

St Mary St Joseph Catholic School

Redevelopment TIA



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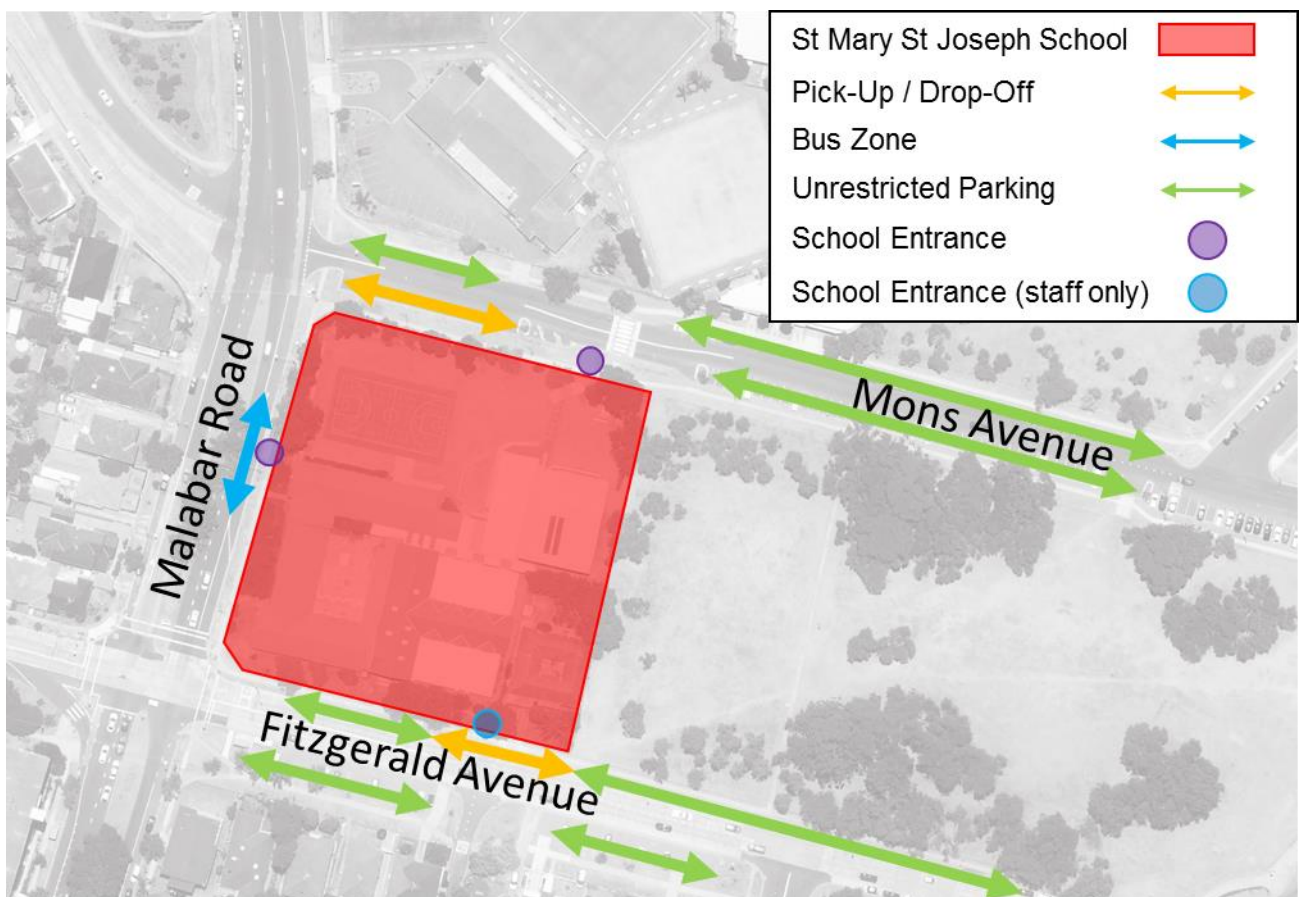
1. INTRODUCTION AND EXISTING CONDITIONS

1.1 Background

Bitzios Consulting has been engaged by JDH Architects to undertake a traffic impact assessment (TIA) for the redevelopment of St Mary St Joseph Catholic School in Maroubra. The school seeks to undertake a two-stage project which includes the construction of a 2-storey building and the refurbishment of existing blocks D and E. To achieve this, a masterplan has been developed for the school to achieve development approval from Randwick City Council.

As part of the development application the development does not intend to increase the number of students, rather proposes to partially re-develop and refurbish the existing school site. The refurbishment is aiming to reduce the building footprint and as such, provide improved play areas. The opportunity exists as part of the master planning process to improve pedestrian points of access to/from the school and how that relates to the existing pick-up / set down area (which is the main method of travel to school).

The existing school location, access points, and surrounding parking availability is shown in Figure 1.1 below.



Aerial image sourced from NSWGlobe

Figure 1.1: St Mary – St Joseph School Location

2. EXISTING FACILITIES AND OPERATIONS

2.1 Overview

Site visits were undertaken 22 October 2019 to observe both the AM and PM school operations, as well as inspect the surrounding road network and public and active transport facilities.

St Mary St Joseph Catholic School is bordered by three roads on one side, with a public field on its eastern frontage. The school has two primary access points:

- Mons Avenue: the primary access point where most students enter the school. A pick-up and drop-off area is located near this gate. At the end of school, a teacher assists students getting picked up from school. No teacher is present before school starts, and the gate to the school is closed before 8:20AM. A pedestrian crossing is located just outside the access gate, however, there was no pedestrian crossing supervisor present to assist students in crossing the road
- Malabar Road: accessing the school office, adjacent to a bus stop (of which only one bus was observed to stop during bus patronage surveys).

There is restricted and unrestricted on-street parking available surrounding the school on Fitzgerald Avenue (east of Malabar Road) and Mons Avenue. Parking supply was observed to suitably meet the parking demands of the school. After the AM drop-off period was concluded and all staff had arrived to school, it was observed that there were still a significant number of on-street spaces available immediately around the site, as well additional parking available further east of the school.

2.2 AM Student Drop-Off Operations

Students were observed arriving from before 8:20AM on Mons Avenue, however, as the gates were closed, students were milling about outside the school. Student arrivals increased rapidly from 8:25AM onwards with most students using the Mons Avenue access. Most drivers were using the kiss and drop zone, with some drivers stopping in No Stopping areas near the pedestrian crossing to drop off the students.

Some parents parked on Fitzgerald Avenue and walked their children to the Mons Avenue gate through the park. They would then return to their car and leave. This process took 5-10 minutes.

No staff were present at the access gate on Mons Avenue during the AM drop-off operations.

Other observations during the AM peak were:

- Parking available on Mons Avenue, with around 80-90% of the angle parking utilised. The northern side of Mons Avenue was used as short-term drop-off / some longer stay. There may be potential to convert this area to 2-hour parking to promote higher turnover use
- There is potential for a dual pickup zone on either side of Mons Avenue, however the new development on the other side of the road is likely to obstruct this option
- Fitzgerald Avenue was not used and as such the school access gate was closed
- Cars were observed to U-turn on Mons Avenue. Extending the double barrier line would assist with preventing this manoeuvre. There is a legible and logical circuit available to navigate the network to not require motorists to conduct U-turns at the kiss and ride facility.
- Motorists found it difficult at times to exit Mons Avenue onto Malabar Road, which then blocked the pick-up zone. This only occurred a couple of times and cleared relatively quickly, once gaps were provided from the adjacent signalised intersection

- Pedestrians crossing Malabar Road at Mons Avenue could be problematic in the future as there is limited pedestrian crossing infrastructure at the intersection. As the intersection is an unsignalized 4-way intersection, some confusion as to 'right of way' was observed in a couple of instances. It was noted that students from other schools in the area were noted to cross at this location.
- The end of the pick-up zone has a horizontal return, reducing its effective length. It would be beneficial to line mark a better transition for motorists to exit the kiss and ride facility
- Pedestrian crossing signposting on Mons Avenue is getting old and needs replacing
- The pick-up zone was very inefficient in the morning. Many drivers parked, then exited the car to get the students bags and walk them to the gate. Teacher supervision would reduce the desire for parents to walk their kids to school. Also considering improved gate locations could reduce this behaviour.
- Some drivers parked on Fitzgerald Avenue then walked across the park (consider possible park entry/ corner entry at Mons Avenue – it is understood that school safety / security is paramount for the school and having multiple gates/points of access could be problematic)
- Disabled parking bays were not used. It may be worth reducing the current 4 bays down to 2 bays or alternatively consider locating them closer to the town centre
- The pickup zone generally operated well, with a maximum queue outside of the kiss and ride facility of 5 cars noticed at 8:30am and at 8:50am. At all other times the facility operated satisfactorily.
- Car arrival was well dispersed, which may be a function of the signals at Malabar releasing cars in platoons and cars then navigating the local circuit to access the set-down area. This had a positive function of the school operations.
- Many parents were observed to use the No Stopping zone on northern side of Mons Ave as drop off. Parents should be advised to avoid doing this as it obscures sight lines for traffic approaching the marked foot crossing.
- Car arrival was typically in an anti-clockwise direction via Fitzgerald Avenue then Mons Avenue then back to Malabar Road
- Few children walked or cycled to school – there is an opportunity to promote a supervised walking school bus or similar.
- No school buses operated during the AM site visit. There may be opportunity to improve this mode share if bus stops were supervised (understanding the local concern of child safety).

2.3 PM Student Drop-Off Operations

Parents were observed arriving just before 3:00PM to pick up their children. During this time, a staff member was present to assist students getting into their cars. Pick up operations had mostly finished by 3:25 PM. Other observations include:

- The maximum queue in the pick-up/drop-off zone was 27 cars (19 past the back of the zone). This blocked egress from the angle parking and caused temporary congestion issues
- Some cars were tempted to drive on the wrong side of the road to bypass the queue
- Upon egress of the zone, the max queue was only 6 cars at the Mons Ave intersection
- The children were let out at 3:04 PM and the school was cleared by 3:15 PM
- Many children were noted to stay for after school care. This should be further encouraged to reduce the congestion observed during the PM peak
- The teacher on duty was very effective at helping children to the cars and asking for the cars to move forward. This was a large part of the success of moving such high volumes of cars in such a short duration.

- The teacher stayed until the last child left which was around 3:25 PM
- Some cars had labels which made it easy for the teacher. Parents should be required to hold the labels on board and have them visible
- The southern pickup zone on Fitzgerald Avenue was not used
- On some occasions the queues from Fitzgerald Avenue / Malabar Road intersection queued back to Mons Avenue and past Mons Avenue. This temporarily caused egress issues from the pick-up facility. RMS should be requested to review signal timing for the school PM peaks to ensure this school does not extend back to the school. Favouring Malabar Road over Fitzgerald Avenue may also assist with better distributing the school arrivals for the PM pick-up.
- The angle parking was well used during the pick-up. The dispersal message will assist with this as well.
- No buses were observed to operate at the school during the PM peak.
- Some parents were observed to park across the road on Mons Avenue and walk to school to pick up their child. This was limited and the turnover on this side of the road was not high in the afternoon.

2.4 Traffic and Parking Observation Summary

As the pick-up/drop-off zone is several metres away from the gate, several drivers were observed in the morning to park and walk their kids to the gate. This would cause bunching at the end of the zone closest to the gate, causing additional queueing along Mons Avenue. This was mostly observed in the AM peak as there was no teacher present to guide students into the school.

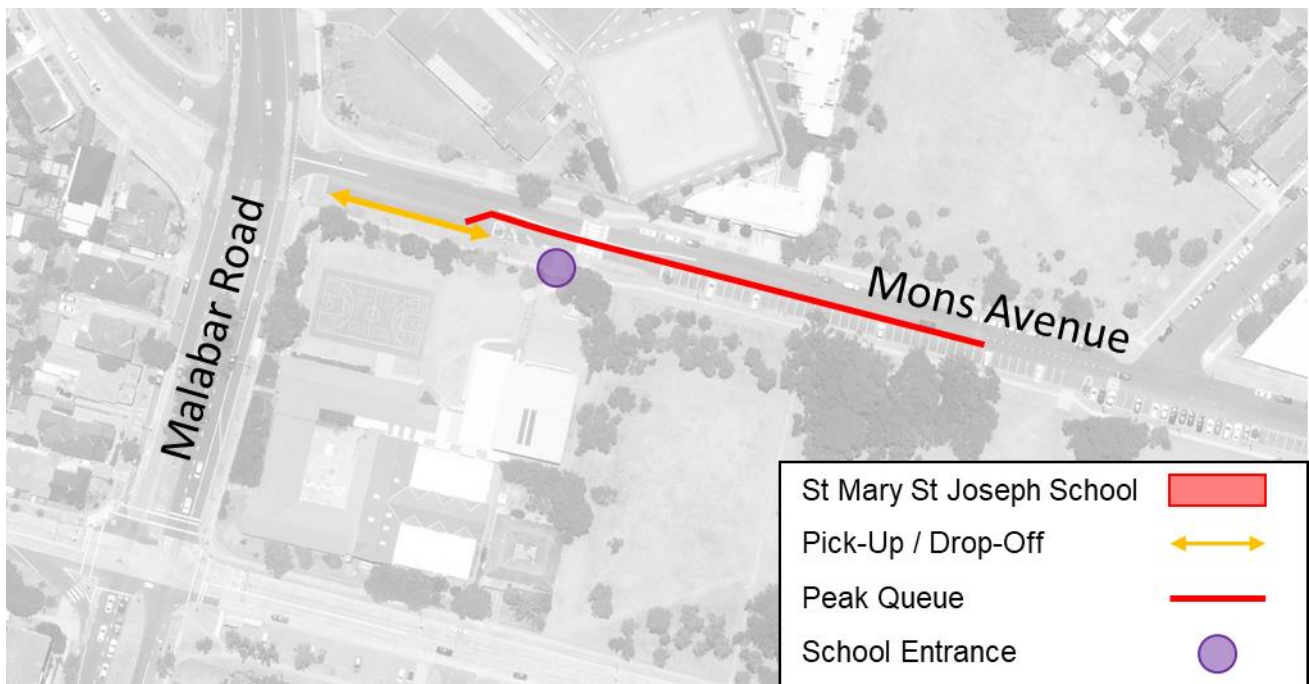
Some vehicles would also queue over the pedestrian crossing near the school access gate.

It is recommended that the school informs parents of Transport for NSW's *Drop-off and Pick-up Zones Safety Tips* in order to improve safety. For example, one item on the document recommends *Make sure your school bag and other items are in a safe position, such as on the floor*, whereas it was observed that some students would store their bags in the boot.

The queue length was longer in the PM, but this was mostly due to most parents arriving around 3:00PM when children didn't start exiting the school until 3.05pm. Notwithstanding this, the operations was much better managed in the PM, with a staff member assisting students to their cars.

Through the middle of the day there was ample parking available in the unrestricted parking spaces available along Mons Avenue. This would suggest that staff parking impacts of the school are minimal.

Figure 2.1 shows the peak queueing observed on site.



Aerial image sourced from NSWGlobe

Figure 2.1: Pick-Up and Drop-Off Queuing

2.5 Active Transport

A bus stop operates adjacent to the school on the eastern side of Malabar Road between Fitzgerald Avenue and Mons Avenue. Transport for NSW's website indicates that four bus services utilise this bus stop:

- 397 – City Circular Quay to South Maroubra
- X97 – City Circular Quay to South Maroubra (Express Service)
- 627E – Randwick Boys HS to South Maroubra
- 649E – Maroubra Junction to Randwick High Schools.

During a site visit undertaken on Tuesday 22 October 2019, no students were observed to travel to or from the school using bus services. A bus patronage survey was undertaken on Tuesday 22 October 2019 and it recorded only one bus stopping at the bus stop after school, and only four people alighted from the bus.

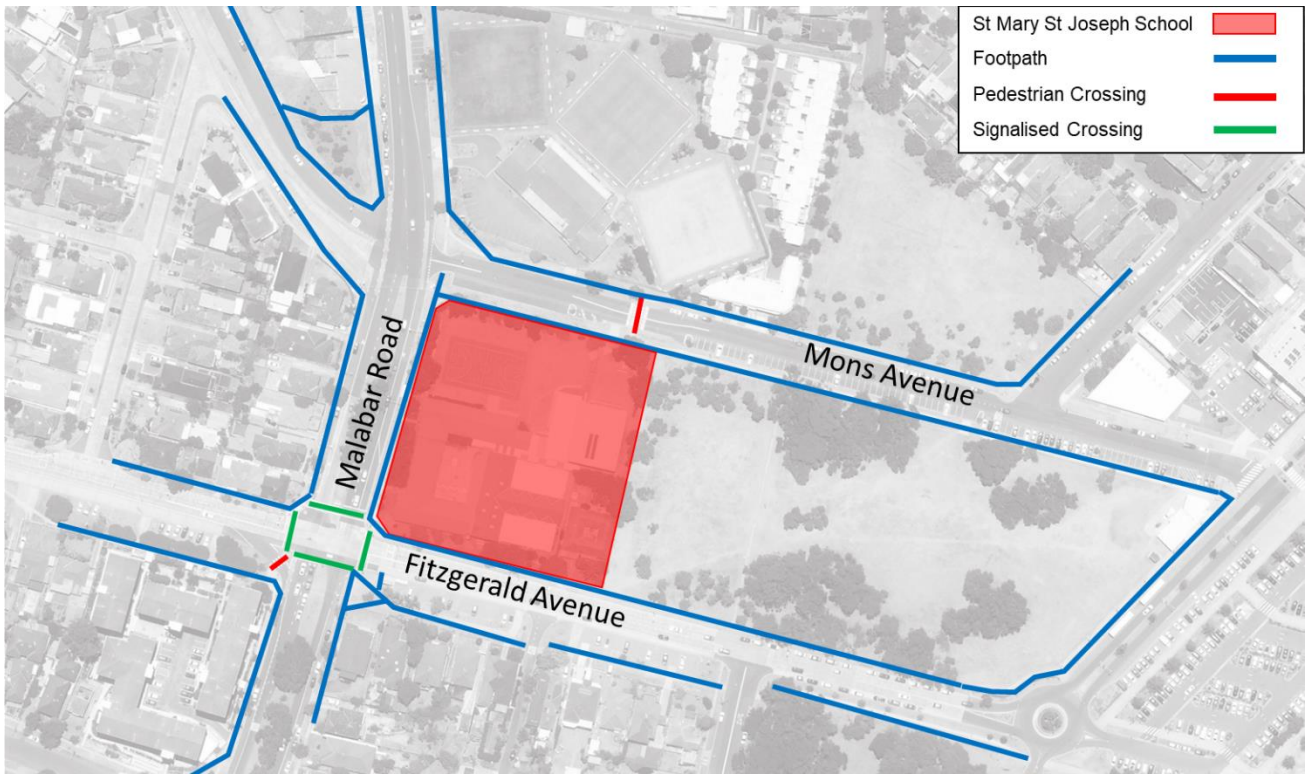
There are no other public transport services near the school.

On-road cycle lanes are present on Malabar Road, however, there are no off-street cycling paths leading to the school.

It should be noted that children under 16 years old are permitted to ride bicycles on footpaths, although many of these around the school are narrow or have poor visibility. Footpath connectivity around the school is generally quite good.

There may be opportunities to encourage children to walk or cycle through the provision of bicycle racks and the operation of a walking bus for children that live near the school.

The pedestrian facilities nearby the school are shown in Figure 2.2 below.



Aerial image sourced from NSWGlobe

Figure 2.2: Pedestrian Facilities near the School.

3. PROPOSED DEVELOPMENT

3.1 Proposal

The applicant proposed re-developments to both streams of students, summarised as follows:

- Stage 1-2 Stream:
 - Construction of a new 2-storey building for staff and administration facilities, a library, and 6 general purpose learning areas
 - Refurbishment of existing blocks D & E into 8 general purpose learning areas, art class, and 'Aspect' (a small space adjacent to the new art area)
 - Demolition of blocks A, B & C
 - Removal of demountable buildings

The proposed layout is shown in Figure 3.1 below.

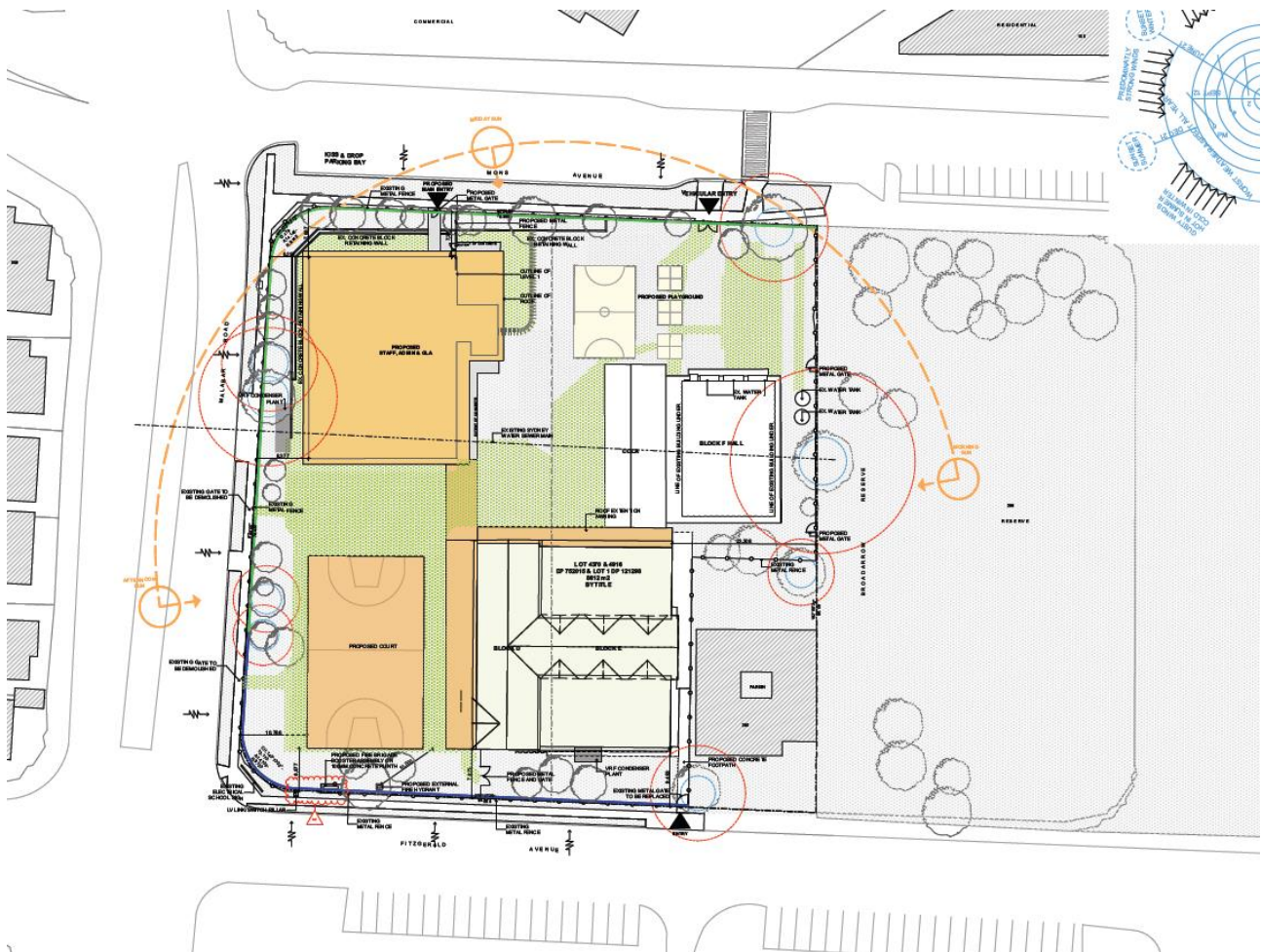


Figure 3.1: Proposed Layout

It should again be noted that there is no proposed increase to the number of enrolments at the school, and so there would not be an increase in the number of trips generated by the school, or any additional impact on the surrounding road network due to changes in traffic volume.

It is expected that the servicing/refuse collection operations would operate the same as the existing conditions.

3.2 School Access Points

As there are no proposed modifications to the number of students, the only impact of the development on the surrounding transport network would be the addition of new access points to the site. Figure 3.1 below shows the removed, retained, and new access points.

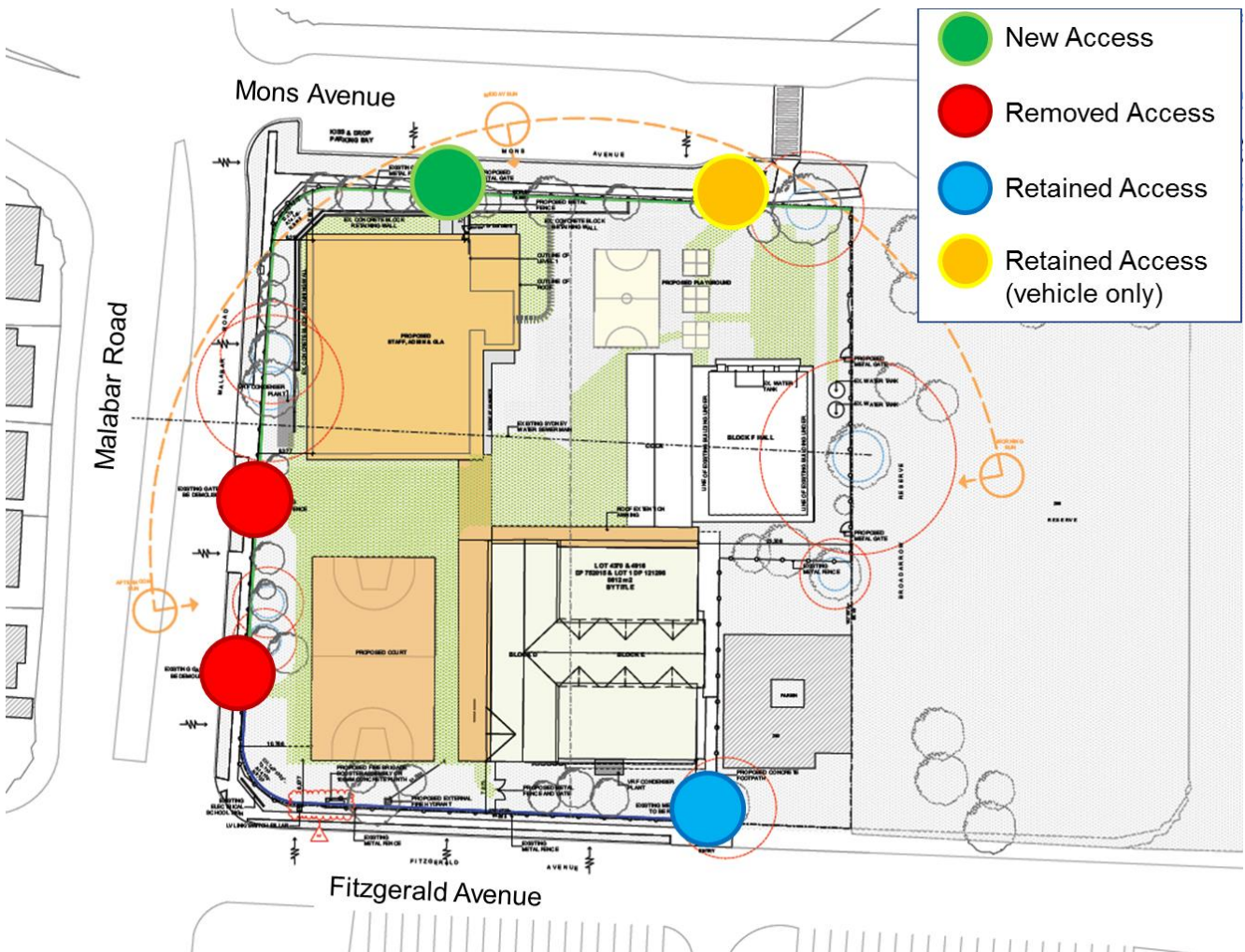


Figure 3.2: Site Access Points

New access points are proposed on Mons Avenue, with existing entrances on Mons Avenue and Fitzgerald Avenue to be retained.

The new Mons Avenue access is effectively a relocation of the existing access near the raised pedestrian crossing. Previously, this access point had issues where vehicles were not fully utilising the pick-up/drop-off bay which lead to additional queueing along Mons Avenue. The new location would lead to drivers wanting park closer to Malabar Road, resulting in more drivers using the pick-up drop off bay and a lower queue length during AM and PM peaks. The existing access on Mons Avenue would be for vehicles only to be utilised outside of school peaks.

The existing school access points on Malabar Road are to be removed. This allows student access and egress to the school to be more easily monitored by staff, improving safety for the students.

Additionally, the existing staff access point on Fitzgerald Avenue will be used as a main entry for 'Aspect' located in Block E. It can also be used for events such as for excursions where students would be able to access buses waiting on Fitzgerald Avenue.

In summary, the proposed new access point is likely to improve the surrounding road network by encouraging drivers to better utilise pick-up/drop-off facilities and also provides the school with greater flexibility and additional options to accommodate student access and egress if necessary.

3.3 Construction Traffic Mitigation

During the construction process, the pick-up and drop-off operations may be disrupted. During this time, it is proposed that the kiss and drop area be relocated to the southern side of the school on Fitzgerald Avenue.

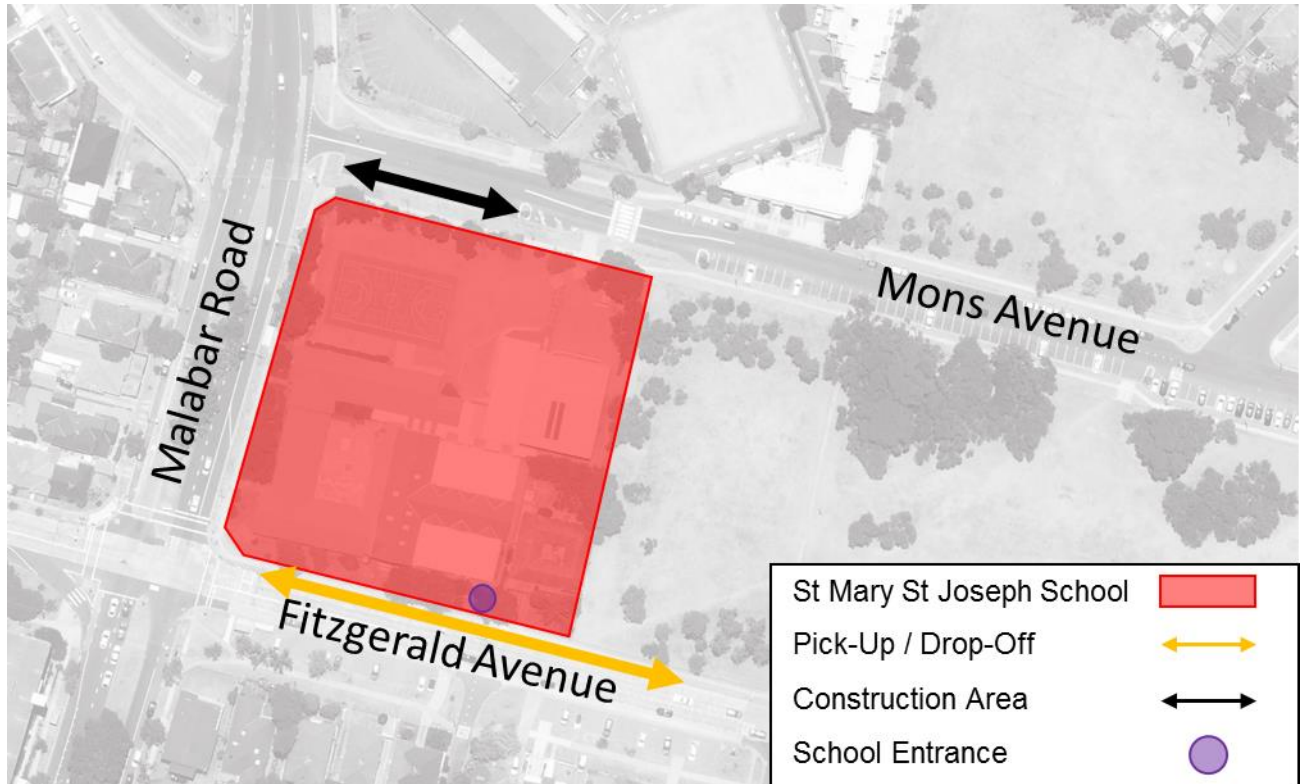
It must be noted that this is proposed as an **option** only and may not be necessary depending on the constructability of the proposed layout. It is preferable to retain the Mons Avenue access as the primary school access point for student access throughout the construction process if the safety of the students can be maintained.

The section on Fitzgerald Avenue currently has a short length of “No Parking” area adjacent to a staff-only access gate. This parking restriction could be expanded and this gate and could form the primary access point for students during the construction period only.

It is expected that this operation will result in less queueing by drivers, as they would not need to wait and give way to a pedestrian crossing like on Mons Avenue. The length of the pick-up / drop off area can also be extended to the east as necessary to accommodate additional vehicles.

One concern is that the queueing for drivers entering the pick-up/drop-off area might flow back to the Fitzgerald Avenue / Malabar Road intersection, obstructing vehicle movements through the intersection. The school would need to work with RMS to ensure the signal cycle times were kept low so that large platoons of cars were not being sent into the pick-up zone. This would reduce the potential for cars queueing back to the intersection. The school will also need to be vigilant with parents to ensure that they do not arrive before school closes. The school may need supportive signage and the support from NSW police during its early establishment to ensure positive behaviours are created.

This proposed pick-up zone is shown in Figure 3.3 below.



Aerial image sourced from NSWGlobe

Figure 3.3: Pick-Up and Drop-Off Operation During Construction

3.4 Existing & Future Intersection Performance

3.4.1 Approach

Back of queue and traffic volume surveys were undertaken on 22nd October 2019, Tuesday for the intersection of Malabar Road and Fitzgerald Avenue, and on 31st October 2019, Thursday for the intersection of Malabar Road and Mons Avenue. The surveys were undertaken during school zone time periods 8:00-9:30AM and 2:30-4:00PM.

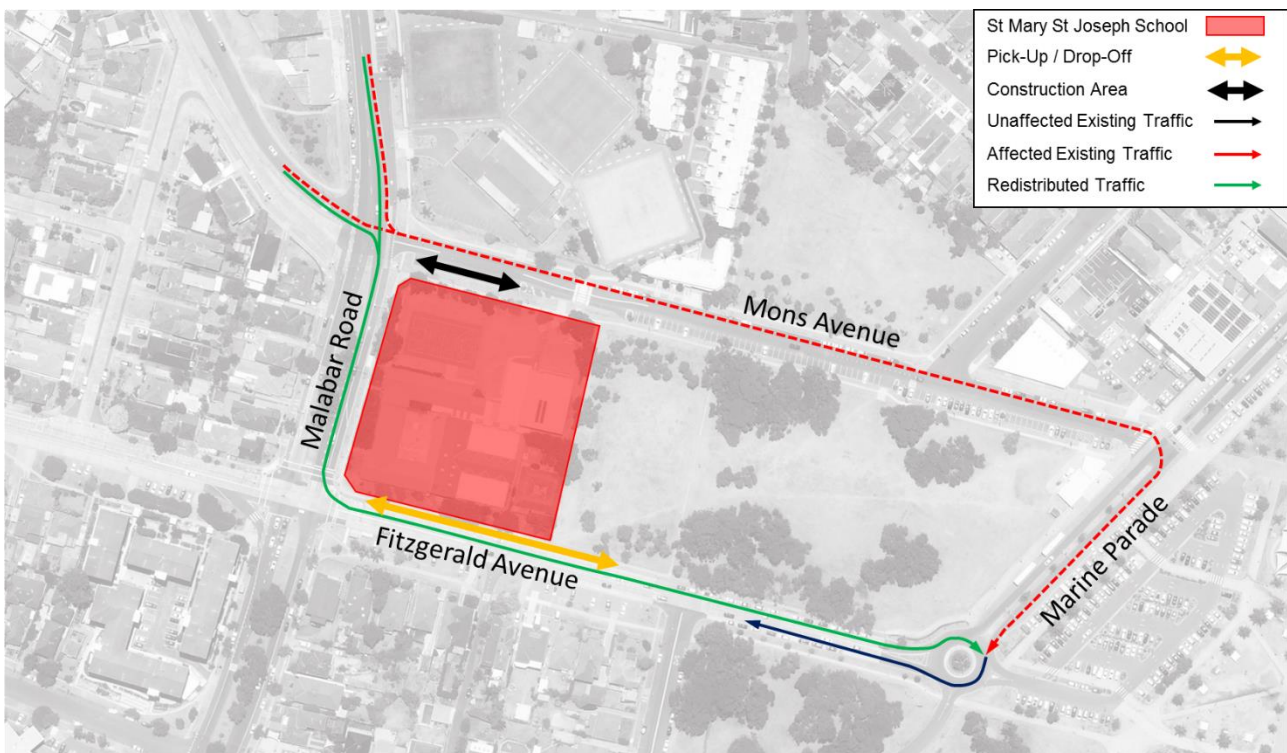
From the traffic volumes, the eastern approach of the Mons Avenue intersection has higher volumes in the AM peak compared to the PM peak. Most of the traffic on this approach (around 60-65% for each peak) are also turning left to Malabar Road southbound in both peaks, only having to give way to southbound traffic on Malabar Road. The rest of the approach traffic are either turning right to Malabar Road northbound (around 10%) or going straight through (around 25%).

3.4.2 Traffic Volume re-distribution during Construction

3.4.2.1 Incoming Traffic

The relocation of the pick-up/drop-off zone from Mons Avenue to Fitzgerald Avenue will shift existing traffic turning into Mons Avenue to turn into Fitzgerald Avenue.

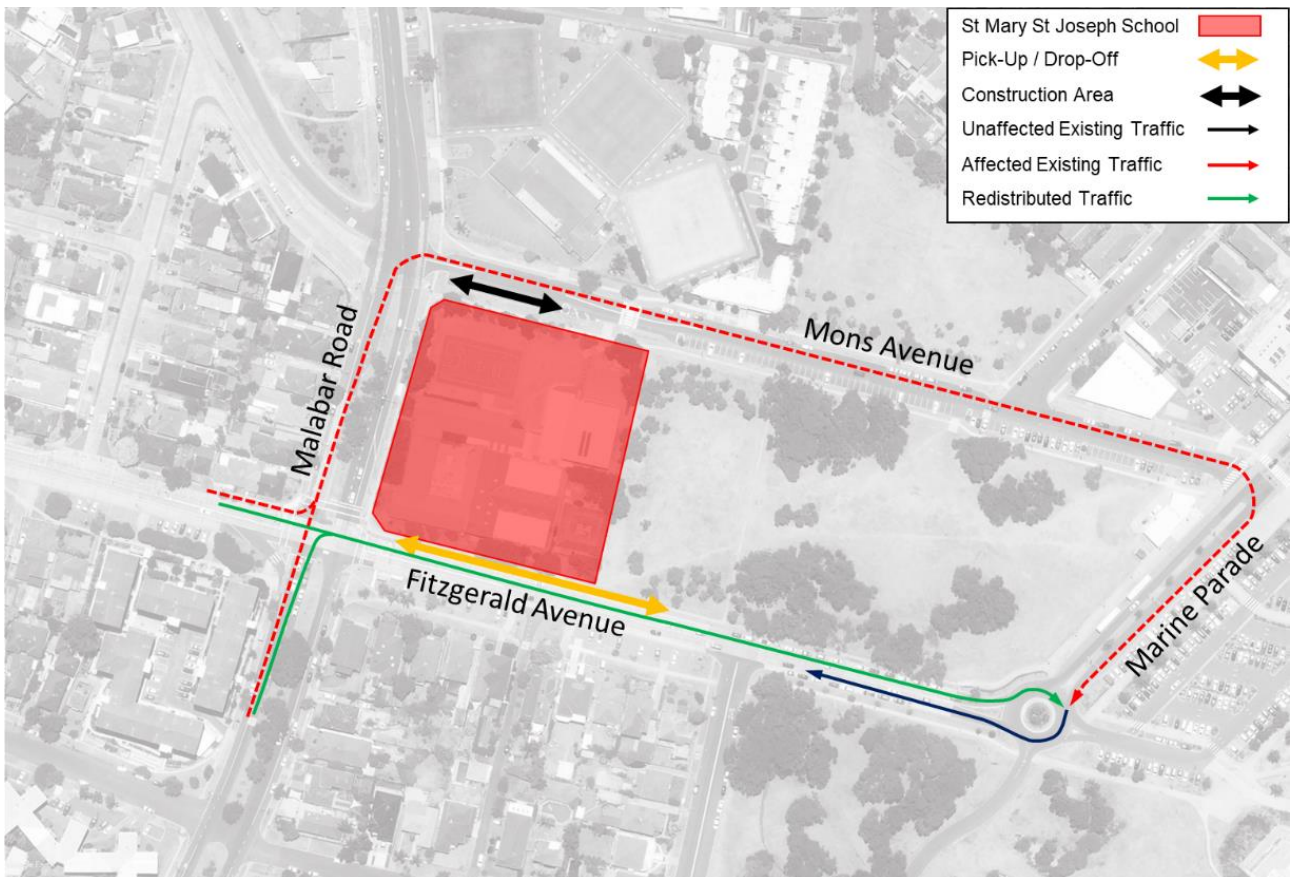
Traffic approaching from the north (Malabar Road southbound) or north-west (Mons Avenue eastbound) currently turn left into Mons Avenue to pick-up or drop-off at the unlimited parking zone opposite existing the pick-up/drop-off zone. In the new pick-up/drop-off arrangement, it is assumed that 40% of these vehicles will instead continue south along Malabar Road before turning left to Fitzgerald Avenue. This will add on to the existing left turn volumes from Malabar Road to Fitzgerald Avenue. A map showing the redistributed routes is shown in Figure 3.4.



Aerial image sourced from NSWGlobe

Figure 3.4: Redistributed Incoming Traffic from the North

Traffic approaching from the south-west (Fitzgerald Avenue eastbound) and south (Malabar Road northbound) currently also turn right into Mons Avenue. In the new arrangement, it is assumed that 40% of these vehicles will instead turn right earlier at Fitzgerald Avenue. This will reduce the existing right turn volumes from Malabar Road to Mons Avenue. A map showing the redistributed routes is shown in Figure 3.5.



Aerial image sourced from NSWGlobe

Figure 3.5: Redistributed Incoming Traffic from the South

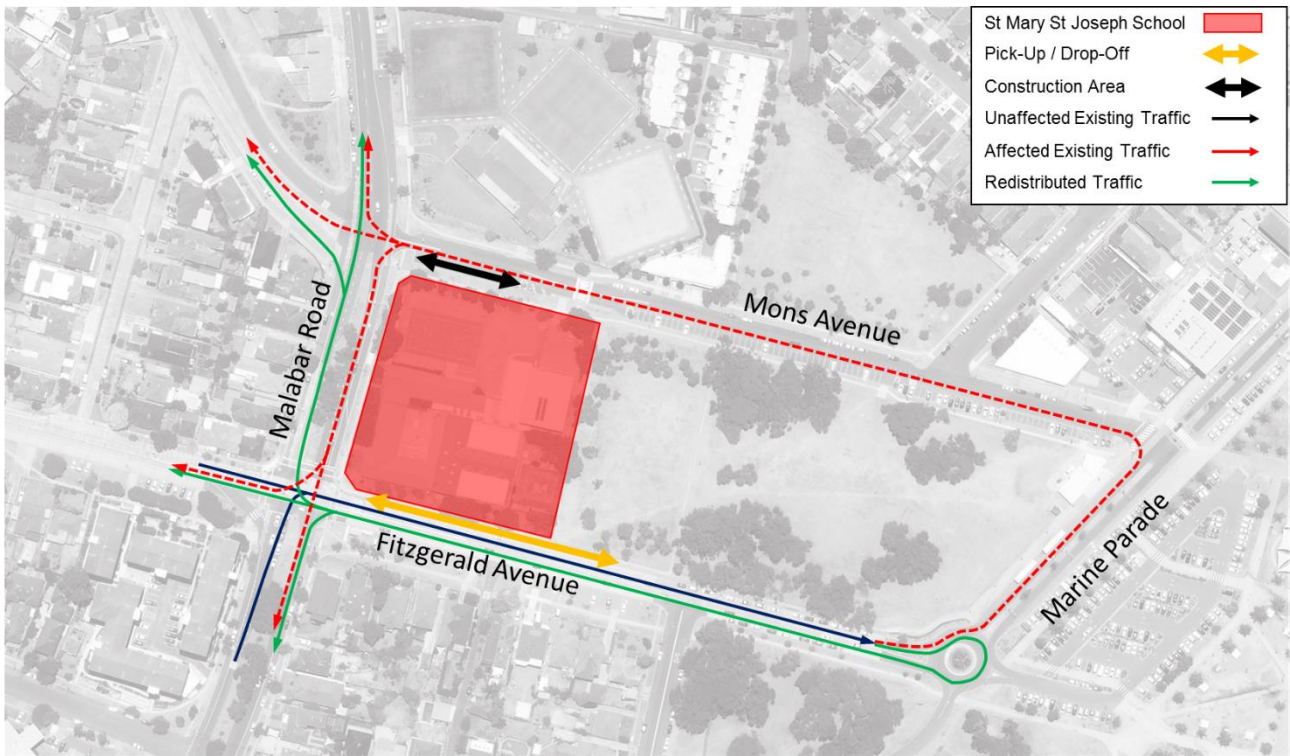
Heavy vehicles were not redistributed as volumes on Mons Avenue and Malabar Road are low and would not make a significant impact.

3.4.2.2 Outgoing Traffic

Majority of the outgoing traffic exiting from the existing pick-up/drop-off zone on Mons Road will be redistributed with the relocation of the zone. Currently, the existing zone is mainly accessed by travelling via Fitzgerald Avenue (eastbound), Marine Parade (northbound) and Mons Avenue (westbound), before exiting onto Malabar Road or Mons Avenue as shown in Figure 3.6.

In the new pick-up/drop-off arrangement, traffic exiting from the relocated zone on Fitzgerald Avenue will likely continue to travel eastbound before u-turning at the roundabout intersection with Marine Parade, before travelling westbound to the Malabar Road intersection. Therefore, majority of the light vehicle traffic (assumed 80%) at the eastern approach of Mons Avenue will be redistributed to the eastern approach of Fitzgerald Avenue. The other 20% are assumed to be local residential traffic.

Heavy vehicles were not redistributed as volumes on Mons Avenue and Malabar Road is low and would not make a significant impact.



Aerial image sourced from NSWGlobe

Figure 3.6: Redistributed Outgoing Traffic

Existing outgoing traffic from Fitzgerald Avenue eastern approach continues to use this approach, albeit via a different incoming route, as shown in Figure 3.4 and Figure 3.5 previously. Therefore, these vehicles are not redistributed to other routes.

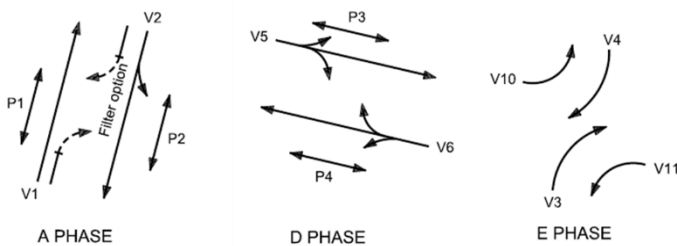
3.5 SIDRA Modelling

SIDRA Modelling was undertaken to analyse the existing (base) and future performance of the two Malabar Road intersections surrounding the school. The existing (base) and future cases were modelled on SIDRA 8.0. The SIDRA model site layouts and results are attached in **Appendix B**.

3.5.1 Inputs

3.5.1.1 Signal Phase Time Inputs

Existing (Base) signal phase time inputs for the intersection of Malabar Road and Fitzgerald Avenue were based on Traffic Control Signal (TCS) plan and the SCATS data collected on 22nd October 2019, Tuesday. All phases have an inter-green time of 7 seconds. The phases recorded on SCATS data are A-D-E, with “A” phase corresponding to north-south movements along Malabar Road. The phase movements are shown in Figure 3.7.



Sourced from Roads and Maritimes Services

Figure 3.7: Signal Phases

Future case phases are unchanged, but phase times may differ from the existing signal times.

Phase times inputs for Base and Future SIDRA models are shown in Table 3.1 for AM peak and Table 3.2 for PM peak.

Table 3.1: AM Phase Times

Phase	SCATS	Base SIDRA	Future SIDRA
A	32	34	34
D	25	22	22
E	14	14	14
Cycle Time	71	70	70

Table 3.2: PM Phase Times

Phase	SCATS	Base SIDRA	Future SIDRA
A	34	35	33
D	26	26	28
E	14	14	14
Cycle Time	74	75	75

3.5.1.2 Traffic Volume Inputs

Existing traffic volumes were determined from traffic surveys undertaken on 31st October 2019, Thursday. The stick diagrams showing existing traffic volumes are shown in **Appendix A**.

Future traffic volumes were based on existing volumes with traffic redistributed to different routes. The stick diagrams showing future traffic volumes are also shown in **Appendix A**.

3.5.2 Results

The SIDRA results for the intersection of Malabar Road and Fitzgerald Avenue are shown in Table 3.3 and Table 3.4 for AM and PM peaks respectively. The results for the intersection of Malabar Road and Mons Avenue are shown in Table 3.5 and Table 3.6 for AM and PM peaks respectively.

Table 3.3: SIDRA Results Comparison (Malabar Road / Fitzgerald Avenue – AM)

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Northern	R	0.32	15	LOS B	16	0.20	14	LOS A	9
	T	0.72	20	LOS B	87	0.56	18	LOS B	71
	L	0.08	22	LOS B	8	0.12	22	LOS B	12
Eastern	R	0.39	29	LOS C	33	0.81	38	LOS C	72
	T	0.39	26	LOS B	33	0.81	35	LOS C	72
	L	0.13	18	LOS B	15	0.20	18	LOS B	24
Southern	R	0.32	14	LOS A	16	0.32	14	LOS A	18
	T	0.71	21	LOS B	108	0.69	21	LOS B	103
	L	0.71	24	LOS B	108	0.69	24	LOS B	103

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Western	R	0.58	31	LOS C	45	0.68	33	LOS C	50
	T	0.58	27	LOS B	45	0.68	30	LOS C	50
	L	0.18	19	LOS B	20	0.16	19	LOS B	18

Table 3.4: SIDRA Results Comparison (Malabar Road / Fitzgerald Avenue – PM)

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Northern	R	0.28	15	LOS B	18	0.21	16	LOS B	13
	T	0.78	24	LOS B	107	0.72	24	LOS B	95
	L	0.06	23	LOS B	6	0.10	25	LOS B	9
Eastern	R	0.39	30	LOS C	36	0.63	32	LOS C	59
	T	0.39	27	LOS B	36	0.63	29	LOS C	59
	L	0.17	18	LOS B	22	0.21	17	LOS B	28
Southern	R	0.27	16	LOS B	14	0.30	17	LOS B	16
	T	0.55	20	LOS B	77	0.58	22	LOS B	79
	L	0.55	23	LOS B	77	0.58	25	LOS B	79
Western	R	0.69	33	LOS C	59	0.71	34	LOS C	60
	T	0.69	30	LOS C	59	0.71	29	LOS C	60
	L	0.14	18	LOS B	16	0.14	18	LOS B	16

Table 3.5: SIDRA Results Comparison (Malabar Road / Mons Avenue – AM)

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Northern	R	0.01	6	LOS A	1	0.02	7	LOS A	1
	T	0.26	0	LOS A	0	0.26	0	LOS A	0
	L	0.26	3	LOS A	0	0.26	3	LOS A	0
Eastern	R	0.69	45	LOS D	34	0.18	28	LOS B	5
	T	0.69	45	LOS D	34	0.18	36	LOS C	5
	L	0.69	18	LOS B	34	0.18	6	LOS A	5
Southern	R	0.05	6	LOS A	1	0.03	6	LOS A	1
	T	0.29	0	LOS A	0	0.32	0	LOS A	0
	L	0.29	3	LOS A	0	0.32	3	LOS A	0

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Western	R	0.41	47	LOS D	13	0.35	36	LOS C	11
	T	0.41	35	LOS C	13	0.35	35	LOS C	11
	L	0.41	13	LOS A	13	0.35	11	LOS A	11

Table 3.6: SIDRA Results Comparison (Malabar Road / Mons Avenue – PM)

Approach	Turn	Base				Future			
		DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)	DoS	Average Delay (s)	Level of Service	95 th Percentile Queue (m)
Northern	R	0.01	6	LOS A	0	0.01	6	LOS A	0
	T	0.32	0	LOS A	0	0.28	0	LOS A	0
	L	0.32	3	LOS A	0	0.28	3	LOS A	0
Eastern	R	0.47	32	LOS C	15	0.09	24	LOS B	2
	T	0.47	29	LOS B	15	0.09	22	LOS B	2
	L	0.47	10	LOS A	15	0.09	6	LOS A	2
Southern	R	0.04	6	LOS A	1	0.03	6	LOS A	1
	T	0.22	0	LOS A	0	0.24	0	LOS A	0
	L	0.22	3	LOS A	0	0.24	3	LOS A	0
Western	R	0.44	42	LOS C	14	0.37	32	LOS C	12
	T	0.44	30	LOS C	14	0.37	28	LOS B	12
	L	0.44	13	LOS A	14	0.37	10	LOS A	12

3.5.3 Queue Impacts

The current 95th percentile queue lengths on the eastern approach of the Mons Avenue intersection are 34 metres in the AM peak and 15 metres in the PM peak. This is supported by the site visit in which minimal queuing was observed at the intersection approach. However, the model and queue surveys are unable to reflect the queueing leading up to the start of the pick-up/drop-off zone, which is located around 70 metres from Malabar Road. The future case model shows there is a decrease of queue lengths at the same approach in both peaks due to the reduction in traffic volumes.

The queue lengths on the eastern approach of the Fitzgerald Avenue intersection increased in the future models. This is expected due to the redistribution of vehicles away from Mons Avenue onto Fitzgerald Avenue. However, the models are unable to incorporate the possible queueing that could form behind the relocated pick-up/drop-off zone. The potential queues must be considered during the construction of the proposed re-development. Initiatives such as spreading parent arrivals and running the Fitzgerald Avenue intersection on a short cycle time may assist with this aspect.

3.5.4 Performance Impacts

With the redistribution of traffic from Mons Avenue to Fitzgerald Avenue for both incoming and outgoing traffic, it is inevitable that the intersection performance of Fitzgerald Avenue to be worse and Mons Avenue to improve. In particular, the eastern approach of Fitzgerald Avenue is expected to be worse due to the increase in outgoing traffic, with volumes increased from 231 to 387 (increase of 68%) in the AM peak and from 273 to 389 (increase of 42%) in the PM peak.

3.6 Recommendations during Construction

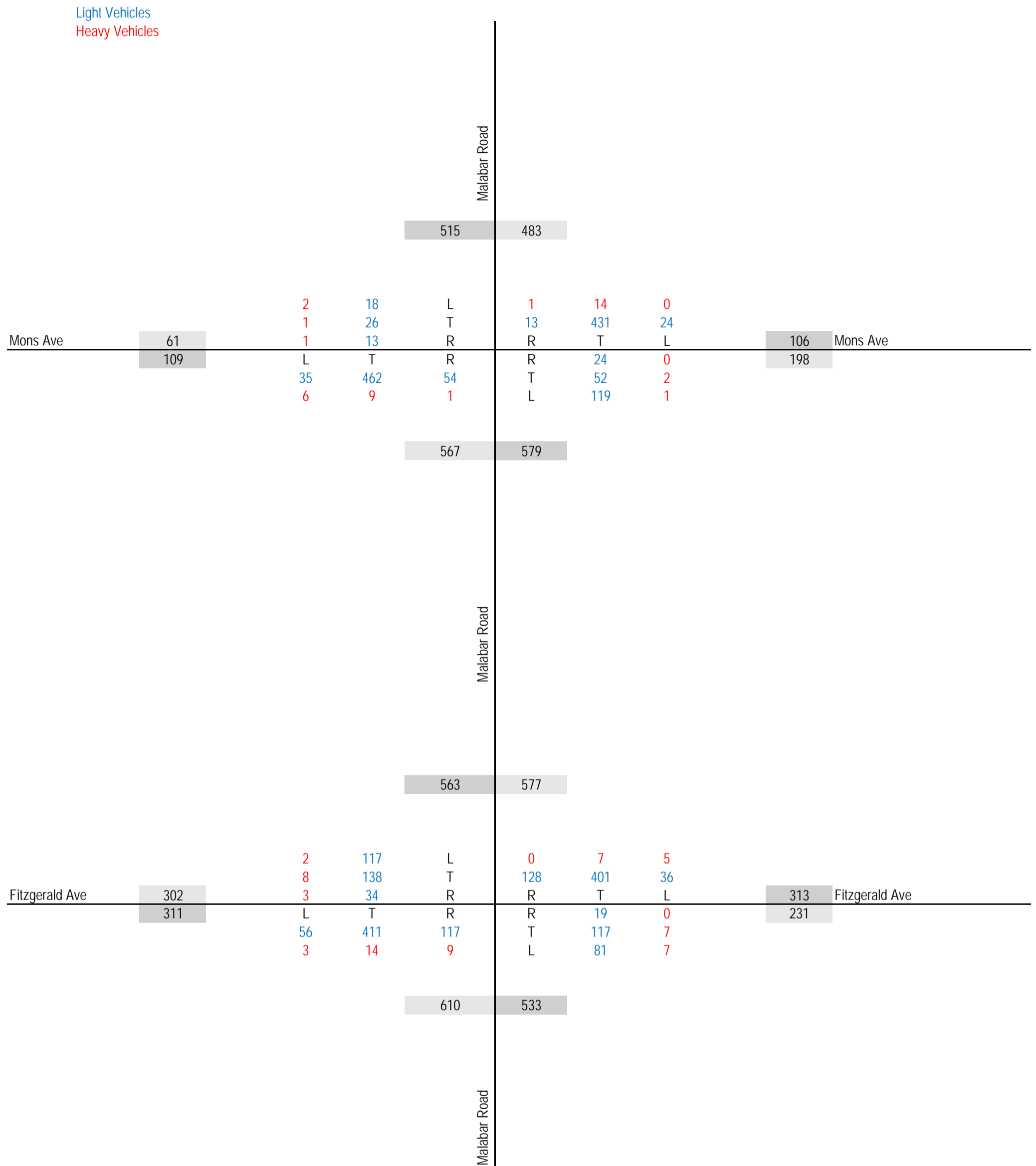
The following items are recommended to assist the school in reducing its traffic impact, especially during the construction of the development.

- The school should consider developing a Transport Access Guide (TAG) targeted at staff, parents, and visitors. It should complement the information and objectives detailed in a Workplace Travel Plan. As a minimum the TAG should include information on services and wayfinding for bus, train, cycle, and car share access to the school
- The school should begin developing a Green Travel Plan to shift some of the travel modes from people driving their children to school to instead utilise public and active transport options
- Stagger the release of students from school so the pick-up operations have less peak impact, but over a longer period. For example, Stream One students could be released at 3:05pm, with Stream Two released at 3:15. As it only takes a couple of minutes for students to reach the pick-up/drop-off area, this should be an appropriate length of time to clear a large number of Stream One students before Stream Two is released
- Have 1-2 staff members assisting students during pick-up and drop-off operations so drivers do not need to exit the car.

Appendix A: Stick Diagrams

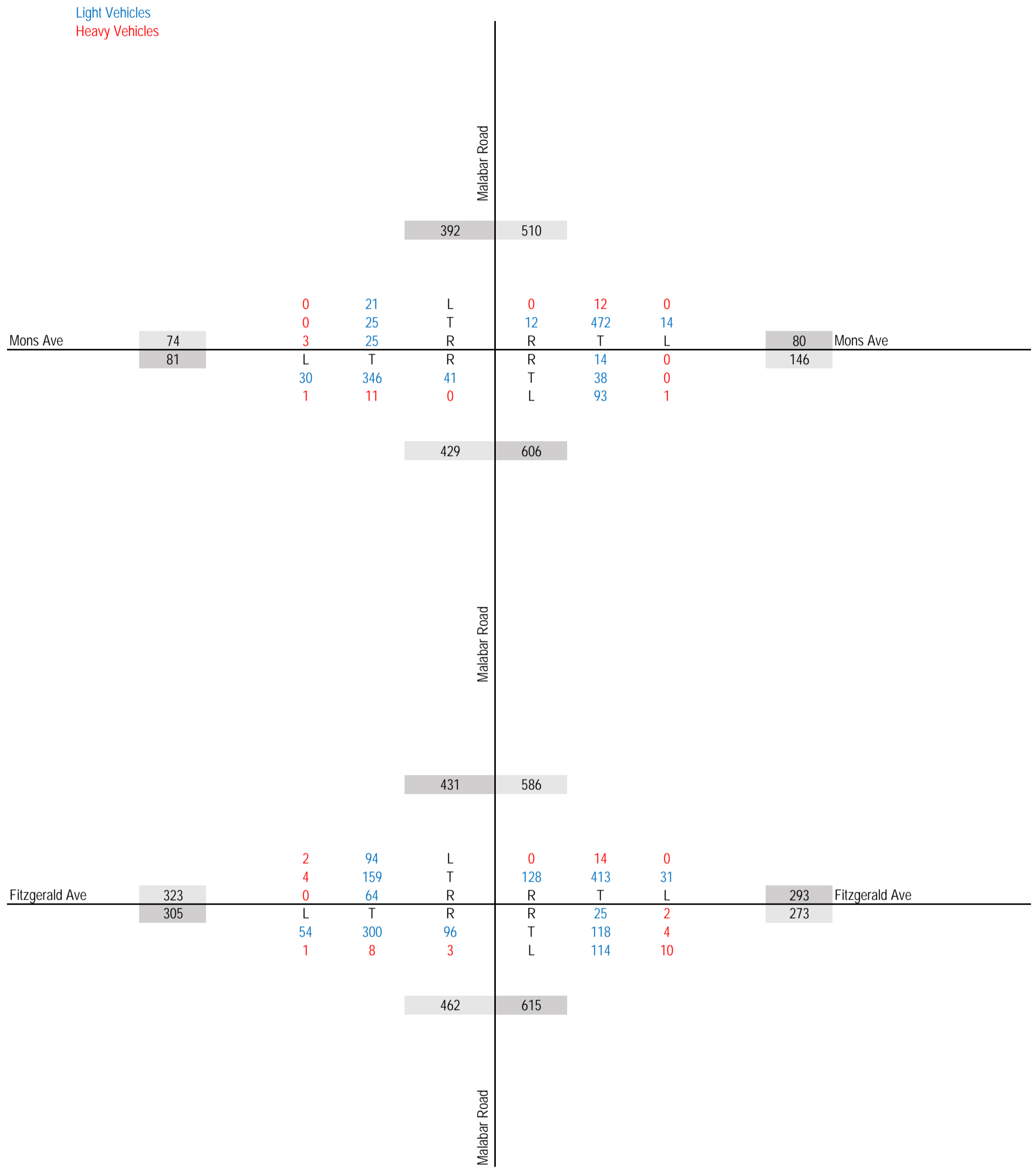
AM Peak Existing Volumes

Intersection 1



PM Peak Existing Volumes

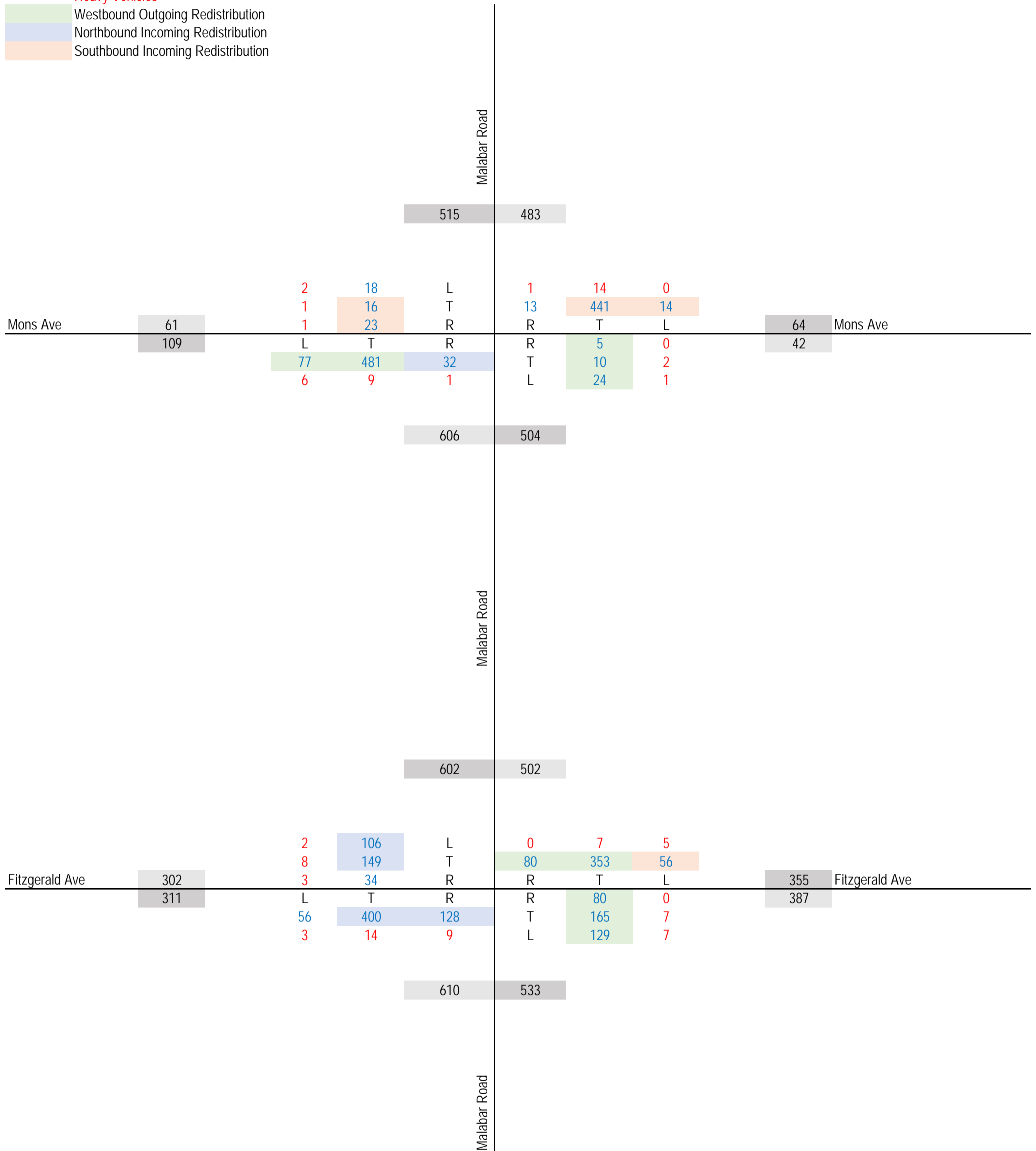
Intersection 1



AM Peak Future Volumes

Intersection 1

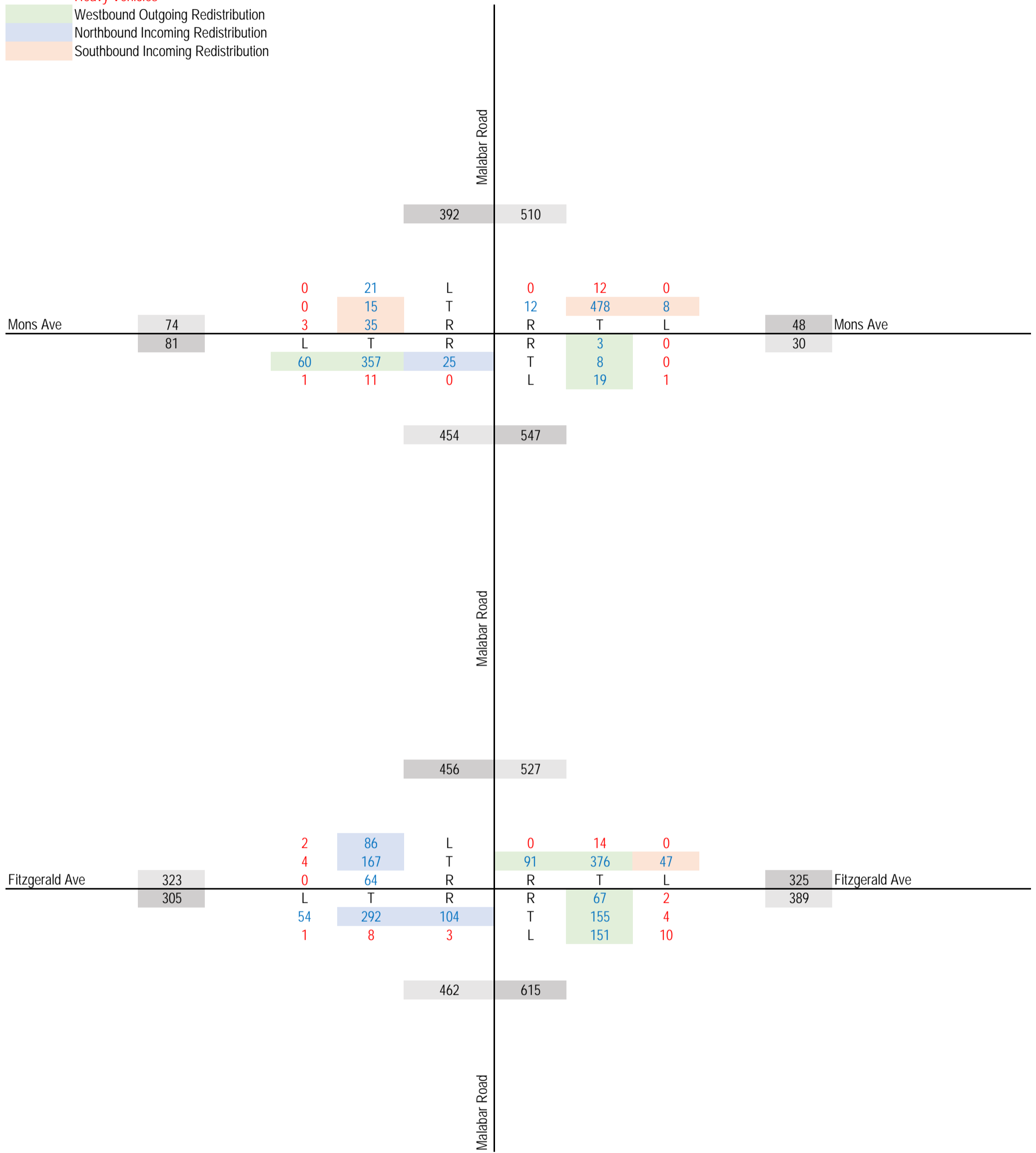
- Light Vehicles
- Heavy Vehicles
- Westbound Outgoing Redistribution
- Northbound Incoming Redistribution
- Southbound Incoming Redistribution



PM Peak Future Volumes

Intersection 1

- Light Vehicles
- Heavy Vehicles
- Westbound Outgoing Redistribution
- Northbound Incoming Redistribution
- Southbound Incoming Redistribution

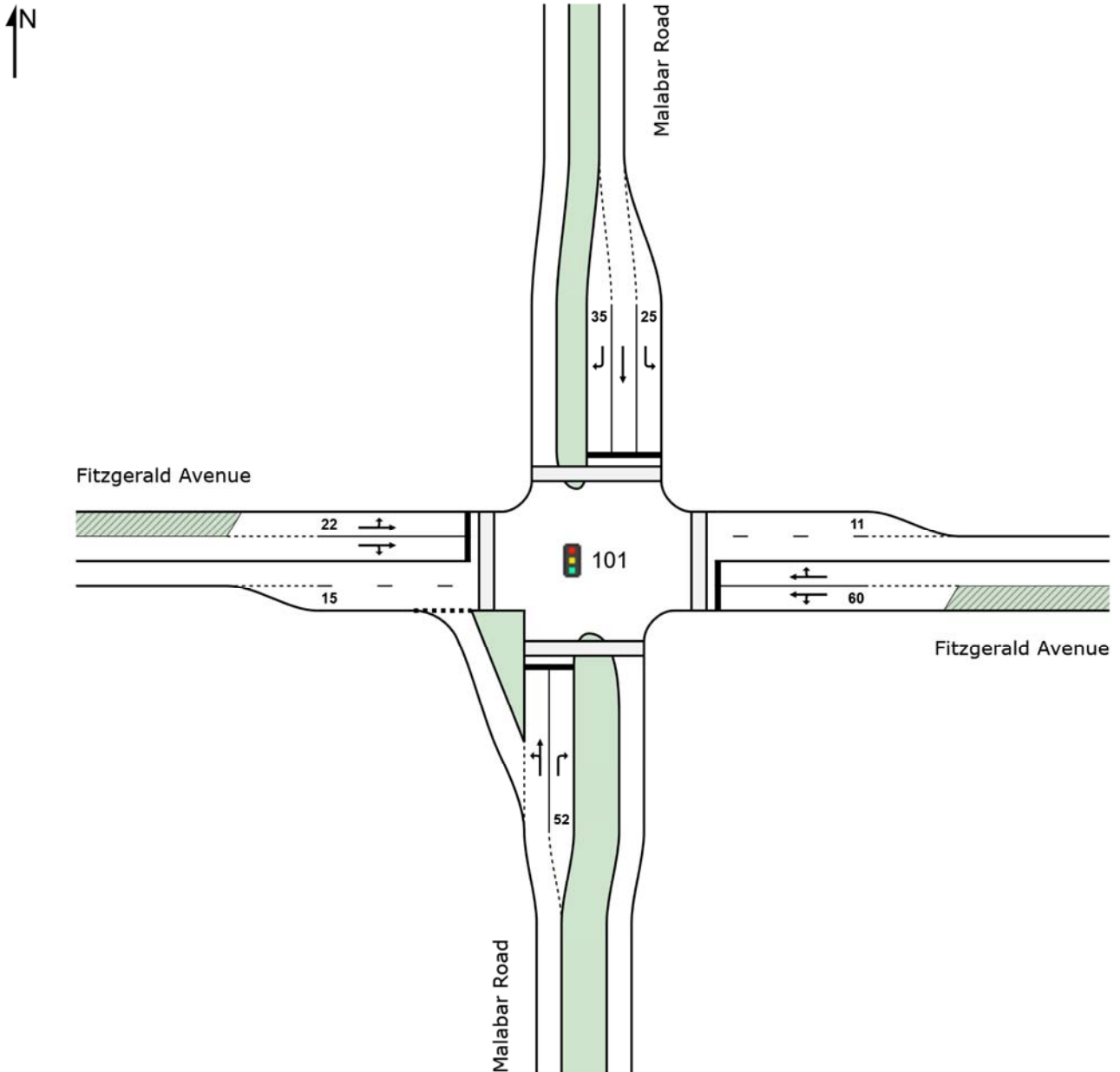


Appendix B: SIDRA Outputs

SITE LAYOUT

 **Site: 101 [AM Case: 101 - Fitzgerald Avenue/Malabar Road]**

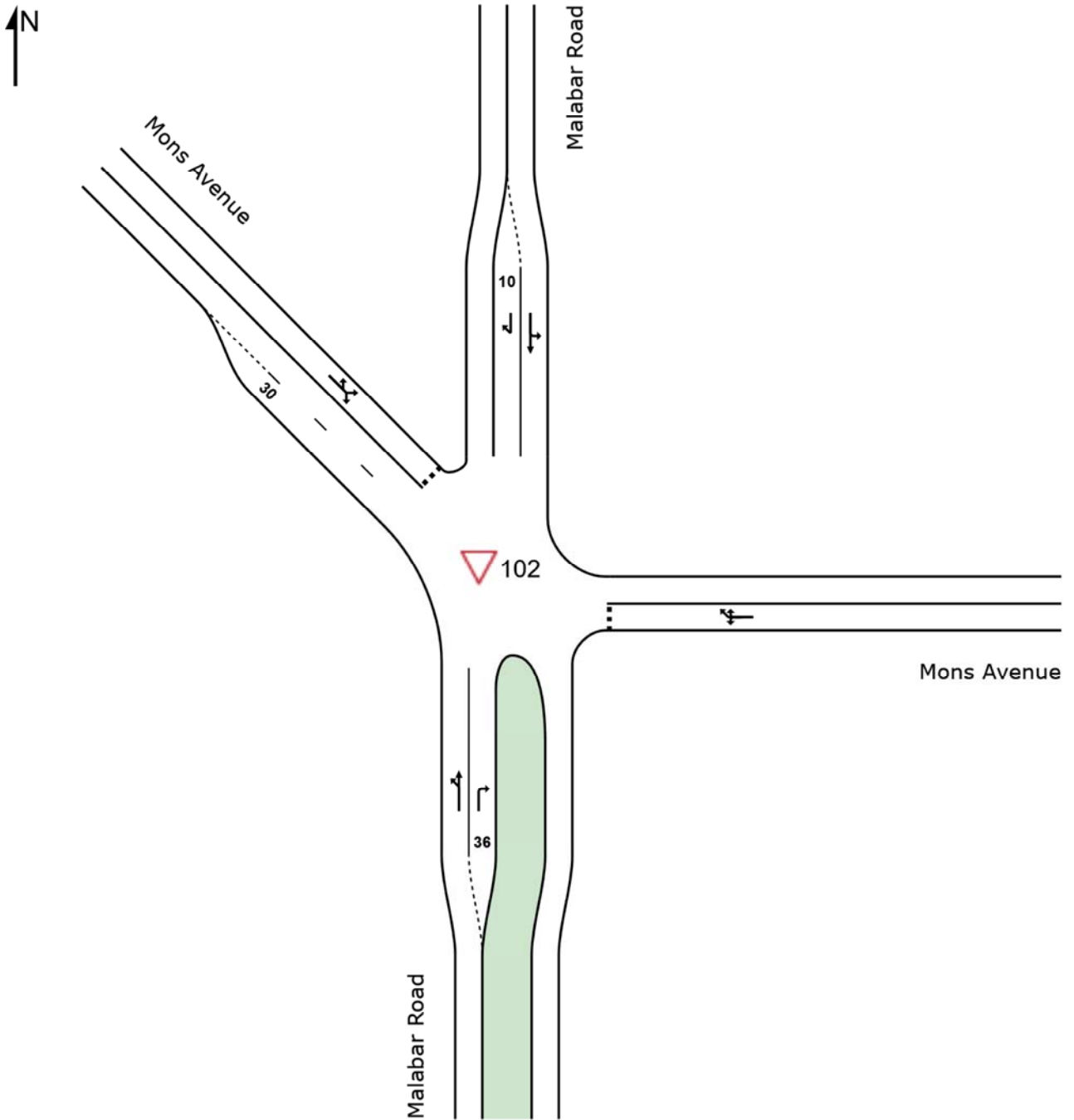
Fitzgerald Avenue/Malabar Road
Site Category: 0800-0900
Signals - Fixed Time Isolated



SITE LAYOUT

▽ Site: 102 [AM Case: 102 - Malabar Road/Mons Avenue]

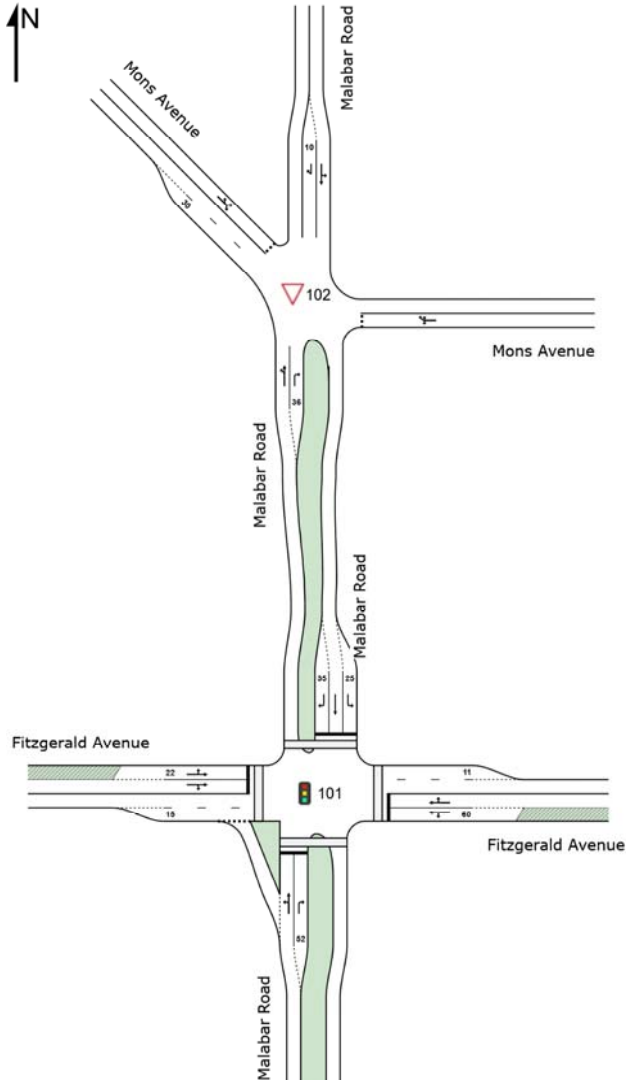
Malabar Road/Mons Avenue
Site Category: 0800-0900
Giveaway / Yield (Two-Way)



NETWORK LAYOUT

Network: N101 [Network1]

New Network
 Network Category: (None)



SITES IN NETWORK		
Site ID	CCG ID	Site Name
101	NA	AM Case: 101 - Fitzgerald Avenue/Malabar Road
102	NA	AM Case: 102 - Malabar Road/Mons Avenue

MOVEMENT SUMMARY

 Site: 101 [AM Case: 101 - Fitzgerald Avenue/Malabar Road]  Network: N101 [Network1]

Fitzgerald Avenue/Malabar Road

Site Category: 0800-0900

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance				km/h
South: Malabar Road														
9	L2	62	5.1	62	5.1	0.712	24.3	LOS B	15.0	108.3	0.90	0.84	1.12	29.4
8	T1	447	3.3	447	3.3	0.712	21.1	LOS B	15.0	108.3	0.90	0.84	1.12	13.2
7	R2	133	7.1	133	7.1	0.317	14.4	LOS A	2.2	16.3	0.79	0.73	0.79	27.9
Approach		642	4.3	642	4.3	0.712	20.0	LOS B	15.0	108.3	0.88	0.82	1.05	19.9
East: Fitzgerald Avenue														
6	L2	93	8.0	93	8.0	0.132	17.8	LOS B	2.0	15.0	0.67	0.68	0.67	26.4
5	T1	131	5.6	131	5.6	0.391	25.5	LOS B	4.5	32.9	0.89	0.73	0.89	29.2
4	R2	20	0.0	20	0.0	0.391	28.8	LOS C	4.5	32.9	0.89	0.73	0.89	19.6
Approach		243	6.1	243	6.1	0.391	22.8	LOS B	4.5	32.9	0.81	0.71	0.81	27.9
North: Malabar Road														
3	L2	43	12.2	43	12.2	0.080	21.8	LOS B	1.0	8.1	0.73	0.68	0.73	24.4
2	T1	429	1.7	429	1.7	0.722	20.0	LOS B	12.3	87.4	0.84	0.78	0.90	19.6
1	R2	135	0.0	135	0.0	0.318	14.7	LOS B	2.2	15.5	0.81	0.74	0.81	31.5
Approach		607	2.1	607	2.1	0.722	18.9	LOS B	12.3	87.4	0.83	0.76	0.87	23.9
West: Fitzgerald Avenue														
12	L2	125	1.7	125	1.7	0.177	18.8	LOS B	2.8	20.1	0.69	0.70	0.69	28.5
11	T1	154	5.5	154	5.5	0.579	27.4	LOS B	6.1	44.7	0.94	0.77	0.94	28.5
10	R2	39	8.1	39	8.1	0.579	30.8	LOS C	6.1	44.7	0.94	0.77	0.94	26.7
Approach		318	4.3	318	4.3	0.579	24.4	LOS B	6.1	44.7	0.84	0.74	0.84	28.3
All Vehicles		1811	3.8	1811	3.8	0.722	20.8	LOS B	15.0	108.3	0.85	0.77	0.92	24.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate		
		ped/h	sec		Pedestrian			Distance	
					ped			m	
P1	South Full Crossing	22	29.3	LOS C	0.0	0.0	0.92	0.92	
P2	East Full Crossing	45	29.3	LOS C	0.1	0.1	0.92	0.92	
P3	North Full Crossing	44	29.3	LOS C	0.1	0.1	0.92	0.92	
P4	West Full Crossing	22	29.3	LOS C	0.0	0.0	0.92	0.92	
All Pedestrians		134	29.3	LOS C			0.92	0.92	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [AM Case: 102 - Malabar Road/Mons Avenue]

Network: N101 [Network1]

Malabar Road/Mons Avenue
 Site Category: 0800-0900
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance				km/h
South: Malabar Road														
9	L1	43	14.6	43	14.6	0.285	3.1	LOS A	0.0	0.0	0.00	0.04	0.00	39.6
8	T1	496	1.9	496	1.9	0.285	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	39.6
7	R2	58	1.8	58	1.8	0.054	5.5	LOS A	0.2	1.3	0.42	0.61	0.42	36.0
Approach		597	2.8	597	2.8	0.285	0.8	NA	0.2	1.3	0.04	0.09	0.04	39.0
East: Mons Avenue														
6	L2	126	0.8	126	0.8	0.688	18.1	LOS B	4.8	33.9	0.82	1.32	1.79	24.7
5	R1	57	3.7	57	3.7	0.688	44.5	LOS D	4.8	33.9	0.82	1.32	1.79	30.8
4	R2	25	0.0	25	0.0	0.688	45.4	LOS D	4.8	33.9	0.82	1.32	1.79	27.4
Approach		208	1.5	208	1.5	0.688	28.6	LOS C	4.8	33.9	0.82	1.32	1.79	27.3
North: Malabar Road														
3	L2	25	0.0	25	0.0	0.259	3.4	LOS A	0.0	0.0	0.00	0.02	0.00	40.1
2	T1	468	3.1	468	3.1	0.259	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	39.6
1	R3	15	7.1	15	7.1	0.014	6.4	LOS A	0.1	0.5	0.52	0.59	0.52	36.0
Approach		508	3.1	508	3.1	0.259	0.4	NA	0.1	0.5	0.02	0.04	0.02	39.3
NorthWest: Mons Avenue														
12	L3	21	10.0	21	10.0	0.414	13.3	LOS A	1.8	13.0	0.84	1.01	1.13	26.8
11	L1	34	3.7	34	3.7	0.414	34.6	LOS C	1.8	13.0	0.84	1.01	1.13	29.7
10	R1	19	5.6	19	5.6	0.414	47.0	LOS D	1.8	13.0	0.84	1.01	1.13	23.8
Approach		74	6.0	74	6.0	0.414	31.7	LOS C	1.8	13.0	0.84	1.01	1.13	27.8
All Vehicles		1387	2.9	1387	2.9	0.688	6.4	NA	4.8	33.9	0.19	0.31	0.35	33.6

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

MOVEMENT SUMMARY

 Site: 101 [PM Case: 101 - Fitzgerald Avenue/Malabar Road]  Network: N101 [Network1]

Fitzgerald Avenue/Malabar Road

Site Category: 1500-1600

Signals - Fixed Time Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance				km/h
South: Malabar Road														
9	L2	58	1.8	58	1.8	0.554	23.4	LOS B	10.8	77.4	0.84	0.76	1.00	29.7
8	T1	324	2.6	324	2.6	0.554	20.2	LOS B	10.8	77.4	0.84	0.76	1.00	13.5
7	R2	104	3.0	104	3.0	0.270	16.1	LOS B	1.9	13.8	0.81	0.73	0.81	27.0
Approach		486	2.6	486	2.6	0.554	19.7	LOS B	10.8	77.4	0.83	0.75	0.96	20.7
East: Fitzgerald Avenue														
6	L2	131	8.1	131	8.1	0.174	17.8	LOS B	3.0	22.2	0.65	0.69	0.65	26.4
5	T1	128	3.3	128	3.3	0.390	26.5	LOS B	5.0	35.9	0.88	0.73	0.88	28.8
4	R2	28	7.4	28	7.4	0.390	29.9	LOS C	5.0	35.9	0.88	0.73	0.88	19.2
Approach		287	5.9	287	5.9	0.390	22.9	LOS B	5.0	35.9	0.78	0.71	0.78	27.3
North: Malabar Road														
3	L2	33	0.0	33	0.0	0.057	23.2	LOS B	0.8	5.9	0.73	0.67	0.73	23.8
2	T1	449	3.3	449	3.3	0.776	24.3	LOS B	14.9	107.3	0.88	0.85	0.99	17.7
1	R2	135	0.0	135	0.0	0.281	14.7	LOS B	2.5	17.7	0.75	0.72	0.75	31.5
Approach		617	2.4	617	2.4	0.776	22.2	LOS B	14.9	107.3	0.84	0.81	0.92	22.3
West: Fitzgerald Avenue														
12	L2	101	2.1	101	2.1	0.139	17.5	LOS B	2.3	16.2	0.64	0.68	0.64	29.1
11	T1	172	2.5	172	2.5	0.693	29.6	LOS C	8.3	59.1	0.94	0.86	1.03	27.8
10	R2	67	0.0	67	0.0	0.693	33.1	LOS C	8.3	59.1	0.94	0.86	1.03	25.9
Approach		340	1.9	340	1.9	0.693	26.7	LOS B	8.3	59.1	0.85	0.80	0.91	27.7
All Vehicles		1731	2.9	1731	2.9	0.776	22.5	LOS B	14.9	107.3	0.83	0.78	0.91	24.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian			
P1	South Full Crossing	22	31.8	LOS D	0.0	0.0	0.92	0.92
P2	East Full Crossing	45	31.8	LOS D	0.1	0.1	0.92	0.92
P3	North Full Crossing	44	31.8	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	22	31.8	LOS D	0.0	0.0	0.92	0.92
All Pedestrians		134	31.8	LOS D			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [PM Case: 102 - Malabar Road/Mons Avenue]

Network: N101 [Network1]

Malabar Road/Mons Avenue
 Site Category: 1500-1600
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Total veh/h	Flows HV % veh/h	Arrival Total HV %	Flows	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Malabar Road														
9	L1	33	3.2	33	3.2	0.216	3.0	LOS A	0.0	0.0	0.00	0.04	0.00	39.6
8	T1	376	3.1	376	3.1	0.216	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	39.6
7	R2	43	0.0	43	0.0	0.041	5.6	LOS A	0.1	1.0	0.43	0.61	0.43	36.0
Approach		452	2.8	452	2.8	0.216	0.8	NA	0.1	1.0	0.04	0.09	0.04	38.9
East: Mons Avenue														
6	L2	99	1.1	99	1.1	0.471	10.2	LOS A	2.2	15.2	0.74	1.01	1.11	29.3
5	R1	40	0.0	40	0.0	0.471	28.5	LOS B	2.2	15.2	0.74	1.01	1.11	34.1
4	R2	15	0.0	15	0.0	0.471	31.7	LOS C	2.2	15.2	0.74	1.01	1.11	31.4
Approach		154	0.7	154	0.7	0.471	17.1	LOS B	2.2	15.2	0.74	1.01	1.11	31.2
North: Malabar Road														
3	L2	15	0.0	15	0.0	0.318	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	40.1
2	T1	509	2.5	509	2.5	0.318	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	39.7
1	R3	13	0.0	13	0.0	0.010	5.6	LOS A	0.0	0.3	0.45	0.54	0.45	36.4
Approach		537	2.4	537	2.4	0.318	0.2	NA	0.0	0.3	0.01	0.03	0.01	39.5
NorthWest: Mons Avenue														
12	L3	22	0.0	22	0.0	0.442	12.5	LOS A	1.9	13.5	0.81	0.99	1.13	27.4
11	L1	31	0.0	31	0.0	0.442	30.2	LOS C	1.9	13.5	0.81	0.99	1.13	30.2
10	R1	29	10.7	29	10.7	0.442	42.0	LOS C	1.9	13.5	0.81	0.99	1.13	24.4
Approach		83	3.8	83	3.8	0.442	29.7	LOS C	1.9	13.5	0.81	0.99	1.13	27.9
All Vehicles		1225	2.4	1225	2.4	0.471	4.5	NA	2.2	15.2	0.17	0.24	0.24	35.0

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

MOVEMENT SUMMARY

 Site: 101 [AM Future: 101 - Fitzgerald Avenue/Malabar Road]

 Network: N101 [Network1]

Fitzgerald Avenue/Malabar Road

Site Category: 0800-0900

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %	Total veh/h	HV %				Vehicles veh	Distance m				
South: Malabar Road														
9	L2	62	5.1	62	5.1	0.691	23.8	LOS B	14.3	103.2	0.89	0.82	1.10	29.6
8	T1	436	3.4	436	3.4	0.691	20.6	LOS B	14.3	103.2	0.89	0.82	1.10	13.4
7	R2	144	6.6	144	6.6	0.323	13.9	LOS A	2.4	17.8	0.77	0.73	0.77	28.3
Approach		642	4.3	642	4.3	0.691	19.4	LOS B	14.3	103.2	0.87	0.80	1.03	20.4
East: Fitzgerald Avenue														
6	L2	143	5.1	143	5.1	0.200	18.3	LOS B	3.2	23.5	0.69	0.70	0.69	26.1
5	T1	181	4.1	181	4.1	0.810	34.9	LOS C	10.0	71.7	1.00	1.03	1.27	26.4
4	R2	84	0.0	84	0.0	0.810	38.2	LOS C	10.0	71.7	1.00	1.03	1.27	16.4
Approach		408	3.6	408	3.6	0.810	29.8	LOS C	10.0	71.7	0.89	0.92	1.07	24.7
North: Malabar Road														
3	L2	64	8.2	64	8.2	0.116	22.0	LOS B	1.6	11.8	0.74	0.69	0.74	24.3
2	T1	379	1.9	379	1.9	0.560	17.9	LOS B	10.0	71.3	0.82	0.70	0.82	20.7
1	R2	84	0.0	84	0.0	0.195	14.2	LOS A	1.3	9.4	0.77	0.71	0.77	31.8
Approach		527	2.4	527	2.4	0.560	17.8	LOS B	10.0	71.3	0.80	0.70	0.80	24.0
West: Fitzgerald Avenue														
12	L2	114	1.9	114	1.9	0.161	18.6	LOS B	2.6	18.2	0.69	0.69	0.69	28.5
11	T1	165	5.1	165	5.1	0.681	30.0	LOS C	6.9	50.4	0.96	0.86	1.06	27.8
10	R2	39	8.1	39	8.1	0.681	33.4	LOS C	6.9	50.4	0.96	0.86	1.06	25.9
Approach		318	4.3	318	4.3	0.681	26.3	LOS B	6.9	50.4	0.86	0.80	0.93	27.8
All Vehicles		1896	3.6	1896	3.6	0.810	22.4	LOS B	14.3	103.2	0.85	0.80	0.96	24.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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		Prop. Queued	Effective Stop Rate
					Pedestrian ped	Distance m		
P1	South Full Crossing	22	29.3	LOS C	0.0	0.0	0.92	0.92
P2	East Full Crossing	45	29.3	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	44	29.3	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	22	29.3	LOS C	0.0	0.0	0.92	0.92
All Pedestrians		134	29.3	LOS C			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [AM Future: 102 - Malabar Road/Mons Avenue]

Network: N101 [Network1]

Malabar Road/Mons Avenue
 Site Category: 0800-0900
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Total veh/h	Flows HV % veh/h	Arrival Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Malabar Road														
9	L1	87	7.2	87	7.2	0.319	3.1	LOS A	0.0	0.0	0.00	0.06	0.00	39.5
8	T1	516	1.8	516	1.8	0.319	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	39.3
7	R2	35	3.0	35	3.0	0.033	5.5	LOS A	0.1	0.8	0.41	0.59	0.41	36.1
Approach		638	2.6	638	2.6	0.319	0.7	NA	0.1	0.8	0.02	0.09	0.02	39.0
East: Mons Avenue														
6	L2	26	4.0	26	4.0	0.178	6.0	LOS A	0.6	4.5	0.74	0.82	0.74	29.1
5	R1	13	16.7	13	16.7	0.178	36.4	LOS C	0.6	4.5	0.74	0.82	0.74	34.0
4	R2	5	0.0	5	0.0	0.178	27.7	LOS B	0.6	4.5	0.74	0.82	0.74	31.3
Approach		44	7.1	44	7.1	0.178	17.3	LOS B	0.6	4.5	0.74	0.82	0.74	31.3
North: Malabar Road														
3	L2	15	0.0	15	0.0	0.260	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	40.1
2	T1	479	3.1	479	3.1	0.260	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	39.7
1	R3	15	7.1	15	7.1	0.015	6.8	LOS A	0.1	0.5	0.55	0.61	0.55	35.8
Approach		508	3.1	508	3.1	0.260	0.3	NA	0.1	0.5	0.02	0.03	0.02	39.4
NorthWest: Mons Avenue														
12	L3	21	10.0	21	10.0	0.354	11.4	LOS A	1.5	10.8	0.83	0.97	1.04	27.9
11	L1	21	5.9	21	5.9	0.354	34.7	LOS C	1.5	10.8	0.83	0.97	1.04	30.7
10	R1	25	4.2	25	4.2	0.354	36.2	LOS C	1.5	10.8	0.83	0.97	1.04	25.0
Approach		68	6.5	68	6.5	0.354	28.0	LOS B	1.5	10.8	0.83	0.97	1.04	28.1
All Vehicles		1258	3.2	1258	3.2	0.354	2.6	NA	1.5	10.8	0.09	0.14	0.10	36.7

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

MOVEMENT SUMMARY

 Site: 101 [PM Future: 101 - Fitzgerald Avenue/Malabar Road]

 Network: N101 [Network1]

Fitzgerald Avenue/Malabar Road

Site Category: 1500-1600

Signals - Fixed Time Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
South: Malabar Road														
9	L2	58	1.8	58	1.8	0.579	25.1	LOS B	11.0	78.6	0.87	0.78	1.04	29.0
8	T1	316	2.7	316	2.7	0.579	21.9	LOS B	11.0	78.6	0.87	0.78	1.04	12.8
7	R2	113	2.8	113	2.8	0.296	17.0	LOS B	2.2	15.9	0.83	0.74	0.83	26.6
Approach		486	2.6	486	2.6	0.579	21.1	LOS B	11.0	78.6	0.86	0.77	0.99	20.1
East: Fitzgerald Avenue														
6	L2	169	6.2	169	6.2	0.210	16.8	LOS B	3.8	27.6	0.64	0.69	0.64	26.9
5	T1	167	2.5	167	2.5	0.634	28.9	LOS C	8.2	59.0	0.95	0.82	0.97	28.0
4	R2	73	2.9	73	2.9	0.634	32.2	LOS C	8.2	59.0	0.95	0.82	0.97	18.2
Approach		409	4.1	409	4.1	0.634	24.5	LOS B	8.2	59.0	0.82	0.77	0.83	26.4
North: Malabar Road														
3	L2	49	0.0	49	0.0	0.095	25.1	LOS B	1.3	9.4	0.77	0.69	0.77	23.0
2	T1	411	3.6	411	3.6	0.717	23.5	LOS B	13.1	94.8	0.89	0.81	0.94	18.0
1	R2	96	0.0	96	0.0	0.211	15.5	LOS B	1.9	13.0	0.76	0.71	0.76	31.2
Approach		556	2.7	556	2.7	0.717	22.2	LOS B	13.1	94.8	0.86	0.78	0.89	21.8
West: Fitzgerald Avenue														
12	L2	93	2.3	93	2.3	0.141	18.2	LOS B	2.3	16.4	0.66	0.67	0.66	28.9
11	T1	180	2.3	180	2.3	0.706	29.4	LOS C	8.5	60.1	0.93	0.86	1.03	27.8
10	R2	67	0.0	67	0.0	0.706	33.5	LOS C	8.5	60.1	0.95	0.87	1.05	25.7
Approach		340	1.9	340	1.9	0.706	27.2	LOS B	8.5	60.1	0.86	0.81	0.93	27.6
All Vehicles		1792	2.8	1792	2.8	0.717	23.4	LOS B	13.1	94.8	0.85	0.78	0.91	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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		Prop. Queued	Effective Stop Rate	
					Pedestrian ped	Distance m			
P1	South Full Crossing	22	31.8	LOS D	0.0	0.0	0.92	0.92	
P2	East Full Crossing	45	31.8	LOS D	0.1	0.1	0.92	0.92	
P3	North Full Crossing	44	31.8	LOS D	0.1	0.1	0.92	0.92	
P4	West Full Crossing	22	31.8	LOS D	0.0	0.0	0.92	0.92	
All Pedestrians		134	31.8	LOS D			0.92	0.92	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [PM Future: 102 - Malabar Road/Mons Avenue]

Network: N101 [Network1]

Malabar Road/Mons Avenue
 Site Category: 1500-1600
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	Distance m			km/h	
South: Malabar Road														
9	L1	64	1.6	64	1.6	0.239	3.0	LOS A	0.0	0.0	0.00	0.06	0.00	39.5
8	T1	387	3.0	387	3.0	0.239	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	39.3
7	R2	26	0.0	26	0.0	0.025	5.6	LOS A	0.1	0.6	0.43	0.59	0.43	36.0
Approach		478	2.6	478	2.6	0.239	0.7	NA	0.1	0.6	0.02	0.09	0.02	39.0
East: Mons Avenue														
6	L2	21	5.0	21	5.0	0.094	6.3	LOS A	0.3	2.3	0.67	0.77	0.67	31.7
5	R1	8	0.0	8	0.0	0.094	22.4	LOS B	0.3	2.3	0.67	0.77	0.67	35.8
4	R2	3	0.0	3	0.0	0.094	23.6	LOS B	0.3	2.3	0.67	0.77	0.67	33.5
Approach		33	3.2	33	3.2	0.094	12.1	LOS A	0.3	2.3	0.67	0.77	0.67	33.4
North: Malabar Road														
3	L2	8	0.0	8	0.0	0.282	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	40.2
2	T1	516	2.4	516	2.4	0.282	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	39.8
1	R3	13	0.0	13	0.0	0.010	5.8	LOS A	0.1	0.4	0.47	0.55	0.47	36.3
Approach		537	2.4	537	2.4	0.282	0.2	NA	0.1	0.4	0.01	0.02	0.01	39.6
NorthWest: Mons Avenue														
12	L3	22	0.0	22	0.0	0.374	10.0	LOS A	1.6	11.6	0.79	0.94	1.02	28.9
11	L1	19	0.0	19	0.0	0.374	27.8	LOS B	1.6	11.6	0.79	0.94	1.02	31.5
10	R1	40	7.9	40	7.9	0.374	31.9	LOS C	1.6	11.6	0.79	0.94	1.02	26.0
Approach		81	3.9	81	3.9	0.374	25.0	LOS B	1.6	11.6	0.79	0.94	1.02	28.5
All Vehicles		1128	2.6	1128	2.6	0.374	2.5	NA	1.6	11.6	0.09	0.14	0.11	36.7

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