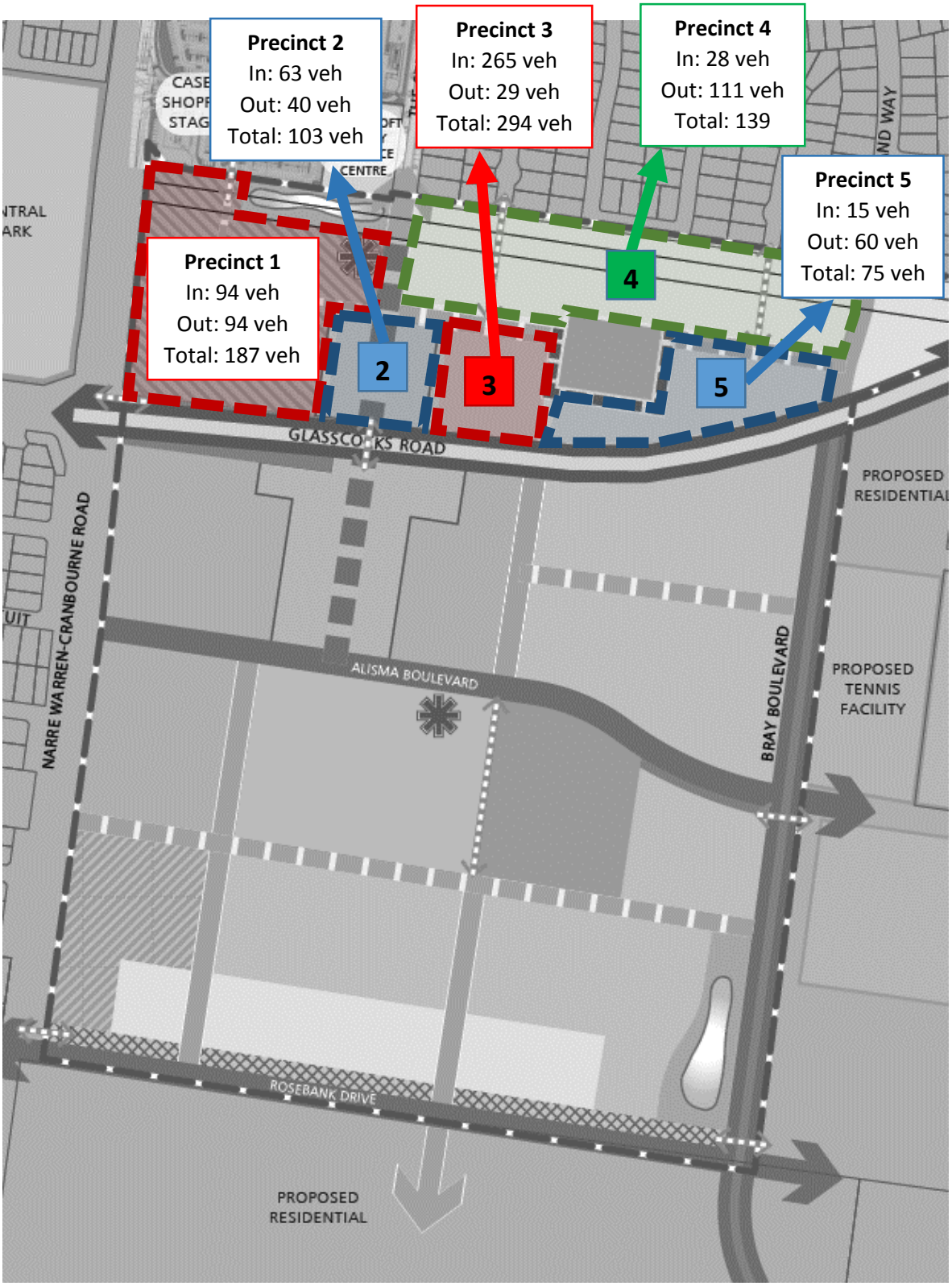
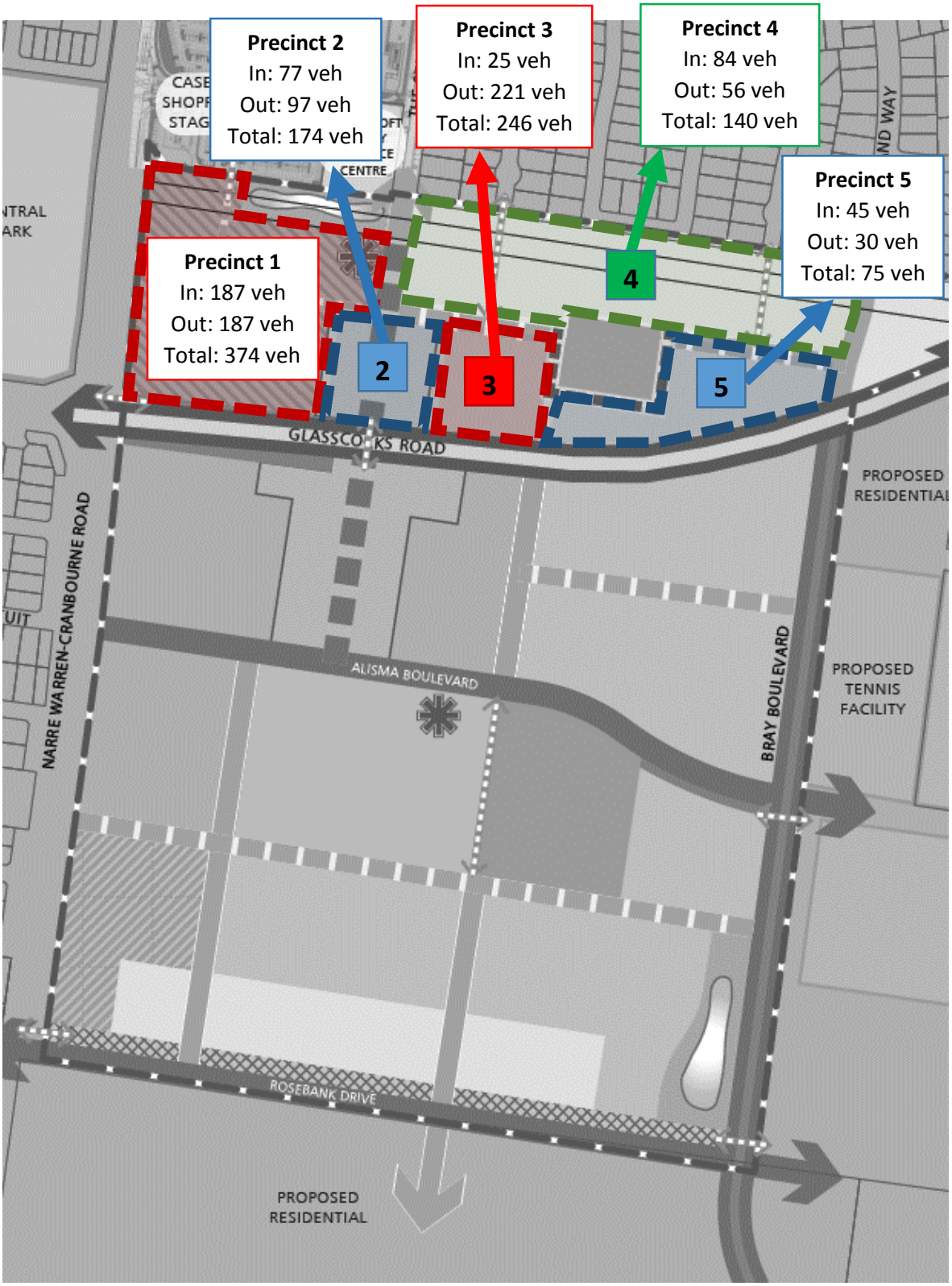
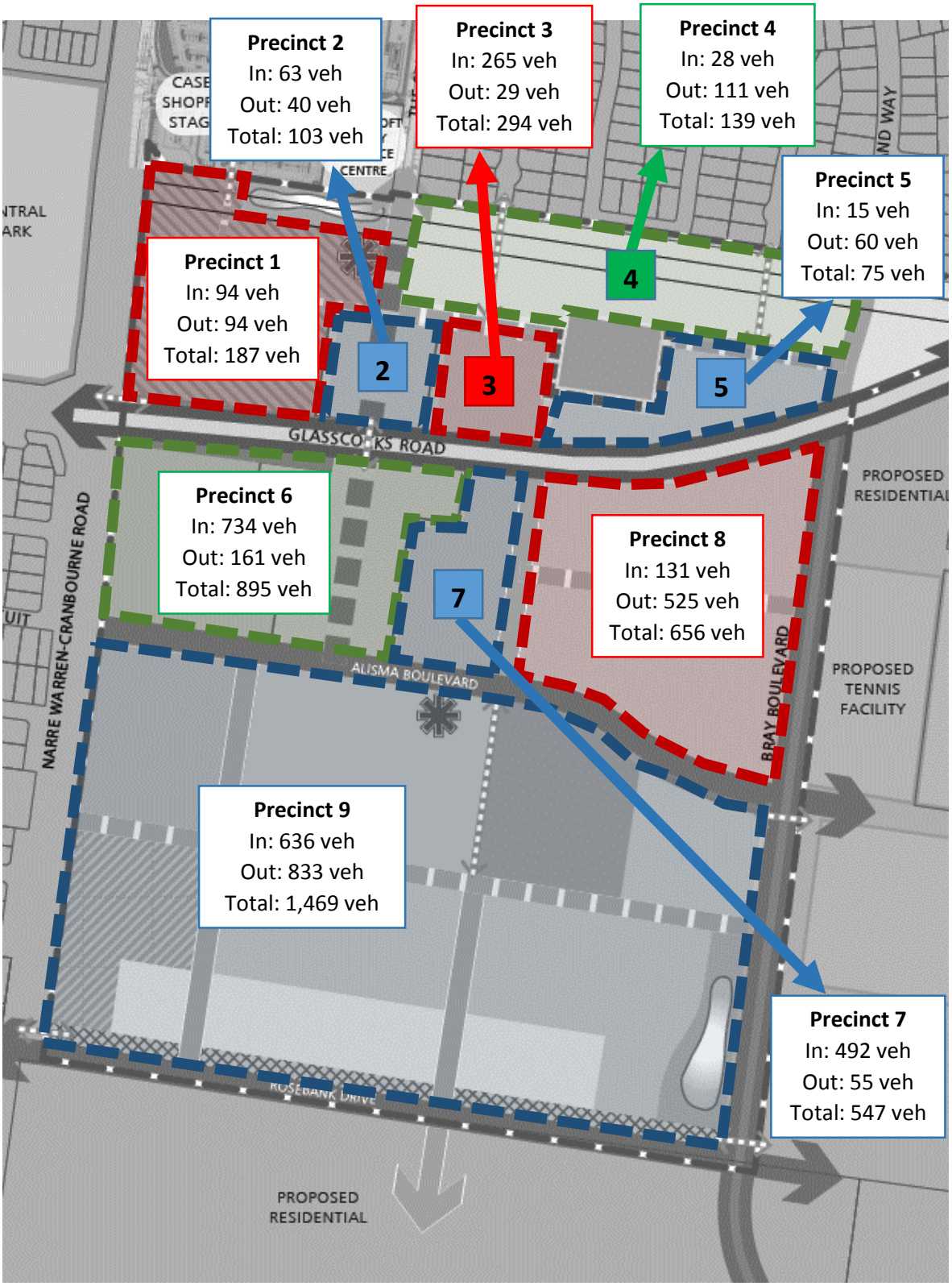
Interim (2026)
AM Peak Hour Traffic Generation



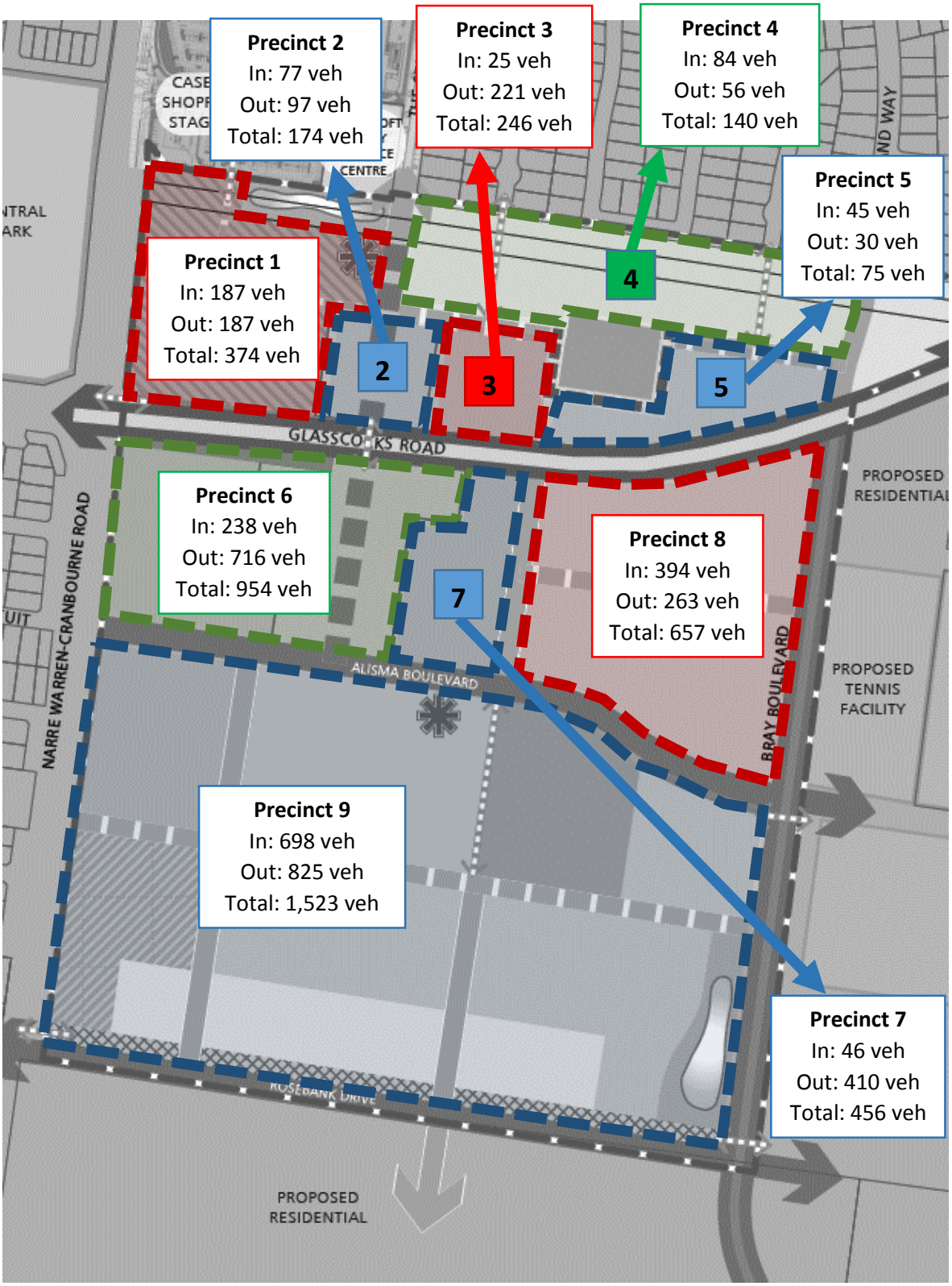
Interim (2026)
PM Peak Hour Traffic Generation



Ultimate (2046)
AM Peak Hour Traffic Generation



Ultimate (2046)
PM Peak Hour Traffic Generation



Casey Central Town Centre

APPENDIX C

SIDRA OUTPUTS

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MOVEMENT SUMMARY

Site: NwcGI-2026-AM - one lane - dcp glass

Network: 2026AM - one lane

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	81	1.0	81	1.0	0.077	12.4	LOS A	1.6	11.1	0.40	0.65	49.3
2	T1	1456	4.0	1456	4.0	0.940	64.2	LOS D	34.0	246.3	1.00	1.10	29.4
3	R2	165	1.0	165	1.0	0.817	69.3	LOS C	8.0	56.5	0.99	0.87	18.7
Approach		1702	3.6	1702	3.6	0.940	62.3	LOS D	34.0	246.3	0.97	1.05	29.1
East: Glasscocks Road (E)													
4	L2	97	1.0	97	1.0	0.080	9.4	LOS A	1.4	9.6	0.30	0.62	48.7
5	T1	594	4.0	594	4.0	0.920	46.8	LOS D	35.0	253.4	0.88	0.95	29.5
6	R2	106	1.0	106	1.0	0.575	72.5	LOS A	3.3	23.5	1.00	0.75	22.9
Approach		797	3.2	797	3.2	0.920	45.6	LOS D	35.0	253.4	0.83	0.88	29.8
North: Narre Warren Road (N)													
7	L2	132	1.0	132	1.0	0.114	8.5	LOS A	1.7	11.8	0.28	0.63	47.2
8	T1	1126	4.0	1126	4.0	0.725	42.9	LOS C	20.3	147.1	0.96	0.84	35.4
9	R2	30	1.0	30	1.0	0.098	62.0	LOS A	0.8	5.9	0.95	0.69	29.8
Approach		1288	3.6	1288	3.6	0.725	39.8	LOS C	20.3	147.1	0.89	0.82	35.7
West: Glasscocks Road (W)													
10	L2	35	1.0	35	1.0	0.031	13.0	LOS A	0.7	5.0	0.40	0.63	48.9
11	T1	299	4.0	299	4.0	0.297	26.2	LOS A	8.8	63.8	0.71	0.59	33.0
12	R2	35	1.0	35	1.0	0.190	68.1	LOS A	1.0	7.4	0.99	0.69	28.4
Approach		369	3.4	369	3.4	0.297	28.9	LOS A	8.8	63.8	0.71	0.61	33.9
All Vehicles		4156	3.5	4156	3.5	0.940	49.2	LOS D	35.0	253.4	0.90	0.91	31.4

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
P2	East Full Crossing	53	43.4	LOS E	0.2	0.2	0.85	0.85
P3	North Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
P4	West Full Crossing	53	45.2	LOS E	0.2	0.2	0.87	0.87
All Pedestrians		211	41.4	LOS E			0.83	0.83

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: NwcGI-2026-AM - one lane - dcp glass

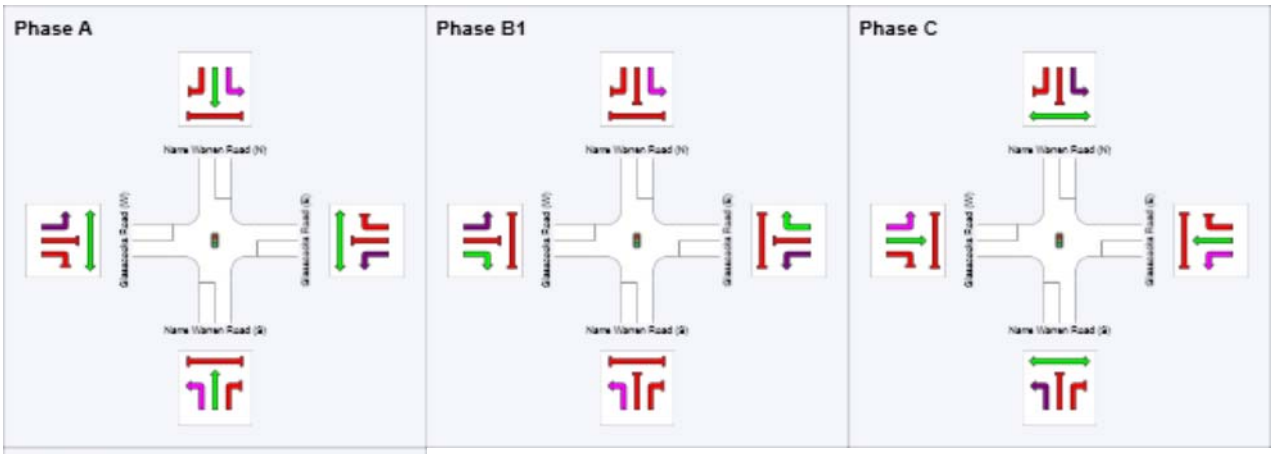
Network: 2026AM - one lane

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Variable Phasing
Movement Class: All Movement Classes
Input Sequence: A, B1, C, F1
Output Sequence: A, B1, C, F1

Phase Timing Results

Phase	A	B1	C	F1
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	81	0	12	65
Green Time (sec)	33	6	47	10
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	39	12	53	16
Phase Split	33 %	10 %	44 %	13 %



MOVEMENT SUMMARY

Site: GISt-2026-AM - one lane

Network: 2026AM - one lane

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Glasscocks Rd (E)													
5	T1	598	4.0	598	4.0	0.589	5.6	LOS A	9.4	68.3	0.30	0.27	50.8
6	R2	53	1.0	53	1.0	0.844	72.5	LOS C	8.5	59.9	1.00	0.92	26.8
6u	U	77	1.0	77	1.0	0.844	73.7	LOS C	8.5	59.9	1.00	0.92	26.8
Approach		728	3.5	728	3.5	0.844	17.6	LOS C	9.4	68.3	0.42	0.39	40.0
North: The Strand (N)													
7	L2	97	1.0	97	1.0	0.701	68.5	LOS C	6.0	42.1	1.00	0.83	27.9
9	R2	89	1.0	89	1.0	0.587	64.3	LOS A	5.3	37.2	1.00	0.79	19.4
Approach		186	1.0	186	1.0	0.701	66.5	LOS C	6.0	42.1	1.00	0.81	24.5
West: Glasscocks Rd (W)													
10	L2	84	1.0	84	1.0	0.073	14.7	LOS A	1.9	13.1	0.41	0.67	43.7
11	T1	393	4.0	393	4.0	0.318	9.8	LOS A	9.9	71.9	0.47	0.42	49.1
Approach		477	3.5	477	3.5	0.318	10.6	LOS A	9.9	71.9	0.46	0.46	48.1
All Vehicles		1391	3.1	1391	3.1	0.844	21.8	LOS C	9.9	71.9	0.51	0.47	38.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	10.0	LOS B	0.1	0.1	0.41	0.41
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	39.5	LOS D			0.77	0.77

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: GISt-2026-AM - one lane

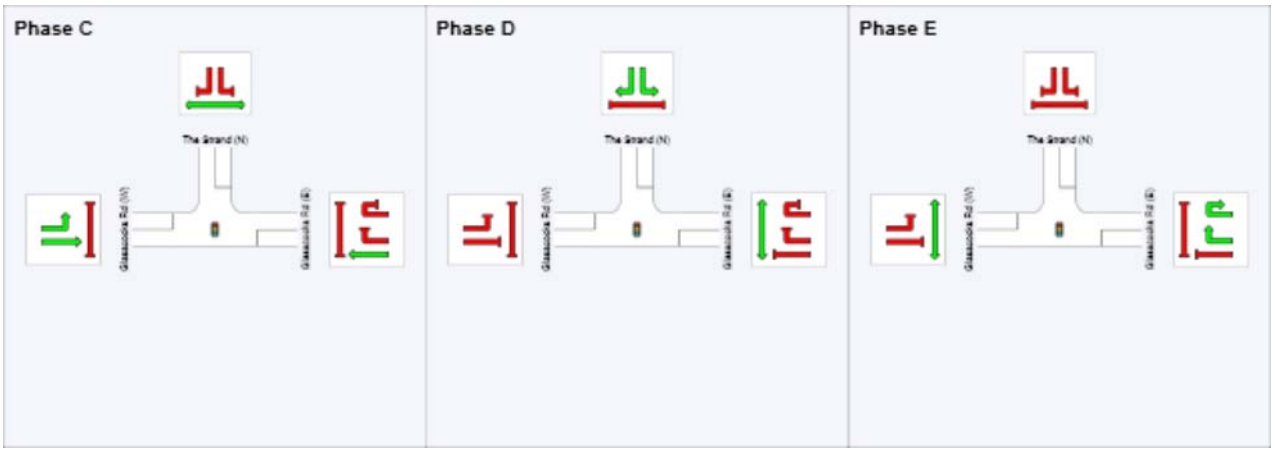
Network: 2026AM - one lane

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: C, D, E
Output Sequence: C, D, E

Phase Timing Results

Phase	C	D	E
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	84	102
Green Time (sec)	78	12	12
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	84	18	18
Phase Split	70 %	15 %	15 %



MOVEMENT SUMMARY

Site: NwcGI-2026-PM - one lane - dcp glass

Network: 2026PM - one lane - dcp glass

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	37	1.0	37	1.0	0.026	8.2	LOS A	0.4	2.9	0.26	0.60	52.2
2	T1	1405	4.0	1405	4.0	0.850	49.9	LOS C	28.6	207.1	1.00	0.98	33.2
3	R2	122	1.0	122	1.0	0.863	74.1	LOS C	6.1	43.3	1.00	0.89	17.9
Approach		1564	3.7	1564	3.7	0.863	50.8	LOS C	28.6	207.1	0.98	0.97	32.3
East: Glasscocks Road (E)													
4	L2	133	1.0	133	1.0	0.117	11.8	LOS A	2.0	14.3	0.30	0.63	46.7
5	T1	375	4.0	375	4.0	0.611	27.9	LOS B	14.8	106.8	0.73	0.63	37.1
6	R2	149	1.0	149	1.0	0.269	62.1	LOS A	4.3	30.6	1.00	0.78	25.1
Approach		657	2.7	657	2.7	0.611	32.4	LOS B	14.8	106.8	0.70	0.66	34.8
North: Narre Warren Road (N)													
7	L2	128	1.0	128	1.0	0.118	14.4	LOS A	2.9	20.6	0.45	0.67	41.1
8	T1	1434	4.0	1434	4.0	0.913	60.9	LOS D	33.6	243.2	1.00	1.09	30.2
9	R2	38	1.0	38	1.0	0.206	68.2	LOS A	1.1	8.0	0.99	0.70	28.3
Approach		1600	3.7	1600	3.7	0.913	57.4	LOS D	33.6	243.2	0.96	1.05	30.5
West: Glasscocks Road (W)													
10	L2	83	1.0	83	1.0	0.071	12.6	LOS A	1.6	11.4	0.40	0.65	49.2
11	T1	683	4.0	683	4.0	0.891	48.8	LOS C	32.0	231.8	0.95	0.95	23.8
12	R2	83	1.0	83	1.0	0.450	69.7	LOS A	2.5	17.9	1.00	0.73	28.1
Approach		849	3.4	849	3.4	0.891	47.3	LOS C	32.0	231.8	0.90	0.90	26.6
All Vehicles		4670	3.5	4670	3.5	0.913	49.8	LOS D	33.6	243.2	0.92	0.94	31.0

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.9	LOS D	0.1	0.1	0.79	0.79
P2	East Full Crossing	53	42.6	LOS E	0.2	0.2	0.84	0.84
P3	North Full Crossing	53	46.9	LOS E	0.2	0.2	0.89	0.89
P4	West Full Crossing	53	43.4	LOS E	0.2	0.2	0.85	0.85
All Pedestrians		211	42.5	LOS E			0.84	0.84

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: NwcGI-2026-PM - one lane - dcp glass

Network: 2026PM - one lane - dcp glass

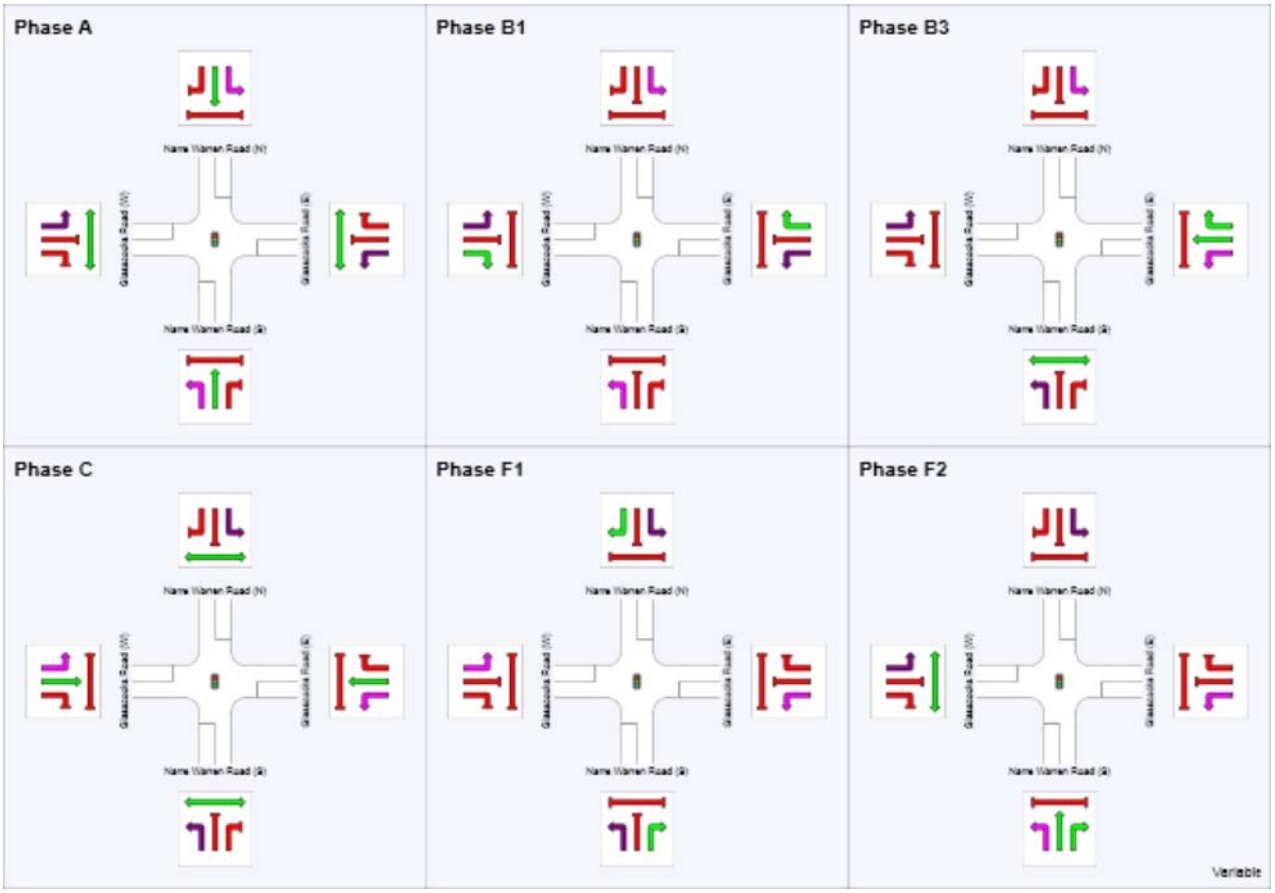
Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Variable Phasing
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, B3, C, F1, F2
Output Sequence: A, B1, B3, C, F1, F2

Phase Timing Results

Phase	A	B1	B3	C	F1	F2
Reference Phase	No	No	Yes	No	No	No
Phase Change Time (sec)	68	108	0	12	55	67
Green Time (sec)	34	6	6	37	6	***
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	40	12	12	43	12	1
Phase Split	33 %	10 %	10 %	36 %	10 %	1 %

*** 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.



MOVEMENT SUMMARY

Site: GISt-2026-PM - one lane

Network: 2026PM - one lane - dcp glass

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Glasscocks Rd (E)													
5	T1	477	4.0	477	4.0	0.386	10.3	LOS A	12.8	92.5	0.50	0.45	44.9
6	R2	119	1.0	119	1.0	0.689	65.3	LOS B	7.5	53.0	1.00	0.83	28.5
6u	U	6	1.0	6	1.0	0.689	66.5	LOS B	7.5	53.0	1.00	0.83	28.4
Approach		602	3.4	602	3.4	0.689	21.8	LOS B	12.8	92.5	0.61	0.53	37.5
North: The Strand (N)													
7	L2	91	1.0	91	1.0	0.493	62.8	LOS A	5.2	37.0	0.99	0.78	29.1
9	R2	150	1.0	150	1.0	0.813	69.3	LOS C	9.5	66.8	1.00	0.90	18.5
Approach		241	1.0	241	1.0	0.813	66.8	LOS C	9.5	66.8	1.00	0.85	23.1
West: Glasscocks Rd (W)													
10	L2	154	1.0	154	1.0	0.128	7.2	LOS A	0.6	4.3	0.07	0.59	49.9
11	T1	684	4.0	684	4.0	0.554	2.4	LOS A	4.9	35.4	0.13	0.12	56.9
Approach		838	3.4	838	3.4	0.554	3.3	LOS A	4.9	35.4	0.12	0.21	55.5
All Vehicles		1681	3.1	1681	3.1	0.813	19.0	LOS C	12.8	92.5	0.42	0.42	40.8

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	10.0	LOS B	0.1	0.1	0.41	0.41
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	39.5	LOS D			0.77	0.77

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: GISt-2026-PM - one lane

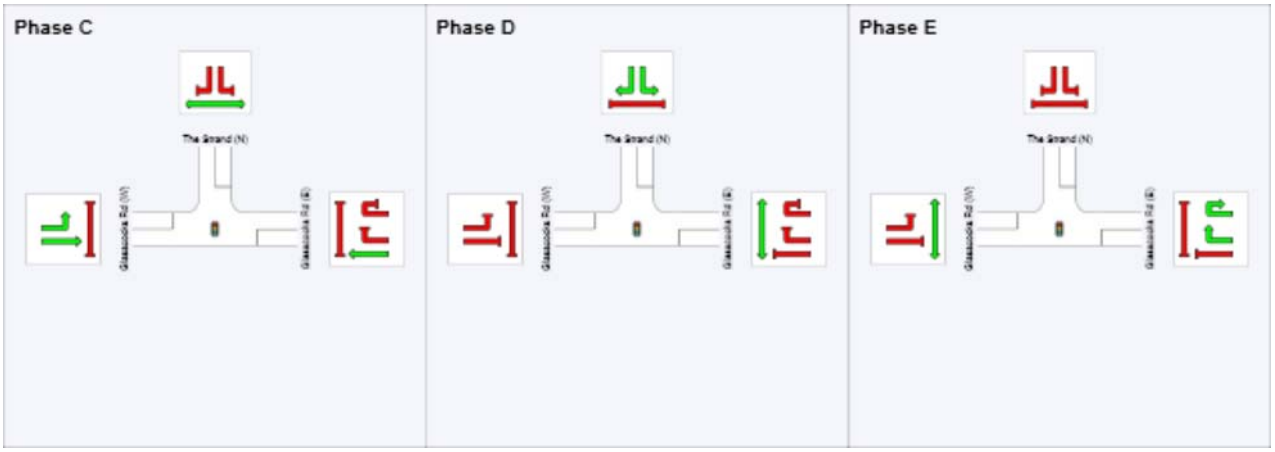
Network: 2026PM - one lane - dcp glass

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: C, D, E
Output Sequence: C, D, E

Phase Timing Results

Phase	C	D	E
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	84	102
Green Time (sec)	78	12	12
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	84	18	18
Phase Split	70 %	15 %	15 %



MOVEMENT SUMMARY

Site: NwcGI-2046-AM

Network: 2046AM

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	161	1.0	161	1.0	0.132	11.9	LOS A	3.4	23.9	0.36	0.65	49.6
2	T1	2584	4.0	2584	4.0	1.063	124.8	LOS F	104.0	753.2	1.00	1.41	19.8
3	R2	256	1.0	256	1.0	0.810	71.0	LOS C	18.0	127.1	1.00	0.90	18.5
3u	U	131	1.0	131	1.0	1.104	196.0	LOS F	16.0	112.9	1.00	1.21	14.2
Approach		3132	3.5	3132	3.5	1.104	117.6	LOS F	104.0	753.2	0.96	1.32	20.1
East: Glasscocks Road (E)													
4	L2	146	1.0	146	1.0	0.175	27.3	LOS A	5.5	38.6	0.60	0.70	36.8
5	T1	855	4.0	855	4.0	0.908	67.1	LOS D	32.6	235.9	0.98	1.05	24.1
6	R2	310	1.0	310	1.0	0.588	58.1	LOS A	9.4	66.2	0.91	0.79	26.0
Approach		1311	3.0	1311	3.0	0.908	60.6	LOS D	32.6	235.9	0.92	0.95	25.5
North: Narre Warren Road (N)													
7	L2	274	1.0	274	1.0	0.223	11.2	LOS A	5.7	40.3	0.37	0.66	44.2
8	T1	1949	4.0	1949	4.0	1.091	169.3	LOS F	84.7	613.2	1.00	1.57	16.0
9	R2	42	1.0	42	1.0	0.266	80.0	LOS A	1.5	10.4	1.00	0.70	26.0
Approach		2265	3.6	2265	3.6	1.091	148.5	LOS F	84.7	613.2	0.92	1.44	16.8
West: Glasscocks Road (W)													
10	L2	112	1.0	112	1.0	0.191	37.1	LOS A	5.5	38.8	0.75	0.75	37.1
11	T1	279	4.0	279	4.0	0.411	55.3	LOS A	8.5	61.6	0.93	0.76	22.0
12	R2	152	1.0	152	1.0	0.962	102.3	LOS E	6.4	45.0	1.00	1.02	22.5
Approach		543	2.5	543	2.5	0.962	64.7	LOS E	8.5	61.6	0.91	0.83	25.0
All Vehicles		7251	3.3	7251	3.3	1.104	113.0	LOS F	104.0	753.2	0.94	1.25	19.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	45.7	LOS E	0.2	0.2	0.81	0.81
P12	South Stage 2	53	41.7	LOS E	0.2	0.2	0.77	0.77
P2	East Full Crossing	53	43.3	LOS E	0.2	0.2	0.79	0.79
P3	North Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	30.3	LOS D	0.1	0.1	0.66	0.66
All Pedestrians		263	45.1	LOS E			0.80	0.80

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: NwcGI-2046-AM

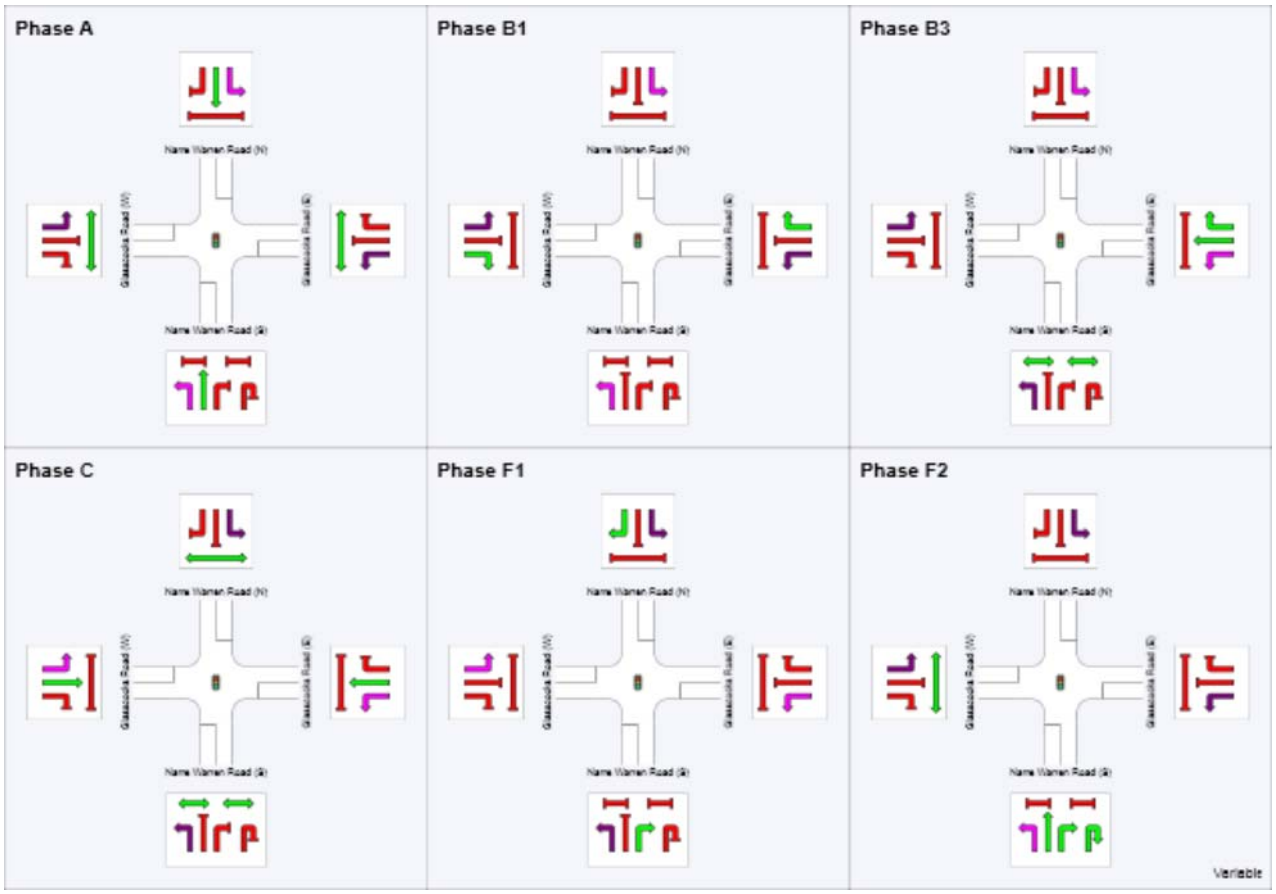
Network: 2046AM

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Variable Phasing
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, B3, C, F1, F2
Output Sequence: A, B1, B3, C, F1, F2

Phase Timing Results

Phase	A	B1	B3	C	F1	F2
Reference Phase	No	No	Yes	No	No	No
Phase Change Time (sec)	75	128	0	14	45	57
Green Time (sec)	47	6	8	25	6	12
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	53	12	14	31	12	18
Phase Split	38 %	9 %	10 %	22 %	9 %	13 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: GISt-2046-AM

Network: 2046AM

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: The Strand (S)													
1	L2	87	1.0	87	1.0	0.908	77.4	LOS D	26.8	189.4	1.00	1.05	18.0
2	T1	263	1.0	263	1.0	0.908	71.8	LOS D	26.8	189.4	1.00	1.05	27.3
3	R2	68	1.0	68	1.0	0.738	82.9	LOS C	5.0	35.2	1.00	0.84	25.3
Approach		418	1.0	418	1.0	0.908	74.8	LOS D	26.8	189.4	1.00	1.02	25.4
East: Glasscocks Rd (E)													
4	L2	80	1.0	80	1.0	0.089	25.9	LOS A	2.9	20.2	0.57	0.70	41.3
5	T1	1124	4.0	1124	4.0	0.794	24.0	LOS C	29.2	211.2	0.68	0.62	33.7
6	R2	157	1.0	157	1.0	0.909	77.0	LOS D	19.3	136.1	0.93	0.96	26.1
6u	U	100	1.0	100	1.0	0.909	78.1	LOS D	19.3	136.1	0.93	0.96	26.0
Approach		1461	3.3	1461	3.3	0.909	33.5	LOS D	29.2	211.2	0.72	0.69	31.6
North: The Strand (N)													
7	L2	168	1.0	168	1.0	0.917	79.3	LOS D	26.8	189.5	1.00	1.04	26.3
8	T1	178	1.0	178	1.0	0.917	73.7	LOS D	26.8	189.5	1.00	1.04	26.7
9	R2	77	1.0	77	1.0	0.942	98.5	LOS D	6.3	44.8	1.00	1.00	14.4
Approach		423	1.0	423	1.0	0.942	80.4	LOS D	26.8	189.5	1.00	1.04	24.4
West: Glasscocks Rd (W)													
10	L2	73	1.0	73	1.0	0.198	63.2	LOS A	4.7	32.9	0.98	0.78	24.3
11	T1	640	4.0	640	4.0	0.905	77.5	LOS D	23.9	172.9	1.00	0.97	21.7
12	R2	71	1.0	71	1.0	0.599	81.4	LOS A	5.1	35.9	1.00	0.77	20.8
Approach		784	3.4	784	3.4	0.905	76.5	LOS D	23.9	172.9	1.00	0.93	21.9
All Vehicles		3086	2.7	3086	2.7	0.942	56.5	LOS D	29.2	211.2	0.87	0.84	26.2

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	23.5	LOS C	0.1	0.1	0.58	0.58
P2	East Full Crossing	53	56.8	LOS E	0.2	0.2	0.90	0.90
P3	North Full Crossing	53	52.4	LOS E	0.2	0.2	0.87	0.87
P4	West Full Crossing	53	56.8	LOS E	0.2	0.2	0.90	0.90
All Pedestrians		211	47.4	LOS E			0.81	0.81

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: GISt-2046-AM

Network: 2046AM

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, C, F1
Output Sequence: A, B1, B2, C, F1

Phase Timing Results

Phase	A	B1	B2	C	F1
Reference Phase	No	No	No	Yes	No
Phase Change Time (sec)	32	70	85	125	19
Green Time (sec)	32	9	34	28	7
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	38	15	40	34	13
Phase Split	27 %	11 %	29 %	24 %	9 %

MOVEMENT SUMMARY

Site: NwcGI-2046-PM

Network: 2046PM

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	142	1.0	142	1.0	0.097	8.0	LOS A	1.7	12.1	0.24	0.61	52.4
2	T1	2246	4.0	2246	4.0	0.790	29.3	LOS C	44.8	324.6	0.86	0.78	40.7
3	R2	221	1.0	221	1.0	0.653	70.6	LOS B	9.4	66.4	1.00	0.82	18.5
3u	U	42	1.0	42	1.0	0.653	72.4	LOS B	8.4	59.2	1.00	0.83	27.4
Approach		2651	3.5	2651	3.5	0.790	32.3	LOS C	44.8	324.6	0.84	0.78	38.8
East: Glasscocks Road (E)													
4	L2	229	1.0	211	1.1	0.467	34.3	LOS A	9.7	68.6	0.74	0.79	33.5
5	T1	557	4.0	515	4.2	1.176	219.8	LOS F	34.4	249.6	1.00	1.44	10.2
6	R2	450	1.0	415	1.1	1.051	118.0	LOS F	19.9	140.8	1.00	1.08	16.5
Approach		1236	2.4	1141 N1	2.5	1.176	148.4	LOS F	34.4	249.6	0.95	1.19	13.9
North: Narre Warren Road (N)													
7	L2	201	1.0	201	1.0	0.189	14.3	LOS A	5.2	36.5	0.42	0.67	41.2
8	T1	2939	4.0	2939	4.0	1.222	261.8	LOS F	159.6	1155.2	1.00	1.96	11.4
9	R2	69	1.0	69	1.0	0.437	81.0	LOS A	2.5	17.4	1.00	0.72	25.8
Approach		3209	3.7	3209	3.7	1.222	242.5	LOS F	159.6	1155.2	0.96	1.85	11.9
West: Glasscocks Road (W)													
10	L2	124	1.0	124	1.0	0.209	30.3	LOS A	5.8	41.3	0.72	0.77	39.8
11	T1	1016	4.0	1016	4.0	1.687	703.4	LOS F	126.0	912.4	1.00	2.70	2.6
12	R2	157	1.0	157	1.0	0.238	59.0	LOS A	4.6	32.6	0.90	0.76	30.6
Approach		1297	3.4	1297	3.4	1.687	561.0	LOS F	126.0	912.4	0.96	2.28	3.8
All Vehicles		8393	3.4	8298 N1	3.5	1.687	212.2	LOS F	159.6	1155.2	0.92	1.48	12.2

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	62.4	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	35.1	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	35.1	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		263	52.2	LOS E			0.86	0.86

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: NwcGI-2046-PM

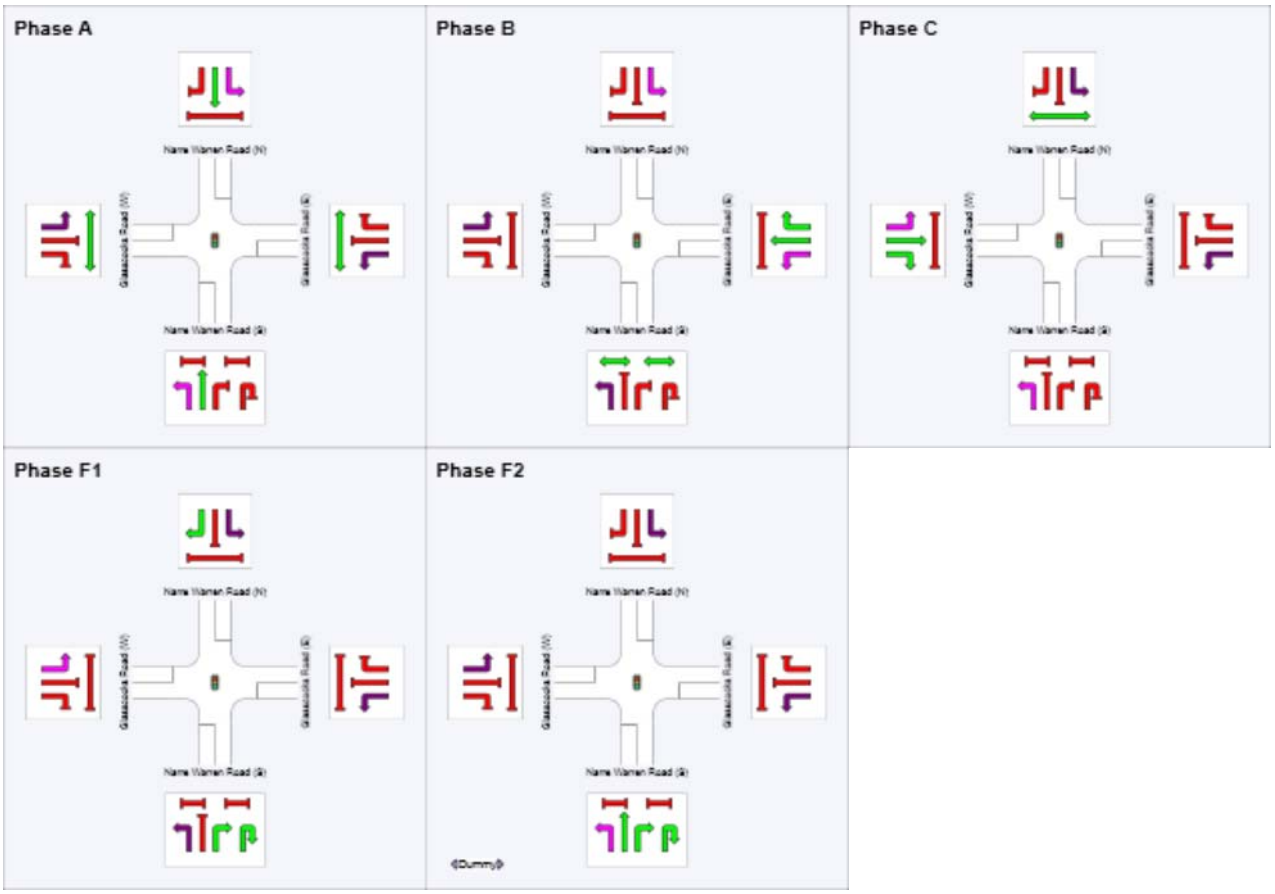
Network: 2046PM

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Split Phasing - glass
Movement Class: All Movement Classes
Input Sequence: A, B, C, F1, F2
Output Sequence: A, B, C, F1, F2

Phase Timing Results

Phase	A	B	C	F1	F2
Reference Phase	No	Yes	No	No	No
Phase Change Time (sec)	76	0	21	52	64
Green Time (sec)	58	15	25	6	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	64	21	31	12	12
Phase Split	46 %	15 %	22 %	9 %	9 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

MOVEMENT SUMMARY

Site: GISt-2046-PM

Network: 2046PM

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: The Strand (S)													
1	L2	220	1.0	220	1.0	1.408	461.0	LOS F	104.2	735.5	1.00	2.20	3.8
2	T1	307	1.0	307	1.0	1.408	455.5	LOS F	104.2	735.5	1.00	2.20	7.1
3	R2	136	1.0	136	1.0	1.291	353.1	LOS F	23.0	162.4	1.00	1.54	8.8
Approach		663	1.0	663	1.0	1.408	436.3	LOS F	104.2	735.5	1.00	2.06	6.3
East: Glasscocks Rd (E)													
4	L2	85	1.0	85	1.0	0.095	25.9	LOS A	3.1	21.6	0.57	0.71	41.3
5	T1	925	4.0	925	4.0	0.573	21.3	LOS A	18.0	130.3	0.59	0.53	35.5
6	R2	247	1.0	247	1.0	1.363	430.9	LOS F	67.1	473.6	1.00	1.60	7.4
6u	U	110	1.0	110	1.0	1.363	432.0	LOS F	67.1	473.6	1.00	1.60	7.4
Approach		1367	3.0	1367	3.0	1.363	128.6	LOS F	67.1	473.6	0.70	0.82	14.3
North: The Strand (N)													
7	L2	131	1.0	131	1.0	1.144	232.5	LOS F	59.7	421.3	1.00	1.64	12.6
8	T1	309	1.0	309	1.0	1.144	226.9	LOS F	59.7	421.3	1.00	1.64	12.7
9	R2	127	1.0	127	1.0	1.442	490.1	LOS F	25.7	181.6	1.00	1.67	3.6
Approach		567	1.0	567	1.0	1.442	287.2	LOS F	59.7	421.3	1.00	1.65	9.6
West: Glasscocks Rd (W)													
10	L2	133	1.0	96	1.0	0.187	46.0	LOS A	4.9	34.6	0.79	0.75	28.8
11	T1	1322	4.0	955	3.9	0.895	54.1	LOS C	34.4	249.1	0.98	0.98	26.9
12	R2	23	1.0	17	1.0	0.210	81.2	LOS A	1.2	8.4	1.00	0.69	20.8
Approach		1478	3.7	1068 N1	3.6	0.895	53.8	LOS C	34.4	249.1	0.97	0.95	27.0
All Vehicles		4075	2.7	3665 N1	3.0	1.442	187.0	LOS F	104.2	735.5	0.88	1.21	11.8

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	23.5	LOS C	0.1	0.1	0.58	0.58
P2	East Full Crossing	53	55.0	LOS E	0.2	0.2	0.89	0.89
P3	North Full Crossing	53	43.3	LOS E	0.2	0.2	0.79	0.79
P4	West Full Crossing	53	55.0	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		211	44.2	LOS E			0.79	0.79

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: GISt-2046-PM

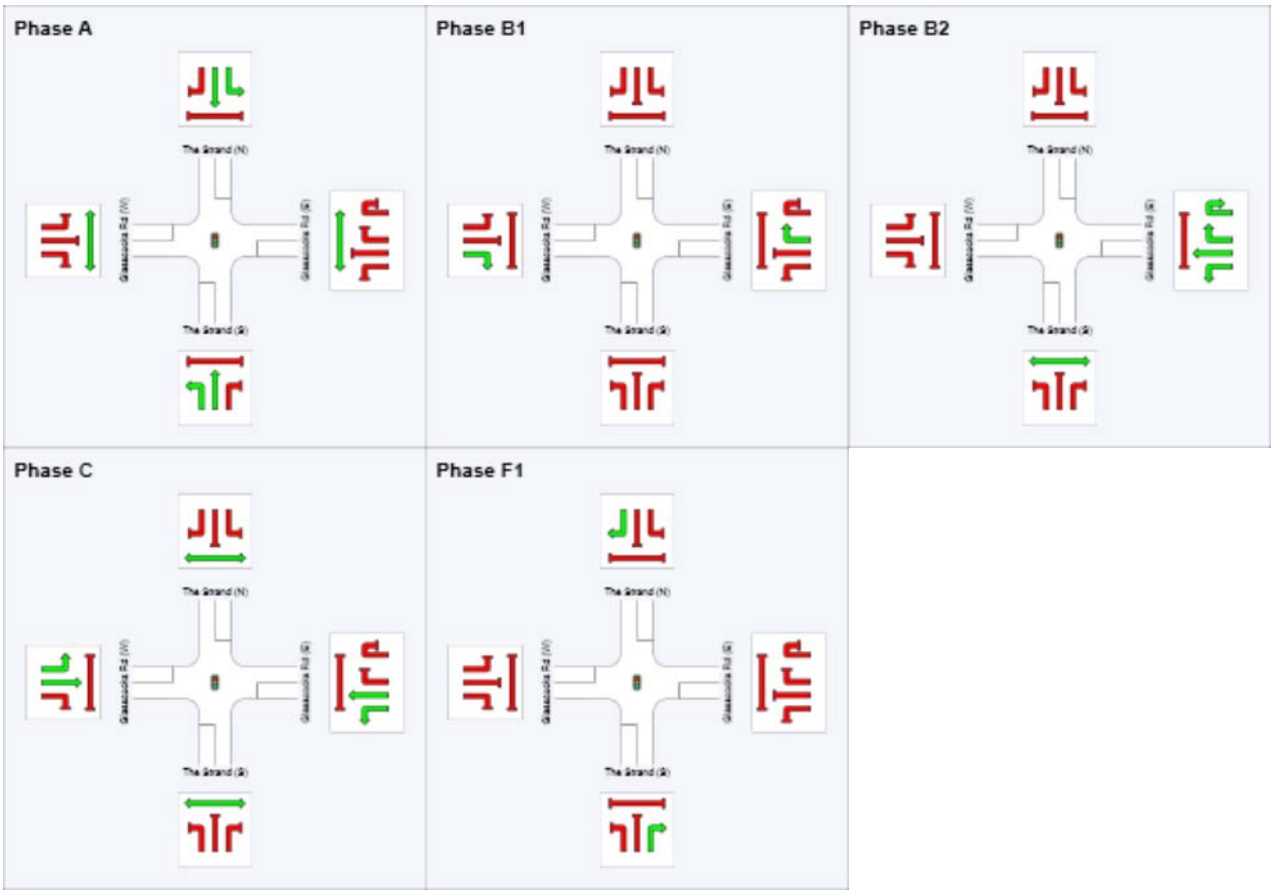
Network: 2046PM

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, C, F1
Output Sequence: A, B1, B2, C, F1

Phase Timing Results

Phase	A	B1	B2	C	F1
Reference Phase	No	No	Yes	No	No
Phase Change Time (sec)	73	113	125	14	59
Green Time (sec)	34	6	23	39	8
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	40	12	29	45	14
Phase Split	29 %	9 %	21 %	32 %	10 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: NwcGI-2046-PM - alisma

Network: 2046PM - alisma

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	162	1.0	162	1.0	0.111	8.0	LOS A	2.0	14.0	0.24	0.62	52.4
2	T1	2374	4.0	2374	4.0	0.830	30.9	LOS C	48.7	352.7	0.89	0.82	40.0
3	R2	181	1.0	181	1.0	0.406	67.4	LOS A	5.9	41.6	0.96	0.78	19.2
Approach		2717	3.6	2717	3.6	0.830	31.9	LOS C	48.7	352.7	0.85	0.80	39.0
East: Glasscocks Road (E)													
4	L2	215	1.0	206	1.0	0.298	30.1	LOS A	9.5	67.3	0.78	0.78	35.4
5	T1	540	4.0	519	4.1	1.183	236.0	LOS F	35.8	259.4	1.00	1.51	9.6
6	R2	319	1.0	306	1.0	0.775	68.5	LOS C	10.4	73.8	1.00	0.85	23.6
Approach		1074	2.5	1031 N1	2.6	1.183	145.1	LOS F	35.8	259.4	0.96	1.17	14.2
North: Narre Warren Road (N)													
7	L2	201	1.0	201	1.0	0.176	12.5	LOS A	4.7	32.8	0.39	0.66	42.8
8	T1	2939	4.0	2939	4.0	1.219	259.1	LOS F	158.4	1146.6	1.00	1.95	11.5
9	R2	69	1.0	69	1.0	0.437	81.0	LOS A	2.5	17.4	1.00	0.72	25.8
Approach		3209	3.7	3209	3.7	1.219	239.8	LOS F	158.4	1146.6	0.96	1.84	12.0
West: Glasscocks Road (W)													
10	L2	124	1.0	124	1.0	0.199	28.2	LOS A	5.3	37.7	0.68	0.75	40.7
11	T1	1016	4.0	1016	4.0	1.584	610.7	LOS F	115.5	836.4	1.00	2.58	3.0
12	R2	157	1.0	157	1.0	0.238	59.0	LOS A	4.6	32.6	0.90	0.76	30.6
Approach		1297	3.4	1297	3.4	1.584	488.2	LOS F	115.5	836.4	0.96	2.19	4.4
All Vehicles		8297	3.5	8254 N1	3.5	1.584	198.6	LOS F	158.4	1146.6	0.92	1.47	12.9

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	62.4	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	35.1	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	35.1	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		263	52.2	LOS E			0.86	0.86

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: NwcGI-2046-PM - alisma

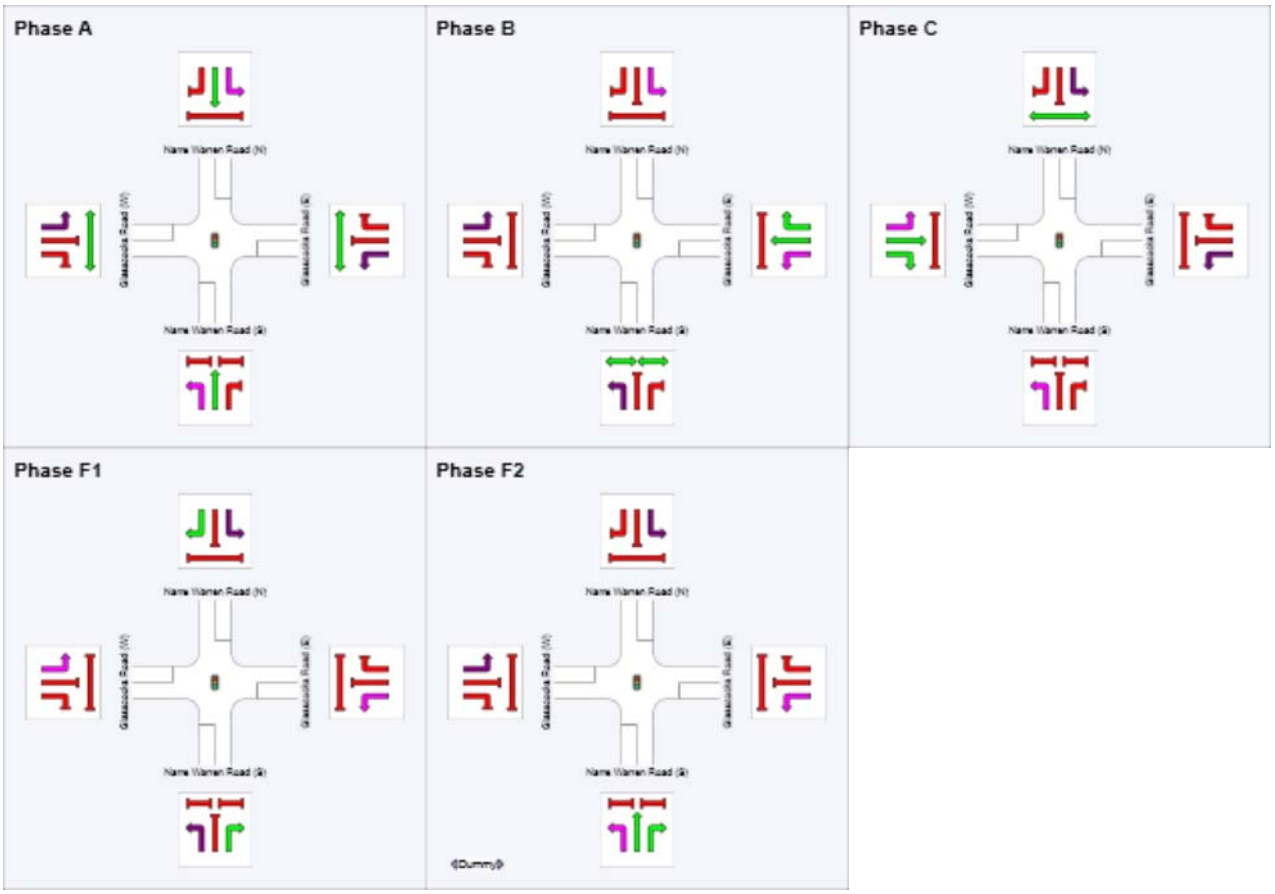
Network: 2046PM - alisma

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Split Phasing - glass
Movement Class: All Movement Classes
Input Sequence: A, B, C, F1, F2
Output Sequence: A, B, C, F1, F2

Phase Timing Results

Phase	A	B	C	F1	F2
Reference Phase	No	Yes	No	No	No
Phase Change Time (sec)	76	0	21	52	64
Green Time (sec)	58	15	25	6	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	64	21	31	12	12
Phase Split	46 %	15 %	22 %	9 %	9 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: GISt-2046-PM - alimsa

Network: 2046PM - alisma

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: The Strand (S)													
1	L2	89	1.0	89	1.0	1.250	322.2	LOS F	66.8	471.7	1.00	1.91	5.4
2	T1	323	1.0	323	1.0	1.250	316.6	LOS F	66.8	471.7	1.00	1.91	9.7
3	R2	119	1.0	119	1.0	0.903	89.4	LOS D	9.3	65.6	1.00	0.98	24.2
Approach		531	1.0	531	1.0	1.250	266.6	LOS F	66.8	471.7	1.00	1.70	10.4
East: Glasscocks Rd (E)													
4	L2	86	1.0	86	1.0	0.092	24.3	LOS A	3.0	20.9	0.55	0.70	42.1
5	T1	893	4.0	893	4.0	0.551	18.8	LOS A	15.9	115.3	0.55	0.49	37.3
6	R2	245	1.0	245	1.0	1.243	327.3	LOS F	57.2	403.7	1.00	1.45	9.4
6u	U	109	1.0	109	1.0	1.243	328.4	LOS F	57.2	403.7	1.00	1.45	9.4
Approach		1333	3.0	1333	3.0	1.243	101.1	LOS F	57.2	403.7	0.67	0.76	17.2
North: The Strand (N)													
7	L2	131	1.0	131	1.0	1.323	389.4	LOS F	78.7	555.8	1.00	2.08	8.2
8	T1	309	1.0	309	1.0	1.323	383.8	LOS F	78.7	555.8	1.00	2.08	8.2
9	R2	127	1.0	127	1.0	1.204	278.5	LOS F	18.9	133.4	1.00	1.43	6.0
Approach		567	1.0	567	1.0	1.323	361.5	LOS F	78.7	555.8	1.00	1.94	7.9
West: Glasscocks Rd (W)													
10	L2	116	1.0	86	1.0	0.171	38.2	LOS A	3.6	25.3	0.65	0.72	31.5
11	T1	1293	4.0	954	3.9	0.909	40.7	LOS D	31.3	226.1	0.92	0.90	31.2
12	R2	19	1.0	14	1.0	0.177	81.0	LOS A	1.0	7.0	1.00	0.69	20.9
Approach		1428	3.7	1053 N1	3.6	0.909	41.0	LOS D	31.3	226.1	0.90	0.89	31.0
All Vehicles		3859	2.7	3484 N1	3.0	1.323	150.6	LOS F	78.7	555.8	0.84	1.13	14.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	21.8	LOS C	0.1	0.1	0.56	0.56
P2	East Full Crossing	53	59.6	LOS E	0.2	0.2	0.92	0.92
P3	North Full Crossing	53	44.1	LOS E	0.2	0.2	0.79	0.79
P4	West Full Crossing	53	59.6	LOS E	0.2	0.2	0.92	0.92
All Pedestrians		211	46.3	LOS E			0.80	0.80

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: GISt-2046-PM - alimsa

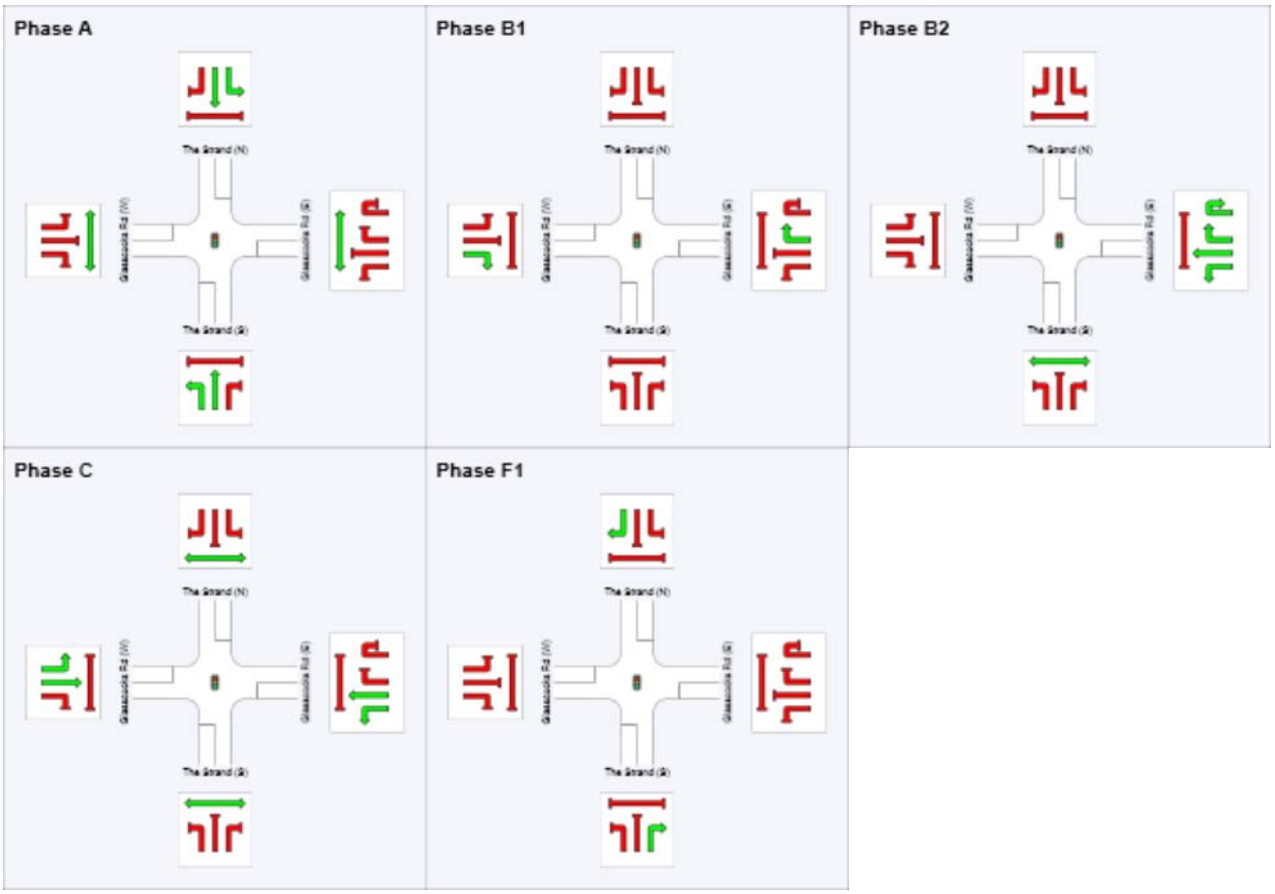
Network: 2046PM - alisma

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, C, F1
Output Sequence: A, B1, B2, C, F1

Phase Timing Results

Phase	A	B1	B2	C	F1
Reference Phase	No	No	Yes	No	No
Phase Change Time (sec)	83	118	130	23	67
Green Time (sec)	29	6	27	38	10
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	35	12	33	44	16
Phase Split	25 %	9 %	24 %	31 %	11 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: NwcGI-2046-PM - works

Network: 2046PM - works

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	142	1.0	142	1.0	0.097	7.9	LOS A	1.7	12.1	0.24	0.61	52.4
2	T1	2246	4.0	2246	4.0	0.793	29.3	LOS C	45.1	326.7	0.86	0.78	40.8
3	R2	221	1.0	221	1.0	0.739	73.8	LOS C	10.0	70.7	1.00	0.87	18.0
3u	U	42	1.0	42	1.0	0.739	75.9	LOS C	8.5	60.3	1.00	0.87	26.7
Approach		2651	3.5	2651	3.5	0.793	32.6	LOS C	45.1	326.7	0.84	0.78	38.7
East: Glasscocks Road (E)													
4	L2	229	1.0	227	1.0	0.514	36.2	LOS A	11.0	77.7	0.78	0.80	32.7
5	T1	557	4.0	552	4.0	1.031	91.5	LOS F	20.2	146.3	0.98	1.01	19.8
6	R2	450	1.0	446	1.0	1.129	187.2	LOS F	26.9	189.7	1.00	1.26	11.6
Approach		1236	2.4	1226 N1	2.4	1.129	116.1	LOS F	26.9	189.7	0.95	1.06	16.7
North: Narre Warren Road (N)													
7	L2	201	1.0	201	1.0	0.171	14.4	LOS A	5.1	36.2	0.42	0.67	41.1
8	T1	2939	4.0	2939	4.0	1.217	256.7	LOS F	157.4	1139.4	1.00	1.94	11.7
9	R2	69	1.0	69	1.0	0.437	81.0	LOS A	2.5	17.4	1.00	0.72	25.9
Approach		3209	3.7	3209	3.7	1.217	237.8	LOS F	157.4	1139.4	0.96	1.84	12.1
West: Glasscocks Road (W)													
10	L2	124	1.0	124	1.0	0.209	30.5	LOS A	5.9	41.7	0.73	0.77	39.7
11	T1	1016	4.0	1016	4.0	1.394	343.4	LOS F	80.4	582.0	1.00	1.86	5.1
12	R2	157	1.0	157	1.0	0.238	59.0	LOS A	4.6	32.6	0.90	0.76	30.6
Approach		1297	3.4	1297	3.4	1.394	279.1	LOS F	80.4	582.0	0.96	1.62	7.3
All Vehicles		8393	3.4	8383 N1	3.4	1.394	161.5	LOS F	157.4	1139.4	0.92	1.36	15.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	62.4	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
P3	North Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
All Pedestrians		263	54.0	LOS E			0.87	0.87

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: NwcGI-2046-PM - works

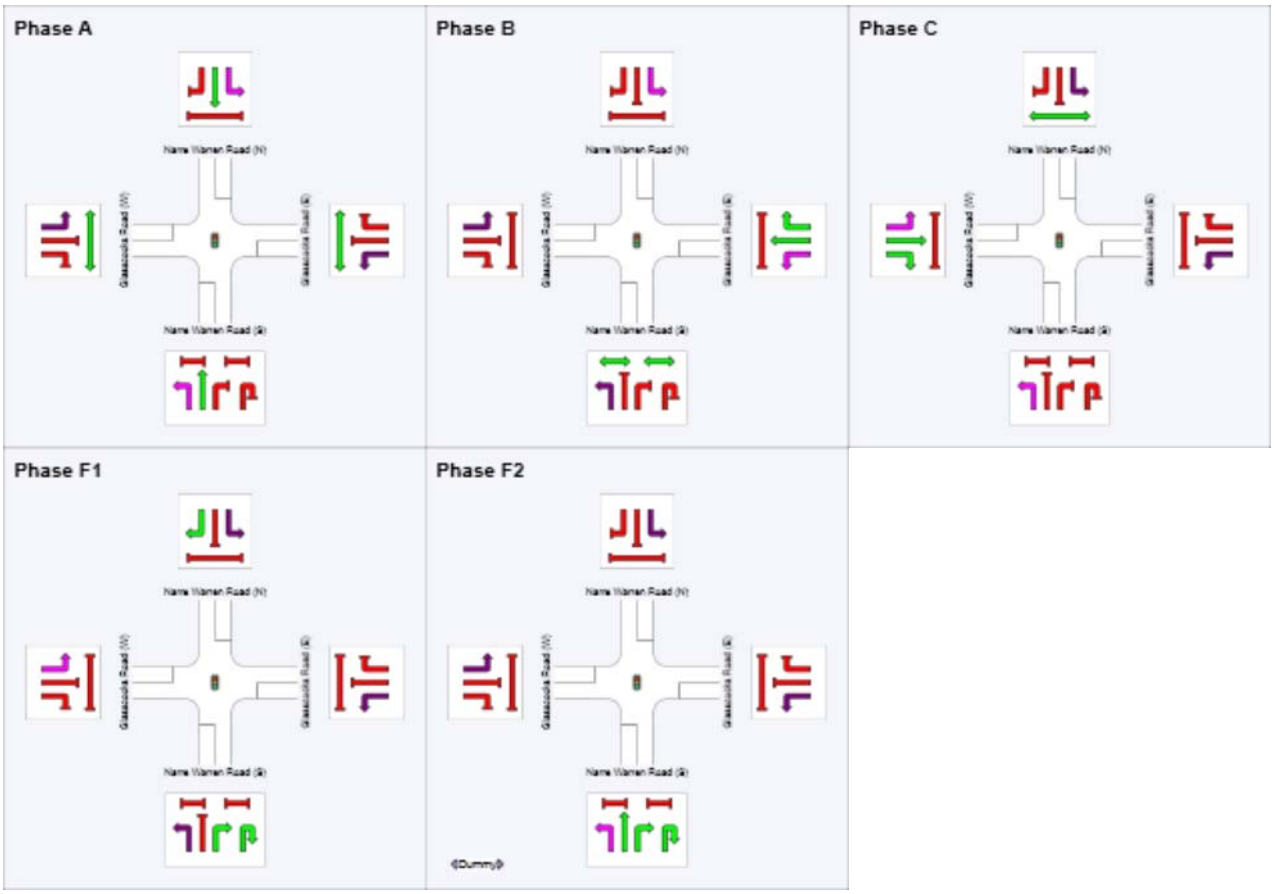
Network: 2046PM - works

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Split Phasing - glass
Movement Class: All Movement Classes
Input Sequence: A, B, C, F1, F2
Output Sequence: A, B, C, F1, F2

Phase Timing Results

Phase	A	B	C	F1	F2
Reference Phase	No	Yes	No	No	No
Phase Change Time (sec)	76	0	21	52	64
Green Time (sec)	58	15	25	6	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	64	21	31	12	12
Phase Split	46 %	15 %	22 %	9 %	9 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: GISt-2046-PM - works

Network: 2046PM - works

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: The Strand (S)													
1	L2	220	1.0	220	1.0	1.009	146.4	LOS F	21.6	152.5	1.00	1.11	10.5
2	T1	307	1.0	307	1.0	1.258	332.1	LOS F	49.9	352.6	1.00	1.80	9.4
3	R2	136	1.0	136	1.0	1.291	353.1	LOS F	23.0	162.4	1.00	1.54	8.8
Approach		663	1.0	663	1.0	1.291	274.8	LOS F	49.9	352.6	1.00	1.52	9.4
East: Glasscocks Rd (E)													
4	L2	85	1.0	85	1.0	0.081	19.7	LOS A	2.5	17.9	0.47	0.68	44.4
5	T1	925	4.0	925	4.0	0.409	17.5	LOS A	17.9	129.3	0.60	0.53	38.4
6	R2	247	1.0	247	1.0	1.212	298.0	LOS F	55.0	388.0	1.00	1.43	10.2
6u	U	110	1.0	110	1.0	1.212	299.1	LOS F	55.0	388.0	1.00	1.43	10.1
Approach		1367	3.0	1367	3.0	1.212	91.0	LOS F	55.0	388.0	0.69	0.77	18.5
North: The Strand (N)													
7	L2	131	1.0	131	1.0	0.452	64.0	LOS A	8.2	58.1	0.95	0.80	28.9
8	T1	309	1.0	309	1.0	1.183	261.5	LOS F	44.4	313.6	1.00	1.65	11.4
9	R2	127	1.0	127	1.0	1.205	277.7	LOS F	18.8	132.4	1.00	1.42	6.1
Approach		567	1.0	567	1.0	1.205	219.5	LOS F	44.4	313.6	0.99	1.40	11.9
West: Glasscocks Rd (W)													
10	L2	133	1.0	115	1.0	0.185	26.2	LOS A	3.4	24.1	0.47	0.69	36.7
11	T1	1322	4.0	1140	3.9	0.894	52.8	LOS C	40.9	295.7	0.95	0.94	27.3
12	R2	23	1.0	20	1.0	0.251	81.6	LOS A	1.4	10.0	1.00	0.70	20.9
Approach		1478	3.7	1275[N1]	3.6	0.894	50.9	LOS C	40.9	295.7	0.90	0.91	27.8
All Vehicles		4075	2.7	3872[N1]	2.8	1.291	128.1	LOS F	55.0	388.0	0.86	1.04	15.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
P2	East Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
P4	West Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	51.9	LOS E			0.86	0.86

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: GISt-2046-PM - works

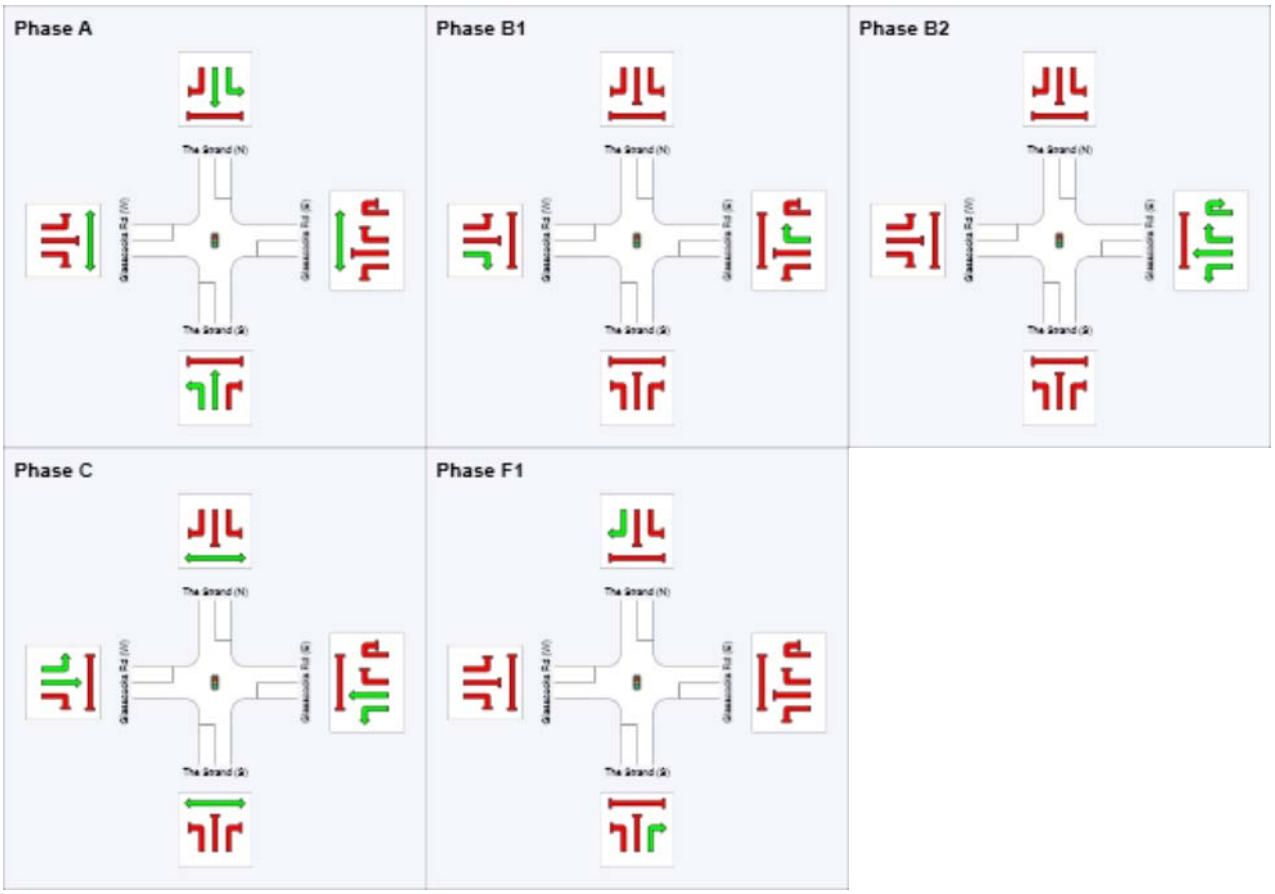
Network: 2046PM - works

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, C, F1
Output Sequence: A, B1, B2, C, F1

Phase Timing Results

Phase	A	B1	B2	C	F1
Reference Phase	No	No	Yes	No	No
Phase Change Time (sec)	85	113	125	18	71
Green Time (sec)	22	6	27	47	8
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	28	12	33	53	14
Phase Split	20 %	9 %	24 %	38 %	10 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: NwcGI-2046-PM - alisma - work

Network: 2046PM - alisma - works

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)													
1	L2	162	1.0	162	1.0	0.108	7.3	LOS A	1.6	11.6	0.21	0.61	52.9
2	T1	2374	4.0	2374	4.0	0.828	30.8	LOS C	48.6	351.8	0.89	0.82	40.1
3	R2	181	1.0	181	1.0	0.402	67.3	LOS A	6.1	43.1	0.96	0.78	19.2
Approach		2717	3.6	2717	3.6	0.828	31.8	LOS C	48.6	351.8	0.85	0.80	39.2
East: Glasscocks Road (E)													
4	L2	215	1.0	211	1.0	0.309	27.4	LOS A	8.8	61.9	0.70	0.76	36.7
5	T1	540	4.0	530	4.1	0.805	56.4	LOS C	11.7	84.9	0.98	0.82	26.7
6	R2	319	1.0	313	1.0	0.791	62.0	LOS C	10.4	73.1	0.98	0.82	25.2
Approach		1074	2.5	1053 N1	2.5	0.805	52.3	LOS C	11.7	84.9	0.92	0.81	27.7
North: Narre Warren Road (N)													
7	L2	201	1.0	201	1.0	0.166	12.3	LOS A	4.5	31.8	0.38	0.66	43.0
8	T1	2939	4.0	2939	4.0	1.217	256.7	LOS F	157.4	1139.4	1.00	1.94	11.7
9	R2	69	1.0	69	1.0	0.437	81.0	LOS A	2.5	17.4	1.00	0.72	25.9
Approach		3209	3.7	3209	3.7	1.217	237.6	LOS F	157.4	1139.4	0.96	1.84	12.1
West: Glasscocks Road (W)													
10	L2	124	1.0	124	1.0	0.210	30.8	LOS A	6.0	42.2	0.73	0.77	39.5
11	T1	1016	4.0	1016	4.0	1.126	165.8	LOS F	52.1	377.1	1.00	1.40	9.7
12	R2	157	1.0	157	1.0	0.238	59.0	LOS A	4.6	32.6	0.90	0.76	30.6
Approach		1297	3.4	1297	3.4	1.126	140.0	LOS F	52.1	377.1	0.96	1.26	12.9
All Vehicles		8297	3.5	8276 N1	3.5	1.217	131.2	LOS F	157.4	1139.4	0.92	1.28	17.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	62.4	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
P3	North Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	39.5	LOS D	0.2	0.2	0.75	0.75
All Pedestrians		263	54.0	LOS E			0.87	0.87

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: NwcGI-2046-PM - alisma - work

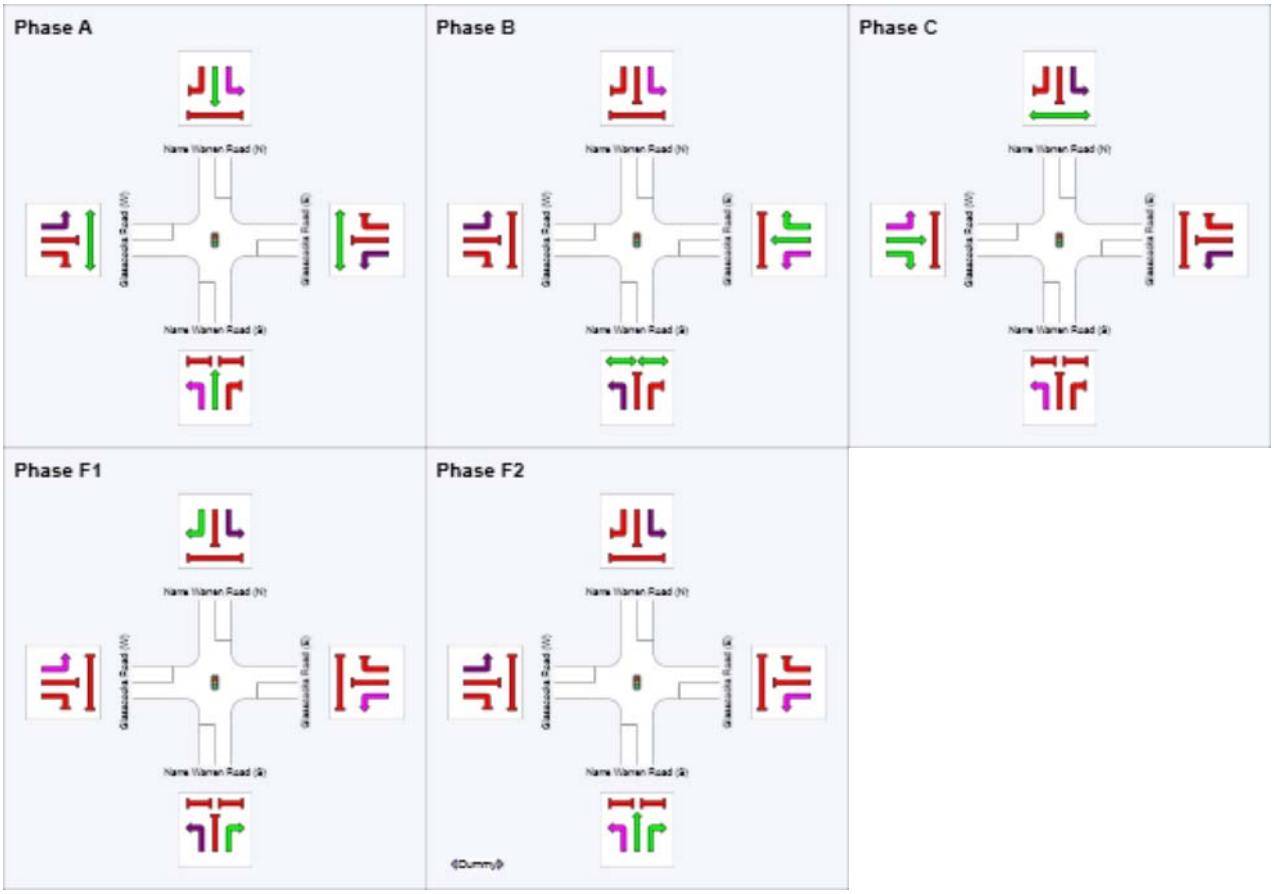
Network: 2046PM - alisma - works

Narre Warren Road / Glasscocks Roads
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: Split Phasing - glass
Movement Class: All Movement Classes
Input Sequence: A, B, C, F1, F2
Output Sequence: A, B, C, F1, F2

Phase Timing Results

Phase	A	B	C	F1	F2
Reference Phase	No	Yes	No	No	No
Phase Change Time (sec)	76	0	21	52	64
Green Time (sec)	58	15	25	6	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	64	21	31	12	12
Phase Split	46 %	15 %	22 %	9 %	9 %



Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

MOVEMENT SUMMARY

Site: GISt-2046-PM - alimsa - work

Network: 2046PM - alisma - works

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: The Strand (S)													
1	L2	89	1.0	89	1.0	0.322	63.5	LOS A	5.5	38.8	0.94	0.77	19.7
2	T1	323	1.0	323	1.0	1.265	331.4	LOS F	53.0	374.4	1.00	1.83	9.4
3	R2	119	1.0	119	1.0	1.129	212.2	LOS F	15.1	106.4	1.00	1.30	13.4
Approach		531	1.0	531	1.0	1.265	259.8	LOS F	53.0	374.4	0.99	1.53	10.7
East: Glasscocks Rd (E)													
4	L2	86	1.0	86	1.0	0.081	19.2	LOS A	2.5	17.8	0.47	0.68	44.7
5	T1	893	4.0	893	4.0	0.377	10.4	LOS A	9.6	69.5	0.35	0.31	44.9
6	R2	245	1.0	245	1.0	1.266	346.7	LOS F	59.1	416.9	1.00	1.50	8.9
6u	U	109	1.0	109	1.0	1.266	347.8	LOS F	59.1	416.9	1.00	1.50	8.9
Approach		1333	3.0	1333	3.0	1.266	100.4	LOS F	59.1	416.9	0.53	0.65	17.3
North: The Strand (N)													
7	L2	131	1.0	131	1.0	0.474	65.1	LOS A	8.3	58.7	0.96	0.80	28.6
8	T1	309	1.0	309	1.0	1.224	296.3	LOS F	47.6	336.2	1.00	1.74	10.3
9	R2	127	1.0	127	1.0	1.205	277.7	LOS F	18.8	132.4	1.00	1.42	6.1
Approach		567	1.0	567	1.0	1.224	238.7	LOS F	47.6	336.2	0.99	1.45	11.1
West: Glasscocks Rd (W)													
10	L2	116	1.0	108	1.0	0.168	20.7	LOS A	2.4	17.2	0.35	0.66	39.8
11	T1	1293	4.0	1206	4.0	0.896	21.3	LOS C	32.1	232.6	0.75	0.71	40.5
12	R2	19	1.0	18	1.0	0.224	81.4	LOS A	1.3	8.9	1.00	0.70	20.9
Approach		1428	3.7	1332[N1]	3.7	0.896	22.1	LOS C	32.1	232.6	0.72	0.70	39.9
All Vehicles		3859	2.7	3763[N1]	2.8	1.266	116.0	LOS F	59.1	416.9	0.73	0.91	17.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	18.0	LOS B	0.1	0.1	0.51	0.51
P2	East Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	38.0	LOS D	0.2	0.2	0.74	0.74
P4	West Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	46.1	LOS E			0.79	0.79

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: GISt-2046-PM - alimsa - work

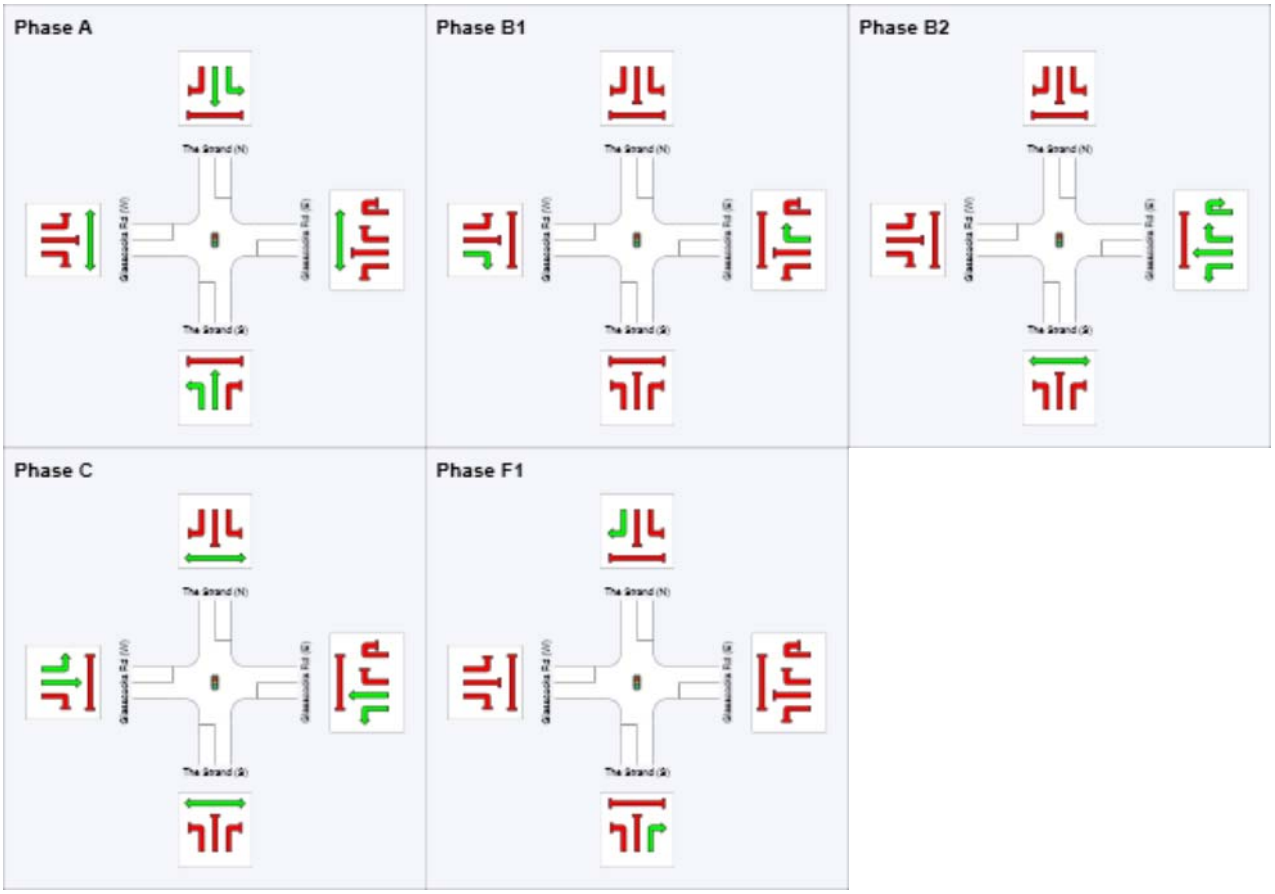
Network: 2046PM - alisma - works

Glasscocks Road / The Strand
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Cycle Time)

Phase times determined by the program
Sequence: CGR
Movement Class: All Movement Classes
Input Sequence: A, B1, B2, C, F1
Output Sequence: A, B1, B2, C, F1

Phase Timing Results

Phase	A	B1	B2	C	F1
Reference Phase	No	No	Yes	No	No
Phase Change Time (sec)	86	113	125	17	72
Green Time (sec)	21	6	26	49	8
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	27	12	32	55	14
Phase Split	19 %	9 %	23 %	39 %	10 %



Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: NwcAI-2046-AM - redist

Narre Warren Road / Alisma
Signals - Fixed Time Coordinated Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Degree of Saturation)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)											
2	T1	2592	4.0	0.837	31.0	LOS C	52.4	379.1	0.91	0.84	44.8
3	R2	233	1.0	0.833	85.2	LOS C	8.9	63.1	1.00	0.91	27.8
Approach		2825	3.8	0.837	35.5	LOS C	52.4	379.1	0.92	0.84	43.0
East: Alisma (E)											
4	L2	191	1.0	0.229	9.1	LOS A	3.3	23.0	0.30	0.65	52.9
6	R2	177	1.0	0.464	73.3	LOS A	6.1	42.8	0.99	0.78	22.4
Approach		368	1.0	0.464	40.0	LOS A	6.1	42.8	0.63	0.71	35.7
North: Narre Warren Road (N)											
7	L2	359	1.0	0.223	6.7	LOS A	3.1	22.0	0.17	0.59	51.1
8	T1	1728	4.0	0.567	18.4	LOS A	21.2	153.4	0.54	0.48	49.9
Approach		2087	3.5	0.567	16.4	LOS A	21.2	153.4	0.47	0.50	50.0
All Vehicles		5280	3.5	0.837	28.2	LOS C	52.4	379.1	0.72	0.70	45.0

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	66.8	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	64.9	LOS F	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	23.2	LOS C	0.1	0.1	0.57	0.57
P3	North Full Crossing	53	66.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	55.4	LOS E			0.86	0.86

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

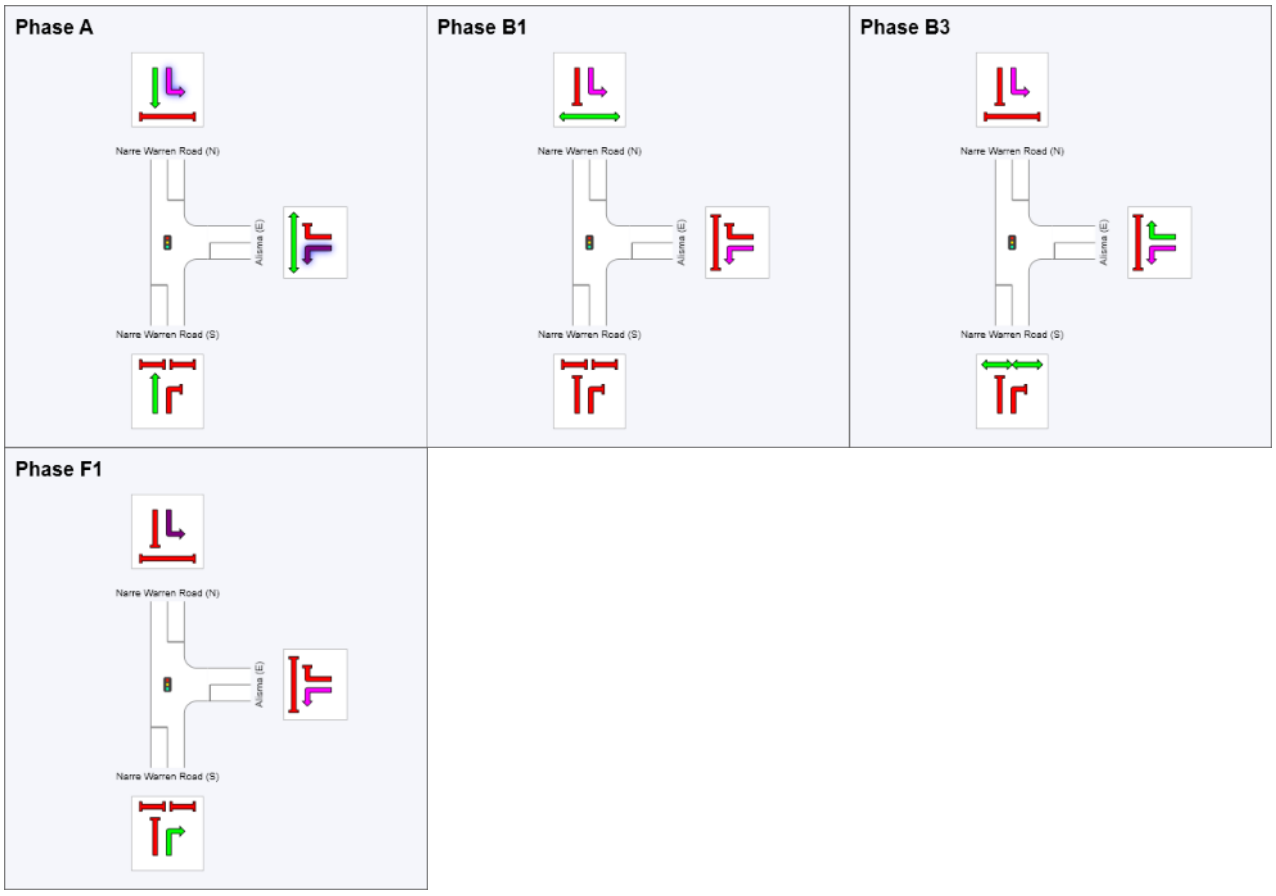
Site: NwcAI-2046-AM - redist

Narre Warren Road / Alisma
Signals - Fixed Time Coordinated Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Degree of Saturation)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase times determined by the program
Sequence: Variable Phasing - Split Glass
Movement Class: All Movement Classes
Input Sequence: A, B1, B3, F1, F2
Output Sequence: A, B1, B3, F1

Phase Timing Results

Phase	A	B1	B3	F1
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	64	0	26	47
Green Time (sec)	75	20	15	11
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	81	26	21	17
Phase Split	56 %	18 %	14 %	12 %



MOVEMENT SUMMARY

Site: NwcAI-2046-PM - redist

Narre Warren Road / Alisma
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Degree of Saturation)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Narre Warren Road (S)											
2	T1	2227	4.0	0.660	24.0	LOS B	37.8	273.3	0.75	0.69	47.5
3	R2	130	1.0	0.881	95.6	LOS C	5.4	38.0	1.00	0.92	26.1
Approach		2357	3.8	0.881	27.9	LOS C	37.8	273.3	0.76	0.70	45.8
East: Alisma (E)											
4	L2	272	1.0	0.414	26.8	LOS A	12.3	87.0	0.70	0.78	43.7
6	R2	235	1.0	0.597	76.3	LOS A	8.4	59.5	1.00	0.80	21.9
Approach		507	1.0	0.597	49.7	LOS A	12.3	87.0	0.84	0.79	32.7
North: Narre Warren Road (N)											
7	L2	294	1.0	0.175	6.1	LOS A	1.6	11.3	0.12	0.58	51.7
8	T1	2866	4.0	0.894	23.4	LOS C	58.6	424.2	0.76	0.73	47.7
Approach		3160	3.7	0.894	21.8	LOS C	58.6	424.2	0.70	0.72	47.9
All Vehicles		6024	3.5	0.894	26.6	LOS C	58.6	424.2	0.74	0.72	45.8

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P11	South Stage 1	53	69.3	LOS F	0.2	0.2	0.96	0.96
P12	South Stage 2	53	66.4	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	20.3	LOS C	0.1	0.1	0.52	0.52
P3	North Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	56.3	LOS E			0.85	0.85

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: NwcAI-2046-PM - redist

Narre Warren Road / Alisma
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Degree of Saturation)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase times determined by the program
Sequence: Variable Phasing - Split Glass
Movement Class: All Movement Classes
Input Sequence: A, B1, B3, F1, F2
Output Sequence: A, B1, B3, F1

Phase Timing Results

Phase	A	B1	B3	F1
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	60	0	26	48
Green Time (sec)	84	20	16	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	90	26	22	12
Phase Split	60 %	17 %	15 %	8 %