TRANSPORT FOR NSW

Riverwood Commuter Car Park Traffic and Transport Impact Assessment

JUNE 2021

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Riverwood Commuter Car Park Traffic and Transport Impact Assessment

Transport for NSW

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1 INTRODUCTION

Transport for NSW (TfNSW) is responsible for strategy, planning, policy, procurement, regulation, funding allocation and other non-service delivery functions for all modes of transport in NSW including road, rail, ferry, light rail, point to point, cycling and walking. Transport for NSW is the proponent for the Riverwood Commuter Car Park (the 'Proposal').

1.1 OVERVIEW OF THE PROPOSAL

1.1.1 THE NEED FOR THE PROPOSAL

The Greater Sydney Commission's South District Plan is a 20-year plan to manage growth considering economic, social and environmental matters. As part of this, Riverwood has been classed as an urban renewal area which includes creating and renewing great places and local centres, respecting the district's heritage and connecting people to and within these centres.

Transport for NSW recognise the critical role commuter car parks play in improving the quality of access to public transport in the customer's first and last mile, particularly in middle and outer metropolitan areas.

Transport for NSW is committed to delivering accessible public transport infrastructure, which is why Transport for NSW are providing more commuter car parks through the Commuter Car Park Program. The Commuter Car Park Program is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

1.1.2 KEY FEATURES OF THE PROPOSAL

The key features of the Proposal are summarised as follows:

- Removal of the existing at grade car park and three residential properties
- Construction and operation of a multi-storey car park (the Proposal) comprised of a ground level and two additional levels (including rooftop) of commuter car park, which would include:
  - Around 140 commuter car parking spaces
  - A minimum of three accessible parking spaces
  - Access to each level of the car park via one lift and two stair wells
  - Internal vehicle circulation ramps connecting each level of the car park
  - Provision for future electric vehicle charging stations (at least 15 per cent of spaces)
  - Transport Park-and-Ride infrastructure (Opal operated boom gates)
- Vehicle access and egress direct from Webb Street
- Separation of vehicles access points and pedestrian access paths
- Installation of roof top solar panels
- Ancillary works including services diversion and/or relocation, drainage works and landscaping
- Installation of CCTV, lighting and wayfinding signage for safety and security
- Installation of supplementary street lighting.

Subject to planning approval, construction is expected to commence in late 2021 and take approximately 12 months to complete.

A detailed description of the Proposal is provided in Chapter 3 of the Review of Environmental Factors (REF).

The NSW Government recognises the important role commuter car parks (CCPs) continue to play in improving the quality of access to public transport in the customer's first and last kilometre. The provision of CCPs increase public transport patronage and make public transport more accessible to all customers. This is particularly important in lower population density areas, where it is both expensive and challenging to provide frequent bus services and ensure access to transport for the elderly or people with a disability.

Between December 2018 and May 2019, the NSW Government committed to deliver 13 CCPs across Greater Sydney. In May 2019, Transport for NSW (TfNSW) established a dedicated CCP Program (the Program) and governance structure to deliver on the NSW Government's election commitments.

1.2 THE PROPOSAL

1.2.1 LOCATION OF THE PROPOSAL

The Proposal is located in the suburb of Riverwood, in the local government area of Georges River, about 16 kilometres south-west of Sydney's central business district.

The Proposal is located about 220 metres to the south west of Riverwood Station on Webb Street. Riverwood Station, on the Airport and South Line, is serviced by T8 services.

The Proposal is positioned immediately to the west of the Riverwood Plaza, approximately 130 metres from the main commercial centre of the suburb of Riverwood, and at the transition of the commercial and residential areas to the south.

The location of the Proposal in a regional context is shown on Figure 1.1 and the site location is shown in Figure 1.2.

The Proposal site would extend across four properties as follows:

- Lot 100 DP832293
- Lot 5 DP23676
- Lot 6 DP23676
- Lot 7 DP23676.

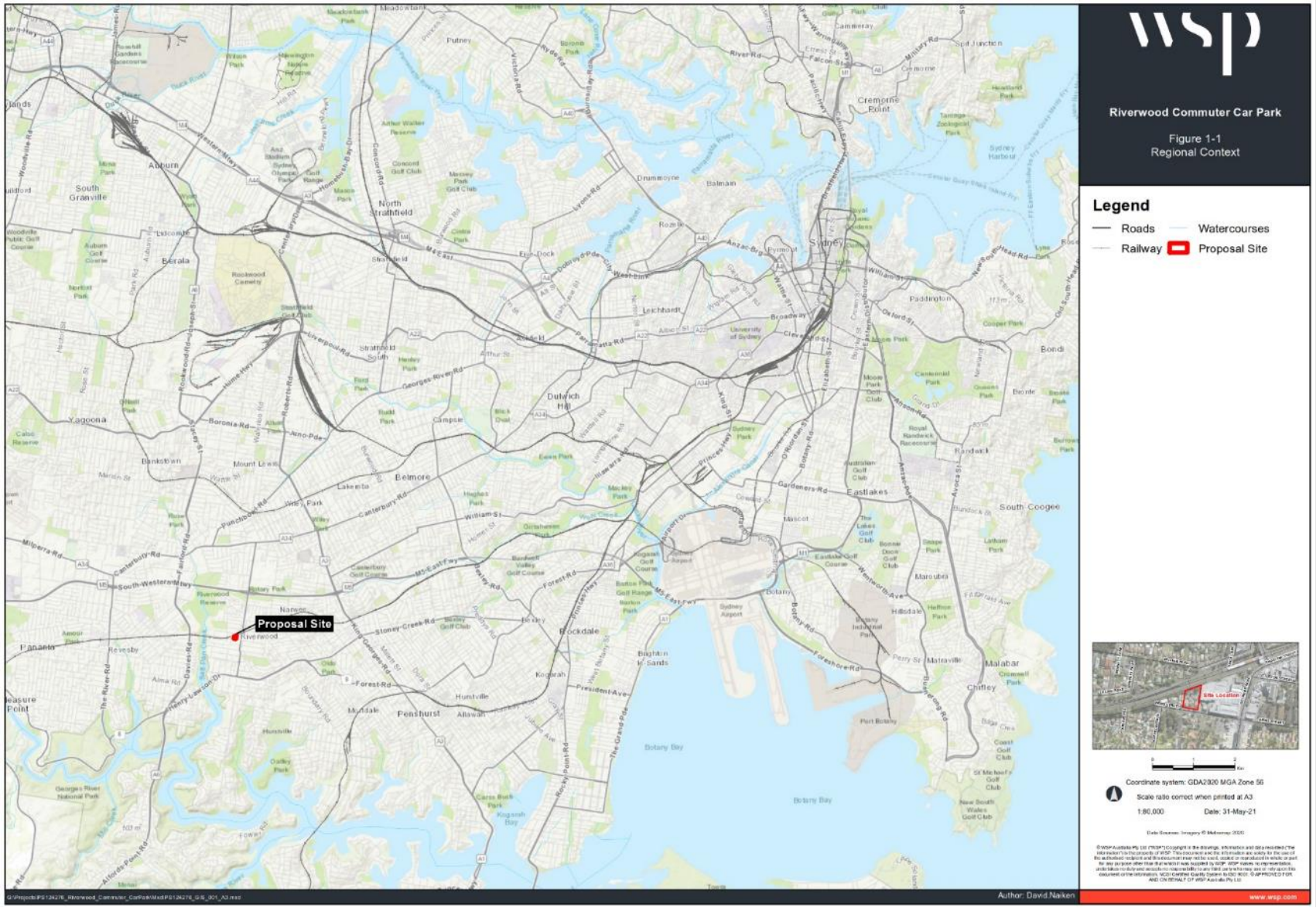


Figure 1.1 Regional context

Figure 1.2 Site locality map

1.3 ASSESSMENT REQUIREMENTS

This Traffic and Transport Impact Assessment has been prepared to satisfy the requirements for environmental assessment under the NSW *Environmental Planning and Assessment Act, 1979* and *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP). The following relevant State legislation, guidelines, policies and industry requirements have been considered in preparing this study:

- *Transport for NSW's Guide to Traffic Generating Developments 2002* – Section 2 of this guideline provides information on Traffic Impact Studies.
- *Austroads Guide to Road Design – The Guide to Road Design* is a set of comprehensive Austroads guides developed to capture the contemporary practice of member organisations in road design.
- *Austroads Guide to Traffic Management – The Guide to Traffic Management* captures the contemporary traffic management practice including emerging techniques and technologies, and relevant international experience. For this study, this guide provides valuable guidance and considerations to achieve efficient, safe and economical management of road traffic.
- Technical Directions – Various technical directions published by Transport for NSW, encompassing design guidelines as accepted in New South Wales roads (e.g. safety barriers, design of traffic facilities, traffic signal design, delineation).

1.4 PURPOSE OF THIS REPORT

The purpose of this report is to assess the potential traffic and transport impacts from the construction and operation of the Proposal to support the Review of Environmental Factors (REF) submission. Specifically, this report:

- Describes the existing conditions for all modes of transport in the study area including general access vehicles, freight (including restricted access vehicles), public transport (rail services, bus services and point-to-point transport) and active transport (bicycles and pedestrians).
- Describes the existing environment (road function, classification and operation) in the study area that will be affected by the construction and operation of the Proposal.
- Assesses the impacts of the Proposal to the surrounding road network, including the potential impacts of construction activities and associated vehicle movements.
- Assesses the operational impacts of the Proposal to the surrounding road network.
- Recommends mitigation measures to manage identified traffic and transport impacts of the Proposal.

1.5 STRUCTURE OF THIS REPORT

The report is structured as follows:

- Chapter 1 – Project Background: Describes the overview of the Proposal, relevant policies and guidelines, assessment requirements, and the purpose and structure of this report.
- Chapter 2 – Methodology: describes the study area, data collection, study methodology and performance metrics used to measure the impacts of the Proposal.
- Chapter 3 – Existing Conditions: Describes the existing condition of the road network, transport services and abutting developments.
- Chapter 4 – Construction Impact Assessment: Provides an analysis of the Proposal's impacts during construction.
- Chapter 5 – Operational Impact Assessment: Provides an analysis of the Proposal's operational impacts.
- Chapter 6 – Mitigation Measures: Discusses and recommends the available mitigation measures to address any significant impacts identified in section 4 and 5.

2 METHODOLOGY

2.1 STUDY AREA

The study area for this Traffic and Transport Impact Assessment is outlined below in Figure 2.1. Figure 2.1 identifies the key roads and intersections considered as part of this assessment. This boundary covers the area influenced by access to and from the current car park, the likely impacts of construction vehicles and the ultimate impact of the development in the future.

Figure 2.1 Study area

2.2 DOCUMENT REVIEW

Table 2.1 lists the documents which were reviewed as part of this study:

Table 2.1 Background document review

Title	Author	Version	Description
Riverwood Commuter Car Park – **Definition Design Report**	FutureRail	Rev B (March 2020)	This report presents the Definition Design to provide sufficient information to inform the Review of Environmental Factors (REF), procurement and the Final Business Case (FBC) of the Proposal
Riverwood Commuter Car Park – **Civil, Architectural and Structures design package**	FutureRail	Rev B (March 2020)	In conjunction with the Definition Design Report, these drawing sets have been developed to detail the design of the Proposal.
Riverwood Commuter Car Park – **Traffic, Transport and Access Impact Assessment**	FutureRail	Rev B (March 2020)	A preliminary Traffic, Transport and Access impact assessment for the Riverwood Commuter Car Park. This report is an early investigation discussing impacts of the Proposal.
Georges River Car Parking Strategy Report	Undertaken on behalf of Georges River Council	Issue 6 (July 2018)	This study was done to develop the parking strategies of town centres in the Georges River Local Government Area, including Riverwood Town Centre.

2.3 DATA COLLECTION

Intersection counts were undertaken on Thursday 22 April 2021 between 6.00 am to 10.00 am and 3.00 pm to 7.00 pm to capture pedestrian, light vehicle and heavy vehicle volumes to represent a typical weekday AM and PM peak at the following locations:

1. Belmore Road/Thurlow Street (signalised).
2. Belmore Road/Webb Street/Cairns Street (signalised).
3. Belmore Road/Short Road/Eldon Street (priority controlled).

Based on these surveys, the following peak hours have been adopted for the purpose of this assessment:

- AM peak 7.30 am–8.30 am
- PM peak: 4.30 pm–5.30 pm.

2.3.1 SITE INSPECTION

A site visit was also undertaken on Thursday, 22 April 2021 to observe the traffic and parking conditions in Riverwood during the data collection period to assist with the preparation of this report.

2.4 TRAFFIC MODELLING SCENARIO

The following modelling scenarios have been included in the assessment to investigate the impacts of the Proposal during construction and operation.

1. **Base 2021 (existing)** – includes 2021 traffic counts to understand existing performance of the road networks. The intersections are modelled based on the existing 2021 layout.
2. **Construction 2022** – includes background traffic growth and addition of construction vehicles to road network to understand impact of construction vehicles on the road network. The intersections are modelled based on the existing 2021 layout.
3. **Future 2023 Base** – includes background traffic growth with no changes to road network (i.e. no new commuter car parks) to understand impact of future traffic volumes. The intersections are modelled based on the existing 2021 layout.
4. **Future 2023 Operational** – includes background traffic growth and proposed traffic generated by commuter car parks to consider worst case option and understand impact of additional commuter traffic. The intersections are modelled based on the preferred design option.
5. **Future 2033 Operational** – adds 10 years of background traffic growth to Future 2023 Operational scenario to understand impact to network in 10 years. The intersections are modelled based on the preferred design option.

2.5 MODELLING ASSUMPTIONS

The following modelling assumptions were applied as part of the assessment:

- Modelling was done in SIDRA 9.0.2.9732. SIDRA is an industry recognised traffic engineering software and is suitable to assess the measurable intersection performance metrics relevant for the Proposal including Level of Service (LoS), queue length and degree of saturation (volume/capacity).
- The background traffic growth on the road network are assumed at 0.5 per cent per annum.

2.6 ASSESSMENT CRITERIA

2.6.1 LEVEL OF SERVICE

Level of Service (LoS) is a basic performance parameter used to describe the operation of an intersection. Levels of Service range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement.

The Transport for NSW LoS criteria for intersections which has been followed for this assessment is shown in Table 2.2.

Table 2.2 Level of Service criteria for intersections

Level of Service	Average Delay (Seconds Per Vehicle)	Traffic Signals, Roundabout	Give-Way And Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity	Near capacity and accident study required.
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode.	At capacity, requires other control mode.
F	Greater than 70	Unsatisfactory with excessive queuing.	Unsatisfactory with excessive queuing; requires other control mode.

Source: Guide to Traffic Generating Developments (Transport for NSW, 2002)

2.6.2 DEGREE OF SATURATION

The Degree of Saturation (DoS) is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extended queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

According to Austroads, in practice, the target degrees of saturation (known as practical degree of saturation) for signal, roundabout and priority-controlled intersections are 0.90, 0.85 and 0.80 respectively.

2.6.3 AVERAGE VEHICLE DELAY

This is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At signalised intersections, the average intersection delay is usually reported. At roundabouts and priority-controlled intersections, the average delay for the most delayed movement is usually reported.

2.6.4 QUEUE LENGTH

Queue length is measured in metres reflecting the number of vehicles waiting at the stop line and is usually quoted as the 95th percentile back of queue, which is the value below which 95 per cent of all observed queue lengths fall. It reflects the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

3 EXISTING CONDITIONS

3.1 RIVERWOOD STATION

3.1.1 RAIL SERVICES

Riverwood Station is serviced by the T8 Airport & South Line, linking Riverwood to the Southern Highlands, Airport and Sydney CBD.

The station has one island platform with two sets of tracks on either side. Rail services for weekday, AM and PM travel between Riverwood Station and City are summarised in Table 3.1.

Table 3.1 AM peak hour services

Service line	Criteria	AM peak					PM peak				
		5 am	6 am	7 am	8 am	Total	3 pm	4 pm	5 pm	6 pm	Total
T8 Airport and South Line Inbound Service (Macarthur To City)	Arrival frequency	4	4	7	7	**22**	4	4	4	4	**16**
	Average interval (min)	15	15	8.5	8.5	-	15	15	15	15	-
T8 Airport and South Line Outbound Service (City To Macarthur)	Arrival frequency	3	4	4	4	**15**	4	4	4	5	**17**
	Average interval (min)	20	15	15	15	-	15	15	15	12	-

Source: Transport for NSW Timetable, created 29/04/2021

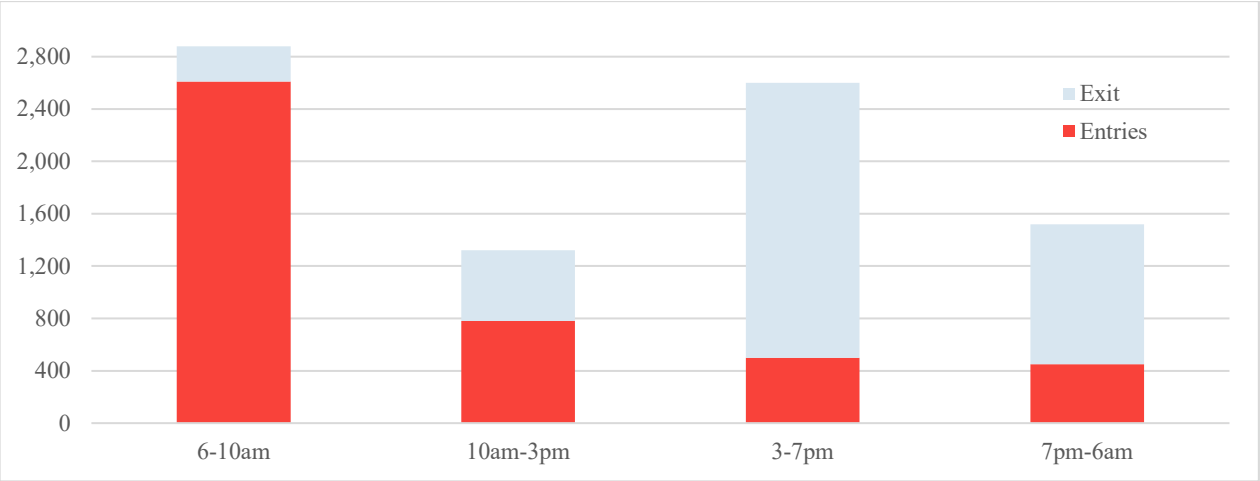
3.1.2 STATION PATRONAGE

Station patronage Opal card data was assessed for the pre-COVID-19 condition to provide an indication of the typical travel patterns of Riverwood Station. The number of commuters boarding at Riverwood Station is summarised in Table 3.2 showing peak and daily demand profiles. Figure 3.1 shows the tidal patterns for Riverwood Station, with the majority of entries boarding trains in the AM and returning in the PM.

Table 3.2 AM peak hour station entries – 2020

Hour commencing	Average station entries	AM peak demand profile	Daily demand profile
5 am	229	8%	5%
6 am	406	17%	10%
7 am	981	41%	23%
8 am	801	33%	19%
AM peak total	2,414	100%	57%
Daily total	4,234		100%

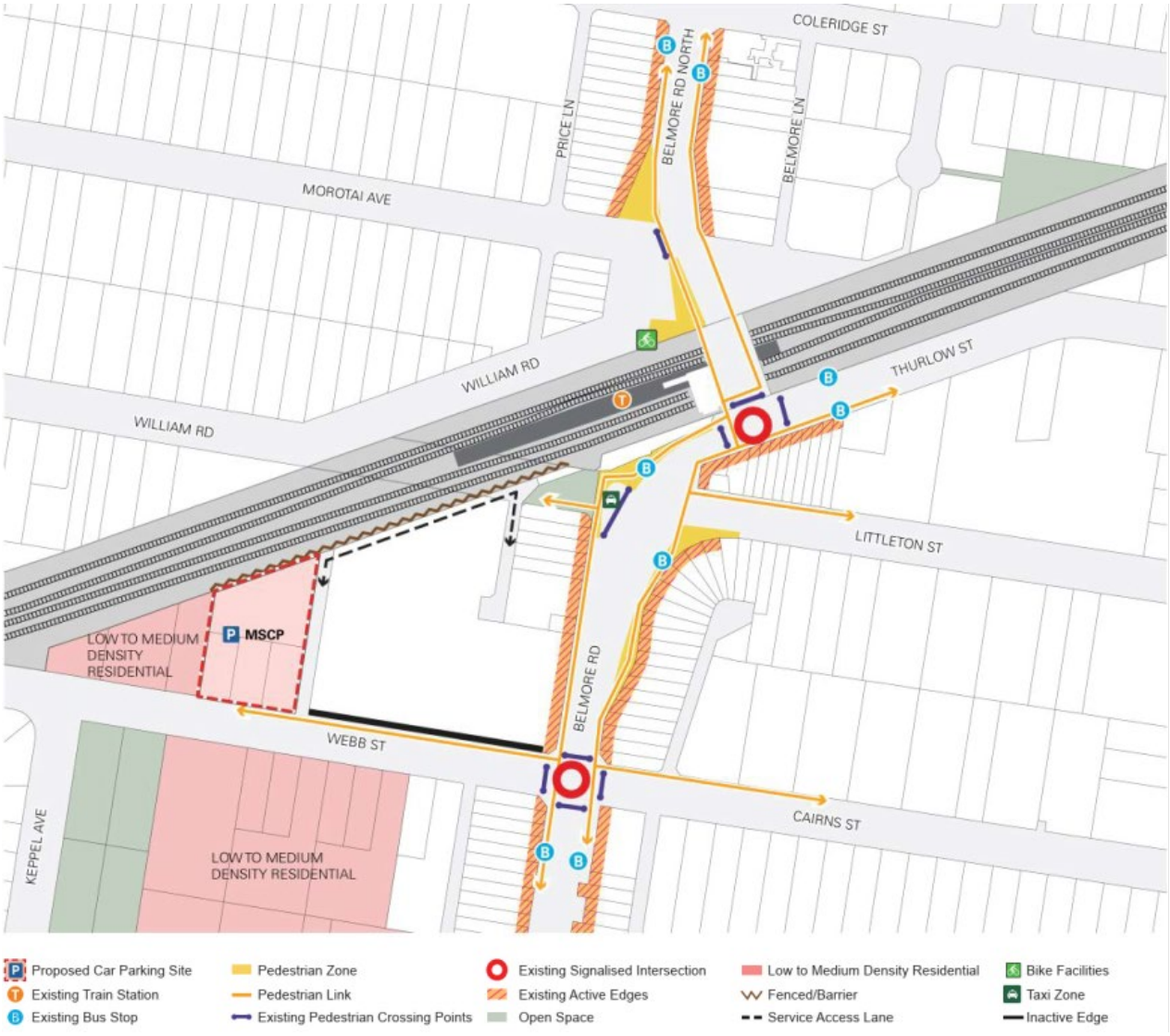
Source: Opal data, January 2020 – FutureRail



Source: Opal data, accessed April 2021

Figure 3.1 2019 Riverwood Station exit and entry profiles

3.1.3 STATION ACCESS AND FACILITIES



Source: FutureRail, March 2020

Figure 3.2 Facilities at Riverwood Station

Based on the information provided by Transport for NSW's station information guide and as shown in Figure 3.2, Riverwood Station provides interchange facilities including bus stops, taxi ranks, kiss-and-ride area, and bicycle parking. The station is also staffed 24 hours a day, seven days a week and provides bicycle parking. The platform is also sheltered and provides access for mobility impaired users. Details of these facilities are discussed in the following sections.

3.1.3.1 BUS SERVICES

The following bus routes service the locations closest to Riverwood Station on weekdays:

- 940 Bankstown to Hurstville via Riverwood, Hurstville to Bankstown via Riverwood
- 942 Campsie to Lugarno, Lugarno to Campsie
- 944 Mortdale to Bankstown via Peakhurst Heights, Bankstown to Mortdale via Peakhurst Heights
- 945 Bankstown to Hurstville via Mortdale, Hurstville to Bankstown via Mortdale
- N20 Riverwood to City Town Hall via Airport.

Table 3.3 details the frequency for bus routes connecting Riverwood Station.

Table 3.3 Weekday bus route frequency at Riverwood Station stops

Time	Northbound Bus Services				Southbound Bus Services				Night service N20
	940	942	944	945	940	942	944	945	
Before 6 am	1	1	1	1	0	0	1	0	4
6 am–9 am	6	8	8	10	6	9	10	11	0
9 am–4 pm	14	9	14	16	14	9	14	15	0
4 pm–7 pm	3	9	9	11	6	9	8	8	0
After 7 pm	0	1	4	6	0	2	3	9	0
Total	**24**	**28**	**36**	**44**	**26**	**29**	**36**	**43**	**4**

Source: Transport for NSW – FutureRail Study

3.1.3.2 BUS STOP FACILITIES

As depicted in Figure 3.2, current bus facilities are in proximity to the Riverwood Station precinct, providing a convenient connectivity to the station via bus services. Bus shelters are typically provided for customers waiting to board bus services, unless where an awning is available. Figure 3.3 shows an example at the existing bus stop on Belmore Road, south of the existing train line.

Figure 3.3 Belmore Road bus stop south of Riverwood Station

3.1.3.3 TAXI FACILITIES

A small, taxi rank loop on the south side of the station off Belmore Road (Figure 3.4) exists with space to comfortably fit three vehicles. Raised marked pedestrian (zebra) crossings facilitate pedestrian movement and prevent disruption of the footpaths.

Figure 3.4 Taxi zone – Belmore Road

3.1.3.4 KISS-AND-RIDE FACILITIES

There are no existing, formal Kiss-and-Ride facilities station. During our site visit, Kiss-and-Ride vehicle movements were observed at the north-west end of the station along William Road.

3.2 EXISTING LAND USE

3.2.1 RIVERWOOD – LAND USE AND INFRASTRUCTURE CONTEXT

The suburb of Riverwood is split across the Georges River and City of Canterbury-Bankstown Council areas. It is primarily a residential suburb, approximately 16 kilometres from the Sydney CBD. Commercial land use exists in the immediate vicinity of Riverwood Station, with on-street business and the Riverwood Plaza along Belmore Road stretching from Short Street (Georges River Council) to Truman Avenue (City of Canterbury-Bankstown Council). The Riverwood Business Park is also located further north and is accessible via a 15–20-minute walk or short bus ride from Riverwood Station.

Education facilities also exist in the area within a radius of around 1.5 kilometres. These include St Joseph's Catholic Primary School, Riverwood Public School, Hannans Road Primary, Southside Montessori, Peakhurst Primary, Peakhurst West Public School and the Georges River College Peakhurst Campus. The area also has a number of green spaces with the most notable being Riverwood Park and Peakhurst Park.

Figure 3.5 outlines the immediate land uses in Riverwood and in proximity to the station, and the location of the Proposal.

Source: FutureRail, 2020

Figure 3.5 Existing land use at Riverwood Station

3.2.2 PROPOSAL SITE – EXISTING LAND USE AND ACCESS

The Proposal site consists of an existing at-grade car park, and three single storey detached residential properties fronting onto Webb Street. Additional residential properties are located along the western boundary of the Proposal, and to the south beyond Webb Street. The T8 rail corridor is located immediately to the north.

The existing at-grade car park consists of around 46 car parking spaces and contains a number of mature trees in its central portion, and a row of mature trees along the northern boundary adjacent to the rail corridor. The existing car park is accessed via the main entry to the Riverwood Plaza shopping centre on Webb Street.

The site is relatively flat, with some landscaping present around the edges of the car park. Brick walls are present between the car park and residential properties located to the south and west.

Pedestrian access to the car park is via the Riverwood Plaza. There is currently no dedicated pedestrian access to/from Webb Street, with pedestrians currently using the vehicle entry to access Webb Street, or accessing the Riverwood Station via the rear of the Riverwood Plaza (though the existing loading dock area).

3.2.3 EXISTING TRAFFIC GENERATION FROM CURRENT USE

Currently the site is occupied by three single residential dwellings and the existing at-grade car park for shopping centre use. In terms of traffic generation from these current uses, the following estimates have been applied:

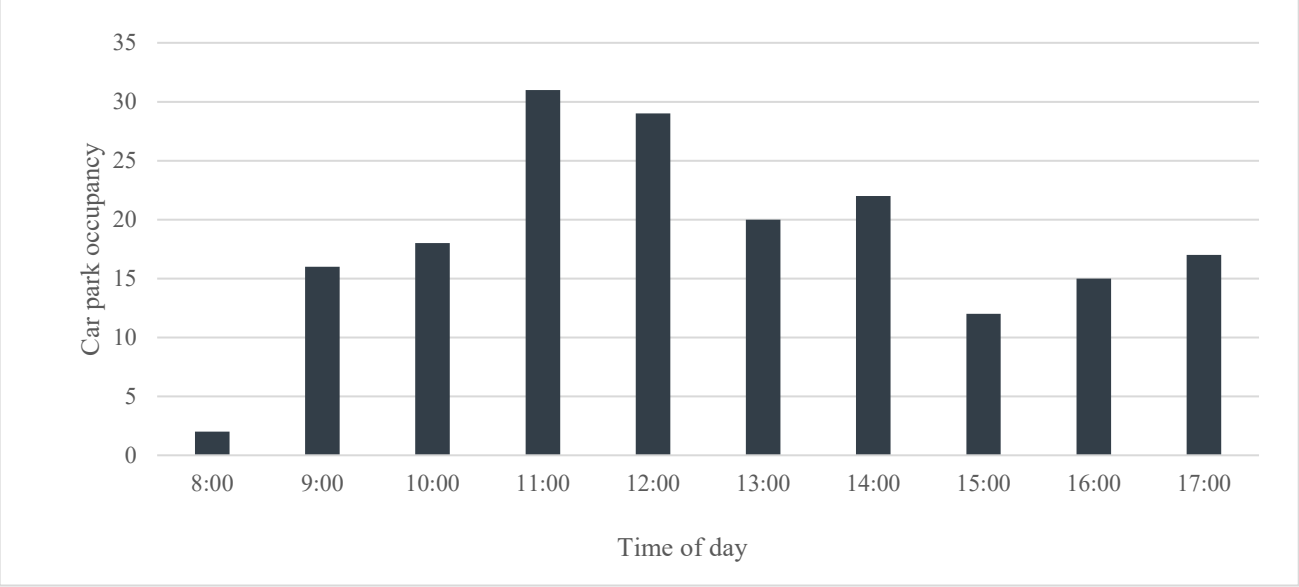
- **Dwelling houses** – Based on *Transport for NSW's Guide to Traffic Generating Developments (GTGD)*, a single dwelling can generate up to 0.85 weekday peak hour vehicle trips. The three dwellings would therefore generate up to **2.55 trips** in the peak hour, which is applicable for both the morning and afternoon peaks.
- **Shopping centre at-grade car park** – *Transport for NSW's GTGD* typically estimate traffic generated by a shopping centre based on the *Gross Leasable Floor Area (*GLFA), which is an unsuitable method to estimate the traffic generated by the at-grade car park, as it only forms a portion of the shopping centre's facility.

  As such, the trips generated from the Webb Street north at-grade car park is estimated based on first principles, using the supply of 50 car parking spaces and observed occupancy at the car park (approximately 50 per cent based on site visit, Georges River Council car parking strategy occupancy heatmap [see Figure 3.12] and record of aerial imageries of the car park over a five-year period between 2015 and 2019).

  The at-grade car park therefore would generate up to 25 inbound trips in the morning, 40 per cent of which are assumed to arrive in the AM peak hour. Similarly, 25 outbound trips in the afternoon with 30 per cent of which are assumed to depart in the PM peak hour. These arrival distributions are assumed based on station demand and activities in the town centre.

  Therefore, the current at-grade car park is estimated to generate up to **ten trips** in the AM peak hour and **7.5 trips** in the PM peak hour. Although the activity of the car park would differ day-by-day, this assumption is generally aligned with the results of an occupancy survey of Webb Street north car park undertaken on a Wednesday in February 2018 for the Georges River Council car parking strategy, summarised in Figure 3.6. This graph shows the occupancy of the car park increased by 12 cars between 8.00 am and 9.00 am and that there were 17 cars remaining at 5.00 pm when the survey ended, which would exit the car park gradually.

  Therefore, the total trips currently generated by the existing use of the site in the AM and PM peak hours are 13 trips (rounded up from 12.55) and 11 trips respectively.



Source: Parking Traffic Consultants (ptc), 2018

Figure 3.6 Occupancy of Webb Street north off-street car park

3.3 SURROUNDING ROAD NETWORK

3.3.1 ROAD NETWORK

Belmore Road is a regional road connecting the M5 Motorway and Henry Lawson Drive. Through Riverwood it is a 50 km/h two-way distributor road with free, timed, short-term parking available along a majority of this road. It crosses the T8 Line at Riverwood Station via a road bridge. No on-road bicycle facilities are available on Belmore Road.

Most cross streets in the Riverwood area are local roads with 50 km/h speed limits. Webb Street is consistent with this and would be the main access to the Proposal. Webb Street is a two-way, two lane road with free, timed, short-term parking along its northern kerb during typical daytime parking times (i.e. 8.30 am to 6.00 pm Monday to Friday, 8.30 am to 12.00 pm Saturday) with unrestricted parking along its southern kerb. No formal cycling facilities are provided along Webb Street.

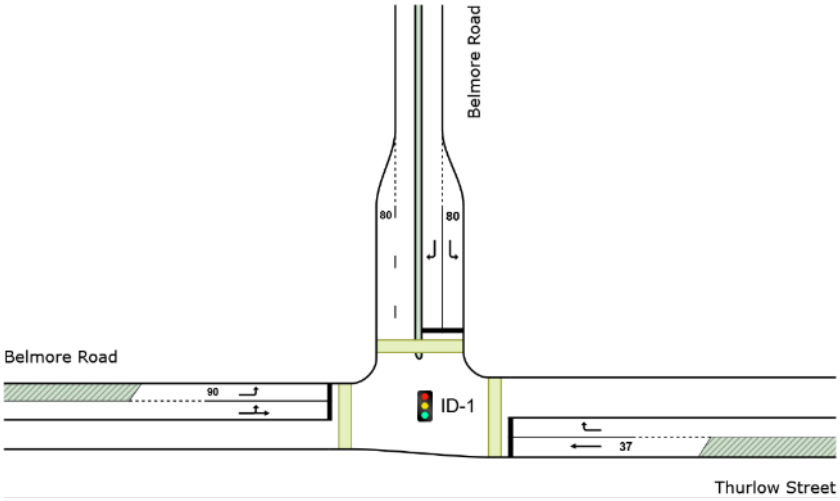
Roads along within the Riverwood town centre and trains station generally allows General Access Vehicles, which does not exceed the following criteria:

- Length:
  - Truck: 12.5 metres
  - Bus: 12.5 metres
  - Truck and trailer: 19.0 metres
  - Articulated vehicle: 19.0 metres
- Height – All vehicles up to 4.3 metres high
- Width – All vehicles up to 2.5 metres wide.

3.3.2 INTERSECTION OPERATIONS

The three key intersections identified in the study area are further described below.

3.3.2.1 BELMORE ROAD/THURLOW STREET (SIGNALISED)



As depicted in Figure 3.7, this intersection consists of:

- Signalised T-intersection with three approach legs.
- North leg (Belmore Road): one left turn lane, one right turn lane.
- South/west leg (Belmore Road): one left turn lane, one shared left turn/through lane.
- East leg (Thurlow Street): one right turn lane, one through lane.

Figure 3.7 Belmore Road/Thurlow Street intersection layout

Notes Green shading refers to on-street parking

3.3.2.2 BELMORE ROAD/WEBB STREET/CAIRNS STREET (SIGNALISED)

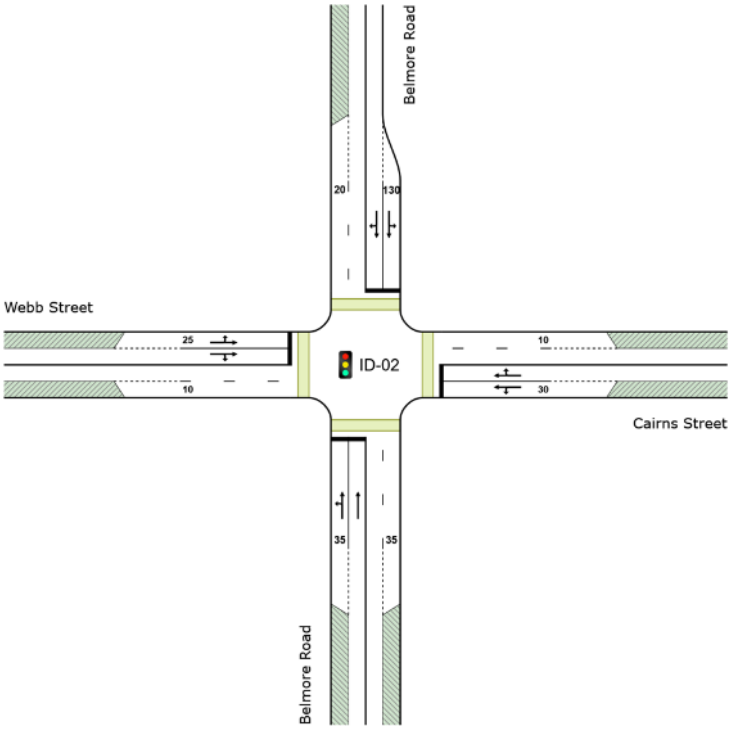


Figure 3.8 Belmore Road/Webb Street/Cairns Street intersection layout

Notes Green shading refers to on-street parking

As depicted in Figure 3.8, this intersection consists of:

- Four-way signalised intersection.
- Northern approach (Belmore Road): two approach lanes, one shared left turn/ through lane with parking, one shared right turn/through lane.
- Southern approach (Belmore Road): two approach lanes, one shared left turn/ through lane with parking, one through lane, no right turn into Cairns Street.
- Eastern approach (Cairns Street): two approach lanes, one shared left turn/ through lane with parking, one shared right turn/through lane.
- Western approach (Webb Street): two approach lanes, one shared left turn/ through lane with parking, one shared right turn/through lane.

3.3.2.3 BELMORE ROAD/SHORT ROAD/ELDON STREET (PRIORITY)

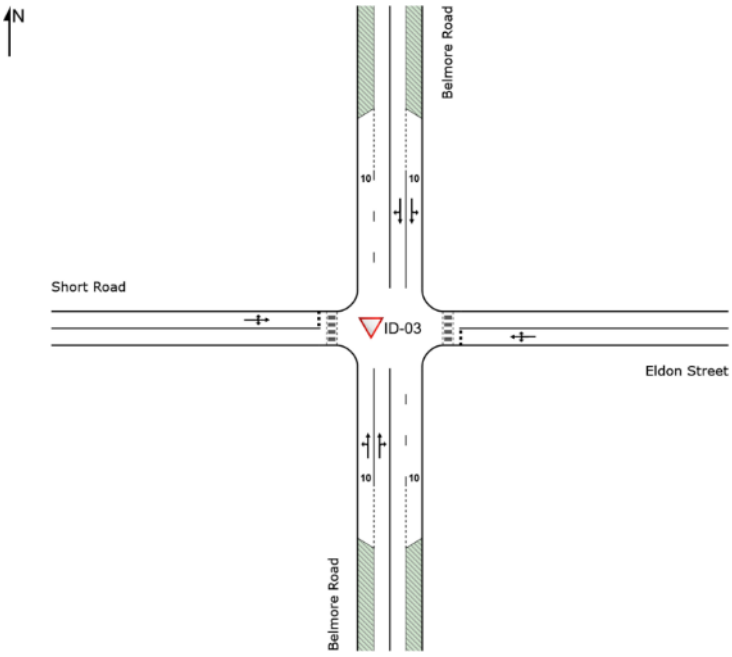


Figure 3.9 Belmore Road/Short Road/Eldon Street intersection layout

Notes Green shading refers to on-street parking

As depicted in Figure 3.9, this intersection consists of:

- Four way, give-way intersection with north-south priority traffic.
- Belmore Road's north and south approaches have two approach lanes, one shared left turn/through lane with parking, one through lane.
- Short Road and Eldon Street have one lane for all movements.
- Refuge island medians on east and west approaches for pedestrians.

3.3.2.4 INTERSECTION PERFORMANCE

Using SIDRA Intersection 9.0 modelling software, the above three intersection have been assessed. The results for the AM and PM peak hours are depicted in Table 3.4 and Table 3.5 respectively.

Table 3.4 Intersection performance – existing conditions AM peak

Intersection	Volume	DoS	Average Delay (seconds)	LoS	95th percentile queue length (m)
Thurlow Street/Belmore Road	1,754	1.02	56	LoS D	300 – west approach
Belmore Road/Webb Street/Cairns Street	1,530	0.67	13	LoS A	150 – south approach
Belmore Road Short Road/Eldon Street	1,446	0.32	75	LoS F	10 – west approach

Table 3.5 Intersection performance – existing conditions PM peak

Intersection	Volume	Dos	Average Delay (seconds)	LoS	95th percentile queue length (m)
Thurlow Street/Belmore Road	1,769	1.03	69	LoS E	500 – north app
Belmore Road/Webb Street/Cairns Street	1,925	0.82	24	LoS B	215 – north approach
Belmore Road/Short Road/Eldon Street	1,630	0.90	155	LoS F	45 – west approach

The signalised Belmore Road/Thurlow Street intersection is performing at capacity at LoS D and E across the AM and PM peaks respectively. This has been confirmed by our site visit where queue lengths were observed on the western and northern legs during the AM and PM peaks respectively. This intersection is constrained with space limited due to the existing bridge of the rail line and road with allocation maximised for traffic lanes.

Belmore Road/Webb Street/Cairns Street modelling shows good performance across both peaks. This was also validated by our observations on site.

The priority-controlled Belmore Road/Short Road/Eldon Street intersection shows poor delays and LoS F in both peaks although this relates directly to the western approach's right turning movement. The western approach has approximately 100 vehicles exiting against Belmore Road's north-south two-way volumes of around 1,500 vehicles per hour. While it appears this intersection does not perform satisfactorily, in reality it operates adequately due to its proximity to the signalised intersection upstream, creating advantage of gaps in traffic to allow vehicles to exit. This has been accounted for in some capacity through SIDRA's bunching parameter. Additionally, it was observed at the site visit that north-south traffic would often allow east-west exiting vehicles to enter the traffic flow although SIDRA cannot specifically model this behaviour.

3.4 EXISTING PARKING CONDITIONS

Existing commuter parking facilities comprises of a total of 109 spaces across three locations near Riverwood Station (Figure 3.10). The largest facility is located north west of Riverwood Station on William Road, comprising 65 spaces. Two smaller commuter parking facilities are located east of Riverwood Station on Morotai Avenue (23 spaces) and Thurlow Street (21 spaces).

A site visit was undertaken in February 2020 to observe parking and traffic conditions near the Proposal (Futurerail, 2020). The site visit observed all three commuter parking facilities at full capacity. Overflow car parking was also observed at unrestricted parking locations on Thurlow Street, Erskine Street, Littleton Street, Webb Street, Keppel Avenue, Short Avenue, William Road and Morotai Avenue (Figure 3.10). Approximately 180 to 210 cars were observed at overflow parking locations during the site visit.

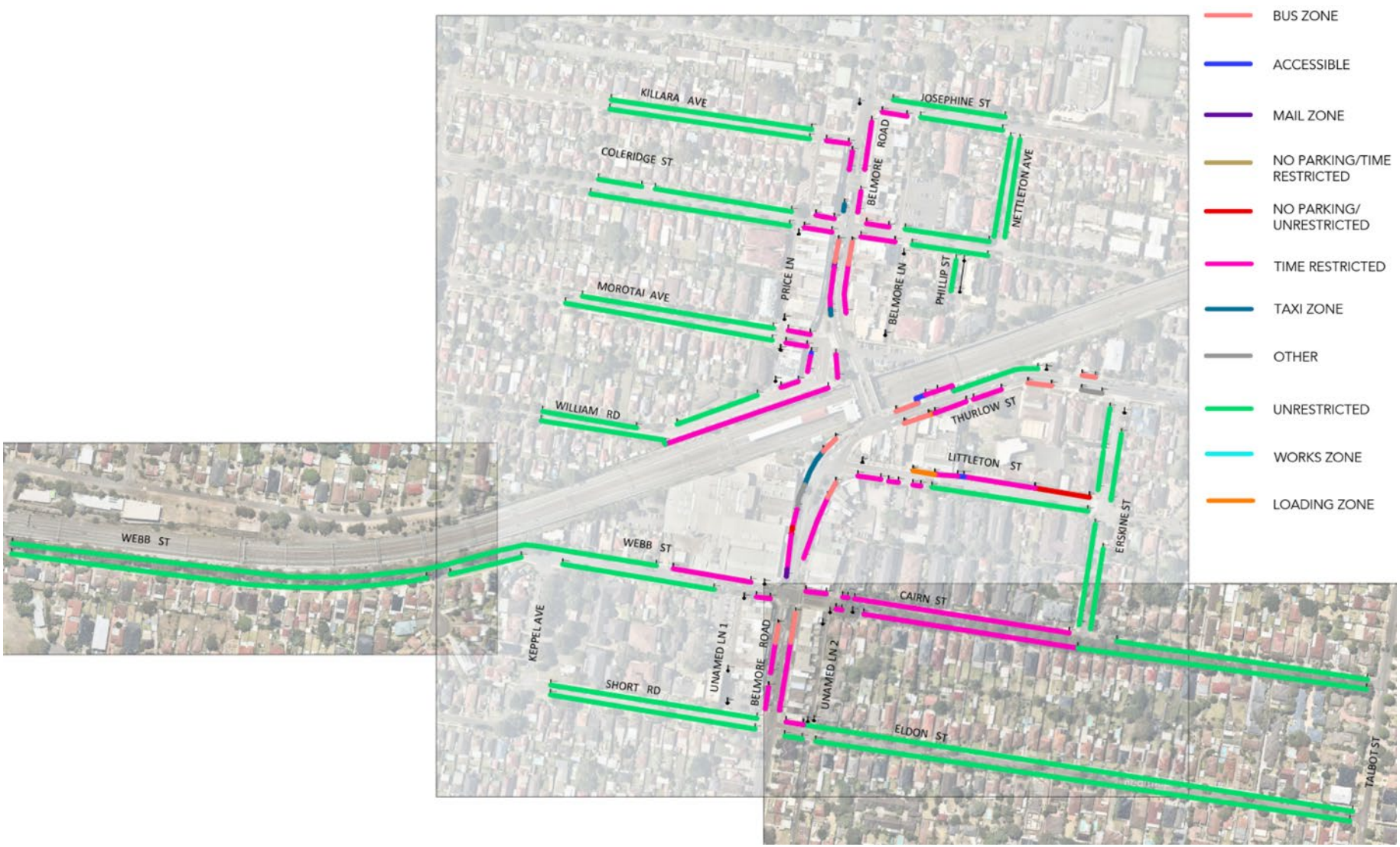
Georges River Council developed a car parking strategy in July 2018 which included capacity and occupancy assessments of the on-street and off-street parking facilities of its town centres, including Riverwood. The study area, which depicts the current parking restrictions is shown in Figure 3.11. The heatmap of car parking occupancy is depicted in Figure 3.12. The study found:

- Eighty per cent of surveyed spaces were on-street; 71 per cent of which were unrestricted at all times.

- Eighty five per cent of the off-street spaces surveyed were 3P parking.
- Peak occupancy of all supply was 68 per cent (weekday) and 59 per cent (weekend).
- The off-street car parking facilities to the north of the railway line were well utilised whilst the car parks south of the railway line have lower utilisation rate.

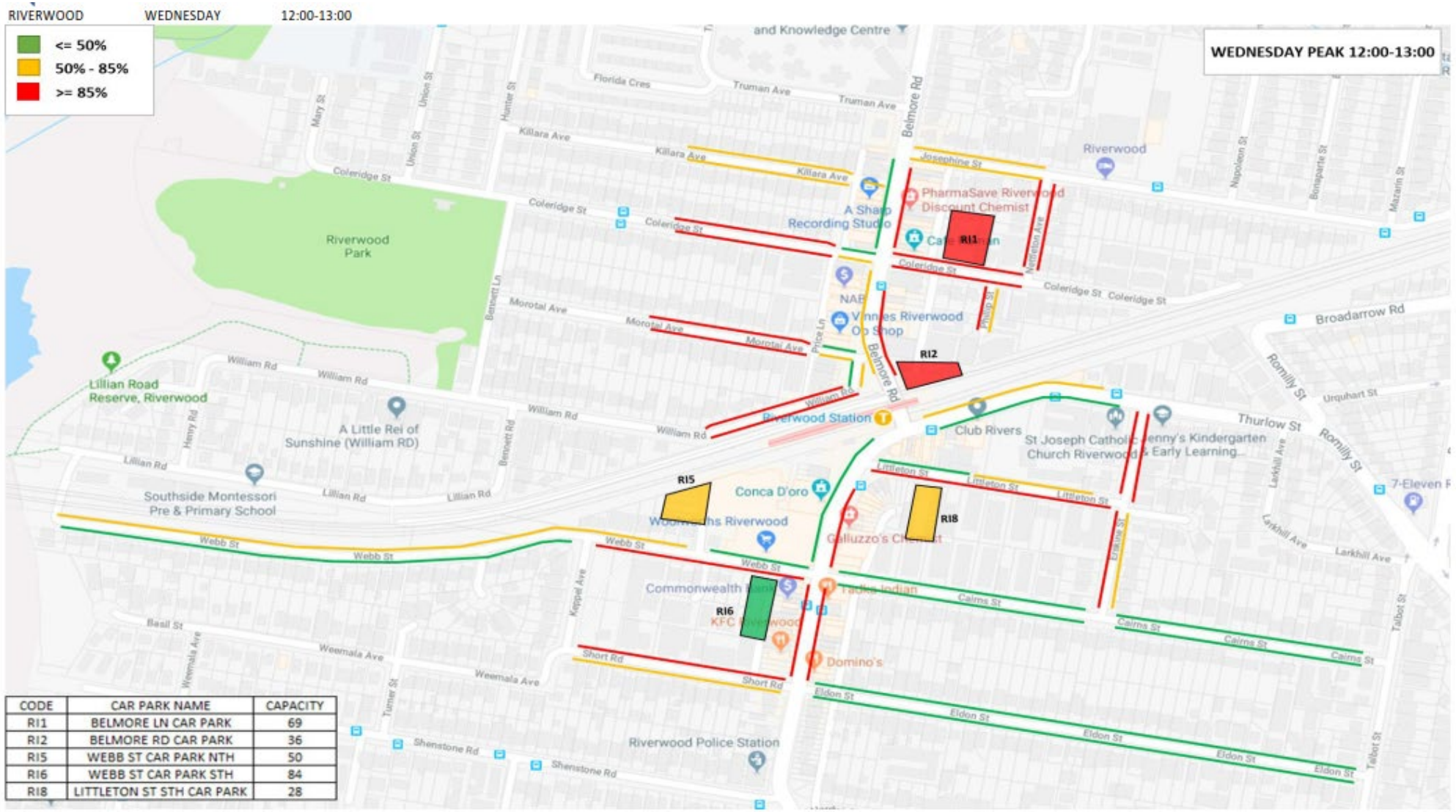
  Webb Street car park (north) site (i.e. development site) were surveyed with a capacity of 50 car parking spaces, weekday occupancy of 62 per cent (Wednesday at 11.00 am), and weekend occupancy of 78 per cent (Saturday at 11.00 am).
- There is lower demand for all day parking (greater than 7 hours) on the weekend compared to the weekday, confirming use of these spaces by commuters or local workers.

Figure 3.10 Existing local parking arrangements



Source: Parking Traffic Consultants (ptc), 2018

Figure 3.11 Georges River Council car parking strategy study area and existing parking restrictions



Source: Parking Traffic Consultants (ptc), 2018

Figure 3.12 Georges River Council car parking strategy study area and occupancy heatmap – Wednesday mid-day

3.5 PEDESTRIAN NETWORK

Being located within the vicinity of a town centre, the footpath network around Riverwood Station and at the proposed site are generally well established and available on both sides of the road. Footpaths within the town centre, including at the immediate boundaries of Riverwood Plaza are typically wide and paved from the boundary (building line) to the road kerb. Other locations, including on Webb Street, at the proposed site have a narrow (typically 1.2 metres) footpaths throughout.

Currently, the site is also informally accessible via Riverwood Plaza via its main entry on Belmore Road (Figure 3.13), north of Webb Street and the loading dock access road (Figure 3.14) which runs parallel with the rail line.

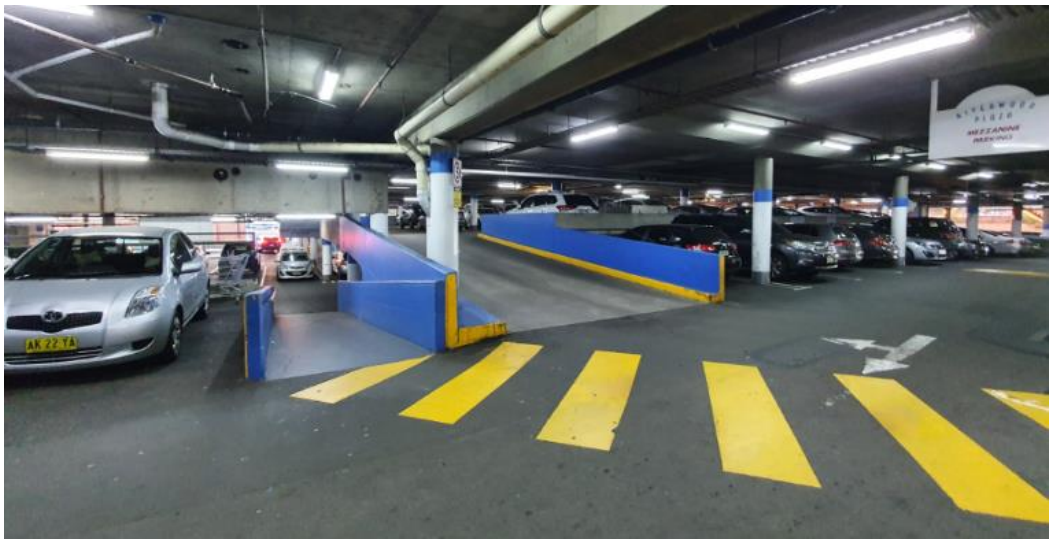


Figure 3.13 Access to site via Riverwood Plaza and car park

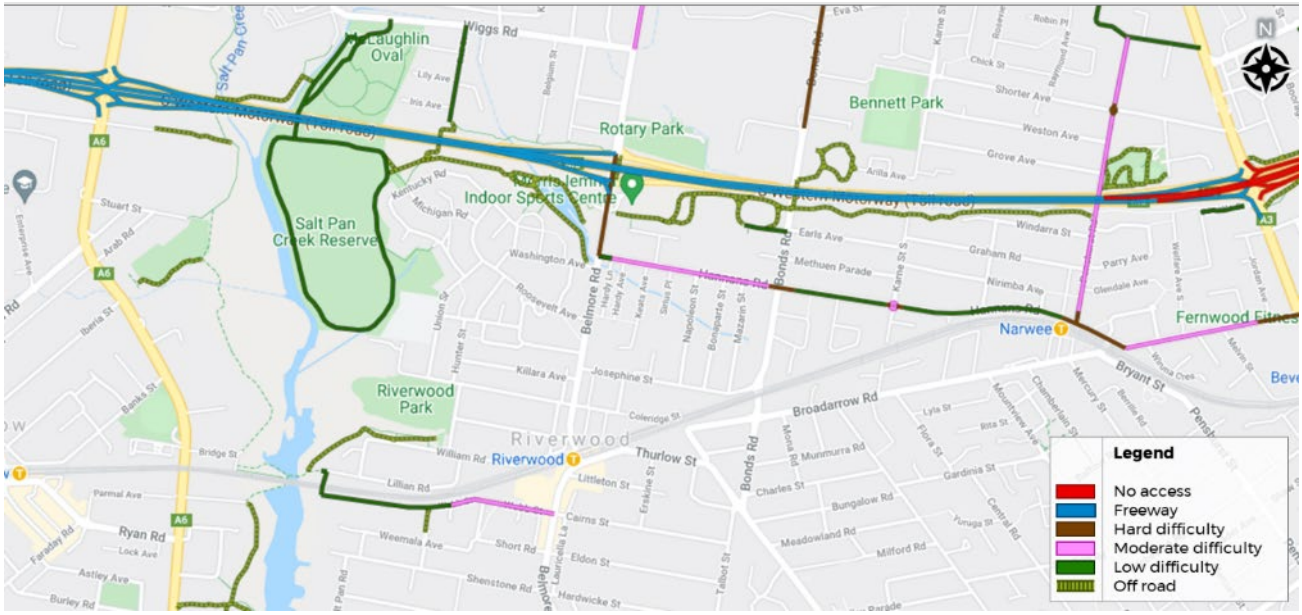
A walkway through the plaza can provide a convenient and secure walking environment as it is sheltered and has good passive surveillance. However, it can be impacted by the operating hours of the shopping centre, pedestrians would also need to travel via the internal ramps and car park, which can have a number of conflict points with the car park operations.

Figure 3.14 Access via Riverwood Plaza loading dock

Access via the Riverwood Plaza loading dock to the site would be the most direct from the Riverwood Station access point. However, it is a facility reserved for heavy vehicles accessing the loading dock which reduces its convenience and safety as a walking facility. It is also not a designated and formal walkway for pedestrians, with the site having poor lighting, walking facilities and guidance for pedestrians.

3.6 BICYCLE NETWORK AND INFRASTRUCTURE

There are currently no formal cycleways to access the bicycle parking and Riverwood Station, with only an off-road cycling facility available on Webb Street between Salt Pan Creek and Turner Street. Connection to the Riverwood town centre and the train station would be completed informally on-road. Transport for NSW's Cycleway Finder (Figure 3.15) depicts the existing cycling facility in the vicinity of Riverwood town centre.



Source: Transport for NSW Cycleway Finder, accessed 23 April 2021

Figure 3.15 Cycling infrastructure and facilities

However, the demand of cycling in the study area (as depicted in *Strava* cycling heatmap in Figure 3.16), generally occurs along Webb Street between Salt Pan Creek to Belmore Road and in north-south direction on Belmore Road.

Source: Strava Heatmap (accessed May 2021)

Figure 3.16 Heatmap of bicycle demand in Riverwood

In terms of bicycle parking facilities, uncovered bicycle hoops were observed within the vicinity of Riverwood Station on William Street (Figure 3.17), immediately north of Riverwood Station and at the north-eastern corner of Thurlow Street/ Belmore Road (Figure 3.18).

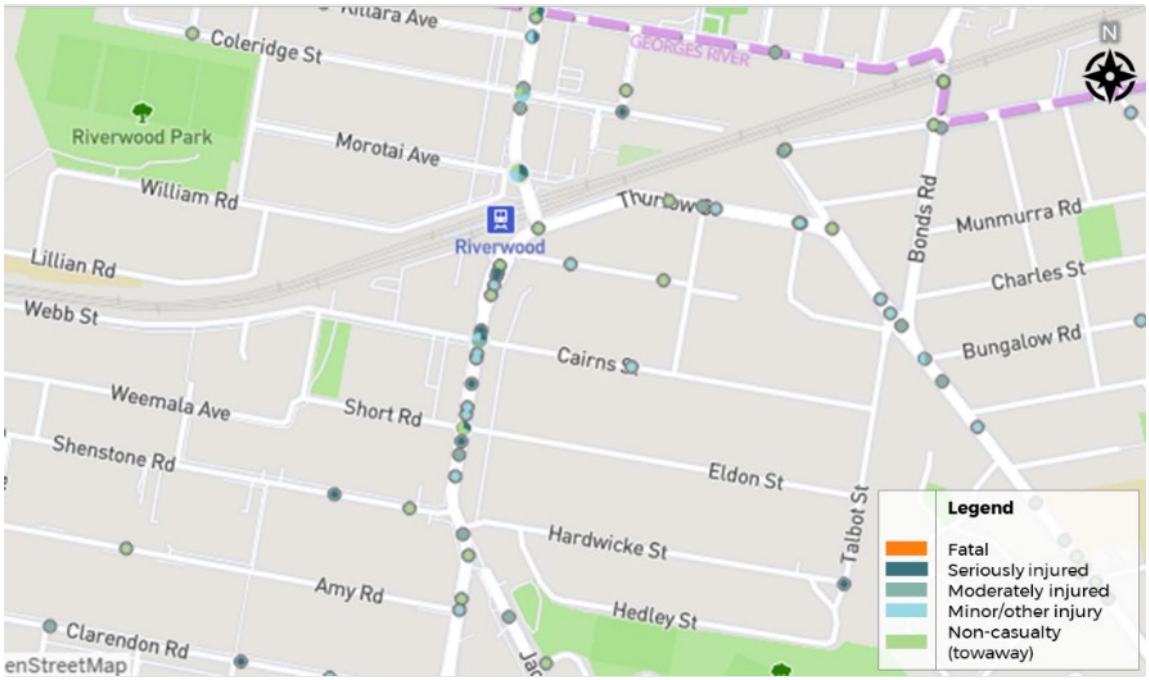
Figure 3.17 Bicycle parking on William Street

Figure 3.18 Bicycle parking on Thurlow Street

3.7 ROAD SAFETY

A preliminary analysis of the data available between 2015–2019 on Transport for NSW *Road Safety Crash and Casualty Statistics Interactive Map* identified the following key findings:

- Zero fatal crashes near Riverwood Station and in the study area.
- Thirty crashes along Belmore Road in proximity to the station.
- Seven crashes involving pedestrians near the station, in the study area along Belmore Road, four of which were serious.
- One crash at the Belmore Road/Thurlow Street intersection.
- Clusters at Belmore Road/Webb Street/Cairns Street and Belmore Road/Short Road/Eldon Street intersection. This could become an issue with the main access for the proposed commuter car park being off the Belmore Road/ Webb Street/Cairns Street intersection.
- There were no recorded crashes on Webb Street.



Source: NSW Centre for Road Safety – Interactive Crash Statistics Map, accessed 23 April 2021

Figure 3.19 Crash map, Riverwood

4 CONSTRUCTION IMPACT ASSESSMENT

4.1 CONSTRUCTION ACTIVITIES

4.1.1 WORK METHODOLOGY

Subject to approval, construction is expected to commence in late 2021 and take around 12 months to complete. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with Transport for NSW.

The proposed construction activities for the Proposal are identified in Table 4.1. This staging is indicative and is based on the current concept design and may change once the detailed design methodology is finalised. The staging is also dependent on the Contractor's preferred methodology, program and sequencing of work.

Table 4.1 Indicative construction staging for key activities

Stage	Activities
Site preparation	— Disconnection of utilities. — Secure the boundary site with temporary fencing and hoarding. — Install traffic and pedestrian controls in the vicinity of Webb Street and close the existing car park. — Undertake survey to identify site boundaries and mark out existing services and proposed car park foundations.
Demolition/site clearing works	— Undertake demolition works of the existing structures at 12, 14 and 16 Webb Street. — Clear site of any existing vegetation not being retained and demolish obsolete kerbs and landscaping in existing car park.
Site establishment/ utilities	— Establish site office, amenities, and plant/material storage areas. — Establish other environmental controls, such as erosion and sediment controls. — Relocate or cap local utilities clear of building footprint. — Provide necessary services to various points within the car parking footprint.
Building and structural works	— Prepare the site for the construction of foundations. — Construct piled foundations, footing beams and pile caps over new piles. — Form and pour ground flood slabs. — Construct suspended levels, including stairs, walls and columns one level at a time. — Construct blockwork on each level. — Make good at grade car park where surface has been disturbed for installation of services or construction of new foundations. — Install new lifts. — Install electrical, hydraulic, and mechanical services infrastructure.

Stage	Activities
Architectural features/ finishing	— Install protective screens around building perimeter. — Install vehicle crash barriers, balustrades, new cladding. — Landscape area at ground level. — Painting of car park concrete elements. — Marking of car park lines, direction arrows and installation of way finding signage. — Construct new footpaths, kerbs and access within the proposal site to link adjacent infrastructure. — Installation of ancillary features including fire protection, CCTV, electrical elements and other transport park-and-ride infrastructure (boom gates etc).
Precinct works (external to the car park)	— Road modifications such as the finishing of surfacing works and line marking between the Proposal and Webb Street. — Installation of new wayfinding signage. — Completion of landscaping (subject to detailed design).
Testing and commissioning	— Completion of activities to test and commission power supply, lifts, lighting boom gates etc.
Decommissioning of temporary facilities and site demobilisation	— Remove temporary site facilities. — Removal of footpath/pedestrian management and traffic controls. — Removal of environmental controls. — Completion of site clean-up and tidying works.

4.1.2 SITE COMPOUND AND LOCATIONS

Construction activities would generally be limited within the boundaries and the immediate vicinity of the proposed site. Access to the site would be provided via Webb Street with the on-street parking at the frontage of the site required for plant, equipment and construction vehicle accesses. Existing parking on Webb Street would need to be restricted at the frontage of the Proposal site to allow for heavy vehicles and machinery access during construction.

Workers driving to site are likely to utilise the parking available further down Webb Street along the rail corridor west of Keppel Avenue as depicted in Figure 4.1 below.

Source: *Basemap: Nearmap*

Figure 4.1 Site compound and worker parking locations

4.1.3 WORKING HOURS

The majority of works required for the Proposal would be undertaken during standard (NSW) Environment Protection Authority (EPA) construction hours, which are as follows:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturdays
- No work on Sundays or public holidays.

Certain works may need to occur outside standard hours and would include night works.

Out of hours works may be required in some cases to minimise disruptions to customers, pedestrians, motorists and nearby sensitive receivers; and to ensure the safety of railway workers and operational assets.

Approval from Transport for NSW would be required for any out of hours work and the affected community would be notified as outlined in Transport for NSW's *Construction Noise and Vibration Strategy* (Transport for NSW, 2019).

EXTENDED WORKING HOURS FOR COVID

The Minister for Planning and Public Spaces has made a number of Orders under Section 10.17 of the EP&A Act in response to the COVID-19 pandemic. This includes the Environmental Planning and Assessment (COVID-19 Development – Infrastructure Construction Work Days No. 2) Order 2020 (the 'Order'), which commenced on 24 December 2020, and is applicable to construction activities for projects which have been subject to an assessment under Division 5.1, or approval under Division 5.2 of the EP&A Act. The Order extends the standard construction hours to allow infrastructure construction work on Saturday, Sunday and Public holidays (7 am to 6 pm), without the need for any approval (excluding high noise generating works such as rock breaking or pile driving and the like).

These extended working hours were due to expire on 25 March 2021. However, on Wednesday 24 March 2021, the NSW Government introduced the COVID-19 Legislation Amendment (Emergency Measures) Bill 2020, which was subsequently passed by parliament, and came into effect on 25 March 2021. A section of the Bill enabled the extension of the extended working hours until 31 March 2022.

Whilst no further assessment of the environmental impacts are required for these extended working hours, in the event that Transport for NSW would seek to utilise the extended working hours permitted by the Order, advance notification would be provided to the community.

4.1.4 WORKFORCE

A breakdown of the workforce associated for each construction stage has been provided in the *FutureRail study*, and shown below in Table 4.2. The busiest construction stage is likely to be the superstructure stage with 45 daily trucks and 62 construction workers across 12 weeks.

Table 4.2 Indicative construction staging for key activities including workforce

Stage	Activities	Duration (weeks)	Maximum daily deliveries (trucks)	Maximum daily workforce
Site preparation	— Disconnection of utilities and demolition of acquired lots. — Secure site boundary with temporary fencing and hoarding. — Provide traffic and pedestrian controls in the vicinity of the proposal site in accordance with Georges River Council requirements. — Undertake survey to identify site boundary and mark out existing services and proposed foundations of car park. — Clear site of any existing vegetation not being retained, and demolish obsolete kerbs and pavements. — Establish site office, amenities and plant/material storage areas on the construction hoarding deck. — Establish other environmental controls, such as erosion and sediment controls.	3	18	15
Utilities infrastructure	— Disconnect and cap existing services. — Locate and excavate storm water drainage and undertake storm water relocation works. — Provide necessary services to various points within the car park footprint.	1	5	15
Foundations	— Prepare site for construction of foundations. — Construct piles and ensure adequate embedment into appropriate bedrock is achieved. — Construct footing beams and pile caps over new piles. — Form and pour ground floor slab.	3	16	27

Stage	Activities	Duration (weeks)	Maximum daily deliveries (trucks)	Maximum daily workforce
Superstructure	— Construct suspended levels, including stairs, walls and columns one level at a time. — Construct block work on each level. — Make good at-grade car park where existing surface has been disturbed for installation of services or construction of new foundations. — Install new lifts. — Install electrical, hydraulic and mechanical services infrastructure.	12	45	62
Architectural features/finishes	— Install protective screens around building perimeter. — Install vehicular crash barriers. — Install balustrades. — Install new cladding. — Landscape area at ground level. — Painting of car park concrete elements. — Marking of car park lines, directional arrows etc. and installation of way finding signage. — Construct new footpaths, kerbs and accesses within the proposal site to link adjacent infrastructure.	4	10	46

Source: Table 4.1, FutureRail Commuter Car Park Program Traffic, Transport and Access Impact Assessment Riverwood Commuter Car Park, March 2020

4.1.5 PLANT AND EQUIPMENT

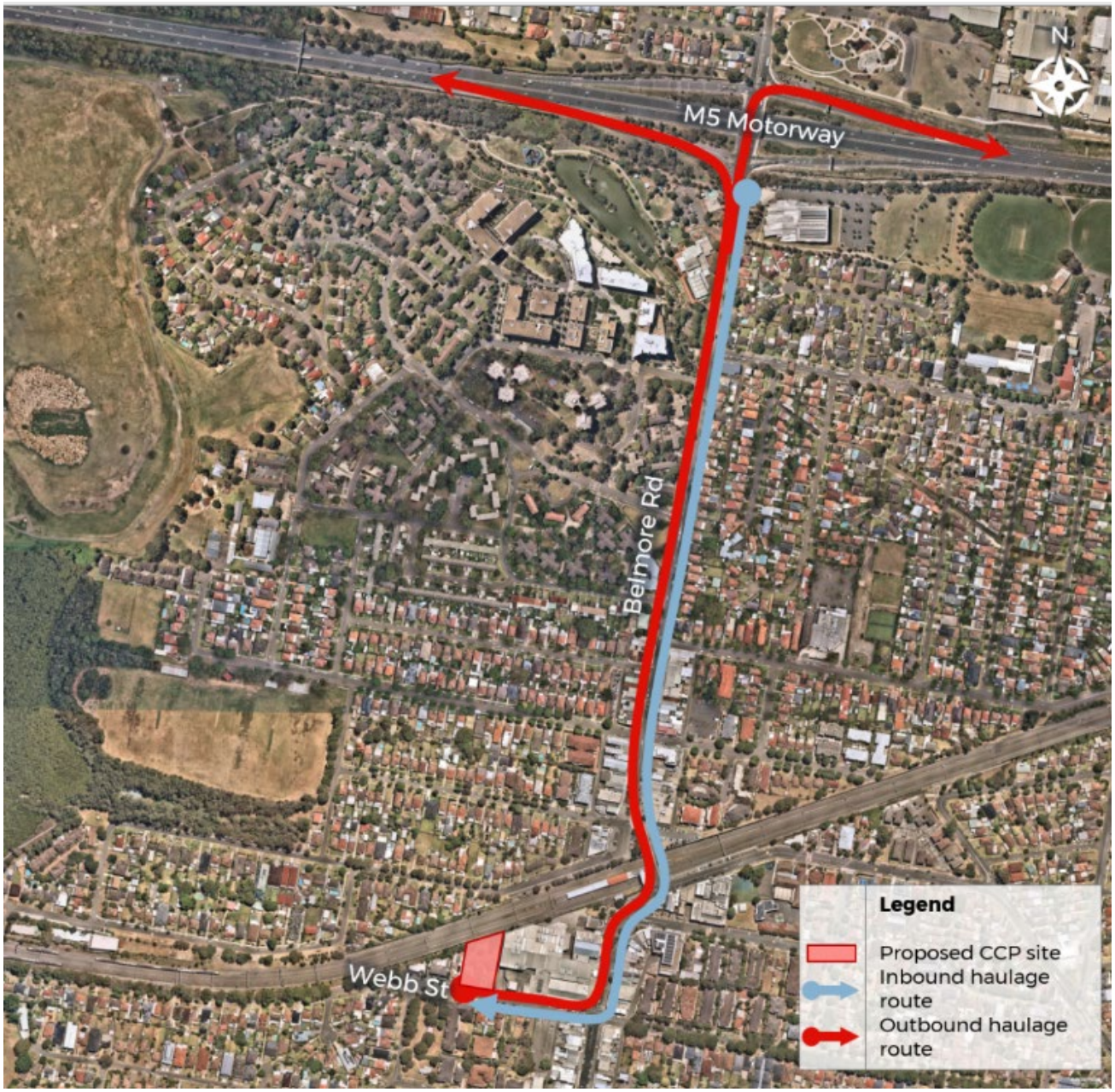
The plant and equipment likely to be used during construction would include, but not be limited to:

- Tower and mobile cranes
- Water truck
- Street sweeper
- Road saw
- Vibratory rollers
- Trench compactors
- Concrete pump
- Semi-trailers
- Spoil trucks (truck and dog)
- Welding equipment
- Air compressors
- Concrete saws
- Generators
- Concrete vibrators
- Jack hammers
- Demolition saw
- Excavators (8-30 tonnes)
- Elevated work platforms
- Paving machine
- Lighting towers
- Various hand tools.

4.2 CONSTRUCTION TRAFFIC

4.2.1 HAULAGE ROUTES

Haulage routes are proposed along Belmore Road between the M5 Motorway and Riverwood Station. Vehicles coming to and leaving from the proposed site would use the same route travelling along Belmore Road and turn onto (or out if exiting the area) Webb Street via the signalised intersection as in Figure 4.2.



Source: Basemap: nearmap

Figure 4.2 Haulage routes

4.2.2 CONSTRUCTION TRAFFIC GENERATION

Based on Table 4.2, the maximum workforce at any one stage will be up to around 62 workers and 45 daily delivery trucks. Assuming workers drive light vehicles (cars/vans/utes) and that a worst-case scenario occupancy rate of one person per car or truck is adopted, the maximum daily traffic will be 62 light vehicles and 45 heavy vehicles (delivery trucks).

It can be assumed that a majority of workers would arrive to site before 7.00 am and depart after 6.00 pm, and that deliveries would be spread across the day.

For the purposes of modelling a worst-case scenario, these volumes have been incorporated into the peak hours. It should be noted that the extent of impacts based on worst-case modelling would likely not be realised due the construction traffic arriving and departing outside of the peak hours and delivers spread across the day.

4.2.1 CONSTRUCTION TRAFFIC DISTRIBUTION

Distribution of the construction generated traffic will follow haulage routes identified in Figure 4.2. Distribution across the three key study areas is shown in Figure 4.3 and Figure 4.4.

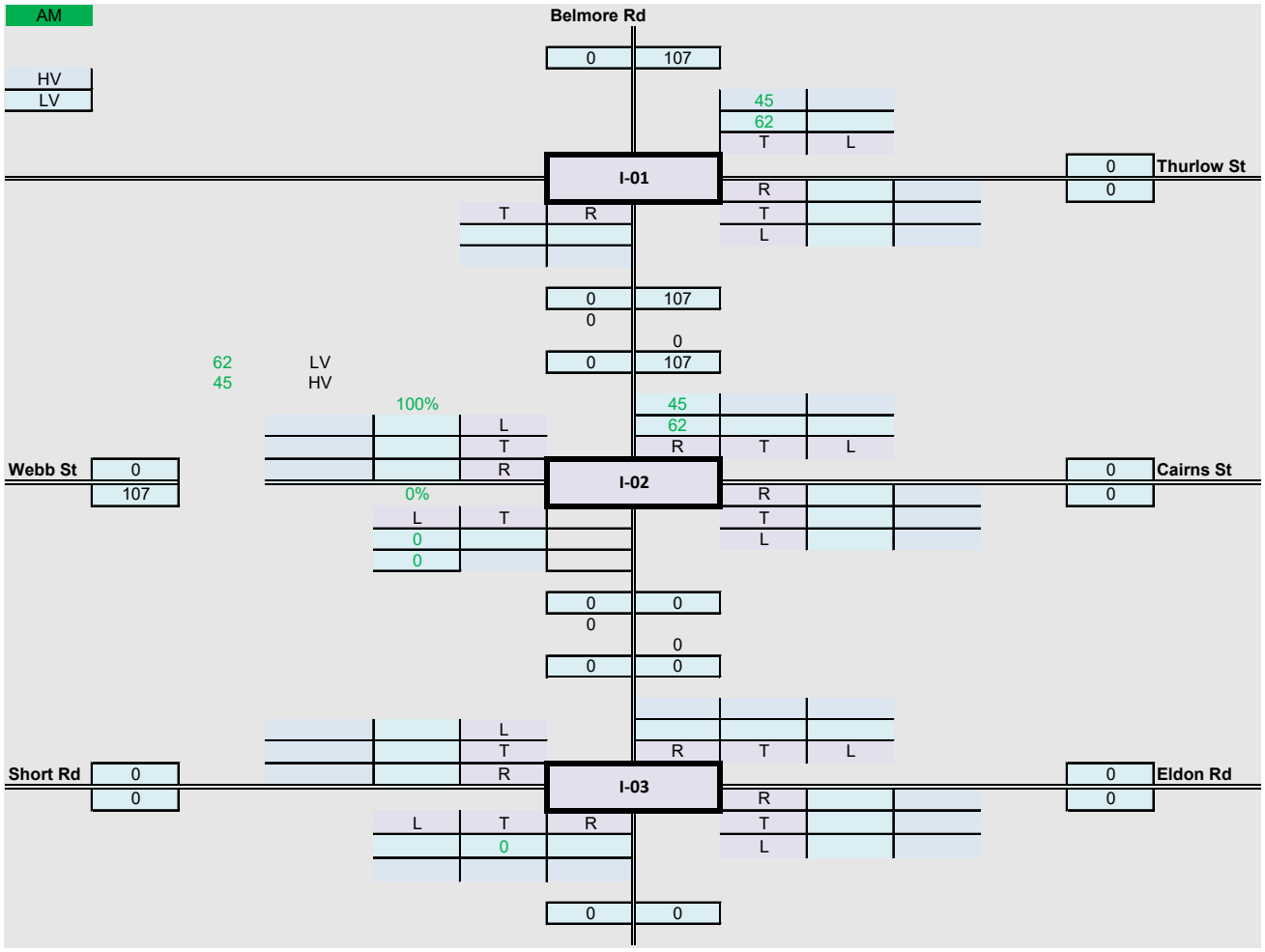


Figure 4.3 AM construction traffic distribution – additional traffic movements per hour

Notes LV = light vehicles, HV = heavy vehicles

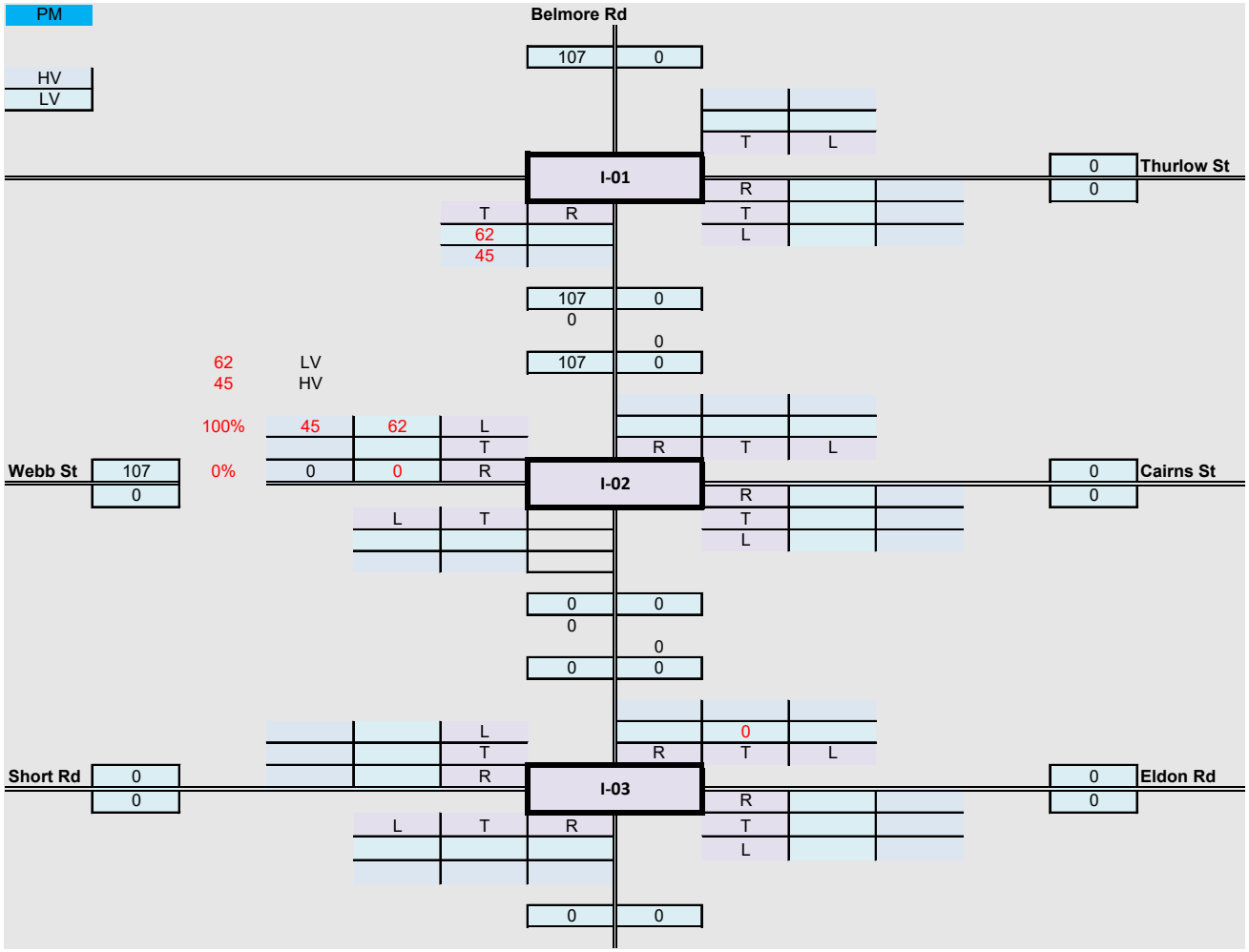


Figure 4.4 PM construction traffic distribution – additional traffic movements per hour

Notes LV = light vehicles, HV = heavy vehicles

4.2.2 INTERSECTION PERFORMANCE

Intersection performance for Construction 2022 scenario are detailed in Table 4.3, with Base 2021 provided for comparison. More detailed results and summaries are provided in Appendix B. AM and PM queue lengths along the western approach at the Belmore Road/Webb Street intersection are up to approximately 25 m and 100 m respectively in these scenarios. This length would not impact the Proposal's location, which is approximately 120 m west of the intersection.

Table 4.3 Intersection performance

Scenario	Intersection	AM					PM				
		Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)	Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)
Base 2021 (existing)	Thurlow Street/ Belmore Road (Signalised)	1,754	1.02	56	LoS D	300 – West approach	1,769	1.03	69	LoS E	500 – North approach
	Belmore Road/Webb Street/ Cairns Street (Signalised)	1,530	0.67	13	LoS A	150 – South approach *25 – West approach*	1,925	0.82	24	LoS B	215 – North approach *60 – West approach*
	Belmore Road/Short Road/ Eldon Street (Priority)	1,446	0.32	75	LoS F	10 – West approach	1,630	0.90	155	LoS F	45 – West approach
Construction 2022	Thurlow Street/ Belmore Road (Signalised)	1,869	1.04	65	LoS E	380 – North approach	1,883	1.06	83	LoS F	505 – North approach
	Belmore Road/Webb Street/ Cairns Street (Signalised)	1,643	0.75	15	LoS B	150 – South approach *25 – West approach*	2,056	0.86	27	LoS B	230 – North approach *100 – West approach*
	Belmore Road/Short Road/ Eldon Street (Priority)	1,454	0.32	76	LoS F	10 – West approach	1,637	0.92	166	LoS F	45 – West approach

4.3 CONSTRUCTION IMPACTS

4.3.1 TRAFFIC IMPACTS

The main traffic impacts associated with construction of the Proposal would be due to the increase in vehicles travelling north-south along Belmore Road. As intersection modelling shows, the performance of the AM and PM intersections in the construction scenario would worsen compared to existing traffic performance. While the assessed intersections would not be at a failure point, they would likely experience greater delays, with predictions of up to 11 and 14 seconds in the AM and PM peaks, and increased queue lengths of up to an additional 80 m, particularly at the Belmore Road/ Thurlow Street intersection. This is mainly due to the addition of more vehicles along the north-south Belmore Road where the existing phasing and associated phase-time splits would not accommodate additional such north-south traffic.

Construction traffic entering Webb Street from Belmore Road from the north approach right turn would also impact performance at this location during the AM peak. While the intersection maintains adequate performance through this scenario, there is a clear decline in performance. Average delay would increase from 12 seconds to 27 seconds for the affected approaches with the existing LoS A becoming a LoS B during construction. The DoS would increase from 0.3 to 0.7 and queue lengths also increase from approximately 50 m to 100 m along the northern approach. Introducing construction traffic to this right turn, across approximately 900 vehicles travelling northbound is expected to create additional delays although, the overall performance is still considered to be acceptable.

During the PM peak, construction traffic exiting Webb Street via the left turn would impact the performance of the western leg of the intersection, with the remaining legs maintaining reasonable performance. Average delays for these movements would increase from 35 seconds to 42 seconds with the existing LoS C becoming a LoS D during construction. The DoS would increase from 0.2 to 0.8 and queue lengths also increase from approximately 45 m to 100 m along the eastern approach.

Detailed intersection performance can be found in Appendix B.

Additional traffic impacts could likely occur based on the introduction of more large, heavy vehicles travelling along the main street of Riverwood. Belmore Road is typically limited to light vehicles, buses and some delivery/loading vehicles but with the need for larger construction vehicles to travel along this road to access the site, there may be some conflict between vehicles.

It is to be noted that while the haulage route via Belmore Road to the M5 Motorway is planned to be the main haulage route, there may be instances where some construction traffic heads south towards Henry Lawson Drive. However, this demand unlikely to be at a level which would result in any measurable traffic impacts.

Section 6 explores the mitigation measures for intersection operation and shows that increasing total cycle time from 120 seconds to a maximum of 140 seconds could improve the construction scenario performance. Table 6.1 shows that intersection performance would be nearing capacity with 68 second delays and 470 m queues during the worst-case PM peak.

4.3.2 TRAIN SERVICES

For most part, the construction activities of the car park would generally be contained within the site boundaries and the immediate vicinity of the site. As such, the construction of the Proposal would have minimal impacts to the train line and daily train services.

However, given that the site abuts the rail corridor, minor works (e.g. stormwater connection) may be required to be done within the rail corridor (subject to detailed design). Should they be required, these works would likely occur outside standard hours and would include night works and during routine rail possessions which are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed, and trains are not operating.

Approval from Transport for NSW would be required for any out of hours work and the affected community would be notified accordingly prior to the undertaking of works.

4.3.3 BUS SERVICES

Bus services currently operate on Belmore Road and would not be likely to be affected by the works undertaken at the site on Webb Street. For the worst-case scenario modelled, buses may experience some delays associated with construction traffic during the peak hours. These delays would likely not have a noticeable impact to the overall service performance, particularly outside of the peak hour, and with the north-south flow maintaining priority bus movements will be accommodated.

4.3.4 TAXI AND KISS-AND-RIDE FACILITIES

Taxi rank on Belmore Road and kiss-and-ride facility within the vicinity of Riverwood Station are not located near the construction site. As such, these facilities would not be impacted by the proposed construction works of the Proposal.

4.3.5 PARKING IMPACTS

During construction, restrictions would be required at the frontage of the Proposal site for plant and equipment and construction vehicle access.

Parking for workers driving to the site would be assigned on Webb Street, west of Keppel Avenue and adjacent to the rail corridor, as depicted in Figure 4.1.

Based on the site visit (Figure 4.5) and car park occupancy survey undertaken for the Georges River Council car parking strategy, the proposed area assigned for construction workers parking currently has a moderate occupancy rate. On-street parking activities associated with construction workers would be temporary and is considered to result in a minor impact to existing parking requirements.

Figure 4.5 Webb Street west of Keppel Avenue

A Construction Traffic Management Plan would be developed as part of the detailed design of the Proposal and would include consideration of management for construction worker parking and access during the construction period.

4.3.6 PEDESTRIAN NETWORK IMPACTS

Construction activities of the car park would generally be contained within the site boundaries and the immediate vicinity of the site. As such, the footpath network would generally be subjected to minor impact, particularly outside of the construction site where construction works, and vehicles are likely to be active.

A Construction Traffic Management Plan would be developed as part of the detailed design of the Proposal and would include consideration of the movements and safety of pedestrians on Webb Street during and outside of the construction hours.

It is envisaged that an accredited Traffic Controller would be present at the site access gate during work hours to manage the construction activities at the site and ensure a minor impact between construction works and pedestrian activities.

4.3.7 BICYCLE NETWORK IMPACTS

As described in section 3.6, while Webb Street currently does not have formalised facility for cycling, it is used regularly by cyclists between Salt Pan Creek and Belmore Road.

A Construction Traffic Management Plan would be developed as part of the detailed design of the Proposal and would include consideration of the management of cycling activities and access on Webb Street. With the development of the Construction Traffic Management Plan, the impact of construction works to cycling activities is considered minor.

4.3.8 PROPERTY ACCESS IMPACTS

With the exception of the three properties requiring acquisition, no additional property access is expected to be compromised during construction activities.

4.3.9 ROAD SAFETY IMPACTS

As discussed in section 3.7, a cluster of crashes in the Riverwood town centre generally occur along Belmore Road at intersections with the abutting streets.

The construction haulage route is proposed to travel via Belmore Road and Webb Street between M5 to the site, with the works proposed to transport a number of machineries to the site, with the largest types of machineries being mobile cranes, 30-tonne excavators on a back of a semi-trailer and spoil trucks (truck and dog).

While these vehicles would be within the current access regulation on Belmore Road and Webb Street (allows General Access Vehicles up to 19 metres long), the haulage route would be required to travel through Riverwood town centre where pedestrian activity is high.

Therefore, to minimise the risk associated with heavy vehicle movements, it is recommended that a Vehicle Movement Plan (VMP) is developed as part of the detailed design of the Proposal. This will inform drivers of the designated route, risks along the travel route, restricted time periods of travel through the town centre. Ultimately this will help to manage the heavy vehicle movements accessing the site.

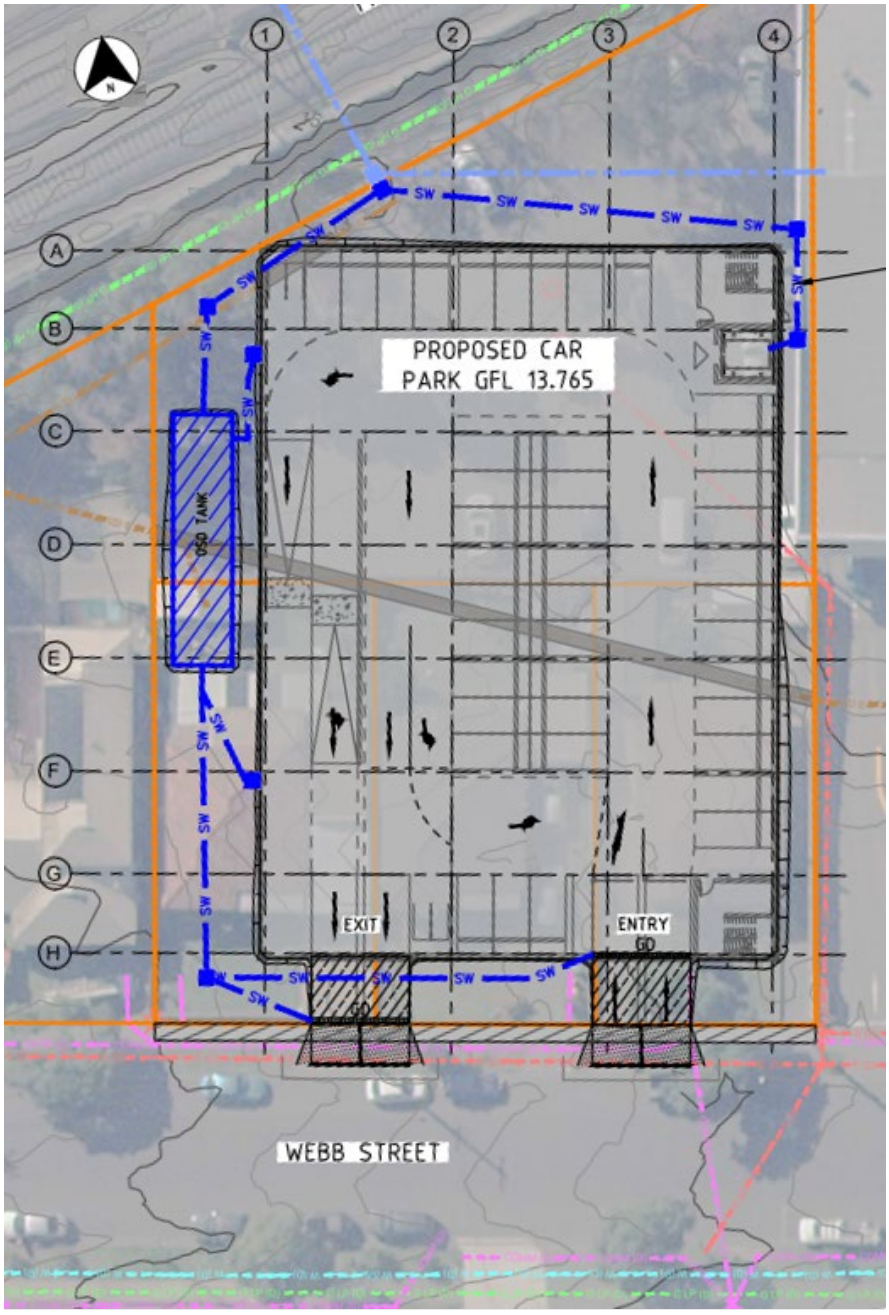
Additionally, it is envisaged that the transporting of large machineries using semi-trailers would be undertaken outside of the peak periods of the existing road network and town centre to further minimise disruptions and safety impacts to customers, pedestrians, motorists and nearby sensitive receivers.

5 OPERATIONAL IMPACT ASSESSMENT

5.1 CAR PARK LAYOUT

The multi-storey car park would consist of separate access and egress from/to Webb Street as shown in Figure 5.1. The car park would operate in a one-way, anti-clockwise circulation arrangement, with ramp accesses provided along the western end of the car park.

The car park will operate 24 hours, 7 days a week and would consist of an Opal Card operated boom gate system.



Source: FutureRail, 2020

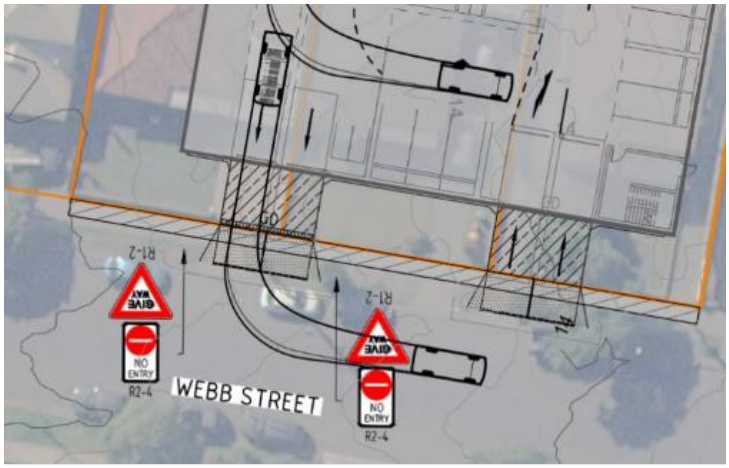
Figure 5.1 Proposed multi-storey car park arrangement and layout

The design of the internal layout of the car park has been subject to a separate design process. The following design criteria of the car park have been checked against the Australian Standards (AS2890.1:2004 – off-street car parking) requirement to consider the car park's safety and operational interface with the public road:

- **Number of access driveway and dimensions**: Section 3.2.1 *access driveway widths* note that a commuter car park with 140 car parking spaces and access to a local road are to have, at a minimum, a combined entry/exit driveway measuring 6.0 to 9.0 metres. The proposed car park would have separated access and egress points measuring approximately 6.8 metres each driveway. Therefore, the proposed driveways into/out of the car park exceed the Australian Standards minimum requirement.
- **Driveway gradient:** Section 3.3 gradients of access driveways note that a maximum of 1 in 20 (5 per cent) between the property line and edge of road. It is noted that this requirement can be satisfied considering the accessibility to existing properties and that the access driveway will be built in accordance with Georges River Council's standard drawings and specifications and other relevant standards.
- **Queueing areas at proposed boom gates**: It is noted that the car park would be serviced by boom gates operated by Opal cards. Section 3.4 *queueing areas* notes that a car park with 140 car parking spaces, requires a queuing space for four vehicles. Given that the site will be serviced by two boom gates, the four vehicles queueing space is rationed to two spaces and therefore the proposed design of the queuing area is considered satisfactory and would therefore minimise traffic queueing to the footpath or Webb Street.
- **Sight distance for vehicles entering the road network**: Section 3.2.4 *sight distance at access driveway exits* note that a 45 metres minimum sight distance free of permanent sight obstruction is required for driveways abutting a road which has a posted speed at 50 km/h. This is achieved at the proposed egress driveways, however like most driveways in urban areas, sight distance may be affected by parked vehicles.
- **Sight distance to pedestrians**: Section 3.2.4 *sight distance at access driveway exits* also note that a triangular sight line of 2.0 m wide and 2.5 m depth is to be provided at the property line to ensure adequate sight distance to pedestrians on the public footpath. This has been achieved as the building line is offset approximately 4.5 metres from the property boundary line.

The check above indicates that the proposed car park layout satisfies the Australian Standards requirements at its interface with the public road.

From a road safety perspective, a conflict point would exist at the exit driveway (Figure 5.2) as the design proposes to include two exit lanes which allows left turn to be made from either lane. There are a number of options that could be available to minimise the safety issue, however determination of the optimal solution will be the subject of a separate investigation during the detailed design of the car park and as part of the consultation process with Georges River Council.



Source: FutureRail, 2020

Figure 5.2 Car park egress driveway

5.2 ROAD NETWORK OPERATIONAL IMPACTS

5.2.1 TRAFFIC IMPACTS

The following chapter describes the traffic impact of the Proposal on the surrounding road network during operation. The traffic generation, distribution and performance of the assessed intersections are further discussed.

The adopted AM peak (7.30 am–8.30 am) aligns with opal data (entries and exits) presented in Table 3.2 where the most entries occur between 7.00 am–9.00 am. We have assumed that the same is true for the PM, where the adopted 4.30 pm–5.30 pm peak matches station exits for the purposes of this assessment.

5.2.1.1 TRAFFIC GENERATION

The Proposal would provide approximately 140 car spaces. The total trip generation for the AM (assumed 40 per cent) and PM (assumed 30 per cent) peaks would be around 56 and 42 vehicles respectively. As identified in section 3.2.3, the total traffic generation for the existing at-grade car park and residential dwellings during the peak AM and PM hours is approximately 13 and 11 light vehicles respectively. These trips can be removed from the Proposal trip generation to understand the net increase in overall trip generation for the site. This Proposal would encourage less use of car travel overall and more public transport although this has not been accounted for in this traffic generation.

The total trip generation for the site would therefore be 43 light vehicles in the AM peak and 31 vehicles in the PM peak.

5.2.1.2 TRAFFIC DISTRIBUTION

Traffic distribution for Proposal traffic is seen in Figure 5.3 Figure 5.4.

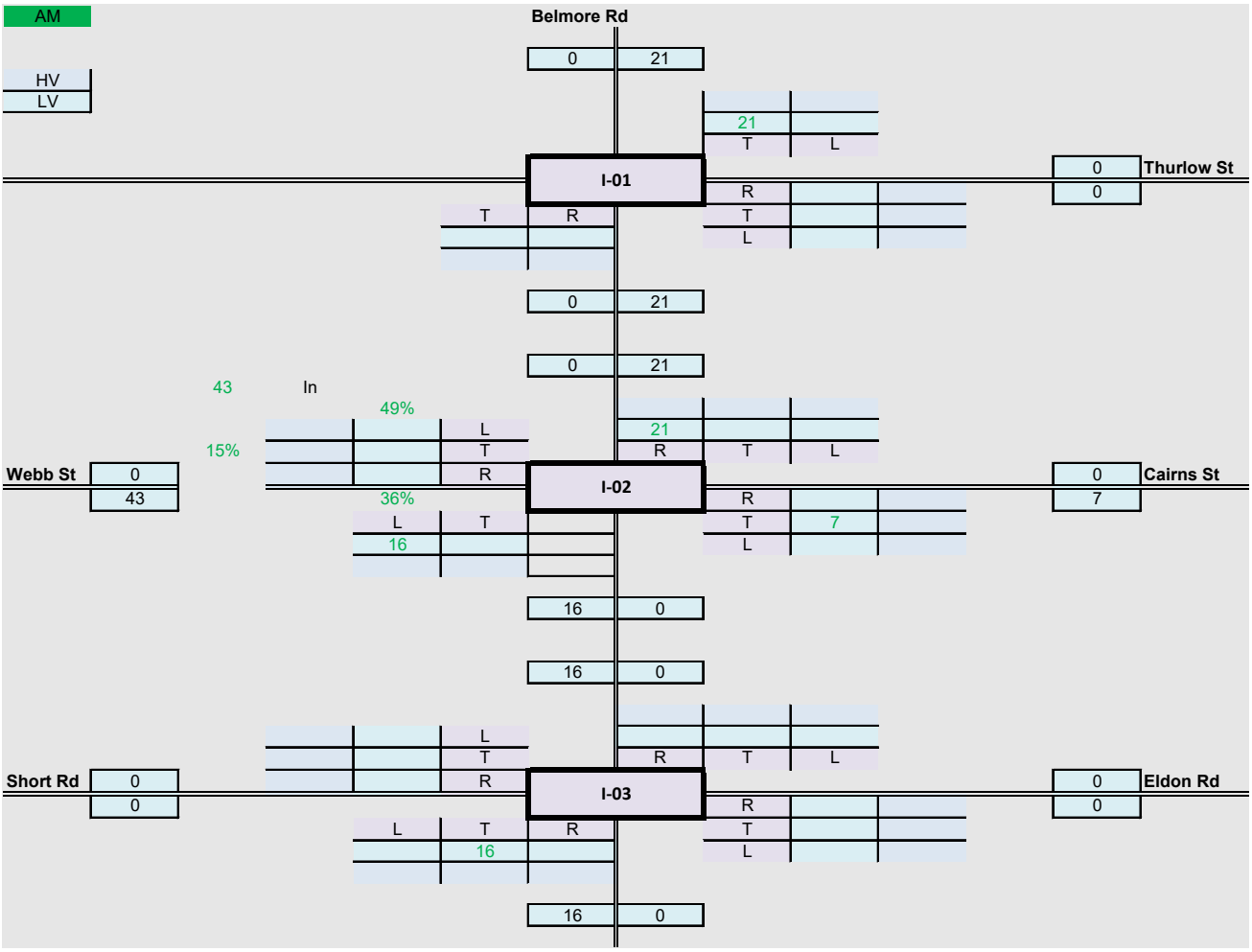


Figure 5.3 AM Proposal traffic distribution – additional vehicle movements in the peak hour

Notes LV = light vehicles, HV = heavy vehicles

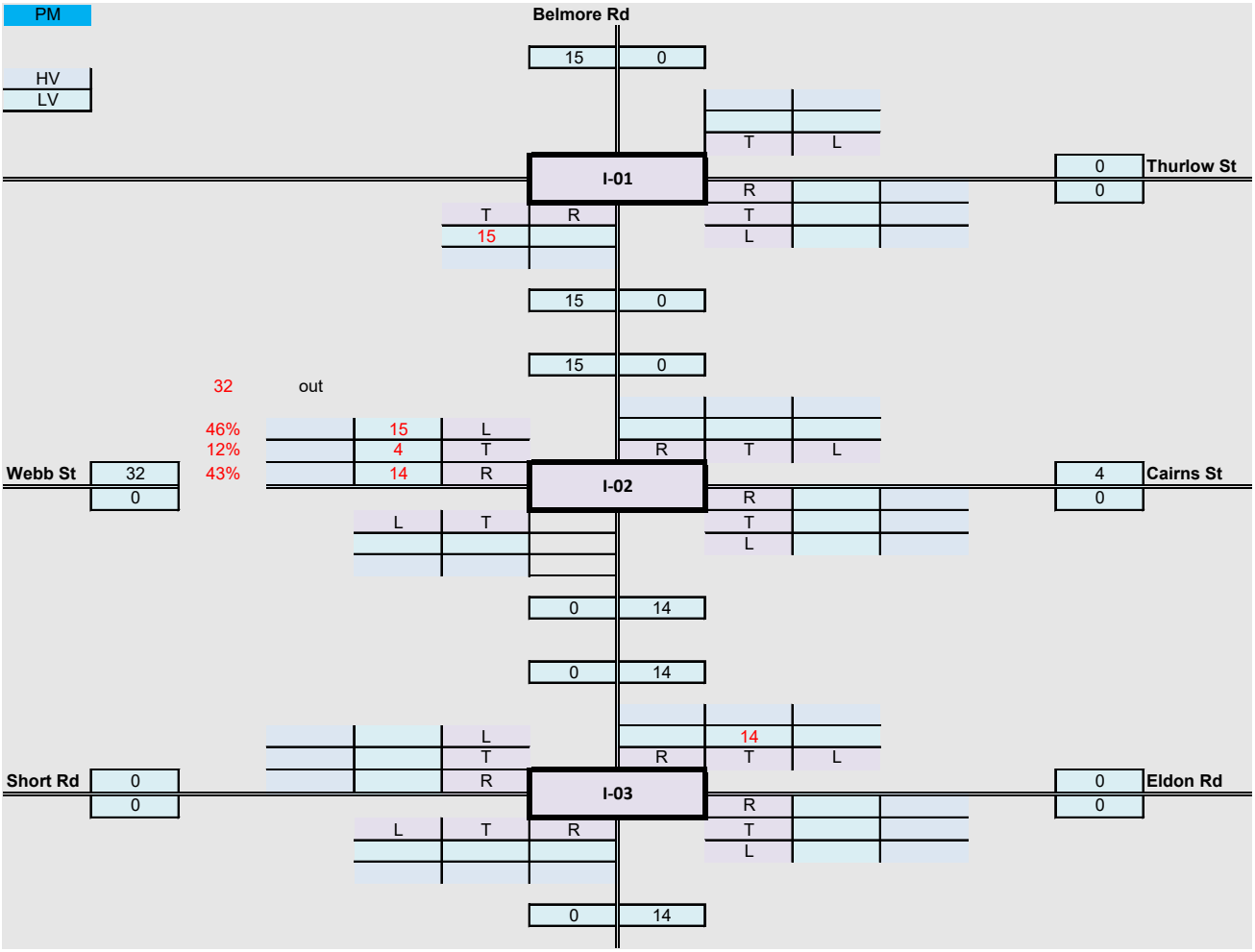


Figure 5.4 PM PROPOSAL traffic distribution – additional vehicle movements in the peak hour

Notes LV = light vehicles, HV = heavy vehicles

5.2.1.3 INTERSECTION PERFORMANCE

Intersection performance for each of the future scenarios are detailed in Table 5.1 with the Base 2021 scenario provided for comparison. More detailed results and summaries are provided in Appendix B. AM and PM queue lengths along the western approach at the intersection of Belmore Road and Webb Street are up to approximately 25 m and 95 m respectively in these scenarios. Neither of these will impact the Proposal's location which is approximately 120 m west of the intersection.

Table 5.1 Intersection performance

Scenario	Intersection	AM					PM				
		Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)	Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)
Base 2021 (existing)	Thurlow Street/ Belmore Road (signalised)	1,754	1.02	56	LoS D	300 – West approach	1,769	1.03	69	LoS E	500 – North approach
	Belmore Road/Webb Street/ Cairns Street (signalised)	1,530	0.67	13	LoS A	150 – South approach *25 – West approach*	1,925	0.82	24	LoS B	215 – North approach *60 – West approach*
	Belmore Road/Short Road/ Eldon Street (priority)	1,446	0.32	75	LoS F	10 – West approach	1,630	0.90	155	LoS F	45 – West approach
Future 2023 Base	Thurlow Street/ Belmore Road (signalised)	1,771	1.03	58	LoS E	315 – West approach	1,784	1.04	73	LoS F	520 – North approach
	Belmore Road/Webb Street/ Cairns Street (signalised)	1,543	0.68	13	LoS A	150 – South approach *25 – West approach*	1,944	0.77	23	LoS B	205 – North approach *75 – West approach*
	Belmore Road/Short Road/ Eldon Street (priority)	1,459	0.33	78	LoS F	10 – West approach	1,645	0.95	180	LoS F	50 – West approach
Future 2023 Operational	Thurlow Street/ Belmore Road (signalised)	1,783	1.03	60	LoS E	305 – West approach	1,791	1.05	75	LoS F	535 – North approach
	Belmore Road/Webb Street/ Cairns Street (signalised)	1,581	0.69	13	LoS A	155 – South approach *25 – West approach*	1,968	0.83	25	LoS B	220 – North approach *70 – West approach*
	Belmore Road/Short Road/ Eldon Street (priority)	1,469	0.34	81	LoS F	10 – West approach	1,651	0.95	182	LoS F	50 – West approach

Scenario	Intersection	AM					PM				
		Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)	Volume	DoS	Average delay (seconds)	LoS	95th percentile queue length (m)
Future 2033 Operational	Thurlow Street/ Belmore Road (signalised)	1,885	0.99	61	LoS E	311.3 – West approach	1,891	1.07	93	LoS F	595 – North approach
	Belmore Road/Webb Street/ Cairns Street (signalised)	1,669	0.65	12	LoS A	131 – South approach *25 – West approach*	2,078	0.89	31	LoS C	295 – North approach *95 – West approach*
	Belmore Road/Short Road/ Eldon Street (priority)	1,552	0.45	111	LoS F	10.3 – West approach	1,744	1.22	363	LoS F	152 – West approach

THURLOW STREET/BELMORE ROAD INTERSECTION

The key findings at Thurlow Street/Belmore Road intersection are:

- There may be a reduction in Level of Service experienced at this intersection due to the estimated background growth alone. Based on averaged delay, performance of the intersection drops from LoS D to LoS E in the AM peak and LoS E to LoS F during the PM peak.
- No clear difference between future 2023 Base and Operational scenarios indicating poor performance in Future 2023 Operational scenario is due to background growth, rather than traffic generated by the Proposal.
- The western approach performance would also worsen due to an increase in opposing traffic north-south - preventing western traffic receiving sufficient green time. The intersection will most likely continue to operate near and eventually at capacity during both peaks until the Future Operational 2033 stage, at which point the increase in background traffic will cause significant delays during the PM peak, projected up to 93 seconds.

KEY FINDINGS AT BELMORE ROAD/WEBB STREET/CAIRNS STREET

- No substantial changes in performance until Future 2033 Operational scenario, supporting the finding that background traffic growth impacts the network more significantly than traffic generated by the Proposal.
- Good performance through all scenarios during both peaks.
- Modelling results show PM queue lengths of between to 70 to 100 m along Webb Street. Site observations support this with no observed queue lengths reaching the Proposal's location, which is approximately 120 m from the intersection.

KEY FINDINGS AT BELMORE ROAD/SHORT ROAD/ELDON STREET

- This intersection shows poor performance. This is due to between 50 to 150 vehicles turning out of the eastern approach, trying to cross the 1,300 to 1,500 vehicles travelling north-south. This mainstream flow impedes cross street traffic based on the intersection models. As observed on site, this intersection's proximity to the upstream, signalised intersection enables east-west vehicles to take advantage of gaps in north-south traffic flow to exit. Drivers along Belmore Road also tend to provide appropriate space for the incoming traffic to merge.
- The trend of worsening performance across each scenario and peak is true at this intersection. However, based on observations, the severity is overrepresented due to SIDRA's tendency to conservatively assess priority-controlled intersections.

TRAFFIC IMPACT SUMMARY

The impacts to traffic based on the development of Proposal itself are minimal. As seen in the scenario modelling, there would be negligible difference between the Future 2023 Base and Operational scenarios, indicating that there would be little impact on the existing traffic network from the 30 to 50 vehicles introduced by the Proposal during peak periods. A more notable impact would be that of the background traffic growth, assumed for the purposes of this modelling as 0.5% per annum. By 2033, the general traffic growth would have reached a point where the network is likely to operate at capacity, requiring investigations into additional upgrades or improving overall efficiency.

Modelling and intersection performance indicates that the Proposal-generated traffic is not likely to be the primary reason for declining intersection performance across the assessed scenarios. Vehicles entering Webb Street from Belmore Road during the AM peak, as well as vehicles exiting Webb Street to Belmore Road during the PM peak, do not appear to impact performance significantly. Each of these movements' performance remains steady and reasonable. It appears that the future background growth would likely be the reason for declining intersection performance.

Detailed intersection performance can be found in Appendix B.

5.2.2 PUBLIC TRANSPORT IMPACTS

5.2.2.1 BUS SERVICES

The existing bus arrangements are in proximity of the Riverwood Station. The current bus operations and access arrangements are not proposed to change with the development of the Proposal.

However, it is noted that with the increase of car parking supply for commuters, traffic in Riverwood town centre particularly on roads affected by access to the car park would be subjected to increased delays. The impact to traffic operation, including buses, has been assessed in section 5.2.1.

5.2.2.2 TAXI AND KISS-AND-RIDE FACILITIES

The existing taxi and kiss-and-ride facilities are not proposed to change with the development of the Proposal.
The location of these facilities near the Riverwood Station and at a distance from the Proposal site would also mean that these facilities would experience insignificant impact from the development of the commuter car park.

5.2.3 PARKING IMPACTS

The Proposal would increase the existing car parking facilities by up to 140 spaces. This car park is expected to reduce on-street parking demand by commuters, which would relieve capacity for other uses, such as residential developments and activities in the Riverwood town centre.

Vehicles using the existing car park would need to be accommodated either within the existing shopping centre car park.

This would result in a moderate positive impact for parking supply in the town centre.

5.2.4 PEDESTRIAN NETWORK IMPACTS

The walking route from Riverwood Station to the Proposal site is likely to be via Belmore Road (western footpath) and Webb Street (northern footpath). This is approximately 300 metres long on existing footpaths, which for most part is wide and sheltered (i.e. around Riverwood Plaza). Direct access between the CCP and Riverwood Station behind Riverwood Plaza is not possible within the land available.

Although not a formalised pedestrian route, customers travelling between the proposed car park and Riverwood Station could also walk through Riverwood Plaza, which would increase the pedestrian traffic for local businesses.

The increase of pedestrian activities generated by customers walking between the Proposal site to Riverwood Station overall would have a positive impact in increasing pedestrian activities on Webb Street (improving passive surveillance) and for businesses along the route. The Proposal would also improve the footpath conditions immediately outside of the Proposal site.

As the Proposal site is not immediately visible from the rail station, it is recommended that pedestrian wayfinding and necessary signage are considered in further development assessment.

5.2.5 BICYCLE NETWORK IMPACTS

There is currently no formal cycling facility on Webb Street outside of the Proposal site. However, cycling activities are observed through the cycling demand heatmap recorded by Strava. The Proposal would not change the configuration of Webb Street, however minor impacts during the morning and afternoon peak periods may be experienced by cyclists travelling through Webb Street due to the minor increase in traffic activities as a result of the Proposal.

5.2.6 PROPERTY ACCESS IMPACTS

No retained property accesses are expected to be compromised during the operation of the Proposal.

5.2.7 ROAD SAFETY IMPACTS

The Proposal overall would introduce an increase to traffic activities within the immediate area with more cars entering and exiting Belmore Road and Webb Street to access the car park. This increase however is considered minor and with the unchanged configuration of the road network, is not envisaged to worsen the existing road safety issues on the road network. The existing crash patterns as discussed in section 3.7 would need to be investigated appropriately and addressed separate to this Proposal.

5.3 CUMULATIVE IMPACTS

Based on the information available of developments around Riverwood town centre, the land use surrounding Riverwood Station would likely remain unchanged in the foreseeable future. However, being located in close proximity to a train station, the area may experience increased population density due to the direct transport connectivity the location offers.

It is further noted that Riverwood Estate is proposed further north (near the M5 Motorway) which is some distance away from the Proposal site.

6 MITIGATION MEASURES

6.1 CONSTRUCTION MITIGATION MEASURES

The following general mitigation measures can be implemented to minimise impacts during the construction of the proposal:

- Prior to the commencement of construction, a Construction Traffic Management Plan (CTMP) would be prepared as part of the Construction Environmental Management Plan and would include at a minimum:
  - Ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised
  - Maximising safety and accessibility for pedestrians and cyclists
  - Ensuring adequate sight lines to allow for safe entry and exit from the site
  - Ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made)
  - Managing impacts and changes to on and off street parking and requirements for any temporary replacement provision
  - Parking locations for construction workers away from stations and busy residential areas and details of how this will be monitored for compliance
  - Routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses, high pedestrian areas and businesses
  - Measures to manage traffic flows around the area affected by the proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the CTMP.
  - Preparing heavy vehicle access plans.
- Communication would be provided to the community and residents to inform them of changes to parking, pedestrian or cyclist access and/or traffic conditions including vehicle movements and anticipated effects on the local road network relating to site works.
- Road Occupancy Licences for temporary road closures would be obtained, where required.
- A Traffic Guidance Scheme (TGS), formerly Traffic Control Plan (TCP), is to be developed for construction vehicle access off Webb Street. TCP implementation will ensure adequate warning and guidance is provided to road users, thus minimising road related traffic impacts. TCP would be required to be submitted to Transport Management Centre (TMC), Transport for NSW, where required. This could also include management of general and construction vehicles entering and exiting the commuter car park and site compounds.
  - This would include qualified traffic controllers who would be used during construction works to ensure safe and efficient movement of vehicle and pedestrian traffic on the external roads as well as in and out of the construction site. This could include managing conflicts along Belmore Road through the commercial land use.
- Whilst not a specific part of a CTMP, conducting a drive-through assessment or swept path analysis is highly recommended to ensure that sufficient manoeuvring space is provided for the largest design vehicle along the proposed haulage routes.
- Suitable vehicle, pedestrian and cyclist paths would be maintained throughout the construction of the proposed upgrade to ensure safe and easy access throughout the interchange outside of the scheduled track possession periods.
- Suitable pedestrian provisions would be made to ensure that pedestrian connectivity between bus stops is not impacted as a part of the works and that suitable and safe paths are provided.
- Fencing and barriers would be installed between construction site and outside construction zone to ensure safe and easy navigation of pedestrians and cyclists.

- Staging any new DDA compliant ramps, lifts and stairs (including demolishing existing non-complaint path) is necessary to minimise the impacts to pedestrians and cyclists accessing the station from the proposed works.

6.2 OPERATIONAL MITIGATION MEASURES

The following proposed mitigation measures are to address and reduce the level of impact to the network surrounding the Proposal during future operation:

- Detailed design would investigate locations to provide new bicycle storage closer to the station entrance. Consultation with the relevant landowner would be undertaken to determine the final location (where feasible and reasonable).
- Implementing Opal-controlled boom gates at the Proposal entrance on Webb Street to maintain security and manage commuter vehicles.
- Installing lighting and CCTV cameras for further security of commuters and supporting the pedestrian network. Additionally, commuter vehicles would be monitored promoting a safe environment for commuters to use this car park.
- Monitor sight lines for cars exiting the Proposal to ensure no obstruction.
- Introduce a safe crossing along the access point for the Proposal for pedestrians.
- Restrict parking between the Proposal's driveways to improve sight distance.
- Intersection modelling identified Belmore Road/Thurlow Street during the PM peak as a critical intersection requiring improvements across each scenario. The following improvements should be considered as part of the detailed design to accommodate increased traffic through each scenario, providing the updated results seen in Table 6.1. these improvements provide solutions to the overall background growth of the area, mitigating the impact of general traffic growth in addition to the Proposal's impact. By implementing these improvements, future performance is expected to provide the same LoS as existing (LoS E) which is acceptable.
    - It is important to note that improving the Belmore Road/Thurlow Street intersection by reducing parking along the traffic lanes will impact parking in the area and would be subject to further monitoring of the traffic demand on the road network in the future and consultation with relevant stakeholders including businesses and Georges River Council. The proposed removal is likely to only be required during peak hours, maintaining timed parking during the day otherwise, limiting parking impacts to the peak hours while also reducing traffic impacts during these times.

Table 6.1 Updated intersection model results with improved intersections

Scenario	Intersection	Improvement	PM				
			Volume	DoS	Average Delay (seconds)	LoS	95th percentile queue length (m)
Construction 2022	Thurlow Street/Belmore Road (Signalised)	Phasing: increase cycle time to 140 seconds from 120 seconds.	1883	1.04	68	LoS E	470 – North approach
Future Base 2023	Thurlow Street/Belmore Road (Signalised)	Phasing adjustments: taking green time from north movements and allocating to west movements.	1784	1.02	69	LoS E	490 – North approach
Future Operational 2023	Thurlow Street/Belmore Road (Signalised)	Phasing: increase cycle time to 130 seconds from 120 seconds.	1791	1.01	68	LoS E	500 – North approach
Future Operational 2033	Thurlow Street/Belmore Road (Signalised)	Phasing: increase cycle time to 130 seconds from 120 seconds. Layout: Remove street parking along Belmore Road (west approach) and Thurlow Street (east approach) (see Figure 6.1)	1891	1.02	65	LoS E	520 – North approach

Notes This table only shows results of the improved intersections identifying the minimal input required to achieve a more acceptable LoS E rather than LoS F

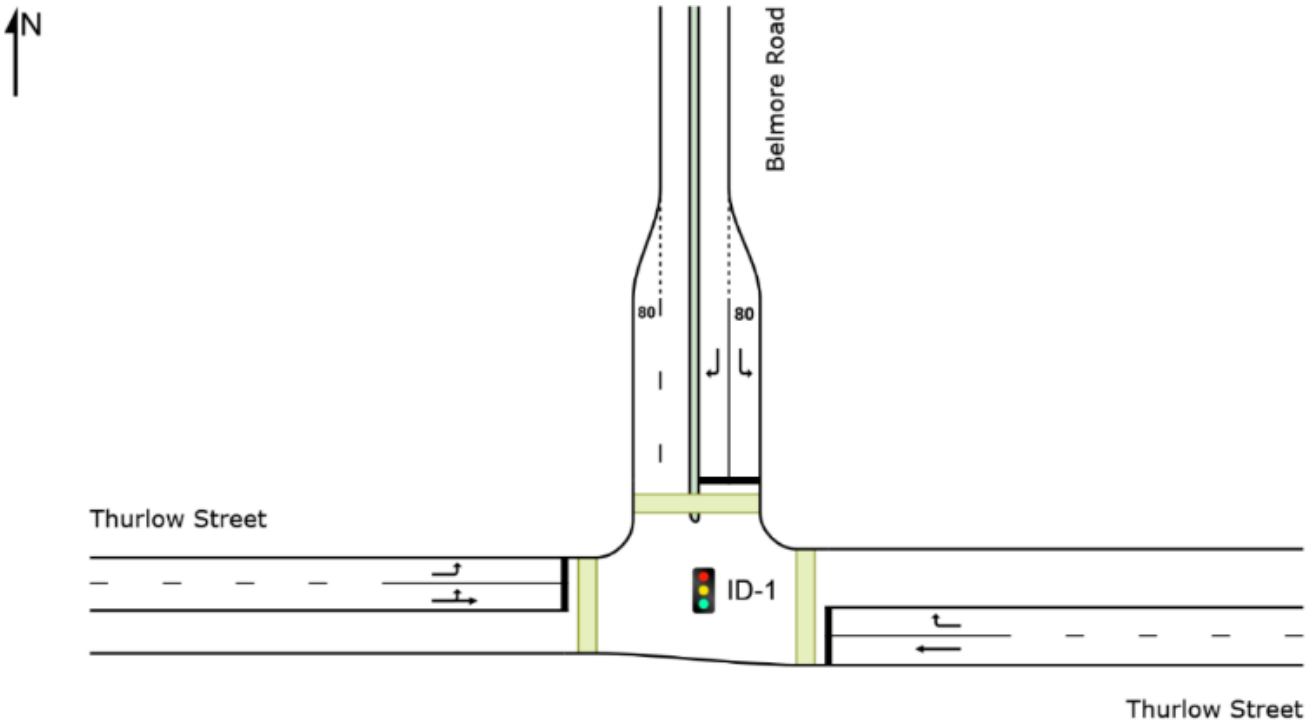


Figure 6.1 Belmore Road/Thurlow Street proposed layout improvements

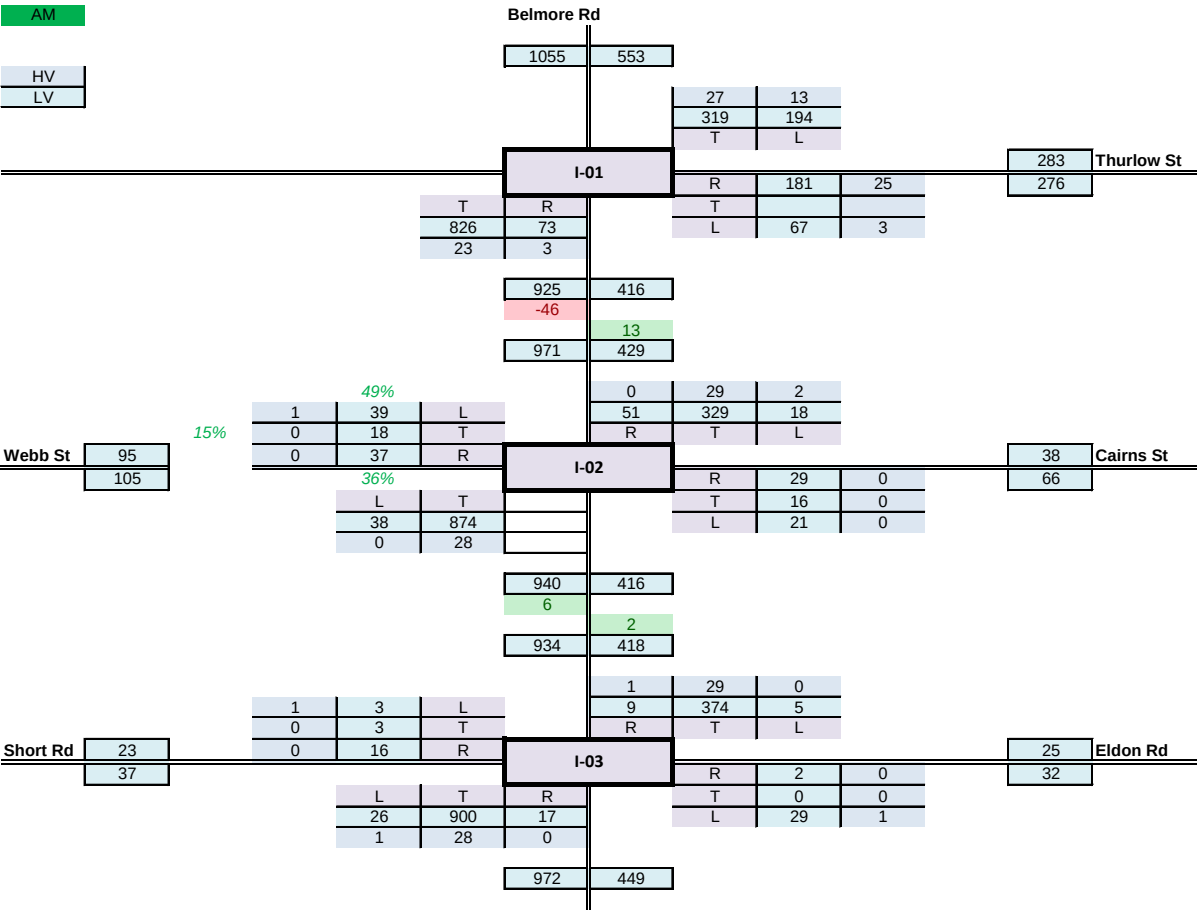
6.2.1 OPPORTUNITIES

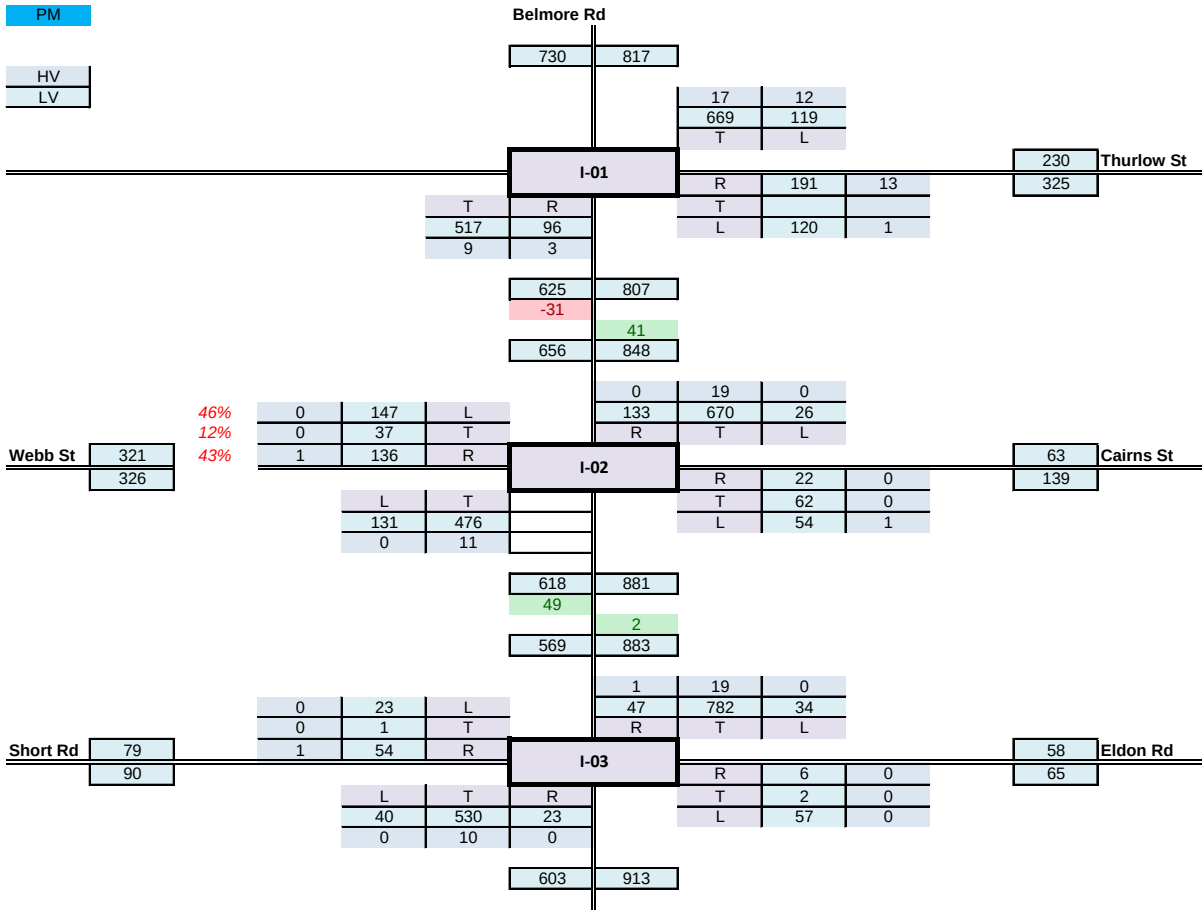
Provision of a pedestrian walkway subject to redevelopment of shopping centre should be considered. This could provide a pedestrian connection along the boundary between the shopping centre and rail corridor.

APPENDIX A

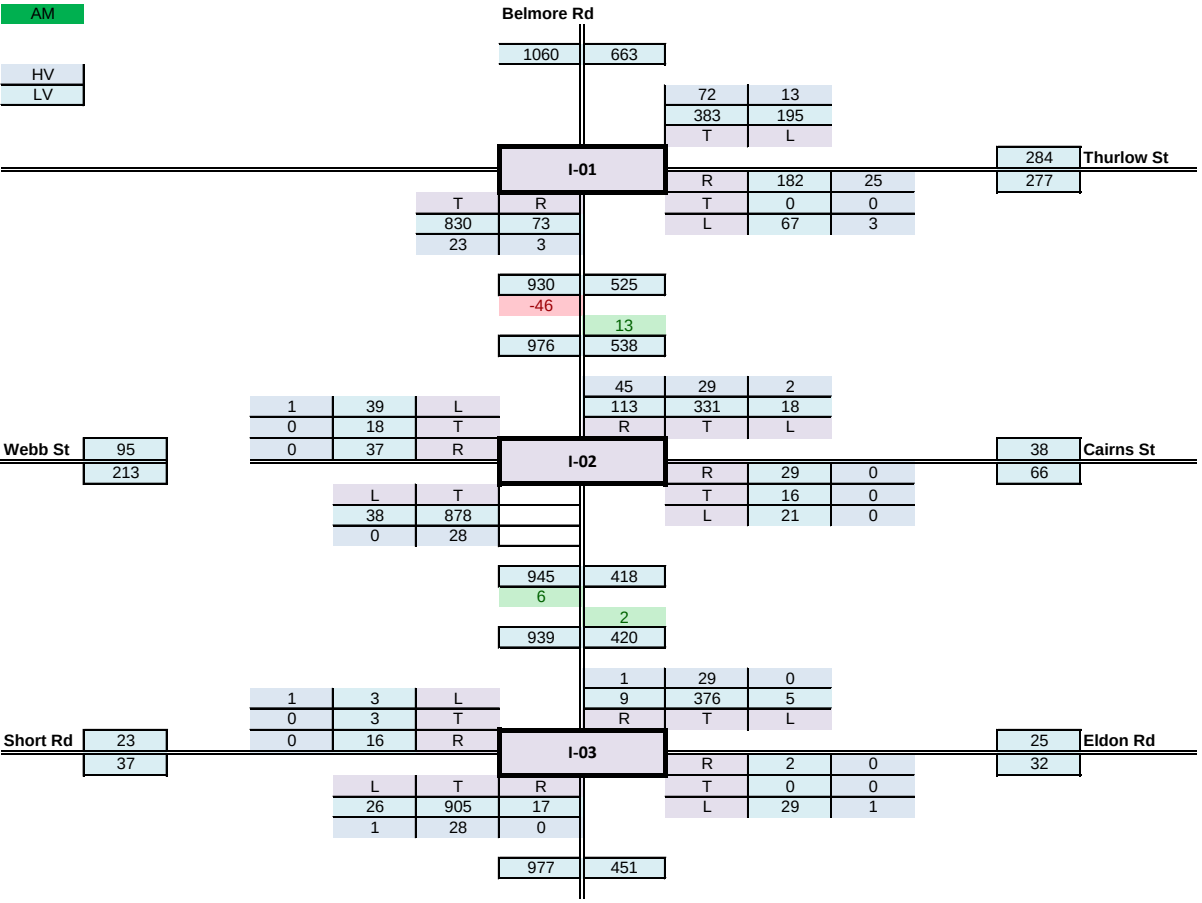
TRAFFIC VOLUMES

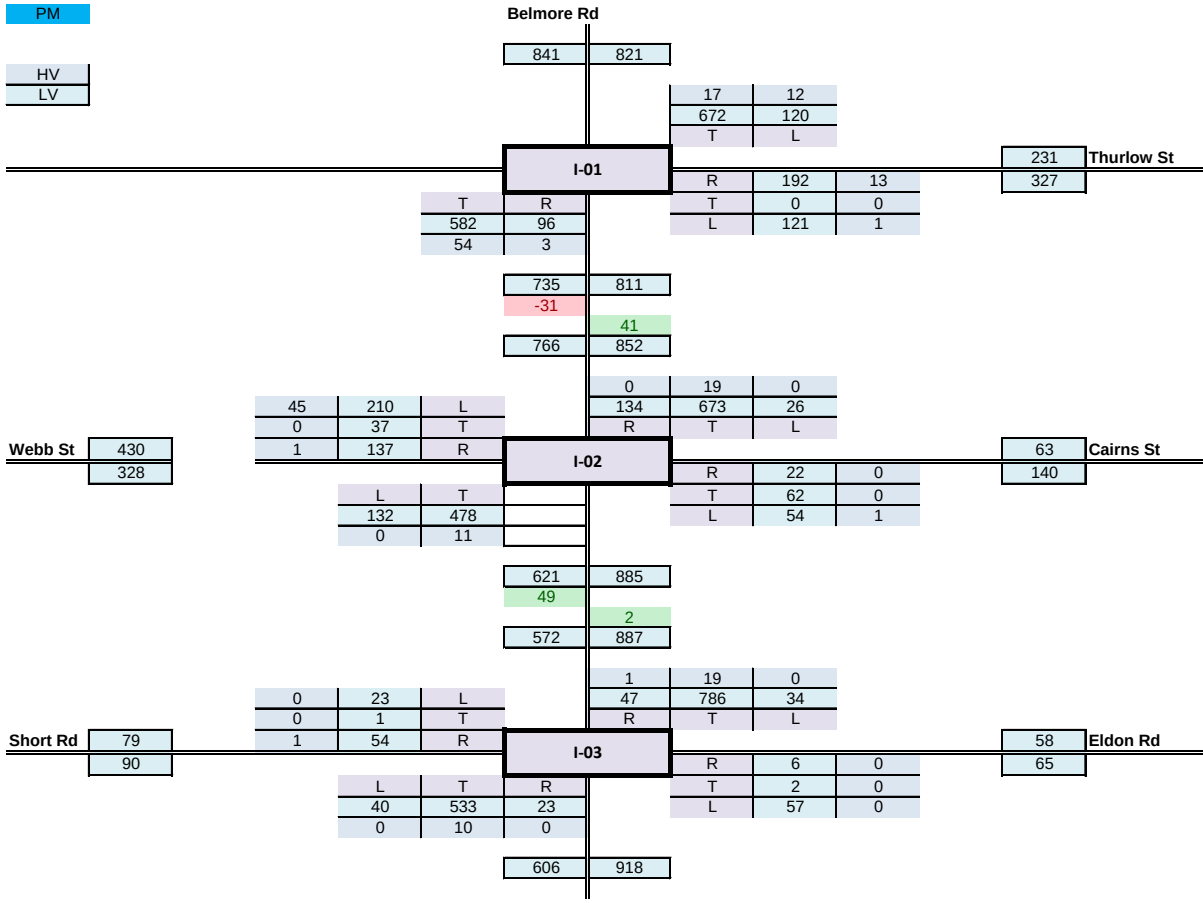
Existing 2021





Construction 2022





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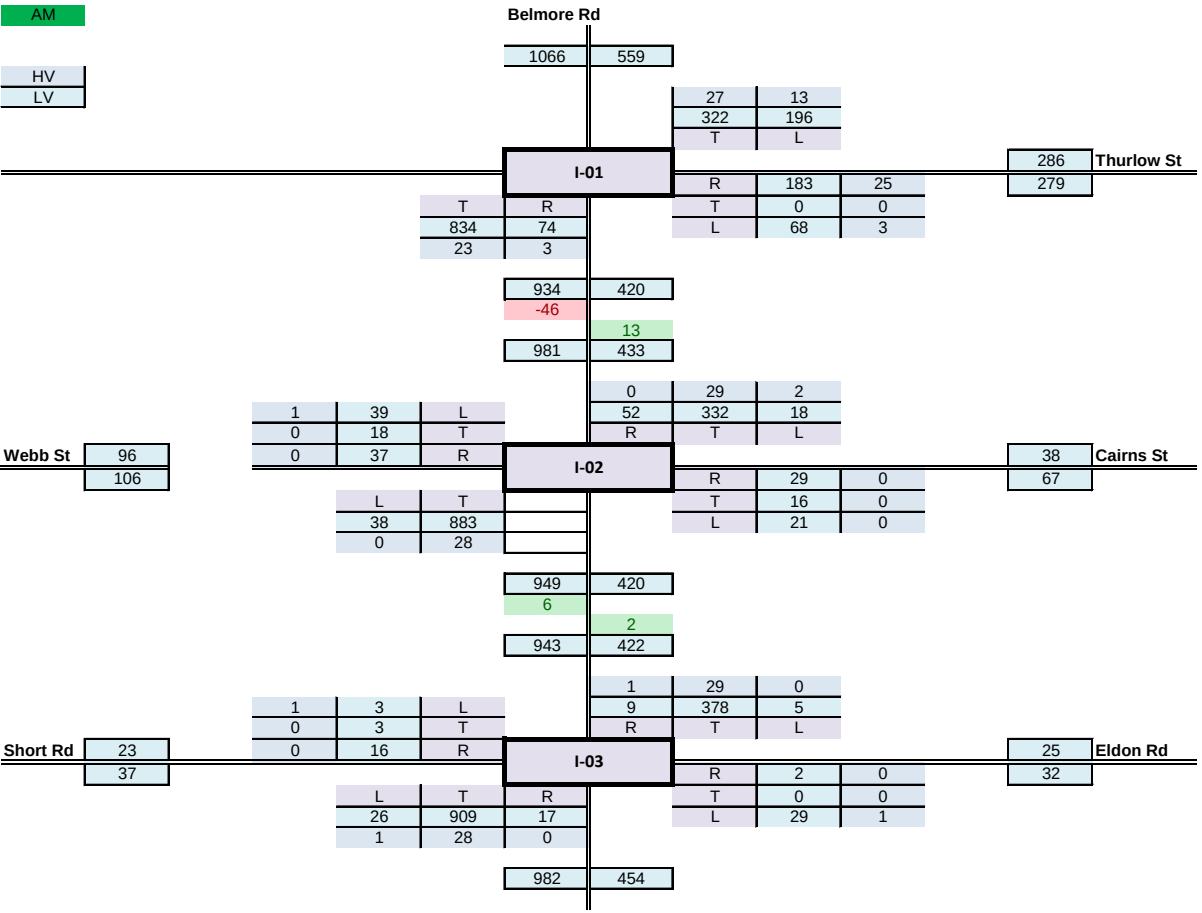

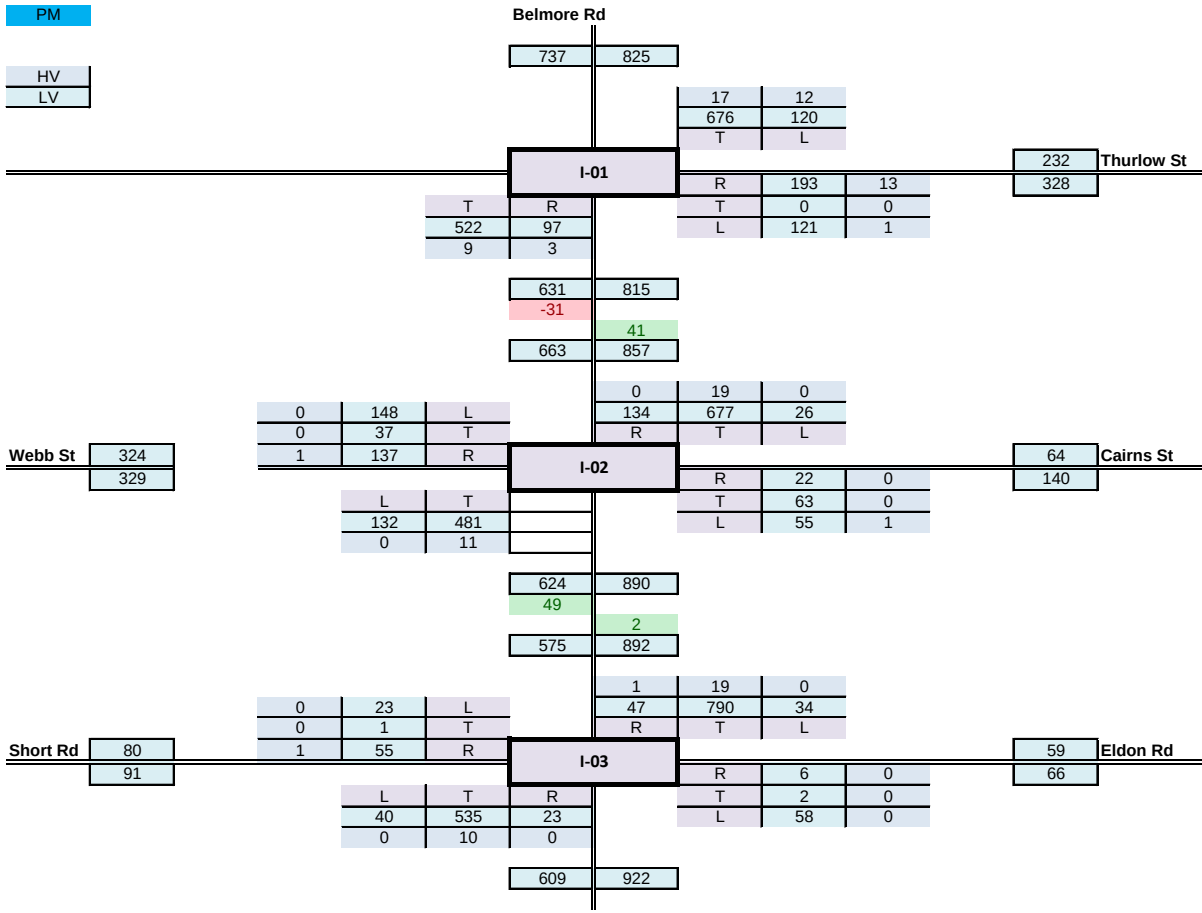

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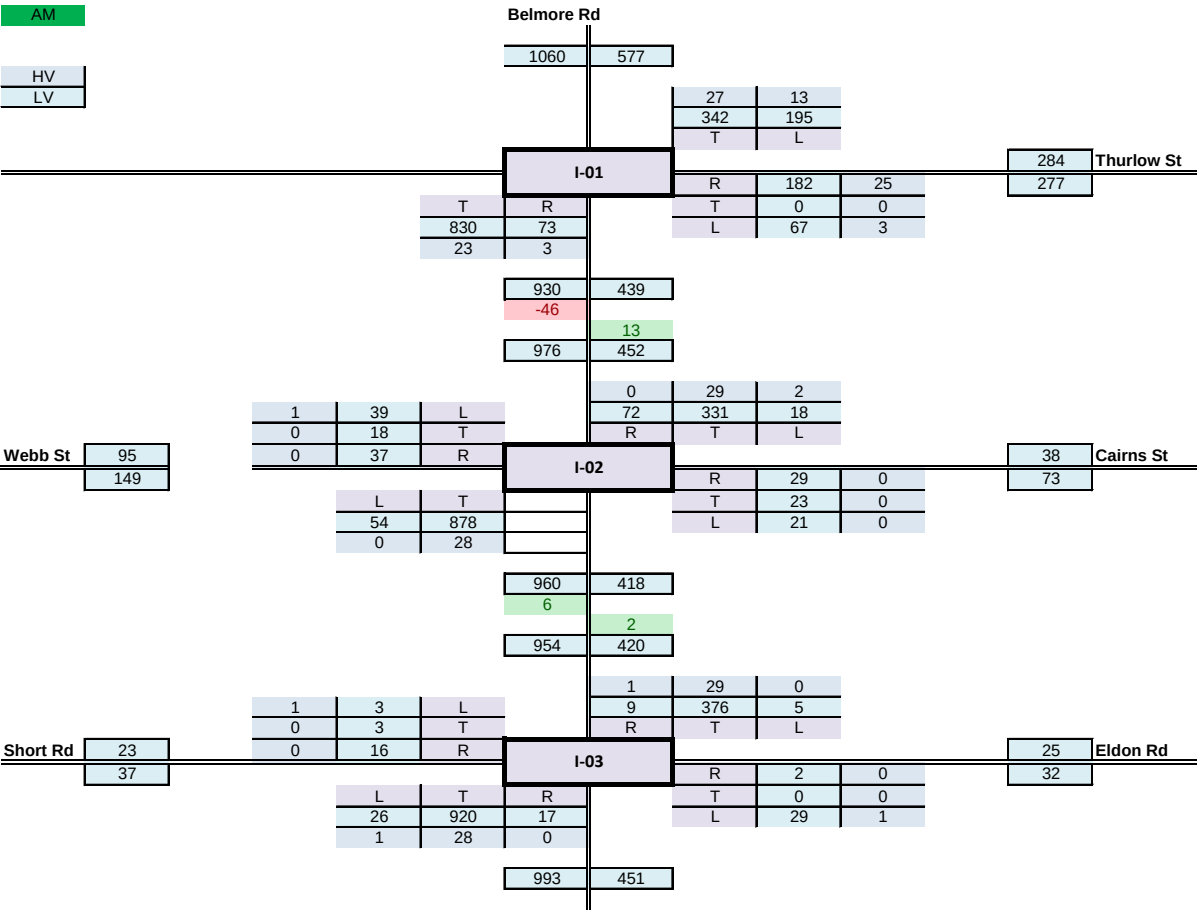

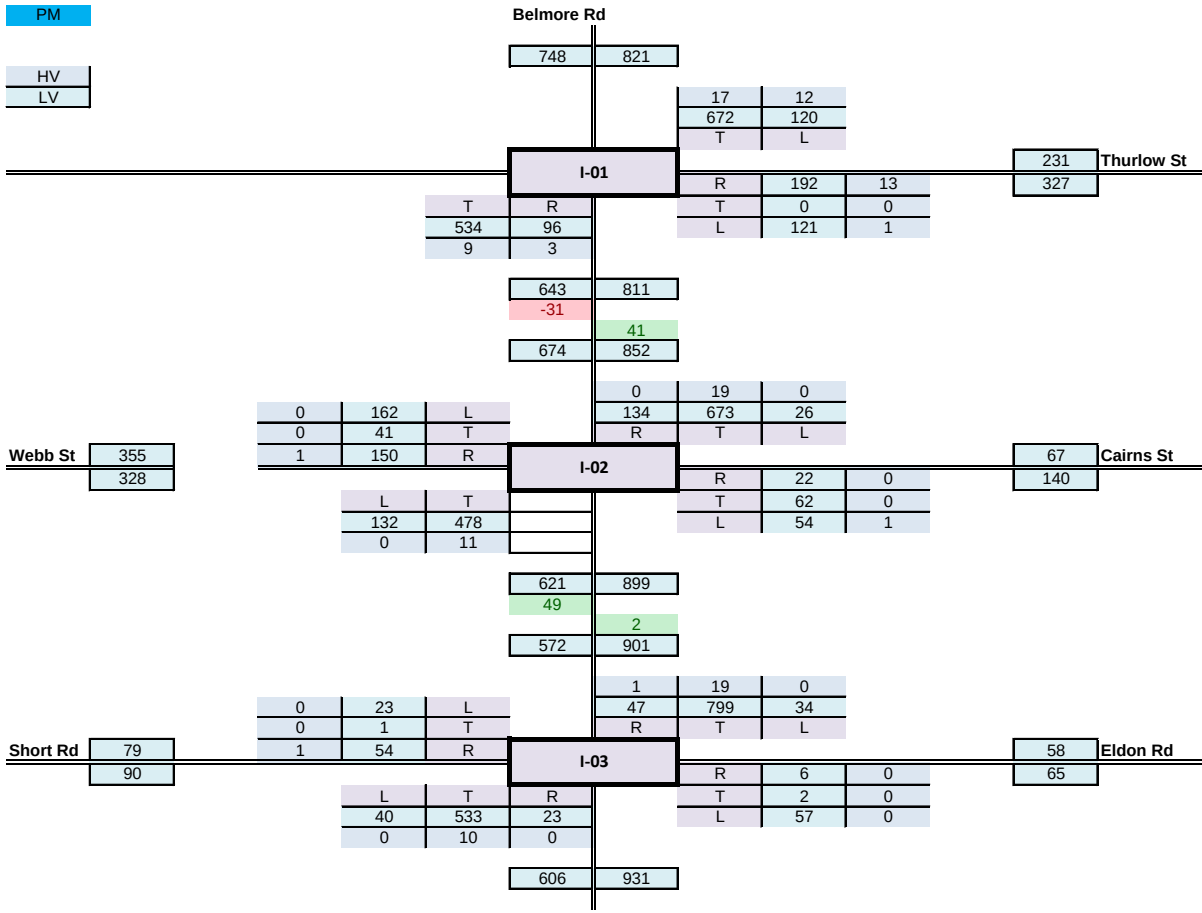

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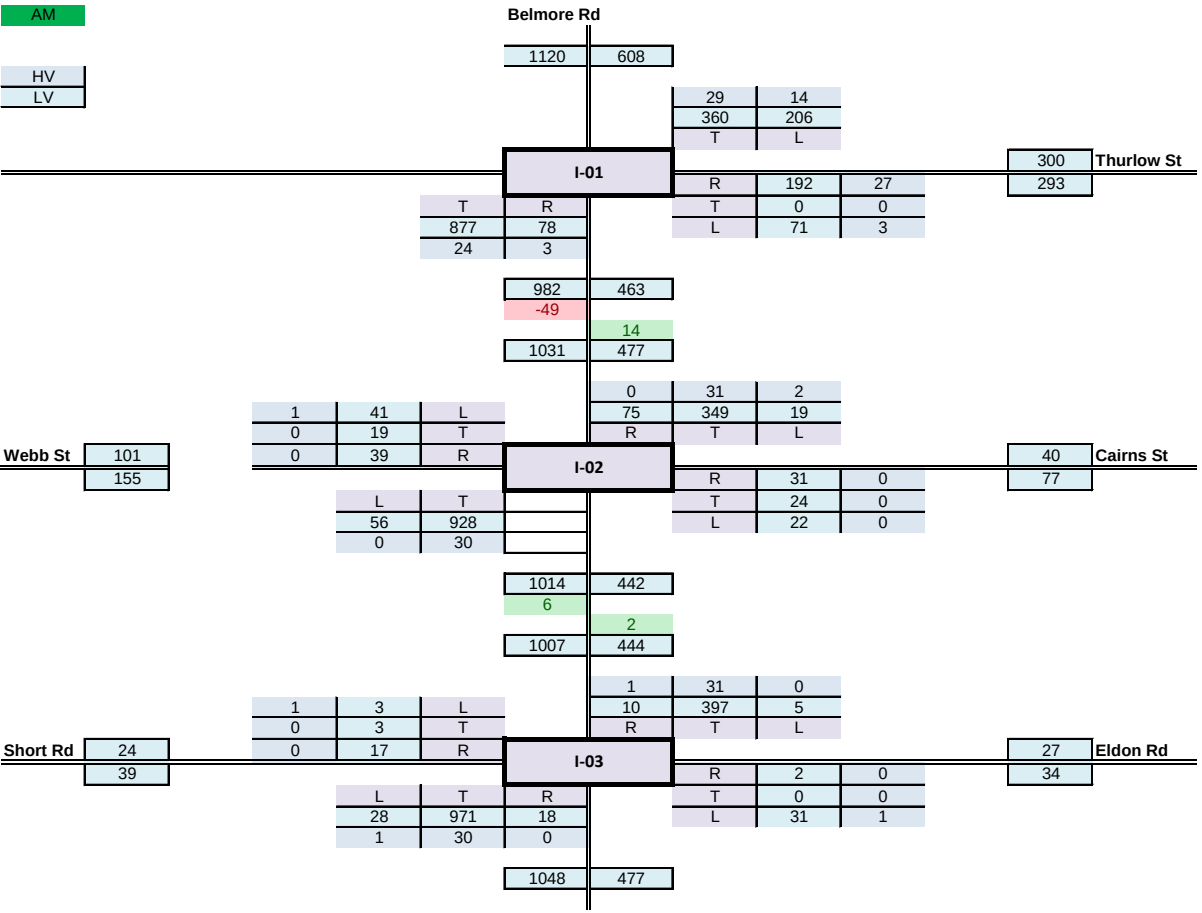
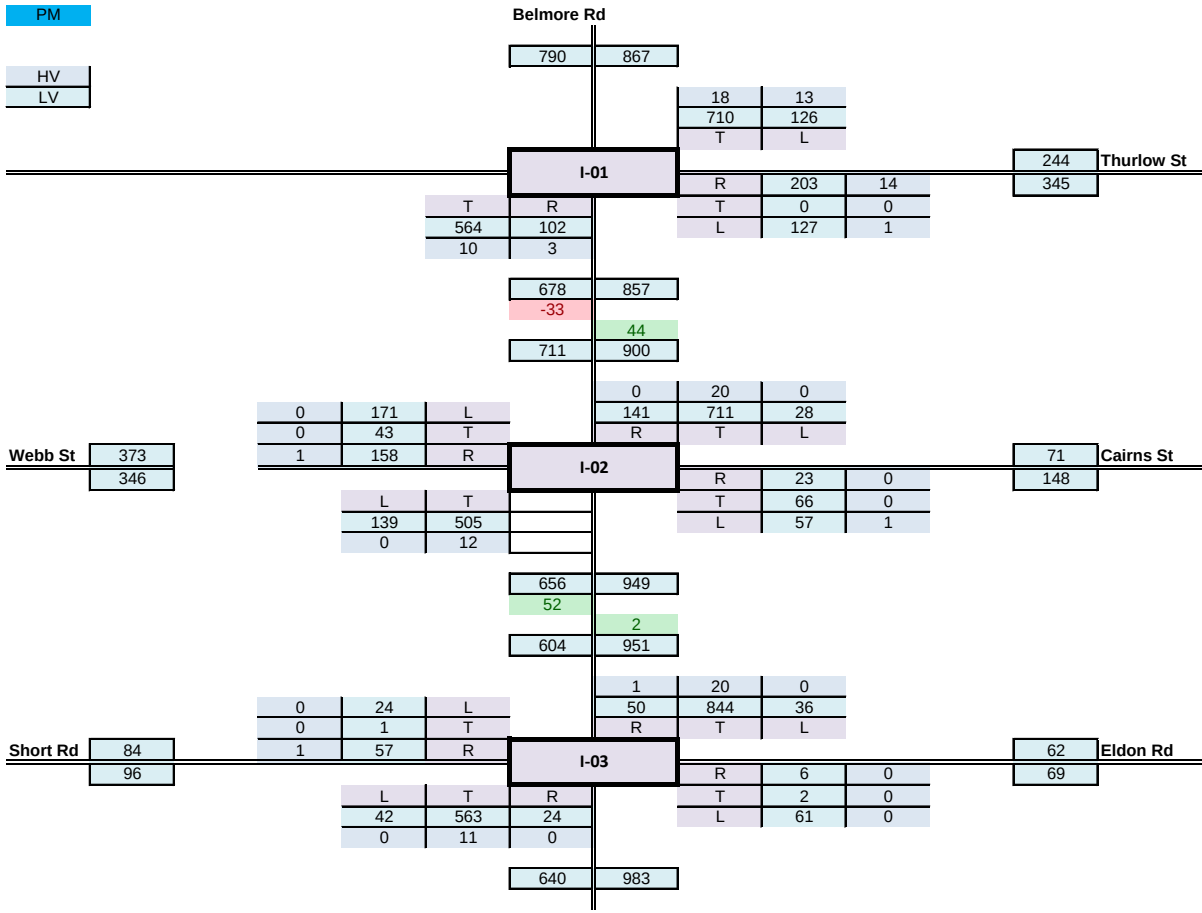




APPENDIX B

SIDRA INTERSECTION PERFORMANCE OUTPUT

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Existing 2021 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	70	3	74	4.3	0.095	21.9	LOS B	2.5	18.4	0.63	0.50	0.63	34.7
6	R2	206	25	217	12.1	* 0.902	73.2	LOS F	14.7	113.6	1.00	1.02	1.40	24.9
Approach		276	28	291	10.1	0.902	60.2	LOS E	14.7	113.6	0.91	0.89	1.20	26.3
North: Belmore Road														
7	L2	207	13	218	6.3	0.257	24.6	LOS B	7.5	55.5	0.64	0.73	0.64	37.1
9	R2	346	27	364	7.8	0.812	53.6	LOS D	21.3	159.3	0.99	0.91	1.10	23.8
Approach		553	40	582	7.2	0.812	42.7	LOS D	21.3	159.3	0.86	0.85	0.93	28.6
West: Thurlow Street														
10	L2	849	23	894	2.7	* 1.024	60.0	LOS E	41.7	298.9	0.87	1.02	1.24	20.5
11	T1	76	3	80	3.9	* 1.024	89.1	LOS F	41.7	298.9	1.00	1.22	1.66	15.1
Approach		925	26	974	2.8	1.024	62.4	LOS E	41.7	298.9	0.88	1.04	1.27	19.9
All Vehicles		1754	94	1846	5.4	1.024	55.9	LOS D	41.7	298.9	0.88	0.95	1.15	23.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Existing 2021 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

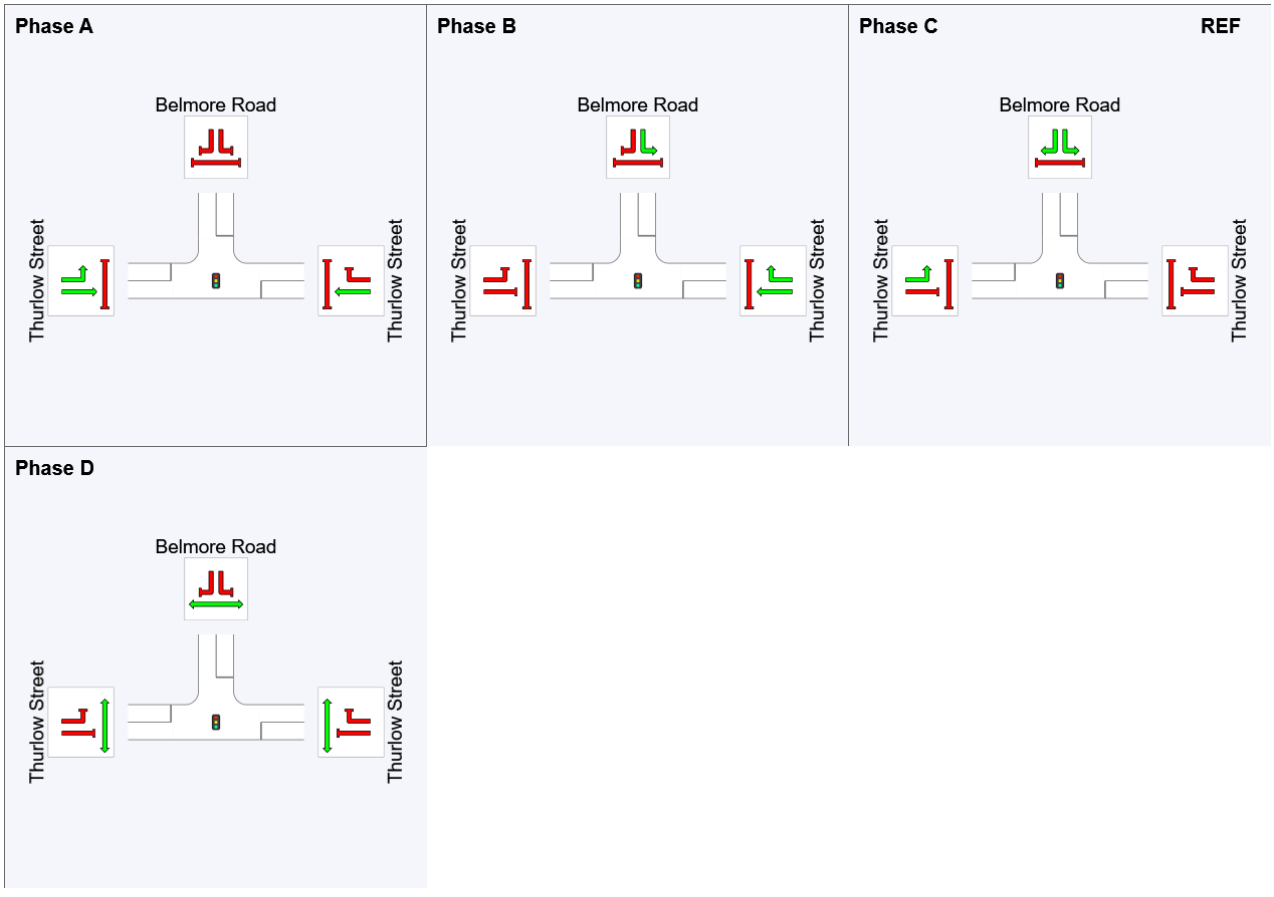
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

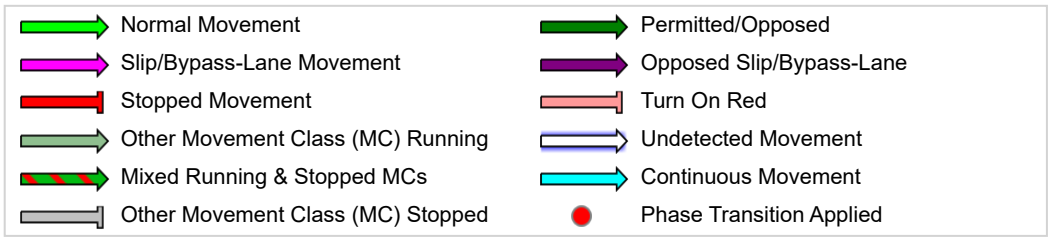
Phase	A	B	C	D
Phase Change Time (sec)	63	95	0	38
Green Time (sec)	26	19	32	19
Phase Time (sec)	32	25	38	25
Phase Split	27%	21%	32%	21%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



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MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Existing 2021 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	38	0	40	0.0	0.142	9.6	LOS A	3.1	22.5	0.32	0.35	0.32	43.6
2	T1	902	28	949	3.1	*0.670	7.7	LOS A	20.5	147.3	0.48	0.45	0.48	37.1
Approach		940	28	989	3.0	0.670	7.7	LOS A	20.5	147.3	0.47	0.45	0.47	37.5
East: Cairns Street														
4	L2	21	0	22	0.0	0.153	60.0	LOS E	1.2	8.4	0.96	0.71	0.96	21.4
5	T1	16	0	17	0.0	0.323	55.2	LOS D	2.6	18.2	0.98	0.74	0.98	27.9
6	R2	29	0	31	0.0	0.323	59.7	LOS E	2.6	18.2	0.98	0.74	0.98	22.8
Approach		66	0	69	0.0	0.323	58.7	LOS E	2.6	18.2	0.97	0.73	0.97	23.8
North: Belmore Road														
7	L2	20	2	21	10.0	0.093	6.9	LOS A	1.5	11.0	0.21	0.24	0.21	46.4
8	T1	358	29	377	8.1	0.356	5.9	LOS A	7.0	51.7	0.38	0.38	0.38	38.2
9	R2	51	0	54	0.0	*0.356	11.9	LOS A	7.0	51.7	0.45	0.44	0.45	42.2
Approach		429	31	452	7.2	0.356	6.7	LOS A	7.0	51.7	0.38	0.38	0.38	39.7
West: Webb Street														
10	L2	40	1	42	2.5	0.134	50.2	LOS D	2.0	14.3	0.88	0.73	0.88	25.2
11	T1	18	0	19	0.0	*0.393	55.6	LOS D	3.2	22.4	0.98	0.75	0.98	27.7
12	R2	37	0	39	0.0	0.393	60.2	LOS E	3.2	22.4	0.98	0.75	0.98	21.5
Approach		95	1	100	1.1	0.393	55.1	LOS D	3.2	22.4	0.94	0.74	0.94	24.4
All Vehicles		1530	60	1611	3.9	0.670	12.6	LOS A	20.5	147.3	0.50	0.46	0.50	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
East: Cairns Street												
P2	Full	50	53	7.0	LOS A	0.1	0.1	0.35	0.35	171.6	214.0	1.25
North: Belmore Road												

P3	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
West: Webb Street												
P4	Full	50	53	7.0	LOS A	0.1	0.1	0.35	0.35	171.6	214.0	1.25
All Pedestrians		200	211	29.2	LOS C	0.2	0.2	0.65	0.65	194.0	214.3	1.10

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Existing 2021 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

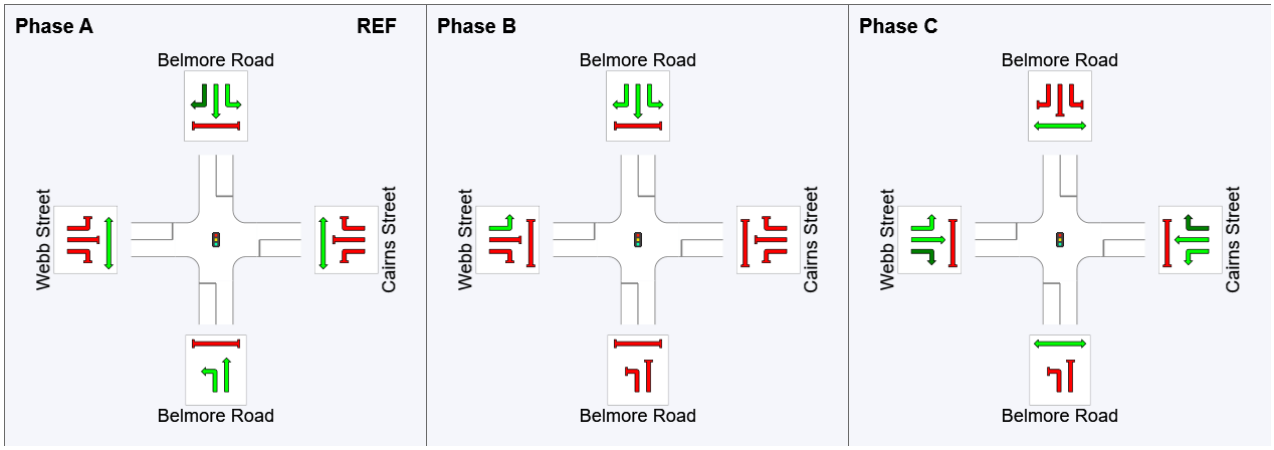
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

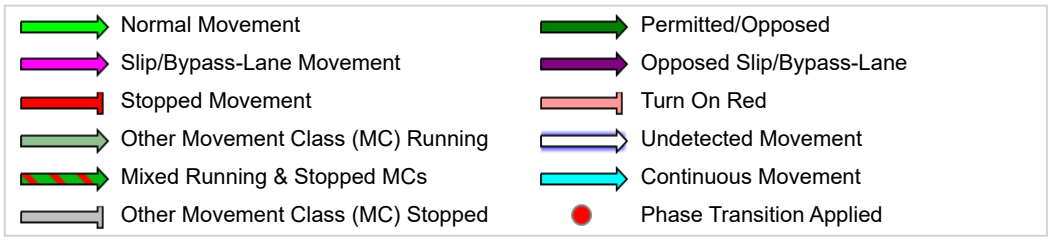
Phase	A	B	C
Phase Change Time (sec)	0	88	98
Green Time (sec)	83	4	12
Phase Time (sec)	89	8	17
Phase Split	78%	7%	15%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Existing 2021 AM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	27	1	28	3.7	0.142	5.8	LOS A	0.2	1.5	0.04	0.06	0.04	57.5
2	T1	928	28	977	3.0	0.711	0.8	LOS A	0.7	4.7	0.04	0.03	0.08	59.0
3	R2	17	0	18	0.0	0.711	9.4	LOS A	0.7	4.7	0.05	0.01	0.09	57.5
Approach		972	29	1023	3.0	0.711	1.1	NA	0.7	4.7	0.04	0.03	0.08	58.9
East: Eldon Street														
4	L2	30	1	32	3.3	0.071	6.7	LOS A	0.2	1.7	0.34	0.56	0.34	49.7
5	T1	1	0	1	0.0	0.071	52.5	LOS D	0.2	1.7	0.34	0.56	0.34	50.2
6	R2	2	0	2	0.0	0.071	60.6	LOS E	0.2	1.7	0.34	0.56	0.34	44.7
Approach		33	1	35	3.0	0.071	11.3	LOS A	0.2	1.7	0.34	0.56	0.34	49.5
North: Belmore Road														
7	L2	5	0	5	0.0	0.092	5.7	LOS A	0.0	0.2	0.01	0.02	0.01	57.0
8	T1	403	29	424	7.2	0.458	1.6	LOS A	0.6	4.3	0.10	0.02	0.13	57.2
9	R2	10	1	11	10.0	0.458	19.2	LOS B	0.6	4.3	0.16	0.03	0.21	52.3
Approach		418	30	440	7.2	0.458	2.1	NA	0.6	4.3	0.10	0.02	0.13	57.0
West: Short Road														
10	L2	4	1	4	25.0	0.318	18.5	LOS B	1.0	7.3	0.91	0.96	1.03	21.8
11	T1	3	0	3	0.0	0.318	60.6	LOS E	1.0	7.3	0.91	0.96	1.03	29.3
12	R2	16	0	17	0.0	0.318	74.7	LOS F	1.0	7.3	0.91	0.96	1.03	29.1
Approach		23	1	24	4.3	0.318	63.1	LOS E	1.0	7.3	0.91	0.96	1.03	28.0
All Vehicles		1446	61	1522	4.2	0.711	2.6	NA	1.0	7.3	0.08	0.05	0.11	56.5

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Existing 2021 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	123	3	129	2.4	0.221	32.2	LOS C	5.5	39.6	0.78	0.63	0.78	30.3
6	R2	204	13	215	6.4	* 0.966	90.4	LOS F	16.4	120.7	1.00	1.13	1.61	22.3
Approach		327	16	344	4.9	0.966	68.5	LOS E	16.4	120.7	0.92	0.94	1.30	24.1
North: Belmore Road														
7	L2	131	12	138	9.2	0.126	14.3	LOS A	3.2	24.2	0.43	0.66	0.43	41.4
9	R2	686	17	722	2.5	* 1.028	111.5	LOS F	69.4	496.4	1.00	1.21	1.64	15.2
Approach		817	29	860	3.5	1.028	95.9	LOS F	69.4	496.4	0.91	1.12	1.45	17.6
West: Thurlow Street														
10	L2	526	9	554	1.7	0.947	28.6	LOS C	15.4	109.9	0.73	0.84	0.85	31.8
11	T1	99	3	104	3.0	* 0.947	67.2	LOS E	15.4	109.9	1.00	1.15	1.51	20.7
Approach		625	12	658	1.9	0.947	34.7	LOS C	15.4	109.9	0.77	0.89	0.96	29.3
All Vehicles		1769	57	1862	3.2	1.028	69.2	LOS E	69.4	496.4	0.86	1.01	1.25	21.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Existing 2021 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

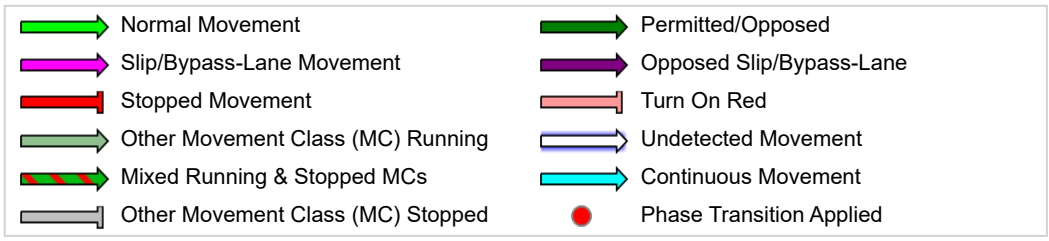
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	19	43	100
Green Time (sec)	14	18	51	14
Phase Time (sec)	20	24	57	19
Phase Split	17%	20%	48%	16%

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

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Organisation: WSP AUSTRALIA PTY LIMITED | Licence: NETWORK / Enterprise | Processed: Tuesday, 4 May 2021 9:25:30 AM
Project: \\corp.pbwan.net\anz\ProjectsAU\PS124xxx\PS124276_Commuter_Carpark\4_WIP\Docs\02_Specialists\02_Traffic_(WSP)\SIDRA\PS124276-RiverwoodSIDRA.sip9

MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Existing 2021 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	131	0	138	0.0	0.139	17.9	LOS B	3.6	25.0	0.52	0.68	0.52	35.6
2	T1	487	11	513	2.3	* 0.536	14.6	LOS B	15.9	113.2	0.63	0.56	0.63	29.7
Approach		618	11	651	1.8	0.536	15.3	LOS B	15.9	113.2	0.61	0.59	0.61	31.6
East: Cairns Street														
4	L2	55	1	58	1.8	0.126	40.3	LOS C	2.4	17.0	0.81	0.72	0.81	26.7
5	T1	62	0	65	0.0	0.197	32.4	LOS C	3.6	25.3	0.80	0.67	0.80	34.2
6	R2	22	0	23	0.0	0.197	37.0	LOS C	3.6	25.3	0.80	0.67	0.80	29.4
Approach		139	1	146	0.7	0.197	36.3	LOS C	3.6	25.3	0.80	0.69	0.80	30.9
North: Belmore Road														
7	L2	26	0	27	0.0	0.215	13.1	LOS A	5.6	39.9	0.44	0.41	0.44	41.8
8	T1	689	19	725	2.8	0.819	21.0	LOS B	30.0	213.8	0.76	0.73	0.80	24.9
9	R2	133	0	140	0.0	* 0.819	30.6	LOS C	30.0	213.8	0.91	0.88	0.97	31.9
Approach		848	19	893	2.2	0.819	22.3	LOS B	30.0	213.8	0.77	0.74	0.81	27.3
West: Webb Street														
10	L2	147	0	155	0.0	0.266	35.8	LOS C	6.2	43.2	0.79	0.76	0.79	29.2
11	T1	37	0	39	0.0	* 0.604	39.6	LOS C	8.7	60.6	0.92	0.80	0.92	31.4
12	R2	136	0	143	0.0	0.604	44.2	LOS D	8.7	60.6	0.92	0.80	0.92	25.3
Approach		320	0	337	0.0	0.604	39.8	LOS C	8.7	60.6	0.86	0.78	0.86	27.9
All Vehicles		1925	31	2026	1.6	0.819	24.0	LOS B	30.0	213.8	0.73	0.69	0.75	28.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
East: Cairns Street												
P2	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
North: Belmore Road												

P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
West: Webb Street												
P4	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
All Pedestrians		200	211	49.3	LOS E	0.2	0.2	0.95	0.95	214.1	214.3	1.00

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Existing 2021 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

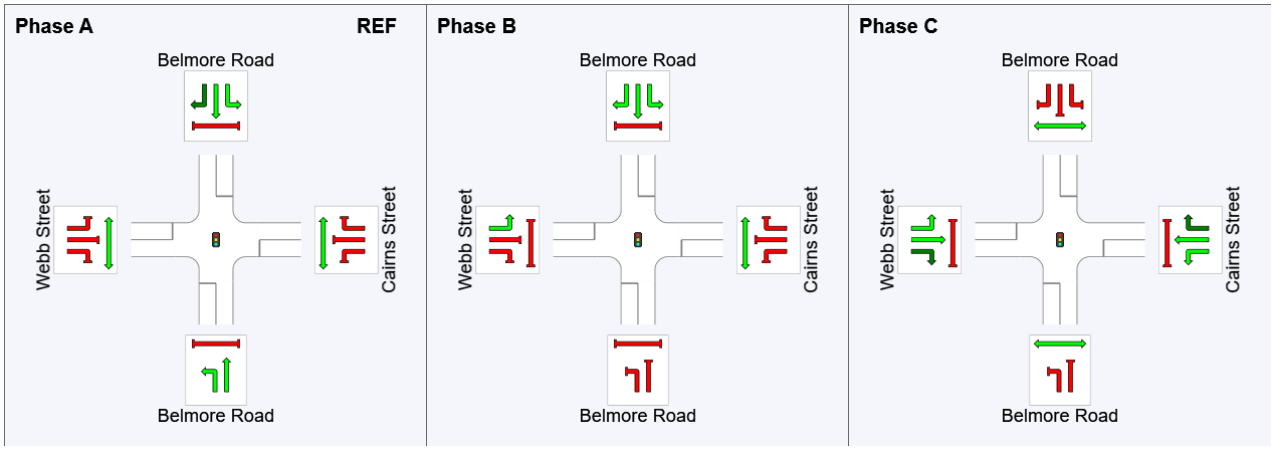
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

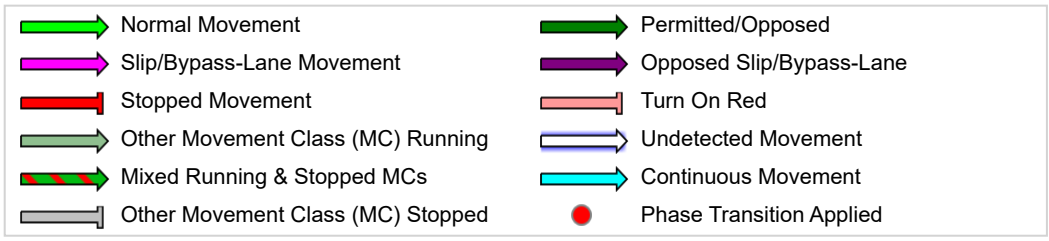
Phase	A	B	C
Phase Change Time (sec)	0	69	77
Green Time (sec)	63	2	31
Phase Time (sec)	69	4	37
Phase Split	63%	4%	34%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Existing 2021 PM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	40	0	42	0.0	0.094	5.7	LOS A	0.3	1.9	0.08	0.15	0.08	56.7
2	T1	540	10	568	1.9	0.468	1.3	LOS A	0.9	6.7	0.13	0.06	0.19	57.1
3	R2	23	0	24	0.0	0.468	13.5	LOS A	0.9	6.7	0.15	0.04	0.22	56.3
Approach		603	10	635	1.7	0.468	2.0	NA	0.9	6.7	0.13	0.06	0.18	57.0
East: Eldon Street														
4	L2	57	0	60	0.0	0.161	8.5	LOS A	0.6	3.9	0.51	0.64	0.51	48.7
5	T1	2	0	2	0.0	0.161	47.9	LOS D	0.6	3.9	0.51	0.64	0.51	49.1
6	R2	6	0	6	0.0	0.161	55.1	LOS D	0.6	3.9	0.51	0.64	0.51	43.3
Approach		65	0	68	0.0	0.161	14.0	LOS A	0.6	3.9	0.51	0.64	0.51	48.4
North: Belmore Road														
7	L2	34	0	36	0.0	0.163	5.8	LOS A	0.2	1.6	0.03	0.07	0.03	56.2
8	T1	801	19	843	2.4	0.816	2.4	LOS A	2.2	15.4	0.15	0.06	0.34	56.1
9	R2	48	1	51	2.1	0.816	13.2	LOS A	2.2	15.4	0.20	0.06	0.48	52.2
Approach		883	20	929	2.3	0.816	3.1	NA	2.2	15.4	0.14	0.06	0.34	55.9
West: Short Road														
10	L2	23	0	24	0.0	0.896	96.2	LOS F	5.7	40.2	0.78	1.18	2.12	12.7
11	T1	1	0	1	0.0	0.896	138.0	LOS F	5.7	40.2	0.78	1.18	2.12	18.3
12	R2	55	1	58	1.8	0.896	154.7	LOS F	5.7	40.2	0.78	1.18	2.12	18.2
Approach		79	1	83	1.3	0.896	137.5	LOS F	5.7	40.2	0.78	1.18	2.12	16.8
All Vehicles		1630	31	1716	1.9	0.896	9.6	NA	5.7	40.2	0.18	0.14	0.37	48.4

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Construction 2022 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	70	3	74	4.3	0.095	21.9	LOS B	2.5	18.4	0.63	0.50	0.63	34.7
6	R2	207	25	218	12.1	* 0.958	87.8	LOS F	16.4	126.7	1.00	1.11	1.58	22.7
Approach		277	28	292	10.1	0.958	71.2	LOS F	16.4	126.7	0.91	0.96	1.34	24.2
North: Belmore Road														
7	L2	208	13	219	6.3	0.237	21.5	LOS B	6.9	51.2	0.59	0.72	0.59	38.3
9	R2	455	72	479	15.8	* 1.040	126.6	LOS F	47.5	377.3	1.00	1.25	1.78	13.8
Approach		663	85	698	12.8	1.040	93.7	LOS F	47.5	377.3	0.87	1.08	1.41	18.6
West: Thurlow Street														
10	L2	853	23	898	2.7	0.965	42.1	LOS C	34.0	244.0	0.83	0.94	1.05	27.2
11	T1	76	3	80	3.9	* 0.965	60.4	LOS E	34.0	244.0	1.00	1.12	1.41	21.7
Approach		929	26	978	2.8	0.965	43.6	LOS D	34.0	244.0	0.85	0.96	1.08	26.7
All Vehicles		1869	139	1967	7.4	1.040	65.4	LOS E	47.5	377.3	0.86	1.00	1.24	22.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Construction 2022 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

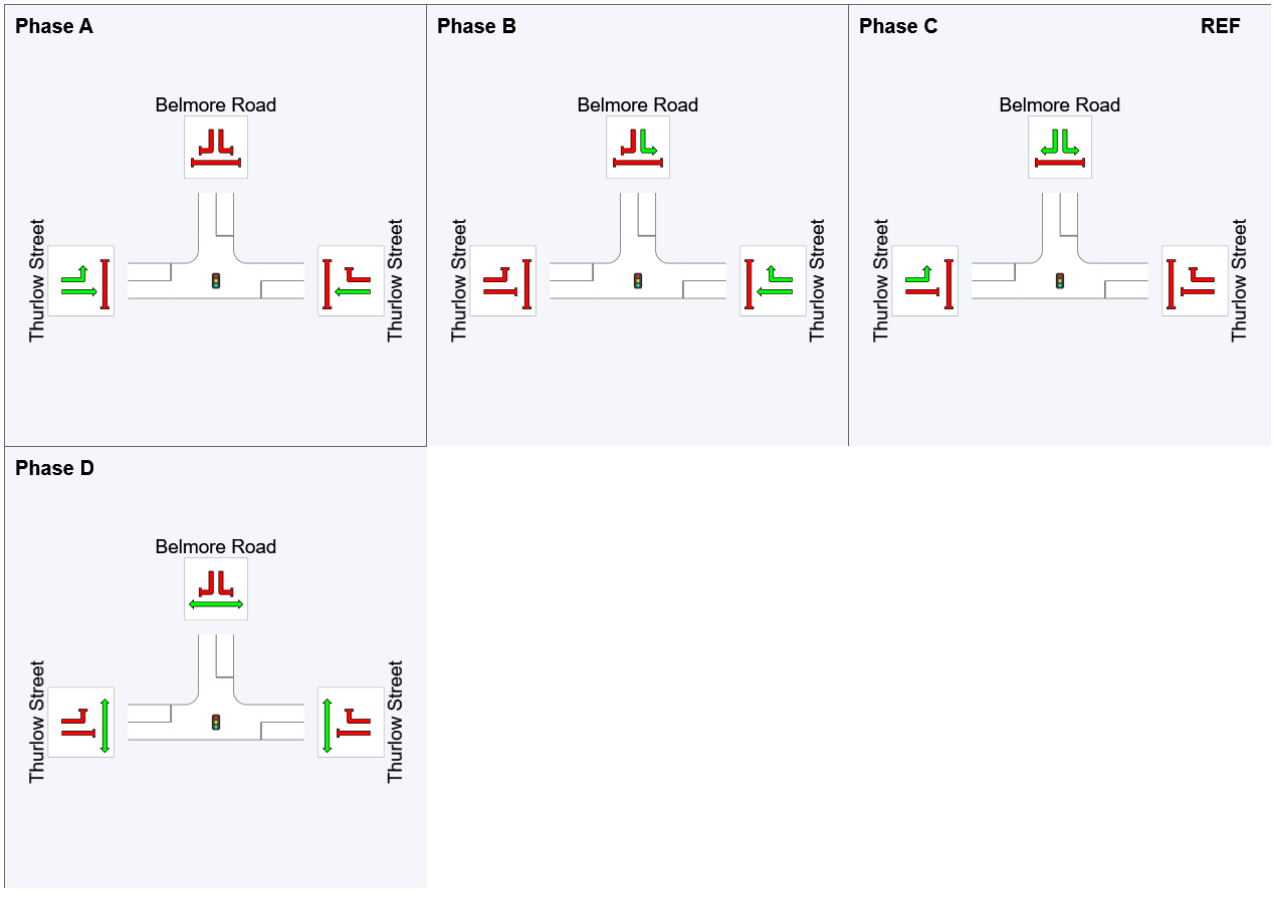
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

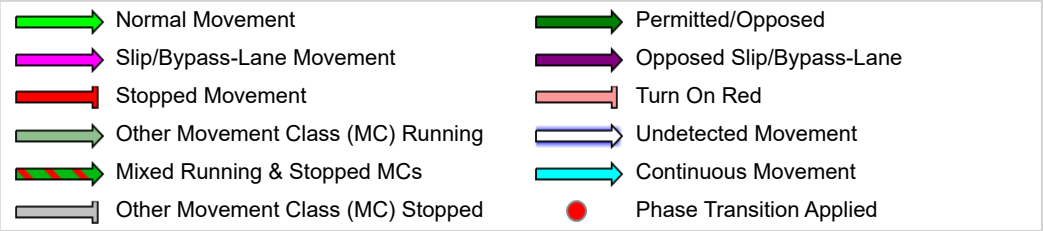
Phase	A	B	C	D
Phase Change Time (sec)	64	96	0	44
Green Time (sec)	27	18	38	14
Phase Time (sec)	33	24	44	19
Phase Split	28%	20%	37%	16%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Construction 2022 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	38	0	40	0.0	0.143	9.8	LOS A	3.2	22.6	0.32	0.35	0.32	43.6
2	T1	906	28	954	3.1	*0.674	7.7	LOS A	20.6	148.3	0.48	0.45	0.48	37.0
Approach		944	28	994	3.0	0.674	7.8	LOS A	20.6	148.3	0.48	0.45	0.48	37.5
East: Cairns Street														
4	L2	21	0	22	0.0	0.153	59.7	LOS E	1.2	8.4	0.96	0.71	0.96	21.4
5	T1	16	0	17	0.0	0.323	55.2	LOS D	2.6	18.2	0.98	0.74	0.98	27.9
6	R2	29	0	31	0.0	0.323	59.7	LOS E	2.6	18.2	0.98	0.74	0.98	22.8
Approach		66	0	69	0.0	0.323	58.6	LOS E	2.6	18.2	0.97	0.73	0.97	23.8
North: Belmore Road														
7	L2	20	2	21	10.0	0.196	7.1	LOS A	3.4	25.6	0.23	0.23	0.23	46.5
8	T1	360	29	379	8.1	0.746	8.6	LOS A	13.4	109.8	0.42	0.42	0.44	34.7
9	R2	158	45	166	28.5	*0.746	27.4	LOS B	13.4	109.8	0.85	0.87	0.94	32.5
Approach		538	76	566	14.1	0.746	14.1	LOS A	13.4	109.8	0.54	0.55	0.58	34.1
West: Webb Street														
10	L2	40	1	42	2.5	0.134	50.3	LOS D	2.0	14.3	0.88	0.73	0.88	25.2
11	T1	18	0	19	0.0	*0.393	55.6	LOS D	3.2	22.4	0.98	0.75	0.98	27.7
12	R2	37	0	39	0.0	0.393	60.2	LOS E	3.2	22.4	0.98	0.75	0.98	21.5
Approach		95	1	100	1.1	0.393	55.1	LOS D	3.2	22.4	0.94	0.74	0.94	24.4
All Vehicles		1643	105	1729	6.4	0.746	14.6	LOS B	20.6	148.3	0.54	0.51	0.56	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
East: Cairns Street												
P2	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
North: Belmore Road												

P3	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
West: Webb Street												
P4	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
All Pedestrians		200	211	51.3	LOS E	0.2	0.2	0.95	0.95	216.1	214.3	0.99

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Construction 2022 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

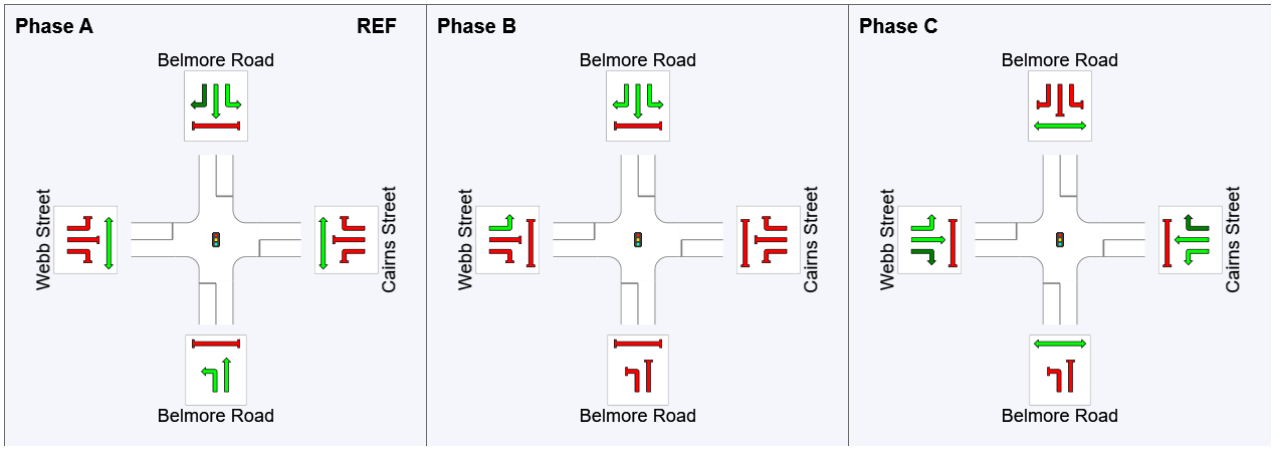
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

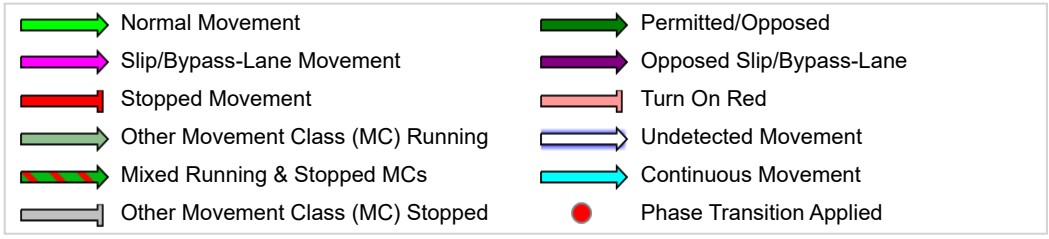
Phase	A	B	C
Phase Change Time (sec)	0	88	98
Green Time (sec)	83	4	12
Phase Time (sec)	89	8	17
Phase Split	78%	7%	15%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Construction 2022 AM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	27	1	28	3.7	0.146	5.8	LOS A	0.2	1.5	0.04	0.06	0.04	57.5
2	T1	933	28	982	3.0	0.731	0.9	LOS A	0.8	5.5	0.05	0.03	0.09	58.9
3	R2	18	1	19	5.6	0.731	9.8	LOS A	0.8	5.5	0.05	0.02	0.10	57.1
Approach		978	30	1029	3.1	0.731	1.2	NA	0.8	5.5	0.05	0.03	0.09	58.8
East: Eldon Street														
4	L2	30	1	32	3.3	0.072	6.7	LOS A	0.2	1.7	0.34	0.56	0.34	49.6
5	T1	1	0	1	0.0	0.072	53.2	LOS D	0.2	1.7	0.34	0.56	0.34	50.1
6	R2	2	0	2	0.0	0.072	61.5	LOS E	0.2	1.7	0.34	0.56	0.34	44.6
Approach		33	1	35	3.0	0.072	11.4	LOS A	0.2	1.7	0.34	0.56	0.34	49.4
North: Belmore Road														
7	L2	5	0	5	0.0	0.092	5.7	LOS A	0.0	0.2	0.01	0.02	0.01	57.1
8	T1	405	29	426	7.2	0.462	1.6	LOS A	0.6	4.4	0.10	0.02	0.13	57.1
9	R2	10	1	11	10.0	0.462	19.3	LOS B	0.6	4.4	0.16	0.03	0.21	52.3
Approach		420	30	442	7.1	0.462	2.1	NA	0.6	4.4	0.10	0.02	0.13	57.0
West: Short Road														
10	L2	4	1	4	25.0	0.324	19.1	LOS B	1.0	7.4	0.91	0.97	1.04	21.5
11	T1	3	0	3	0.0	0.324	61.8	LOS E	1.0	7.4	0.91	0.97	1.04	29.0
12	R2	16	0	17	0.0	0.324	76.1	LOS F	1.0	7.4	0.91	0.97	1.04	28.8
Approach		23	1	24	4.3	0.324	64.4	LOS E	1.0	7.4	0.91	0.97	1.04	27.7
All Vehicles		1454	62	1531	4.3	0.731	2.7	NA	1.0	7.4	0.08	0.05	0.12	56.4

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Construction 2022 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	122	1	128	0.8	0.217	32.2	LOS C	5.5	38.6	0.77	0.63	0.77	30.3
6	R2	205	13	216	6.3	* 1.056	140.4	LOS F	21.2	156.6	1.00	1.31	2.00	16.9
Approach		327	14	344	4.3	1.056	100.0	LOS F	21.2	156.6	0.92	1.06	1.54	19.3
North: Belmore Road														
7	L2	132	12	139	9.1	0.130	15.2	LOS B	3.4	25.5	0.45	0.66	0.45	41.0
9	R2	689	17	725	2.5	1.032	114.5	LOS F	70.6	505.0	1.00	1.22	1.66	14.9
Approach		821	29	864	3.5	1.032	98.5	LOS F	70.6	505.0	0.91	1.13	1.47	17.3
West: Thurlow Street														
10	L2	636	54	669	8.5	* 1.059	48.2	LOS D	26.3	194.9	0.76	0.93	1.05	23.6
11	T1	99	3	104	3.0	* 1.059	117.2	LOS F	26.3	194.9	1.00	1.33	1.94	12.8
Approach		735	57	774	7.8	1.059	57.5	LOS E	26.3	194.9	0.79	0.99	1.17	21.2
All Vehicles		1883	100	1982	5.3	1.059	82.8	LOS F	70.6	505.0	0.87	1.06	1.37	19.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Construction 2022 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

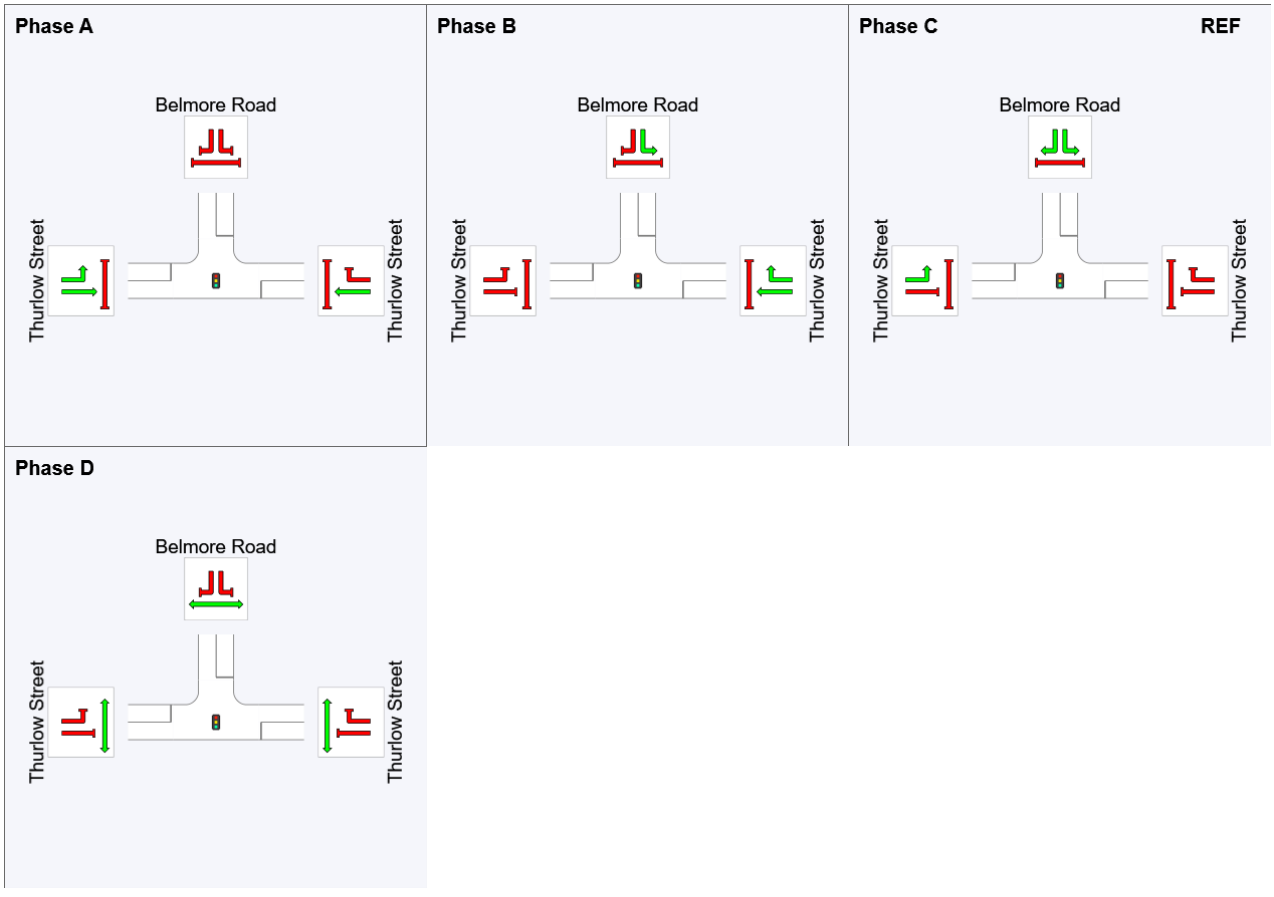
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

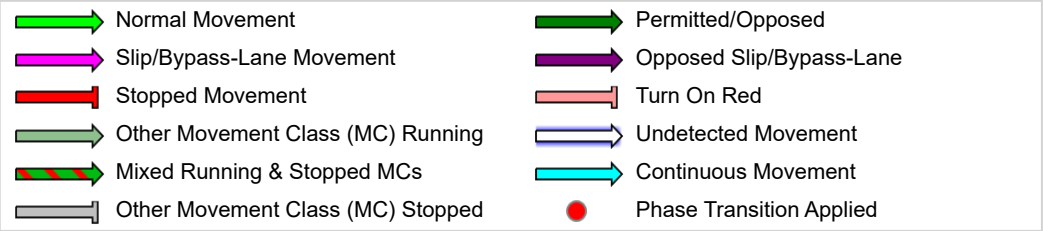
Phase	A	B	C	D
Phase Change Time (sec)	77	98	0	57
Green Time (sec)	16	16	51	14
Phase Time (sec)	22	22	57	19
Phase Split	18%	18%	48%	16%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Construction 2022 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	132	0	139	0.0	0.140	17.9	LOS B	3.6	25.2	0.52	0.68	0.52	35.6
2	T1	503	25	529	5.0	* 0.566	14.9	LOS B	16.7	121.9	0.64	0.57	0.64	29.4
Approach		635	25	668	3.9	0.566	15.5	LOS B	16.7	121.9	0.62	0.60	0.62	31.4
East: Cairns Street														
4	L2	55	1	58	1.8	0.126	40.3	LOS C	2.4	17.0	0.81	0.72	0.81	26.7
5	T1	62	0	65	0.0	0.237	37.0	LOS C	3.9	27.2	0.85	0.70	0.85	32.8
6	R2	22	0	23	0.0	0.237	41.6	LOS C	3.9	27.2	0.85	0.70	0.85	27.9
Approach		139	1	146	0.7	0.237	39.0	LOS C	3.9	27.2	0.83	0.71	0.83	30.0
North: Belmore Road														
7	L2	26	0	27	0.0	0.221	13.1	LOS A	5.8	41.1	0.44	0.41	0.44	41.8
8	T1	692	19	728	2.7	0.840	23.0	LOS B	31.8	226.7	0.77	0.75	0.83	23.9
9	R2	134	0	141	0.0	* 0.840	33.7	LOS C	31.8	226.7	0.93	0.92	1.02	30.7
Approach		852	19	897	2.2	0.840	24.4	LOS B	31.8	226.7	0.78	0.77	0.85	26.2
West: Webb Street														
10	L2	255	45	268	17.6	0.750	42.6	LOS D	12.6	101.6	0.87	0.85	0.96	27.0
11	T1	37	0	39	0.0	* 0.732	42.4	LOS C	9.2	64.5	0.91	0.86	1.03	30.7
12	R2	138	1	145	0.7	0.732	46.9	LOS D	9.2	64.5	0.91	0.86	1.03	24.5
Approach		430	46	453	10.7	0.750	44.0	LOS D	12.6	101.6	0.89	0.85	0.99	26.6
All Vehicles		2056	91	2164	4.4	0.840	26.7	LOS B	31.8	226.7	0.76	0.73	0.81	27.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
East: Cairns Street												
P2	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
North: Belmore Road												

P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
West: Webb Street												
P4	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
All Pedestrians		200	211	49.3	LOS E	0.2	0.2	0.95	0.95	214.1	214.3	1.00

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Construction 2022 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

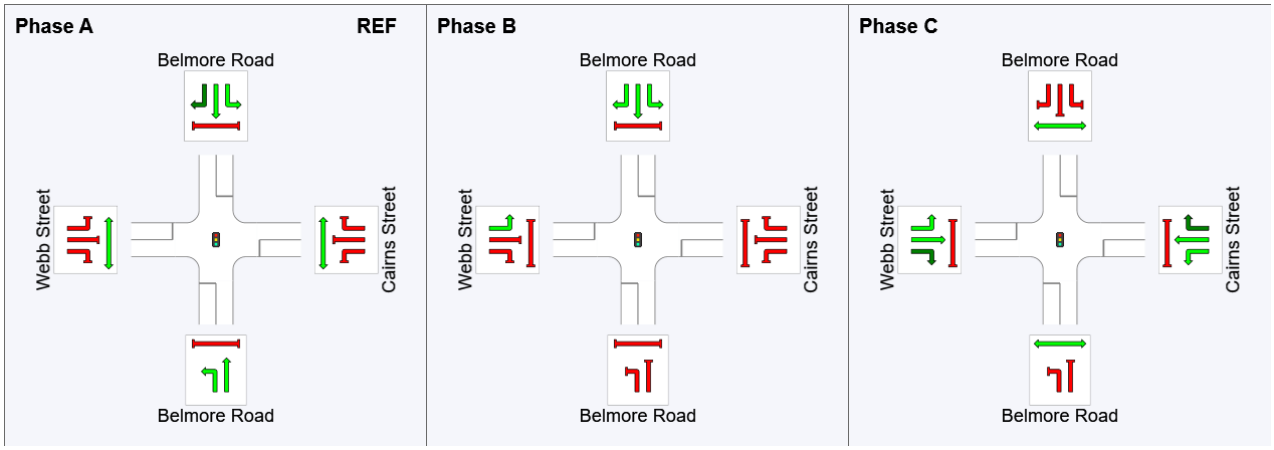
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

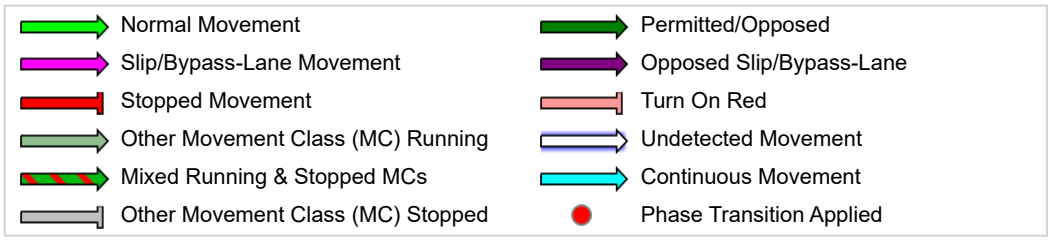
Phase	A	B	C
Phase Change Time (sec)	0	69	77
Green Time (sec)	63	2	31
Phase Time (sec)	69	4	37
Phase Split	63%	4%	34%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Construction 2022 PM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	40	0	42	0.0	0.116	5.7	LOS A	0.3	2.0	0.07	0.12	0.07	57.0
2	T1	543	10	572	1.8	0.582	1.5	LOS A	1.0	7.3	0.13	0.06	0.21	56.8
3	R2	23	0	24	0.0	0.582	13.6	LOS A	1.0	7.3	0.15	0.04	0.27	55.9
Approach		606	10	638	1.7	0.582	2.2	NA	1.0	7.3	0.13	0.07	0.21	56.8
East: Eldon Street														
4	L2	57	0	60	0.0	0.163	8.6	LOS A	0.6	3.9	0.52	0.64	0.52	48.6
5	T1	2	0	2	0.0	0.163	49.2	LOS D	0.6	3.9	0.52	0.64	0.52	49.0
6	R2	6	0	6	0.0	0.163	56.7	LOS E	0.6	3.9	0.52	0.64	0.52	43.2
Approach		65	0	68	0.0	0.163	14.2	LOS A	0.6	3.9	0.52	0.64	0.52	48.3
North: Belmore Road														
7	L2	34	0	36	0.0	0.164	5.8	LOS A	0.2	1.6	0.03	0.07	0.03	56.2
8	T1	805	19	847	2.4	0.820	2.4	LOS A	2.2	15.6	0.14	0.06	0.34	56.1
9	R2	48	1	51	2.1	0.820	13.1	LOS A	2.2	15.6	0.19	0.06	0.48	52.2
Approach		887	20	934	2.3	0.820	3.1	NA	2.2	15.6	0.14	0.06	0.34	55.9
West: Short Road														
10	L2	23	0	24	0.0	0.918	105.3	LOS F	6.1	43.1	0.86	1.30	2.45	12.0
11	T1	1	0	1	0.0	0.918	148.2	LOS F	6.1	43.1	0.86	1.30	2.45	17.4
12	R2	55	1	58	1.8	0.918	165.7	LOS F	6.1	43.1	0.86	1.30	2.45	17.3
Approach		79	1	83	1.3	0.918	147.9	LOS F	6.1	43.1	0.86	1.30	2.45	15.9
All Vehicles		1637	31	1723	1.9	0.918	10.2	NA	6.1	43.1	0.19	0.15	0.40	47.8

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Base 2023 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	71	3	75	4.2	0.096	21.9	LOS B	2.6	18.7	0.63	0.50	0.63	34.7
6	R2	208	25	219	12.0	* 0.912	75.2	LOS F	15.1	116.5	1.00	1.04	1.43	24.6
Approach		279	28	294	10.0	0.912	61.6	LOS E	15.1	116.5	0.91	0.90	1.22	26.0
North: Belmore Road														
7	L2	209	13	220	6.2	0.259	24.6	LOS B	7.6	56.0	0.64	0.73	0.64	37.1
9	R2	349	27	367	7.7	0.827	54.8	LOS D	21.8	163.1	0.99	0.93	1.13	23.5
Approach		558	40	587	7.2	0.827	43.5	LOS D	21.8	163.1	0.86	0.85	0.94	28.4
West: Thurlow Street														
10	L2	857	23	902	2.7	* 1.034	63.7	LOS E	43.6	313.0	0.87	1.04	1.26	19.9
11	T1	77	3	81	3.9	* 1.034	95.8	LOS F	43.6	313.0	1.00	1.25	1.71	14.5
Approach		934	26	983	2.8	1.034	66.4	LOS E	43.6	313.0	0.88	1.05	1.30	19.3
All Vehicles		1771	94	1864	5.3	1.034	58.4	LOS E	43.6	313.0	0.88	0.97	1.18	22.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Base 2023 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

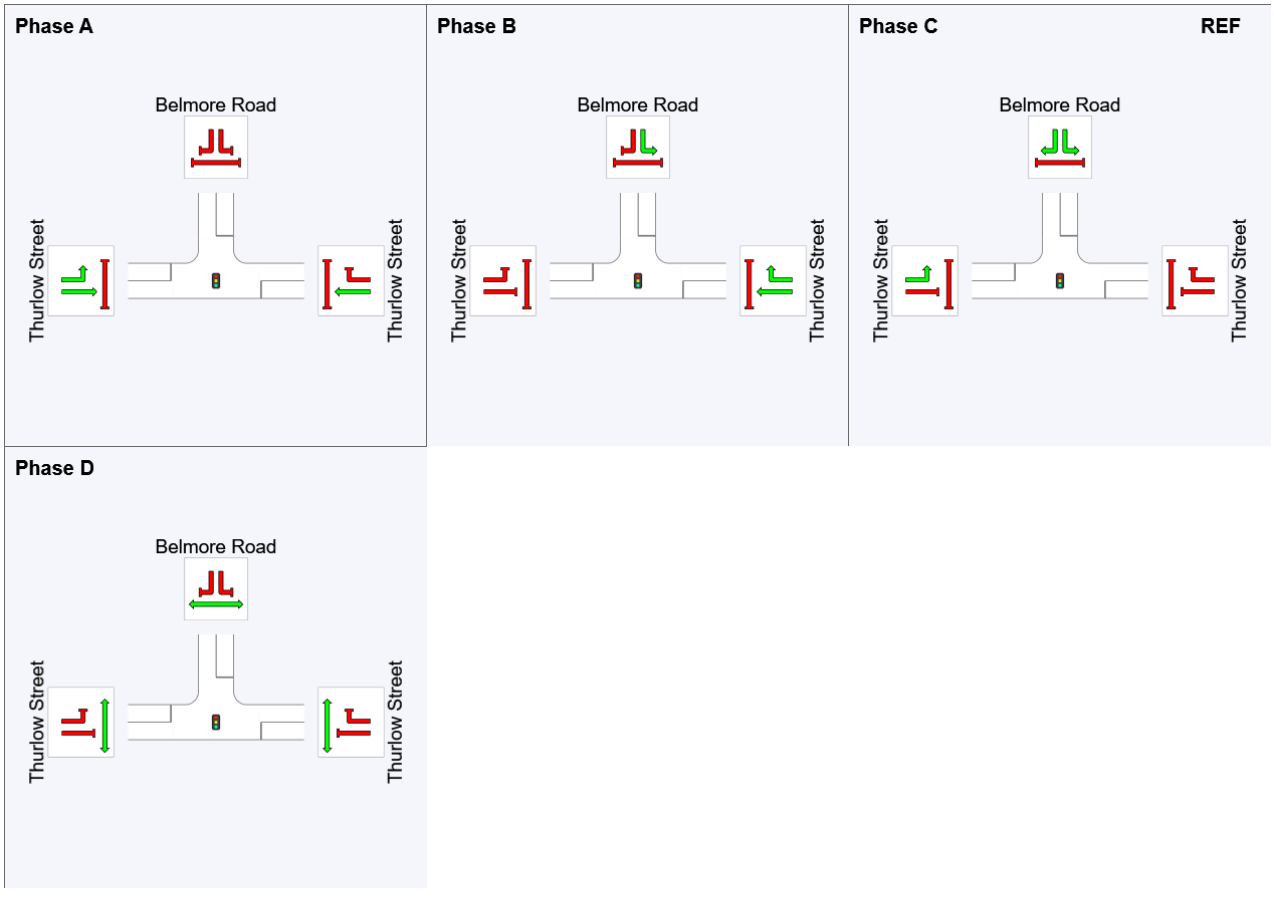
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

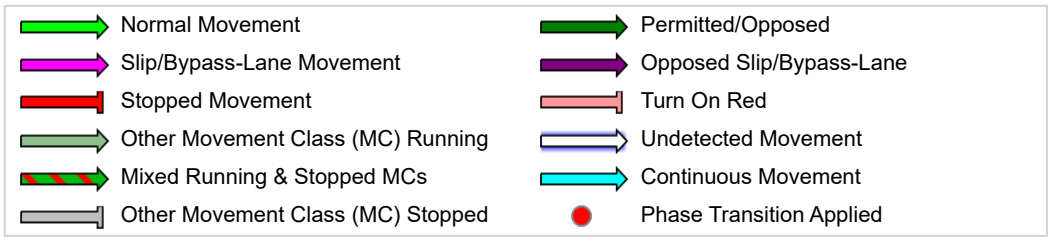
Phase	A	B	C	D
Phase Change Time (sec)	63	95	0	38
Green Time (sec)	26	19	32	19
Phase Time (sec)	32	25	38	25
Phase Split	27%	21%	32%	21%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



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MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Base 2023 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	38	0	40	0.0	0.144	9.6	LOS A	3.2	22.7	0.32	0.35	0.32	43.6
2	T1	911	28	959	3.1	*0.678	7.7	LOS A	20.8	149.6	0.48	0.45	0.48	37.0
Approach		949	28	999	3.0	0.678	7.8	LOS A	20.8	149.6	0.48	0.45	0.48	37.5
East: Cairns Street														
4	L2	21	0	22	0.0	0.153	60.0	LOS E	1.2	8.4	0.96	0.71	0.96	21.4
5	T1	16	0	17	0.0	0.323	55.2	LOS D	2.6	18.2	0.98	0.74	0.98	27.9
6	R2	29	0	31	0.0	0.323	59.7	LOS E	2.6	18.2	0.98	0.74	0.98	22.8
Approach		66	0	69	0.0	0.323	58.7	LOS E	2.6	18.2	0.97	0.73	0.97	23.8
North: Belmore Road														
7	L2	20	2	21	10.0	0.095	6.9	LOS A	1.5	11.2	0.21	0.24	0.21	46.4
8	T1	361	29	380	8.0	0.362	5.9	LOS A	7.1	52.3	0.38	0.38	0.38	38.1
9	R2	52	0	55	0.0	*0.362	11.9	LOS A	7.1	52.3	0.45	0.44	0.45	42.2
Approach		433	31	456	7.2	0.362	6.7	LOS A	7.1	52.3	0.38	0.38	0.38	39.6
West: Webb Street														
10	L2	40	1	42	2.5	0.134	50.3	LOS D	2.0	14.3	0.88	0.73	0.88	25.2
11	T1	18	0	19	0.0	*0.393	55.6	LOS D	3.2	22.4	0.98	0.75	0.98	27.7
12	R2	37	0	39	0.0	0.393	60.2	LOS E	3.2	22.4	0.98	0.75	0.98	21.5
Approach		95	1	100	1.1	0.393	55.2	LOS D	3.2	22.4	0.94	0.74	0.94	24.4
All Vehicles		1543	60	1624	3.9	0.678	12.6	LOS A	20.8	149.6	0.50	0.46	0.50	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
East: Cairns Street												
P2	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
North: Belmore Road												

P3	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
West: Webb Street												
P4	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
All Pedestrians		200	211	51.3	LOS E	0.2	0.2	0.95	0.95	216.1	214.3	0.99

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Base 2023 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

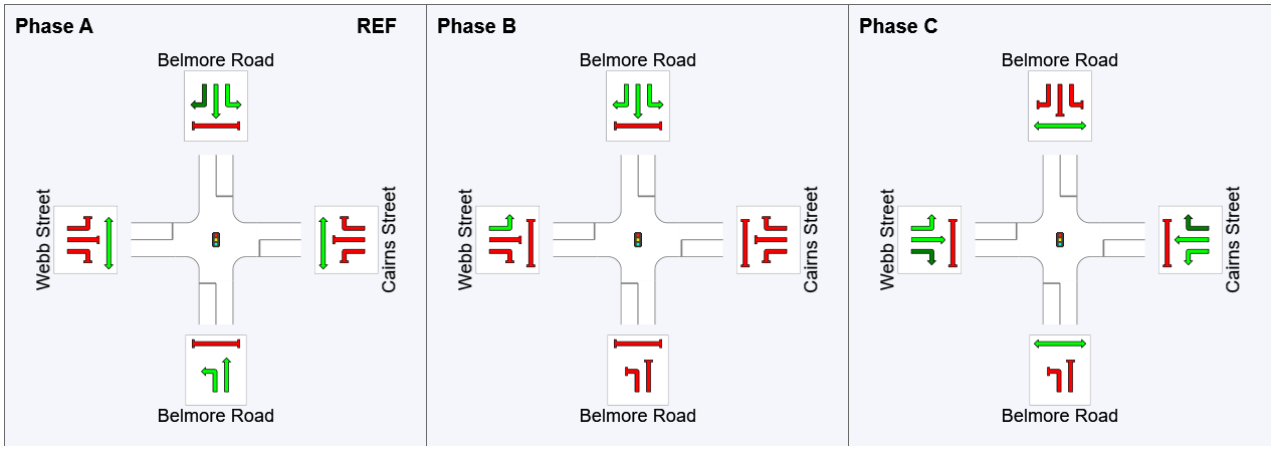
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

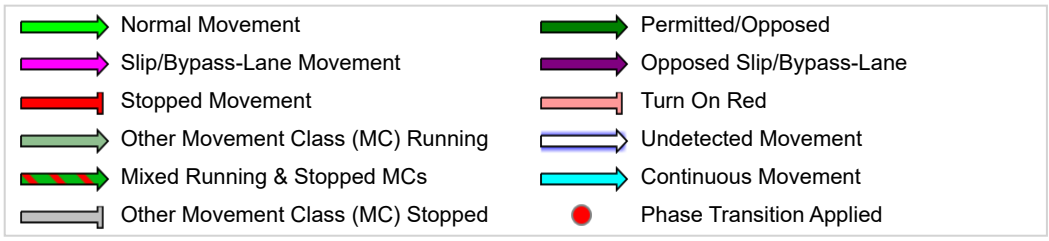
Phase	A	B	C
Phase Change Time (sec)	0	88	98
Green Time (sec)	83	4	12
Phase Time (sec)	89	8	17
Phase Split	78%	7%	15%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Base 2023 AM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	27	1	28	3.7	0.144	5.8	LOS A	0.2	1.5	0.04	0.06	0.04	57.5
2	T1	937	28	986	3.0	0.722	0.8	LOS A	0.7	4.9	0.04	0.03	0.08	59.0
3	R2	17	0	18	0.0	0.722	9.5	LOS A	0.7	4.9	0.05	0.01	0.09	57.5
Approach		981	29	1033	3.0	0.722	1.1	NA	0.7	4.9	0.04	0.03	0.08	58.9
East: Eldon Street														
4	L2	30	1	32	3.3	0.073	6.7	LOS A	0.2	1.8	0.35	0.56	0.35	49.6
5	T1	1	0	1	0.0	0.073	54.0	LOS D	0.2	1.8	0.35	0.56	0.35	50.1
6	R2	2	0	2	0.0	0.073	62.4	LOS E	0.2	1.8	0.35	0.56	0.35	44.6
Approach		33	1	35	3.0	0.073	11.5	LOS A	0.2	1.8	0.35	0.56	0.35	49.4
North: Belmore Road														
7	L2	5	0	5	0.0	0.093	5.7	LOS A	0.0	0.2	0.01	0.02	0.01	57.1
8	T1	407	29	428	7.1	0.466	1.6	LOS A	0.6	4.4	0.10	0.02	0.14	57.1
9	R2	10	1	11	10.0	0.466	19.5	LOS B	0.6	4.4	0.16	0.03	0.21	52.2
Approach		422	30	444	7.1	0.466	2.1	NA	0.6	4.4	0.10	0.02	0.14	57.0
West: Short Road														
10	L2	4	1	4	25.0	0.329	19.6	LOS B	1.0	7.5	0.91	0.97	1.04	21.3
11	T1	3	0	3	0.0	0.329	63.1	LOS E	1.0	7.5	0.91	0.97	1.04	28.7
12	R2	16	0	17	0.0	0.329	77.7	LOS F	1.0	7.5	0.91	0.97	1.04	28.5
Approach		23	1	24	4.3	0.329	65.7	LOS E	1.0	7.5	0.91	0.97	1.04	27.4
All Vehicles		1459	61	1536	4.2	0.722	2.7	NA	1.0	7.5	0.08	0.05	0.12	56.5

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Base 2023 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	122	1	128	0.8	0.217	32.2	LOS C	5.5	38.6	0.77	0.63	0.77	30.3
6	R2	206	13	217	6.3	* 0.971	92.7	LOS F	16.8	123.6	1.00	1.14	1.64	22.0
Approach		328	14	345	4.3	0.971	70.2	LOS E	16.8	123.6	0.92	0.95	1.31	23.9
North: Belmore Road														
7	L2	132	12	139	9.1	0.127	14.3	LOS A	3.2	24.4	0.43	0.66	0.43	41.4
9	R2	693	17	729	2.5	* 1.038	118.0	LOS F	72.1	515.4	1.00	1.23	1.69	14.6
Approach		825	29	868	3.5	1.038	101.4	LOS F	72.1	515.4	0.91	1.14	1.49	17.0
West: Thurlow Street														
10	L2	531	9	559	1.7	0.956	29.3	LOS C	15.9	113.6	0.73	0.85	0.86	31.5
11	T1	100	3	105	3.0	* 0.956	70.1	LOS E	15.9	113.6	1.00	1.17	1.54	20.2
Approach		631	12	664	1.9	0.956	35.8	LOS C	15.9	113.6	0.77	0.90	0.97	29.0
All Vehicles		1784	55	1878	3.1	1.038	72.5	LOS F	72.1	515.4	0.86	1.02	1.27	21.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Base 2023 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

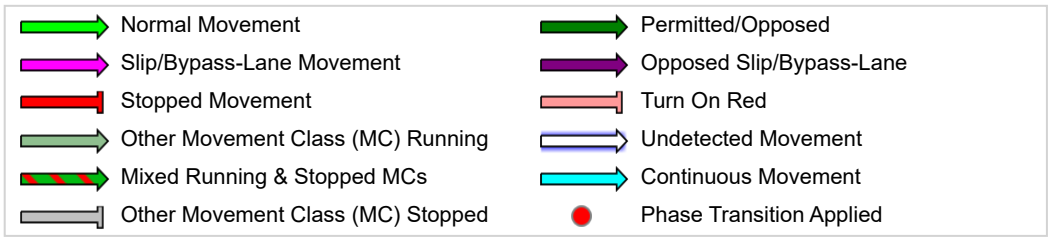
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	19	43	100
Green Time (sec)	14	18	51	14
Phase Time (sec)	20	24	57	19
Phase Split	17%	20%	48%	16%

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

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Base 2023 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	132	0	139	0.0	0.119	13.7	LOS A	3.1	21.5	0.41	0.65	0.41	38.1
2	T1	492	11	518	2.2	0.455	9.7	LOS A	13.6	97.0	0.49	0.44	0.49	34.4
Approach		624	11	657	1.8	0.455	10.5	LOS A	13.6	97.0	0.48	0.49	0.48	35.7
East: Cairns Street														
4	L2	56	1	59	1.8	0.157	48.4	LOS D	2.8	20.1	0.86	0.74	0.86	24.4
5	T1	63	0	66	0.0	0.261	44.1	LOS D	4.5	31.3	0.89	0.72	0.89	30.9
6	R2	22	0	23	0.0	0.261	48.6	LOS D	4.5	31.3	0.89	0.72	0.89	25.8
Approach		141	1	148	0.7	0.261	46.5	LOS D	4.5	31.3	0.87	0.72	0.87	27.9
North: Belmore Road														
7	L2	26	0	27	0.0	0.202	12.7	LOS A	5.5	39.4	0.41	0.39	0.41	42.1
8	T1	696	19	733	2.7	*0.769	16.3	LOS B	28.1	200.5	0.69	0.65	0.69	28.1
9	R2	134	0	141	0.0	0.769	23.6	LOS B	28.1	200.5	0.80	0.76	0.80	35.1
Approach		856	19	901	2.2	0.769	17.3	LOS B	28.1	200.5	0.70	0.66	0.70	30.4
West: Webb Street														
10	L2	148	0	156	0.0	0.548	50.5	LOS D	8.0	55.8	0.91	0.79	0.91	24.8
11	T1	37	0	39	0.0	*0.759	51.2	LOS D	10.6	74.3	0.96	0.89	1.10	28.6
12	R2	138	1	145	0.7	0.759	55.7	LOS D	10.6	74.3	0.96	0.89	1.10	22.3
Approach		323	1	340	0.3	0.759	52.8	LOS D	10.6	74.3	0.94	0.84	1.01	24.3
All Vehicles		1944	32	2046	1.6	0.769	23.2	LOS B	28.1	200.5	0.68	0.64	0.69	29.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
East: Cairns Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98

North: Belmore Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
West: Webb Street											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	219.1	214.3	0.98

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Base 2023 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

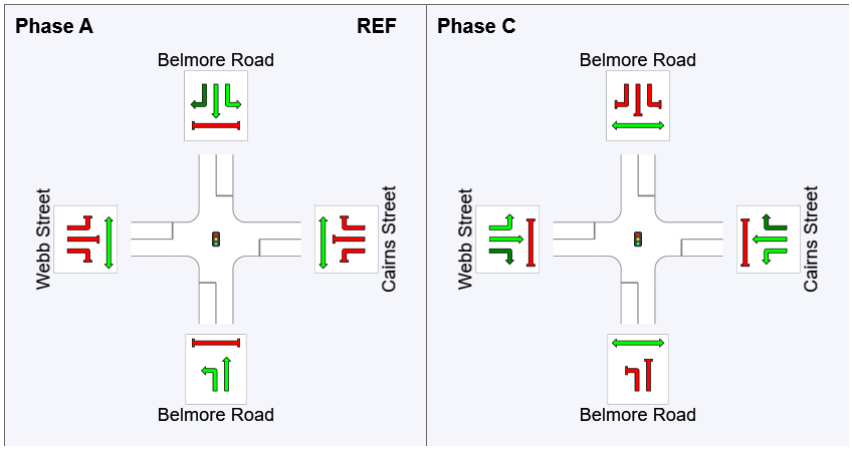
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B*, C
Output Phase Sequence: A, C
(* Variable Phase)

Phase Timing Summary

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

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Project: \\corp.pbwan.net\anz\ProjectsAU\PS124xxx\PS124276_Commuter_Carpark\4_WIP\Docs\02_Specialists\02_Traffic_(WSP)\SIDRA\PS124276-RiverwoodSIDRA.sip9

MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Base 2023 PM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	40	0	42	0.0	0.117	5.7	LOS A	0.3	2.0	0.07	0.12	0.07	57.0
2	T1	545	10	574	1.8	0.586	1.5	LOS A	1.0	7.3	0.13	0.06	0.21	56.8
3	R2	23	0	24	0.0	0.586	13.7	LOS A	1.0	7.3	0.15	0.04	0.27	55.9
Approach		608	10	640	1.6	0.586	2.2	NA	1.0	7.3	0.13	0.06	0.21	56.7
East: Eldon Street														
4	L2	58	0	61	0.0	0.166	8.6	LOS A	0.6	4.0	0.52	0.64	0.52	48.6
5	T1	2	0	2	0.0	0.166	49.8	LOS D	0.6	4.0	0.52	0.64	0.52	49.0
6	R2	6	0	6	0.0	0.166	57.4	LOS E	0.6	4.0	0.52	0.64	0.52	43.2
Approach		66	0	69	0.0	0.166	14.3	LOS A	0.6	4.0	0.52	0.64	0.52	48.3
North: Belmore Road														
7	L2	34	0	36	0.0	0.165	5.8	LOS A	0.2	1.6	0.03	0.07	0.03	56.2
8	T1	809	19	852	2.3	0.827	2.4	LOS A	2.2	16.0	0.14	0.06	0.35	56.0
9	R2	48	1	51	2.1	0.827	13.3	LOS A	2.2	16.0	0.19	0.06	0.50	52.1
Approach		891	20	938	2.2	0.827	3.1	NA	2.2	16.0	0.14	0.06	0.35	55.8
West: Short Road														
10	L2	23	0	24	0.0	0.948	118.7	LOS F	6.8	48.0	0.87	1.36	2.66	11.2
11	T1	1	0	1	0.0	0.948	162.2	LOS F	6.8	48.0	0.87	1.36	2.66	16.3
12	R2	56	1	59	1.8	0.948	180.1	LOS F	6.8	48.0	0.87	1.36	2.66	16.2
Approach		80	1	84	1.3	0.948	162.2	LOS F	6.8	48.0	0.87	1.36	2.66	14.9
All Vehicles		1645	31	1732	1.9	0.948	11.0	NA	6.8	48.0	0.19	0.15	0.41	47.1

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2023 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	70	3	74	4.3	0.095	21.9	LOS B	2.5	18.4	0.63	0.50	0.63	34.7
6	R2	207	25	218	12.1	* 0.906	74.0	LOS F	14.9	114.9	1.00	1.03	1.41	24.8
Approach		277	28	292	10.1	0.906	60.9	LOS E	14.9	114.9	0.91	0.90	1.21	26.2
North: Belmore Road														
7	L2	208	13	219	6.3	0.258	24.6	LOS B	7.6	55.8	0.64	0.73	0.64	37.1
9	R2	369	27	388	7.3	0.913	67.6	LOS E	26.4	196.4	1.00	1.02	1.32	21.0
Approach		577	40	607	6.9	0.913	52.1	LOS D	26.4	196.4	0.87	0.91	1.07	26.1
West: Thurlow Street														
10	L2	853	23	898	2.7	* 1.027	61.3	LOS E	42.4	304.1	0.87	1.03	1.25	20.3
11	T1	76	3	80	3.9	* 1.027	91.3	LOS F	42.4	304.1	1.00	1.23	1.68	14.9
Approach		929	26	978	2.8	1.027	63.7	LOS E	42.4	304.1	0.88	1.04	1.28	19.7
All Vehicles		1783	94	1877	5.3	1.027	59.5	LOS E	42.4	304.1	0.88	0.98	1.20	22.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2023 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

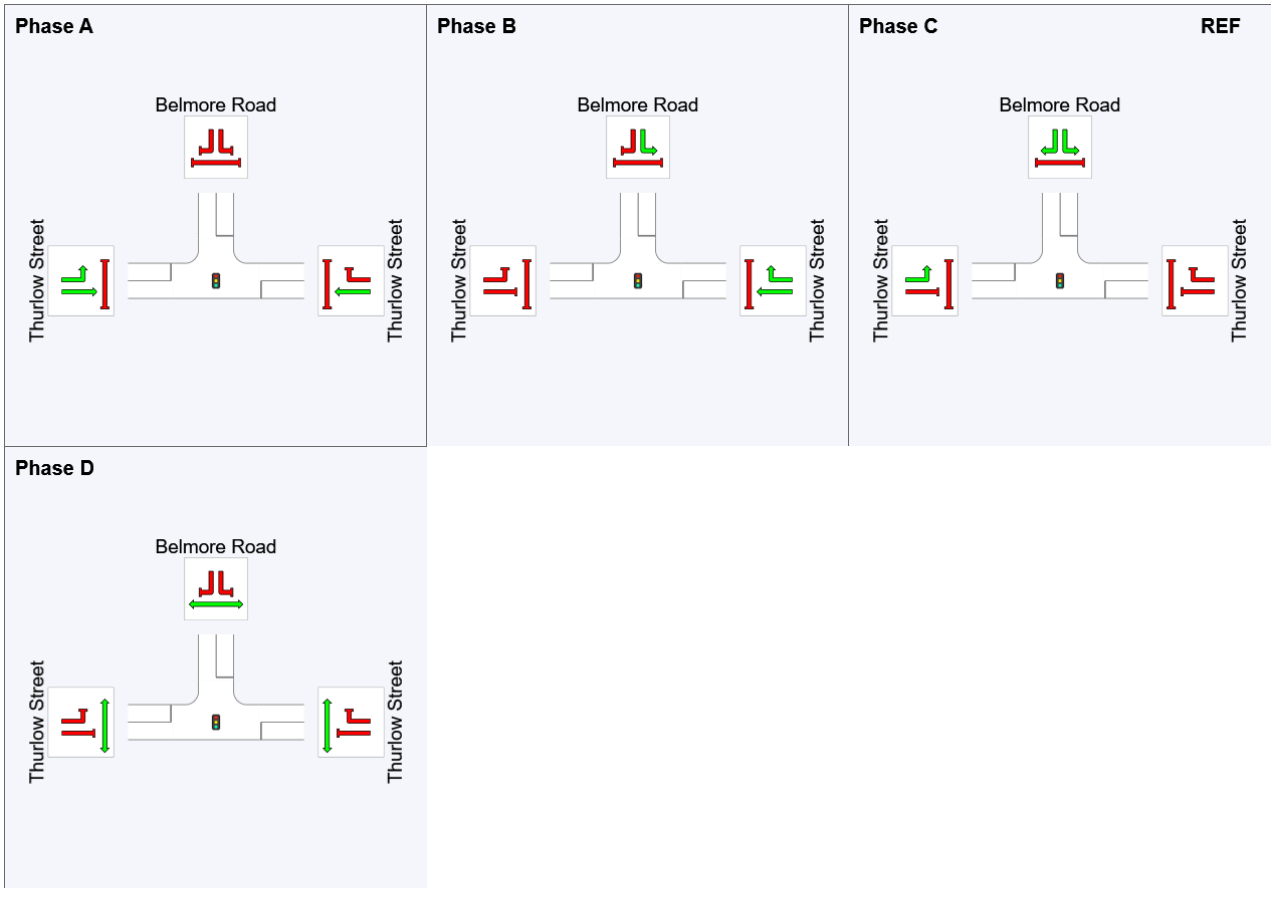
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

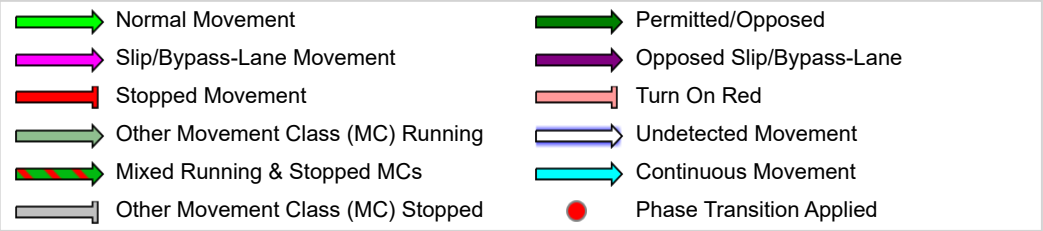
Phase	A	B	C	D
Phase Change Time (sec)	63	95	0	38
Green Time (sec)	26	19	32	19
Phase Time (sec)	32	25	38	25
Phase Split	27%	21%	32%	21%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2023 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	54	0	57	0.0	0.146	10.0	LOS A	3.3	23.6	0.33	0.39	0.33	43.0
2	T1	906	28	954	3.1	* 0.687	7.8	LOS A	21.3	152.9	0.49	0.47	0.49	36.8
Approach		960	28	1011	2.9	0.687	7.9	LOS A	21.3	152.9	0.48	0.46	0.48	37.4
East: Cairns Street														
4	L2	21	0	22	0.0	0.153	59.9	LOS E	1.2	8.4	0.96	0.71	0.96	21.4
5	T1	23	0	24	0.0	0.363	54.5	LOS D	3.0	21.0	0.98	0.75	0.98	28.1
6	R2	29	0	31	0.0	0.363	59.1	LOS E	3.0	21.0	0.98	0.75	0.98	23.0
Approach		73	0	77	0.0	0.363	57.9	LOS E	3.0	21.0	0.97	0.74	0.97	24.4
North: Belmore Road														
7	L2	20	2	21	10.0	0.112	6.9	LOS A	1.8	13.4	0.22	0.24	0.22	46.5
8	T1	360	29	379	8.1	0.425	7.1	LOS A	8.2	60.7	0.41	0.41	0.41	36.5
9	R2	73	0	77	0.0	* 0.425	14.2	LOS A	8.2	60.7	0.53	0.52	0.53	40.3
Approach		453	31	477	6.8	0.425	8.2	LOS A	8.2	60.7	0.42	0.42	0.42	38.2
West: Webb Street														
10	L2	40	1	42	2.5	0.134	50.3	LOS D	2.0	14.3	0.88	0.73	0.88	25.2
11	T1	18	0	19	0.0	* 0.395	55.7	LOS D	3.2	22.4	0.98	0.75	0.98	27.7
12	R2	37	0	39	0.0	0.395	60.2	LOS E	3.2	22.4	0.98	0.75	0.98	21.5
Approach		95	1	100	1.1	0.395	55.2	LOS D	3.2	22.4	0.94	0.74	0.94	24.4
All Vehicles		1581	60	1664	3.8	0.687	13.2	LOS A	21.3	152.9	0.52	0.48	0.52	33.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
East: Cairns Street												
P2	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
North: Belmore Road												

P3	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	216.3	214.6	0.99
West: Webb Street												
P4	Full	50	53	51.3	LOS E	0.2	0.2	0.95	0.95	215.9	214.0	0.99
All Pedestrians		200	211	51.3	LOS E	0.2	0.2	0.95	0.95	216.1	214.3	0.99

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2023 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site User-Given Phase Times)

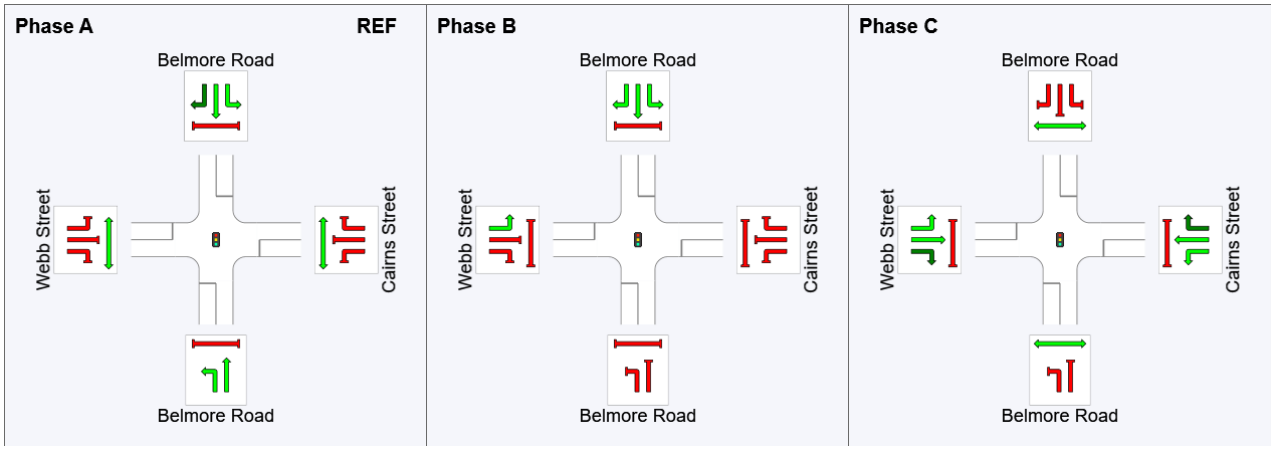
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

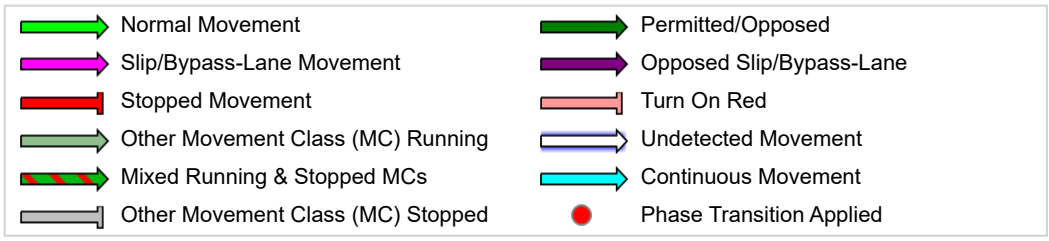
Phase	A	B	C
Phase Change Time (sec)	0	88	98
Green Time (sec)	83	4	12
Phase Time (sec)	89	8	17
Phase Split	78%	7%	15%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Op 2023 AM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	27	1	28	3.7	0.146	5.8	LOS A	0.2	1.5	0.04	0.06	0.04	57.5
2	T1	949	28	999	3.0	0.732	0.9	LOS A	0.7	5.0	0.04	0.03	0.08	59.0
3	R2	17	0	18	0.0	0.732	9.5	LOS A	0.7	5.0	0.04	0.01	0.09	57.5
Approach		993	29	1045	2.9	0.732	1.2	NA	0.7	5.0	0.04	0.03	0.08	58.9
East: Eldon Street														
4	L2	30	1	32	3.3	0.074	6.7	LOS A	0.2	1.8	0.35	0.56	0.35	49.5
5	T1	1	0	1	0.0	0.074	55.5	LOS D	0.2	1.8	0.35	0.56	0.35	50.0
6	R2	2	0	2	0.0	0.074	64.3	LOS E	0.2	1.8	0.35	0.56	0.35	44.4
Approach		33	1	35	3.0	0.074	11.6	LOS A	0.2	1.8	0.35	0.56	0.35	49.3
North: Belmore Road														
7	L2	5	0	5	0.0	0.094	5.7	LOS A	0.0	0.2	0.01	0.02	0.01	57.1
8	T1	405	29	426	7.2	0.470	1.7	LOS A	0.6	4.6	0.10	0.02	0.14	57.0
9	R2	10	1	11	10.0	0.470	19.9	LOS B	0.6	4.6	0.16	0.03	0.22	52.0
Approach		420	30	442	7.1	0.470	2.2	NA	0.6	4.6	0.10	0.02	0.14	56.8
West: Short Road														
10	L2	4	1	4	25.0	0.340	20.8	LOS B	1.1	7.7	0.92	0.97	1.05	20.7
11	T1	3	0	3	0.0	0.340	65.6	LOS E	1.1	7.7	0.92	0.97	1.05	28.1
12	R2	16	0	17	0.0	0.340	80.8	LOS F	1.1	7.7	0.92	0.97	1.05	27.9
Approach		23	1	24	4.3	0.340	68.4	LOS E	1.1	7.7	0.92	0.97	1.05	26.9
All Vehicles		1469	61	1546	4.2	0.732	2.7	NA	1.1	7.7	0.08	0.05	0.12	56.4

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2023 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	122	1	128	0.8	0.212	31.4	LOS C	5.4	38.1	0.76	0.62	0.76	30.6
6	R2	205	13	216	6.3	* 0.919	76.1	LOS F	14.9	110.1	1.00	1.05	1.45	24.4
Approach		327	14	344	4.3	0.919	59.4	LOS E	14.9	110.1	0.91	0.89	1.20	25.9
North: Belmore Road														
7	L2	132	12	139	9.1	0.127	14.3	LOS A	3.2	24.4	0.43	0.66	0.43	41.4
9	R2	689	17	725	2.5	* 1.051	127.7	LOS F	74.3	531.3	1.00	1.26	1.76	13.7
Approach		821	29	864	3.5	1.051	109.4	LOS F	74.3	531.3	0.91	1.17	1.55	16.1
West: Thurlow Street														
10	L2	544	9	573	1.7	0.979	32.5	LOS C	17.5	124.5	0.74	0.87	0.90	30.3
11	T1	99	3	104	3.0	* 0.979	78.4	LOS F	17.5	124.5	1.00	1.21	1.62	18.9
Approach		643	12	677	1.9	0.979	39.5	LOS C	17.5	124.5	0.78	0.92	1.01	27.7
All Vehicles		1791	55	1885	3.1	1.051	75.2	LOS F	74.3	531.3	0.86	1.03	1.29	20.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2023 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

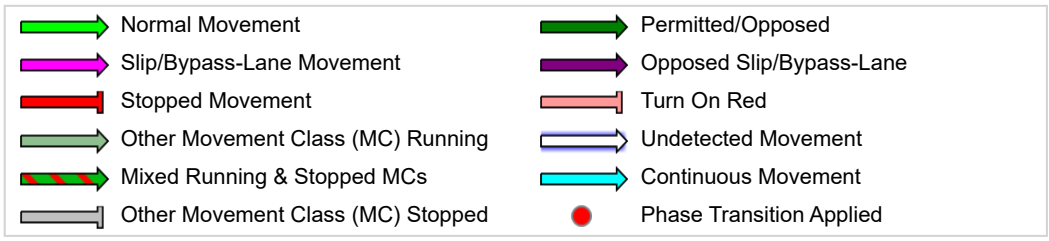
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	19	44	100
Green Time (sec)	14	19	50	14
Phase Time (sec)	20	25	56	19
Phase Split	17%	21%	47%	16%

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

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



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MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2023 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	132	0	139	0.0	0.140	17.9	LOS B	3.6	25.2	0.52	0.68	0.52	35.6
2	T1	489	11	515	2.2	* 0.539	14.6	LOS B	16.0	113.8	0.63	0.56	0.63	29.6
Approach		621	11	654	1.8	0.539	15.3	LOS B	16.0	113.8	0.61	0.59	0.61	31.6
East: Cairns Street														
4	L2	55	1	58	1.8	0.126	40.4	LOS C	2.4	17.0	0.81	0.72	0.81	26.7
5	T1	62	0	65	0.0	0.200	34.1	LOS C	3.7	26.0	0.82	0.68	0.82	33.7
6	R2	22	0	23	0.0	0.200	38.6	LOS C	3.7	26.0	0.82	0.68	0.82	28.9
Approach		139	1	146	0.7	0.200	37.3	LOS C	3.7	26.0	0.81	0.69	0.81	30.6
North: Belmore Road														
7	L2	26	0	27	0.0	0.216	13.1	LOS A	5.6	40.2	0.44	0.41	0.44	41.8
8	T1	692	19	728	2.7	0.825	21.5	LOS B	30.6	217.8	0.76	0.74	0.81	24.7
9	R2	134	0	141	0.0	* 0.825	31.3	LOS C	30.6	217.8	0.91	0.89	0.98	31.6
Approach		852	19	897	2.2	0.825	22.8	LOS B	30.6	217.8	0.77	0.75	0.82	27.1
West: Webb Street														
10	L2	163	0	172	0.0	0.351	36.1	LOS C	6.9	48.4	0.80	0.76	0.80	29.0
11	T1	41	0	43	0.0	* 0.698	40.8	LOS C	10.0	70.2	0.92	0.84	0.99	31.1
12	R2	152	1	160	0.7	0.698	45.4	LOS D	10.0	70.2	0.92	0.84	0.99	24.9
Approach		356	1	375	0.3	0.698	40.6	LOS C	10.0	70.2	0.86	0.81	0.90	27.6
All Vehicles		1968	32	2072	1.6	0.825	24.7	LOS B	30.6	217.8	0.74	0.70	0.77	28.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
East: Cairns Street												
P2	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
North: Belmore Road												

P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
West: Webb Street												
P4	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	213.9	214.0	1.00
All Pedestrians		200	211	49.3	LOS E	0.2	0.2	0.95	0.95	214.1	214.3	1.00

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2023 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

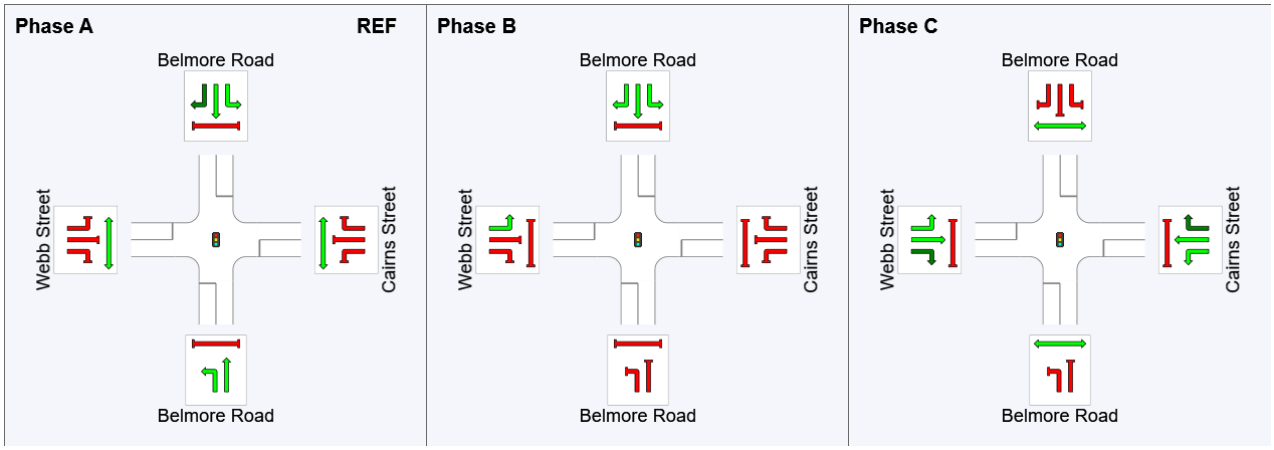
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

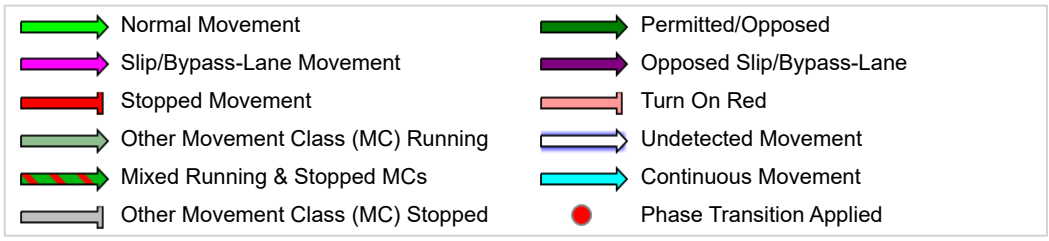
Phase	A	B	C
Phase Change Time (sec)	0	69	77
Green Time (sec)	63	2	31
Phase Time (sec)	69	4	37
Phase Split	63%	4%	34%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Op 2023 PM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	40	0	42	0.0	0.118	5.7	LOS A	0.3	2.0	0.07	0.12	0.07	57.0
2	T1	543	10	572	1.8	0.590	1.5	LOS A	1.1	7.5	0.13	0.06	0.22	56.7
3	R2	23	0	24	0.0	0.590	13.9	LOS A	1.1	7.5	0.16	0.04	0.28	55.9
Approach		606	10	638	1.7	0.590	2.3	NA	1.1	7.5	0.13	0.07	0.21	56.7
East: Eldon Street														
4	L2	57	0	60	0.0	0.167	8.7	LOS A	0.6	4.0	0.53	0.65	0.53	48.5
5	T1	2	0	2	0.0	0.167	50.5	LOS D	0.6	4.0	0.53	0.65	0.53	48.8
6	R2	6	0	6	0.0	0.167	58.3	LOS E	0.6	4.0	0.53	0.65	0.53	43.0
Approach		65	0	68	0.0	0.167	14.5	LOS B	0.6	4.0	0.53	0.65	0.53	48.1
North: Belmore Road														
7	L2	34	0	36	0.0	0.168	5.8	LOS A	0.2	1.6	0.03	0.07	0.03	56.2
8	T1	819	19	862	2.3	0.838	2.5	LOS A	2.3	16.6	0.14	0.06	0.36	55.9
9	R2	48	1	51	2.1	0.838	13.3	LOS A	2.3	16.6	0.19	0.06	0.51	52.0
Approach		901	20	948	2.2	0.838	3.2	NA	2.3	16.6	0.14	0.06	0.36	55.7
West: Short Road														
10	L2	23	0	24	0.0	0.947	119.6	LOS F	6.7	47.7	0.87	1.36	2.65	11.1
11	T1	1	0	1	0.0	0.947	163.8	LOS F	6.7	47.7	0.87	1.36	2.65	16.2
12	R2	55	1	58	1.8	0.947	182.0	LOS F	6.7	47.7	0.87	1.36	2.65	16.1
Approach		79	1	83	1.3	0.947	163.6	LOS F	6.7	47.7	0.87	1.36	2.65	14.8
All Vehicles		1651	31	1738	1.9	0.947	11.0	NA	6.7	47.7	0.19	0.15	0.42	47.1

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2033 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	74	3	78	4.1	0.091	18.8	LOS B	2.5	18.0	0.59	0.47	0.59	36.2
6	R2	219	27	231	12.3	* 0.923	77.0	LOS F	16.2	125.1	1.00	1.05	1.45	24.3
Approach		293	30	308	10.2	0.923	62.3	LOS E	16.2	125.1	0.90	0.91	1.23	25.9
North: Belmore Road														
7	L2	220	14	232	6.4	0.268	24.1	LOS B	7.9	58.6	0.63	0.73	0.63	37.3
9	R2	390	29	411	7.4	0.984	93.3	LOS F	33.4	248.4	1.00	1.13	1.56	17.2
Approach		610	43	642	7.0	0.984	68.3	LOS E	33.4	248.4	0.87	0.99	1.22	22.8
West: Thurlow Street														
10	L2	901	24	948	2.7	* 0.994	53.4	LOS D	43.4	311.3	0.86	1.01	1.14	24.3
11	T1	81	3	85	3.7	* 0.994	76.5	LOS F	43.4	311.3	1.00	1.20	1.51	19.0
Approach		982	27	1034	2.7	0.994	55.3	LOS D	43.4	311.3	0.87	1.02	1.17	23.7
All Vehicles		1885	100	1984	5.3	0.994	60.6	LOS E	43.4	311.3	0.87	0.99	1.20	23.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2033 AM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

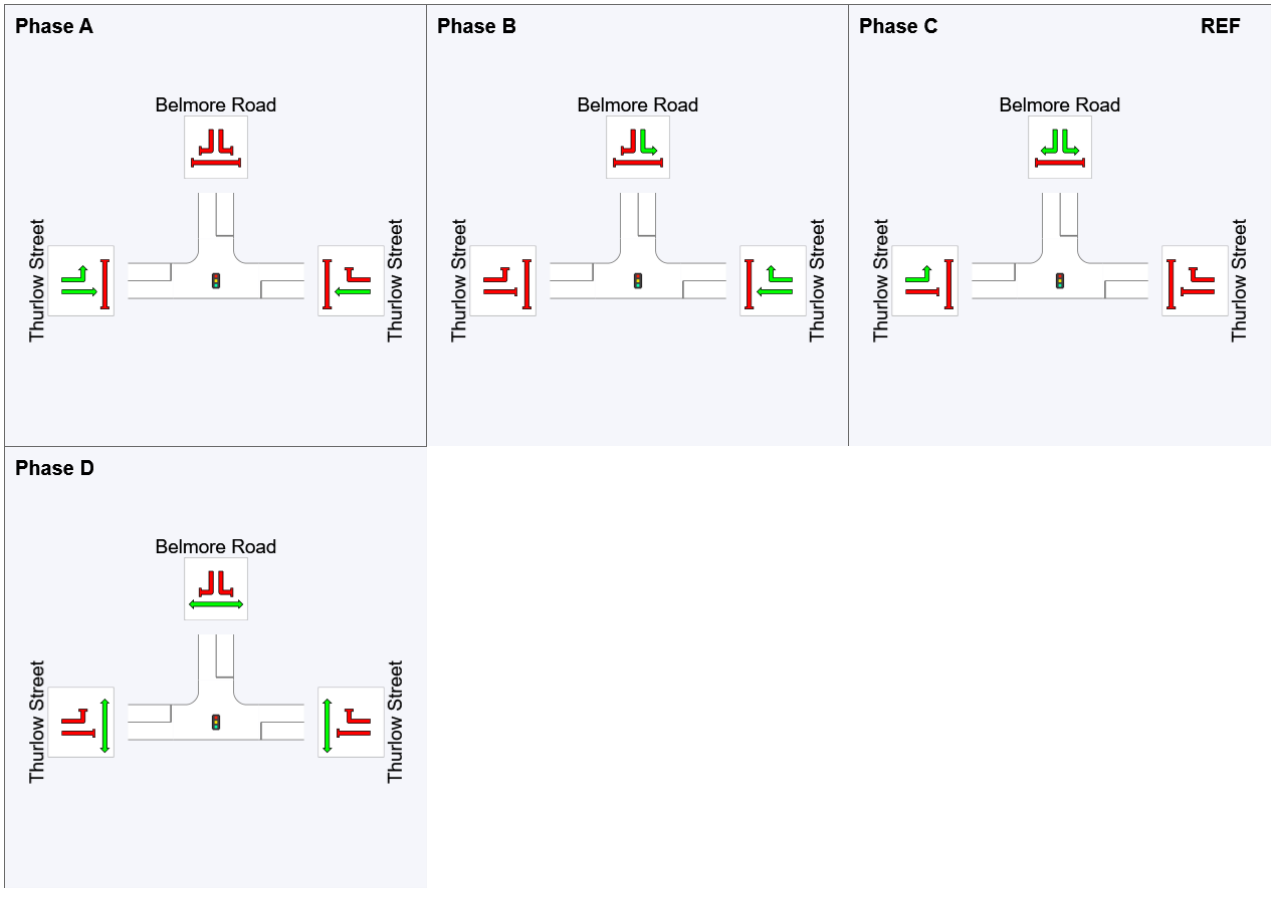
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

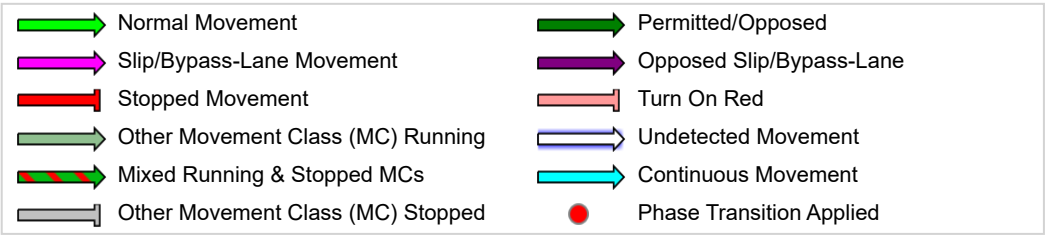
Phase	A	B	C	D
Phase Change Time (sec)	59	94	0	38
Green Time (sec)	30	20	32	15
Phase Time (sec)	36	26	38	20
Phase Split	30%	22%	32%	17%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



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MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2033 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	57	0	60	0.0	0.139	7.8	LOS A	2.7	19.4	0.25	0.33	0.25	44.9
2	T1	958	30	1008	3.1	* 0.654	4.8	LOS A	18.2	131.0	0.38	0.37	0.38	41.1
Approach		1015	30	1068	3.0	0.654	5.0	LOS A	18.2	131.0	0.37	0.36	0.37	41.5
East: Cairns Street														
4	L2	22	0	23	0.0	0.169	63.4	LOS E	1.3	9.3	0.97	0.71	0.97	20.7
5	T1	24	0	25	0.0	0.410	58.3	LOS E	3.4	23.6	0.98	0.76	0.98	27.3
6	R2	31	0	33	0.0	0.410	62.8	LOS E	3.4	23.6	0.98	0.76	0.98	22.2
Approach		77	0	81	0.0	0.410	61.6	LOS E	3.4	23.6	0.98	0.74	0.98	23.6
North: Belmore Road														
7	L2	21	2	22	9.5	0.125	7.5	LOS A	2.3	17.0	0.24	0.25	0.24	46.0
8	T1	380	31	400	8.2	0.478	7.1	LOS A	8.9	65.4	0.40	0.41	0.40	36.5
9	R2	76	0	80	0.0	0.478	14.2	LOS A	8.9	65.4	0.51	0.52	0.51	40.4
Approach		477	33	502	6.9	0.478	8.3	LOS A	8.9	65.4	0.41	0.42	0.41	38.2
West: Webb Street														
10	L2	42	1	44	2.4	0.328	67.0	LOS E	2.6	18.4	0.99	0.74	0.99	21.6
11	T1	19	0	20	0.0	* 0.443	59.4	LOS E	3.6	25.1	0.99	0.76	0.99	27.0
12	R2	39	0	41	0.0	0.443	63.9	LOS E	3.6	25.1	0.99	0.76	0.99	20.8
Approach		100	1	105	1.0	0.443	64.4	LOS E	3.6	25.1	0.99	0.75	0.99	22.5
All Vehicles		1669	64	1757	3.8	0.654	12.1	LOS A	18.2	131.0	0.45	0.42	0.45	34.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
East: Cairns Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98

North: Belmore Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
West: Webb Street											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	219.1	214.3	0.98

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

PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2033 AM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

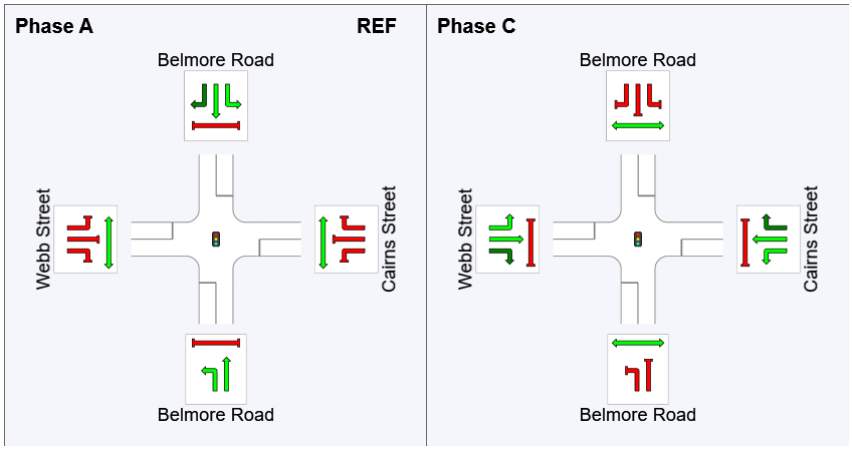
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B*, C
Output Phase Sequence: A, C
(* Variable Phase)

Phase Timing Summary

Phase	A	C
Phase Change Time (sec)	0	102
Green Time (sec)	96	12
Phase Time (sec)	102	18
Phase Split	85%	15%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

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MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Op 2033 AM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	29	1	31	3.4	0.160	5.8	LOS A	0.2	1.7	0.04	0.06	0.04	57.5
2	T1	1002	30	1055	3.0	0.801	1.1	LOS A	0.9	6.6	0.05	0.03	0.10	58.8
3	R2	18	0	19	0.0	0.801	10.0	LOS A	0.9	6.6	0.05	0.02	0.12	57.3
Approach		1049	31	1104	3.0	0.801	1.4	NA	0.9	6.6	0.05	0.03	0.10	58.7
East: Eldon Street														
4	L2	32	1	34	3.1	0.089	6.9	LOS A	0.3	2.1	0.41	0.57	0.41	48.8
5	T1	1	0	1	0.0	0.089	67.4	LOS E	0.3	2.1	0.41	0.57	0.41	49.3
6	R2	2	0	2	0.0	0.089	78.6	LOS F	0.3	2.1	0.41	0.57	0.41	43.6
Approach		35	1	37	2.9	0.089	12.8	LOS A	0.3	2.1	0.41	0.57	0.41	48.6
North: Belmore Road														
7	L2	5	0	5	0.0	0.065	5.7	LOS A	0.0	0.2	0.01	0.03	0.01	56.9
8	T1	428	31	451	7.2	0.327	2.0	LOS A	0.8	5.8	0.12	0.02	0.15	56.5
9	R2	11	1	12	9.1	0.327	22.3	LOS B	0.8	5.8	0.16	0.02	0.20	52.2
Approach		444	32	467	7.2	0.327	2.5	NA	0.8	5.8	0.12	0.02	0.15	56.3
West: Short Road														
10	L2	4	1	4	25.0	0.451	34.9	LOS C	1.4	10.3	0.94	1.00	1.14	16.6
11	T1	3	0	3	0.0	0.451	90.6	LOS F	1.4	10.3	0.94	1.00	1.14	23.2
12	R2	17	0	18	0.0	0.451	110.7	LOS F	1.4	10.3	0.94	1.00	1.14	23.1
Approach		24	1	25	4.2	0.451	95.6	LOS F	1.4	10.3	0.94	1.00	1.14	22.2
All Vehicles		1552	65	1634	4.2	0.801	3.4	NA	1.4	10.3	0.09	0.05	0.14	55.6

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

MOVEMENT SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2033 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Thurlow Street														
5	T1	128	1	135	0.8	0.240	33.9	LOS C	5.9	41.7	0.80	0.65	0.80	29.6
6	R2	217	14	228	6.5	* 1.069	149.0	LOS F	23.3	172.2	1.00	1.34	2.04	16.2
Approach		345	15	363	4.3	1.069	106.3	LOS F	23.3	172.2	0.92	1.08	1.58	18.6
North: Belmore Road														
7	L2	139	13	146	9.4	0.134	14.3	LOS A	3.4	25.9	0.43	0.66	0.43	41.4
9	R2	728	18	766	2.5	* 1.071	141.3	LOS F	83.0	593.0	1.00	1.31	1.85	12.7
Approach		867	31	913	3.6	1.071	121.0	LOS F	83.0	593.0	0.91	1.21	1.62	15.0
West: Thurlow Street														
10	L2	574	10	604	1.7	1.054	38.7	LOS C	20.3	144.9	0.74	0.89	0.96	26.5
11	T1	105	3	111	2.9	* 1.054	113.8	LOS F	20.3	144.9	1.00	1.32	1.95	13.0
Approach		679	13	715	1.9	1.054	50.3	LOS D	20.3	144.9	0.78	0.95	1.11	22.8
All Vehicles		1891	59	1991	3.1	1.071	92.9	LOS F	83.0	593.0	0.87	1.09	1.43	17.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Thurlow Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.4	214.7	0.98
North: Belmore Road												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.9	0.98
West: Thurlow Street												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.7	212.5	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	219.2	214.4	0.98

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

PHASING SUMMARY

Site: ID-1 [Belmore Rd and Thurlow St (Site Folder: Future Op 2033 PM Peak)]

AM Peak
TCS2440
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

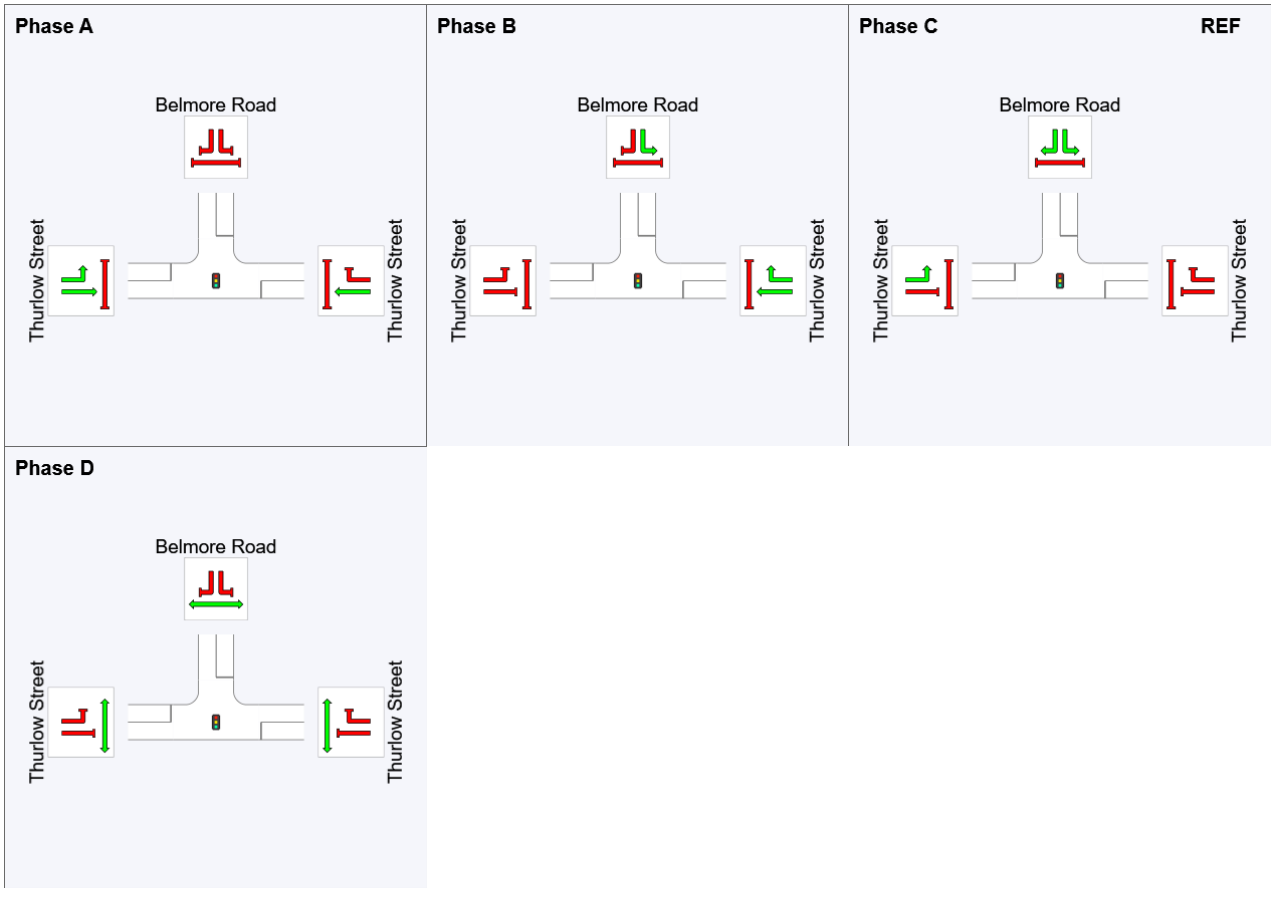
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: TCS2440
Reference Phase: Phase C
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

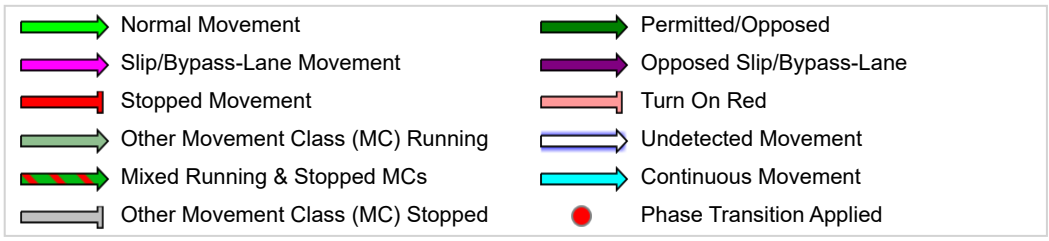
Phase	A	B	C	D
Phase Change Time (sec)	79	97	0	58
Green Time (sec)	13	17	52	15
Phase Time (sec)	19	23	58	20
Phase Split	16%	19%	48%	17%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2033 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	139	0	146	0.0	0.131	15.0	LOS B	3.5	24.4	0.44	0.66	0.44	37.3
2	T1	517	12	544	2.3	0.508	11.4	LOS A	15.7	112.0	0.54	0.49	0.54	32.6
Approach		656	12	691	1.8	0.508	12.2	LOS A	15.7	112.0	0.52	0.52	0.52	34.1
East: Cairns Street														
4	L2	58	1	61	1.7	0.145	46.0	LOS D	2.8	20.1	0.83	0.73	0.83	25.1
5	T1	66	0	69	0.0	0.257	42.3	LOS C	4.6	32.1	0.87	0.71	0.87	31.3
6	R2	23	0	24	0.0	0.257	46.9	LOS D	4.6	32.1	0.87	0.71	0.87	26.3
Approach		147	1	155	0.7	0.257	44.5	LOS D	4.6	32.1	0.86	0.72	0.86	28.5
North: Belmore Road														
7	L2	28	0	29	0.0	0.234	14.2	LOS A	6.7	48.1	0.45	0.42	0.45	41.1
8	T1	731	20	769	2.7	* 0.891	30.7	LOS C	41.3	294.6	0.78	0.80	0.89	20.4
9	R2	141	0	148	0.0	0.891	44.4	LOS D	41.3	294.6	0.93	0.98	1.10	27.1
Approach		900	20	947	2.2	0.891	32.4	LOS C	41.3	294.6	0.79	0.82	0.91	22.7
West: Webb Street														
10	L2	172	0	181	0.0	0.642	48.6	LOS D	9.1	63.9	0.90	0.80	0.91	25.4
11	T1	43	0	45	0.0	* 0.867	59.8	LOS E	13.6	95.6	0.96	1.00	1.29	26.8
12	R2	160	1	168	0.6	0.867	64.3	LOS E	13.6	95.6	0.96	1.00	1.29	20.6
Approach		375	1	395	0.3	0.867	56.6	LOS E	13.6	95.6	0.93	0.90	1.12	23.5
All Vehicles		2078	34	2187	1.6	0.891	31.2	LOS C	41.3	294.6	0.74	0.73	0.82	25.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Belmore Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
East: Cairns Street												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98

North: Belmore Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98
West: Webb Street											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	218.9	214.0	0.98
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	219.1	214.3	0.98

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

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PHASING SUMMARY

Site: ID-02 [Belmore Rd/Webb St/Cairns St (Site Folder: Future Op 2033 PM Peak)]

AM Peak
TCS3089
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

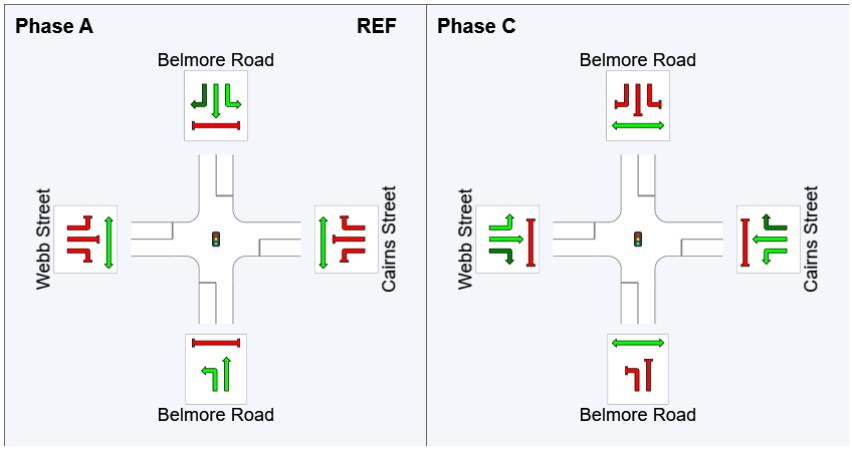
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS 3089
Reference Phase: Phase A
Input Phase Sequence: A, B*, C
Output Phase Sequence: A, C
(* Variable Phase)

Phase Timing Summary

Phase	A	C
Phase Change Time (sec)	0	83
Green Time (sec)	77	31
Phase Time (sec)	83	37
Phase Split	69%	31%

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

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MOVEMENT SUMMARY

Site: ID-03 [Belmore Rd/Short Rd/Eldon St (Site Folder: Future Op 2033 PM Peak)]

AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Belmore Road														
1	L2	42	0	44	0.0	0.089	5.7	LOS A	0.3	2.0	0.08	0.16	0.08	56.6
2	T1	574	11	604	1.9	0.445	1.4	LOS A	1.1	7.8	0.14	0.06	0.21	56.8
3	R2	24	0	25	0.0	0.445	14.8	LOS B	1.1	7.8	0.16	0.03	0.23	56.1
Approach		640	11	674	1.7	0.445	2.2	NA	1.1	7.8	0.14	0.06	0.20	56.8
East: Eldon Street														
4	L2	61	0	64	0.0	0.195	9.0	LOS A	0.7	4.6	0.58	0.68	0.58	47.8
5	T1	2	0	2	0.0	0.195	59.6	LOS E	0.7	4.6	0.58	0.68	0.58	48.2
6	R2	6	0	6	0.0	0.195	69.2	LOS E	0.7	4.6	0.58	0.68	0.58	42.2
Approach		69	0	73	0.0	0.195	15.7	LOS B	0.7	4.6	0.58	0.68	0.58	47.5
North: Belmore Road														
7	L2	36	0	38	0.0	0.188	5.8	LOS A	0.3	1.8	0.03	0.07	0.03	56.3
8	T1	865	20	911	2.3	0.938	4.9	LOS A	4.6	33.0	0.15	0.07	0.70	52.9
9	R2	51	1	54	2.0	0.938	17.3	LOS B	4.6	33.0	0.21	0.08	1.04	48.0
Approach		952	21	1002	2.2	0.938	5.6	NA	4.6	33.0	0.15	0.07	0.70	52.7
West: Short Road														
10	L2	24	0	25	0.0	1.215	295.5	LOS F	15.8	112.0	1.00	1.99	4.86	5.7
11	T1	1	0	1	0.0	1.215	341.9	LOS F	15.8	112.0	1.00	1.99	4.86	8.8
12	R2	58	1	61	1.7	1.215	362.5	LOS F	15.8	112.0	1.00	1.99	4.86	8.8
Approach		83	1	87	1.2	1.215	342.8	LOS F	15.8	112.0	1.00	1.99	4.86	7.9
All Vehicles		1744	33	1836	1.9	1.215	20.8	NA	15.8	112.0	0.20	0.19	0.71	39.2

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