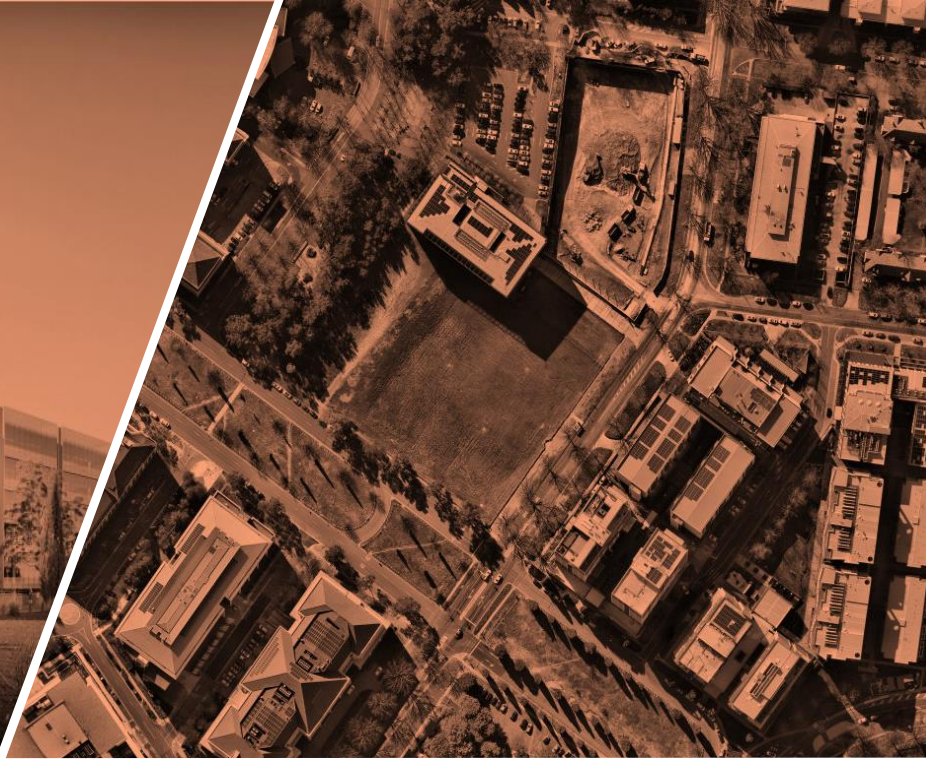

PROPOSED COMMERCIAL DEVELOPMENT
15 SYDNEY AVENUE, BARTON

TRAFFIC AND PARKING ASSESSMENT REPORT

PROPOSED COMMERCIAL DEVELOPMENT 15 SYDNEY AVENUE, BARTON
Client: **Block Constructions (ACT) Pty Ltd**
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MELBOURNE Level 3, 51 Queen Street, Melbourne VIC 3000
+61 3 9020 4225

SYDNEY Suite 303/61 Marlborough Street, Surry Hills NSW 2010
+61 2 9068 7995

HOBART Level 4, 116 Bathurst Street, Hobart TAS 7000
+61 400 535 634

CANBERRA 45 West Row, Canberra ACT 2601
+61 2 9068 7995

www.salt3.com.au

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1 INTRODUCTION

SALT has been engaged by Bloc Constructions Pty Ltd to undertake a Traffic and Parking Assessment of the proposed commercial development to be located at 15 Sydney Avenue in Barton.

In the course of undertaking this assessment;

- A desktop inspection of the subject site has been undertaken;
- Preliminary advice has been provided to the project team;
- The adjacent intersection and site access point have been analysed using SIDRA Intersection v9;
- Swept path analysis of the access and parking has been undertaken;
- The traffic and parking implications of the proposal have been assessed.

The following sets out SALT's findings with respect to the traffic engineering matters of the proposal.

2 EXISTING CONDITIONS

2.1 SITE DESCRIPTION

The subject site is located at 15 Sydney Avenue in Barton, on Block 3, Section 22. It is situated on the northern corner of the intersection of Sydney Avenue and National Circuit in Barton. It is rectangular in shape, with a total site area of 11,573m^2. Windsor Walk runs along the north-western boundary of the site, providing an active transport connection toward the north of the site.

The site lies to the south-west of Parliament and the Capital Hill. It is located within close proximity to numerous facilities including the Realm Precinct, hotels, cafes, restaurants, Wesley Music Centre, schools and childcare centres.

Figure 1 depicts the location of the subject site with respect to the surround road network and land uses. An aerial view of the subject site can be seen in **Figure 2**.

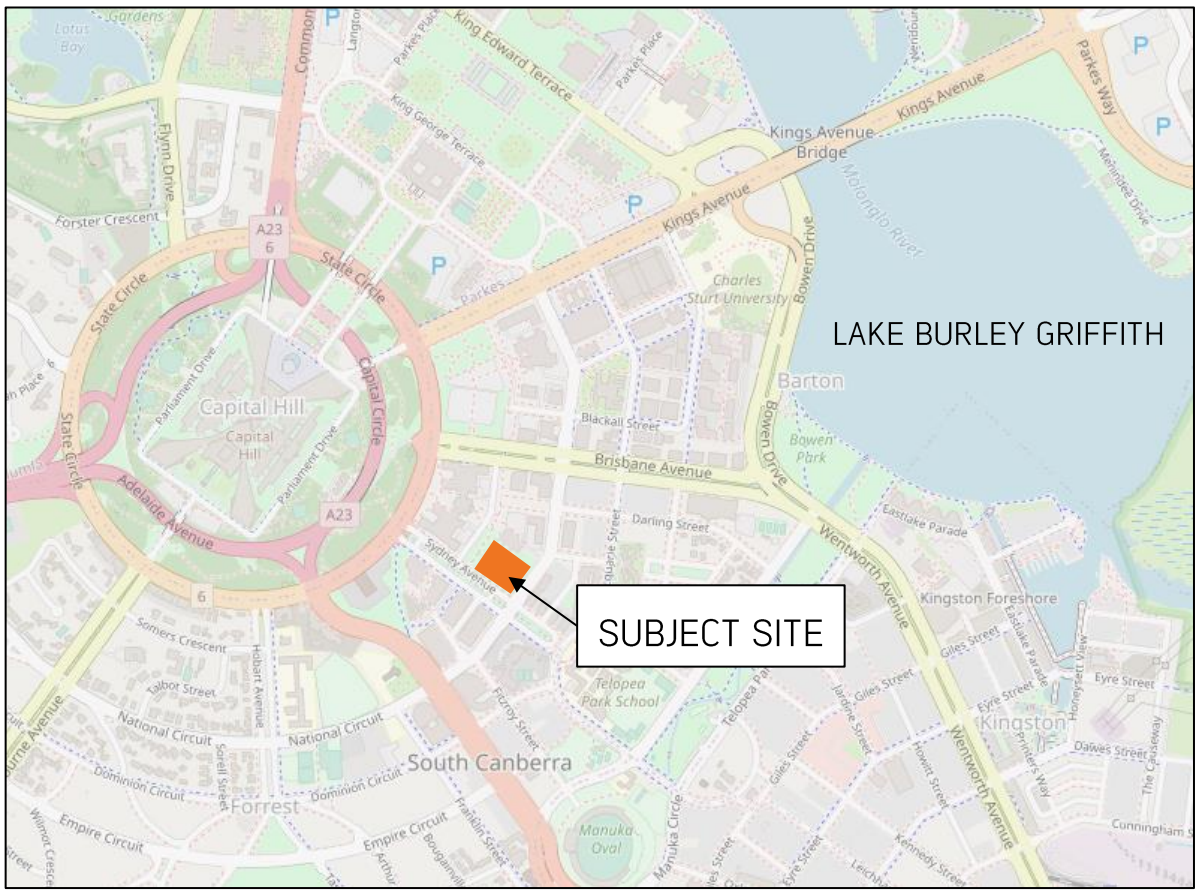


Figure 1 Subject site locality

Figure 2 Aerial view of subject site

2.2 PLANNING CONSIDERATIONS

2.2.1 NATIONAL CAPITAL PLAN

The subject site is classified as a Designated Area (DES) and is under the responsibility of the National Capital Authority. It is subject to the specifications and requirements outlined in the National Capital Plan, within which is falls under the Barton Precinct Code.

2.2.2 BARTON PRECINCT CODE

Barton is considered a prestigious office location, characterised by large buildings in a generous landscape setting. It is home to many key government agencies including the Department of Foreign Affairs and Trade, Australian Federal Police and Australian National Audit Office.

Objectives for the Barton Precinct include:

- Ensure the highest standards of architecture for all buildings in the precinct;
- Ensure that individual buildings contribute to the coherent definition of streets, blocks and public spaces intended for the Precinct;
- Create a legible network of paths and streets and enhance connectivity and accessibility to the Lake;
- Encourage a mix of land uses which contribute to the vibrancy, amenity and convenience of the Barton Precinct as an attractive place in which to work and live;
- Ensure new development meets leading practice for environmental sustainability including energy efficiency and waster sensitive urban design measures;
- Ensure development recognises and complements the precinct character; as a major employment centre and area of national importance; and
- Recognise and reinforce the difference streetscapes associated with Kings, Brisbane and Sydney Avenues, and State Circle.

The Barton Precinct is subject to specific planning, design and development conditions. The following details the requirements relevant from a traffic engineering perspective:

Pedestrian and bicycle movement

- Windsor Walk will be constructed and landscaped to form the main pedestrian spine through the Barton Precinct;
- Cycle ways and pedestrian paths will be provided to enable safe and convenient movement and should connect to major peripheral paths;
- Pedestrian safety and visual amenity should be secured through traffic calming and appropriate streetscape design;
- New development should provide a positive address to pedestrian areas, to provide visual interest, activity and passive surveillance; and
- Opportunities for linking the pedestrian networks of the Barton Precinct with the surrounding areas such as the trail system in the peripheral parklands of Parliament House should be addressed by new developments.

Sustainable development

- Promote environmentally sustainable development including increased pedestrian and cycle accessibility and public transport use while reducing dependency on private vehicles.

2.2.3 YORK PARK AREA

Within the Barton Precinct, the subject site lies within a prominent area known as York Park. York Park is the considered to include all of the area between National Circuit, Canberra Avenue, State Circle and Kings Avenue. Objectives for the York Park area include:

- The York Park area should be developed primarily as a prestigious office area and landscape setting to satisfy demand for office accommodation requiring proximity to Parliament House;
- The landscape design of streets, pedestrian paths and open spaces of York Park should consist of a range of formal and informal spaces that reinforce the Griffin geometry and contribute to the landscape setting of Parliament House;
- The public domain of York Park should provide for places for local recreation with a high level of pedestrian amenity;
- Individual buildings should contribute to the coherent definition of streets, blocks and public spaces, form the public domain of the precinct, and contribute to the public domain's active pedestrian qualities;
- Greater use of public transport should be encouraged, particularly for the journey to work. As should less, or more efficient, use of private transport; and
- Safe and convenient movement systems for pedestrians and cyclists should be provided within the precinct.

The York Area is subject to specific planning, design and development conditions. The following details the requirements relevant from a traffic engineering perspective:

Car parking

- Surface car parks are inappropriate as foreground to the views from Parliament House, and, to the extent they are permitted on a temporary basis, they are to be carefully screened with landscaping;
- Basement car parks should be constructed below finished ground level and concealed from public streets and pedestrian areas;
- Parking policies for the York Park area are designed to encourage greater use of public transport for the journey to work;
- An overall reduction in the total long-term car parking provision is proposed. This will be achieved by initially limiting the amount of on-site parking permitted in new developments; and
- On-site car parking should be provided at a rate of 1 space per 100m^2 of gross floor area for new offices approved in the York Park area. A higher on-site and/or off-site provision may be required by the National Capital Authority in specific cases, after taking into account the relationship between on-site parking, off-site parking opportunities and the capacity of public transport in the area.

Building articulation and entries

- Drop-off points will be considered within front setback zones;
- Services and service entries should be concealed from Main Avenues and pedestrian pathways; and

- The number of vehicle crossings should be kept to a minimum, to enhance the amenity and safety of pedestrian paths.

Open space

- Windsor Walk is to serve as a central linear park and continuous pedestrian spine connecting public car parks, office destinations, the proposed retail plaza and a variety of landscaped recreation areas.

The location of the subject site within the Barton and York Park precincts is shown **Figure 3**.

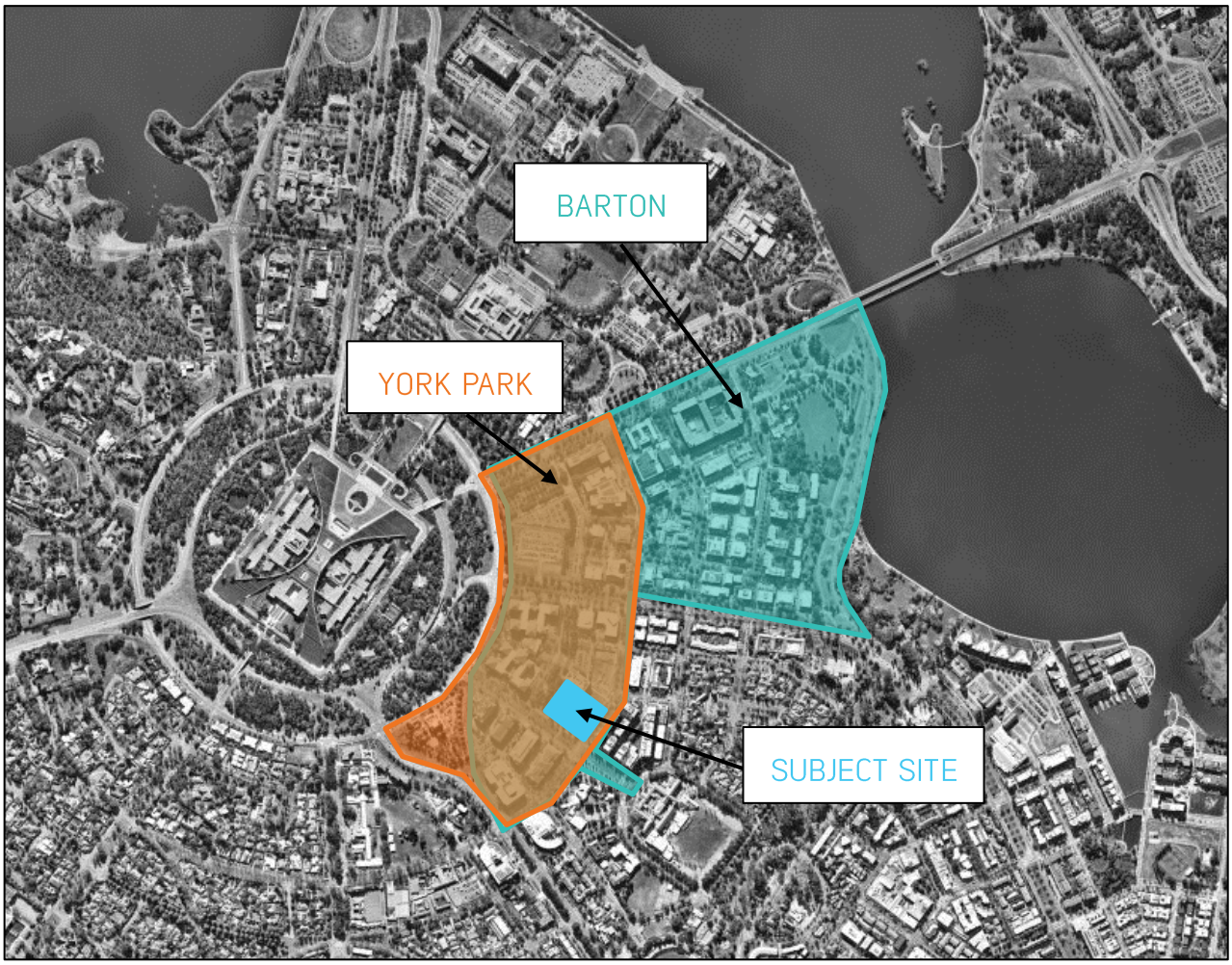


Figure 3 Planning precincts

2.3 ROAD NETWORK

2.3.1 SYDNEY AVENUE

Sydney Avenue runs in a southeast–northwest alignment from State Circuit to its termination. It provides two traffic lanes in each direction separated by a 30m wide median.

On–street parking is permitted along some sections of Sydney Avenue, most of which is limited to 2–hour parking. There is also a taxi zone at the site frontage on Sydney Avenue and a 15–minute parking zone at the frontage of the Department of Foreign Affairs and Trade, near State Circuit.

In the vicinity of the site, the speed limit is 40km/hr on Sydney Avenue.

2.3.2 NATIONAL CIRCUIT

National Circuit runs in a northeast–southwest alignment from Adelaide Avenue to Kings Avenue. In the vicinity of the site, it provides one traffic lane in each direction. A posted speed limit of 60km/hr applies. On–street parking is not permitted on either side of National Circuit in the vicinity of the site.

2.4 SUSTAINABLE TRANSPORT

2.4.1 PUBLIC TRANSPORT

The subject site is accessible by public transport with a bus stop located at the site frontage on National Circuit, and Barton Bus Station located in close proximity to the site. The bus routes operating in the vicinity of the subject site are summarised in **Table 1** and shown in **Figure 4**.

Table 1 Bus route summary

Bus Route Number	Bus Route Description	Nearest Bus Stop	Distance to Bus Stop
59	Woden Interchange to City West Alinga St	National Cct before Sydney Ave	0m (at site frontage)
830	Canberra City Centre to Queanbeyan Interchange via Russel and Kingston	National Cct before Sydney Ave	0m (at site frontage)
842	Yass to Canberra City Centre via Woden Interchange and Canberra Hospital	National Cct before Sydney Ave	0m (at site frontage)
2	Fraser West Terminus Shakespeare Cr to City Interchange	Barton Station	800m (10-minute walk)
6	Woden Interchange to City West Alinga St	Barton Station	800m (10-minute walk)
56	Fyshwick Park & Ride Iron Knob St to City Interchange	Barton Station	800m (10-minute walk)
182	Lanyon Marketplace Box Hill Ave to City West Alinga Street	Barton Station	800m (10-minute walk)

Figure 4 Bus routes map

2.4.2 WALKING

The subject site has good walking facilities in place with pedestrian footpaths provided on each road frontage and surrounding streets. Windsor Walk runs along the western frontage on the site, providing pedestrian access separated from the road network. This runs between Sydney Avenue and Brisbane Avenue.

The adjacent intersection of Sydney Avenue and National Circuit is signalised with pedestrian crossings on all legs, providing safe crossing opportunities in close proximity to the subject site.

The subject site achieves a Walk Score of 71 out of a possible 100 indicating that it is *'very walkable'* and *'most errands can be accomplished on foot'*. The site is within convenient walking distance to numerous destinations including various commercial premises, schools, hotels and cafes/restaurants.

Figure 5 displays the area accessible by a 20-minute walk of the site

Figure 5 20-minute walking catchment

2.4.3 CYCLING

The subject site is accessibly by cycling via Windsor Walk which provides an off-road shared path adjacent to the site. On-road bike lanes are provided nearby on Capital Circle. An off-road path is also located to the east of the site at Telopea Park.

Figure 6 shows the area accessible by a 20-minute cycle from the site.

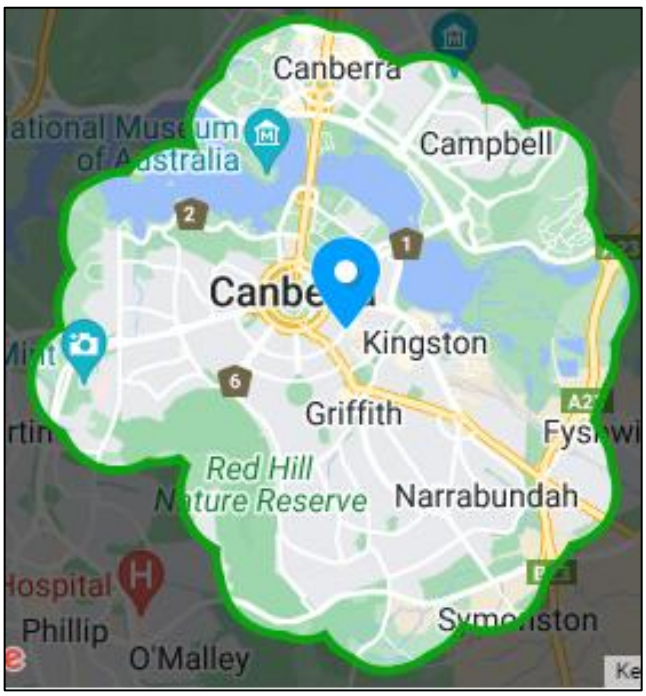


Figure 6 20-minute cycling catchment

2.5 TRAFFIC VOLUMES

The existing traffic volumes in the vicinity of the site have been determined by analysis of the SCATS data at the adjacent intersection of Sydney Avenue and National Highway. The data was collated for the week of 20 June 2022 to 26 June 2022, which represents a typical week during the school term, with no public holidays and with no COVID-19 government restrictions in place.

The data was analysed to find that Thursday 23 June 2022 had the highest level of traffic activity of that week. The AM peak hour was found to occur between 8:30am–9:30am and the PM peak hour was found to occur between 5:00pm–6:00pm.

The traffic movements that occurred during these peak hours on Thursday 23 June 2022 are shown diagrammatically in **Figure 7**.

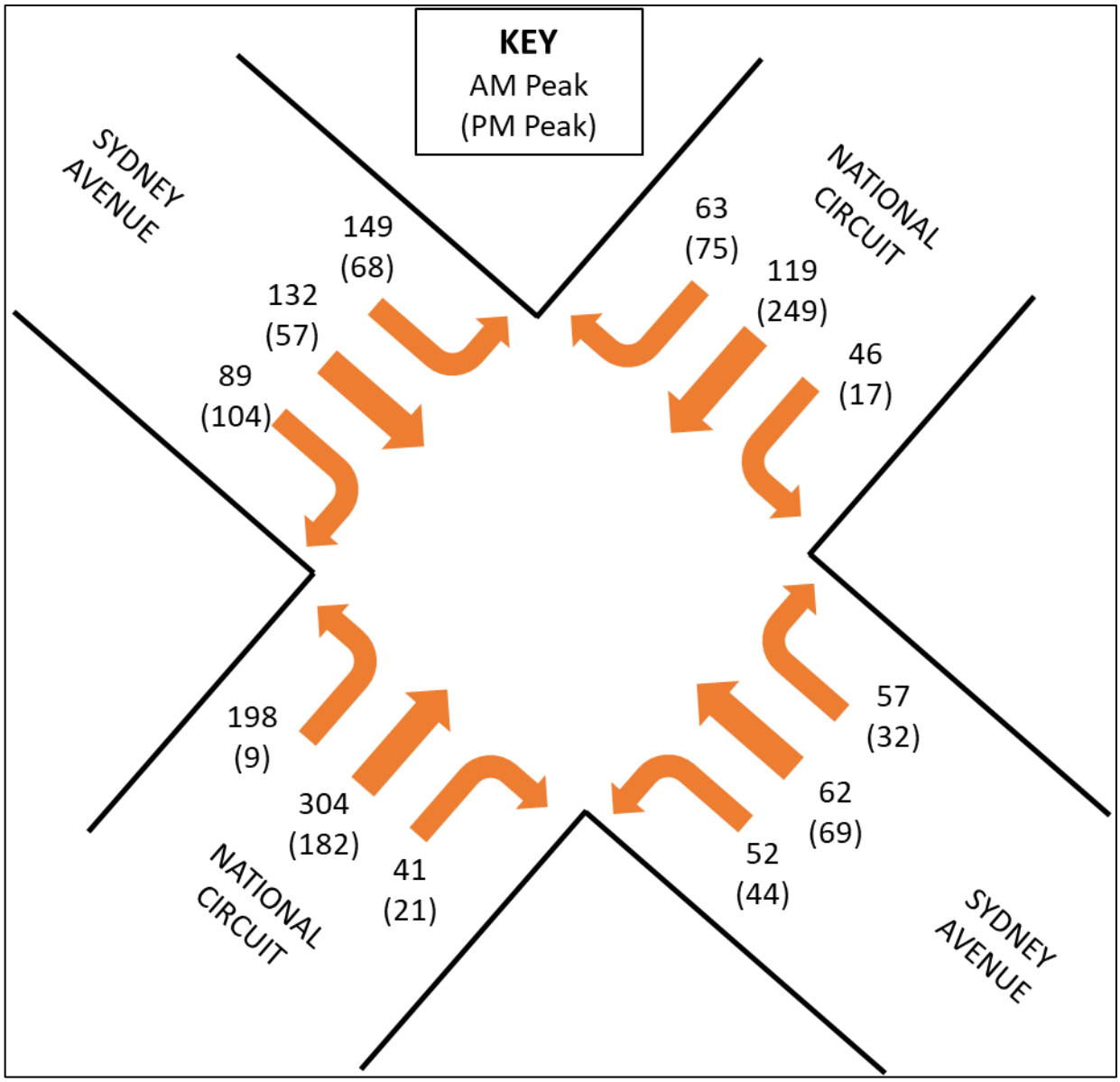


Figure 7 Traffic volumes at intersection

The resulting through traffic volumes along each of the site frontages and access points can be estimated as shown in **Figure 8**.

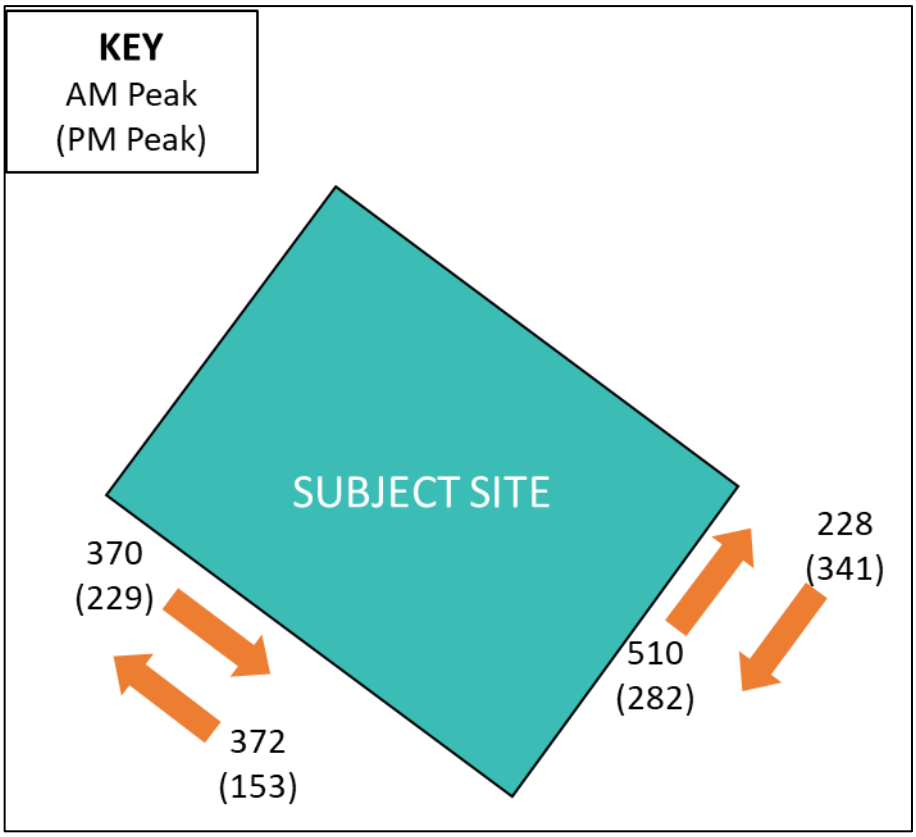


Figure 8 Traffic volumes at site access points

3 PROPOSAL

The proposal involves the development of a five-storey office building with a ground floor café. The building has a total gross floor area of 37,473m^2 including the café and storage areas. The proposed office spaces have a total gross floor area of 36,331m^2 over all levels.

Car parking is to be provided on-site over two basement levels, with a total of 356 parking spaces proposed including six (6) accessible parking spaces. The car park is to be secured by boom gates on entry and exit to each parking level.

Furthermore, on-street parking facilities are proposed to be provided at the site frontage on Sydney Avenue. This is to include one (1) accessible space, two (2) loading spaces and one (1) 5-minute drop-off space. The adjacent 2-hour parking and taxi-zones are to be retained.

Bicycle parking and end of trip facilities are proposed on ground floor and within basement level 1, with a total of 268 bicycle parking spaces to be provided. These are provided with a separate entrance from Windsor Walk.

Vehicle access is to occur from a new 7.2m wide crossover to National Circuit. This is to provide two-way access to the basement car park and on-site loading and waste collection facilities. Basement level 1 is to provide loading and waste collection facilities.

The main building entrance is to be located at the Sydney Avenue site frontage. The café will be provided with an additional access point from Windsor Walk.

4 CAR PARKING

4.1 CAR PARKING REQUIREMENTS

The proposal is subject to car parking requirements specific to the York Park area of the Barton Precinct Code in the National Capital Plan. This specifies that on-site car parking should be provided at a rate of 1 space per 100m^2 of gross floor area for new offices approved in the York Park area.

The proposed office building, with a total gross floor area of 37,473m^2 should provide a total of 370 parking spaces.

Furthermore, the Building Code of Australia specifies the rate of accessible parking to be provided to various building types. The proposal falls under a Class 5 building which required accessible parking to be provided at a rate of 1 DDA space per 100 car parking spaces or part thereof. With a total of 360 parking spaces, four (4) DDA spaces are required.

4.2 ADEQUACY OF CAR PARKING PROVISIONS

The proposal involves 356 car parking spaces over the two basement levels plus an additional 4 spaces on Sydney Avenue, thus a total of 360 parking spaces are proposed. This does not quite meet the required 370 spaces, at a shortfall of 10 parking spaces.

The Bicycle Parking General Code specifies that office land uses have an allowance for a reduction of car parking requirements. This allows a development with a provision of bicycle parking above the minimum required number to reduce the provision of car parking spaces by one space for each additional Class 1 or 2 bicycle parking space, up to a maximum 5% of the total number of car parking spaces.

A total of 268 bicycle parking spaces are proposed to be provided, well above the required 185 spaces (total employee and visitor bicycle parking requirements), as to be discussed in Section 5. Therefore, there is a proposed excess of 83 bicycle parking spaces which can reduce the number of parking spaces required up to 5% of the 370 spaces, equal to 18 spaces.

Therefore, the car parking requirement is reduced to 352 spaces when taking into account the proposed bicycle parking provisions. This is exceeded by the proposed provision of 360 parking spaces.

Furthermore, a variety of alternative parking options are available in the vicinity of the site including along Sydney Avenue and the public car park adjacent to the site at 21 National Circuit. These could assist to cater for the slight shortfall in parking.

The proposal includes a total of seven (7) accessible spaces in the basement and on Sydney Avenue. This exceeds the required four (4) accessible spaces as per the Building Code of Australia.

Therefore, the proposed parking provisions are deemed appropriate for the proposed land use and location.

5 BICYCLE PARKING

5.1 BICYCLE PARKING REQUIREMENTS

The Bicycle Parking General Code specifies the rate of bicycle parking to be provided for various land uses. For an office building, the bicycle parking requirements are summarised in **Table 2**.

Table 2 Bicycle parking requirements

Land Use	Area	Bicycle Parking Rate	Number of Spaces Required
Office	37,473m^2 (GFA)	For employees: 1 per 250m^2 GFA after the first 250m^2 GFA	149 spaces (class 1 or 2)
		For visitors: 1 per 950m^2 GFA after the first 400m^2 GFA	39 spaces (class 3)

Therefore, the proposal results in a requirement to provide 149 employee bicycle parking spaces. These are to take the form of class 1 or 2 bicycle parking facilities which include bicycle lockers or bicycle enclosures. 39 visitor bicycle parking spaces are required which can be class 3 bicycle rails.

5.2 ADEQUACY OF BICYCLE PARKING REQUIREMENTS

The proposal includes secure bicycle parking at ground level and within the basement level 1. A total of 268 bicycle parking spaces are proposed, with 22 at ground level and 123 at basement level. This exceeds the total bicycle requirements as per the Bicycle Parking General Code.

6 DESIGN CONSIDERATIONS

6.1 ACCESS ARRANGEMENTS

Th main vehicle access point is a new 7.2m wide crossover to National Circuit, located towards the north-eastern corner of the site. This meets the requirements of Australian Standard AS2890.1 for a car park of this size and nature. The crossover adequately allows simultaneously passing of an Australian Standard B85 and B99 vehicle, and for the loading and waste collection vehicles as can be seen by swept path diagrams provided in **APPENDIX 1**.

The proposed location of site access from National Circuit is currently provided with line marking along the frontage which may misinform drivers that they cannot turn right out of or into the site, as can be seen in **Figure 9**. It is recommended that this line marking is removed, or a break be added at the access point, similar to the adjacent crossover.

Furthermore, the existing bus stop on National Circuit is proposed to be shifted to the south slightly as it is currently in very close proximity to the proposed site access point. It is to be moved to the adjacent gap between the existing trees, and no tree removal is necessary. This has the added benefit of shifting the bus stop away from the opposite Realm Hotel crossover, allowing drivers to more easily and safely exit the hotel, should a bus be present.

Figure 9 Site access line marking requires modification – design drawing to be prepared

Sufficient sight triangles are proposed to be provided at the exit side of the crossover to allow exiting vehicles to view pedestrians on the footpaths on National Circuit. The plans show no obstacles within the triangle 2.5m along the exit lane of the accessway and 2.0m along the property boundary. Any landscaping in this area is to be kept to a low level, below 900mm.

Internal accessways are wide enough to allow vehicles to pass simultaneously. This is shown in the swept path diagrams provided in **APPENDIX 1.**

6.2 PARKING LAYOUT

6.2.1 CAR PARKING SPACES

All car parking spaces are proposed to be 2.4m wide and 5.4m long and accessed from a minimum 6.0m wide aisle. These dimensions meet the requirements of Australian Standard AS2890.1 for long-term employee parking as intended for the proposed car park.

DDA parking is proposed to also be 2.4m wide and 5.4m long, with shared spaces of the same dimensions. This complies with the requirements of Australian Standard AS2890.6.

The columns have been positioned such that the required clearances have been provided to all parking spaces to allow access and door opening. Columns are situated to provide a 300mm clearance to each side of the parking spaces.

Parking spaces located at dead-end aisle are to be provided with an additional aisle length of minimum 1.0m, allowing sufficient spaces for vehicles to enter and exit these spaces.

Swept path diagrams of some key parking spaces are provided in **APPENDIX 1.**

6.2.2 BICYCLE PARKING

Bicycle parking spaces are provided with a spatial envelope 700mm wide and 1.2m long and are accessed by a minimum 1.5m wide aisle. This meets the requirements of Australian Standard AS2890.3 and facilitates convenient and efficient access for cyclists.

6.3 LOADING AND WASTE COLLECTION

Loading and waste collection facilities are proposed to be located within basement level 1, at the bottom of the ramp and before the secure access to the car parking area. This provides three loading bays, one for a small-medium sized loading or waste collection vehicle and two for service vans.

The waste collection and loading vehicles can adequately enter the site, traverse the ramp and reverse from the aisle into the loading dock area. It can then access the ramp and exit the site in a forward's direction. This is shown in the swept path diagrams in **APPENDIX 1.**

Waste collection is anticipated to occur outside of the AM and PM peak hours, when access to and from the car park will be minimal. Therefore, the movements of the waste collection vehicle should not cause major adverse delays to vehicles entering or exiting the car park.

6.4 RAMP GRADES

With the loading and waste collection facilities located within basement 1, the ramp from ground level to basement 1 is required to meet the ramp grade and transition requirements for service and waste collection vehicles. The ramp from ground level to Basement 1 is proposed to comprise of;

- 7.6m flat at ground level;
- 7.0m at 1:20;
- 7.0m at 1:9;
- 15.6m at 1:6.5;
- 7.0m at 1:8;
- 7.0m at 1:16
- 24+ m flat at Basement 1.

These ramps grades meet the requirements of Australian Standard AS2890.2 to accommodate the expected service vehicle, with adequate transitions proposed to prevent vehicle scraping and bottoming.

The ramp between Basement 1 and Basement 2 provides access for staff cars, including DDA parking. For a straight ramp up to 20m long of a private car park, the ramp grade must not exceed 1:4 (25%) and transitions of 2.0m long are to be provided where the change in grade exceeds 12.5% for a summit grade change, or 15% for a sag grade change.

The proposed ramp has a maximum grade of 1:5 and is provided with 2m long transitions at 1:8 at either end. This complies with the relevant requirements of AS2890.1.

6.5 HEADROOM

Basement 1 is shown to have a height of 3.5m and Basement 2 is to have a height of 3.0m. These exceed the requirements of Australian Standard AS2890.1 which specifies a required headroom of 2.2m for cars and light vans.

The area to be traversed by the loading vehicles is to be provided with a head clearance of 4.2m. This will adequately allow access for the expected service vehicle.

6.6 SECURITY

The car park is to be secure with roller doors provided upon entrance to each basement level and to the loading dock.

The area between the base of the ramp and the roller door to basement level 1 has capacity for 4 vehicles to queue on arrival. By assessment of the operation if this facility, there is a very minimal chance that more than 4 vehicles would be required to queue, at only 0.1% probability.

On exit of the basement, there is sufficient space for 3 vehicles to queue in the flat section before the roller door to the ramp to ground level. There is only a 0.4% probability that more than 3 vehicles would be required to queue when exiting the site.

The internal accessways are wide enough to allow vehicles to pass such that any queuing occurring will not block the accessway for those travelling in the other direction.

6.7 BUS STOP RELOCATION

There is an existing bus stop on National Circuit in close proximity to the proposed crossover location. As a result, it is proposed to relocate the bus stop, shifted slightly to the south to the adjacent gap between the existing trees. The proposed new location of the bus stop maintains a distance of 52m between it and the intersection of National Circuit and Sydney Avenue. The existing and proposed location is shown in **Figure 10**.

This moves the bus stop closer to the existing bus stop on the eastern side of the road (National Circuit after Bourke Street). Its proposed location maintains approximately 25m between it and the opposite bus stop. The carriageway is wide enough to allow vehicles to overtake a stopped bus.

In the rare occasion that buses were stopped on both sides of the road, opposite each other, this has the potential to delay through traffic. This is anticipated to occur very infrequently so poses a low risk. By review of the bus timetables, the buses are never scheduled to arrive at the two bus stops at the same time.

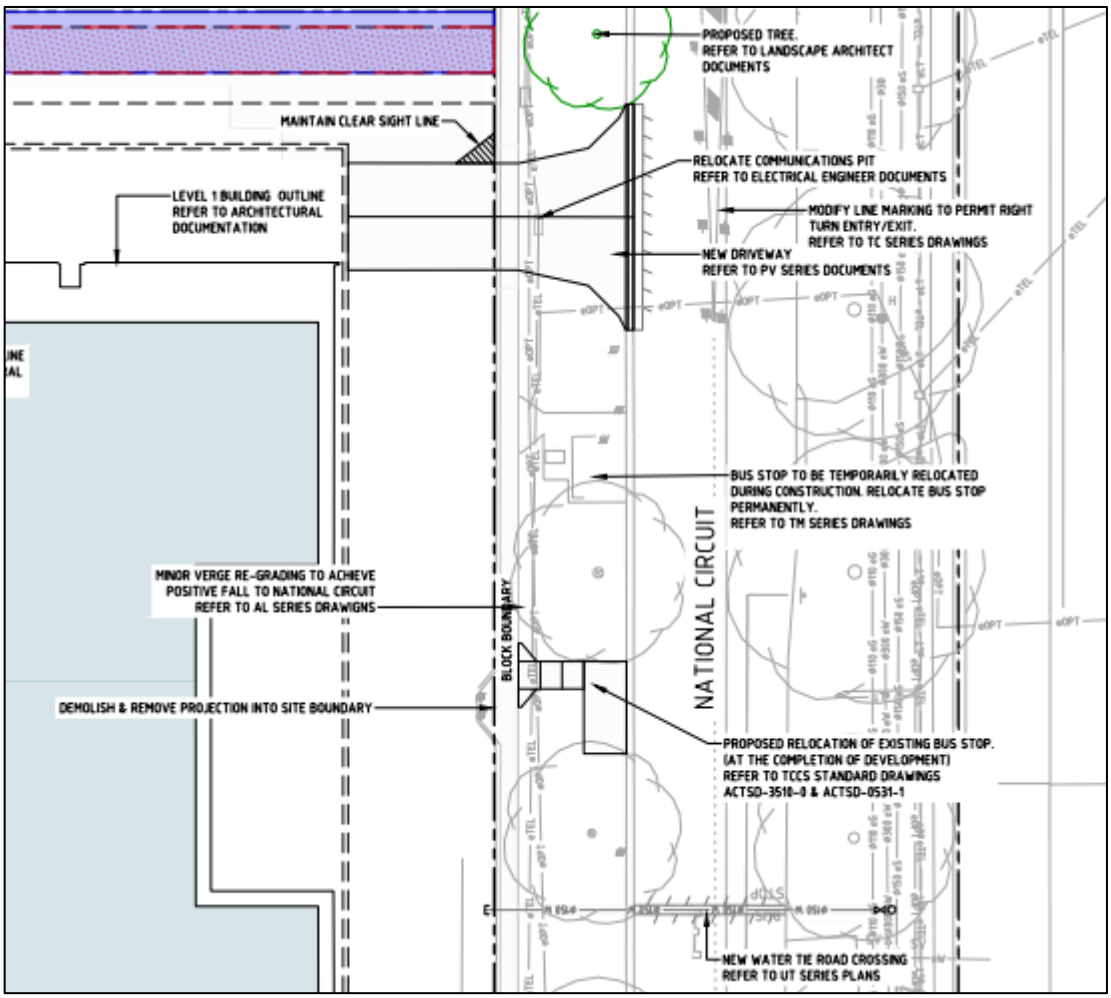


Figure 10 Civil details of bus relocation

The proposed bus stop relocation is not anticipated to cause any major adverse traffic impacts on National Circuit or the adjacent intersection.

7 TRAFFIC CONSIDERATIONS

7.1 TRAFFIC GENERATION

The traffic generated by the proposal will be mainly associated with vehicles entering and exiting the basement car park. Transport for NSW has undertaken updated surveys which demonstrate a traffic generation rate of 1.6 vehicles per 100m^2 in the AM peak hour and 1.2 vehicles per 100m^2 in the PM peak hour for office blocks. When applied to the proposed office of 37,000m^2, this results in the following trip generation:

- AM peak hour: 592 vehicles; and
- PM peak hour: 444 vehicles.

This trips generation is excessively high given that the development is to provide only 356 parking spaces. Given the central location of the site it is anticipated that a smaller proportion of staff will drive to the site, than those considered in the Transport for NSW surveys.

A more realistic assessment of traffic generation is based on the car parking provisions of the site. With a basement parking provision of 356 spaces, it is assumed that the car park will be occupied at half capacity during each of the AM and PM peak hours, that is 178 vehicles are parked in each peak hour. This is an assumption that is widely used and accepted for similar office developments and represents typical and expected traffic generation.

The split of trips arriving and departing the site in each peak hour are assumed as follows:

- AM peak 80% arrivals / 20% departures:
  - 142 vehicles arrive; and
  - 36 vehicles depart.
- PM peak 20% arrivals / 80% departures:
  - 35 vehicles arrive; and
  - 142 vehicles depart.

7.2 TRAFFIC DISTRIBUTION

The distribution of the traffic generated is estimated based on the surrounding road layout, locations of key destinations and employment and residential catchments, and the existing directional split of traffic on National Circuit.

The data collected by traffic surveys at the adjacent intersection of National Circuit and Sydney Avenue indicates a directional split:

- 70% northbound and 30% southbound in the AM peak hour; and
- 40% northbound and 60% southbound in the PM peak hour.

This directional split is logical considering the largely commercial and employment areas to the north and east, and more residential areas to the south and west.

The resulting distribution of the traffic generation at the site access point is shown diagrammatically in **Figure 11**. The distribution of this traffic at the adjacent intersection has been calculated based on the existing traffic volumes at the intersection. This is considered to represent the typical route of travel for those accessing the area and is anticipated to be similar post development.

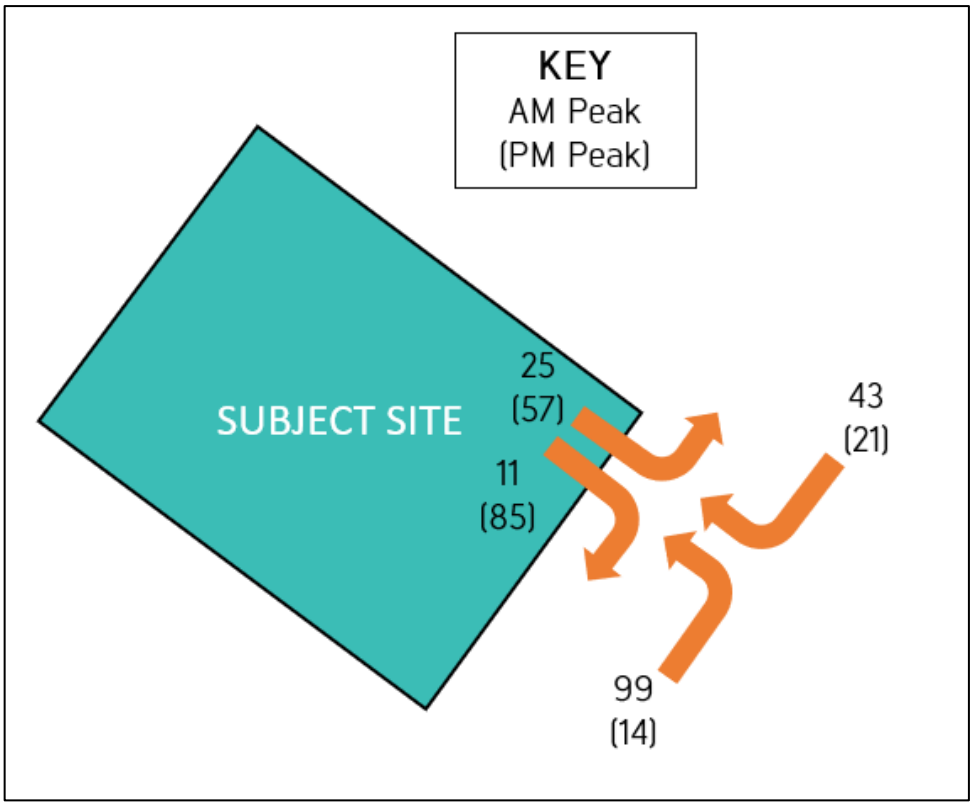


Figure 11 Estimated traffic distribution

7.3 EXISTING PRECINCT TRAFFIC

The proposed site access point is in fairly close proximity to the crossover to the adjacent site which provides a shared driveway access to the Little National Hotel at 21 National Circuit, and to the proposed CLT office building at 23 National Circuit. There is also currently a line-marked median along National Circuit at the location of the proposed site access. It is of interest to analyse the operation of the two crossovers to determine if access should be limited to left-in, left-out.

The traffic generation and distribution of the adjacent properties has been sourced from the traffic reports undertaken for each of the sites including:

- Traffic and Parking Assessment for Proposed Commercial Development on B14 S22 Barton, prepared by ISG Traffic (dated 14 November 2012); and
- Traffic Impact and Parking Assessment for Proposed Commercial Development at B15 S22 Barton, prepared by Sellick Consultants (dated 18 December 2020).

These reports provide traffic generation and distribution information for the two adjacent sites and their shared driveway, as shown diagrammatically in **Figure 12**.

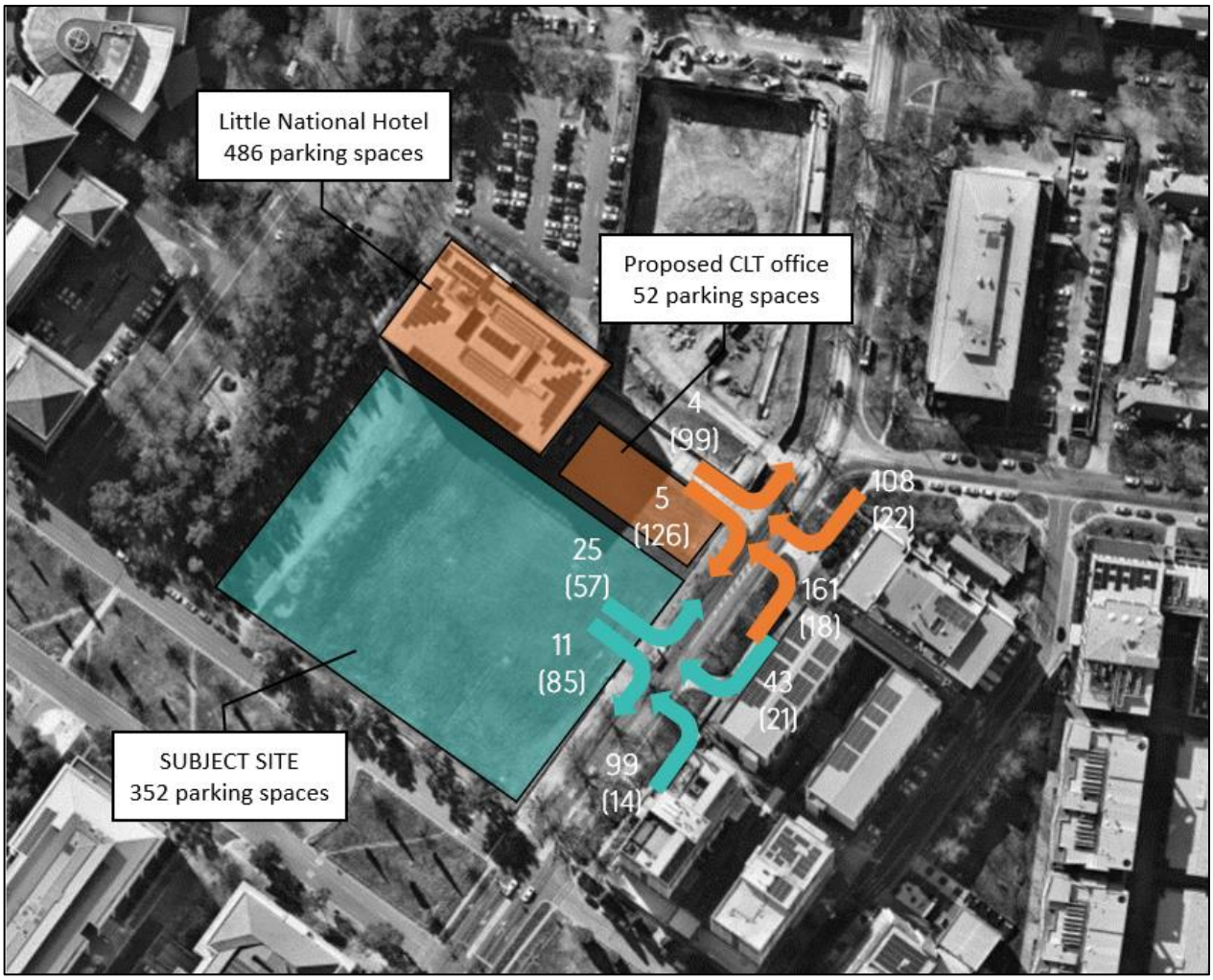


Figure 12 Greater precinct traffic movements

7.4 SIDRA ANALYSIS

7.4.1 ASSUMPTIONS AND SETTINGS

The level of traffic impact associated with the proposal in the critical weekday AM and PM peak hours has been determined using SIDRA Intersection v9.

A network has been created to assess the impacts on the surrounding road network. This including the intersections of the site access / National Circuit, the adjacent driveway access / National Circuit and the intersection of Sydney Avenue / National Circuit. This was assessed in the AM and PM peak hours under existing conditions (where relevant), post development conditions and 10-years post development,

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 3**.

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 3 Level of Service Ratings

Level of Service	
A	Excellent
B	Very Good
C	Good
D	Acceptable
E	Poor
F	Very Poor

Default SIDRA settings have been adopted for this assessment. A compounding growth factor of 2%pa has been applied to the National Circuit and Sydney Avenue volumes over 10 years.

7.4.2 SIDRA RESULTS – EXISTING INTERSECTION

Firstly, as a base case, the intersection of Sydney Avenue and National Circuit was modelled as per existing conditions and in the 10-year scenario to assess how the intersection would function if the proposal were not to be developed.

The intersection itself has been modelled as a network, given the large median along Sydney Avenue and its capacity to store vehicles. The SIDRA network layout is shown in **Figure 13**.

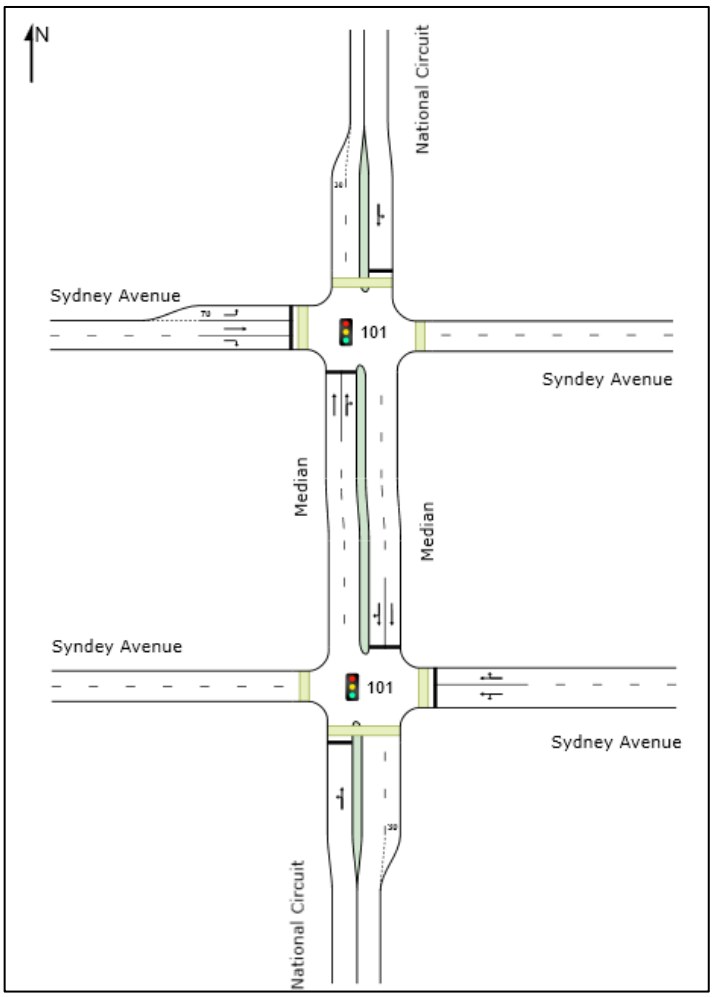


Figure 13 National Circuit / Sydney Avenue SIDRA layout

The key performance factors are summarised in the tables below, with the detailed SIDRA outputs provided in the Appendices.

Table 4 Intersection AM peak hour results

Approach	Movement	Existing Conditions			10 Years Scenario		
		DOS	Ave Delay (s)	95th % Queue (m)	DOS	Ave Delay (s)	95th % Queue (m)
National Cct (south)	L	0.391	11.7	47.9	0.477	12.3	63.8
	T	0.391	6.1	47.9	0.382	11.6	15.0
	R	0.291	12.9	15.0	0.382	15.4	15.0
Sydney Ave (east)	L	0.345	45.8	23.0	0.420	46.4	28.4
	T	0.345	40.1	23.0	0.420	40.8	28.4
	R	0.380	47.7	12.1	0.420	48.4	16.5
National Cct (north)	L	0.291	16.1	23.8	0.257	15.9	32.1
	T	0.291	10.5	23.8	0.239	10.3	29.2
	R	0.191	13.3	15.0	0.268	18.1	15.0
Sydney Ave (west)	L	0.287	35.0	25.7	0.318	33.2	30.5
	T	0.241	28.4	22.3	0.267	26.4	26.4
	R	0.204	33.8	15.0	0.384	34.1	19.3

Table 5 Intersection PM peak hour results

Approach	Movement	Existing Conditions			10 Years Scenario		
		DOS	Average Delay (s)	95th % Queue (m)	DOS	Average Delay (s)	95th % Queue (m)
National Cct (south)	L	0.139	11.1	14.3	0.170	11.3	17.9
	T	0.169	7.2	11.8	0.251	12.6	15.0
	R	0.169	10.7	11.8	0.251	17.3	15.0
Sydney Ave (east)	L	0.231	43.3	16.4	0.303	44.0	21.9
	T	0.231	37.6	16.4	0.303	38.3	21.9
	R	0.231	43.5	11.7	0.303	44.5	13.0
National Cct (north)	L	0.286	13.7	36.2	0.403	18.9	55.8
	T	0.242	3.5	13.5	0.301	3.6	15.0
	R	0.242	6.8	13.5	0.301	7.1	15.0
Sydney Ave (west)	L	0.140	34.9	11.4	0.133	28.9	12.4
	T	0.111	28.7	9.5	0.106	22.7	10.3
	R	0.291	36.4	18.6	0.411	32.2	22.0

From **Table 4** and **Table 5** it can be concluded that the intersection of Sydney Avenue and National Circuit will operate satisfactorily in the AM and PM peak period under existing conditions and in 10 years without inclusion of the proposed development The Degree of Saturation values are well less than 1.0 for all movements on all legs of the intersection in each scenario.

7.4.3 SIDRA RESULTS – POST DEVELOPMENT

A network of the proposed site access / National Circuit and the adjacent crossover to 21 & 23 National Circuit / National Circuit has been modelled in conjunction with the intersection of Sydney Avenue and National Circuit with the SIDRA layout shown in **Figure 14**.

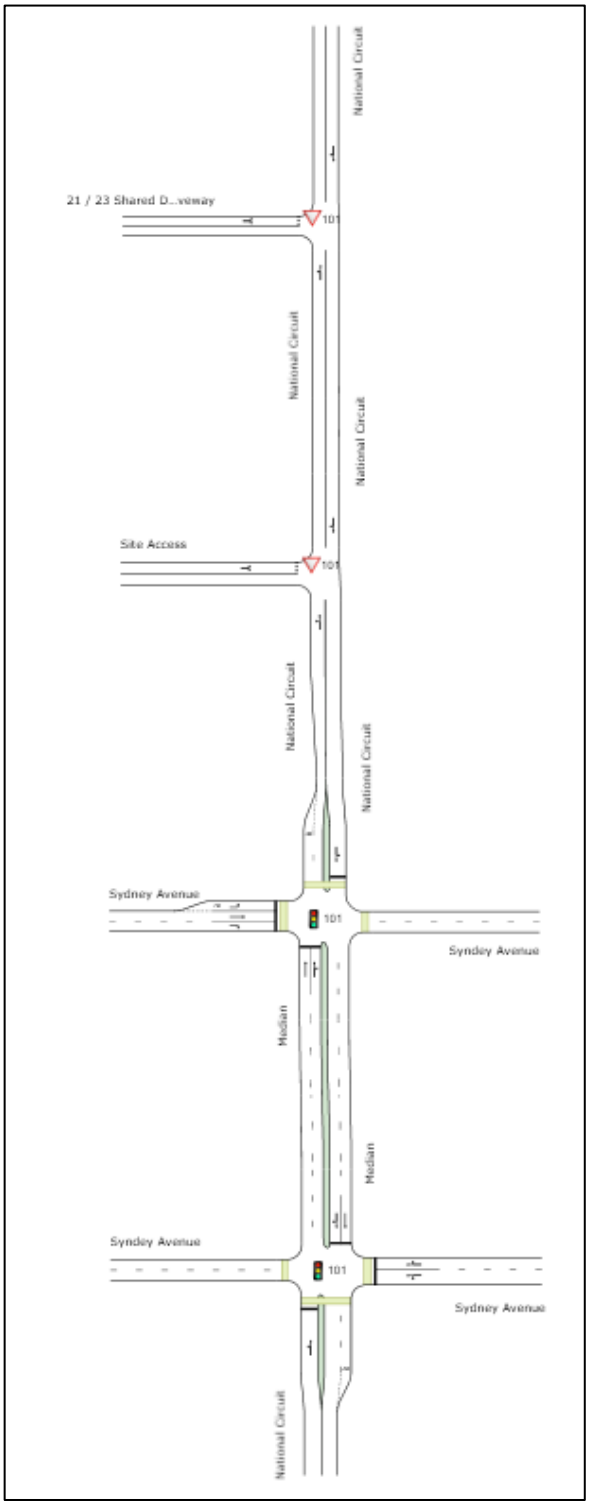


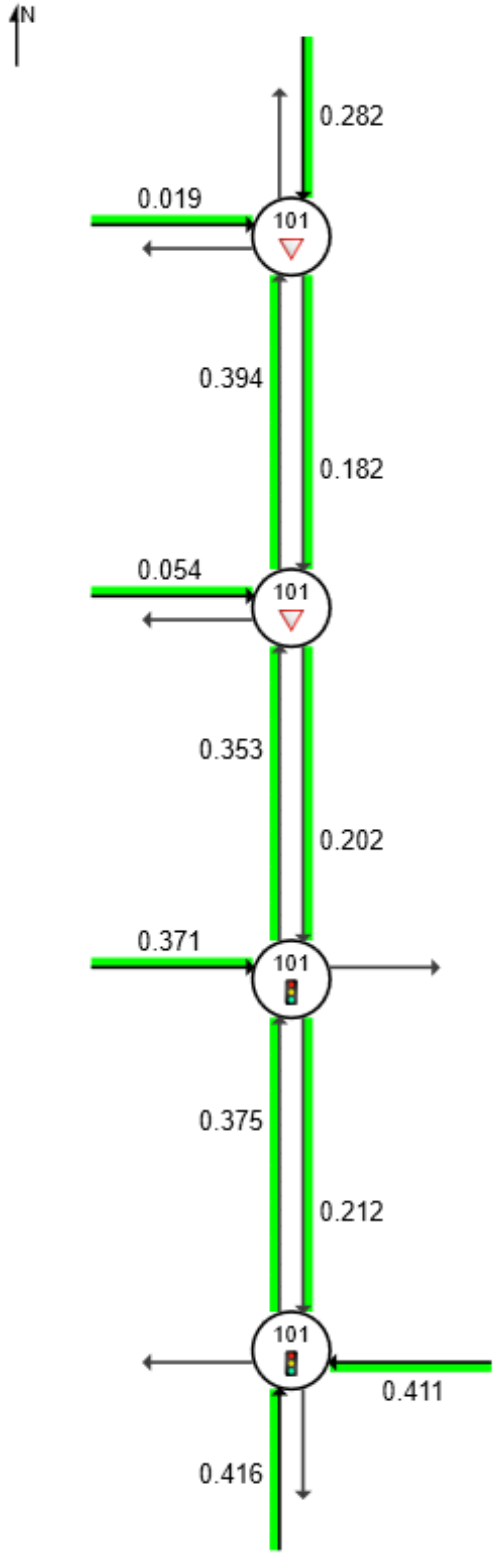
Figure 14 Site access network SIDRA layout

The key performance factors are presented diagrammatically below for each approach within the network.

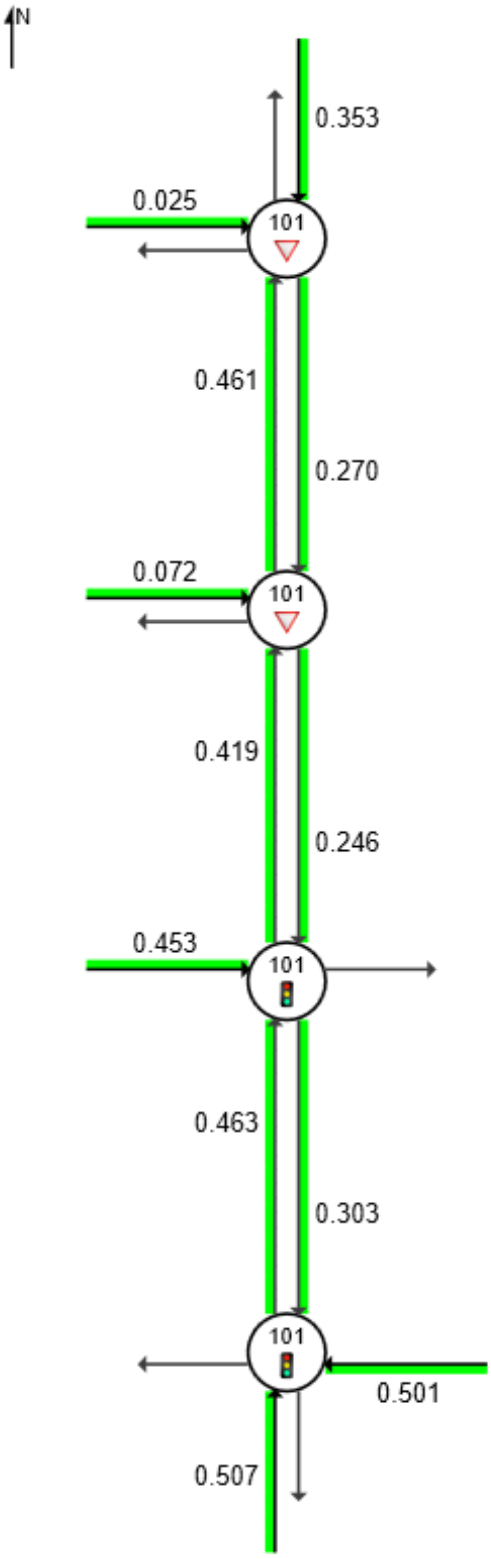
The following compares the network under post development conditions (assuming all three buildings have been constructed), and in the 10-year scenario for both the AM and PM peak hours.

AM PEAK HOUR RESULTS

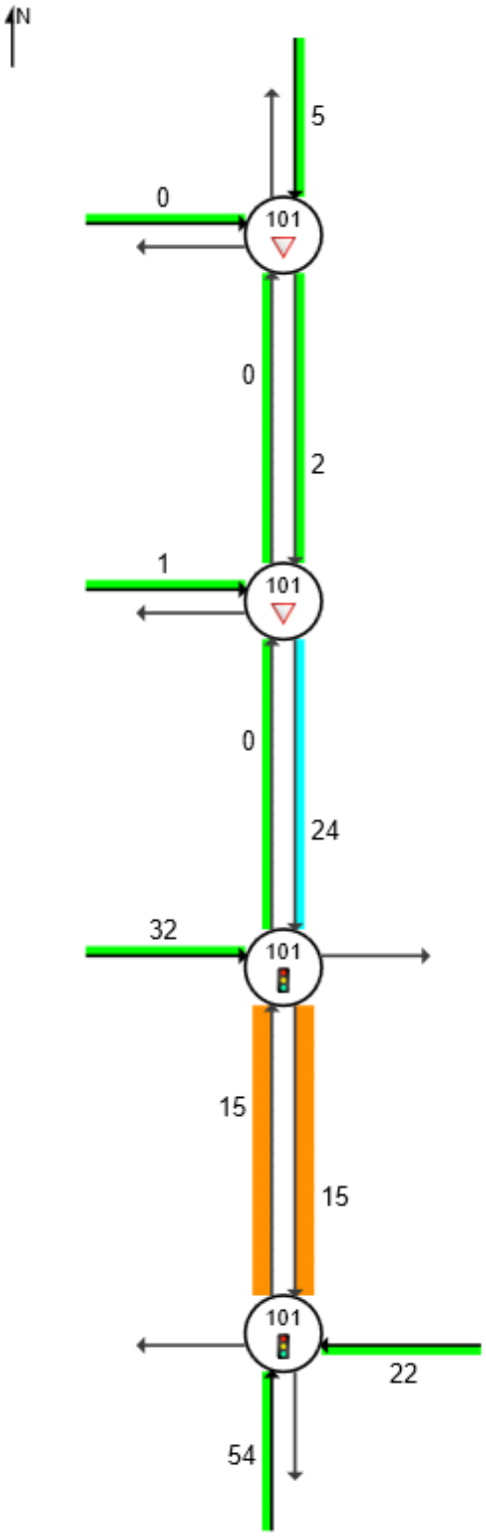
Degree of Saturation post development



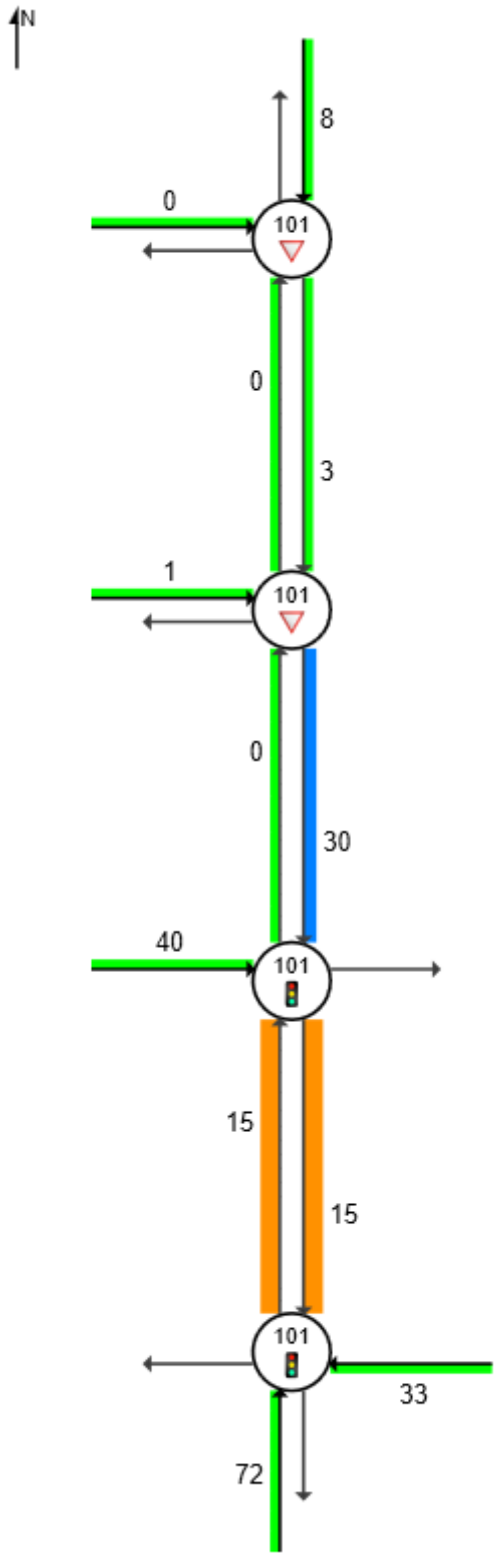
Degree of Saturation 10 years post development



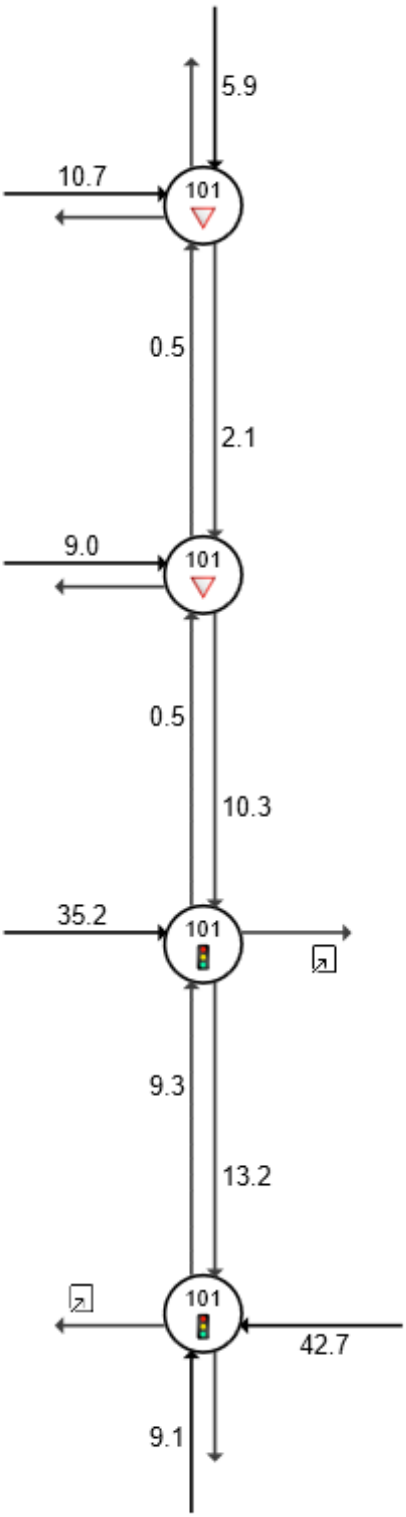
95th percentile queue distance (m) post development



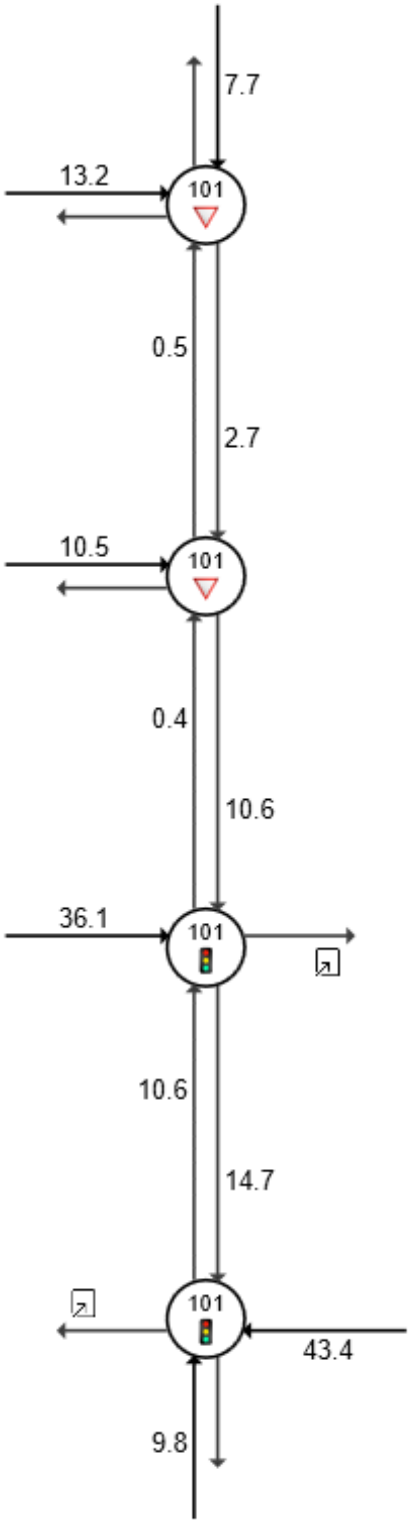
95th percentile queue distance (m) 10 years post development



Average delay (s) post development

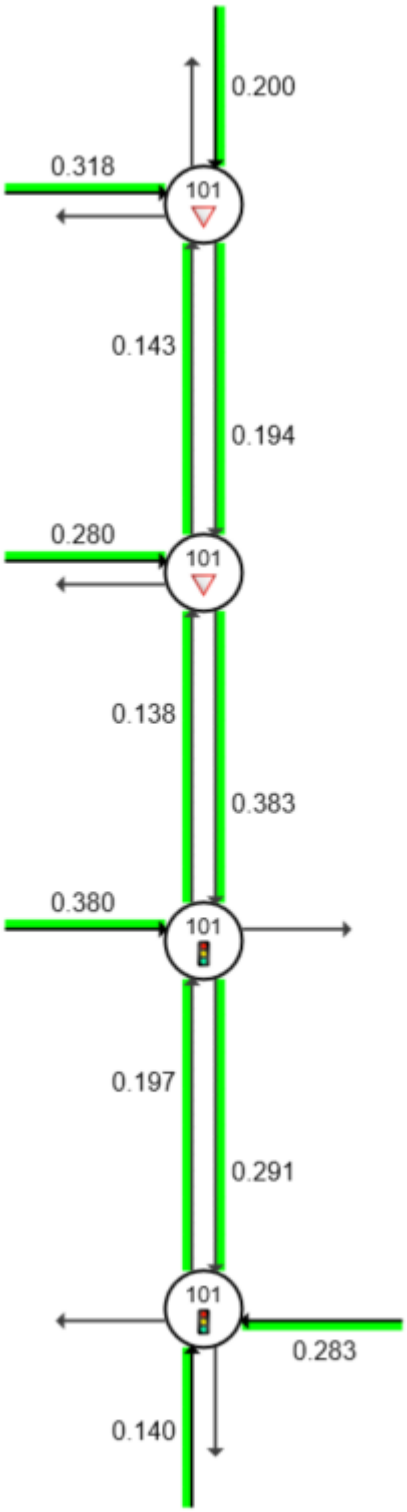


Average delay (s) 10 years post development

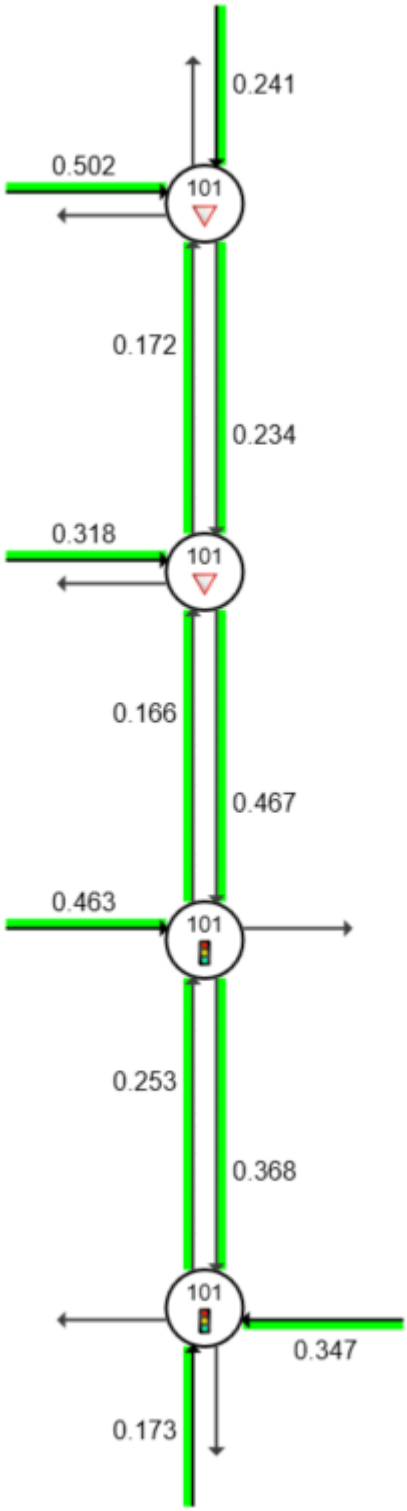


PM PEAK HOUR RESULTS

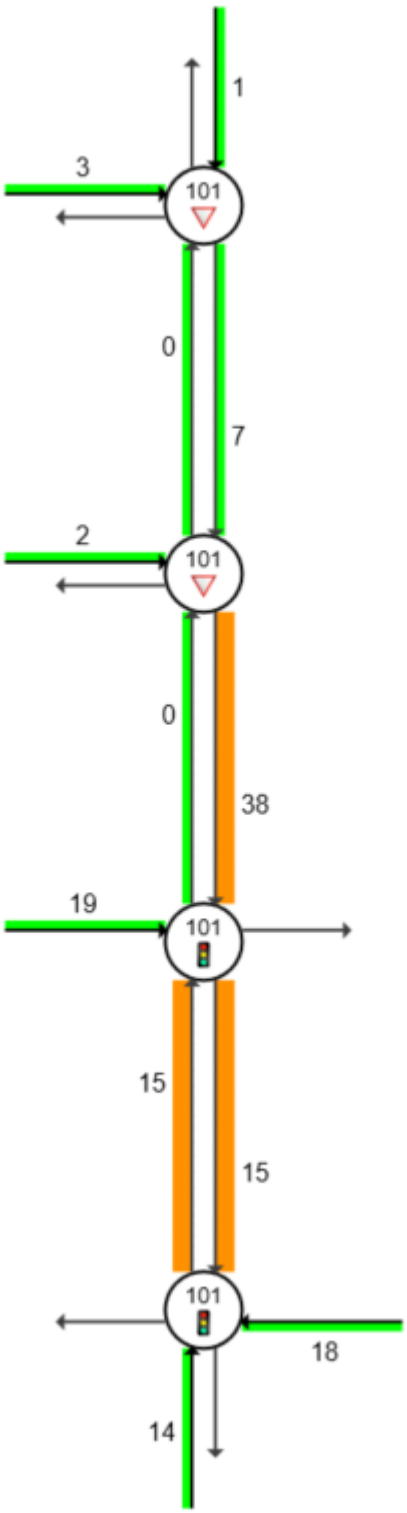
Degree of Saturation post development



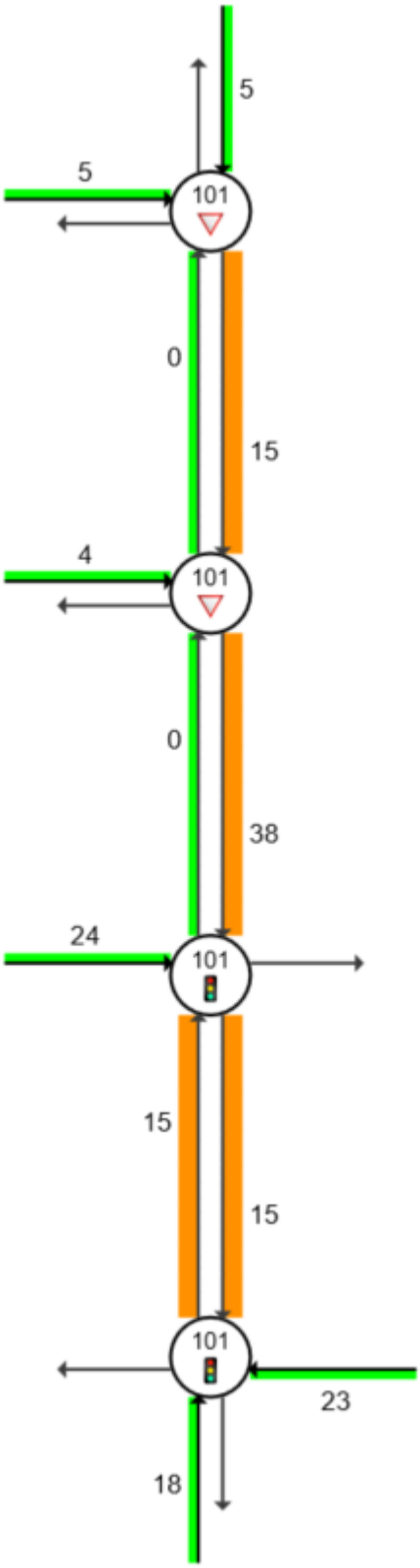
Degree of Saturation 10 years post development



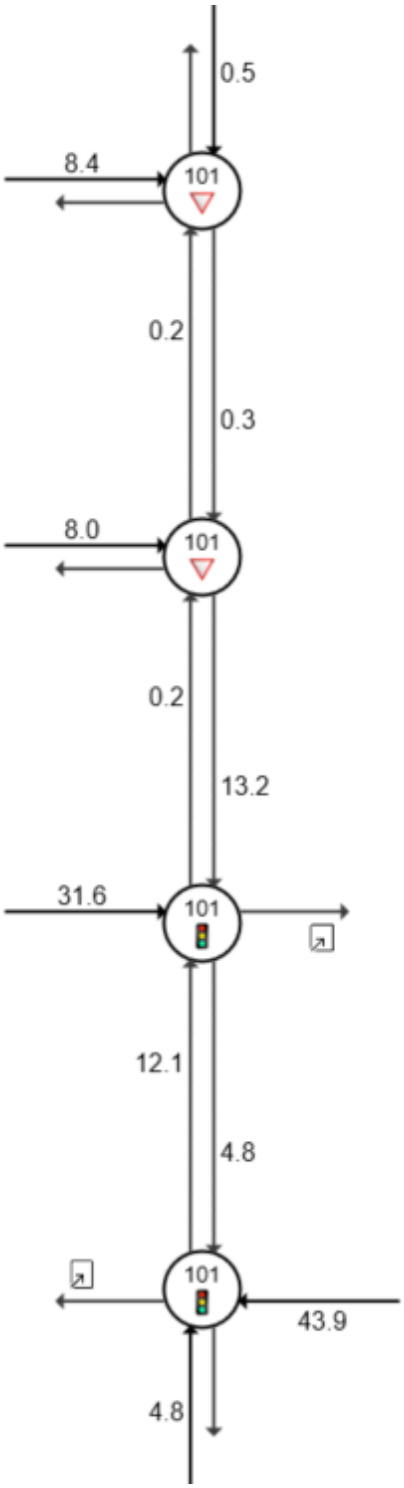
95th percentile queue distance (m) post development



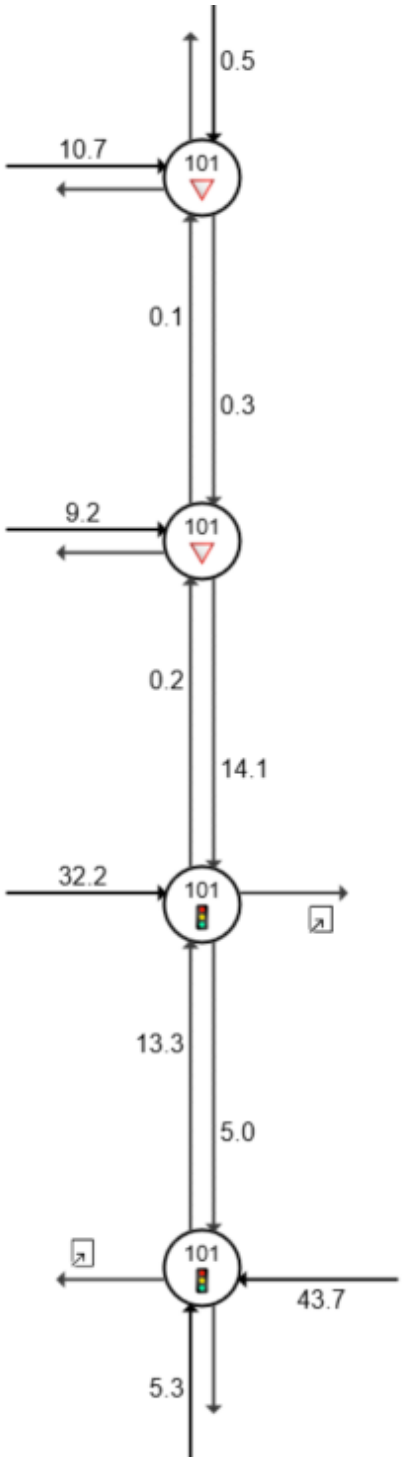
95th percentile queue distance (m) 10 years post development



Average delay (s) post development



Average delay (s) 10 years post development



From the above results, it is concluded that the site network and surrounding road network and intersections operates satisfactorily in both the AM and PM peak periods post development and 10-years post development. Degree of Saturation values are well less than 1.0 for all movements on all legs of the network.

The single site access point will be sufficient to accommodate the anticipated traffic generated to and from the site and this won't affect the operation of the adjacent crossover to 21 and 23 National Circuit.

The results indicate that queuing of vehicles entering and exiting the site will be minimal and will not adversely affect the neighbouring sites or intersections.

7.4.4 SIDRA RESULTS – NATIONAL CIRCUIT / SYDNEY AVENUE WITH HIGHER TRAFFIC GENERATION

The previous analysis assessed the operation of the network utilising a traffic generation rate of 50% of the car parking capacity on-site. This represents a typical peak arrival and departure rate for an office development and is widely accepted for the purpose of traffic analysis.

Nonetheless, the following analyses the affect if a greater proportion of traffic were to be generated in the peak hours. For this, a rate of 80% of car parking capacity has been adopted. This represents a highly unlikely worst-case scenario to check how the network would operate under these circumstances. This has been done to acknowledge the request to model the impacts under the RTA Guide rates, however reduced to 80% given those rates exceed the car parking supply and as such do not make traffic engineering sense, particularly for an office use.

The proportion of vehicles arriving and departing, and their direction distribution is as per that outlined in Section 7.1 and 7.2. The resulting estimated traffic distribution at the site access is shown diagrammatically in Figure 15.

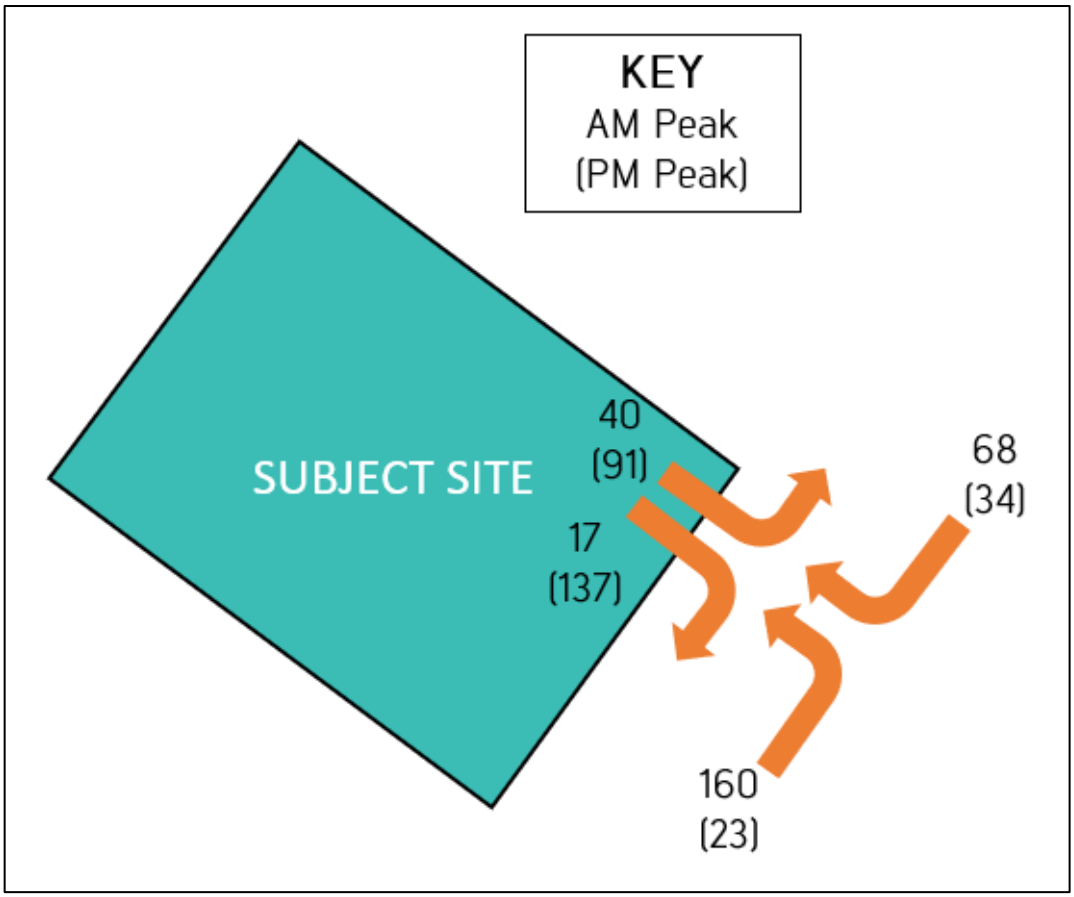


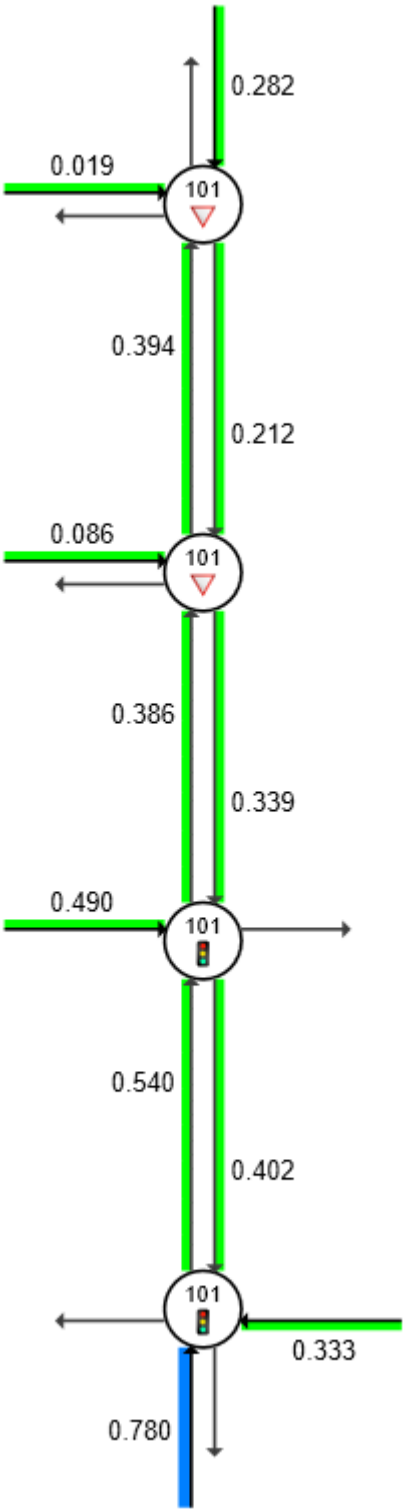
Figure 15 Estimated traffic distribution with higher traffic generation

The key performance factors are presented diagrammatically below for each approach within the network under this scenario.

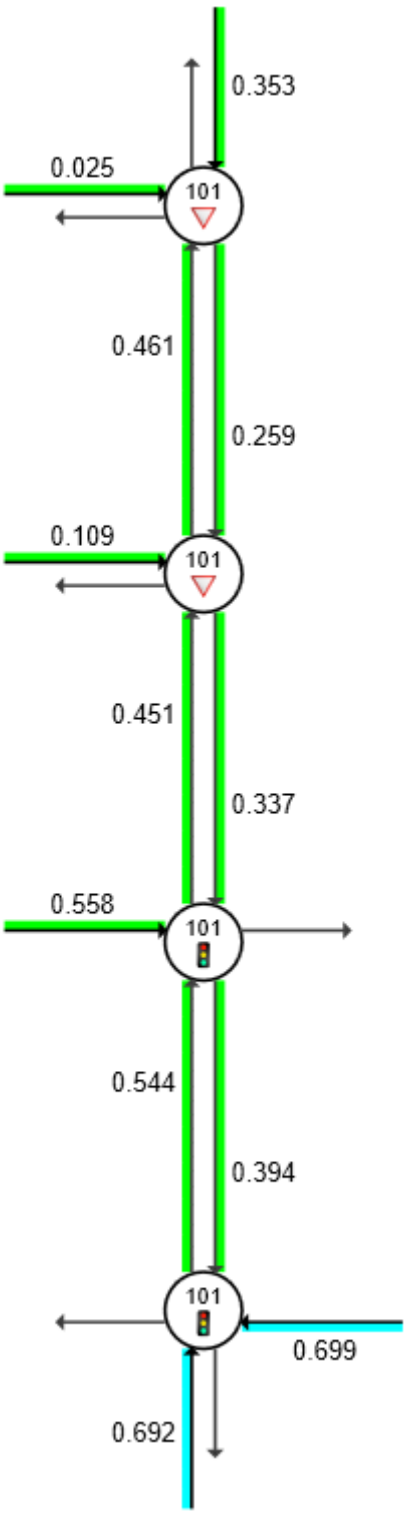
The following compares the network under post development conditions (assuming all three buildings have been constructed), and in the 10-year scenario for both the AM and PM peak hours.

AM PEAK HOUR RESULTS

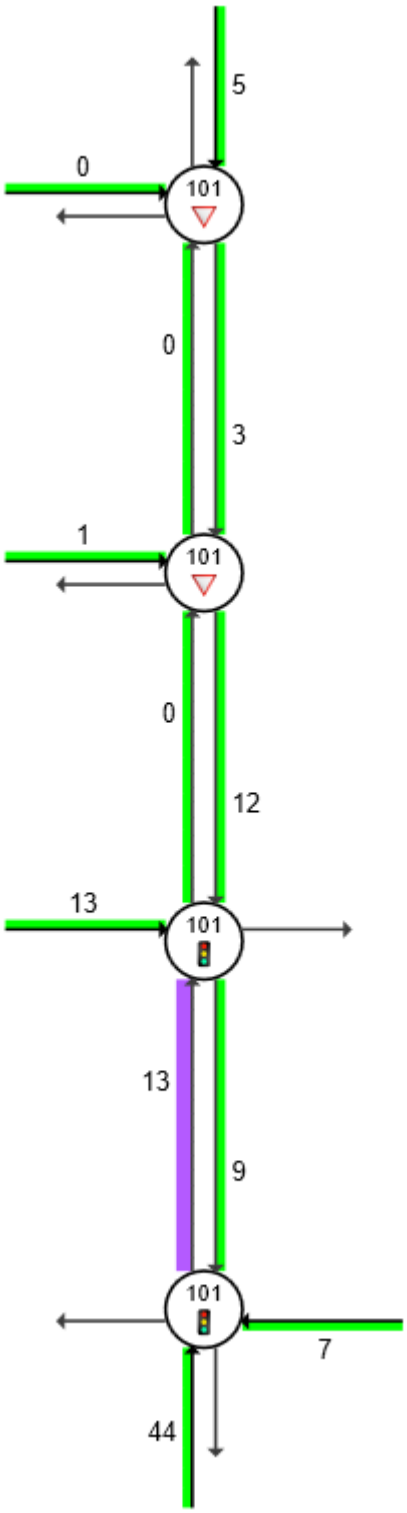
Degree of Saturation post development



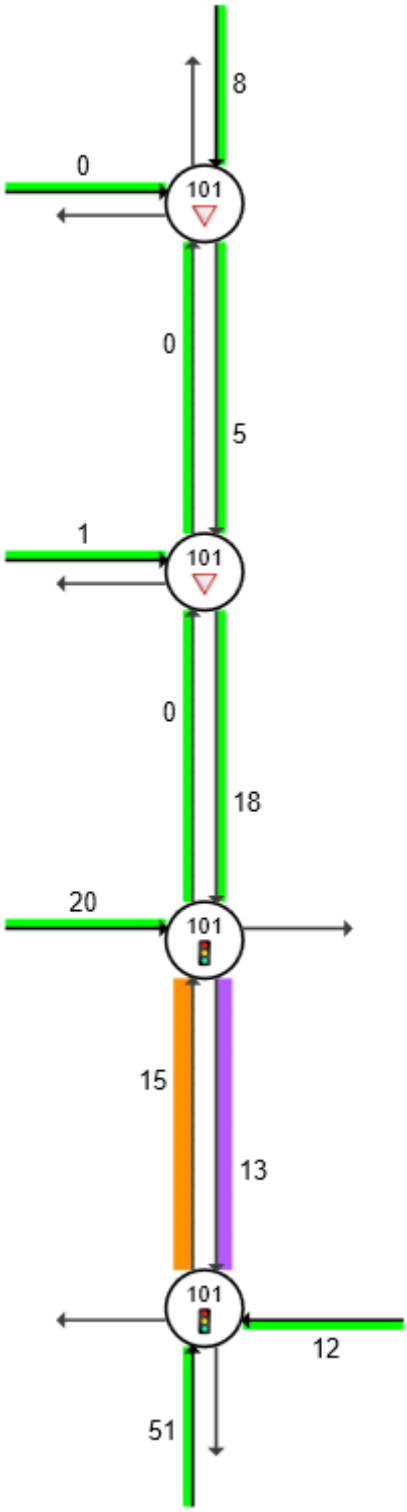
Degree of Saturation 10 years post development



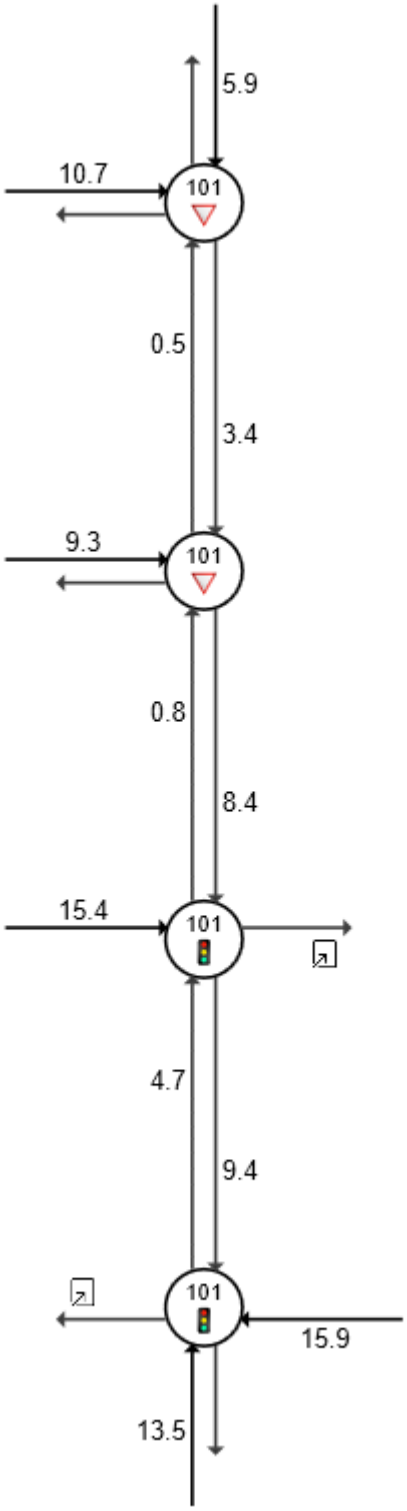
95th percentile queue distance (m) post development



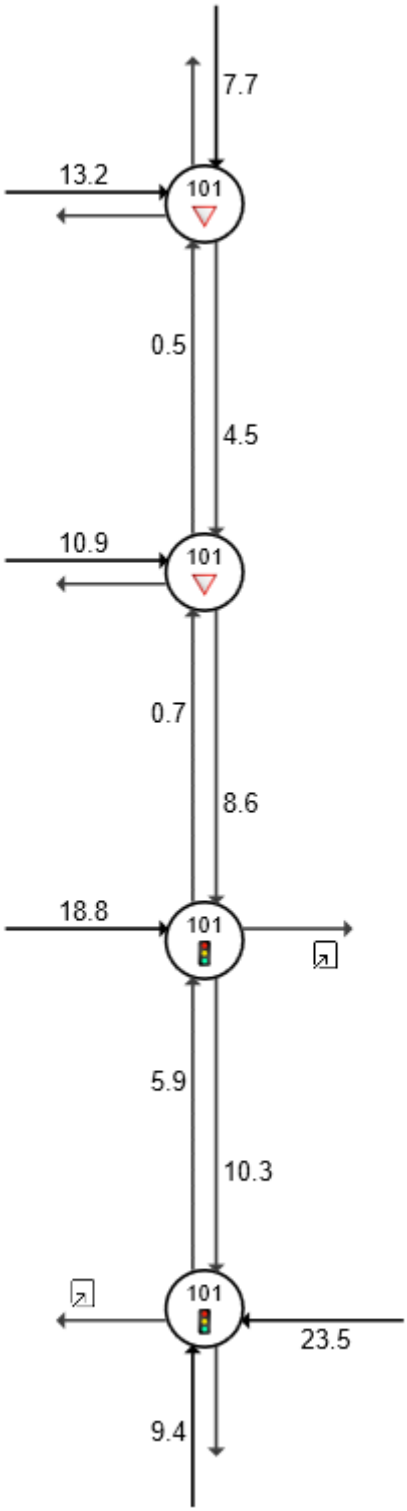
95th percentile queue distance (m) 10 years post development



Average delay (s) post development

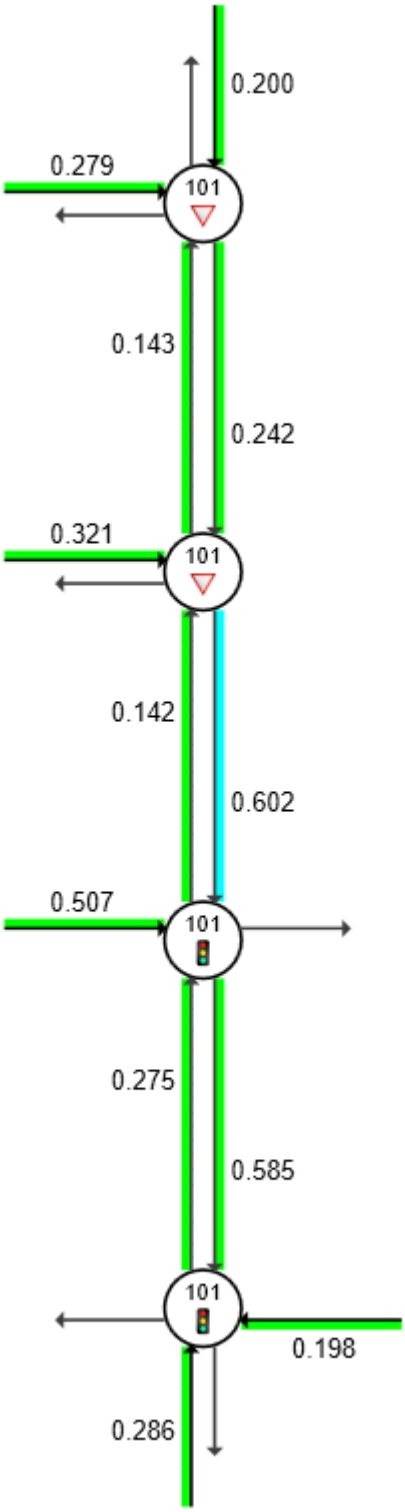


Average delay (s) 10 years post development

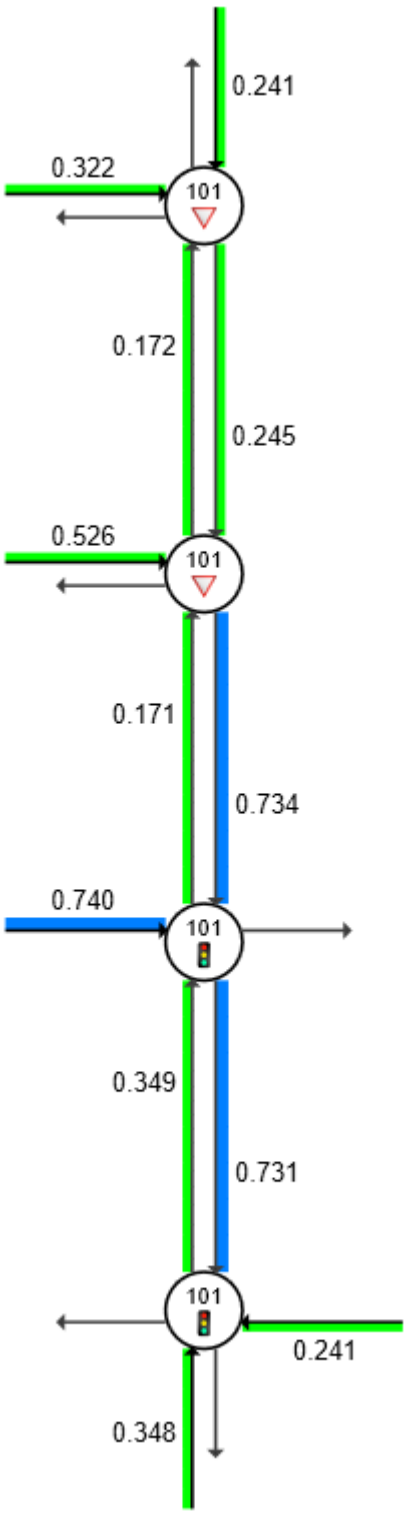


PM PEAK HOUR RESULTS

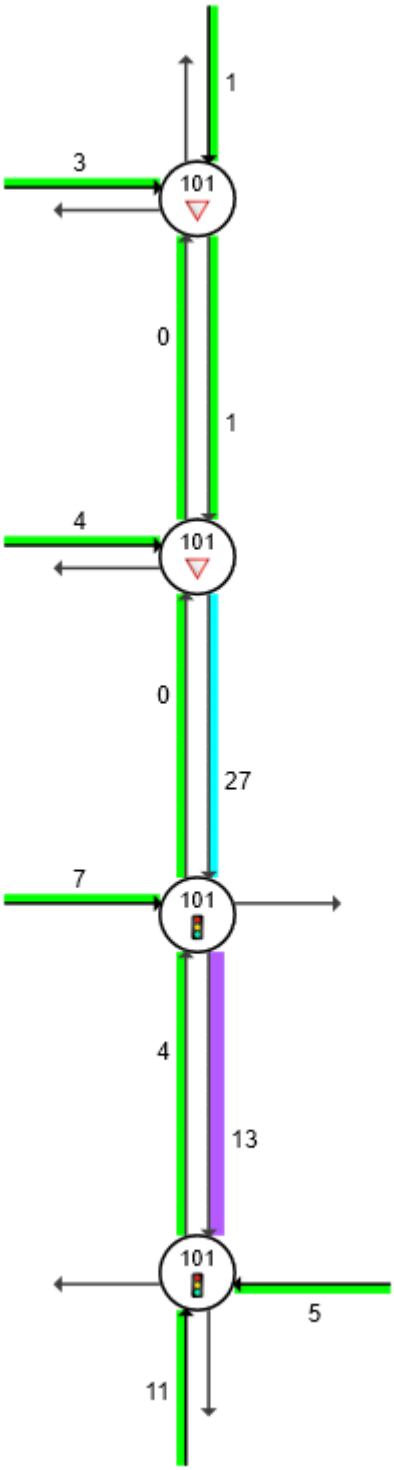
Degree of Saturation post development



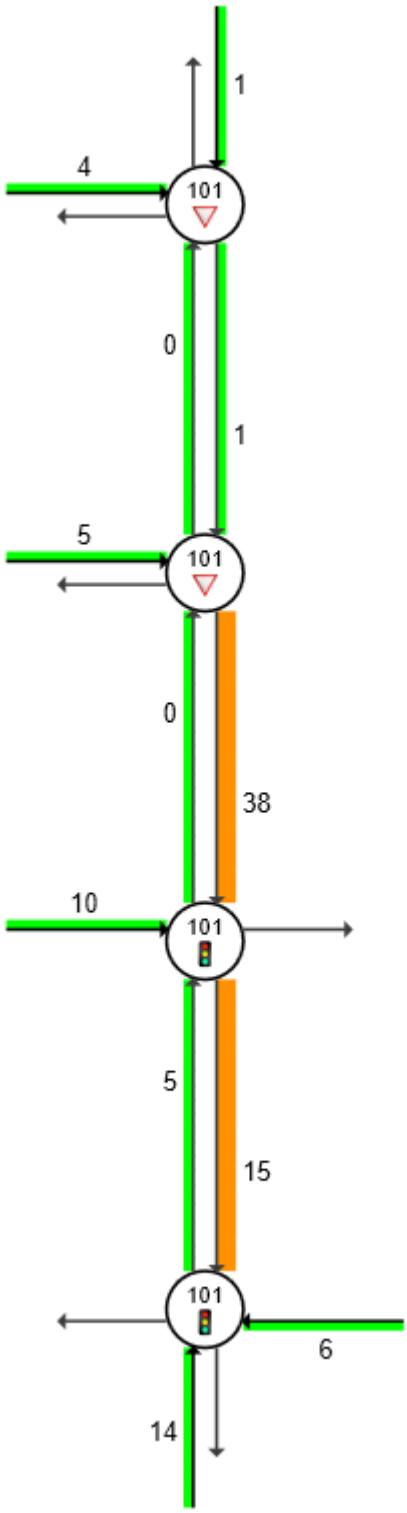
Degree of Saturation 10 years post development



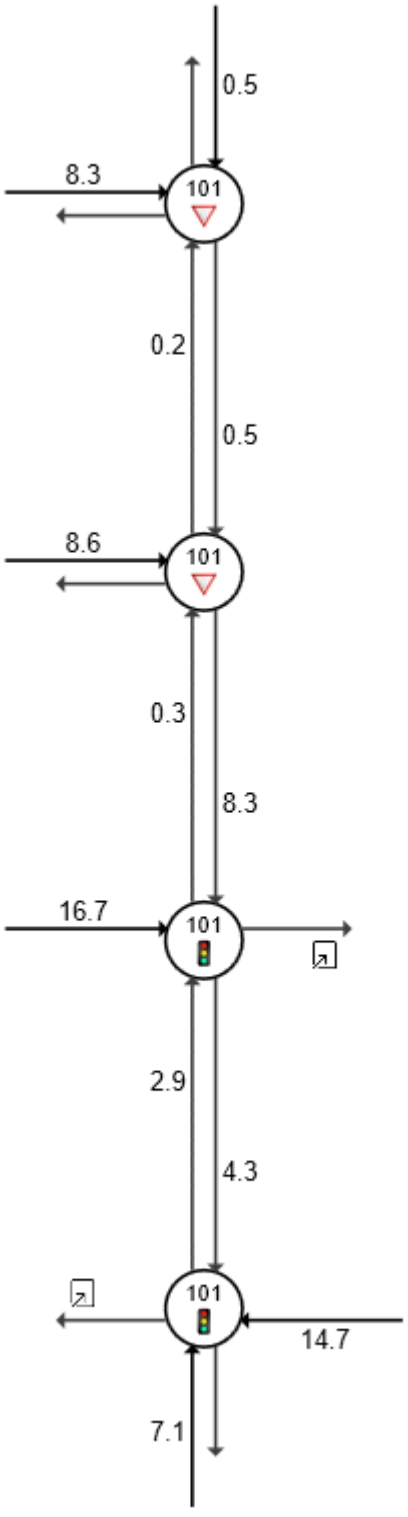
95th percentile queue distance (m) post development



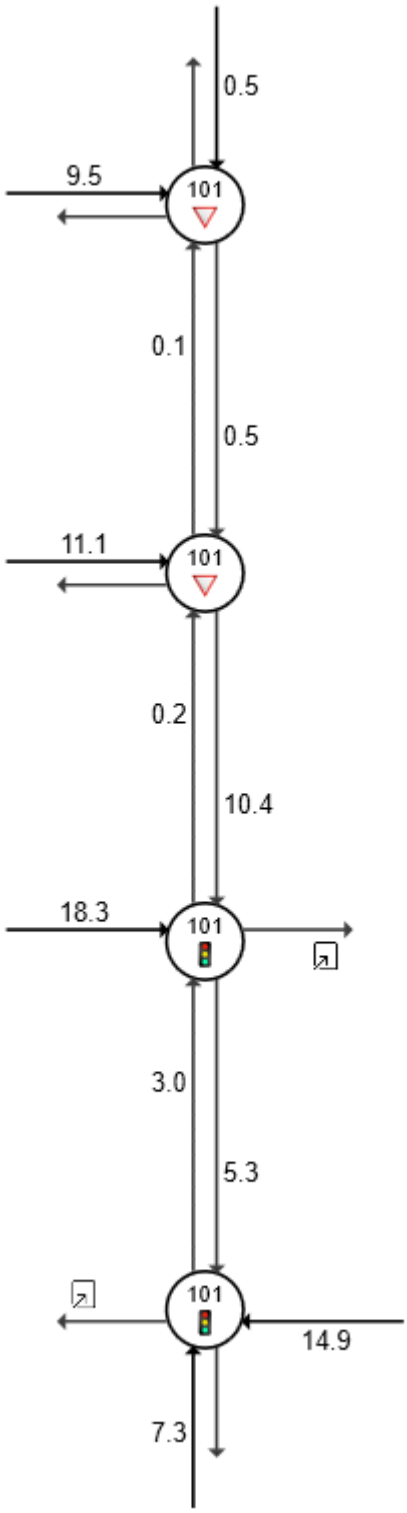
95th percentile queue distance (m) 10 years post development



Average delay (s) post development



Average delay (s) 10 years post development



From the above, it can be concluded that the network is expected to operate satisfactorily even in the unlikely scenario of a traffic generation rate of 80% of parking capacity post development and in the 10-year scenario. The Degree of Saturation values remain less than 1.0 for all movements on all legs within the network. Therefore, the proposal is not expected to have any major adverse impacts on the operation of National Circuit or nearby intersection. It is noted that the above is a conservative analysis, utilising a traffic generation rate that is unlikely to occur on any typical day.

7.4.5 SIDRA RESULTS – NATIONAL CIRCUIT / SYDNEY AVENUE WITH LANE CHANGES

The proposal involves shifting the existing bus stop at the site frontage on National Circuit slightly further south to move it away from the site access. This results in the bus area to site slightly within the part of merging section of National Circuit, line marked with 'Form One Lane'.

Under existing conditions, this merging is somewhat redundant as the road does not formally provide two lanes in the first place. It is proposed to remove the line marking, to provide a single northbound lane on National Circuit. Furthermore, the two lanes in the median will be altered to provide one right turn lane and one through lane.

The network analysis has been undertaken under these conditions to assess the impact of one through lane northbound on National Circuit at the intersection with Sydney Avenue. The SIDRA layout of the National Circuit and Sydney Avenue intersection is shown in **Figure 16**.

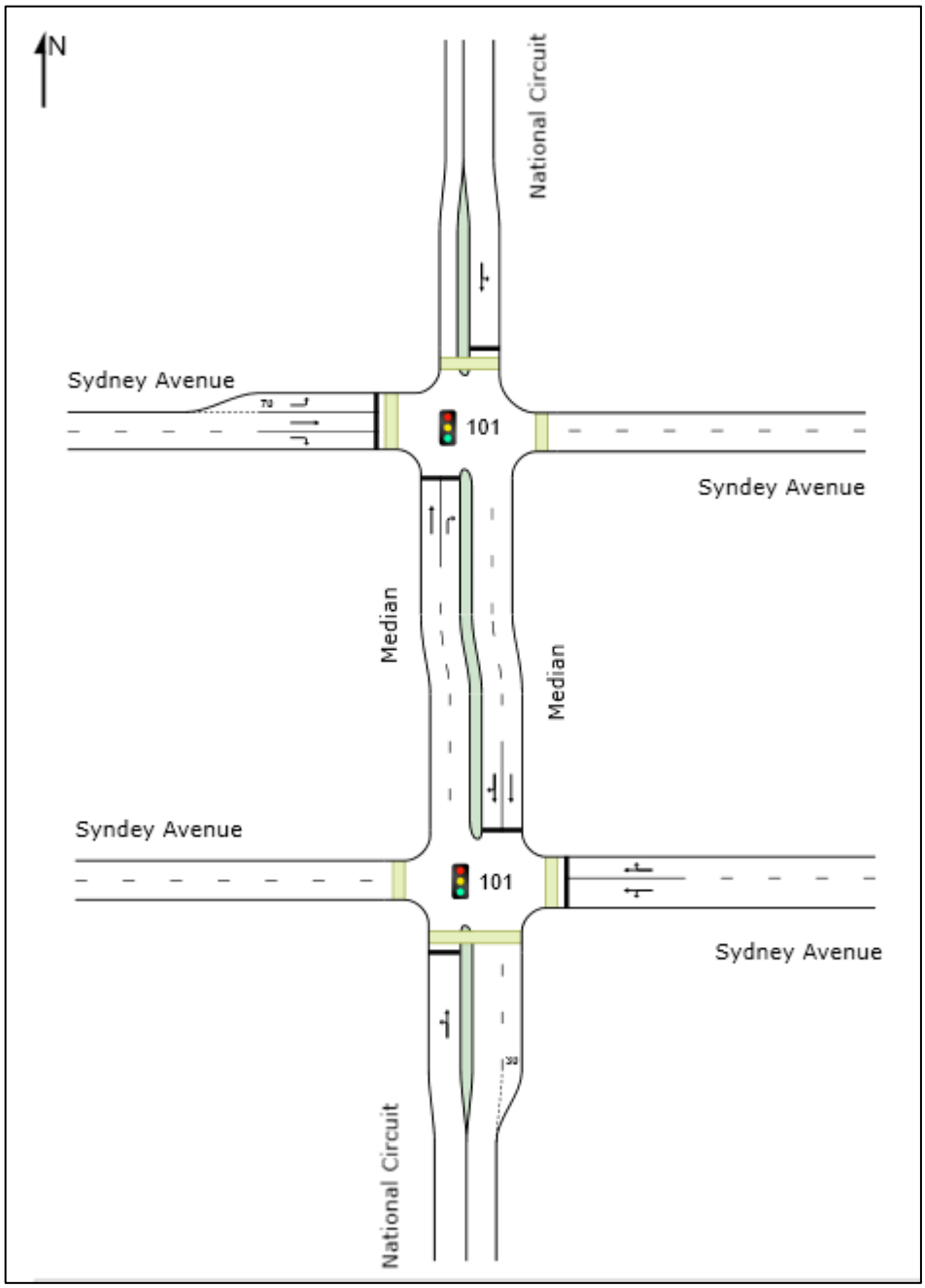


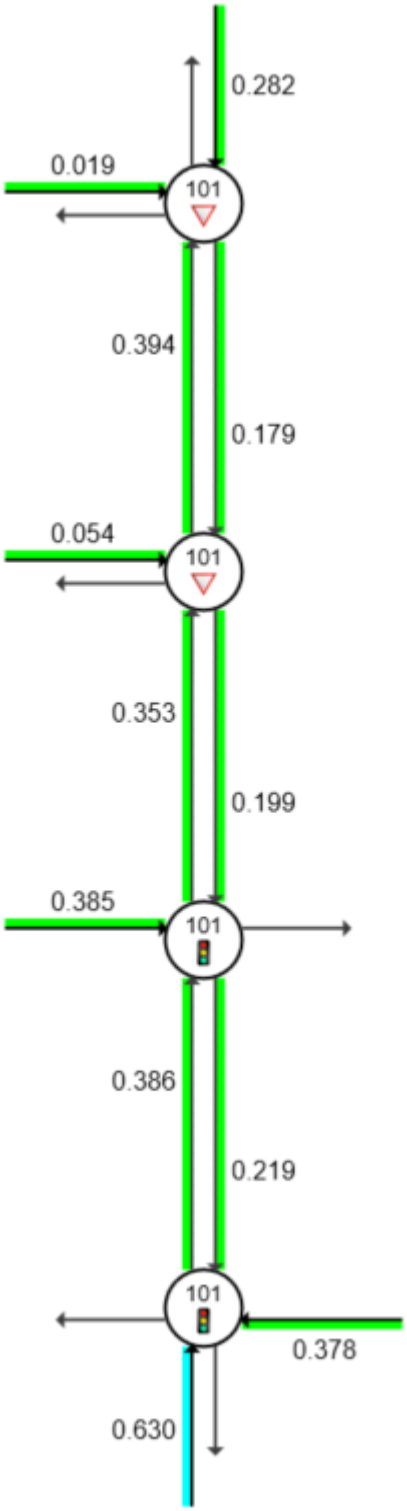
Figure 16 National Circuit / Sydney Avenue SIDRA layout with proposed lane changes

The key performance factors are presented diagrammatically below for each approach within the network.

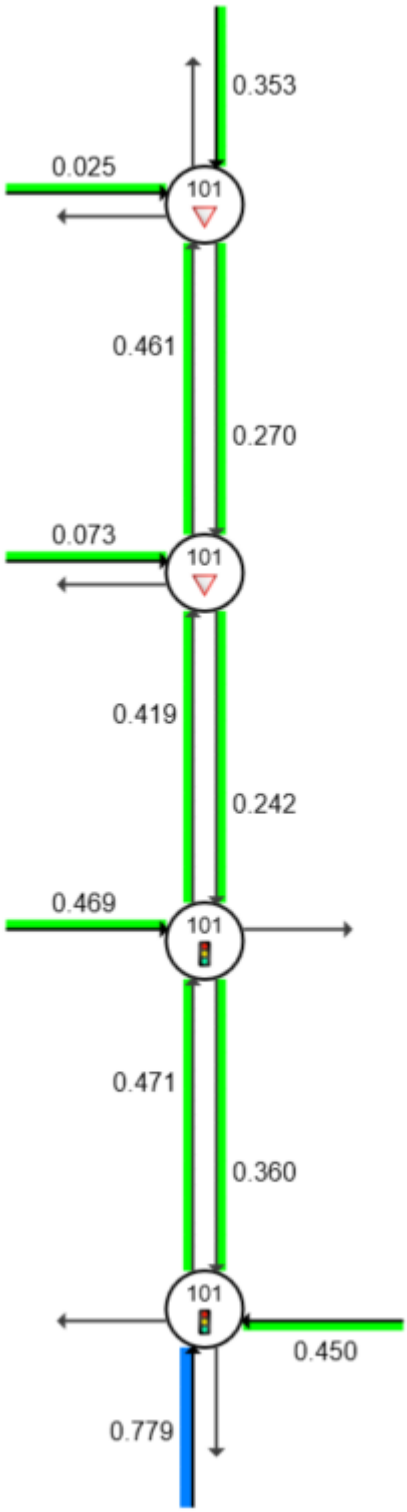
The following compares the network under post development conditions (assuming all three buildings have been constructed), and in the 10-year scenario for both the AM and PM peak hours with the changes to the northbound lanes.

AM PEAK HOUR RESULTS

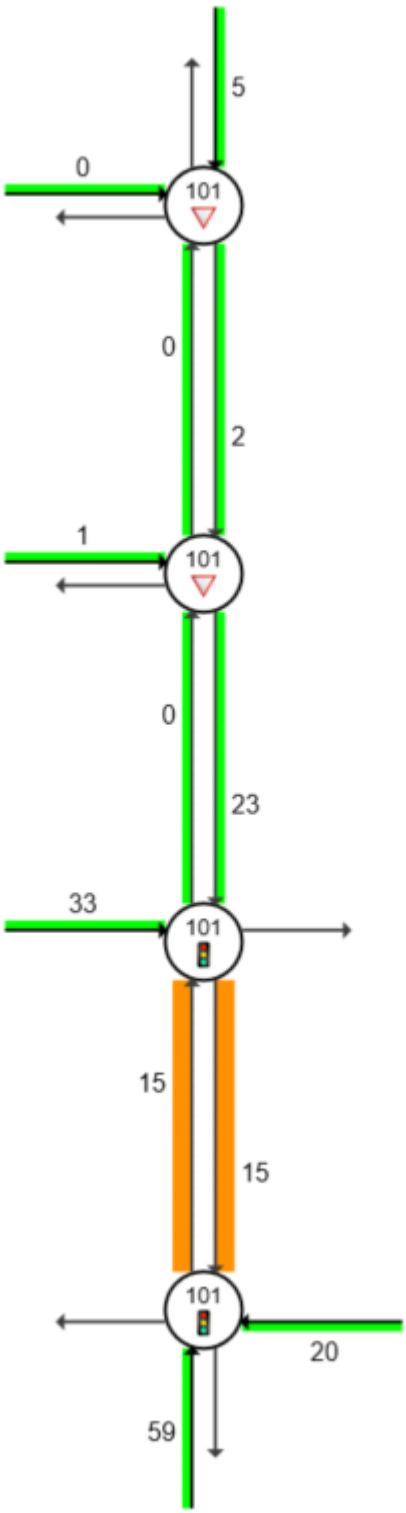
Degree of Saturation post development



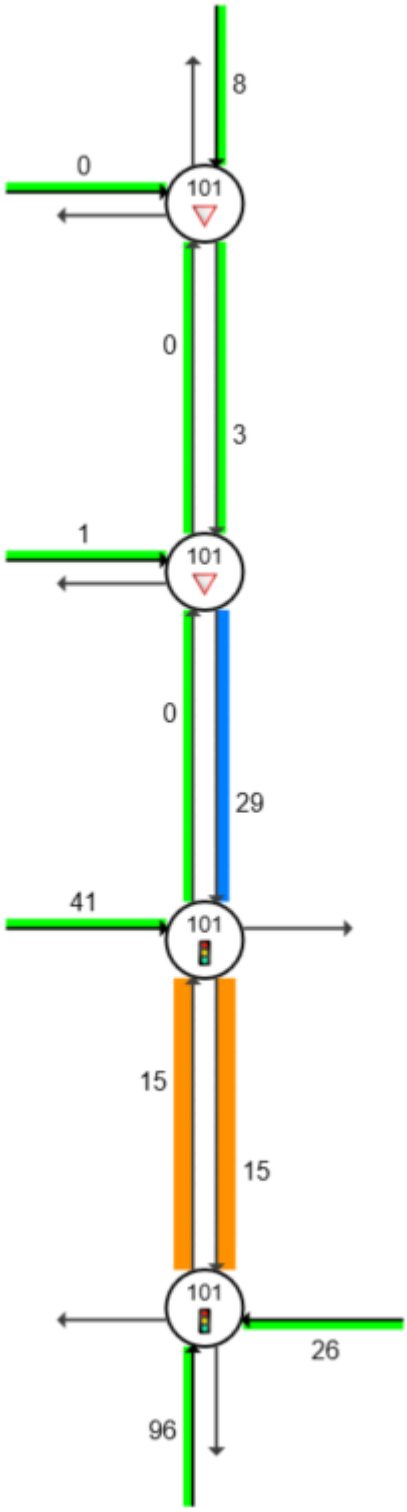
Degree of Saturation 10 years post development



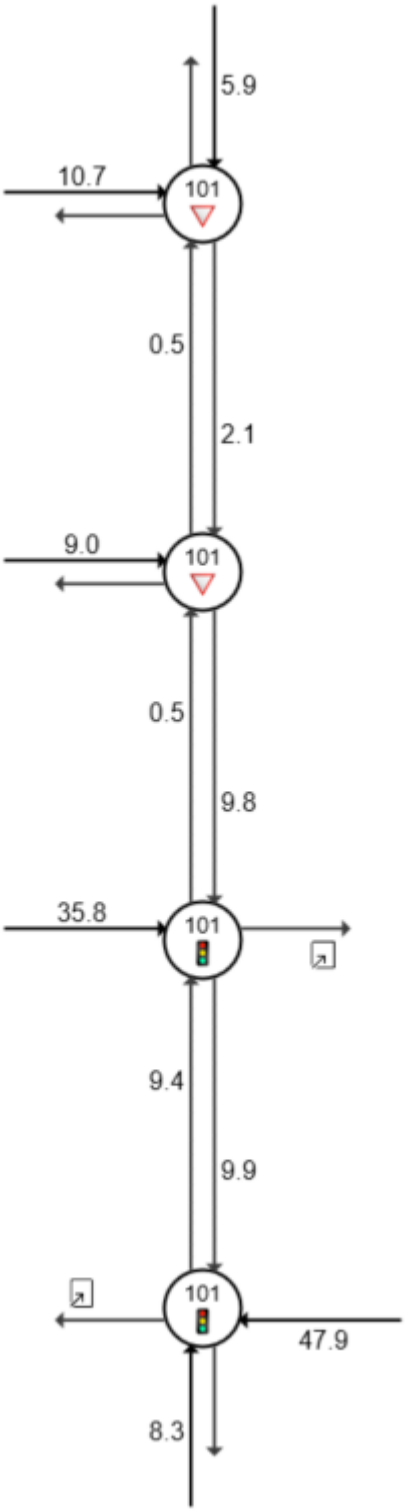
95th percentile queue distance (m) post development



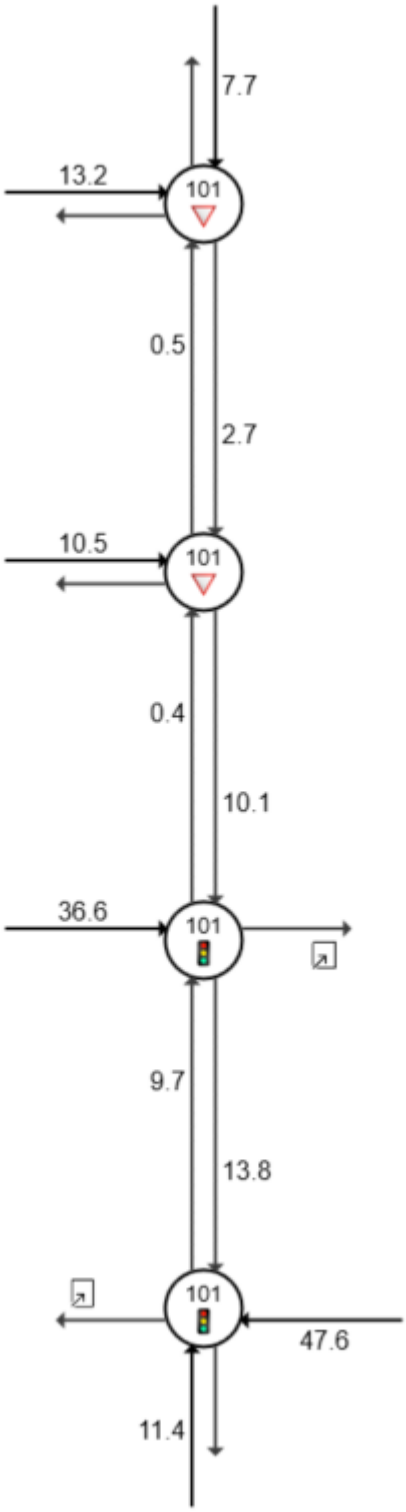
95th percentile queue distance (m) 10 years post development



Average delay (s) post development

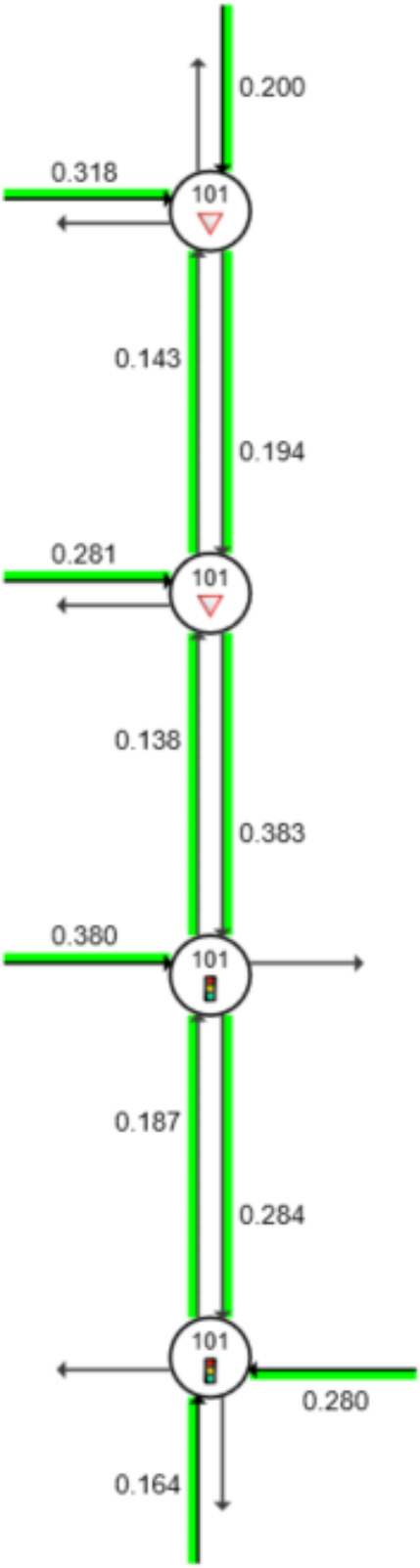


Average delay (s) 10 years post development

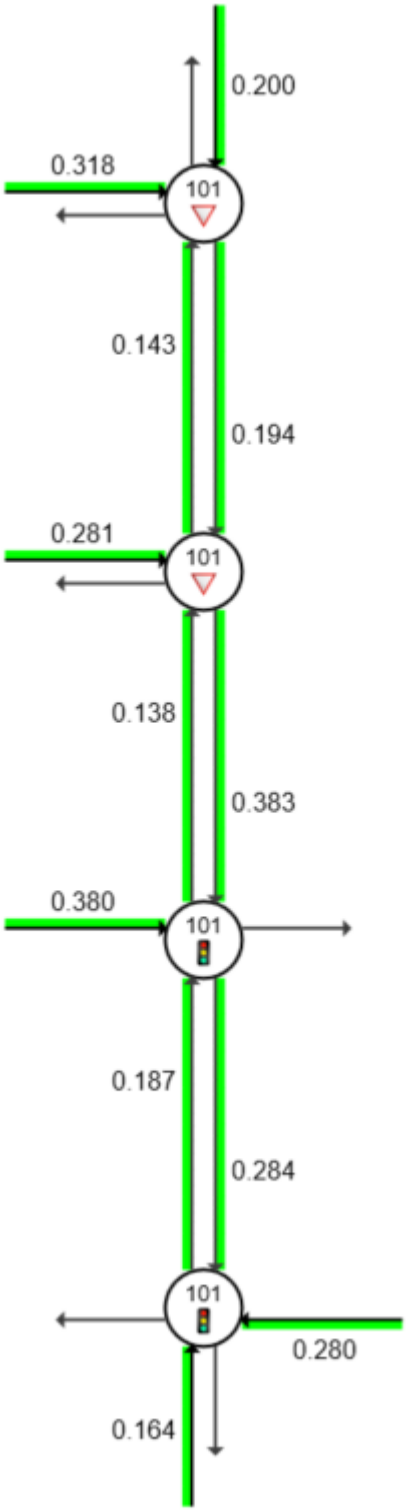


PM PEAK HOUR RESULTS

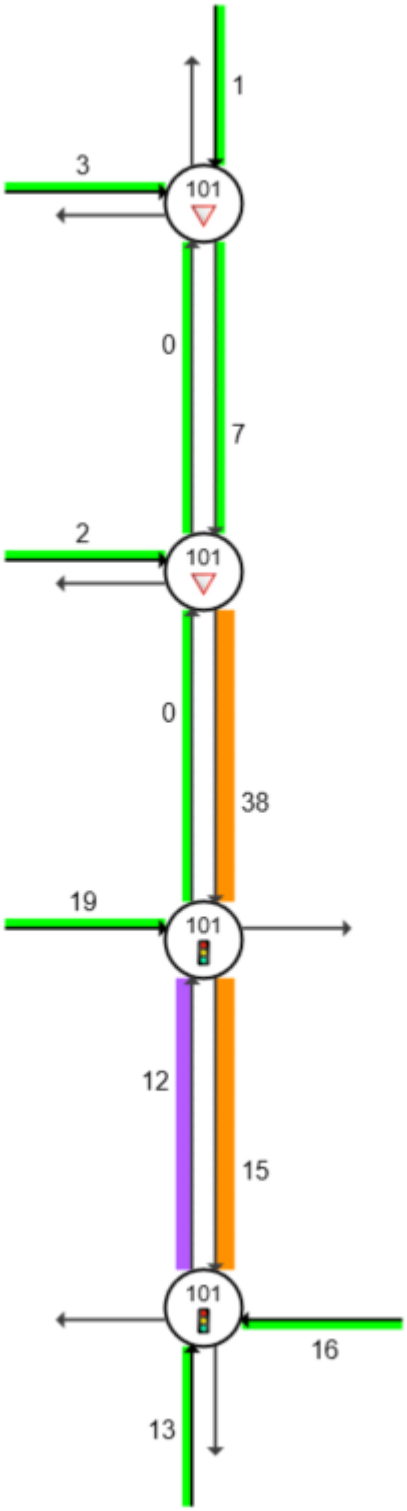
Degree of Saturation post development



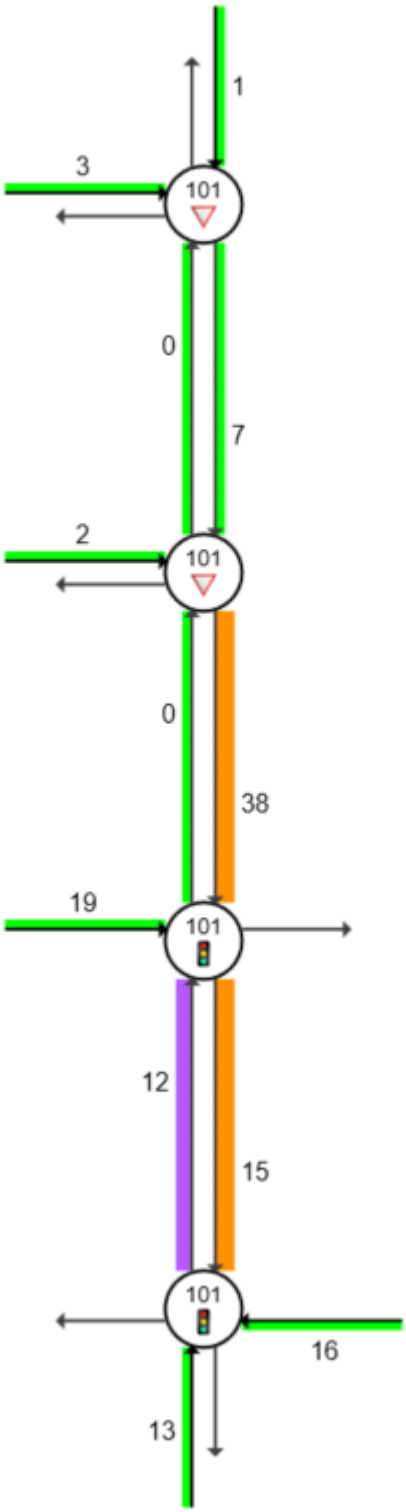
Degree of Saturation 10 years post development



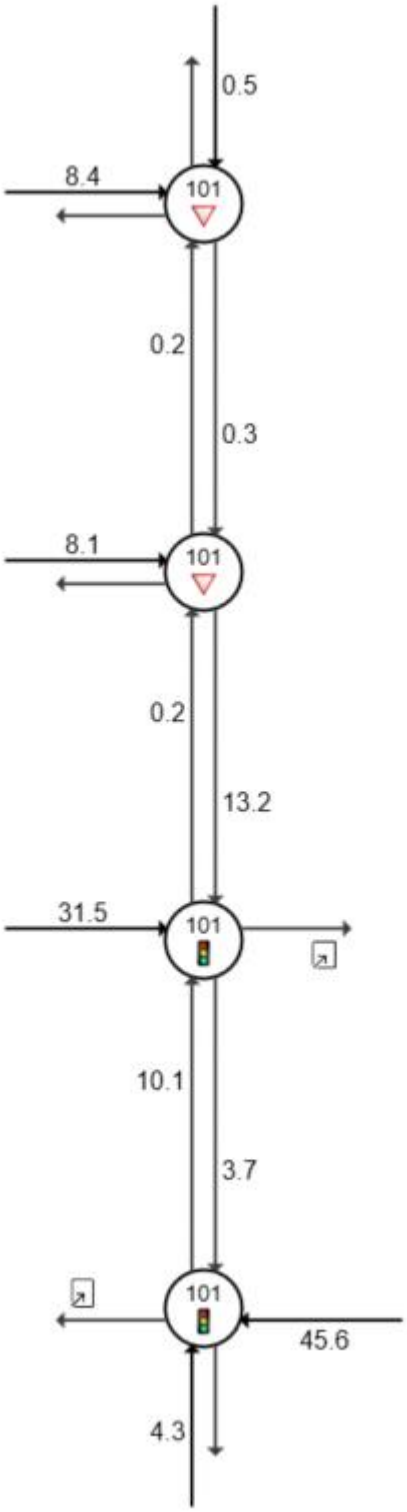
95th percentile queue distance (m) post development



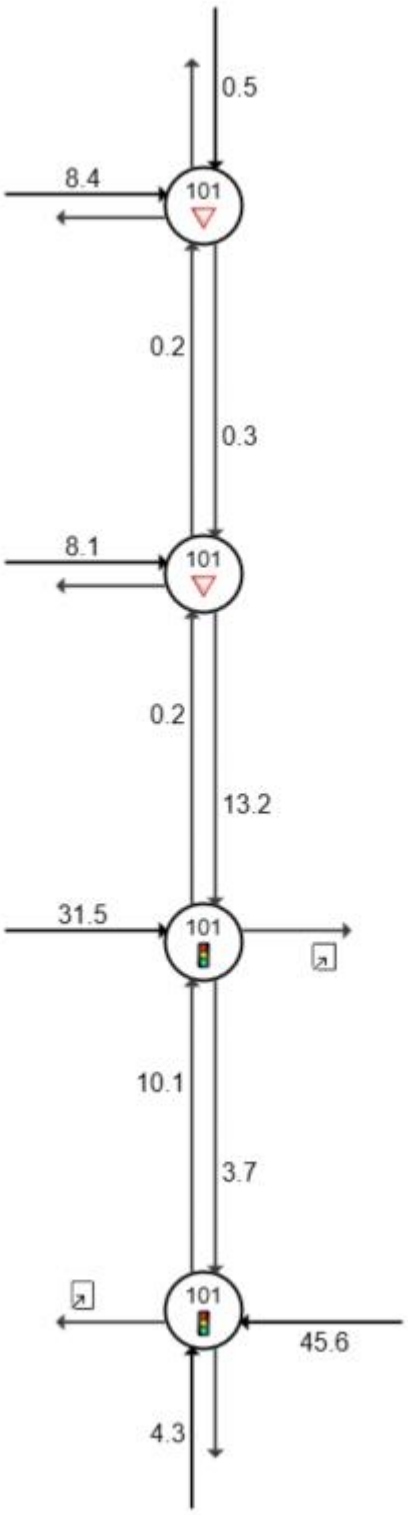
95th percentile queue distance (m) 10 years post development



Average delay (s) post development



Average delay (s) 10 years post development



From the above results, it can be concluded that the intersection operates satisfactorily with the changes to the lanes. The Degree of Saturation values remain below 1.0 for all movements on all legs post development and in the 10-year scenario.

It is noted that the Degree of Saturation for those on the southern leg of National Circuit does reach a value of 0.779 in the AM peak period in the 10-year scenario. This is to be expected given the reduction in the traffic lane for through movements. The DOS does not exceed 1.0 so is still acceptable.

The traffic lane on the southern approach is fairly wide, allowing through vehicles to pass those turning left which would further reduce the delays to through movements from the south.

7.5 TRAFFIC IMPACTS

The above analysis concludes that the traffic generated by the development can be suitably accommodated by the surrounding road network and intersections. The network has been assessed under a worst-case scenario of traffic generation and found to operate satisfactorily during the peak hours.

It is anticipated that the traffic will be further dispersed as it approaches other key intersections such as that of National Circuit / Brisbane Avenue and National Circuit / Canberra Avenue. The impact to these intersections is therefore anticipated to be minimal.

Overall, the proposal is not expected to have any major adverse impact on the operation of the frontage roads or adjacent properties and intersections.

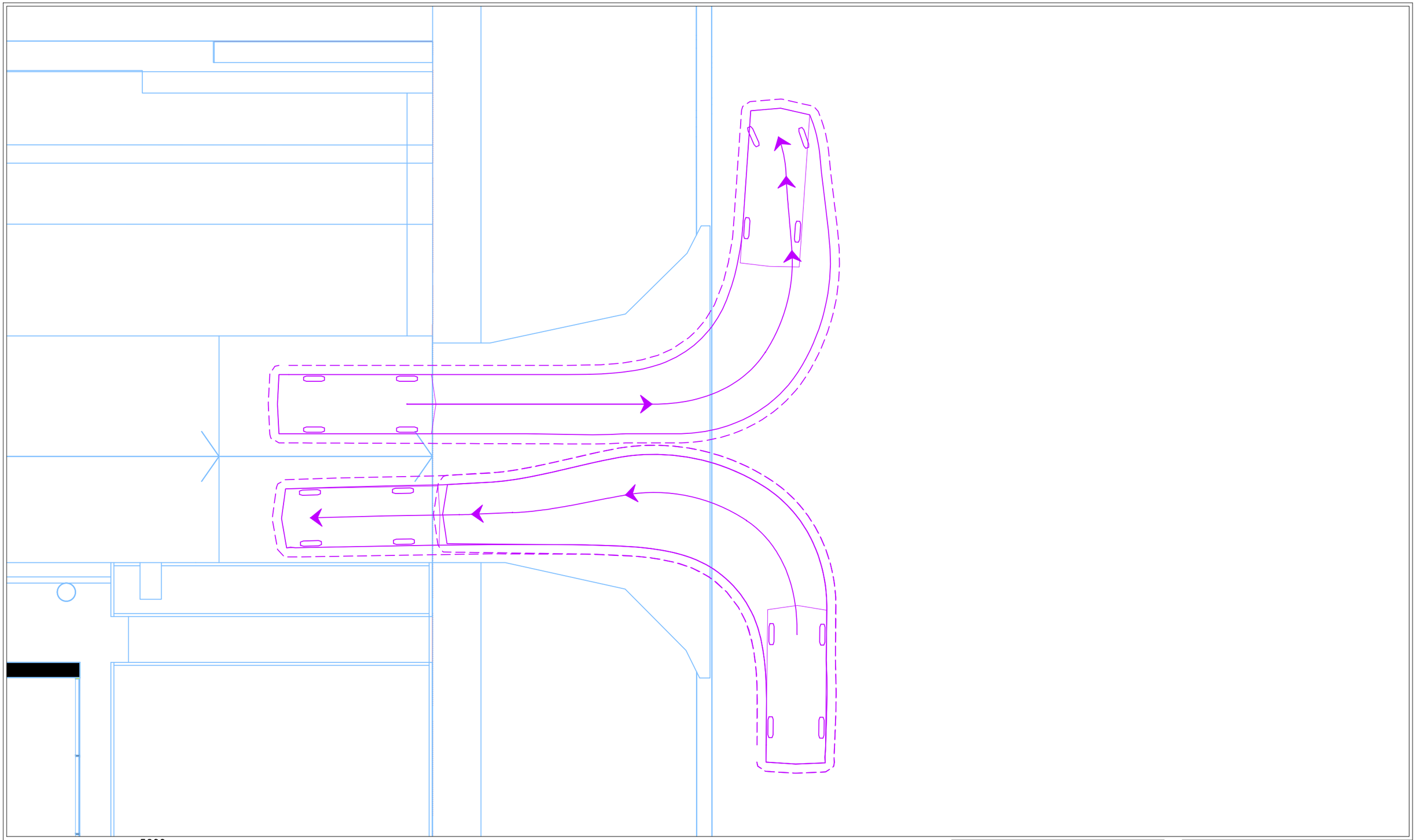
8 CONCLUSION

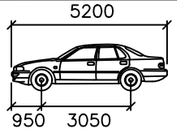
Based on the preceding analysis, the following is concluded:

- It is proposed to develop a five-storey office building with a ground floor café, with a total gross floor area of 37,473m^2;
- Two levels of basement car parking are proposed to provide 356 parking spaces including 6 DDA spaces. This is to be accessed via a new 7.2m wide crossover to National Circuit. An additional 4 parking spaces (including 1 DDA space) are proposed to be located at the site frontage on Sydney Avenue;
- The site is subject to required car parking rate of 1 space per 100m^2 as it lies within the York Park Precinct in the Barton Precinct Code of the National Capital Plan. This results in a requirement for 370 parking spaces, which is not met by the proposed provision of 360 parking spaces;
- The shortfall of 10 parking spaces can be justified given the proposed bicycle parking in excess of the requirements which can reduce the car parking requirement to 352 spaces which is then exceeded by the proposed 360 spaces;
- Bicycle parking facilities and end-of-trip facilities are proposed on ground level and in Basement 1, with a total of 268 spaces proposed. This is in excess of the 147 required employee spaces ad 38 required visitor spaces;
- The proposed car park layout is generally compliant with Australian Standards, with parking spaces 2.4m wide and 5.4m long;
- Adequate on-site provisions have been made for loading and waste collection. This is to occur from Basement 1 by a small to medium sized service vehicle which can reverse into the loading bay from the car park access aisle;
- The proposed ramps to the basement will adequately accommodate the anticipated vehicles, with appropriate grades and transitions provided;
- The proposal is anticipated not anticipated to have any significant adverse impact on the operation of the surrounding road network and intersections. It is not expected to interfere with access to the adjacent crossover to 21 and 23 National Circuit and the intersection of National Circuit and Sydney Avenue is expected to continue to operate satisfactorily post-development.

Therefore, the proposed development is supported from a traffic engineering perspective.

APPENDIX 1 SWEPT PATH DIAGRAMS





B99

	mm
Width	: 1940
Track	: 1840
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

BLOC CONSTRUCTIONS PTY LTD

PROPOSED COMMERCIAL DEVELOPMENT

15 SYDNEY AVENUE

BARTON

SWEPT PATH DIAGRAM

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Sydney: 303, 61 Marlborough Street Surry Hills NSW 2010
Hobart: Level 4, 116 Bathurst St Hobart TAS 7000
Canberra: 45 West Row Canberra ACT 2601

0 1 2 4

SCALE: 1:200 @ A3

MELWAY MAP REF
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DRAWN / CHECKED	DATE	SIZE
CG / JG	01-09-2022	A3

DRAWING NUMBER	REVISION
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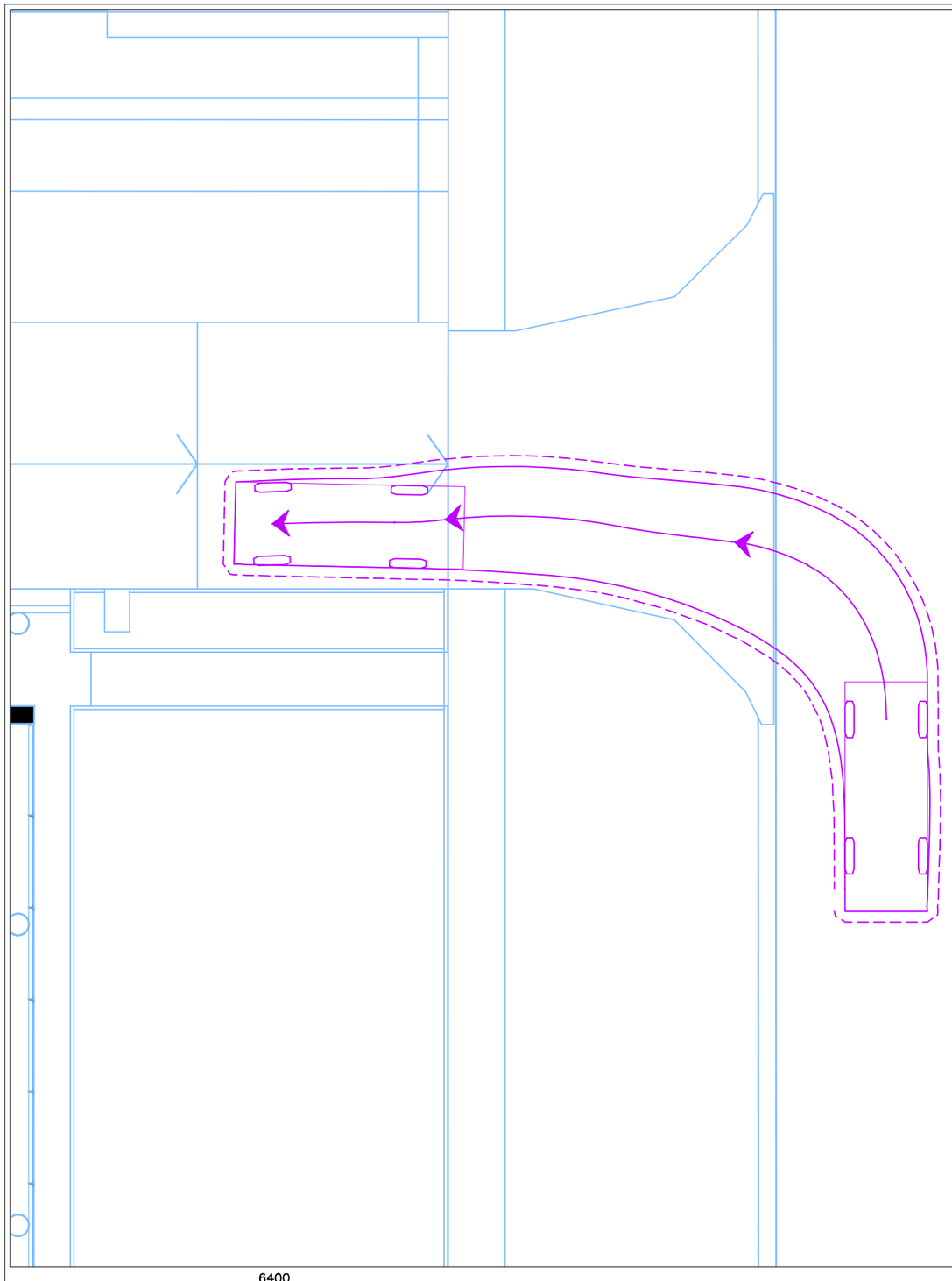

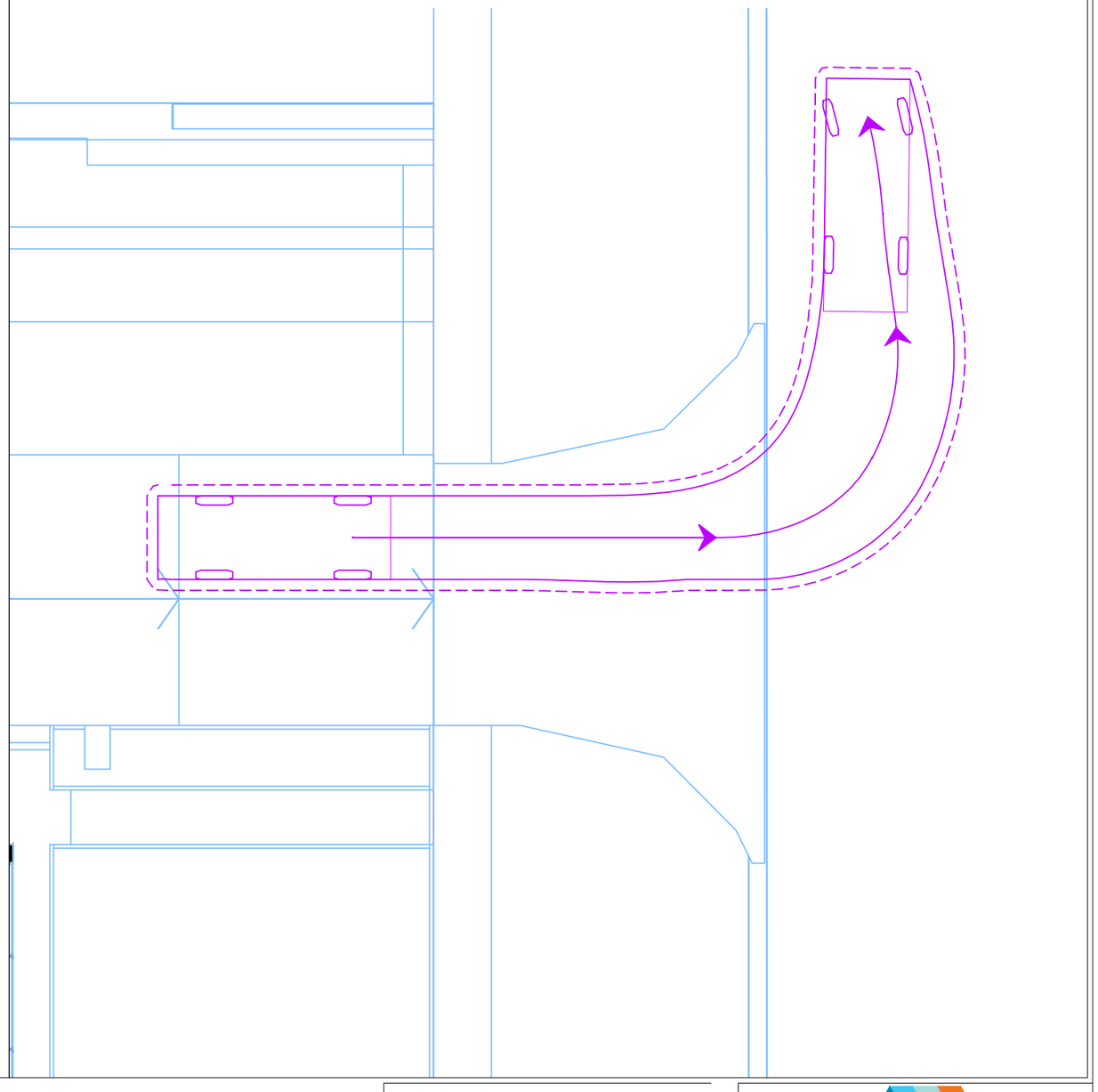

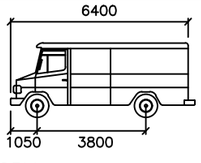

SRV

	mm
Width	: 2300
Track	: 2300
Lock to Lock Time	: 6.0
Steering Angle	: 38.0

BLOC CONSTRUCTIONS PTY LTD

PROPOSED COMMERCIAL DEVELOPMENT

15 SYDNEY AVENUE

BARTON

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Canberra: 45 West Row Canberra ACT 2601

0 0.75 1.5 3

SCALE: 1:150 @ A3

MELWAY MAP REF
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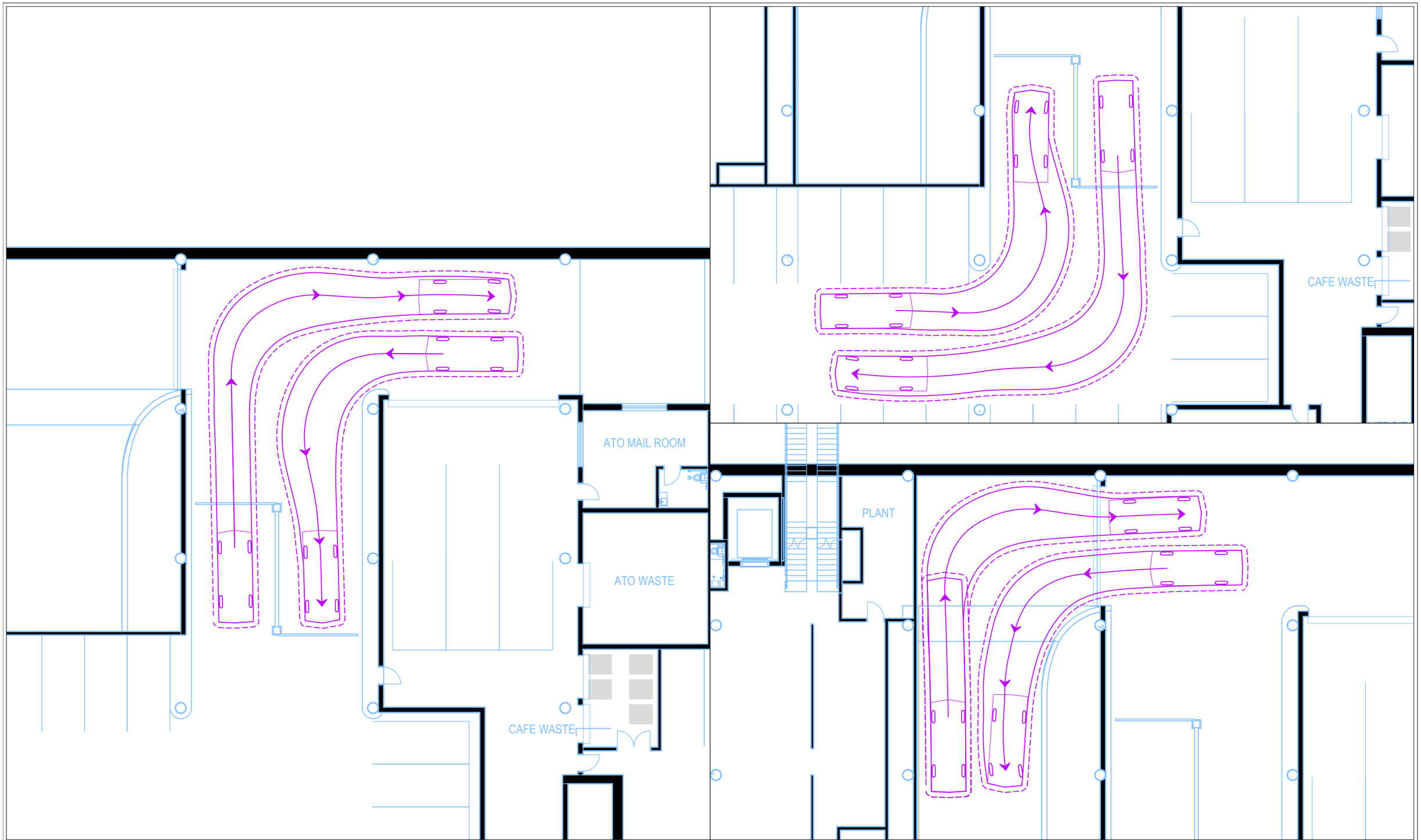
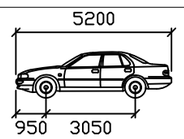
DRAWN / CHECKED	DATE	SIZE
CG / JG	14-10-2022	A3
DRAWING NUMBER		REVISION
22046-SK-002		2





B99

	mm
Width	: 1940
Track	: 1840
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

BLOC CONSTRUCTIONS PTY LTD

PROPOSED COMMERCIAL DEVELOPMENT

15 SYDNEY AVENUE

BARTON

SWEPT PATH DIAGRAM

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0 1 2 4

SCALE: 1:200 @ A3

MELWAY MAP REF
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DRAWN / CHECKED	DATE	SIZE
CG / JG	16-08-2022	A3

DRAWING NUMBER	REVISION
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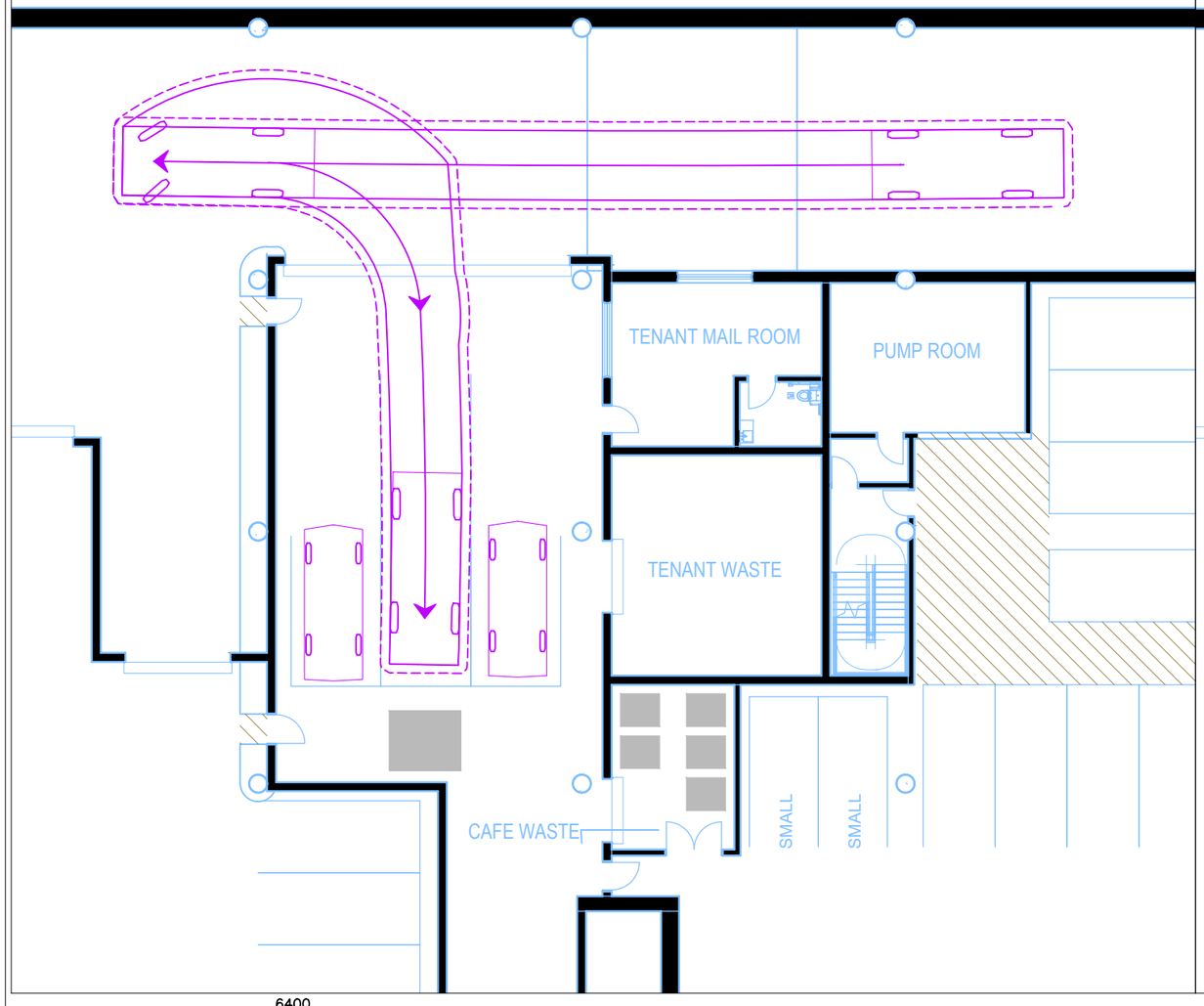

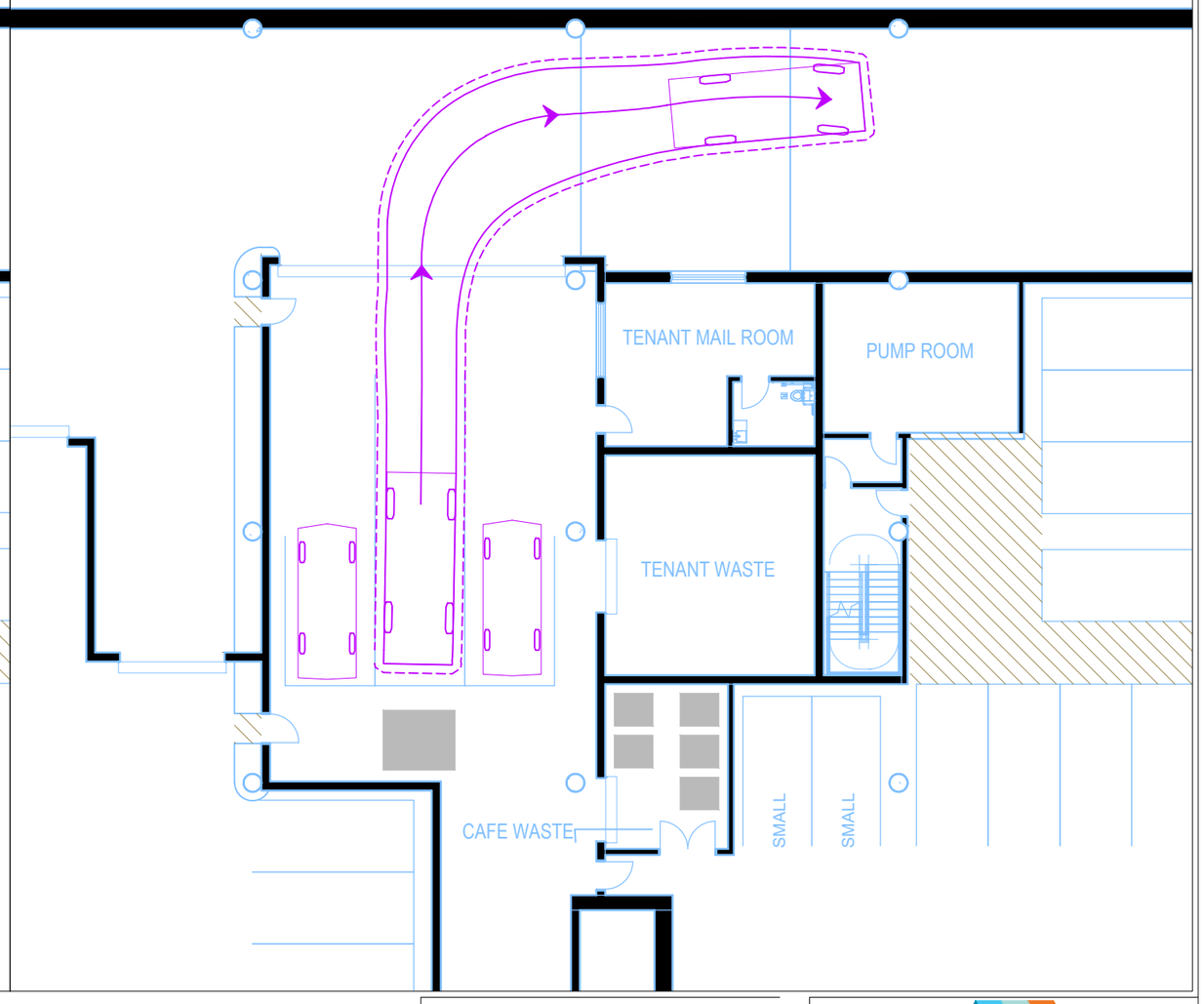

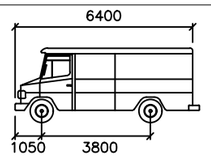

SRV

	mm
Width	: 2300
Track	: 2300
Lock to Lock Time	: 6.0
Steering Angle	: 38.0

BLOC CONSTRUCTIONS PTY LTD

PROPOSED COMMERCIAL DEVELOPMENT

15 SYDNEY AVENUE

BARTON

SWEPT PATH DIAGRAM

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Canberra: 45 West Row Canberra ACT 2601

0 1 2 4

SCALE: 1:200 @ A3

MELWAY MAP REF
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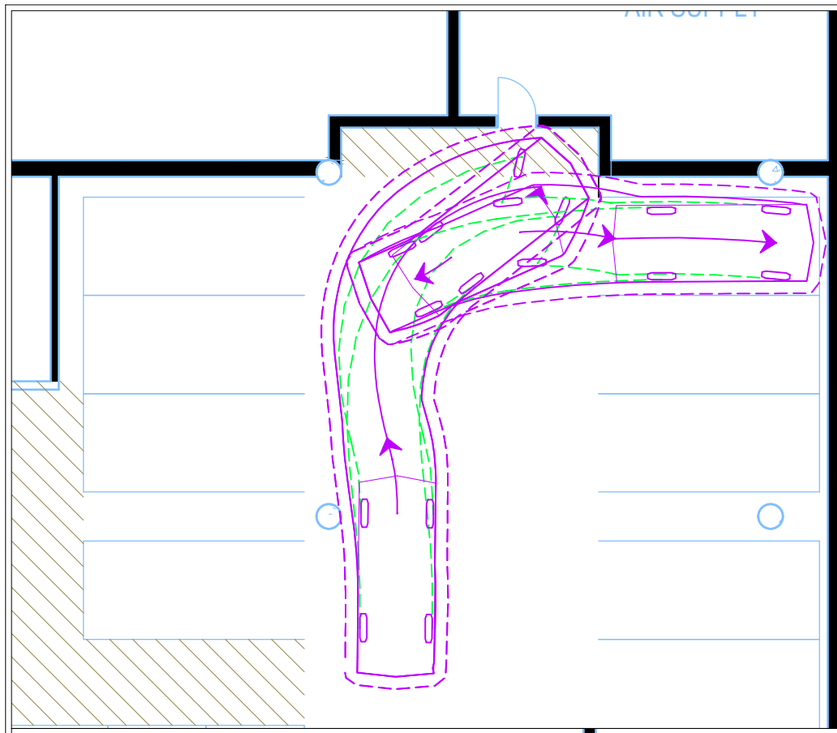
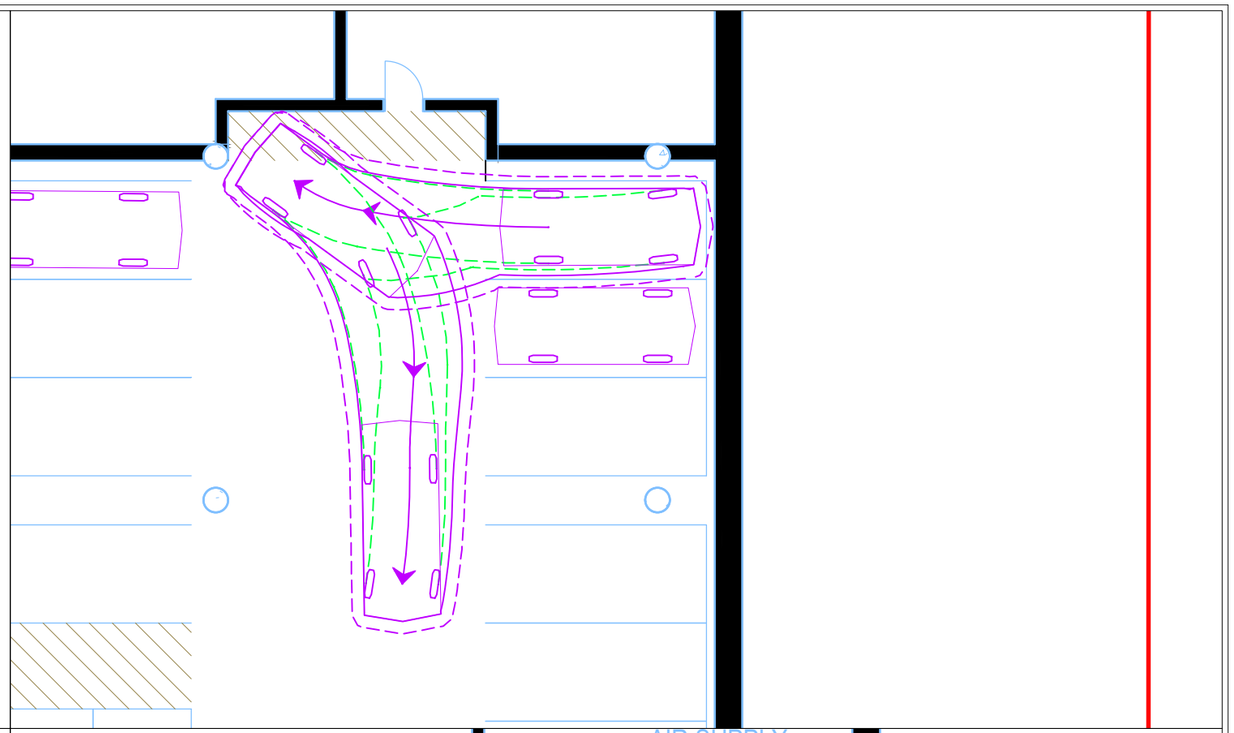
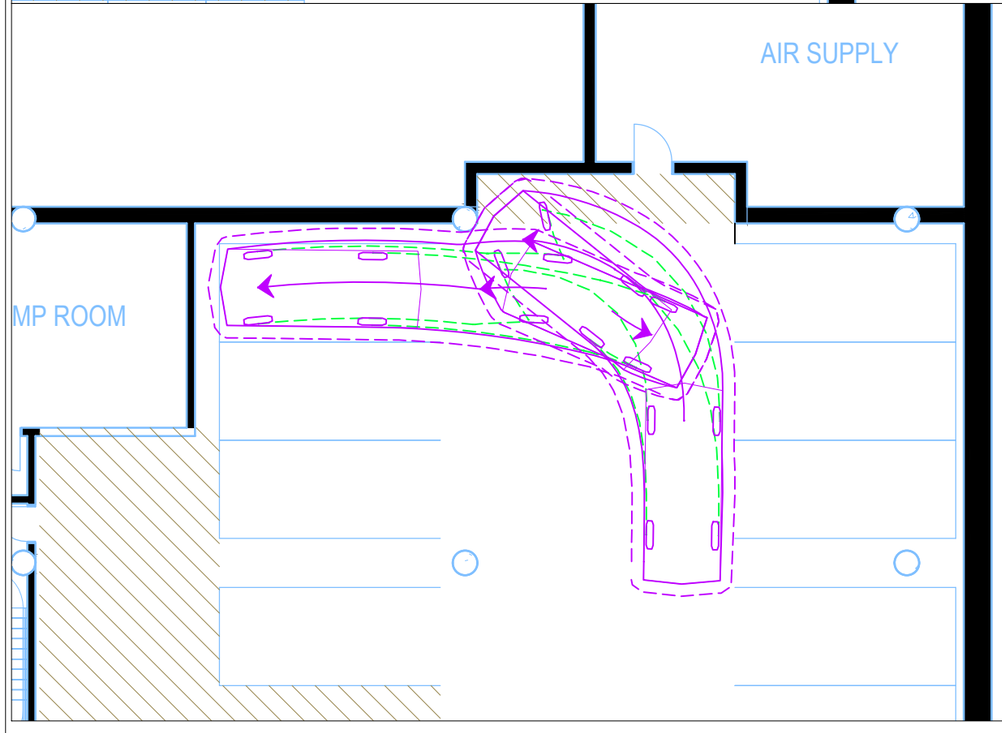
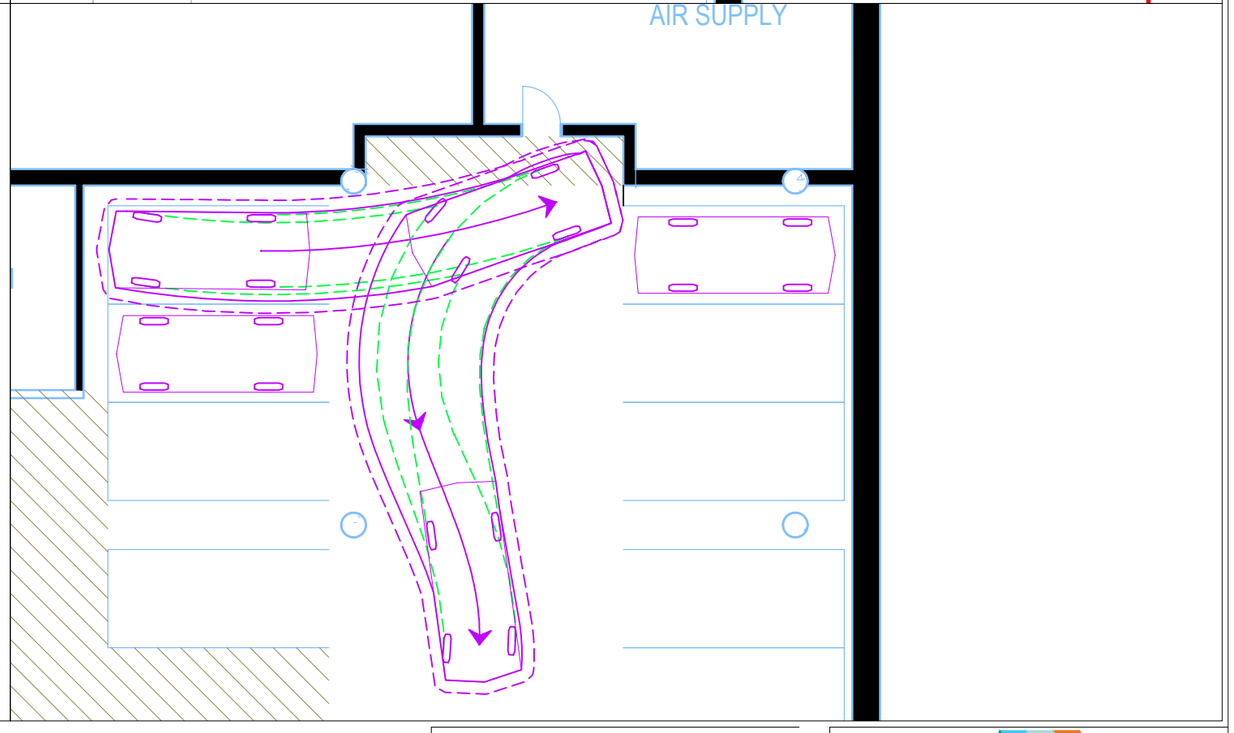
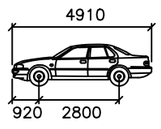
DRAWN / CHECKED	DATE	SIZE
CG / JG	14-10-2022	A3
DRAWING NUMBER		REVISION
22046-SK-004		1











B85

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Lock to Lock Time	: 6.0
Steering Angle	: 34.1

BLOC CONSTRUCTIONS PTY LTD

PROPOSED COMMERCIAL DEVELOPMENT

15 SYDNEY AVENUE

BARTON

SWEPT PATH DIAGRAM

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Canberra: 45 West Row Canberra ACT 2601

0 0.75 1.5 3

SCALE: 1:150 @ A3

MELWAY MAP REF
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DRAWN / CHECKED	DATE	SIZE
CG / JG	01-09-2022	A3

DRAWING NUMBER	REVISION
22046-SK-005	2

APPENDIX 2 SIDRA RESULTS – EXISTING INTERSECTION AM PEAK 2022

MOVEMENT SUMMARY

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Network: N101 [Intersection - AM Existing (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median															
2	T1	320	2.0	320	2.0		0.291	9.4	LOS A	2.1	15.0	0.39	0.37	0.39	17.7
3	R2	43	2.0	43	2.0	*	0.291	12.9	LOS B	2.1	15.0	0.44	0.43	0.44	42.3
Approach		363	2.0	363	2.0		0.291	9.8	LOS A	2.1	15.0	0.40	0.37	0.40	25.3
North: National Circuit															
7	L2	48	2.0	48	2.0		0.200	14.0	LOS B	3.3	23.8	0.51	0.49	0.51	43.1
8	T1	192	2.0	192	2.0		0.200	10.5	LOS B	3.3	23.8	0.51	0.49	0.51	13.0
Approach		240	2.0	240	2.0		0.200	11.2	LOS B	3.3	23.8	0.51	0.49	0.51	26.5
West: Sydney Avenue															
10	L2	157	2.0	157	2.0	*	0.287	35.0	LOS D	3.6	25.7	0.81	0.77	0.81	28.5
11	T1	139	2.0	139	2.0		0.241	28.4	LOS C	3.1	22.3	0.80	0.65	0.80	40.9
12	R2	94	2.0	94	2.0		0.204	33.8	LOS C	2.1	15.0	0.78	0.76	0.78	28.6
Approach		389	2.0	389	2.0		0.287	32.4	LOS C	3.6	25.7	0.80	0.72	0.80	33.8
All Vehicles		993	2.0	993	2.0		0.291	19.0	LOS B	3.6	25.7	0.58	0.54	0.58	31.6

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

MOVEMENT SUMMARY

Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Network: N101 [Intersection - AM Existing (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: National Circuit															
1	L2	208	2.0	208	2.0		0.391	11.7	LOS B	6.7	47.9	0.43	0.51	0.43	51.5
2	T1	363	2.0	363	2.0	*	0.391	6.1	LOS A	6.7	47.9	0.43	0.51	0.43	47.4
Approach		572	2.0	572	2.0		0.391	8.2	LOS A	6.7	47.9	0.43	0.51	0.43	49.5
East: Sydney Avenue															
4	L2	55	2.0	55	2.0		0.345	45.8	LOS D	3.2	23.0	0.93	0.76	0.93	34.7
5	T1	65	2.0	65	2.0		0.345	40.1	LOS D	3.2	23.0	0.93	0.76	0.93	35.3
6	R2	60	2.0	60	2.0	*	0.380	47.7	LOS D	1.7	12.1	0.93	0.77	0.93	23.5
Approach		180	2.0	180	2.0		0.380	44.4	LOS D	3.2	23.0	0.93	0.76	0.93	31.9
North: Median															
8	T1	125	2.0	125	2.0		0.191	5.9	LOS A	2.1	15.0	0.32	0.32	0.32	49.8
9	R2	66	2.0	66	2.0		0.191	13.3	LOS B	2.1	15.0	0.60	0.61	0.60	41.1
Approach		192	2.0	192	2.0		0.191	8.5	LOS A	2.1	15.0	0.42	0.42	0.42	46.4
All Vehicles		943	2.0	943	2.0		0.391	15.1	LOS B	6.7	47.9	0.52	0.54	0.52	43.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Existing (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	64
Green Time (sec)	58	30
Phase Time (sec)	64	36
Phase Split	64%	36%

Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	77
Green Time (sec)	71	17
Phase Time (sec)	77	23
Phase Split	77%	23%

APPENDIX 3 SIDRA RESULTS – EXISTING INTERSECTION PM PEAK

MOVEMENT SUMMARY

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Network: N101 [Intersection - PM Existing (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median															
2	T1	192	2.0	192	2.0		0.169	7.2	LOS A	1.7	11.8	0.30	0.29	0.30	21.0
3	R2	22	2.0	22	2.0		0.169	10.7	LOS B	1.7	11.8	0.36	0.34	0.36	44.5
Approach		214	2.0	214	2.0		0.169	7.6	LOS A	1.7	11.8	0.31	0.29	0.31	28.1
North: National Circuit															
7	L2	18	2.0	18	2.0		0.286	13.7	LOS B	5.1	36.2	0.52	0.46	0.52	43.8
8	T1	341	2.0	341	2.0	*	0.286	10.2	LOS B	5.1	36.2	0.52	0.46	0.52	13.8
Approach		359	2.0	359	2.0		0.286	10.4	LOS B	5.1	36.2	0.52	0.46	0.52	18.3
West: Sydney Avenue															
10	L2	72	2.0	72	2.0		0.140	34.9	LOS C	1.6	11.4	0.79	0.74	0.79	28.5
11	T1	60	2.0	60	2.0		0.111	28.7	LOS C	1.3	9.5	0.78	0.60	0.78	40.8
12	R2	109	2.0	109	2.0	*	0.291	36.4	LOS D	2.6	18.6	0.83	0.77	0.83	27.4
Approach		241	2.0	241	2.0		0.291	34.0	LOS C	2.6	18.6	0.80	0.72	0.80	31.8
All Vehicles		814	2.0	814	2.0		0.291	16.7	LOS B	5.1	36.2	0.55	0.49	0.55	28.6

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

MOVEMENT SUMMARY

Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Network: N101 [Intersection - PM Existing (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: National Circuit															
1	L2	9	2.0	9	2.0		0.139	11.1	LOS B	2.0	14.3	0.36	0.32	0.36	53.3
2	T1	192	2.0	192	2.0		0.139	5.6	LOS A	2.0	14.3	0.36	0.32	0.36	50.4
Approach		201	2.0	201	2.0		0.139	5.8	LOS A	2.0	14.3	0.36	0.32	0.36	50.7
East: Sydney Avenue															
4	L2	46	2.0	46	2.0		0.231	43.3	LOS D	2.3	16.4	0.89	0.73	0.89	35.5
5	T1	73	2.0	73	2.0	*	0.231	37.6	LOS D	2.3	16.4	0.89	0.73	0.89	36.0
6	R2	34	2.0	34	2.0		0.231	43.5	LOS D	1.6	11.7	0.89	0.73	0.89	25.8
Approach		153	2.0	153	2.0		0.231	40.6	LOS D	2.3	16.4	0.89	0.73	0.89	34.2
North: Median															
8	T1	262	2.0	262	2.0		0.242	3.5	LOS A	1.9	13.5	0.19	0.25	0.19	53.5
9	R2	79	2.0	79	2.0	*	0.242	6.8	LOS A	1.9	13.5	0.26	0.34	0.26	48.4
Approach		341	2.0	341	2.0		0.242	4.2	LOS A	1.9	13.5	0.21	0.27	0.21	52.2
All Vehicles		695	2.0	695	2.0		0.242	12.7	LOS B	2.3	16.4	0.40	0.39	0.40	44.3

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Existing (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	66
Green Time (sec)	60	28
Phase Time (sec)	66	34
Phase Split	66%	34%

Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	75
Green Time (sec)	69	19
Phase Time (sec)	75	25
Phase Split	75%	25%

APPENDIX 4 SIDRA RESULTS – EXISTING INTERSECTION AM PEAK 2032

MOVEMENT SUMMARY

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Network: N101 [Intersection - AM Existing - 2032 (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median															
2	T1	390	2.0	390	2.0		0.382	11.6	LOS B	2.1	15.0	0.45	0.42	0.45	15.2
3	R2	53	2.0	53	2.0	*	0.382	15.4	LOS B	2.1	15.0	0.51	0.49	0.51	40.1
Approach		443	2.0	443	2.0		0.382	12.0	LOS B	2.1	15.0	0.45	0.42	0.45	22.4
North: National Circuit															
7	L2	59	2.0	59	2.0		0.257	15.9	LOS B	4.5	32.1	0.56	0.53	0.56	41.3
8	T1	234	2.0	234	2.0		0.257	12.5	LOS B	4.5	32.1	0.56	0.53	0.56	11.5
Approach		293	2.0	293	2.0		0.257	13.2	LOS B	4.5	32.1	0.56	0.53	0.56	24.2
West: Sydney Avenue															
10	L2	191	2.0	191	2.0		0.318	33.2	LOS C	4.3	30.5	0.79	0.78	0.79	29.3
11	T1	169	2.0	169	2.0		0.267	26.4	LOS C	3.7	26.4	0.78	0.64	0.78	41.9
12	R2	114	2.0	114	2.0	*	0.384	34.1	LOS C	2.7	19.3	0.81	0.79	0.81	28.4
Approach		475	2.0	475	2.0		0.384	31.0	LOS C	4.3	30.5	0.79	0.73	0.79	34.4
All Vehicles		1210	2.0	1210	2.0		0.384	19.8	LOS B	4.5	32.1	0.61	0.57	0.61	31.0

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

MOVEMENT SUMMARY

Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Network: N101 [Intersection - AM Existing - 2032 (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: National Circuit															
1	L2	254	2.0	254	2.0		0.477	12.3	LOS B	9.0	63.8	0.47	0.54	0.47	51.1
2	T1	443	2.0	443	2.0	*	0.477	6.7	LOS A	9.0	63.8	0.47	0.54	0.47	46.7
Approach		697	2.0	697	2.0		0.477	8.7	LOS A	9.0	63.8	0.47	0.54	0.47	49.0
East: Sydney Avenue															
4	L2	67	2.0	67	2.0		0.420	46.4	LOS D	4.0	28.4	0.94	0.77	0.94	34.5
5	T1	80	2.0	80	2.0		0.420	40.8	LOS D	4.0	28.4	0.94	0.77	0.94	35.1
6	R2	73	2.0	73	2.0	*	0.463	48.4	LOS D	2.3	16.5	0.94	0.78	0.94	23.3
Approach		219	2.0	219	2.0		0.463	45.0	LOS D	4.0	28.4	0.94	0.78	0.94	31.7
North: Median															
8	T1	153	2.0	153	2.0		0.268	7.2	LOS A	2.1	15.0	0.34	0.32	0.34	48.3
9	R2	81	2.0	81	2.0		0.268	18.1	LOS B	2.1	15.0	0.76	0.71	0.76	37.2
Approach		234	2.0	234	2.0		0.268	11.0	LOS B	2.1	15.0	0.49	0.46	0.49	43.8
All Vehicles		1150	2.0	1150	2.0		0.477	16.1	LOS B	9.0	63.8	0.57	0.57	0.57	42.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Existing - 2032 (Network Folder: General)]

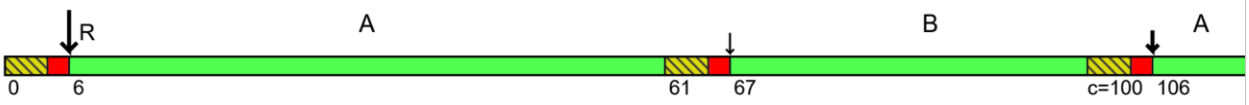
New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Reference Site / CCG



Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Existing (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	61
Green Time (sec)	55	33
Phase Time (sec)	61	39
Phase Split	61%	39%

Site: 101 [National Cct / Sydney Ave 2 - AM Existing (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	77
Green Time (sec)	71	17
Phase Time (sec)	77	23
Phase Split	77%	23%

APPENDIX 5 SIDRA RESULTS – EXISTING INTERSECTION PM PEAK 2032

MOVEMENT SUMMARY

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Network: N101 [Intersection - PM Existing - 2032 (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median															
2	T1	234	2.0	234	2.0		0.251	12.6	LOS B	2.1	15.0	0.44	0.39	0.44	14.3
3	R2	27	2.0	27	2.0		0.251	17.3	LOS B	2.1	15.0	0.51	0.47	0.51	38.6
Approach		260	2.0	260	2.0		0.251	13.1	LOS B	2.1	15.0	0.45	0.40	0.45	20.4
North: National Circuit															
7	L2	22	2.0	22	2.0		0.403	18.9	LOS B	7.8	55.8	0.65	0.58	0.65	39.3
8	T1	416	2.0	416	2.0	*	0.403	15.5	LOS B	7.8	55.8	0.65	0.58	0.65	9.9
Approach		438	2.0	438	2.0		0.403	15.6	LOS B	7.8	55.8	0.65	0.58	0.65	13.5
West: Sydney Avenue															
10	L2	87	2.0	87	2.0		0.133	28.9	LOS C	1.7	12.4	0.71	0.73	0.71	31.2
11	T1	73	2.0	73	2.0		0.106	22.7	LOS C	1.4	10.3	0.70	0.55	0.70	43.7
12	R2	133	2.0	133	2.0	*	0.411	32.2	LOS C	3.1	22.0	0.80	0.79	0.80	29.3
Approach		294	2.0	294	2.0		0.411	28.8	LOS C	3.1	22.0	0.74	0.71	0.74	34.2
All Vehicles		992	2.0	992	2.0		0.411	18.9	LOS B	7.8	55.8	0.63	0.57	0.63	26.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

MOVEMENT SUMMARY

Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Network: N101 [Intersection - PM Existing - 2032 (Network Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: National Circuit															
1	L2	12	2.0	12	2.0		0.170	11.3	LOS B	2.5	17.9	0.37	0.34	0.37	53.2
2	T1	234	2.0	234	2.0		0.170	5.7	LOS A	2.5	17.9	0.37	0.34	0.37	50.2
Approach		245	2.0	245	2.0		0.170	6.0	LOS A	2.5	17.9	0.37	0.34	0.37	50.5
East: Sydney Avenue															
4	L2	56	2.0	56	2.0		0.303	44.0	LOS D	3.1	21.9	0.90	0.75	0.90	35.4
5	T1	89	2.0	89	2.0	*	0.303	38.3	LOS D	3.1	21.9	0.90	0.75	0.90	35.8
6	R2	41	2.0	41	2.0		0.303	44.5	LOS D	1.8	13.0	0.90	0.74	0.90	25.3
Approach		186	2.0	186	2.0		0.303	41.4	LOS D	3.1	21.9	0.90	0.75	0.90	33.9
North: Median															
8	T1	320	2.0	320	2.0		0.301	3.6	LOS A	2.1	15.0	0.20	0.26	0.20	53.3
9	R2	96	2.0	96	2.0	*	0.301	7.1	LOS A	2.1	15.0	0.28	0.36	0.28	48.1
Approach		416	2.0	416	2.0		0.301	4.4	LOS A	2.1	15.0	0.22	0.28	0.22	52.0
All Vehicles		847	2.0	847	2.0		0.303	13.0	LOS B	3.1	21.9	0.41	0.40	0.41	44.0

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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)

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Existing - 2032 (Network Folder: General)]

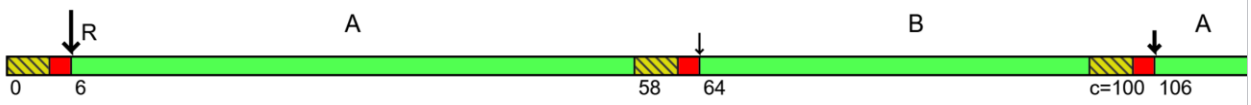
New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Reference Site / CCG



Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Existing (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	58
Green Time (sec)	52	36
Phase Time (sec)	58	42
Phase Split	58%	42%

Site: 101 [National Cct / Sydney Ave 2 - PM Existing (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	75
Green Time (sec)	69	19
Phase Time (sec)	75	25
Phase Split	75%	25%

APPENDIX 6 POST DEVELOPMENT SIDRA RESULTS – AM PEAK 2022

NETWORK SUMMARY

Network: N101 [Intersection - AM Post Development (2022) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.71			
Travel Time Index	6.83			
Congestion Coefficient	1.40			
Travel Speed (Average)	42.9 km/h		3.7 km/h	32.6 km/h
Travel Distance (Total)	1821.4 veh-km/h		66.9 ped-km/h	2252.6 pers-km/h
Travel Time (Total)	42.5 veh-h/h		18.2 ped-h/h	69.2 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	4325 veh/h		316 ped/h	5506 pers/h
Arrival Flows (Total for all Sites)	4325 veh/h		316 ped/h	5506 pers/h
Demand Flows (Entry Total)	1604 veh/h			
Midblock Inflows (Total)	297 veh/h			
Midblock Outflows (Total)	-96 veh/h			
Percent Heavy Vehicles (Demand)	2.2 %			
Percent Heavy Vehicles (Arrival)	2.2 %			
Degree of Saturation	0.416			
Control Delay (Total)	11.71 veh-h/h		3.88 ped-h/h	17.94 pers-h/h
Control Delay (Average)	9.7 sec		44.3 sec	11.7 sec
Control Delay (Worst Lane)	46.1 sec			
Control Delay (Worst Movement)	46.1 sec		44.3 sec	46.1 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	8.4 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1496 veh/h		297 ped/h	2093 pers/h
Effective Stop Rate	0.35	0.82 per km	0.94	0.38
Proportion Queued	0.36		0.94	0.39
Performance Index	149.9		19.8	169.7
Cost (Total)	1805.67 $/h	0.99 $/km	502.02 $/h	2307.69 $/h
Fuel Consumption (Total)	177.0 L/h	97.2 mL/km		
Fuel Economy	9.7 L/100km			
Carbon Dioxide (Total)	418.0 kg/h	229.5 g/km		
Hydrocarbons (Total)	0.036 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.469 kg/h	0.258 g/km		
NOx (Total)	0.407 kg/h	0.224 g/km		

Network Model Variability Index (Iterations 3 to N): 2.5 %
Number of Iterations: 9 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Post Development (2022) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 1 - AM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	66
Green Time (sec)	60	28
Phase Time (sec)	66	34
Phase Split	66%	34%

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	75
Green Time (sec)	69	19
Phase Time (sec)	75	25
Phase Split	75%	25%

APPENDIX 7 POST DEVELOPMENT SIDRA RESULTS – PM PEAK

NETWORK SUMMARY

Network: N101 [Intersection - PM Post Development (2022) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.72			
Travel Time Index	6.93			
Congestion Coefficient	1.38			
Travel Speed (Average)	43.4 km/h		3.7 km/h	30.3 km/h
Travel Distance (Total)	1330.3 veh-km/h		66.9 ped-km/h	1663.3 pers-km/h
Travel Time (Total)	30.7 veh-h/h		18.2 ped-h/h	55.0 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Arrival Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Demand Flows (Entry Total)	1378 veh/h			
Midblock Inflows (Total)	4 veh/h			
Midblock Outflows (Total)	-277 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.383			
Control Delay (Total)	8.28 veh-h/h		3.88 ped-h/h	13.82 pers-h/h
Control Delay (Average)	8.7 sec		44.3 sec	11.3 sec
Control Delay (Worst Lane)	44.5 sec			
Control Delay (Worst Movement)	46.8 sec		44.3 sec	46.8 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	7.5 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1139 veh/h		297 ped/h	1665 pers/h
Effective Stop Rate	0.33	0.86 per km	0.94	0.38
Proportion Queued	0.32		0.94	0.37
Performance Index	109.4		19.8	129.2
Cost (Total)	1295.27 $/h	0.97 $/km	502.02 $/h	1797.28 $/h
Fuel Consumption (Total)	124.5 L/h	93.6 mL/km		
Fuel Economy	9.4 L/100km			
Carbon Dioxide (Total)	293.9 kg/h	220.9 g/km		
Hydrocarbons (Total)	0.025 kg/h	0.019 g/km		
Carbon Monoxide (Total)	0.332 kg/h	0.250 g/km		
NOx (Total)	0.277 kg/h	0.208 g/km		

Network Model Variability Index (Iterations 3 to N): 40.4 %
Number of Iterations: 7 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.5% 0.6% 0.9%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Post Development (2022) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	78
Green Time (sec)	72	16
Phase Time (sec)	78	22
Phase Split	78%	22%

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	62
Green Time (sec)	56	32
Phase Time (sec)	62	38
Phase Split	62%	38%

APPENDIX 8 POST DEVELOPMENT SIDRA RESULTS – AM PEAK 2032

NETWORK SUMMARY

Network: N101 [Intersection - AM Post Development (2032) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS D			
Speed Efficiency	0.70			
Travel Time Index	6.64			
Congestion Coefficient	1.43			
Travel Speed (Average)	41.8 km/h		3.7 km/h	31.8 km/h
Travel Distance (Total)	2151.7 veh-km/h		81.6 ped-km/h	2663.6 pers-km/h
Travel Time (Total)	51.4 veh-h/h		22.2 ped-h/h	83.9 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	5167 veh/h		385 ped/h	6586 pers/h
Arrival Flows (Total for all Sites)	5167 veh/h		385 ped/h	6586 pers/h
Demand Flows (Entry Total)	1920 veh/h			
Midblock Inflows (Total)	302 veh/h			
Midblock Outflows (Total)	-117 veh/h			
Percent Heavy Vehicles (Demand)	2.2 %			
Percent Heavy Vehicles (Arrival)	2.2 %			
Degree of Saturation	0.507			
Control Delay (Total)	15.10 veh-h/h		4.74 ped-h/h	22.86 pers-h/h
Control Delay (Average)	10.5 sec		44.3 sec	12.5 sec
Control Delay (Worst Lane)	46.9 sec			
Control Delay (Worst Movement)	46.9 sec		44.3 sec	46.9 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	9.3 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1837 veh/h		363 ped/h	2568 pers/h
Effective Stop Rate	0.36	0.85 per km	0.94	0.39
Proportion Queued	0.38		0.94	0.42
Performance Index	187.0		24.2	211.2
Cost (Total)	2179.23 $/h	1.01 $/km	612.02 $/h	2791.24 $/h
Fuel Consumption (Total)	211.7 L/h	98.4 mL/km		
Fuel Economy	9.8 L/100km			
Carbon Dioxide (Total)	500.0 kg/h	232.4 g/km		
Hydrocarbons (Total)	0.043 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.559 kg/h	0.260 g/km		
NOx (Total)	0.499 kg/h	0.232 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Post Development (2032) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	66
Green Time (sec)	60	28
Phase Time (sec)	66	34
Phase Split	66%	34%

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	75
Green Time (sec)	69	19
Phase Time (sec)	75	25
Phase Split	75%	25%

APPENDIX 9 POST DEVELOPMENT SIDRA RESULTS – PM PEAK 2032

NETWORK SUMMARY

Network: N101 [Intersection - PM Post Development (2032) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.71			
Travel Time Index	6.77			
Congestion Coefficient	1.41			
Travel Speed (Average)	42.6 km/h		3.7 km/h	29.5 km/h
Travel Distance (Total)	1555.1 veh-km/h		81.6 ped-km/h	1947.8 pers-km/h
Travel Time (Total)	36.5 veh-h/h		22.2 ped-h/h	66.0 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	4063 veh/h		385 ped/h	5261 pers/h
Arrival Flows (Total for all Sites)	4063 veh/h		385 ped/h	5261 pers/h
Demand Flows (Entry Total)	1590 veh/h			
Midblock Inflows (Total)	25 veh/h			
Midblock Outflows (Total)	-307 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.502			
Control Delay (Total)	10.41 veh-h/h		4.74 ped-h/h	17.23 pers-h/h
Control Delay (Average)	9.2 sec		44.3 sec	11.8 sec
Control Delay (Worst Lane)	44.9 sec			
Control Delay (Worst Movement)	46.8 sec		44.3 sec	46.8 sec
Geometric Delay (Average)	1.2 sec			
Stop-Line Delay (Average)	8.1 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1412 veh/h		363 ped/h	2057 pers/h
Effective Stop Rate	0.35	0.91 per km	0.94	0.39
Proportion Queued	0.34		0.94	0.39
Performance Index	130.8		24.2	155.0
Cost (Total)	1543.72 $/h	0.99 $/km	612.02 $/h	2155.74 $/h
Fuel Consumption (Total)	148.2 L/h	95.3 mL/km		
Fuel Economy	9.5 L/100km			
Carbon Dioxide (Total)	350.0 kg/h	225.1 g/km		
Hydrocarbons (Total)	0.030 kg/h	0.019 g/km		
Carbon Monoxide (Total)	0.394 kg/h	0.253 g/km		
NOx (Total)	0.339 kg/h	0.218 g/km		

Network Model Variability Index (Iterations 3 to N): 15.7 %
Number of Iterations: 10 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Post Development (2032) (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	77
Green Time (sec)	71	17
Phase Time (sec)	77	23
Phase Split	77%	23%

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	62
Green Time (sec)	56	32
Phase Time (sec)	62	38
Phase Split	62%	38%

APPENDIX 10 POST DEVELOPMENT WITH 80% TRAFFIC RESULTS – AM PEAK 2022

NETWORK SUMMARY

Network: N101 [AM Peak - 80% traffic - 2022 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic]

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.79			
Travel Time Index	7.63			
Congestion Coefficient	1.27			
Travel Speed (Average)	47.2 km/h		4.4 km/h	37.1 km/h
Travel Distance (Total)	1925.7 veh-km/h		66.9 ped-km/h	2377.8 pers-km/h
Travel Time (Total)	40.8 veh-h/h		15.1 ped-h/h	64.1 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	4468 veh/h		316 ped/h	5678 pers/h
Arrival Flows (Total for all Sites)	4468 veh/h		316 ped/h	5678 pers/h
Demand Flows (Entry Total)	1707 veh/h			
Midblock Inflows (Total)	370 veh/h			
Midblock Outflows (Total)	-176 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.780			
Control Delay (Total)	8.22 veh-h/h		0.84 ped-h/h	10.71 pers-h/h
Control Delay (Average)	6.6 sec		9.6 sec	6.8 sec
Control Delay (Worst Lane)	18.0 sec			
Control Delay (Worst Movement)	18.0 sec		9.6 sec	18.0 sec
Geometric Delay (Average)	1.4 sec			
Stop-Line Delay (Average)	5.2 sec			
Ave. Queue Storage Ratio (Worst Lane)	0.86			
Total Effective Stops	1951 veh/h		253 ped/h	2595 pers/h
Effective Stop Rate	0.44	1.01 per km	0.80	0.46
Proportion Queued	0.47		0.80	0.49
Performance Index	109.3		16.6	125.9
Cost (Total)	1772.35 $/h	0.92 $/km	418.11 $/h	2190.46 $/h
Fuel Consumption (Total)	187.0 L/h	97.1 mL/km		
Fuel Economy	9.7 L/100km			
Carbon Dioxide (Total)	441.6 kg/h	229.3 g/km		
Hydrocarbons (Total)	0.038 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.496 kg/h	0.258 g/km		
NOx (Total)	0.439 kg/h	0.228 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [AM Peak - 80% traffic - 2022 (Network Folder: General)]

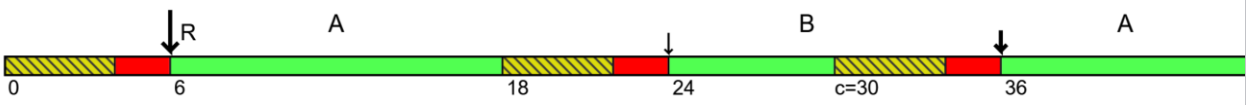
New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic]

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic (Site Folder: General)]



Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	17
Green Time (sec)	11	7
Phase Time (sec)	17	13
Phase Split	57%	43%

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	6
Phase Time (sec)	18	12
Phase Split	60%	40%

APPENDIX 11 POST DEVELOPMENT WITH 80% TRAFFIC RESULTS – PM PEAK 2022

NETWORK SUMMARY

Network: N101 [PM Peak - 80% traffic - 2022 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic]

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS B			
Speed Efficiency	0.81			
Travel Time Index	7.88			
Congestion Coefficient	1.24			
Travel Speed (Average)	48.6 km/h		4.4 km/h	35.4 km/h
Travel Distance (Total)	1437.8 veh-km/h		66.9 ped-km/h	1792.3 pers-km/h
Travel Time (Total)	29.6 veh-h/h		15.1 ped-h/h	50.7 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	3676 veh/h		316 ped/h	4727 pers/h
Arrival Flows (Total for all Sites)	3676 veh/h		316 ped/h	4727 pers/h
Demand Flows (Entry Total)	1501 veh/h			
Midblock Inflows (Total)	3 veh/h			
Midblock Outflows (Total)	-321 veh/h			
Percent Heavy Vehicles (Demand)	2.0 %			
Percent Heavy Vehicles (Arrival)	2.0 %			
Degree of Saturation	0.602			
Control Delay (Total)	5.42 veh-h/h		0.84 ped-h/h	7.35 pers-h/h
Control Delay (Average)	5.3 sec		9.6 sec	5.6 sec
Control Delay (Worst Lane)	18.9 sec			
Control Delay (Worst Movement)	18.9 sec		9.6 sec	18.9 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	4.0 sec			
Ave. Queue Storage Ratio (Worst Lane)	0.90			
Total Effective Stops	1487 veh/h		253 ped/h	2037 pers/h
Effective Stop Rate	0.40	1.03 per km	0.80	0.43
Proportion Queued	0.41		0.80	0.44
Performance Index	77.9		16.6	94.5
Cost (Total)	1284.89 $/h	0.89 $/km	418.11 $/h	1703.00 $/h
Fuel Consumption (Total)	135.4 L/h	94.2 mL/km		
Fuel Economy	9.4 L/100km			
Carbon Dioxide (Total)	319.6 kg/h	222.3 g/km		
Hydrocarbons (Total)	0.027 kg/h	0.019 g/km		
Carbon Monoxide (Total)	0.361 kg/h	0.251 g/km		
NOx (Total)	0.313 kg/h	0.218 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

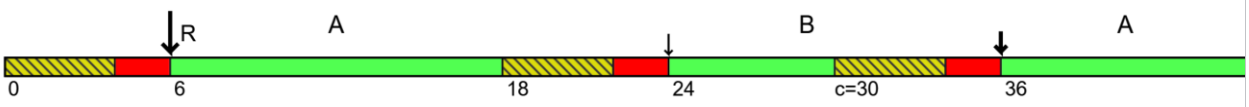
Network: N101 [PM Peak - 80% traffic - 2022 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic]

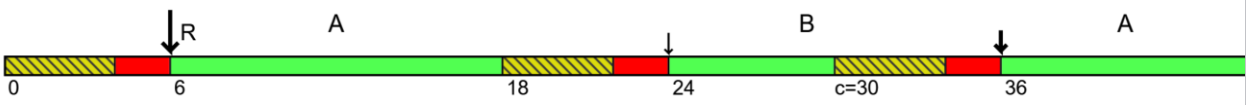
Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG



Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) - 80% traffic (Site Folder: General)]



Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	6
Phase Time (sec)	18	12
Phase Split	60%	40%

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	6
Phase Time (sec)	18	12
Phase Split	60%	40%

APPENDIX 12 POST DEVELOPMENT WITH 80% TRAFFIC RESULTS – AM PEAK 2032

NETWORK SUMMARY

Network: N101 [AM Peak - 80% traffic - 2032 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 40 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic]
Design Life Analysis (Final Year): Results for 10 years

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.77			
Travel Time Index	7.47			
Congestion Coefficient	1.29			
Travel Speed (Average)	46.4 km/h		4.3 km/h	36.1 km/h
Travel Distance (Total)	2265.5 veh-km/h		81.6 ped-km/h	2800.2 pers-km/h
Travel Time (Total)	48.9 veh-h/h		19.0 ped-h/h	77.6 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	5317 veh/h		385 ped/h	6766 pers/h
Arrival Flows (Total for all Sites)	5317 veh/h		385 ped/h	6766 pers/h
Demand Flows (Entry Total)	2041 veh/h			
Midblock Inflows (Total)	376 veh/h			
Midblock Outflows (Total)	-214 veh/h			
Percent Heavy Vehicles (Demand)	2.2 %			
Percent Heavy Vehicles (Arrival)	2.2 %			
Degree of Saturation	0.699			
Control Delay (Total)	10.60 veh-h/h		1.55 ped-h/h	14.27 pers-h/h
Control Delay (Average)	7.2 sec		14.5 sec	7.6 sec
Control Delay (Worst Lane)	27.6 sec			
Control Delay (Worst Movement)	27.6 sec		14.5 sec	27.6 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	5.8 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	2160 veh/h		328 ped/h	2920 pers/h
Effective Stop Rate	0.41	0.95 per km	0.85	0.43
Proportion Queued	0.46		0.85	0.48
Performance Index	138.6		20.8	159.4
Cost (Total)	2112.28 $/h	0.93 $/km	524.04 $/h	2636.32 $/h
Fuel Consumption (Total)	219.3 L/h	96.8 mL/km		
Fuel Economy	9.7 L/100km			
Carbon Dioxide (Total)	518.0 kg/h	228.6 g/km		
Hydrocarbons (Total)	0.044 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.582 kg/h	0.257 g/km		
NOx (Total)	0.523 kg/h	0.231 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [AM Peak - 80% traffic - 2032 (Network Folder: General)]

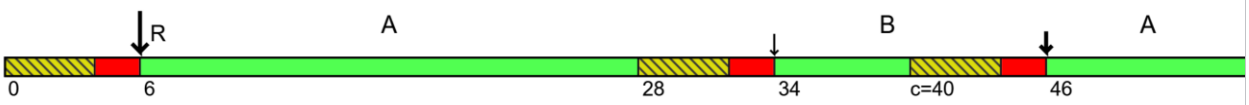
New Network
Network Category: (None)
Network Cycle Time = 40 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic]
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic (Site Folder: General)]



Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	24
Green Time (sec)	18	10
Phase Time (sec)	24	16
Phase Split	60%	40%

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	28
Green Time (sec)	22	6
Phase Time (sec)	28	12
Phase Split	70%	30%

APPENDIX 13 POST DEVELOPMENT WITH 80% TRAFFIC RESULTS – PM PEAK 2032

NETWORK SUMMARY

Network: N101 [PM Peak - 80% traffic - 2032 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic]
Design Life Analysis (Final Year): Results for 10 years

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.79			
Travel Time Index	7.64			
Congestion Coefficient	1.27			
Travel Speed (Average)	47.2 km/h		4.4 km/h	34.3 km/h
Travel Distance (Total)	1673.2 veh-km/h		81.6 ped-km/h	2089.5 pers-km/h
Travel Time (Total)	35.4 veh-h/h		18.5 ped-h/h	61.0 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	4354 veh/h		385 ped/h	5610 pers/h
Arrival Flows (Total for all Sites)	4354 veh/h		385 ped/h	5610 pers/h
Demand Flows (Entry Total)	1720 veh/h			
Midblock Inflows (Total)	35 veh/h			
Midblock Outflows (Total)	-358 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.740			
Control Delay (Total)	7.31 veh-h/h		1.03 ped-h/h	9.81 pers-h/h
Control Delay (Average)	6.0 sec		9.6 sec	6.3 sec
Control Delay (Worst Lane)	22.4 sec			
Control Delay (Worst Movement)	22.4 sec		9.6 sec	22.4 sec
Geometric Delay (Average)	1.2 sec			
Stop-Line Delay (Average)	4.8 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1945 veh/h		309 ped/h	2642 pers/h
Effective Stop Rate	0.45	1.16 per km	0.80	0.47
Proportion Queued	0.45		0.80	0.47
Performance Index	98.7		20.2	118.9
Cost (Total)	1538.86 $/h	0.92 $/km	509.69 $/h	2048.55 $/h
Fuel Consumption (Total)	162.5 L/h	97.1 mL/km		
Fuel Economy	9.7 L/100km			
Carbon Dioxide (Total)	383.5 kg/h	229.2 g/km		
Hydrocarbons (Total)	0.033 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.430 kg/h	0.257 g/km		
NOx (Total)	0.390 kg/h	0.233 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

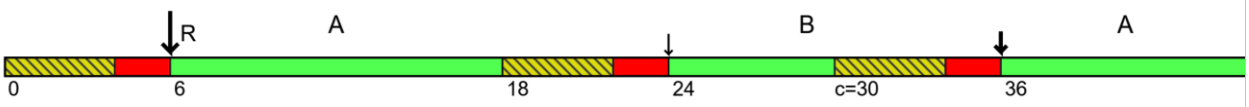
Network: N101 [PM Peak - 80% traffic - 2032 (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 30 seconds (Network Practical Cycle Time)
Critical Site / Common Control Group that determines the Network Cycle Time (for Coordinated Sites): 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic]
Design Life Analysis (Final Year): Results for 10 years

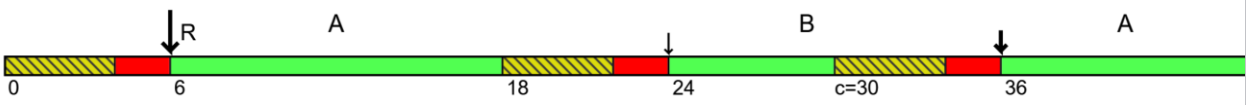
Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG



Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) - 80% traffic (Site Folder: General)]



Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	6
Phase Time (sec)	18	12
Phase Split	60%	40%

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) - 80% traffic (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	18
Green Time (sec)	12	6
Phase Time (sec)	18	12
Phase Split	60%	40%

APPENDIX 14 POST DEVELOPMENT WITH LANE CHANGES SIDRA RESULTS – AM PEAK 2022

NETWORK SUMMARY

Network: N101 [Intersection - AM Post Development (2022) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.71			
Travel Time Index	6.81			
Congestion Coefficient	1.40			
Travel Speed (Average)	42.8 km/h		3.7 km/h	32.5 km/h
Travel Distance (Total)	1821.4 veh-km/h		66.8 ped-km/h	2252.4 pers-km/h
Travel Time (Total)	42.6 veh-h/h		18.2 ped-h/h	69.3 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	4325 veh/h		316 ped/h	5506 pers/h
Arrival Flows (Total for all Sites)	4325 veh/h		316 ped/h	5506 pers/h
Demand Flows (Entry Total)	1604 veh/h			
Midblock Inflows (Total)	297 veh/h			
Midblock Outflows (Total)	-96 veh/h			
Percent Heavy Vehicles (Demand)	2.2 %			
Percent Heavy Vehicles (Arrival)	2.2 %			
Degree of Saturation	0.630			
Control Delay (Total)	11.73 veh-h/h		3.88 ped-h/h	17.96 pers-h/h
Control Delay (Average)	9.8 sec		44.3 sec	11.7 sec
Control Delay (Worst Lane)	48.6 sec			
Control Delay (Worst Movement)	49.8 sec		44.3 sec	49.8 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	8.5 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1504 veh/h		297 ped/h	2103 pers/h
Effective Stop Rate	0.35	0.83 per km	0.94	0.38
Proportion Queued	0.36		0.94	0.40
Performance Index	149.7		19.8	169.5
Cost (Total)	1809.24 $/h	0.99 $/km	501.08 $/h	2310.32 $/h
Fuel Consumption (Total)	177.3 L/h	97.4 mL/km		
Fuel Economy	9.7 L/100km			
Carbon Dioxide (Total)	418.8 kg/h	229.9 g/km		
Hydrocarbons (Total)	0.036 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.470 kg/h	0.258 g/km		
NOx (Total)	0.409 kg/h	0.224 g/km		

Network Model Variability Index (Iterations 3 to N): 1.5 %
Number of Iterations: 8 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Post Development (2022) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - Lane change (Site Folder: General)]

Reference Site / CCG

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	81
Green Time (sec)	75	13
Phase Time (sec)	81	19
Phase Split	81%	19%

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - Lane change (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	67
Green Time (sec)	61	27
Phase Time (sec)	67	33
Phase Split	67%	33%

APPENDIX 15 POST DEVELOPMENT WITH LANE CHANGES SIDRA RESULTS – PM PEAK 2022

NETWORK SUMMARY

Network: N101 [Intersection - PM Post Development (2022) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.73			
Travel Time Index	6.98			
Congestion Coefficient	1.37			
Travel Speed (Average)	43.7 km/h		3.7 km/h	30.4 km/h
Travel Distance (Total)	1330.3 veh-km/h		66.8 ped-km/h	1663.2 pers-km/h
Travel Time (Total)	30.4 veh-h/h		18.2 ped-h/h	54.7 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Arrival Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Demand Flows (Entry Total)	1378 veh/h			
Midblock Inflows (Total)	4 veh/h			
Midblock Outflows (Total)	-277 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.383			
Control Delay (Total)	8.06 veh-h/h		3.88 ped-h/h	13.55 pers-h/h
Control Delay (Average)	8.5 sec		44.3 sec	11.0 sec
Control Delay (Worst Lane)	45.9 sec			
Control Delay (Worst Movement)	48.4 sec		44.3 sec	48.4 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	7.2 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1104 veh/h		297 ped/h	1622 pers/h
Effective Stop Rate	0.32	0.83 per km	0.94	0.37
Proportion Queued	0.31		0.94	0.36
Performance Index	105.9		19.8	125.7
Cost (Total)	1285.94 $/h	0.97 $/km	501.08 $/h	1787.02 $/h
Fuel Consumption (Total)	123.5 L/h	92.8 mL/km		
Fuel Economy	9.3 L/100km			
Carbon Dioxide (Total)	291.5 kg/h	219.1 g/km		
Hydrocarbons (Total)	0.025 kg/h	0.019 g/km		
Carbon Monoxide (Total)	0.330 kg/h	0.248 g/km		
NOx (Total)	0.274 kg/h	0.206 g/km		

Network Model Variability Index (Iterations 3 to N): 40.0 %
Number of Iterations: 7 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.1%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Post Development (2022) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - Lane change (Site Folder: General)]
Reference Site / CCG

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	80
Green Time (sec)	74	14
Phase Time (sec)	80	20
Phase Split	80%	20%

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - Lane change (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	62
Green Time (sec)	56	32
Phase Time (sec)	62	38
Phase Split	62%	38%

APPENDIX 16 POST DEVELOPMENT WITH LANE CHANGES SIDRA RESULTS – AM PEAK 2032

NETWORK SUMMARY

Network: N101 [Intersection - AM Post Development (2032) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS D			
Speed Efficiency	0.69			
Travel Time Index	6.56			
Congestion Coefficient	1.45			
Travel Speed (Average)	41.4 km/h		3.7 km/h	31.5 km/h
Travel Distance (Total)	2151.7 veh-km/h		81.4 ped-km/h	2663.4 pers-km/h
Travel Time (Total)	51.9 veh-h/h		22.1 ped-h/h	84.4 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	5167 veh/h		385 ped/h	6586 pers/h
Arrival Flows (Total for all Sites)	5167 veh/h		385 ped/h	6586 pers/h
Demand Flows (Entry Total)	1920 veh/h			
Midblock Inflows (Total)	302 veh/h			
Midblock Outflows (Total)	-117 veh/h			
Percent Heavy Vehicles (Demand)	2.2 %			
Percent Heavy Vehicles (Arrival)	2.2 %			
Degree of Saturation	0.779			
Control Delay (Total)	15.51 veh-h/h		4.74 ped-h/h	23.35 pers-h/h
Control Delay (Average)	10.8 sec		44.3 sec	12.8 sec
Control Delay (Worst Lane)	48.7 sec			
Control Delay (Worst Movement)	49.6 sec		44.3 sec	49.6 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	9.6 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1894 veh/h		363 ped/h	2636 pers/h
Effective Stop Rate	0.37	0.88 per km	0.94	0.40
Proportion Queued	0.40		0.94	0.43
Performance Index	195.5		24.1	219.7
Cost (Total)	2198.93 $/h	1.02 $/km	610.88 $/h	2809.81 $/h
Fuel Consumption (Total)	212.9 L/h	99.0 mL/km		
Fuel Economy	9.9 L/100km			
Carbon Dioxide (Total)	502.9 kg/h	233.7 g/km		
Hydrocarbons (Total)	0.044 kg/h	0.020 g/km		
Carbon Monoxide (Total)	0.561 kg/h	0.261 g/km		
NOx (Total)	0.502 kg/h	0.233 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - AM Post Development (2032) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - Lane change (Site Folder: General)]
Reference Site / CCG

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Syndey Ave 1 - AM Post Development (2022) - Lane change (Site Folder: General)]
Reference Site / CCG
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	67
Green Time (sec)	61	27
Phase Time (sec)	67	33
Phase Split	67%	33%

Site: 101 [National Cct / Sydney Ave 2 - AM Post Development (2022) (Site Folder: General)]
Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	80
Green Time (sec)	74	14
Phase Time (sec)	80	20
Phase Split	80%	20%

APPENDIX 17 POST DEVELOPMENT WITH LANE CHANGES SIDRA RESULTS – PM PEAK 2032

NETWORK SUMMARY

Network: N101 [Intersection - PM Post Development (2032) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Network Performance - Hourly Values				
Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Speed Efficiency	0.73			
Travel Time Index	6.98			
Congestion Coefficient	1.37			
Travel Speed (Average)	43.7 km/h		3.7 km/h	30.4 km/h
Travel Distance (Total)	1330.3 veh-km/h		66.8 ped-km/h	1663.2 pers-km/h
Travel Time (Total)	30.4 veh-h/h		18.2 ped-h/h	54.7 pers-h/h
Desired Speed (Program)	60.0 km/h			
Demand Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Arrival Flows (Total for all Sites)	3417 veh/h		316 ped/h	4416 pers/h
Demand Flows (Entry Total)	1378 veh/h			
Midblock Inflows (Total)	4 veh/h			
Midblock Outflows (Total)	-277 veh/h			
Percent Heavy Vehicles (Demand)	2.1 %			
Percent Heavy Vehicles (Arrival)	2.1 %			
Degree of Saturation	0.383			
Control Delay (Total)	8.06 veh-h/h		3.88 ped-h/h	13.55 pers-h/h
Control Delay (Average)	8.5 sec		44.3 sec	11.0 sec
Control Delay (Worst Lane)	45.9 sec			
Control Delay (Worst Movement)	48.4 sec		44.3 sec	48.4 sec
Geometric Delay (Average)	1.3 sec			
Stop-Line Delay (Average)	7.2 sec			
Ave. Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	1104 veh/h		297 ped/h	1622 pers/h
Effective Stop Rate	0.32	0.83 per km	0.94	0.37
Proportion Queued	0.31		0.94	0.36
Performance Index	105.9		19.8	125.7
Cost (Total)	1285.94 $/h	0.97 $/km	501.08 $/h	1787.02 $/h
Fuel Consumption (Total)	123.5 L/h	92.8 mL/km		
Fuel Economy	9.3 L/100km			
Carbon Dioxide (Total)	291.5 kg/h	219.1 g/km		
Hydrocarbons (Total)	0.025 kg/h	0.019 g/km		
Carbon Monoxide (Total)	0.330 kg/h	0.248 g/km		
NOx (Total)	0.274 kg/h	0.206 g/km		

Network Model Variability Index (Iterations 3 to N): 40.0 %
Number of Iterations: 7 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.1%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

NETWORK SIGNAL PHASE TIMINGS

Network: N101 [Intersection - PM Post Development (2032) - Lane change (Network Folder: General)]

New Network
Network Category: (None)
Network Cycle Time = 100 seconds (Network User-Given Cycle Time)

Offset Definition: Green Start

Displayed Phase Times for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - Lane change (Site Folder: General)]

Reference Site / CCG

Phase Timing Summaries for Sites/CCGs

Site: 101 [National Cct / Sydney Ave 2 - PM Post Development (2022) (Site Folder: General)]

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	80
Green Time (sec)	74	14
Phase Time (sec)	80	20
Phase Split	80%	20%

Site: 101 [National Cct / Syndey Ave 1 - PM Post Development (2022) - Lane change (Site Folder: General)]

Reference Site / CCG

Reference Phase: A

Phase	A	B
Phase Change Time (sec)	0	62
Green Time (sec)	56	32
Phase Time (sec)	62	38
Phase Split	62%	38%

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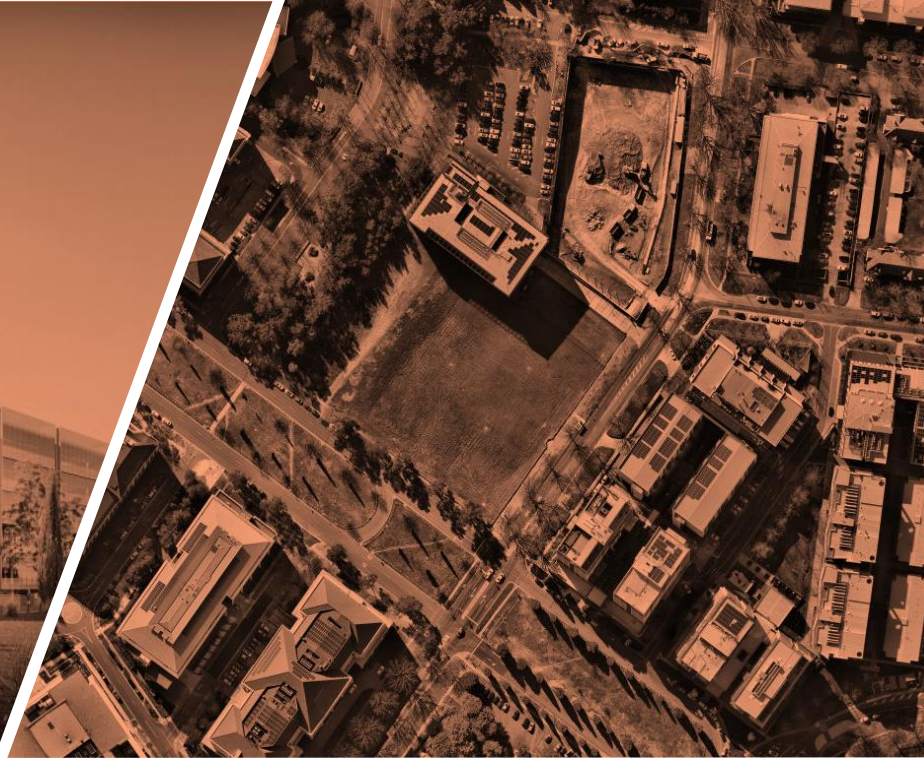

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+61 400 535 634

CANBERRA 45 West Row, Canberra ACT 2601
+61 2 9068 7995

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