



PARTIAL STREET CLOSURE

MELROSE STREET, SANDRINGHAM

TRAFFIC STUDY

PROPOSED STREET CLOSURE MELROSE STREET, SANDRINGHAM

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1 INTRODUCTION

SALT has been engaged to undertake a traffic study of the potential partial closure of Melrose Street in Sandringham. Members of the community have raised the idea to close the northern end of Melrose Street to provide public outdoor space. The following traffic study assess the impacts of this, with a particular interest in the redirection of traffic movements and circulation to other streets and intersections in the vicinity.

In the course of undertaking this study, the following has been completed:

- The subject site and its environs have been inspected;
- Detailed traffic surveys have been commissioned. These included turning movement surveys and origin-destination surveys at various key intersections surrounding Melrose Street;
- The redistribution of traffic has been estimated based on the traffic survey data; and
- The key intersections have been analysed using SIDRA Intersection v9 to ascertain the impact of the closure of Melrose Street.

The following sets out our findings.

2 EXISTING CONDITIONS

2.1 LOCATION AND LAND USE

Melrose Street is located in Sandringham, between Beach Road and Station Street. The study area has been expanded beyond Melrose Street to include a greater portion of the Sandringham activity centre, home to numerous dining and retail tenancies. The study area is situated in close proximity to Sandringham Railway Station and Sandringham beach / waterfront.

The key intersections within the study include that of Melrose Street / Station Street, Melrose Street / Beach Road, Beach Road / Bay Road and Bay Road / Station Street.

Figure 1 depicts the location of the study area with respect to the surrounding road network and land uses. An aerial view of the study area is provided in Figure 2.



Figure 1 Study area locality



Figure 2 Aerial view of study area

2.2 ROAD NETWORK

2.2.1 MELROSE STREET

Melrose Street is classified as a Local Road under the care and management of Bayside City Council. It runs in a northeast – southwest alignment between Beach Road and Station Street, with a length of approximately 130m.

The road has a carriageway width of approximately 12.7m, providing two-way traffic movements with parking and partial on-street bike lanes on both sides.

On the southern side, on-street parallel parking is provided and restricted to 2-hour parking between 8:00am–6:00pm Monday to Saturday. On the northern side, parking is provided as both parallel and 90-degree parking and is restricted to 1-hour parking between 8:00am–6:00pm Monday to Saturday.

A zebra pedestrian crossing is provided toward the northern end of the street, on approach to Station Street. A speed limit of 40km/hr applies.

Views of Melrose Street in each direction are provided in **Figure 3** and **Figure 4**.



Figure 3 View of Melrose Street facing north-east



Figure 4 View of Melrose Street facing south-west

2.2.2 BAY ROAD

Bay Road is an Arterial Road under the care and management of the Department of Transport. It runs in a generally east-west alignment between Beach Road and Nepean Highway.

In the vicinity of the study area, Bay Road provides one traffic lane in each direction, with indented parallel and 90-degree parking on both sides of the street. On the northern side, parking is mostly restricted to 1-hour parking between 8:00am-8:00pm. On the southern side, parking is mostly restricted to 1-hour parking between 8:00am-6:00pm Monday to Friday.

A signalised pedestrian crossing is provided on Bay Road in the vicinity of the study area. The intersection of Bay Road and Station Street is in the form of a roundabout.

A posted speed limit of 40km/hr applies.

Views of Bay Road in each direction are provided in **Figure 5** and **Figure 6**.



Figure 5 View of Bay Road facing east



Figure 6 View of Bay Road facing west

2.2.3 BEACH ROAD

Beach Road is an Arterial Road under the care and management of the Department of Transport. In the vicinity of the site, it runs in a northwest-southeast alignment.

Beach Road provides two traffic lanes in each direction. An off-road shared path is provided along the western side of the road.

On-street parking is not permitted on either side of Beach Road. A posted speed limit of 60km/hr applies.

Views of Beach Road in each direction are provided in **Figure 7** and **Figure 8**.



Figure 7 View of Beach Road facing south



Figure 8 View of Beach Road facing north

2.2.4 STATION STREET

Station Street is under the care and management of Bayside City Council. Between Bay Road and Melrose Street, Station Street is classified as a Collector Street and north of Melrose Street it is classified as a Local Road.

Station Street runs in a generally north-south alignment and provides one traffic lane in each direction. In the vicinity of the study area, parking on the western side is provided an indented parallel spaces, mostly restricted to 1-hour parking between 8:00am-6:00pm Monday to Saturday. On the eastern side, parking is mostly provided as indented angled spaces restricted to 1-hour parking between 8:00am-6:00pm Monday to Saturday.

Zebra pedestrian crossings are provided on Station Street, near Sandringham Railway Station.

A posted speed limit of 40km/hr applies.



Figure 9 View of Station Street facing south



2.3 SUSTAINABLE TRANSPORT

2.3.1 PUBLIC TRANSPORT

The study area is excellently serviced by public transport with Sandringham Railway Station situated just north of Melrose Street. This is the end of the Sandringham train line, providing connection to Melbourne CBD.

Furthermore, multiple bus routes operated within and nearby the study area. These are accessible from the Sandringham Railway Station / Station Street bus interchange facility located at the railway station. Bus routes 600, 922 and 923 operate from this interchange form a high service combined route between St Kilda Light Rail and Southland Shopping Centre, with routes varying slightly in Brighton and Beaumaris areas.

Bus route 822 also services the study area, running between Chadstone Shopping Centre and Sandringham via Murrumbeena and Southland Shopping Centre.

A map of the public transport routes near the site is provided in **Figure 10**.



Figure 10 Public transport map

2.3.2 WALKING

The study area has excellent walking facilities in place. Footpaths are provided along all streets in the vicinity, along with various pedestrian crossings including zebra crossings on Melrose Street and Station Street and a signalised pedestrian crossing on Bay Road.

The Sandringham Village Activity Centre encourages and allows people to walk between the various destinations including retail and food and drink premises. It is noted however that there is still a relatively high amount of traffic activity, with vehicles constantly arriving and departing the area, as to be expected for an activity centre with mostly short-stay parking in place.

2.3.3 CYCLING

The study area is accessible by bicycle with an off-road shared path along Beach Road providing access for cyclists from neighbouring suburbs. The activity centre itself is somewhat limited in its cycling provision, with on-road cycling treatments provided only on Melrose Street.

Bay Road and Beach Road are included in the Department of Transport's Principal Bicycle Network (PBN), as seen in **Figure 11**. The PBN defines the network of existing and proposed bicycle routes in the municipality to guide the planning, prioritisation and implementation of bicycle facilities.

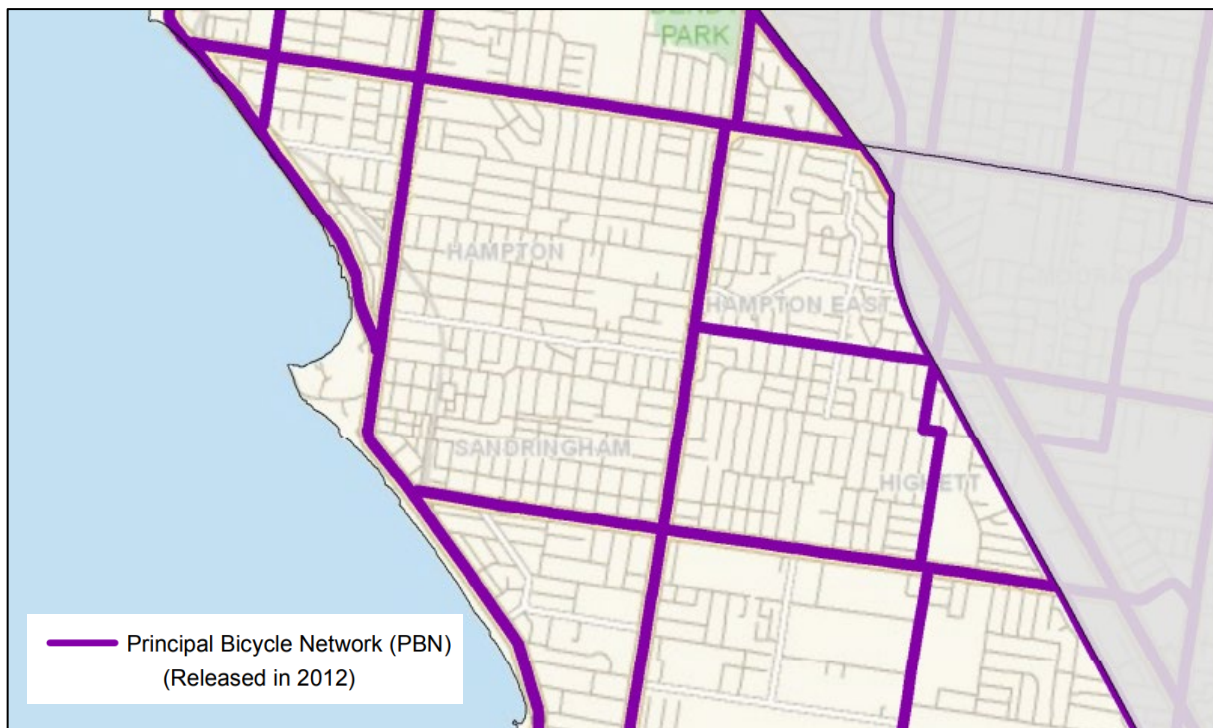


Figure 11 Principal Bicycle Network in Sandringham

Further, Council provides a cycling route map depicting the existing on- and off-road cycling routes and trails within the municipality. This indicates that Melrose Street is part of the Municipal level bicycle network, and Bay Road and Beach Road are part of the Strategic Cycling Corridor connecting between other municipalities, as seen in Figure 12.

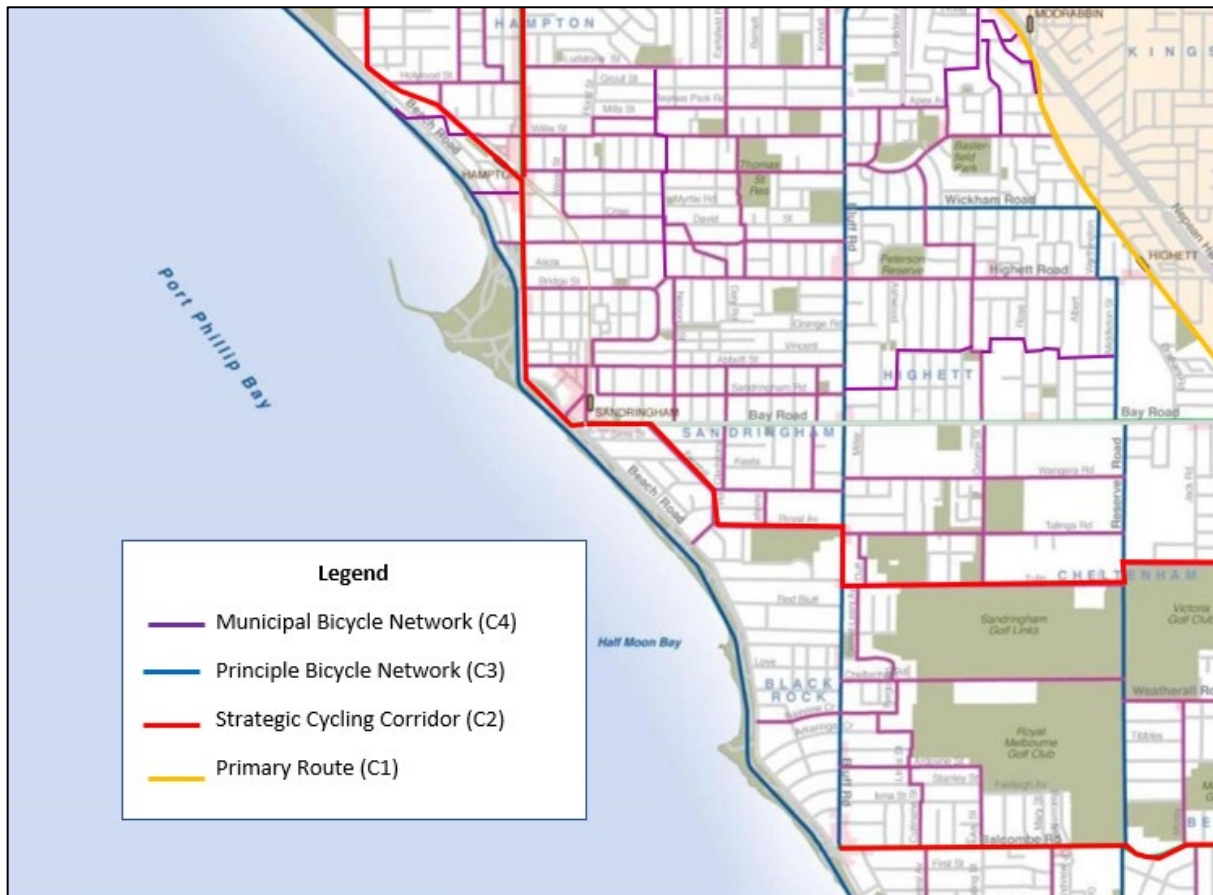


Figure 12 Bayside cycling routes map

2.4 CRASH STATISTICS

An assessment of the crash history for the study area was undertaken by analysing crash data for the past five calendar years obtained from the VicRoads Crash Information database. The database contains all reported casualty crashes which include the categories of fatal, serious injury and other injury crashes. Non-injury crashes or property damage only crashes are not included in this database.

The categories of crash severity are defined as follows:

- Fatal injury – one or more persons are killed in the crash, or die within 30 days from injuries sustained in the crash;
- Serious injury – one or more persons are admitted to hospital as a result of injuries sustained in the crash; and
- Other injury – one or more persons are given medical treatment for injuries sustained in the crash.

The crashes in the vicinity of the study area in the most recent five-year period are summarised in **Table 1**.

Table 1 Crash statistics summary

Date / Time	Location	Severity	Description	Conditions
25 July 2017 at 3:29pm	Beach Road / Bay Road	Serious Injury	Struck pedestrian	Clear, dry, day
9 November 2017 at 6:30am	Bay Road / The Crescent	Injury	Bicycle – no collision and no object struck	Clear, dry, day
4 January 2018 at 5:45am	Beach Road / Melrose Street	Fatal	Struck pedestrian	Clear, dry, dark with street lights on
6 June 2018 at 7:09am	Bay Road / Station Street	Serious Injury	Bicycle collision with vehicle	Clear, dry, dark with street lights on
24 January 2019 at 11:25am	Beach Road (north of The Crescent intersection)	Serious Injury	Bicycle collision with vehicle	Clear, dry, day

From the above table, it can be seen that five (5) vehicle crashes have occurred in the vicinity of the site since 2017, including one fatal injury crash. Notably, all of the crashes recorded involved a pedestrian or cyclist and majority occurred at the intersections involved in the study.

This indicates that there is significant scope to improve pedestrian and cyclist safety in the precinct. The closure of a section of Melrose Street has the potential to achieve this, with an increase of pedestrianised areas.

2.5 TRAFFIC DATA

To ascertain the level of existing traffic in the study area, traffic surveys have been commissioned. These included turning movement counts and origin-destination surveys at the locations depicted in **Figure 11** and **Figure 12** respectively.

The turning movement surveys capture the number of cars and truck travelling in each direction and undertaking turns, as well as the number of pedestrians and cyclists crossing the roads at these locations.

The origin-destination surveys track the vehicles entering and exiting Melrose Street from the various access points including the main intersections with Station Street and Beach Road, as well as via the Sandringham Hotel car park, and BWS car park which provides a thoroughfare between Melrose Street and Station Street or Bay Road.

The surveys were undertaken on Friday 9 September 2022 between 7:30am–9:30am and 5:00pm–7:00pm, and on Saturday 10 September 2022 between 10:30am–2:30pm. This represents the anticipated peak periods of the activity centre outside of school holidays and public holidays.

The results were analysed to find the weekday AM peak hour to occur from 8:00am–9:00am and the weekday PM peak hour to occur from 5:30pm–6:30pm. The Saturday peak hour was found to occur between 11:30am–12:30pm.

The results of the turning movement survey for the weekday and weekend peak hour are summarised in **Figure 13** and **Figure 14** respectively.

The results of the origin destination survey are summarised diagrammatically in **Figures 15-18**. These show the number of vehicles entering and existing Melrose Street to/from Station Street and the point at which they exit Melrose Street.

These are the vehicles that will be redirected to other streets depending on their ultimate destination. Note that the origin destination survey results are totals for the survey periods, thus over 2-hours on the Friday AM and PM peak periods, and over 4-hours on the Saturday. The Friday PM peak period is identified as the critical period having regard to the individual peak hour volumes.



Figure 13 Turning movement count locations



Figure 14 Origin destination survey locations

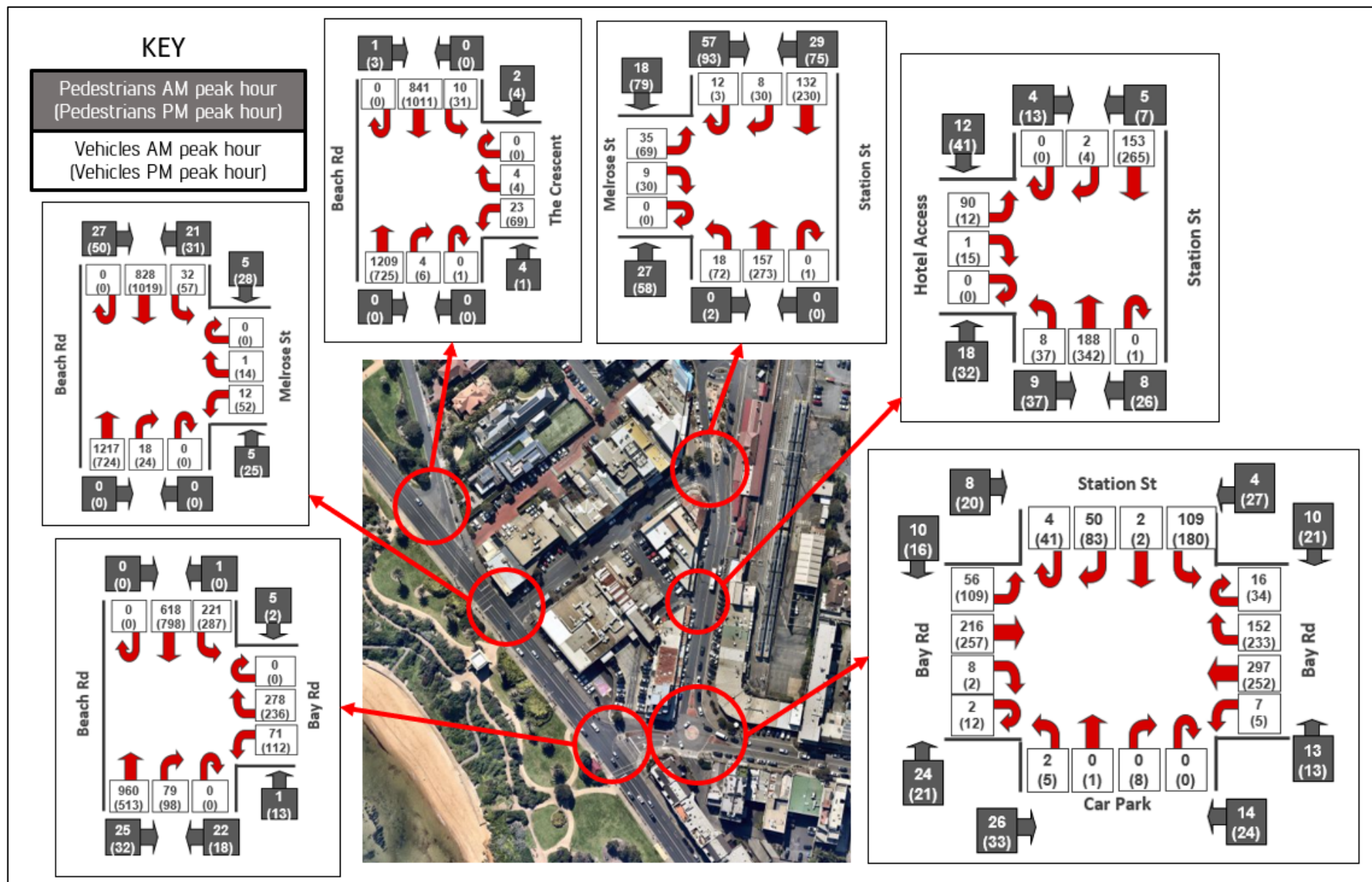


Figure 15 Summary of peak hour turning movement counts – Friday 9 September 2022

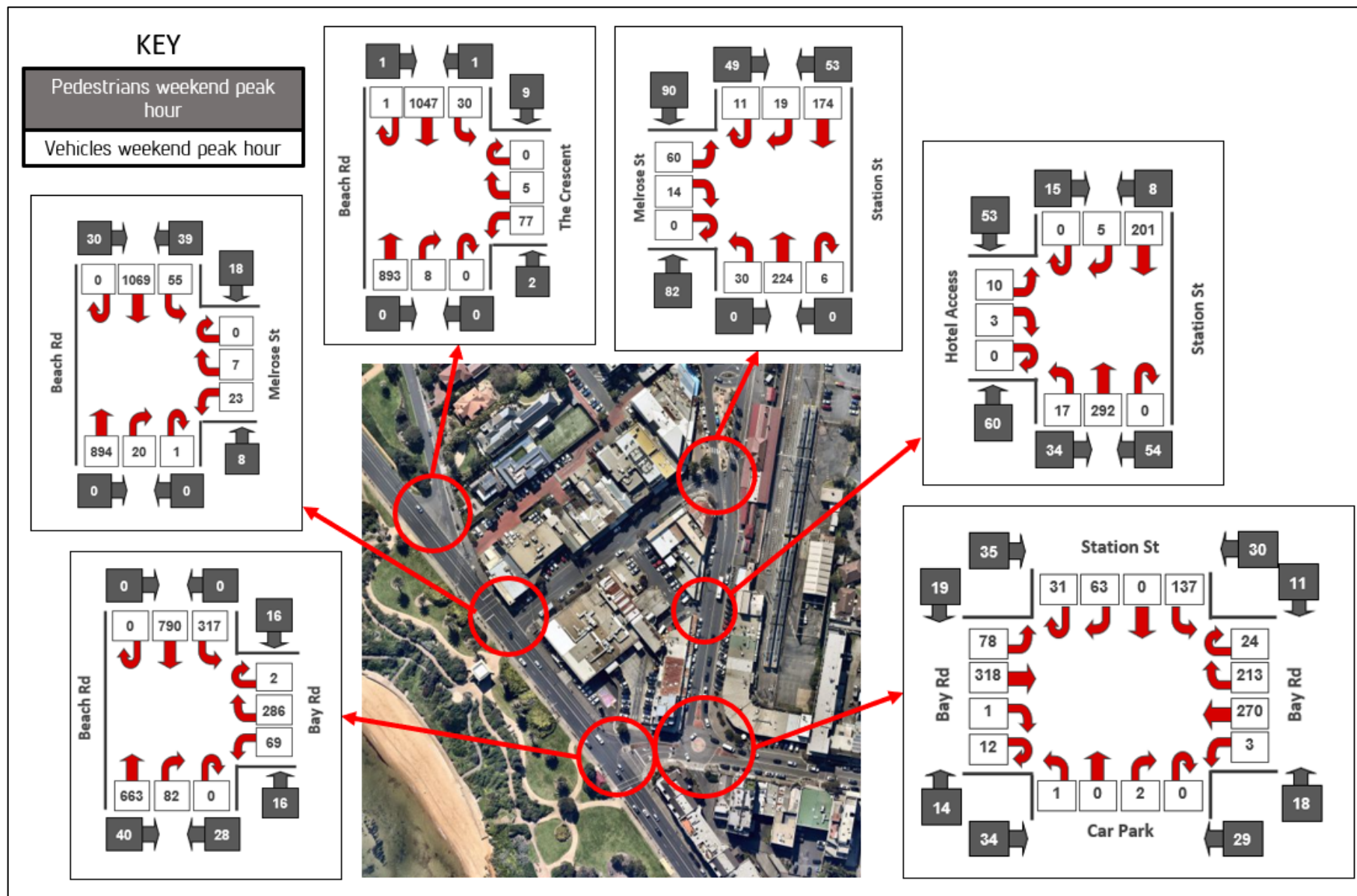


Figure 16 Summary of peak hour turning movement counts – Saturday 10 September 2022

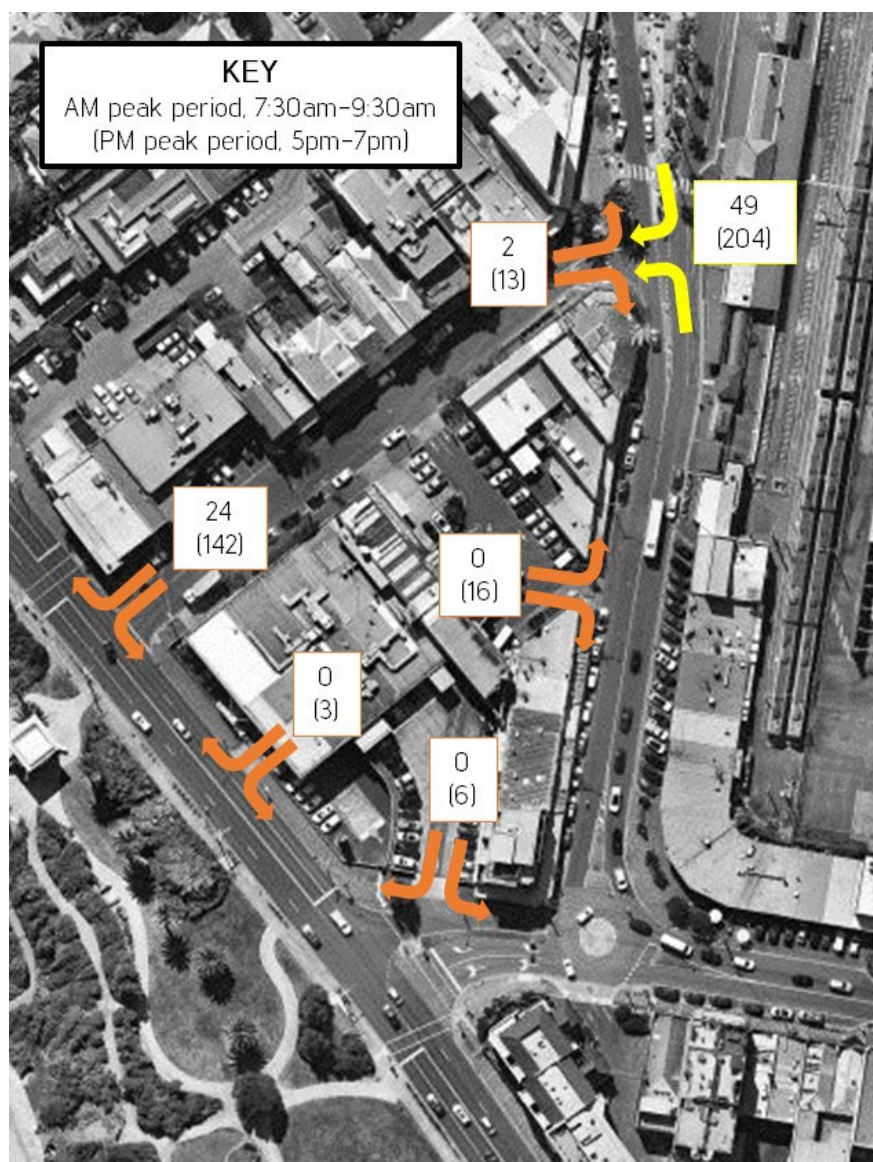


Figure 17 Origin destination results vehicles entering – Friday 9 September 2022

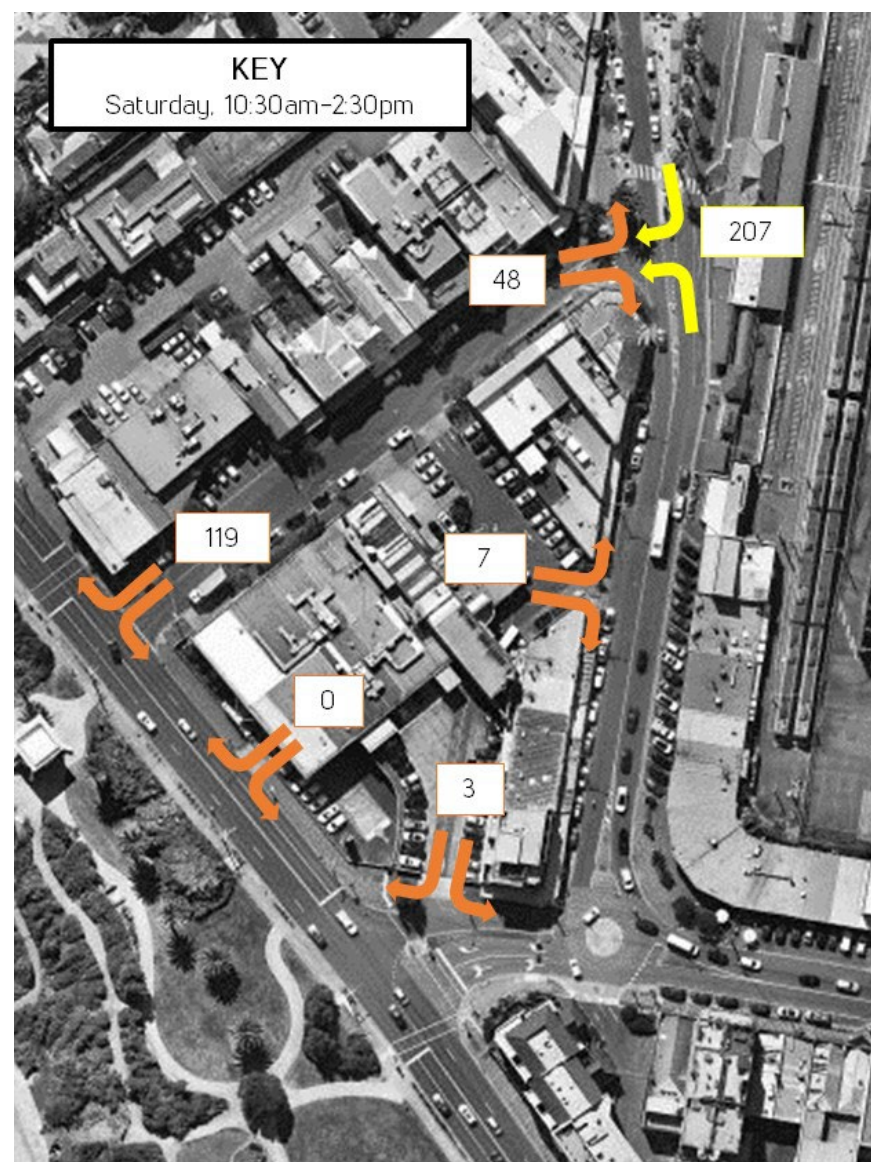


Figure 18 Origin destination results vehicles entering – Saturday 10 September 2022

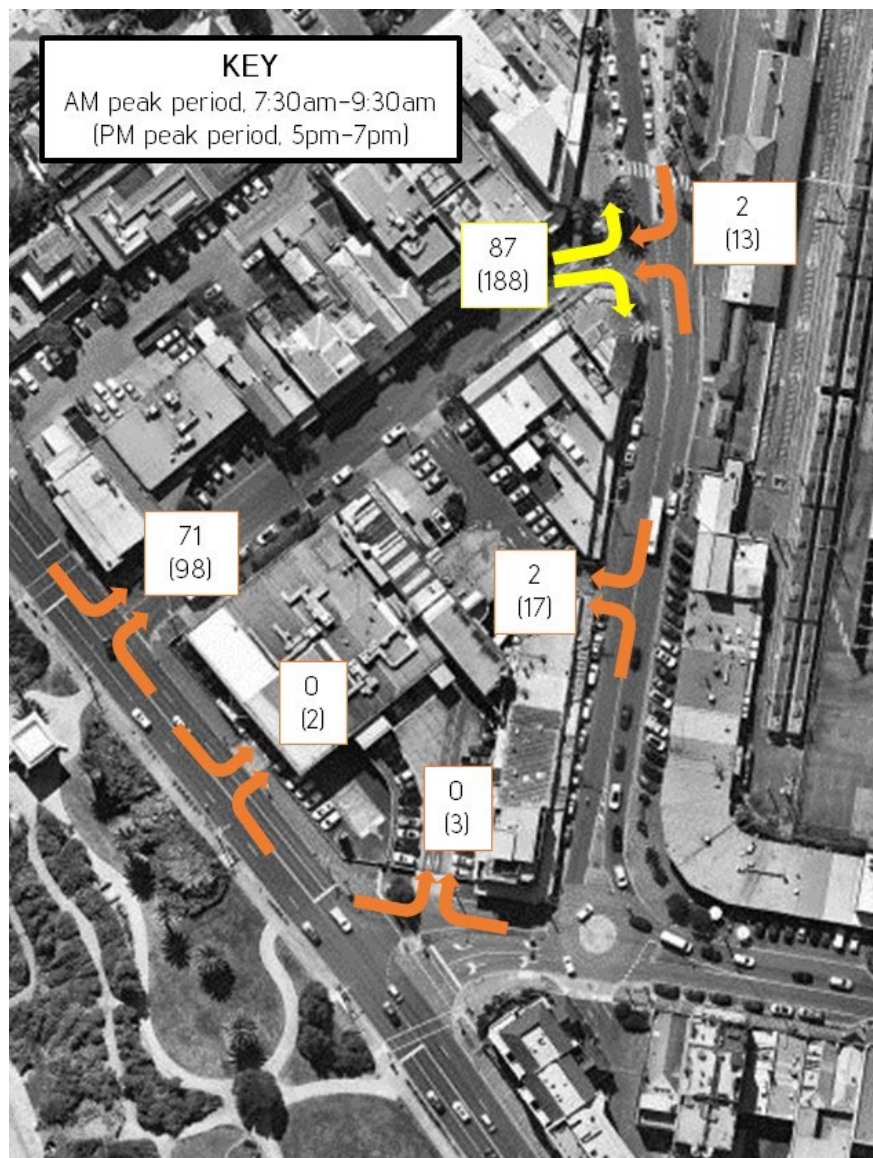


Figure 19 Origin destination results vehicles exiting – Friday 9 September 2022

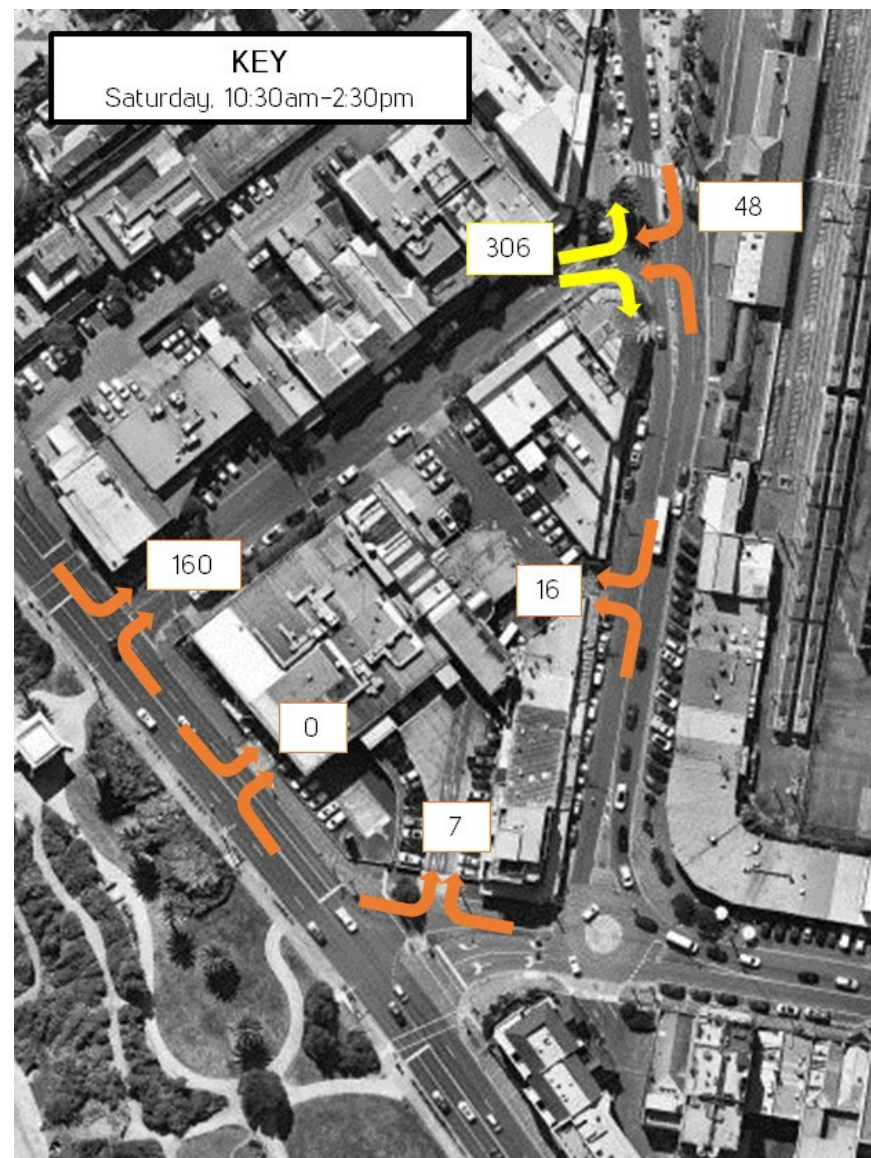


Figure 20 Origin destination results vehicles entering – Saturday 10 September 2022

The turning movement data also provided volumes of bicycles in the precinct. This is of interest, as any bicycle using Melrose Street would need to be redirected as well. It was found that very low volumes of cyclists were observed in Melrose Street during the peak hours on both days, with a maximum of four (4) cyclists entering/existing Melrose Street.

The turning movements of cyclists to/from Melrose Street are shown diagrammatically for the Friday AM and PM peak hours in **Figure 21**, and the Saturday peak hour in **Figure 22**. No cyclists were observed to enter or exit Melrose Street at the Beach Road end.

The results indicate very low levels of cyclist activity on Melrose Street.

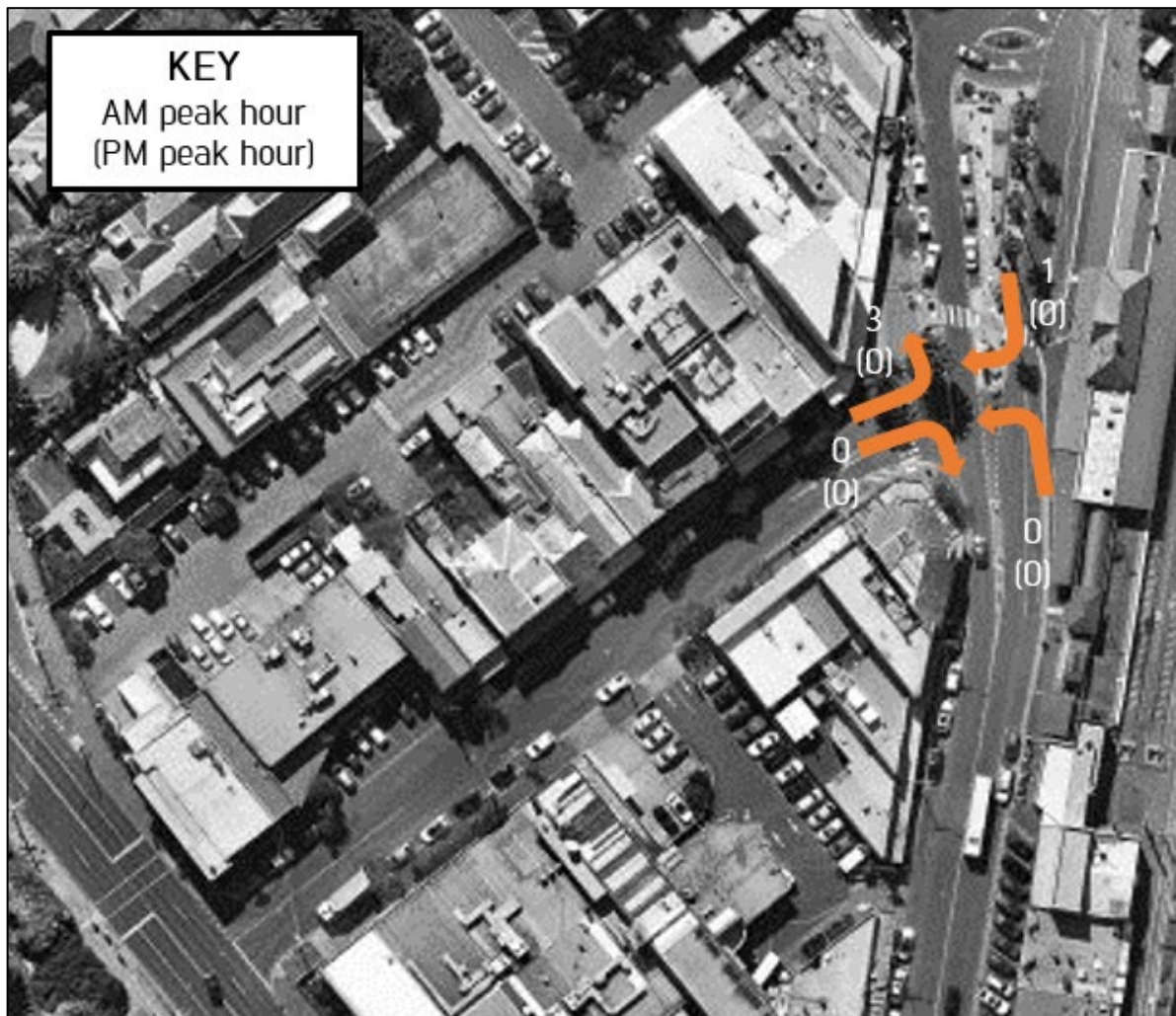


Figure 21 Cyclists in Melrose Street – Friday 9 September 2022

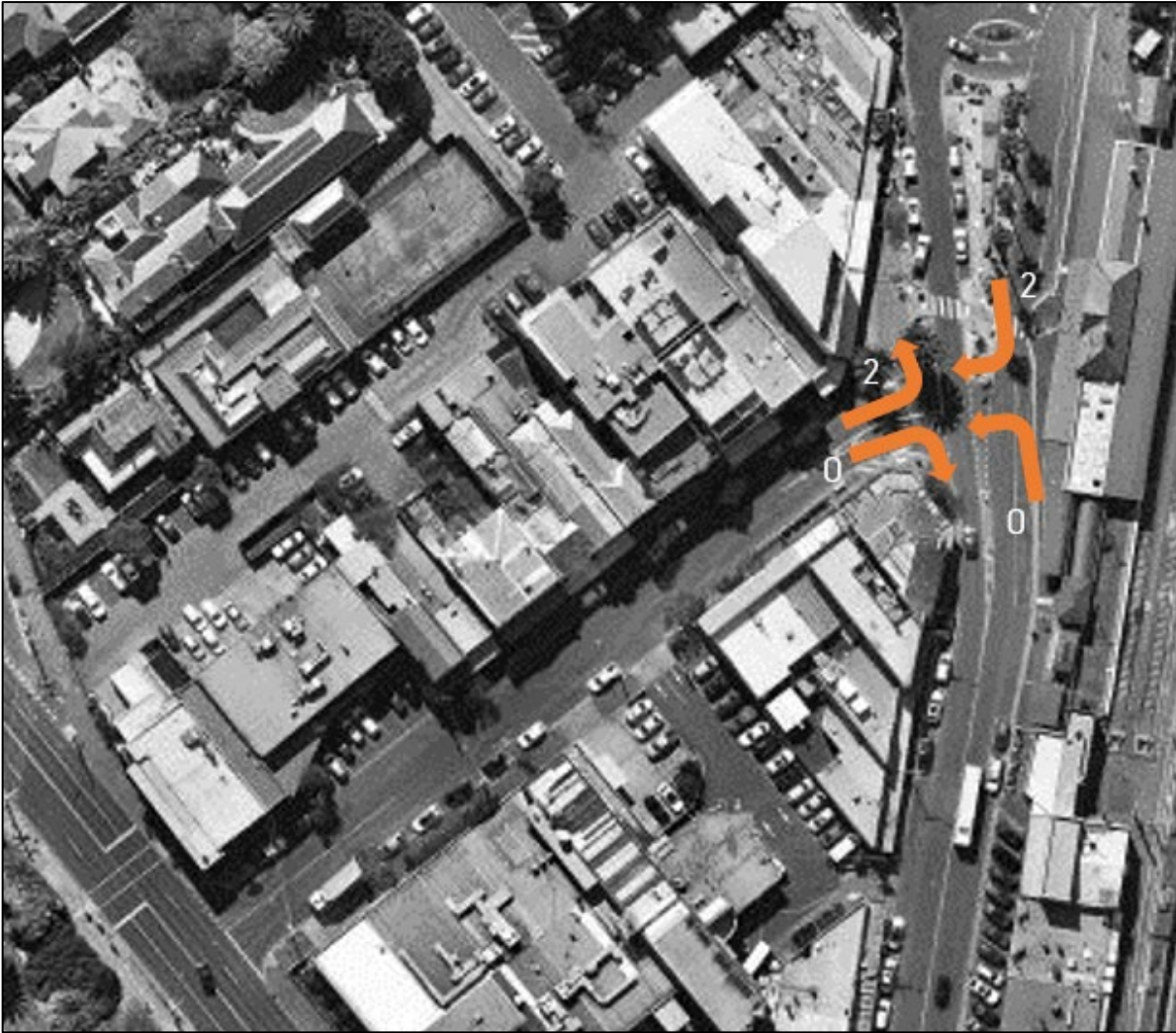


Figure 22 Cyclists in Melrose Street – Saturday 10 September 2022

3 PROPOSAL

Council wishes to investigate the traffic impacts associated with closing the northern section of Melrose Street between 12 Melrose Street and Station Street. The intent is to convert the road space to a pedestrianised area, increasing the level of public open space and outdoor dining opportunities in the activity centre, whilst improving safety for pedestrians.

The closure of the street would result in a loss of approximately 14 on-street parking spaces including seven (7) 1-hour parking spaces, three (3) 2-hour parking spaces and four (4) spaces that are currently already used as parklets.

The proposal is shown diagrammatically in **Figure 23**.

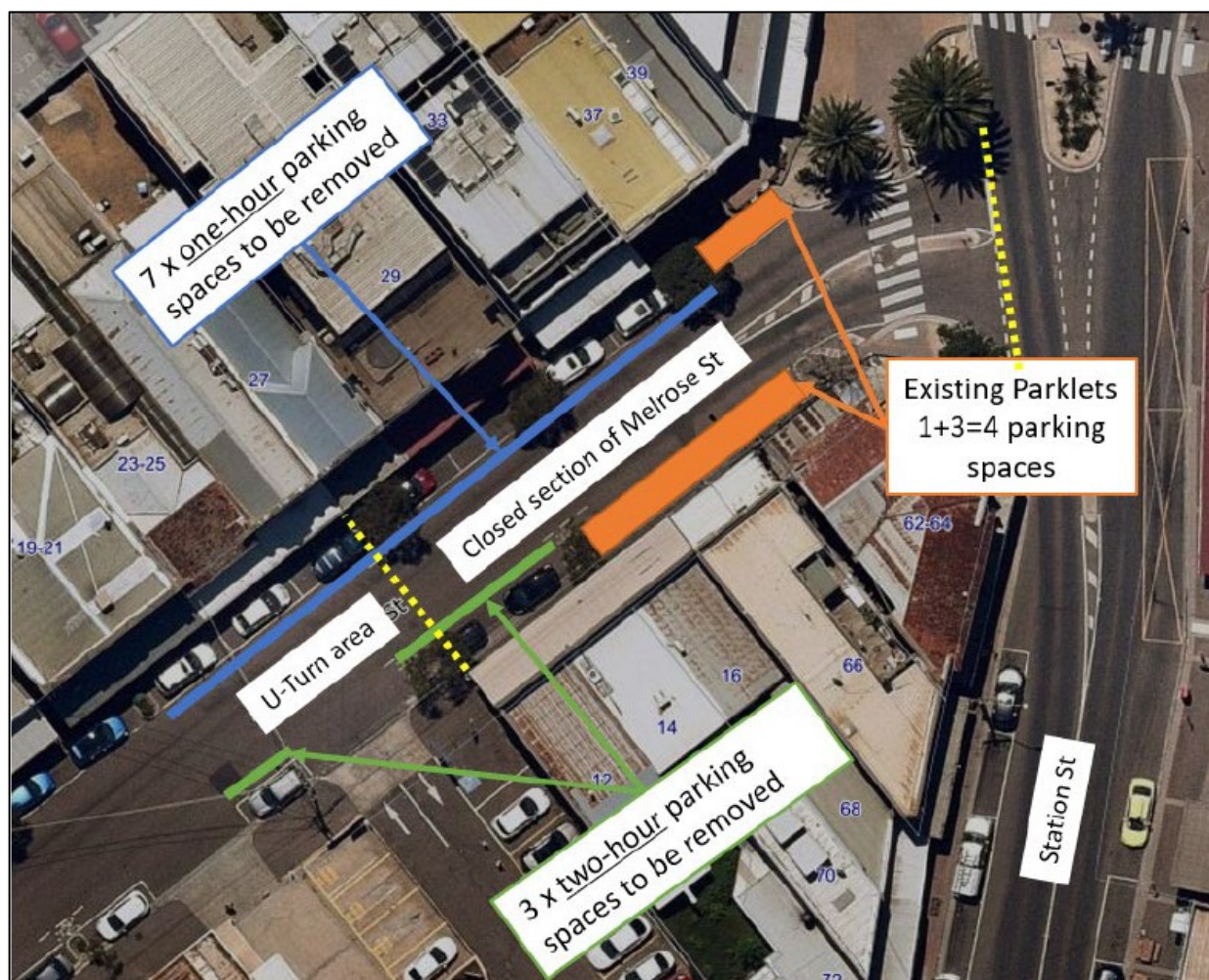


Figure 23 Proposed Melrose Street closure

4 TRAFFIC CONSIDERATIONS

4.1 TRAFFIC REDISTRIBUTION

With the proposed closure of Melrose Street, vehicles currently entering and existing Melrose Street at Station Street will be redistributed to other access points. The nature of the redistribution can be estimated based on the information provided by the origin destination survey results and understanding of the surrounding road network and key employment, retail and residential precincts.

By review of the peak hour turning movement counts, it can be determined that activity through Melrose Street is most significant during the weekday PM peak hour. This is the critical period to assess the impacts of redistributed traffic on the surrounding key intersections, including:

- Bay Road / Station Street;
- Bay Road / Beach Road;
- Beach Road / Melrose Street; and
- Beach Road / The Crescent.

The origin destination survey results for the weekday PM peak hour show the following characteristics of traffic in the Melrose Street precinct.

- Majority of vehicles enter Melrose Street via the Station Street and Beach Road access points, as to be expected;
- A significant proportion (50–70%) of vehicles utilise Melrose Street as a thoroughfare between Station Street and Beach Road. That is, vehicles entering Melrose Street from Station Street continue to exit to Beach Road and vice versa;
- Melrose Street provides access to retail and parking facilities including the Sandringham Hotel with off-street parking facilities, thus some vehicles will enter Melrose Street to park or visit the facilities, or leave from having been parked in the precinct.

4.1.1 VEHICLES ENTERING MELROSE STREET AT STATION STREET

During the weekday PM peak hour, it was found that 30 vehicles turn right-in and 72 vehicles turn left into Melrose Street from Station Street, as was seen in **Figure 15**.

The origin-destination data showed that vehicles turning right into Melrose Street from Station Street (30 vehicles) generally travel as follows:

- 70%, or 21 vehicles, travel through to reach Beach Road. These vehicles will be redistributed to access Beach Road via Bay Road;
- The remaining 30%, or 9 vehicles, are accessing Melrose Street to visit the shops or hotel. These vehicles will be redistributed to access the precinct via the hotel entrance on Station Street (6 vehicles), or from Beach Road via The Crescent (1 vehicle) or Bay Road (2 vehicles).

This is shown diagrammatically in **Figure 24**, showing the existing traffic volume in orange and the redistributed routes shown in the various shades of yellow.

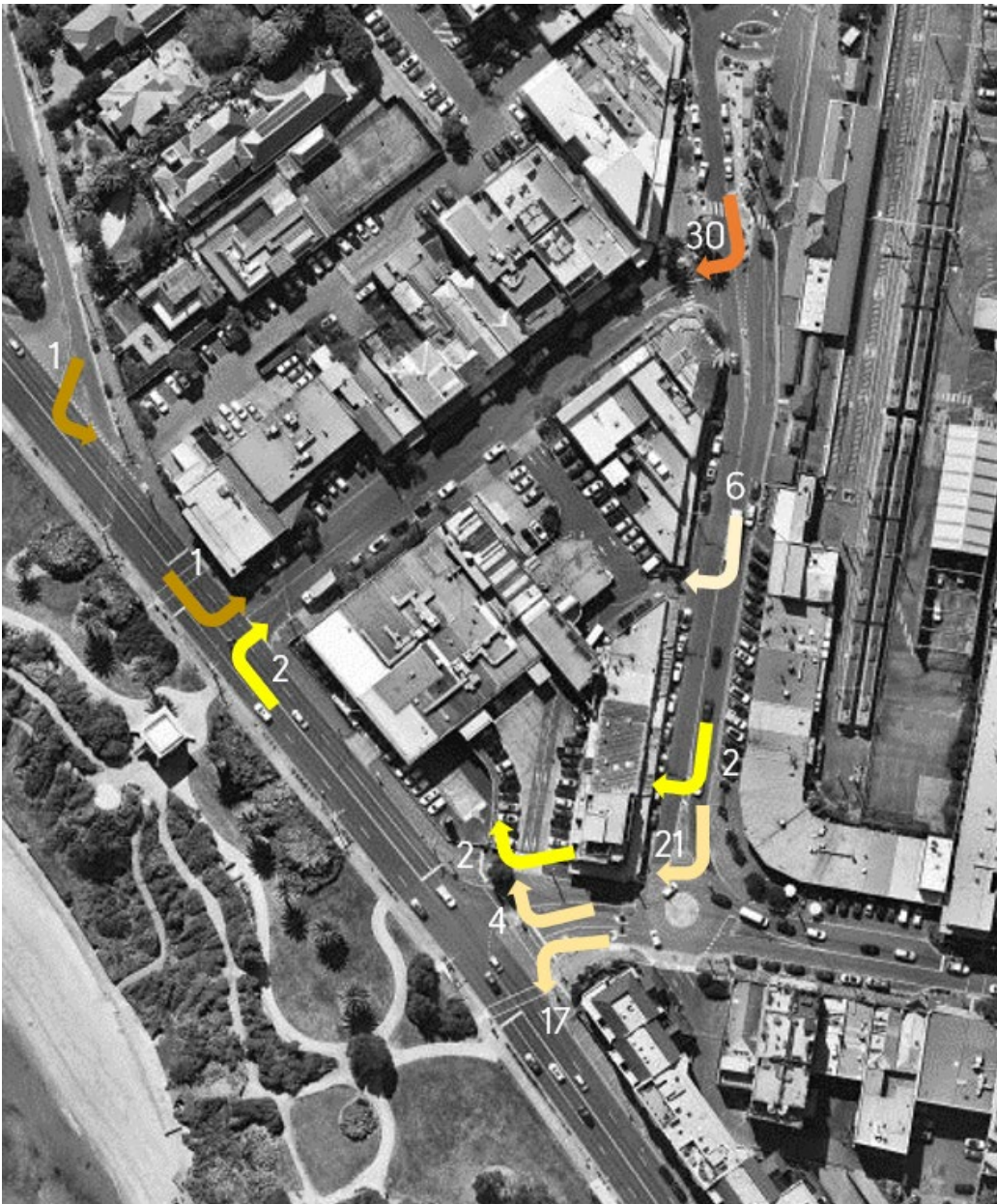


Figure 24 Right-in vehicles redistribution

The vehicles turning left into Melrose Street from Station Street (72 vehicles) are expected to be travelling as follows:

- 50%, or 36 vehicles, travel through to reach Beach Road. These vehicles will be redistributed to access Beach Road via Bay Road;
- The remaining 50%, or 36 vehicles, are accessing Melrose Street to visit the shops or hotel. These vehicles will be redistributed to access the precinct via the hotel entrance on Station Street (27 vehicles), or from Beach Road via Bay Road (9 vehicles).

This is shown diagrammatically in **Figure 25**, showing the existing traffic volume in orange and the redistributed routes shown in the various shades of yellow.

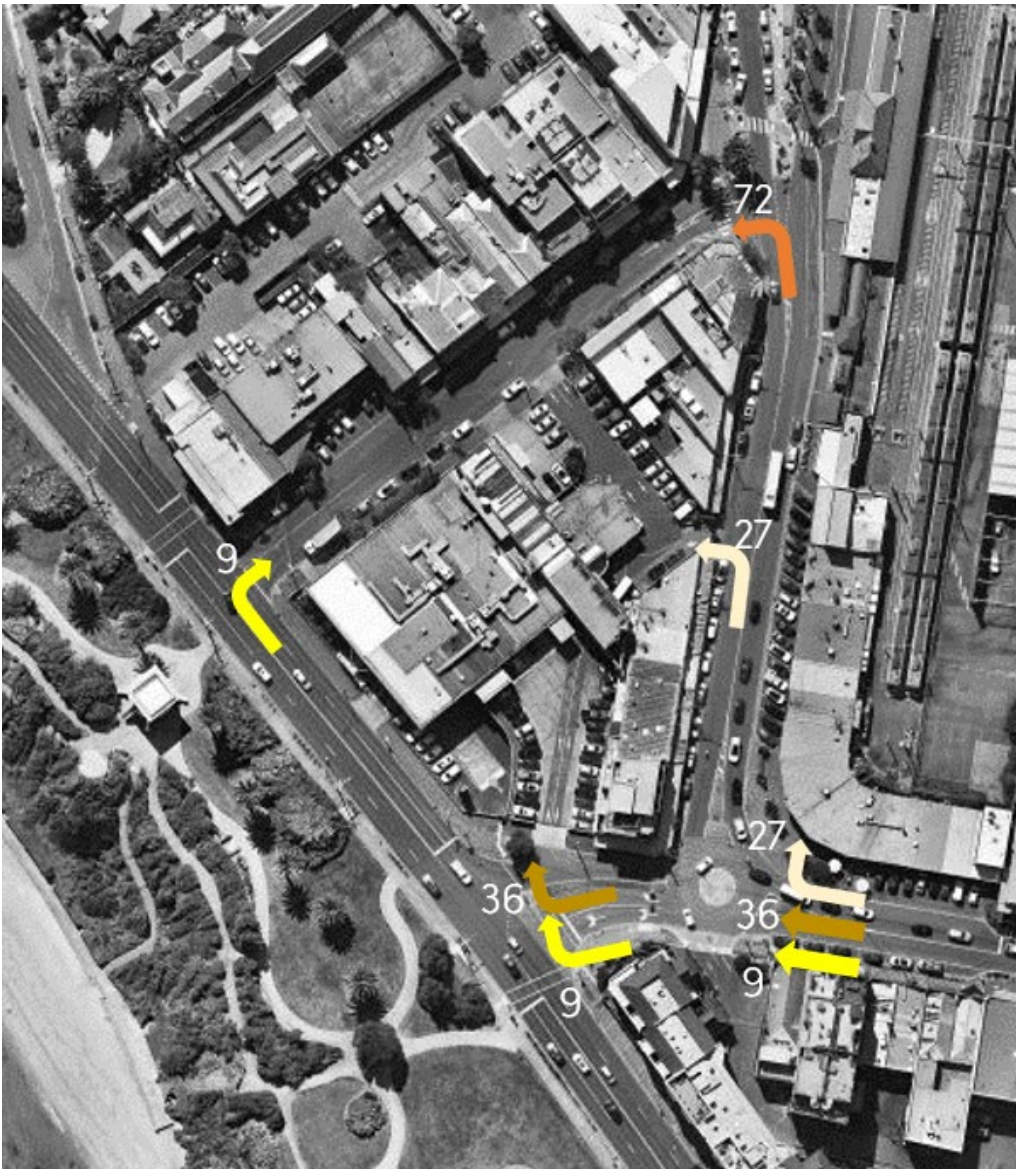


Figure 25 Left-in vehicles redistribution

4.1.2 VEHICLES EXITING MELROSE STREET AT STATION STREET

During the weekday PM peak hour, it was found that 69 vehicles turn left out and 30 vehicles turn right out of Melrose Street into Station Street, as was seen in **Figure 15**.

The origin-destination data showed that vehicles turning left out of Melrose Street into Station Street (69 vehicles) generally travel as follows:

- 50%, or 35 vehicles, travel through from Beach Road to access Station Street. These vehicles will be redistributed to access Station Street via Bay Road;
- The remaining 50%, or 35 vehicles, are exiting Melrose Street from having been parked in the precinct to visit the shops or hotel. These vehicles will be redistributed to access Station Street via the hotel exit on Station Street (20 vehicles), or via The Crescent from Beach Road (3 vehicles), or via Bay Road from Beach Road (11 vehicles).

This is shown diagrammatically in **Figure 26**, showing the existing traffic volume in orange and the redistributed routes shown in the various shades of yellow.

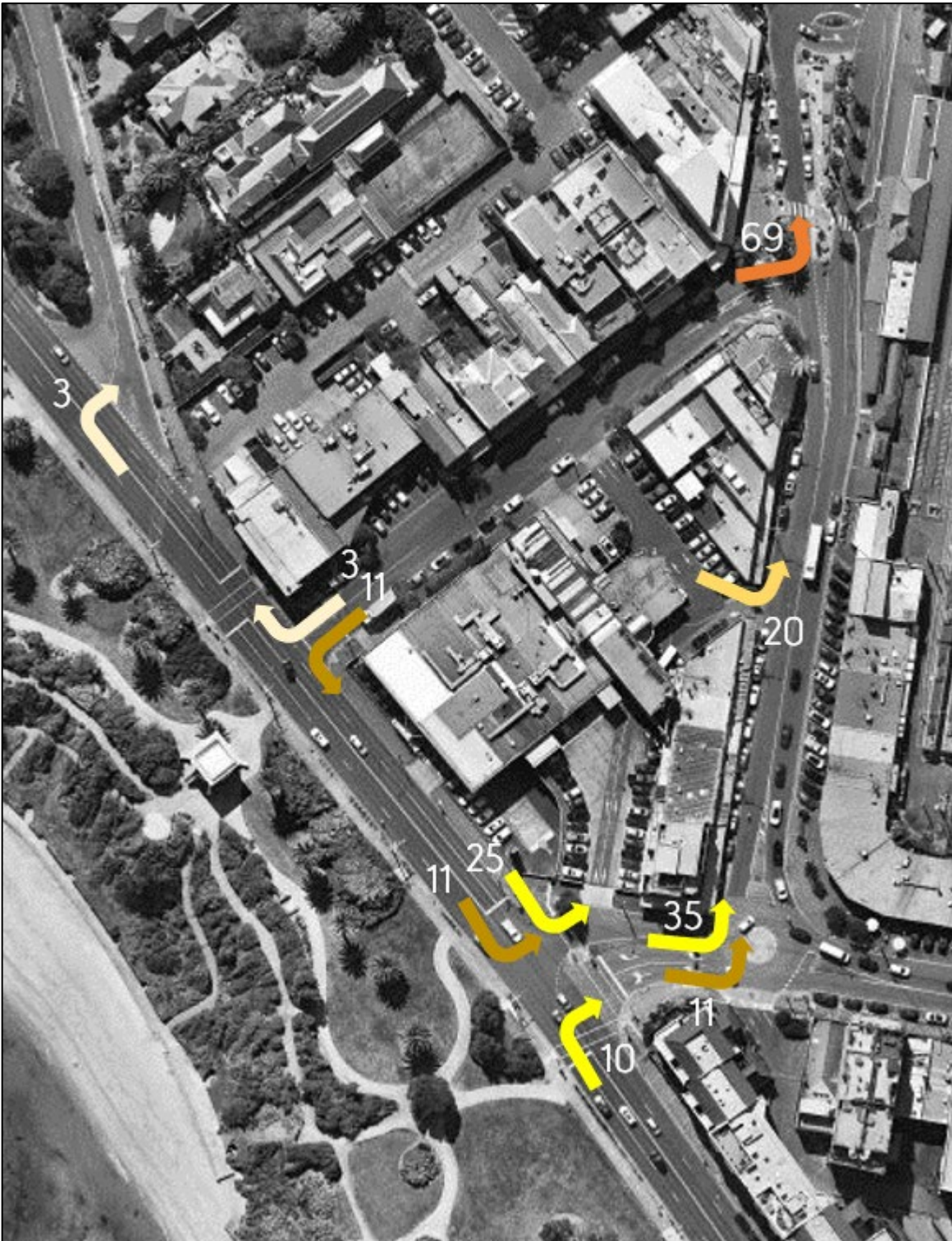


Figure 26 Left-out vehicles redistribution

The vehicles turning right out of Melrose Street into Station Street (30 vehicles) generally travel as follows:

- 50%, or 15 vehicles, travel through from Beach Road to access Station Street. These vehicles will be redistributed to access Station Street via Bay Road;
- The remaining 50%, or 15 vehicles, are exiting Melrose Street from having been parked in the precinct to visit the shops or hotel. These vehicles will be redistributed to access Station Street via the hotel exit on Station Street (10 vehicles), or via Beach Road (5 vehicles).

This is shown diagrammatically in **Figure 24**, showing the existing traffic volume in orange and the redistributed routes shown in the various shades of yellow.

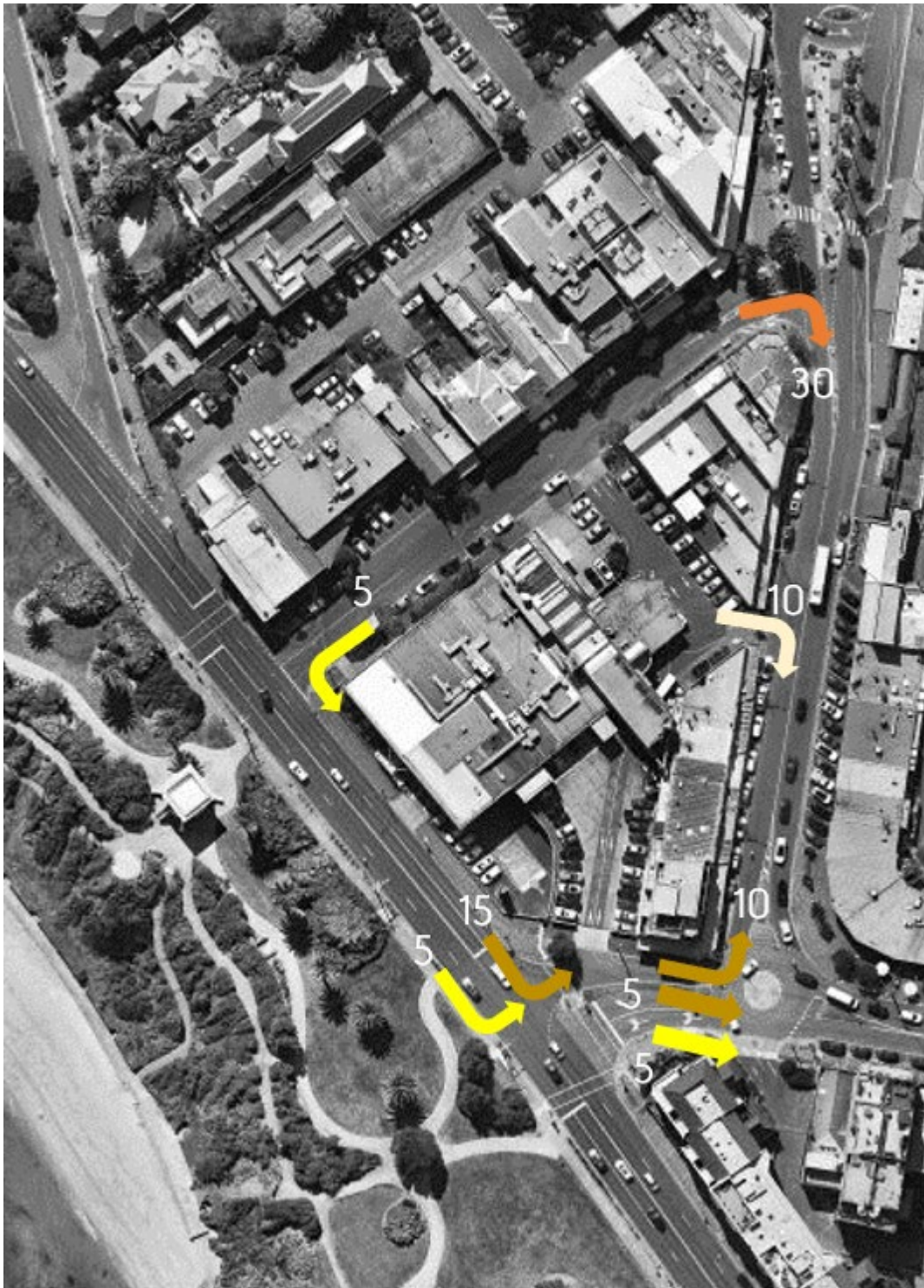


Figure 27 Right-out vehicles redistribution

4.2 SIDRA ANALYSIS

4.2.1 ASSUMPTIONS AND SETTINGS

The level of traffic impact associated with the proposal in the critical peak hours has been determined using SIDRA Intersection v9. The following intersections have been modelled under existing conditions, and with the redistributed traffic associated with the closure of Melrose Street:

- Bay Road / Station Street;
- Bay Road / Beach Road;
- Beach Road / Melrose Street; and
- Beach Road / The Crescent.

SIDRA is an advanced micro-analytical traffic evaluation tool that provides estimates of capacity and performance statistics (delay, queue lengths etc) on a lane-by-lane basis.

Key performance criteria include:

Degree of Saturation (DOS): This represents the ratio of traffic volume to capacity. Generally speaking, a DOS of below 0.9 indicates acceptable performance. A DOS of over 1.0 indicates that capacity has been exceeded.

Level of Service (LOS): An index of the operational performance of traffic based on service measures such as delay, degree of saturation, density and speed during a given flow period. A guide to LOS ratings is provided in **Table 2**.

Average Delay: The average delay time that can be expected for a given movement.

95th Percentile Queue: The maximum queue length that can be expected in 95% of all observed queue lengths during the hour.

Table 2 Level of Service Ratings

Level of Service		Degree of Saturation Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.90
D	Acceptable	0.80-0.90	0.90-0.95	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

Default SIDRA settings have been adopted for this assessment except where noted below.

A compounding growth factor of 1%pa has been applied to the traffic volumes. This is having regard for DoT traffic data which demonstrates growth rates of 0.1 – 0.3% on Beach Road and slightly negative growth on Bay Road. Therefore, 1.0% is on the conservative side.

Analysis has only been undertaken for the Friday PM peak hour as that is when the critical traffic volumes occur, in comparison to the Saturday survey data.

4.2.2 SIDRA RESULTS – PM PEAK HOUR

The following summarises the operation of the key intersections under existing conditions and post the closure of Melrose Street.

Beach Road / Melrose Street

Extra bunching factors have been applied to the north and south Beach Road approaches, in accordance with the SIDRA user guide, to account for the platooning of traffic caused by nearby traffic signals.

The SIDRA layout and detailed results are provided in **APPENDIX 1**, with the results summarised in **Table 3**.

Table 3 Beach Road / Melrose Street PM peak hour results

Approach	Movement	Existing Conditions				Post Closure				10-years Post Closure			
		LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)
Beach Road (south)	T	A	0.230	1.1	6.6	A	0.223	0.8	5.2	A	0.252	1.2	7.7
	R	A	0.230	15.5	6.6	A	0.223	14.8	5.2	A	0.252	17.6	7.7
Melrose Street (east)	L	A	0.083	11.4	2.1	A	0.036	11.5	0.9	A	0.119	12.1	2.6
	R	A	0.289	89.0	6.0	A	0.117	72.6	2.3	A	0.119	105.6	2.6
Beach Road (north)	L	A	0.295	2.1	0.0	A	0.285	2.1	0.0	A	0.315	2.1	0.0
	T	A	0.295	0.0	0.0	A	0.285	0.0	0.0	A	0.315	0.0	0.0

From **Table 3**, it can be seen that the closure of the northern end of Melrose Street generally improves the operation of the southern end where it intersects with Beach Road, with a drop in average delay for vehicles turning right onto Beach Road from 89 to 73 seconds. This is due to fewer vehicles entering Melrose Street as they cannot use it as a thoroughfare to Station Street.

The intersection of Beach Road and Melrose Street will operate satisfactorily in each scenario during the critical weekday PM peak hour, with a Level of Service A and DOS values well below 1 for all movements on all legs.

Beach Road / The Crescent

Similarly, the intersection of Beach Road and The Crescent has been modelled in SIDRA with extra bunching factors to account for the platooning of traffic flow.

The SIDRA network layout and detailed results are provided in **APPENDIX 1**, with the results summarised in **Table 4**.

Table 4 Beach Road / The Crescent PM peak hour results

Approach	Movement	Existing Conditions				Post Closure				10-years Post Closure			
		LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)
Beach Road (south)	T	A	0.207	0.4	1.9	A	0.211	0.5	2.8	A	0.236	0.8	4.3
	R	A	0.207	17.4	1.9	A	0.211	17.4	2.8	A	0.236	20.8	4.3
The Crescent (east)	L	A	0.097	8.4	2.4	A	0.097	8.4	2.4	A	0.116	8.9	2.9
	R	A	0.073	64.8	1.4	A	0.073	65.0	1.4	A	0.125	95.8	2.4
Beach Road (north)	L	A	0.285	5.6	0.0	A	0.286	5.6	0.0	A	0.316	5.6	0.0
	T	A	0.285	0.1	0.0	A	0.286	0.1	0.0	A	0.316	0.1	0.0

From **Table 4**, it can be concluded that the intersection of Beach Road and The Crescent is expected to operate satisfactorily in the critical weekday PM peak hour, with LOS A and DOS values well below 1.0 for all movements on all legs.

The closure of the northern section of Melrose Street has a small impact on this intersection, with some vehicles redirected to The Crescent, however this is minimal, with only slight increases to the above key performance indicators.

Beach Road / Bay Road / Station Street

A SIDRA network has been prepared for the intersection of Beach Road / Bay Road and the roundabout between Bay Road / Station Street / car park entrance, given the close proximity of the two intersections.

The signal phasing for the intersection of Beach Road and Bay Road has been sourced from the Department of Transport traffic signal configuration data sheets.

The SIDRA network layout and detailed results are provided in **APPENDIX 1**, with the results summarised in **Table 5**.

Table 5 Beach Road / Bay Road / Station Street PM peak hour results

Approach	Movement	Existing Conditions				Post Closure				10-Years Post Closure			
		LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)	LOS	DOS	Delay (s)	Queue (m)
Beach Road (south)	T	A	0.421	9.8	102.1	A	0.421	9.8	102.1	A	0.465	10.2	117.7
	R	A	0.446	24.9	27.5	A	0.520	26.6	31.5	C	0.713	39.7	48.8
Beach Road (north)	L	A	0.445	12.7	92.1	A	0.459	12.3	93.4	A	0.512	13.0	110.5
	T	A	0.445	9.1	110.5	A	0.459	9.1	115.6	A	0.512	9.7	135.7
Bay Road (east of Beach Rd)	L	A	0.429	45.4	40.8	A	0.512	46.4	40.8	A	0.566	47.0	40.8
	R	A	0.429	45.3	40.8	A	0.512	46.3	40.8	A	0.566	46.9	40.8
Bay Road (west of Station St)	L	A	0.397	3.9	15.9	A	0.450	3.8	19.2	A	0.513	4.2	23.4
	T	A	0.397	4.4	15.9	A	0.450	4.3	19.2	A	0.513	4.7	23.4
	R	A	0.397	8.3	15.9	A	0.450	8.3	19.2	A	0.513	8.6	23.4
Station Street (north)	L	A	0.389	5.9	11.6	A	0.416	6.1	16.4	A	0.485	6.4	20.5
	T	A	0.389	6.1	11.6	A	0.416	6.2	16.4	A	0.485	6.6	20.5
	R	A	0.389	10.8	11.6	A	0.416	10.9	16.4	A	0.485	11.3	20.5
Bay Road (east of Station St)	L	B	0.638	4.8	35.4	B	0.696	5.0	58.9	C	0.794	7.2	73.4
	T	B	0.638	5.1	35.4	B	0.696	5.3	58.9	C	0.794	7.4	73.4
	R	B	0.638	9.7	35.4	B	0.696	9.9	58.9	C	0.794	12.1	73.4
Car park entrance	L	A	0.028	7.4	0.7	A	0.029	7.6	1.0	A	0.035	8.2	1.2
	T	A	0.028	7.6	0.7	A	0.029	7.8	1.0	A	0.035	8.5	1.2
	R	A	0.028	12.2	0.7	A	0.029	12.4	1.0	A	0.035	13.1	1.2

From **Table 5**, it can be concluded that the closure of Melrose Street has would have an acceptable impact on the operation of the intersections of Beach Road / Bay Road and Bay Road / Station Street, in terms of intersection capacity (Degree of Saturation). DOS values increase slightly with the additional traffic however they remain well below 1.0 for all movements. Notably:

- The right turn from Bay Road into Station Street features an increase in the 95th percentile queue length from 35 to 59 metres in the 2022 scenarios; however, the average delay only increases by 0.2 seconds i.e. negligible. Impacts to bus travel times will hence be minimal as discussed in **Section 5.1**; and
- The Level of Service at the Beach Road / Bay Road intersection increases from A to C in the 2032 scenario; however, this is mainly due to general traffic growth and not the proposed closure.

4.3 TRAFFIC IMPACT

4.3.1 SURROUNDING ROAD NETWORK

Based on the above assessment, it has been determined that the partial closure of Melrose Street has an overall minor impact on the operation of the surrounding intersections and road network.

The intersection of Beach Road and Melrose Street is anticipated to have an improved operation post closure given the reduction in traffic accessing Melrose Street.

The critical intersection is that between Beach Road and Bay Road during the weekday PM peak hour, particularly in the longer term 10-year scenario, however its operation remains within acceptable ranges for all movements in each scenario.

There is expected to be a greater level of traffic entering and exiting the hotel car park via the driveway between Melrose Street and Station Street. These are mostly vehicles that are visiting the hotel or bottle shop or parking in Melrose Street. The greater level of traffic may have some impacts to the operation of the access on Station Street, however this in turn improves the operation of the Melrose Street and Station Street intersection as no vehicles would be entering. Therefore, any delay to vehicles on Station Street due to vehicles entering the hotel would be similar to existing conditions due to vehicles entering Melrose Street.

This traffic analysis indicates that the surrounding road network and intersections have the capacity to accommodate the traffic redirected due to the closure of the northern end of Melrose Street.

4.3.2 BWS BOTTLE SHOP

As above, some traffic accessing the hotel and BWS bottle shop will need to re-route. For example:

- Customers who turn right from Station Street to Melrose Street and then left into the hotel/bottle shop will now need to turn right into the Station Street access point instead; and
- Customers who depart the hotel/bottle shop and turn right into Melrose Street will now need to turn left directly into Station Street instead.

Importantly, the drive-through bottle shop remains accessible from either direction if the closure was to be implemented, as shown in **Figure 28**. Accessibility will hence not be impacted.

However, the re-distribution of traffic flow through the hotel/bottle shop site will result in a greater number of movements at the existing Station Street access point, which is relatively narrow (approx. 5.5 metres wide) for two-way travel. Normally a width of 6.1m is provided per current standards. It may be that no major impacts occur, and no changes are required, but this can only be determined through monitoring the situation post-closure. If congestion issues arise within the site, the owner of the land could take steps to improve access such as by banning parking adjacent to the north-facing wall of 78 Station Street and/or altering the car park layout to provide a smoother left turn exit (requiring one parking space to be removed). Both these changes should be considered in any event as the existing site access is poorly configured.

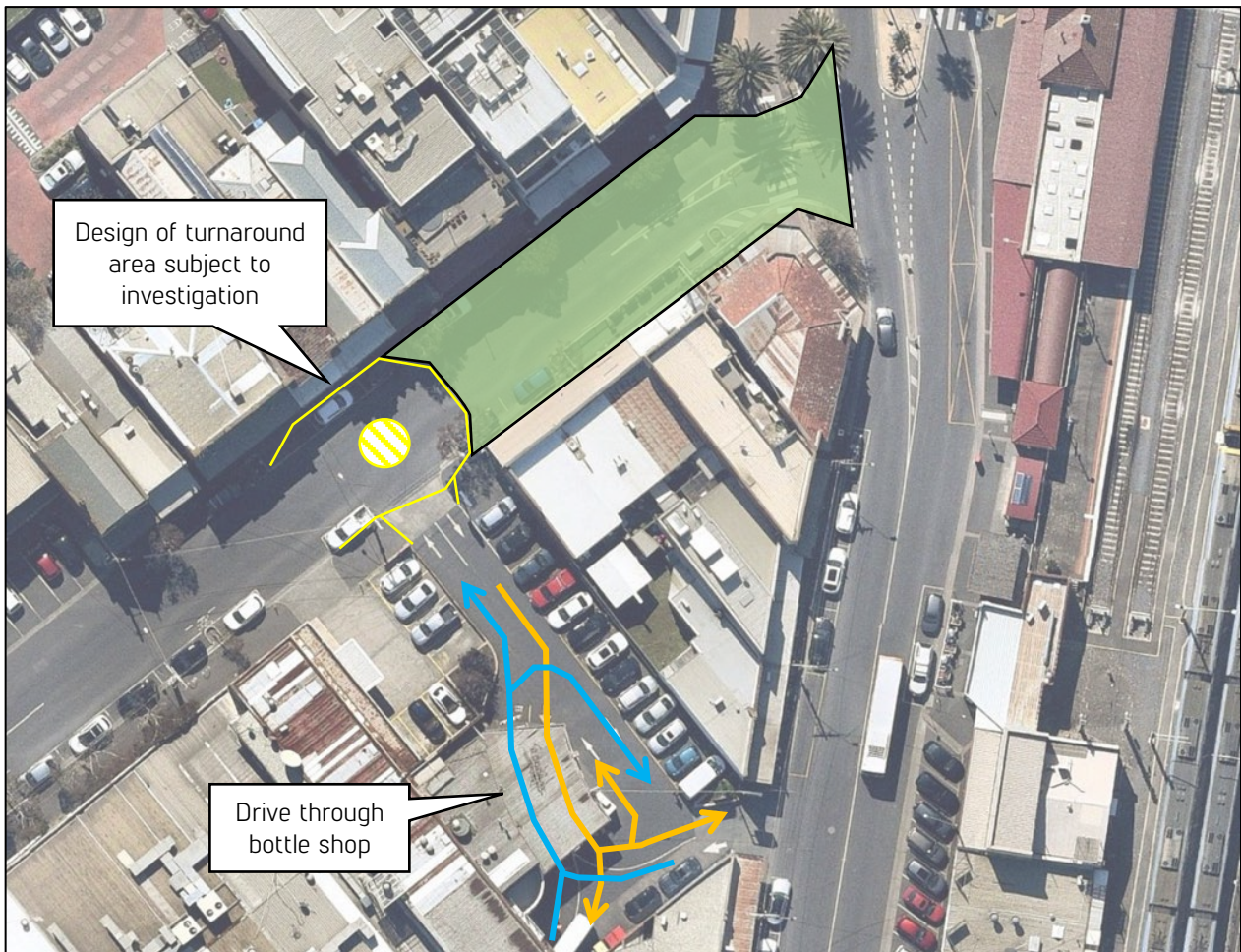


Figure 28 BWS Bottle Shop Access Routes

5 ROAD NETWORK AND ACCESS IMPACTS

The proposed partial closure of Melrose Street removes a key through route between Station Street and Beach Road, having an impact on access for loading vehicles, emergency vehicles, drop-off / pick-up activity, taxis and buses. Discussion for key road user groups is provided as follows:

5.1 BUSES

Melrose Street is not part of any bus route, so no direct impacts to bus activity are expected. Buses operate along Station Street and Bay Road in the vicinity of the site. These routes can continue as per existing conditions, with the proposed road closure having minimal impact on the intersection of Station Street / Bay Road, thus minimal change to delays (0.2 seconds) is expected, as per **Table 5**.

There may be a minor improvement for bus flow at the Station Street / Melrose Street intersection due to the removal of right-turn movements into Station Street, that may otherwise result in queued vehicles blocking Station Street (southbound).

5.2 LOADING AND EMERGENCY ACCESS

The section of Melrose Street proposed to be pedestrianised does not include any designated loading zones. Delivery vehicles can utilise the surrounding road network to reach their intended destination including Bay Road and Station Street. The businesses that front the proposed closure area have mostly dual frontages and can load from the street/car park at the rear, if not doing so currently. Loading opportunities are indicated in **Figure 29**.

Similarly for emergency vehicles, other routes can provide convenient and efficient access. Depending on their origin and destination, this may include via The Crescent, Bay Road or through the Hotel carpark connection between Melrose Street and Station Street.



Figure 29 Loading opportunities

The ultimate design of the closure, if pursued, would need to accommodate U-turning trucks at the newly created 'dead end'. This would need to be investigated in detail.

5.3 CAR PARKING

Pick-up and drop-off activity is mostly expected to occur on Station Street, north of Waltham Street where a designated 2-minute drop-off zone is provided on the eastern side adjacent to Sandringham Station. It is expected that some of these vehicles would currently be continuing through Melrose Street to access Beach Road. These vehicles can instead use Waltham Street to access The Crescent, or Bay Road to access Beach Road. It was previously found that these intersections have the capacity to accommodate these redirected vehicles.

The impact of the loss of car parking within the closure area is not subject to this study.

5.4 RAIL

The proposed road closure location does not directly interface the nearby rail corridor thus the railway land is not considered to be impacted. It is understood that VicTrack has no objection to the proposed changes.

5.5 CYCLISTS

The closure would have some impact to cyclists in the precinct. However, the traffic data showed few cyclists to utilise Melrose Street, with a maximum of four (4) cyclists travelling into or out of Melrose Street at the Station Street intersection. These cyclists will be redirected to the surrounding street network such as Station Street and Bay Road. The cyclist volumes are minimal, and Melrose Street is not an identified bicycle route within the Principal Bicycle Network or Councils cycling route map, therefore this is not anticipated to be a major issue.

5.6 PEDESTRIANS

The closure would have a positive impact to pedestrian safety and amenity by removing a road crossing point at the Melrose Street / Station Street intersection.

6 CONCLUSION

The preceding assessment determines the impact on the closure of the northern section of Melrose Street on the surrounding road network and intersections.

The proposal involves the closure of Melrose Street between number 12 Melrose Street and Station Street to vehicles, to increase the level of public open space pedestrian facilities. The closure of the street would result in a loss of approximately 14 on-street parking spaces.

Various traffic data was collected in the precinct, to allow determination of how vehicles will be redirected, and modelling of the surrounding intersections. This found that moderate to high proportion of vehicles utilise Melrose Street as a thoroughfare between Station Street and Beach Road, or parking in Melrose Street or the Hotel car parking areas.

The traffic modelling concluded the following:

- The intersection of Beach Road and Melrose Street is expected to operate satisfactorily with the closure, during the critical weekday PM peak hour and in the 10-year post closure scenario, with an LOS value of A for all movements. Fewer vehicles are anticipated to utilise this intersection than existing conditions, given the closure;
- The intersection of Beach Road and The Crescent is also expected to operate satisfactorily post road closure and in the 10-year scenario, with an LOS value of A for all movements;
- The intersection of Beach Road / Bay Road / Station Street is expected to operate satisfactorily during the weekday PM peak hour, post closure and in the 10-year scenario, with a maximum LOS value of C expected in the 10-year scenario;

Based on the preceding analysis, it has been determined that it is viable to implement a closure of the northern end of Melrose Street, with the surrounding intersections able to accommodate the redirection of traffic, and with negligible impact to bus travel times.

The proposed road closure can be expected to have a positive impact on pedestrian amenity and safety with additional public open space and fewer vehicles utilising Melrose Street as a thoroughfare. This is particularly important considering the history of road crashes in the vicinity of the site mainly involving pedestrians and cyclists.

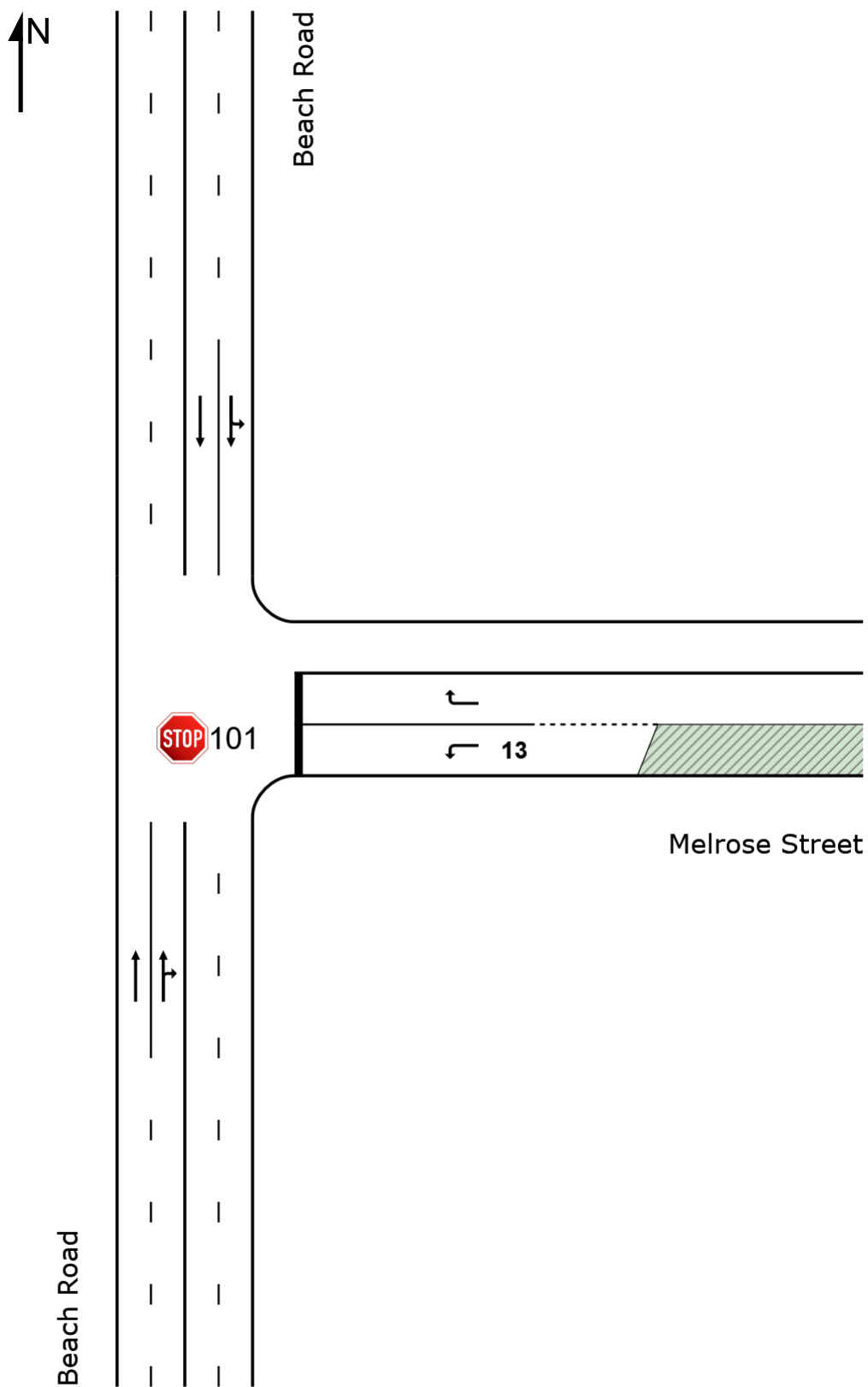
The next steps, if Council chooses to pursue a road closure, would involve:

- Consultation with PTV and DoT regarding bus impacts and Beach Road intersection impacts;
- Designing the road closure including the layout of outdoor public space and dining areas, ensuring adequate space for pedestrian access, as well as the road dead-end treatment. This would need to ensure that vehicles can adequately turn around within the street in approach to the road closure, and adequate signage to ensure drivers are aware of the closure from Beach Road and Melrose Street; and
- Public consultation for the preferred design solution.

Overall, the report does not foresee a major issue if Melrose Street is partially closed to vehicles.

APPENDIX 1 SIDRA RESULTS

BEACH ROAD / MELROSE STREET



MOVEMENT SUMMARY

 **Site: 101 [Beach / Melrose - PM peak (2022) (Site Folder: General)]**

New Site

Site Category: (None)

Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	724	2.0	762	2.0	0.230	1.1	LOS A	0.9	6.6	0.11	0.02	0.12	46.9
3	R2	24	2.0	25	2.0	0.230	15.5	LOS A	0.9	6.6	0.25	0.05	0.28	52.7
Approach		748	2.0	787	2.0	0.230	1.5	LOS A	0.9	6.6	0.11	0.02	0.12	47.9
East: Melrose Street														
4	L2	52	2.0	55	2.0	0.083	11.4	LOS A	0.3	2.1	0.51	0.94	0.51	43.8
6	R2	14	2.0	15	2.0	0.289	89.0	LOS A	0.8	6.0	0.96	1.02	1.05	15.8
Approach		66	2.0	69	2.0	0.289	27.9	LOS A	0.8	6.0	0.61	0.95	0.62	32.6
North: Beach Road														
7	L2	57	2.0	60	2.0	0.295	2.1	LOS A	0.0	0.0	0.00	0.06	0.00	56.2
8	T1	1019	2.0	1073	2.0	0.295	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	58.7
Approach		1076	2.0	1133	2.0	0.295	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	58.1
All Vehicles		1890	2.0	1989	2.0	0.295	1.6	LOS A	0.9	6.6	0.07	0.06	0.07	48.6

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on degree of saturation per movement.

Minor Road Approach LOS values are based on worst degree of saturation for any vehicle movement.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 101 [Beach / Melrose - PM peak (2022) - Post Closure (Site Folder: General)]**

New Site

Site Category: (None)

Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	724	2.0	762	2.0	0.223	0.8	LOS A	0.7	5.2	0.09	0.02	0.09	49.2
3	R2	20	2.0	21	2.0	0.223	14.8	LOS A	0.7	5.2	0.20	0.04	0.22	53.9
Approach		744	2.0	783	2.0	0.223	1.2	LOS A	0.7	5.2	0.09	0.02	0.10	49.8
East: Melrose Street														
4	L2	22	2.0	23	2.0	0.036	11.5	LOS A	0.1	0.9	0.51	0.91	0.51	43.8
6	R2	6	2.0	6	2.0	0.117	72.6	LOS A	0.3	2.3	0.95	1.00	0.95	18.3
Approach		28	2.0	29	2.0	0.117	24.6	LOS A	0.3	2.3	0.60	0.93	0.60	34.4
North: Beach Road														
7	L2	23	2.0	24	2.0	0.285	2.1	LOS A	0.0	0.0	0.00	0.02	0.00	56.5
8	T1	1019	2.0	1073	2.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.3
Approach		1042	2.0	1097	2.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles		1814	2.0	1909	2.0	0.285	0.9	LOS A	0.7	5.2	0.05	0.03	0.05	52.2

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on degree of saturation per movement.

Minor Road Approach LOS values are based on worst degree of saturation for any vehicle movement.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 101 [Beach / Melrose - PM peak (2032) - Post Closure (Site Folder: General)]**

New Site

Site Category: (None)

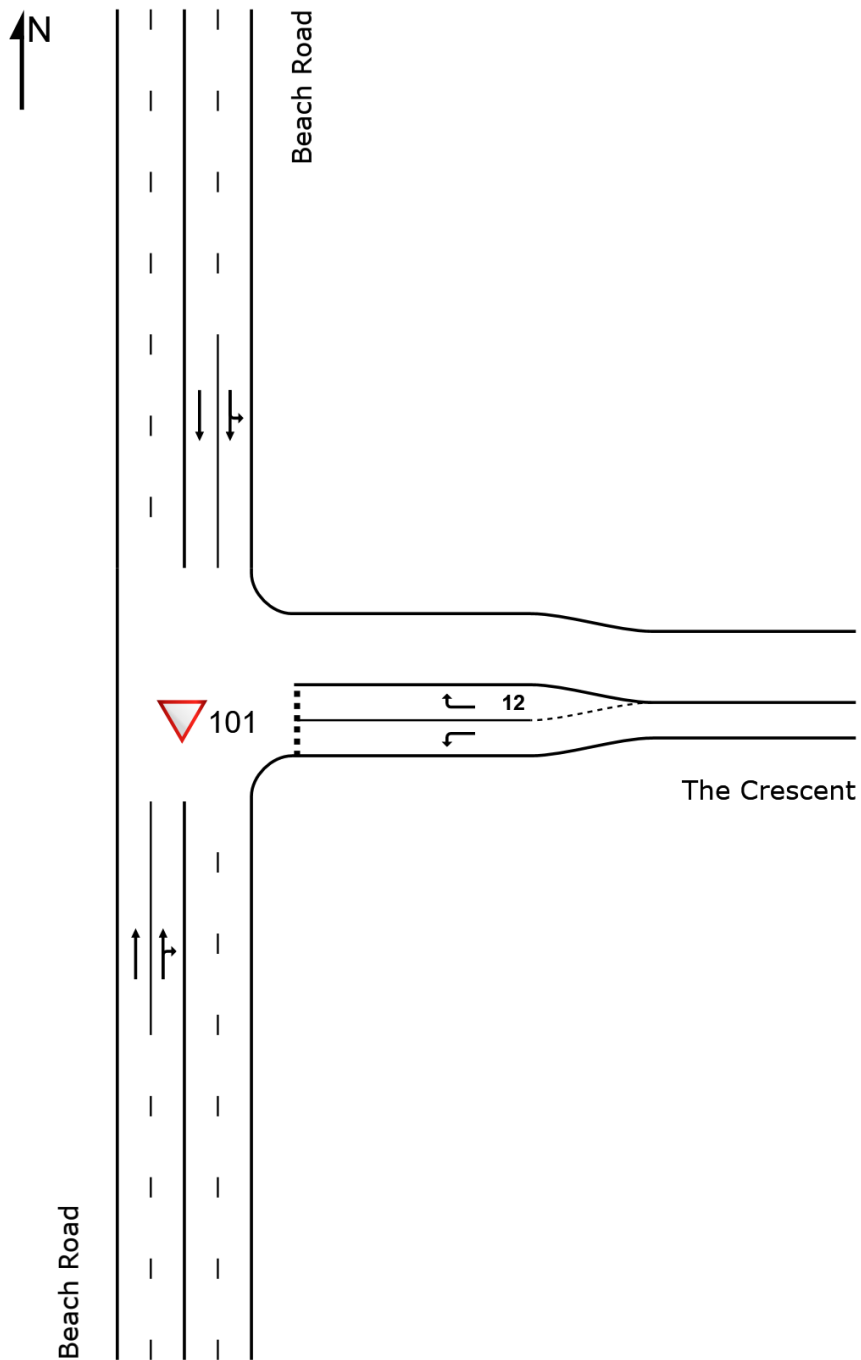
Stop (Two-Way)

Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%				veh	m				
South: Beach Road														
2	T1	724	2.0	842	2.0	0.252	1.2	LOS A	1.1	7.7	0.10	0.02	0.12	46.2
3	R2	20	2.0	23	2.0	0.252	17.6	LOS A	1.1	7.7	0.25	0.04	0.28	52.5
Approach		744	2.0	865	2.0	0.252	1.6	LOS A	1.1	7.7	0.11	0.02	0.12	47.1
East: Melrose Street														
4	L2	22	2.0	26	2.0	0.119	12.1	LOS A	0.4	2.6	0.71	0.97	0.71	36.5
6	R2	6	2.0	7	2.0	0.119	105.6	LOS A	0.4	2.6	0.87	0.99	0.87	18.5
Approach		28	2.0	33	2.0	0.119	32.1	LOS A	0.4	2.6	0.74	0.97	0.74	30.6
North: Beach Road														
7	L2	23	2.0	27	2.0	0.315	2.1	LOS A	0.0	0.0	0.00	0.02	0.00	56.4
8	T1	1019	2.0	1185	2.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.3
Approach		1042	2.0	1212	2.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.0
All Vehicles		1814	2.0	2109	2.0	0.315	1.2	LOS A	1.1	7.7	0.06	0.03	0.06	50.2

BEACH ROAD / THE CRESCENT



MOVEMENT SUMMARY

Site: 101 [Beach / Crescent - PM peak (2022) (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	725	2.0	763	2.0	0.207	0.4	LOS A	0.3	1.9	0.03	0.01	0.03	59.5
3	R2	6	2.0	6	2.0	0.207	17.4	LOS A	0.3	1.9	0.07	0.01	0.07	57.7
Approach		731	2.0	769	2.0	0.207	0.5	LOS A	0.3	1.9	0.03	0.01	0.03	59.5
East: The Crescent														
4	L2	69	2.0	73	2.0	0.097	8.4	LOS A	0.3	2.4	0.50	0.74	0.50	51.4
6	R2	4	2.0	4	2.0	0.073	64.8	LOS A	0.2	1.4	0.95	0.98	0.95	28.8
Approach		73	2.0	77	2.0	0.097	11.5	LOS A	0.3	2.4	0.52	0.75	0.52	49.3
North: Beach Road														
7	L2	31	2.0	33	2.0	0.285	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	57.8
8	T1	1011	2.0	1064	2.0	0.285	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		1042	2.0	1097	2.0	0.285	0.2	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1846	2.0	1943	2.0	0.285	0.8	LOS A	0.3	2.4	0.03	0.04	0.03	59.1

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on degree of saturation per movement.

Minor Road Approach LOS values are based on worst degree of saturation for any vehicle movement.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Beach / Crescent - PM peak (2022) - Post Closure (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	725	2.0	763	2.0	0.211	0.5	LOS A	0.4	2.8	0.05	0.01	0.05	59.3
3	R2	9	2.0	9	2.0	0.211	17.4	LOS A	0.4	2.8	0.10	0.02	0.11	57.3
Approach		734	2.0	773	2.0	0.211	0.7	LOS A	0.4	2.8	0.05	0.01	0.05	59.3
East: The Crescent														
4	L2	69	2.0	73	2.0	0.097	8.4	LOS A	0.3	2.4	0.50	0.74	0.50	51.4
6	R2	4	2.0	4	2.0	0.073	65.0	LOS A	0.2	1.4	0.95	0.98	0.95	28.8
Approach		73	2.0	77	2.0	0.097	11.5	LOS A	0.3	2.4	0.52	0.75	0.52	49.3
North: Beach Road														
7	L2	32	2.0	34	2.0	0.286	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	57.8
8	T1	1011	2.0	1064	2.0	0.286	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		1043	2.0	1098	2.0	0.286	0.3	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1850	2.0	1947	2.0	0.286	0.9	LOS A	0.4	2.8	0.04	0.04	0.04	59.0

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on degree of saturation per movement.

Minor Road Approach LOS values are based on worst degree of saturation for any vehicle movement.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Beach / Crescent - PM peak (2032) - Post Closure (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%				veh	m				
South: Beach Road														
2	T1	725	2.0	843	2.0	0.236	0.8	LOS A	0.6	4.3	0.06	0.01	0.06	59.0
3	R2	9	2.0	10	2.0	0.236	20.8	LOS A	0.6	4.3	0.12	0.02	0.14	56.7
Approach		734	2.0	853	2.0	0.236	1.0	LOS A	0.6	4.3	0.06	0.01	0.07	59.0
East: The Crescent														
4	L2	69	2.0	80	2.0	0.116	8.9	LOS A	0.4	2.9	0.53	0.77	0.53	51.0
6	R2	4	2.0	5	2.0	0.125	95.8	LOS A	0.3	2.4	0.97	0.99	0.97	23.2
Approach		73	2.0	85	2.0	0.125	13.7	LOS A	0.4	2.9	0.55	0.78	0.55	47.9
North: Beach Road														
7	L2	32	2.0	37	2.0	0.316	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	57.8
8	T1	1011	2.0	1176	2.0	0.316	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		1043	2.0	1213	2.0	0.316	0.3	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1850	2.0	2151	2.0	0.316	1.1	LOS A	0.6	4.3	0.04	0.04	0.05	58.8

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on degree of saturation per movement.

Minor Road Approach LOS values are based on worst degree of saturation for any vehicle movement.

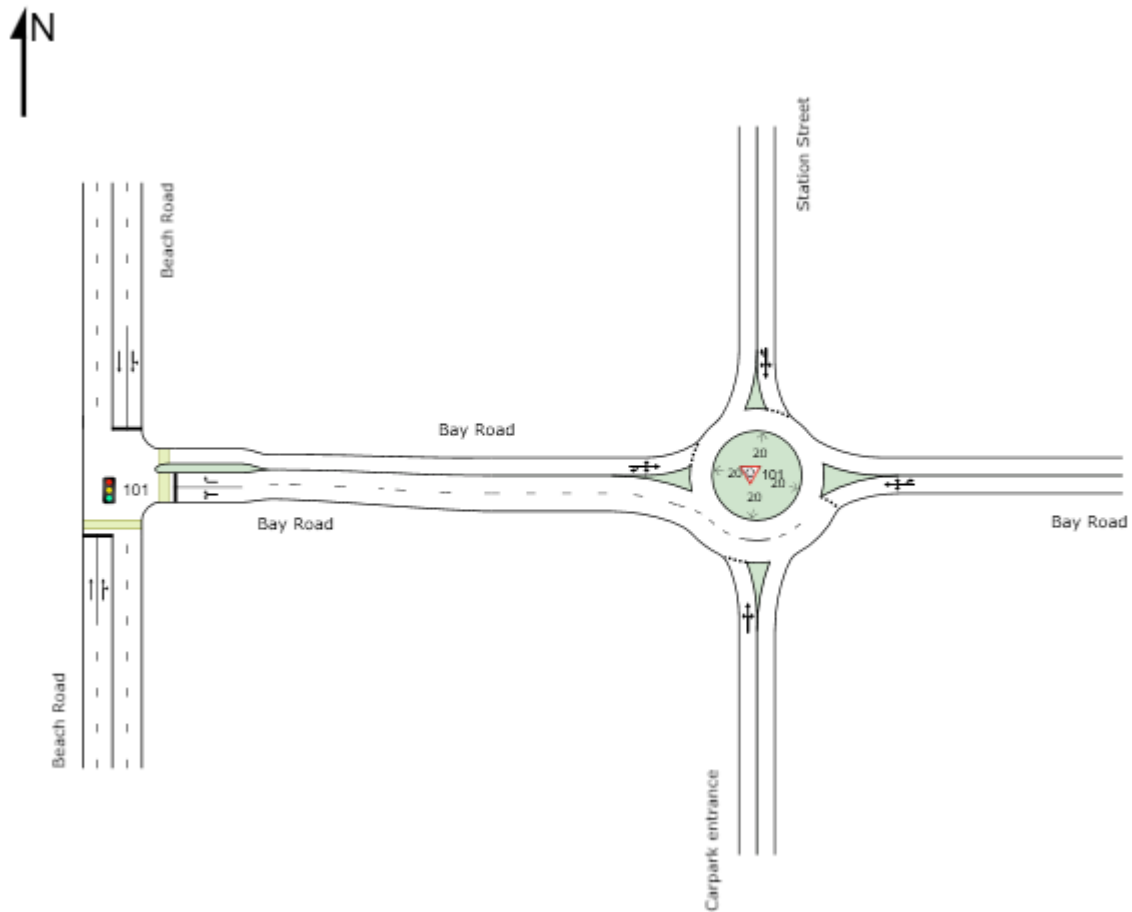
Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

BEACH ROAD / BAY ROAD / STATION STREET



MOVEMENT SUMMARY

 **Site: 101 [Bay / Station - PM peak (2022) (Site Folder: General)]**

 **Network: N101 [Beach / Bay / Station - PM peak (2022) (Network Folder: General)]**

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Carpark entrance														
1	L2	5	0.0	5	0.0	0.028	7.4	LOS A	0.1	0.7	0.62	0.69	0.62	45.6
2	T1	1	0.0	1	0.0	0.028	7.6	LOS A	0.1	0.7	0.62	0.69	0.62	52.1
3	R2	8	0.0	8	0.0	0.028	12.2	LOS A	0.1	0.7	0.62	0.69	0.62	52.1
Approach		15	0.0	15	0.0	0.028	10.1	LOS A	0.1	0.7	0.62	0.69	0.62	50.5
East: Bay Road														
4	L2	5	0.0	5	0.0	0.638	4.8	LOS B	5.0	35.4	0.45	0.59	0.45	52.1
5	T1	265	2.0	265	2.0	0.638	5.1	LOS B	5.0	35.4	0.45	0.59	0.45	47.4
6	R2	245	2.0	245	2.0	0.638	9.7	LOS B	5.0	35.4	0.45	0.59	0.45	53.2
6u	U	36	0.0	36	0.0	0.638	11.7	LOS B	5.0	35.4	0.45	0.59	0.45	54.2
Approach		552	1.9	552	1.9	0.638	7.6	LOS B	5.0	35.4	0.45	0.59	0.45	51.2
North: Station Street														
7	L2	189	2.0	189	2.0	0.389	5.9	LOS A	1.6	11.6	0.58	0.67	0.58	52.1
8	T1	2	0.0	2	0.0	0.389	6.1	LOS A	1.6	11.6	0.58	0.67	0.58	53.4
9	R2	87	2.0	87	2.0	0.389	10.8	LOS A	1.6	11.6	0.58	0.67	0.58	47.5
9u	U	43	0.0	43	0.0	0.389	12.8	LOS A	1.6	11.6	0.58	0.67	0.58	54.4
Approach		322	1.7	322	1.7	0.389	8.2	LOS A	1.6	11.6	0.58	0.67	0.58	51.7
West: Bay Road														
10	L2	115	2.0	115	2.0	0.397	3.9	LOS A	2.2	15.9	0.49	0.59	0.49	51.6
11	T1	271	2.0	271	2.0	0.397	4.4	LOS A	2.2	15.9	0.49	0.59	0.49	53.9
12	R2	2	0.0	2	0.0	0.397	8.3	LOS A	2.2	15.9	0.49	0.59	0.49	53.9
12u	U	13	0.0	13	0.0	0.397	10.4	LOS A	2.2	15.9	0.49	0.59	0.49	25.3
Approach		400	1.9	400	1.9	0.397	4.5	LOS A	2.2	15.9	0.49	0.59	0.49	53.0
All Vehicles		1288	1.8	1288	1.8	0.638	6.8	LOS B	5.0	35.4	0.50	0.61	0.50	51.8

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

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.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101 [Beach / Bay - PM peak (2022)]
(Site Folder: General)]

 Network: N101 [Beach / Bay / Station - PM peak
(2022) (Network Folder: General)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	540	2.0	540	2.0	0.421	9.8	LOS A	14.3	102.1	0.50	0.45	0.50	51.7
3	R2	103	2.0	103	2.0	* 0.446	24.9	LOS A	3.9	27.5	0.65	0.76	0.65	33.3
Approach		643	2.0	643	2.0	0.446	12.2	LOS A	14.3	102.1	0.52	0.50	0.52	49.3
East: Bay Road														
4	L2	118	2.0	118	2.0	0.429	45.4	LOS A	5.7	40.8	0.90	0.80	0.90	24.4
6	R2	248	2.0	248	2.0	0.429	45.3	LOS A	5.7	40.8	0.90	0.80	0.90	24.3
Approach		366	2.0	366	2.0	0.429	45.3	LOS A	5.7	40.8	0.90	0.80	0.90	24.4
North: Beach Road														
7	L2	302	2.0	302	2.0	* 0.445	12.7	LOS A	12.9	92.1	0.49	0.60	0.49	45.2
8	T1	840	2.0	840	2.0	0.445	9.1	LOS A	15.5	110.5	0.50	0.51	0.50	51.5
Approach		1142	2.0	1142	2.0	0.445	10.1	LOS A	15.5	110.5	0.50	0.53	0.50	50.4
All Vehicles		2152	2.0	2152	2.0	0.446	16.7	LOS A	15.5	110.5	0.58	0.57	0.58	44.8

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

 Site: 101 [Beach / Bay - PM peak (2022)]
(Site Folder: General)]

 Network: N101 [Beach / Bay / Station - PM peak (2022)] (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

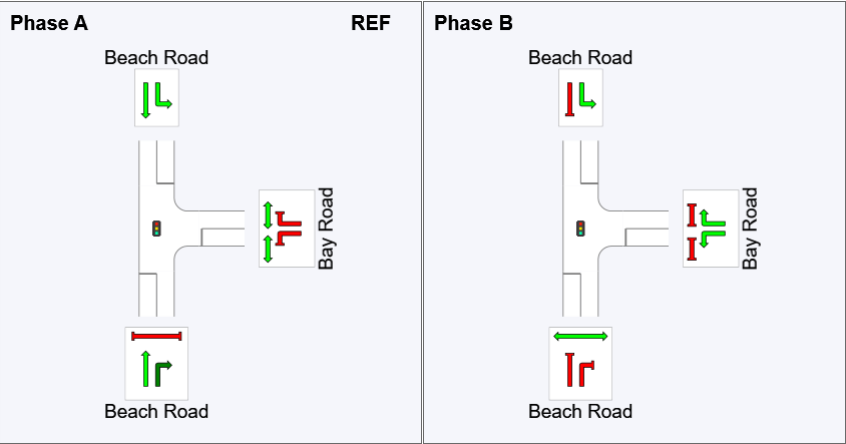
Timings based on settings in the Site by Phasing & the Timing dialog
Phase Times specified Sequence: by the user
Phase Reference Phase: Phase Two-Phase
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	86
Green Time (sec)	80	28
Phase Time (sec)	86	34
Phase Split	72%	28%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

 **Site: 101 [Bay / Station - PM peak (2022) - Post Closure (Site Folder: General)]**

 **Network: N101 [Beach / Bay / Station - Post Closure (2022) (Network Folder: General)]**

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Carpark entrance														
1	L2	5	0.0	5	0.0	0.029	7.6	LOS A	0.1	1.0	0.63	0.70	0.63	45.4
2	T1	1	0.0	1	0.0	0.029	7.8	LOS A	0.1	1.0	0.63	0.70	0.63	52.0
3	R2	8	0.0	8	0.0	0.029	12.4	LOS A	0.1	1.0	0.63	0.70	0.63	52.0
Approach		15	0.0	15	0.0	0.029	10.3	LOS A	0.1	1.0	0.63	0.70	0.63	50.3
East: Bay Road														
4	L2	5	0.0	5	0.0	0.696	5.0	LOS B	8.3	58.9	0.49	0.60	0.49	52.2
5	T1	313	2.0	313	2.0	0.696	5.3	LOS B	8.3	58.9	0.49	0.60	0.49	47.6
6	R2	198	2.0	198	2.0	0.696	9.9	LOS B	8.3	58.9	0.49	0.60	0.49	53.3
6u	U	36	0.0	36	0.0	0.696	11.9	LOS B	8.3	58.9	0.49	0.60	0.49	54.3
Approach		552	1.9	552	1.9	0.696	7.3	LOS B	8.3	58.9	0.49	0.60	0.49	50.9
North: Station Street														
7	L2	189	2.0	189	2.0	0.416	6.1	LOS A	2.3	16.4	0.60	0.69	0.60	51.9
8	T1	2	0.0	2	0.0	0.416	6.2	LOS A	2.3	16.4	0.60	0.69	0.60	53.1
9	R2	87	2.0	87	2.0	0.416	10.9	LOS A	2.3	16.4	0.60	0.69	0.60	47.1
9u	U	67	0.0	67	0.0	0.416	12.9	LOS A	2.3	16.4	0.60	0.69	0.60	54.1
Approach		346	1.6	346	1.6	0.416	8.6	LOS A	2.3	16.4	0.60	0.69	0.60	51.6
West: Bay Road														
10	L2	174	2.0	174	2.0	0.450	3.8	LOS A	2.7	19.2	0.49	0.59	0.49	51.8
11	T1	281	2.0	281	2.0	0.450	4.3	LOS A	2.7	19.2	0.49	0.59	0.49	54.1
12	R2	2	0.0	2	0.0	0.450	8.3	LOS A	2.7	19.2	0.49	0.59	0.49	54.1
12u	U	13	0.0	13	0.0	0.450	10.4	LOS A	2.7	19.2	0.49	0.59	0.49	25.3
Approach		469	1.9	469	1.9	0.450	4.3	LOS A	2.7	19.2	0.49	0.59	0.49	53.0
All Vehicles		1382	1.8	1382	1.8	0.696	6.7	LOS B	8.3	58.9	0.52	0.62	0.52	51.6

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

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.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 101 [Beach / Bay - PM peak (2022) - Post Closure (Site Folder: General)]**

 **Network: N101 [Beach / Bay / Station - Post Closure (2022) (Network Folder: General)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	540	2.0	540	2.0	0.421	9.8	LOS A	14.3	102.1	0.50	0.45	0.50	51.7
3	R2	114	2.0	114	2.0	* 0.520	26.6	LOS A	4.6	32.5	0.70	0.78	0.70	32.3
Approach		654	2.0	654	2.0	0.520	12.7	LOS A	14.3	102.1	0.53	0.51	0.53	48.9
East: Bay Road														
4	L2	136	2.0	136	2.0	0.512	46.4	LOS A	5.7	40.8	0.92	0.81	0.92	24.1
6	R2	302	2.0	302	2.0	0.512	46.3	LOS A	5.7	40.8	0.92	0.81	0.92	24.0
Approach		438	2.0	438	2.0	0.512	46.3	LOS A	5.7	40.8	0.92	0.81	0.92	24.1
North: Beach Road														
7	L2	340	2.0	340	2.0	* 0.459	12.3	LOS A	13.1	93.4	0.49	0.61	0.49	45.3
8	T1	840	2.0	840	2.0	0.459	9.1	LOS A	16.2	115.6	0.51	0.51	0.51	51.5
Approach		1180	2.0	1180	2.0	0.459	10.1	LOS A	16.2	115.6	0.50	0.54	0.50	50.3
All Vehicles		2272	2.0	2272	2.0	0.520	17.8	LOS A	16.2	115.6	0.59	0.58	0.59	43.8

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [Beach / Bay - PM peak (2022) - Post Closure (Site Folder: General)]

Network: N101 [Beach / Bay / Station - Post Closure (2022) (Network Folder: General)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times specified by the user

Phase Sequence: Two-Phase

Input Phase: A

Output Phase Sequence: A, B

Phase: Phase

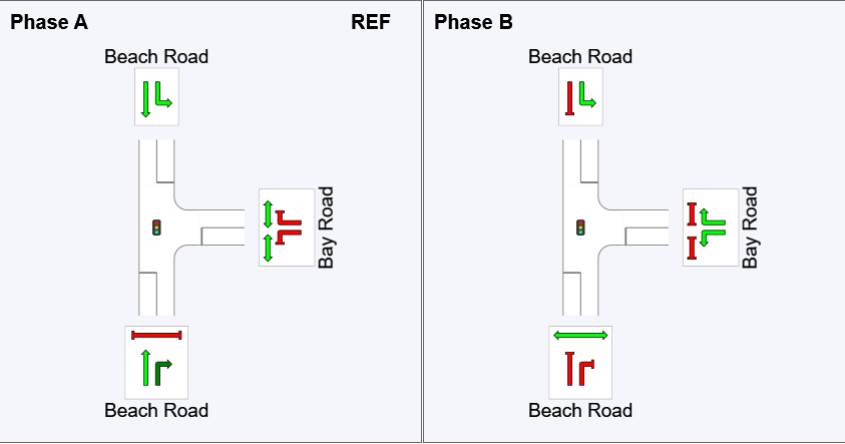
Sequence: Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	86
Green Time (sec)	80	28
Phase Time (sec)	86	34
Phase Split	72%	28%

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

Output Phase Sequence



REF:

Reference

Phase

VAR: Variable Phase

MOVEMENT SUMMARY

 **Site: 101 [Bay / Station - PM peak (2022) - Post Closure (Site Folder: General)]**

 **Network: N101 [Beach / Bay / Station - Post Closure (2032) (Network Folder: General)]**

New Site

Site Category: (None)

Roundabout

Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total HV]		ARRIVAL FLOWS [Total HV]		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Carpark entrance														
1	L2	6	0.0	6	0.0	0.035	8.2	LOS A	0.2	1.2	0.68	0.72	0.68	44.7
2	T1	1	0.0	1	0.0	0.035	8.5	LOS A	0.2	1.2	0.68	0.72	0.68	51.5
3	R2	9	0.0	9	0.0	0.035	13.1	LOS A	0.2	1.2	0.68	0.72	0.68	51.5
Approach		16	0.0	16	0.0	0.035	11.0	LOS A	0.2	1.2	0.68	0.72	0.68	49.8
East: Bay Road														
4	L2	6	0.0	6	0.0	0.794	7.2	LOS C	10.3	73.4	0.57	0.68	0.66	51.4
5	T1	345	2.0	345	2.0	0.794	7.4	LOS C	10.3	73.4	0.57	0.68	0.66	46.4
6	R2	219	2.0	219	2.0	0.794	12.1	LOS C	10.3	73.4	0.57	0.68	0.66	52.5
6u	U	40	0.0	40	0.0	0.794	14.1	LOS C	10.3	73.4	0.57	0.68	0.66	53.5
Approach		609	1.9	609	1.9	0.794	9.5	LOS C	10.3	73.4	0.57	0.68	0.66	49.9
North: Station Street														
7	L2	209	2.0	209	2.0	0.485	6.4	LOS A	2.9	20.5	0.66	0.71	0.66	51.7
8	T1	14	0.0	14	0.0	0.485	6.6	LOS A	2.9	20.5	0.66	0.71	0.66	52.9
9	R2	97	2.0	97	2.0	0.485	11.3	LOS A	2.9	20.5	0.66	0.71	0.66	46.8
9u	U	74	0.0	74	0.0	0.485	13.3	LOS A	2.9	20.5	0.66	0.71	0.66	53.8
Approach		394	1.6	394	1.6	0.485	8.9	LOS A	2.9	20.5	0.66	0.71	0.66	51.4
West: Bay Road														
10	L2	192	2.0	192	2.0	0.513	4.2	LOS A	3.3	23.4	0.53	0.62	0.53	51.3
11	T1	310	2.0	310	2.0	0.513	4.7	LOS A	3.3	23.4	0.53	0.62	0.53	53.5
12	R2	2	0.0	2	0.0	0.513	8.6	LOS A	3.3	23.4	0.53	0.62	0.53	53.6
12u	U	14	0.0	14	0.0	0.513	10.7	LOS A	3.3	23.4	0.53	0.62	0.53	24.1
Approach		519	1.9	519	1.9	0.513	4.7	LOS A	3.3	23.4	0.53	0.62	0.53	52.5
All Vehicles		1539	1.8	1539	1.8	0.794	7.8	LOS C	10.3	73.4	0.58	0.67	0.62	51.0

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

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.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101 [Beach / Bay - PM peak (2022) - Post Closure (Site Folder: General)]

 Network: N101 [Beach / Bay / Station - Post Closure (2032) (Network Folder: General)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Beach Road														
2	T1	596	2.0	596	2.0	0.465	10.2	LOS A	16.5	117.7	0.52	0.47	0.52	51.4
3	R2	126	2.0	126	2.0	* 0.713	39.7	LOS C	6.9	48.8	0.83	0.89	0.99	26.3
Approach		722	2.0	722	2.0	0.713	15.3	LOS C	16.5	117.7	0.58	0.54	0.60	47.0
East: Bay Road														
4	L2	150	2.0	150	2.0	0.566	47.0	LOS A	5.7	40.8	0.94	0.82	0.94	23.9
6	R2	334	2.0	334	2.0	0.566	46.9	LOS A	5.7	40.8	0.94	0.82	0.94	23.8
Approach		484	2.0	484	2.0	0.566	47.0	LOS A	5.7	40.8	0.94	0.82	0.94	23.9
North: Beach Road														
7	L2	376	2.0	376	2.0	* 0.512	13.0	LOS A	15.5	110.5	0.52	0.64	0.52	44.6
8	T1	928	2.0	928	2.0	0.512	9.7	LOS A	19.1	135.7	0.54	0.54	0.54	51.0
Approach		1303	2.0	1303	2.0	0.512	10.7	LOS A	19.1	135.7	0.53	0.57	0.53	49.8
All Vehicles		2509	2.0	2509	2.0	0.713	19.0	LOS C	19.1	135.7	0.62	0.61	0.63	43.1

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [Beach / Bay - PM peak (2022) - Post Closure (Site Folder: General)]

Network: N101 [Beach / Bay / Station - Post Closure (2032) (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)
Design Life Analysis (Final Year): Results for 10 years

Timings based on settings in the Site Phasing & Timing dialog (Demand & Sensitivity Analysis overrides)

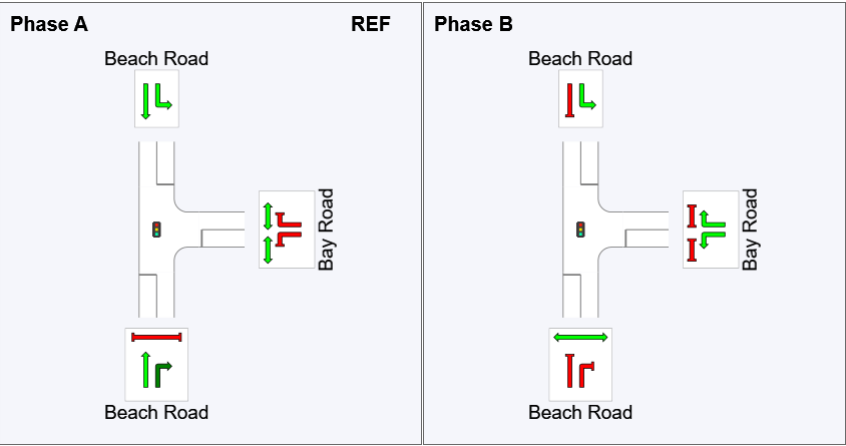
Phase	Times	specified	by	the	user
Phase		Sequence:			Two-Phase
Reference		Phase:		Phase	A
Input	Phase	Sequence:		A,	B
Output Phase Sequence:	A, B				

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	86
Green Time (sec)	80	28
Phase Time (sec)	86	34
Phase Split	72%	28%

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

Output Phase Sequence



REF: Reference
VAR: Variable Phase

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