

Waterloo Integrated Station Development

CONSTRUCTION TRAFFIC MANAGEMENT PLAN ADDENDUM 3 ONE WAY ROAD CLOSURE

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Document and Revision History

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Client	Sydney Metro City & Southwest			

Revisions

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В	31/08/2022	Submitted to Sydney Metro for Review & Approval	N. Lasky	R. Madden	A. Knispel

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Glossary

Term	Explanation
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
СоА	Conditions of Approval
CSSI	Critical State Significance Infrastructure
СТМР	Construction Traffic Management Plan
DPE	Department of Planning & Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ER	Environmental Representative
GMR	Global Mandatory Requirements
ISD	Integrated Station Development
JHPL	John Holland Pty Limited
Minister, the	NSW Minister for Planning
OEH	Office of Environment and Heritage
OSOM	Oversize and Over Mass Vehicles
PkMP	Parking Management Plan
PMP	Pedestrian Management Plan
PHSMP	Project Health and Safety Management Plan
RSA	Road Safety Audit
REMMs	Revised Environmental Mitigation Measures
SMCSW	Sydney Metro City and Southwest
SWTC	Scope of Work and Technical Criteria
TGS	Traffic Guidance Scheme
TCWSM	Roads and Maritime Services Traffic Control at Work Sites Manual
TMP	Traffic Management Plan
TRA	Task Risk Assessment
TSE	Sydney Metro Tunnel and Station Excavation Contractor
VMP	Vehicle Movement Plan

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1 Introduction

1.1 Project Overview

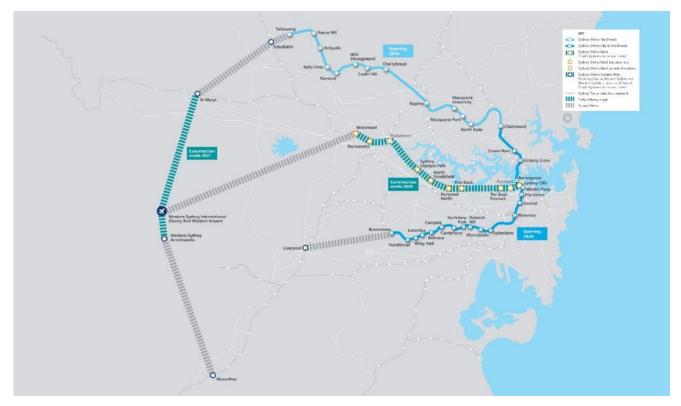
1.1.1 Sydney Metro 2 – City & Southwest

The Sydney Metro is Australia's biggest public transport project.

Services started in 2019 in the city's North-West with a train every four minutes in the peak. Metro rail will be extended into the CBD and beyond to Bankstown in 2024. Sydney Metro includes new CBD railway stations underground at Martin Place, Pitt Street and Barangaroo and new metro platforms under Central.

In 2024, Sydney Metro will have 31 stations on a new 66km rail system – the biggest urban rail project in Australian history. Sydney Metro will have ultimate capacity for a train every two minutes in each direction under the CBD.

Figure 1: Sydney Metro



1.1.2 Waterloo Integrated Sydney Metro Upgrade

John Holland Pty Ltd has been awarded by Sydney Metro the contract to deliver the Waterloo Integrated Station Development (ISD).

The Waterloo ISD Project Works comprises of construction of the new station infrastructure to support customer movement and experience.

The Waterloo ISD is located within Sydney's suburb of Waterloo, as shown in Figure 2, within the Metro Quarter. The Metro Quarter Development (MQD) comprises the land bounded by Botany Road, Raglan Street, Cope Street and Wellington Street, but excluding the Congregational Church located at 103 Botany Road. It is situated approximately 3km from the Sydney CBD and is surrounded by established residential properties.

Figure 1: Site Location Plan



1.2 Purpose of this Plan

This Construction Traffic Management Plan (CTMP) will facilitate the construction of the Waterloo Integrated Station Development with minimal impacts on the road user and road network.

John Holland will manage traffic during the Works, particularly identifying the location, nature and duration of work activities, their impact on the roadway, all road users, and the control strategies implemented to mitigate these impacts.

1.3 Scope of Works

This Construction Traffic Management Plan (CTMP) facilitates the safe introduction of the temporary control strategy designed to introduce new construction areas on the adjacent streets around the site to facilitate the construction of the Waterloo Integrated Station Development (i.e. Utilities, Civil, Public Domain, Finishes and Structure).

This CTMP enables the following traffic management controls and devices:

- Survey set out new pavement marking and barrier locations on Raglan St, Cope St & Wellington St;
- Pavement marking and removal of redundant lines;
- Installing long term temporary roadworks signage;
- Placement of safety barriers;
- Introduction of Site Gates;
- Vehicle movements to and from the work zone; and
- Positioning of portable VMS.

1.4 Proposed timing and duration

Construction works are proposed to commence in September 2022 for approximately 12 months completing in September 2023.

2 Existing Road Conditions

2.1 Cope Street

Cope Street is a local road under jurisdiction and control of City of Sydney Council. It spans from Redfern Street to the North in Redfern and ends at McEvoy Street to the South in Waterloo. The speed limit is 50 km/h. This area has substantial residential land uses with low daily light vehicle volumes.

Vehicle volumes are low, with traffic surveys undertaken in June 2020 (pre covid restrictions) recorded:

- AM Peak: 8:15AM 9:15AM
 - 71 northbound, 32 southbound
- PM Peak: 5:00 PM 6:00 PM
 - 86 northbound, 38 southbound

Traffic surveys during the COVID-19 lockdown in August 2021 recorded:

- AM Peak: 8:00AM 9:00AM
 - o 52 northbound, 28 southbound
- PM Peak: 4:00 PM 5:00 PM
 - 73 northbound, 31 southbound.

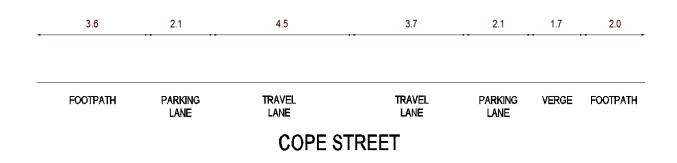
Roundabouts exist at the intersections of Raglan Street and Wellington Street.

Parking is unrestricted between Raglan Street & Wellington Street with "No Stopping" signposted at all intersections. Parking on Cope St (between Raglan St & Wellington St) has been removed as part of Addendum 2.

There is no on road cycling facility on Cope Street.

The Eastern footpath is 2m wide with verges typically located between the footpath and roadway (2m). The Western footpath is 4.5m wide with no vegetation verge (adjacent to the work site). There are no pedestrian crossing facilities along Cope Street other than the use of the splitter islands located at the roundabouts.

Figure 3: Cope Street Existing Arrangement (Northbound)



As part of a previous approved CTMP (SMCSWSWL-JHG-SWL-EM-PLN-000013_J_CTMP Addendum 2):

- the two existing bus stops to the South of Raglan St servicing route 355 located on the eastern side of the road have since been relocated and diverted.
- the two garbage collection points located on the eastern side within the Land and Housing Estate that require servicing weekly continue to be serviced as agreed with the road closure.

The open-air off-street car park for the local residents on the eastern side still has access to residents only.

2.2 Raglan Street

Raglan Street is classified as a local road and is under the control of City of Sydney Council. Raglan Street commences from Botany Road and ceases on Elizabeth Street to the East in Waterloo. The speed limit on Raglan Street is 50 km/h.

Vehicle volumes are low, with traffic surveys undertaken in June 2020 (pre covid restrictions) recorded:

- AM Peak: 8:15AM 9:15AM
 - o 247 eastbound, 248 westbound
- PM Peak: 5:00 PM 6:00 PM
 - o 260 eastbound, 300 westbound

Traffic surveys during the COVID-19 lockdown in August 2021 recorded:

- AM Peak: 8:00AM 9:00AM
 - o 160 eastbound, 156 westbound
- PM Peak: 4:00 PM 5:00 PM
 - 183 eastbound, 208 westbound.

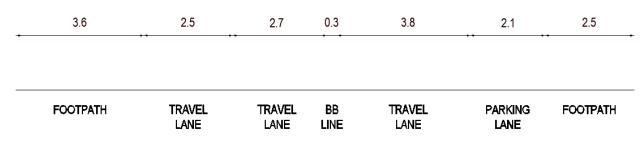
There are no bus stops on Raglan Street (adjacent to the site) between Cope Street and Botany Road, however Sydney Bus routes 355 travel east and west.

There are one hour (Monday -Friday) parking restrictions in this street.

The existing footpaths are approximately 3.7 - 4.5m wide. There are no cycling facilities on this section of Raglan Street.

There are four businesses located on the Northern side of Raglan Street and a loading zone to service the bottle shop.

Figure 4: Raglan Street Existing Arrangement (Eastbound)



RAGLAN STREET

2.3 Wellington Street

Wellington Street is classified as a local road and is under the control of City of Sydney Council. Wellington Street commences at Botany Road and continues to Morehead Street Waterloo. The State default speed limit of 50km/h applies. There are no bus stops on Wellington Street (adjacent to the site) between Botany Road and Cope Street, however, Sydney Bus route 355 travels east on Wellington.

There is two-hour parking restriction in this street on the south side and unrestricted parking on the north side.

Vehicle volumes are low, with traffic surveys undertaken in June 2020 (pre covid restrictions) recorded:

- AM Peak: 8:15 AM 9:15 AM
 - 174 eastbound, 71 westbound
- PM Peak: 5:00 PM 6:00 PM
 - 131 eastbound, 124 westbound

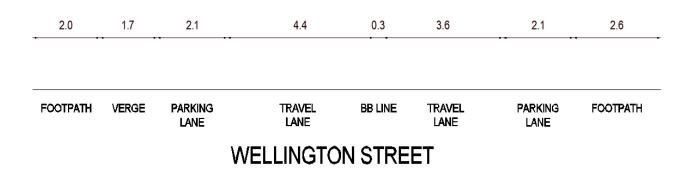
Traffic surveys during the COVID-19 lockdown in August 2021 recorded:

- AM Peak: 8:00AM 9:00AM
 - 117 eastbound, 62 westbound
- PM Peak 4:15 PM 5:15 PM
 - 112 eastbound, 102 westbound.

The existing footpath on the southern side maintain a minimum width of 1.6m. There is a short cycling facility on this section of Wellington Street on the southern side prior to crossing Botany Road.

There is one business located on the southern side of Wellington Street (i.e. Cauliflower Hotel) along with residential properties. There is a loading zone to service the hotel.

Figure 5: Wellington Street Existing Arrangement (Eastbound)



3 Proposed Conditions of Roads Affected by CTMP

The intention of this CTMP is to highlight the various stages of implementation on the adjacent streets of the site. John Holland will seek opportunities to reduce the construction footprint once construction works is completed in an area to limit the impact to the local community, residents and road users.

3.1 Cope Street

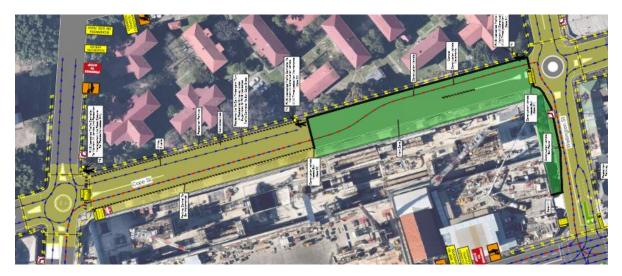
This CTMP proposes multiple set ups on Cope St to facilitate the works and reduce the impact to the local residents and road users. These works can be captured as below:

- 1. Cope St (Southern) Road Closure (Currently being implemented).
- 2. Cope St (Northern) Road Closure.
- 3. Cope St Full Road Closure (between Raglan Street and Wellington Street).

3.1.1 Cope St (Southern) – Road Closure

John Holland currently have this CTMP in place on site. For more information, please refer to previously approved CTMP SMCSWSWL-JHG-SWL-EM-PLN-000013_J_CTMP Addendum 2.

Figure 6: Cope St (Southern) – Road Closure



3.1.2 Cope St (Northern) – Road Closure

Similarly, to the above closure (3.1.1 Cope St (Southern) – Road Closure) John Holland propose to mirror the above closure for the North (please refer to Figure 7).

The proposed configuration will:

- continue to have the western footpath closed to pedestrians.
- continue to have no parking on Cope St (Northbound and Southbound).
- not impede the open-air off-street car park and garbage collection points for the Land and Housing Corporation (LAHC) residents. This will be managed by traffic controllers (during day shift construction hours) and temporary traffic light signals (night shift construction hours and for non-construction hours).
- reduce the speed limit to 40km/h for the duration of works.



Figure 7: Cope St (Northern) – Road Closure

3.1.3 Cope St – Full Road Closure between Raglan and Wellington Streets

The proposed configuration will:

- continue to have the western footpath closed to pedestrians.
- continue to have no parking on Cope St (Northbound and Southbound).
- Close the open-air off-street LAHC car park (refer to Appendix L Approval from LAHC to close car park) to residents.
- continue to service and maintain the garbage collection points for the LAHC residents (refer to Appendix H – Garbage Bins Endorsement).



Figure 8: Cope St Full Road Closure

3.2 Cope St Intersections (with Raglan St & Wellington St)

Whilst the above closures are in place, the roundabouts can remain in place in order to minimise interruptions to the local community, residents and road users. However, the sewer manholes at both intersections (located in the centre of either roundabouts) are required to be lowered to facilitate the final design levels of Cope St.

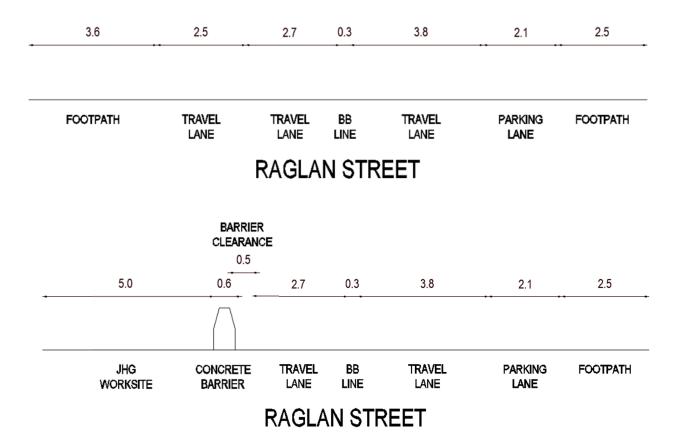
Once the sewer manholes are lowered, the roundabout and pedestrian refuges will be removed, and the new traffic diversions will be implemented to mimic the final traffic set up (refer to Appendix J for detailed drawings for intersections and Appendix F for final intersection drawings).

3.3 Raglan Street

The proposed configuration will:

- close the southern footpath to pedestrians and remove parking.
- close the Westbound (kerbside lane) of Raglan Street between the parking signs allowing single lane traffic to travel in both directions (i.e. West & East).
- not impact the proposed travel lanes (nor the signalised traffic lights) since the parking lanes on the Southern footpath will be removed and be separated from the worksite by concrete barriers with anti-gawk screens.
- not impact the parking spaces and loading zone on the northern side of Raglan St to reduce the effect on the local community and to ensure the businesses are serviced and not impeded by the works.
- reduce the speed limit to 40km/h for the duration of works.

Figure 9: Raglan Street - Existing vs Proposed Arrangement (Westbound)



3.4 Wellington Street

The proposed configuration will:

- close the northern footpath to pedestrians and remove parking.
- close the Eastbound (kerbside lane) of Wellington Street between the Wellington Gate and the parking signs allowing single lane traffic to travel in both directions (i.e. West & East).
- not impact the proposed travel lanes (nor the signalised traffic lights) since the parking lanes on the Northern footpath will be removed and be separated from the worksite by concrete barriers with anti-gawk screens.
- not impact the parking spaces and loading zone on the southern side of Wellington Street to reduce the effect on the local community to ensure the businesses are serviced and not impeded by the works.
- reduce the speed limit to 40km/h for the duration of works.

2.0 1.7 2.1 4.4 0.3 3.6 2.1 2.6 PARKING FOOTPATH VERGE PARKING TRAVEL **BB LINE** TRAVEL FOOTPATH LANE LANE LANE LANE WELLINGTON STREET BARRIER CLEARANCE 0.5 7.6 0.6 4.4 0.3 3.6 2.1 2.6 JHG WORKSITE CONCRETE TRAVEL **BB LINE** TRAVEL PARKING FOOTPATH BARRIER LANE LANE LANE WELLINGTON STREET

Figure 10: Wellington Street proposed arrangement

4 Impact Assessment

4.1 Public Transport Services

The below bus stops are affected and have been diverted as part of previously approved CTMP (SMCSWSWL-JHG-SWL-EM-PLN-000013_J_CTMP Addendum 2).

- Route 355 Cope Street at Raglan Street 201772
- Route 355 Cope Street at Wellington Street 201773

Bus Route 355 operates Marrickville Metro from Bondi Junction via Moore Park and Erskineville.

Figure 11: Affected Bus Stop Facilities Near the Site



The updated bus routes and temporary bus stop are shown in the figure below. The temporary bus stop has been constructed and the temporary bus diversion is in place.



Figure 12: Affected Bus Routes

Note: An amendment to the existing signage design at the Botany Rd/Raglan intersection is currently being worked through by Sydney Metro with TfNSW which will restrict the movement of oversize vehicles turning left from Raglan St southbound onto Botany Rd. This is expected to be formally endorsed and approved over the coming months. Once approved and implemented on site, this will address the turning path concern identified by the swept path analysis for a bus turning left at this location.

In the interim period until this signage design is updated, a traffic controller will be stationed at this location during bus operating hours as shown on the TCP.

4.2 Parking Spaces

The proposed work area will affect parking spaces around the Waterloo ISD surroundings. Parking spaces along Cope Street, Wellington Street and Raglan Street will be affected as shown in Figure below.

The affected parking spaces are summarised as follows:

- Wellington Street: loss of 6 parking spaces.
- Cope Street: loss of 54 parking spaces (currently occupied as part of a previously approved City of Sydney TMP).
- Raglan Street: loss of 4 parking spaces.

Parking on the opposite side of the road (i.e. Wellington & Raglan Streets only) to the works area will not be impacted by the works.

Parking along Wellington Street consists of two-hour (2P) and untimed parking spaces. Similar to Wellington Street, Cope Street provides untimed parking spaces on both sides of vehicle travel lanes. Raglan Street consists of one-hour (1P) parking spaces.

Figure 13: Affected Parking Spaces



Other parking options are available on Raglan Street (east of Cope Street), Wellington Street (east of Cope Street), and Cope Street (north of Raglan Street and South of Wellington Street), Cooper Street and George Street.

While no parking surveys have been undertaken for these works due to the unreliability of data associated with the Sydney COVID-19 lockdown, it is expected that these areas would have sufficient capacity to handle the displaced vehicles.

The project team have undertaken an informal review of available parking on surrounding streets and observed over several days and time periods that untimed parking remains available.

4.3 Surrounding Businesses

Due to the proposed road closures, this may influence customer traffic into each business. Furthermore, performance of businesses may be affected due to the loss of available parking spaces. However, as no loading zones or kerbside parking immediately outside local businesses are directly affected, there are expected to be negligible impacts to these businesses from a traffic perspective. Figure 14 identifies the businesses on the surrounding streets.

Figure 14: Businesses near the site



4.4 Pedestrian Management

As shown in Figure 15, the surrounding pedestrian footpaths located along Wellington Street, Cope Street and Raglan Street will be closed. Details of pedestrian footpaths affected are summarised as follows:

- Wellington Street: northern side, between Botany Road and Cope Street
- Cope Street: western side, between Wellington Street and Raglan Street
- Raglan Street: southern side, between Botany Road and Cope Street.

At each of these areas, there are footpaths available on the opposite side of the road. Signalised intersections at Botany Road / Raglan Street and Botany Road / Wellington Street provide safe crossing opportunities for pedestrians.

The closure of the footpaths does not impact on any residents, driveways, or businesses and pedestrians have an alternative footpath available. Therefore, the impacts are expected to be negligible and additional mitigation options are not considered necessary.

Figure 15: Pedestrian Facilities Near the Site



Additionally, due to safety precautions several pedestrian ramps nearby the work zone will be closed. Figures 16 & 17 below shows the locations of the pedestrian ramp closures.

Figure 16: Pedestrian Ramp Closure near Cope Street / Raglan Street Roundabout



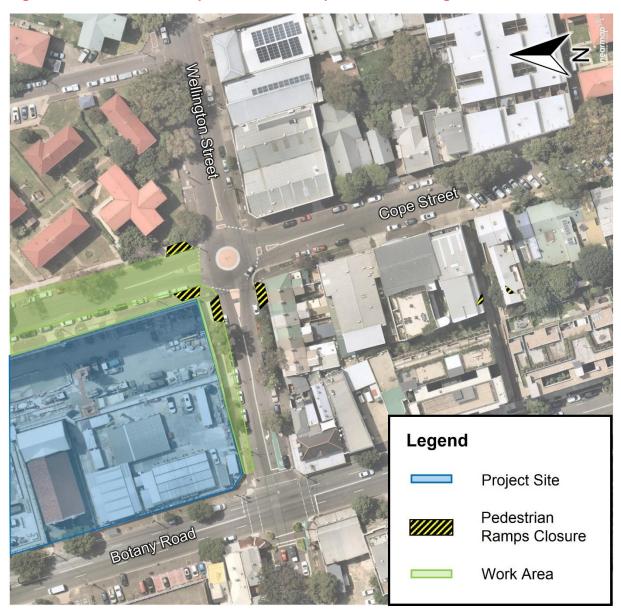
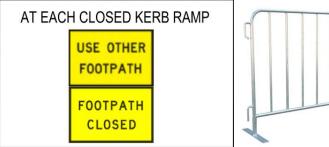


Figure 17: Pedestrian Ramp Closure near Cope Street / Wellington Street Roundabout

Where the pedestrian ramps are closed, the below physical barriers (i.e. crowd control barriers) and signage (i.e. arrow pointing to the adjacent available pedestrian ramp and signage) will be in place to ensure pedestrians adhere to the CTMP and are guided to use the available existing pedestrian crossings to safely cross the road.





4.5 Cyclist Paths

Due to the proposed road closures there will be minor impacts to cyclists during works.

A dedicated cycle path exists along the southern side of Wellington Street, travelling westbound.

Cyclists will otherwise follow light vehicle detour routes. As the vehicle speed in the detour area is to be reduced to 40 km/h, it is expected that impacts to cyclists will be negligible.

The eastbound direction on Wellington Street does not have a dedicated cycle lane, and cyclists are on-road. Eastbound movements are retained during construction.

Figure 18: Affected Cyclist Facilities Near the Site



4.6 Existing Vehicle Routes

Existing vehicle routes will be affected due to the proposed works of the subject site. The road closure will divert vehicles travelling along the existing vehicle routes of Cope Street.

To support these changes, alternative routes for each existing vehicle route are provided below:

 Cope Street travel: Detour route is via Raglan Street westbound, Botany Road southbound, or else Raglan Street eastbound and George Street southbound (Figure 2).

Redistribution of traffic and the impact of this is detailed and assessed in the SIDRA modelling technical note (Appendix C).

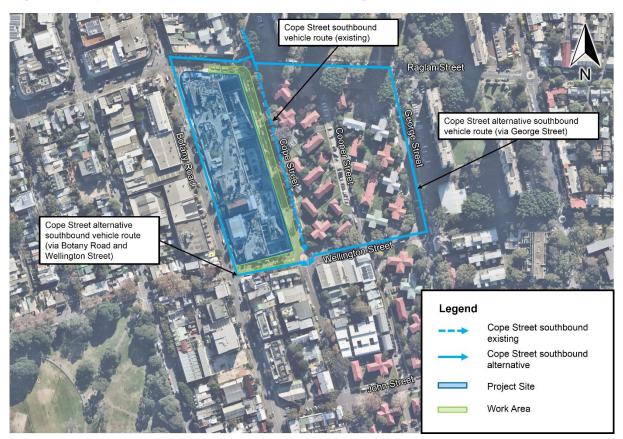


Figure 2: Cope Street Alternative Route for Existing Southbound Travel

4.7 Additional Traffic Signage

Additional traffic signage is required to be placed due to the proposed works of the subject site. The signage will provide additional awareness to drivers that site access gates are limited to construction personnel only.

The gate locations along Cope Street are shown in the TGS. Each will also have the same "NO ENTRY" and "CONSTRUCTION VEHICLES EXCEPTED" signage.

4.8 Heavy Vehicle Manoeuvres

Heavy vehicle movements around the work area along the Waterloo ISD site are another factor to be considered. Swept path analysis of a 12.5m heavy-rigid vehicle (HRV) and 12.5m bus has been undertaken.

Swept path analysis has been undertaken for key heavy vehicle and light vehicle movements for this project and is available in Appendix A – Swept Paths.

Shown in the swept path analysis for the 12.5m bus is the proposed diversion of route 355 which currently travels southbound along Cope Street. The movement of a bus is possible even through the sharp left turn into Botany Road (bus is to straddle Westbound lanes).

Like the 12.5m bus, the 12.5m HRV provides smooth manoeuvring through the key turning points of the subject site. A key consideration is the possible removal of roundabouts around the site.

Heavy Vehicle Entry and Exit movements into Wellington Street and Raglan Street gates will be completed under traffic control.

Refer to Appendix A – Swept Paths for other heavy vehicle manoeuvres.

Site access/egress will be managed by traffic controllers / gate keepers and will be positioned at strategic points to minimise traffic flow and pedestrian interaction. The existing gates (1x Raglan, 2x Botany and 1x Wellington) will remain to be in use.

Figure 20: Existing Access & Egress for Waterloo Station



4.9 Impacts to Traffic Control Signals

4.9.1 Botany Road / Raglan Street

No changes to the TCS required. Only impact to intersection is that parking lane of southern side of eastern (Raglan Street) approach is occupied as work area.

4.9.2 For Botany Road / Wellington Street

No changes to the TCS required. Only impact to intersection is that parking lane of northern side of eastern (Wellington Street) approach is occupied as work area.

5 Community Notification

5.1 VMS Strategy

This section provides the operational strategy for Variable Message Signs (VMS) for these works.

This section is prepared in accordance with the VMS requirements set out in Austroads Guide to Traffic Management Part 10: Traffic Control and Communication Devices Section 5 – Electronic Signs ("Austroads Guide"), and Transport for NSWs Guide to use of Portable Variable Message Signs for Temporary Traffic Management on NSW Roads.

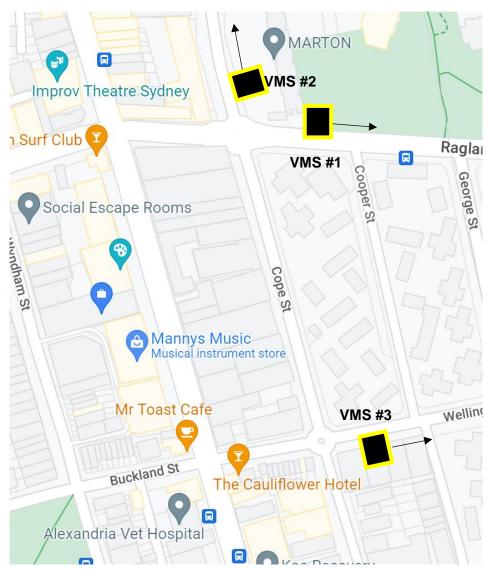
5.2 VMS Locations

5.2.1 VMS Placement

Three VMS are to be used for these works. The locations are shown in Figure 21 below.

The precise placement of the VMS must be in accordance with the Austroads Guide.

Figure 21: VMS Locations



5.2.2 VMS Specifications

- The colour of the text is to be white or yellow, with a black background
- Contrast level between 8 and 12 is to be used during daytime hours
- Automatic dimming is to be used at night in order to reduce glare.

5.3 VMS Details

5.3.1 Prior to the Works

For two weeks prior to the works and remain for two weeks post implementation, the VMS is to display two frames of information:

1. COPE ST DETOUR

DD/MM

Where DD/MM is the commencement of the road closure.

In addition to the above, JHG will have Traffic Controllers on site for the first week to guide traffic to the new arrangements.

5.3.2 Post Works

The VMS are to be removed.

5.4 Other Notification

Community notification will be undertaken in accordance with Waterloo ISD Community Communications Strategy.

This will include advertising significant traffic management changes, detours, traffic disruptions and work outside any working hours contained in the Planning Approval at least 5 Business Days before any detour, disruption, work or change occurs. These advertisements must be placed in local newspapers that cover Waterloo ISD area.

6 Road Safety Audit

A formal Road Safety Audit has been undertaken of this CTMP Addendum. This report has been reviewed by an accredited Level 3 accredited Road Safety Auditor.

The RSA and responses are attached in Appendix E – Road Safety Audit.

6.1 Records

Records associated with this management plan and monitoring programme will be maintained.

7 Other notes

7.1 Emergency Response

The Emergency Evacuation and Response Plan for this project is available in JHG-SWL-HS-PLN-000002. Other relevant emergency plans are:

- JH-MPR-RCC-006 Crisis Management
- JH-MPR-WHS-005 First Aid & Rehabilitation Management.

Additional emergency response documentation can be found in the Project Health and Safety Management Plan Section 6.1 *Emergency Preparedness and Crisis Management.* This is to be implemented for all incidents involving construction traffic.

The proposed road closures are to be communicated to emergency services through TCG and TTLG.

The nearest emergency services are located at the following areas:

- Fire: Alexandria Fire Station 177-187 Wyndham St, Alexandria NSW 2015
- Police: Redfern Police Station 1 Lawson St, Redfern NSW 2016
- Public Hospital: Royal Prince Alfred 50 Missenden Rd, Camperdown NSW 2050.

8 Consultation

8.1 TCG

The proposed changes included in the Addendum has been presented to the TCG on:

- 14/09/2021
- 22/10/2021
- 09/11/2021
- 23/11/2021
- 07/12/2021
- 14/01/2022
- 01/02/2022
- 15/02/2022
- 15/03/2022
- 29/03/2022
- 11/04/2022
- 10/05/2022
- 24/05/2022
- 07/06/2022
- 19/07/2022
- 02/08/2022
- 16/08/2022

8.2 TTLG

The proposed changes included in the Addendum has been presented to the TTLG on:

- 29/09/2021
- 27/10/2021
- 25/11/2021
- 22/12/2021
- 27/01/2022
- 22/03/2022
- 20/04/2022
- 18/05/2022
- 27/07/2022

Appendix A – Swept Paths Analysis



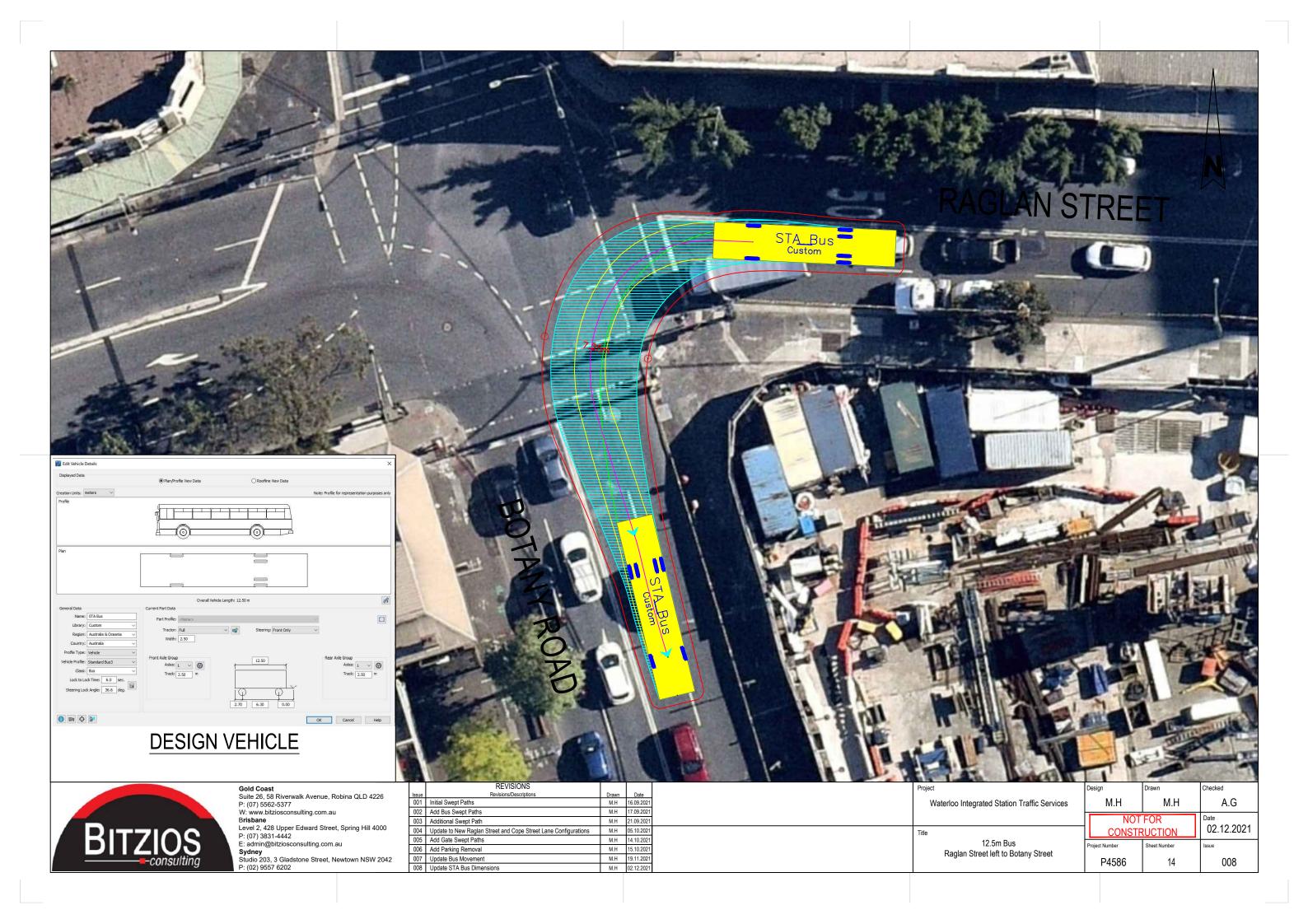


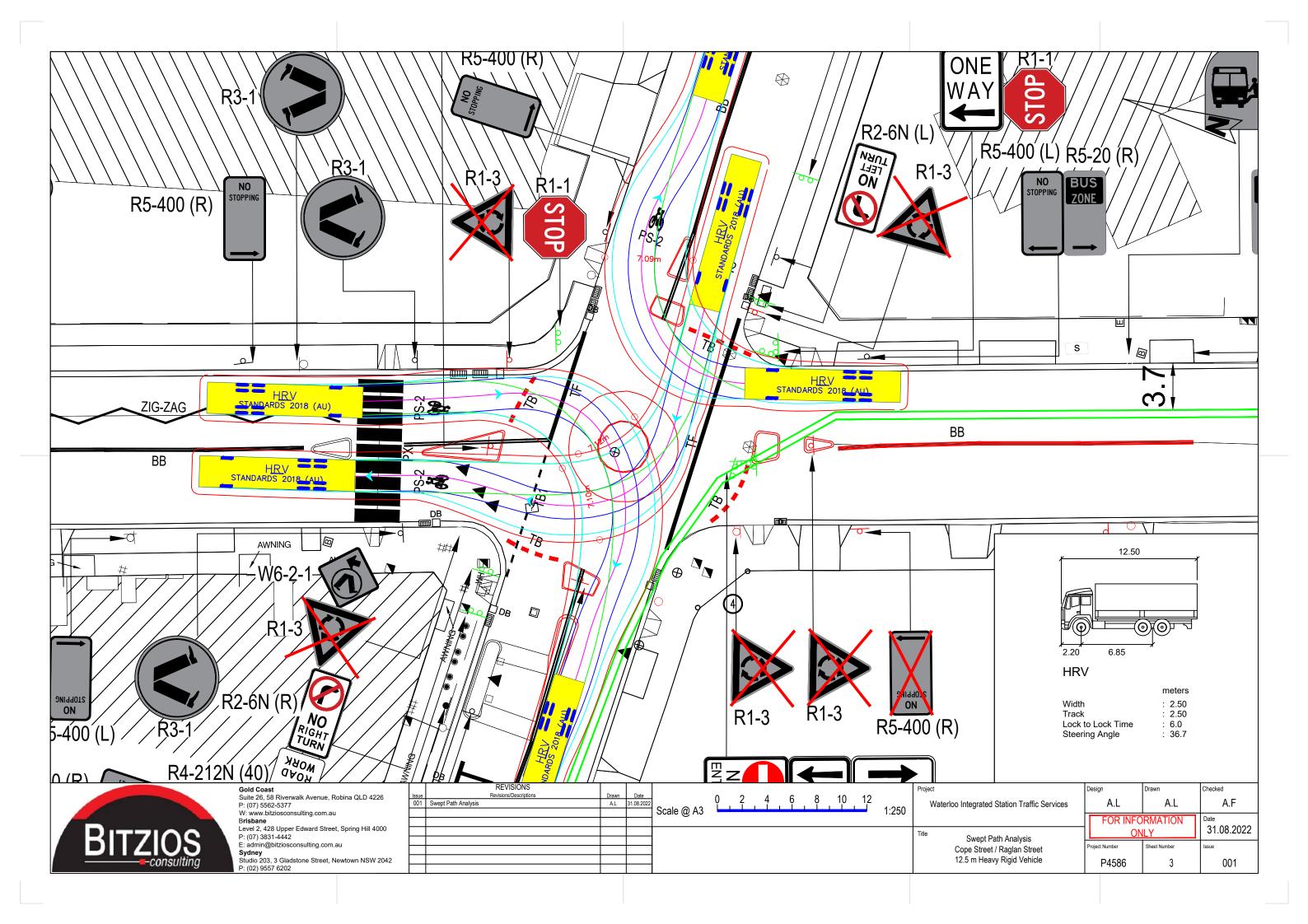
Gold Coast Suite 26, 58 Riverwalk Avenue, Robina QLD 4226 P: (07) 5562-5377 W: www.bitziosconsulting.com.au Brisbane Level 2, 428 Upper Edward Street, Spring Hill 4000 P: (07) 3831-4442 E: admin@bitziosconsulting.com.au Sydney Studio 203, 3 Gladstone Street, Newtown NSW 2042 P: (02) 9557 6202

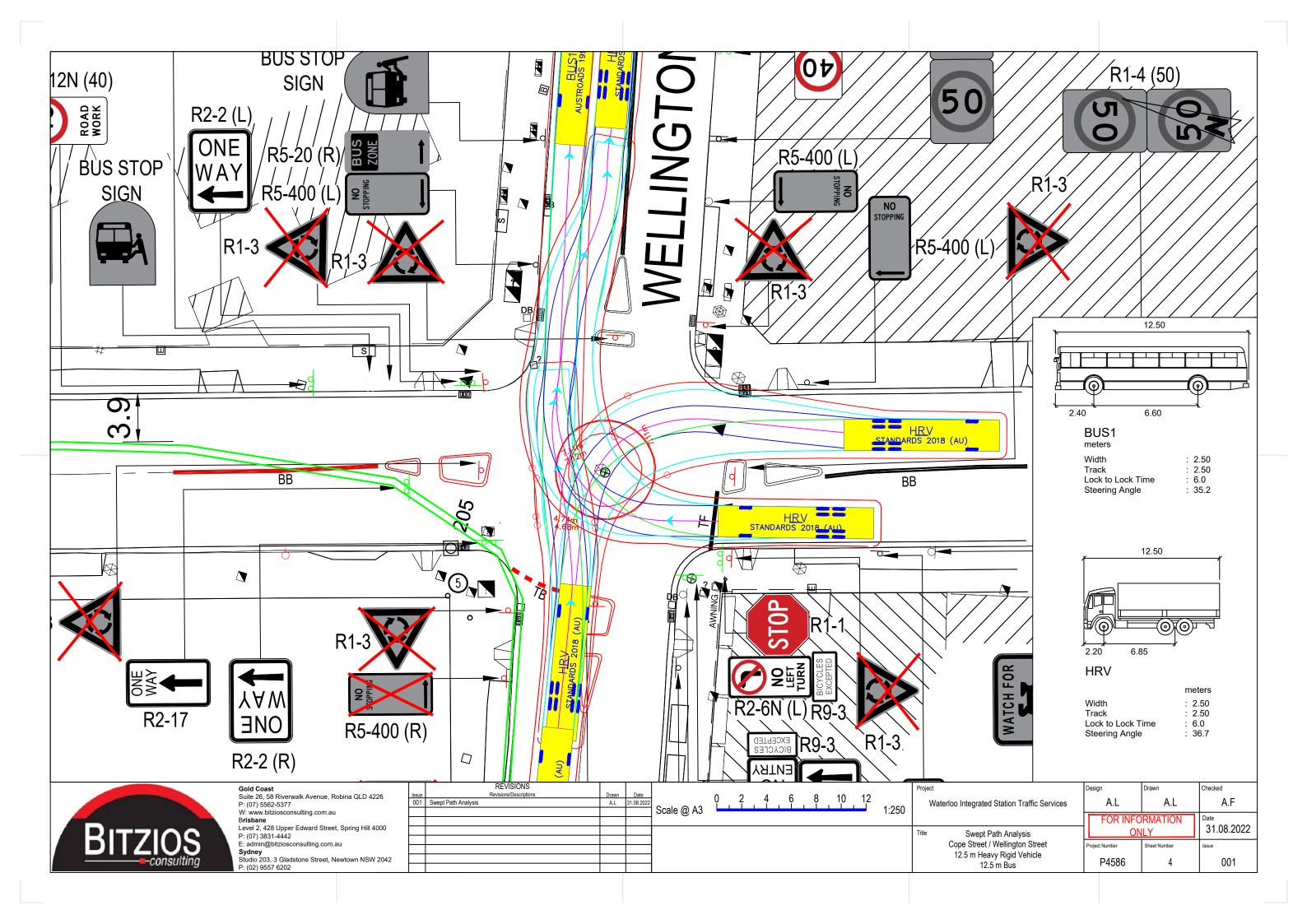
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		REVISIONS			
	Issue	Revisions/Descriptions	Drawn	Date	
	001	Initial Swept Paths	M.H	09.09.2021	
	002	Add Bus Swept Paths	M.H	17.09.2021	
	003	Additional Swept Path	M.H	21.09.2021	
	004	Update to New Raglan Street and Cope Street Lane Configurations	M.H	05.10.2021	
	005	Add Gate Swept Paths	M.H	14.10.2021	
	006	Add Parking Removal	M.H	15.10.2021	
	007	Update Bus Movement	M.H	19.11.2021	
	008	Update STA Bus Dimensions	M.H	02.12.2021	

	Design	Drawn	Checked
aterloo Integrated Station Traffic Services	M.H	M.H	A.G
	NOT CONSTR	FOR RUCTION	Date 02.12.2021
B99	Project Number	Sheet Number	Issue
Car Park to Cope Street (Left Turn)	P4586	11	008

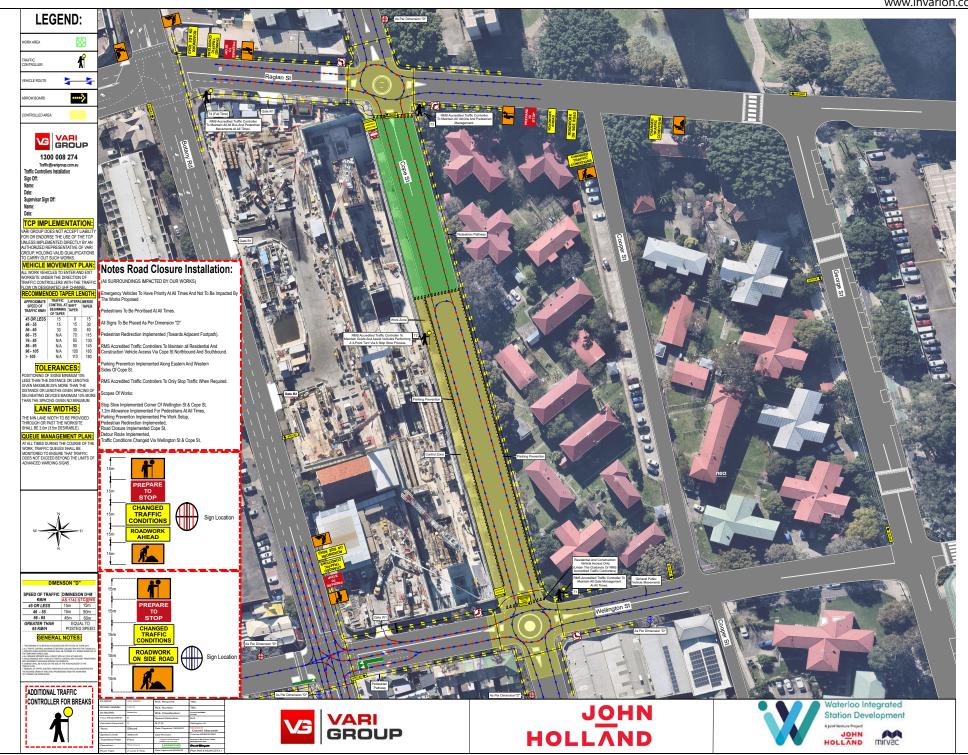
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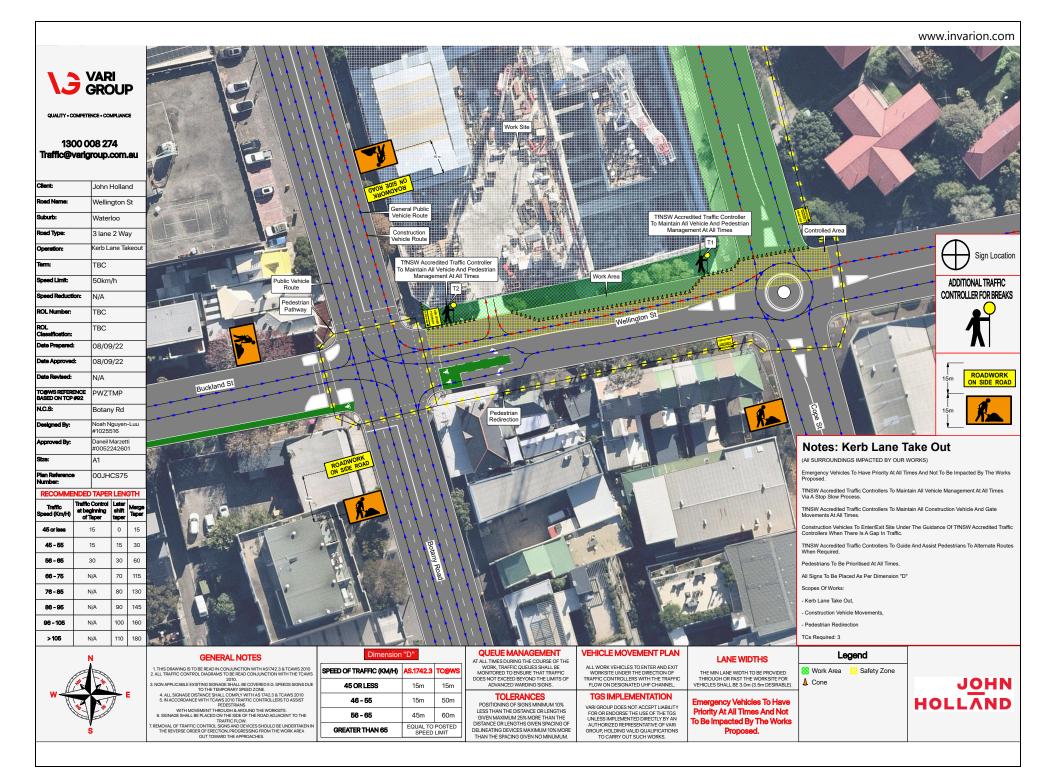


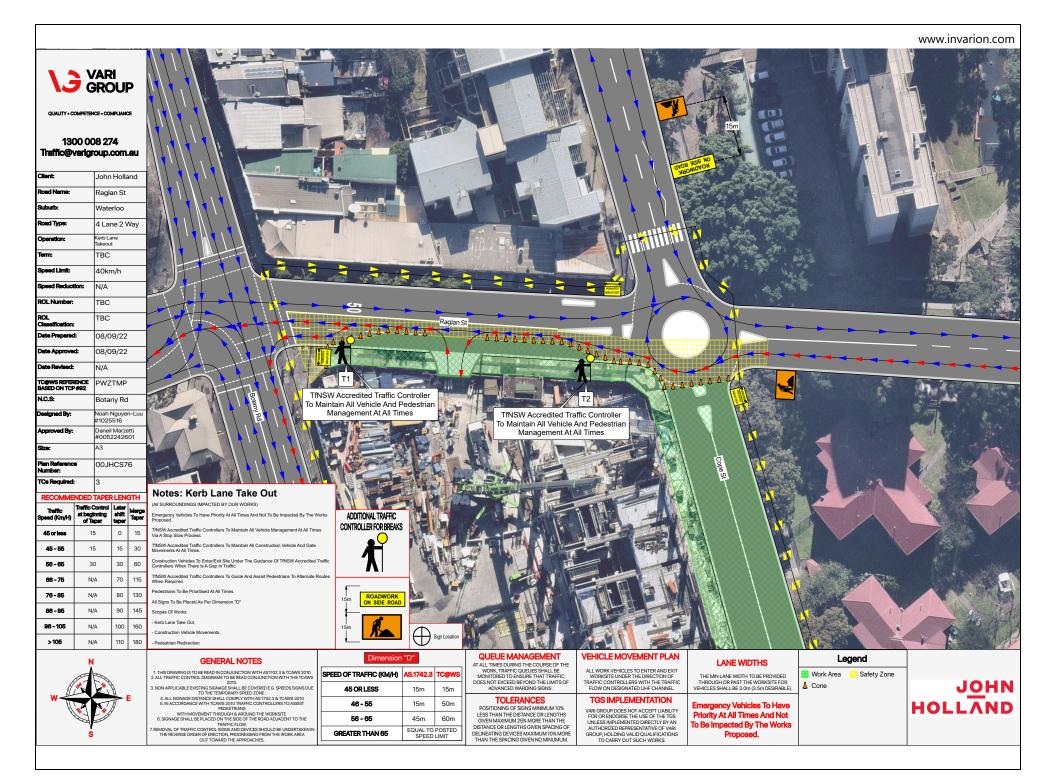


Appendix B – Traffic Guidance Scheme

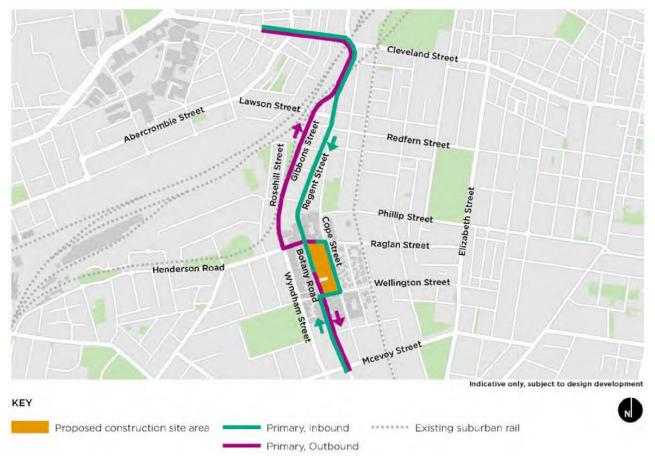








Appendix C – Haulage Routes & Endorsement from COS to Utilise George St as an Alternate Route



Source: Chatswood to Sydenham Environmental Impact Statement May 2016 Technical Paper 1: Traffic and Transport

Matthew Kerry-JHG

From:	Joshua Faull <jfaull@cityofsydney.nsw.gov.au></jfaull@cityofsydney.nsw.gov.au>
Sent:	Wednesday, 1 December 2021 3:31 PM
То:	Matthew Kerry-JHG
Cc:	Sally Reynolds-JHG; Baria Mahdy-JHG; Julian Paul-JHG; Nathaniel Lasky-JHG
Subject:	RE: Cope St Closure - Revised Haulage Routes

Hi Matt,

Any vehicle over 3t can use a 3t load limited street as long as it has a delivery too that street or needs to use that street to access a property for a delivery.

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 <u>cityofsydney.nsw.gov.au</u>



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Matthew Kerry-JHG <Matthew.Kerry@jhg.com.au>
Sent: Wednesday, 1 December 2021 3:27 PM
To: Joshua Faull <jfaull@cityofsydney.nsw.gov.au>
Cc: Sally Reynolds-JHG <Sally.Reynolds@jhg.com.au>; Baria Mahdy-JHG <Baria.Mahdy@jhg.com.au>; Julian Paul-JHG <Julian.Paul@jhg.com.au>; Nathaniel Lasky-JHG <Nathaniel.Lasky@jhg.com.au>
Subject: RE: Cope St Closure - Revised Haulage Routes

Josh,

Thanks for the below response. Can you please confirm the following:

- Does the below no objection apply to John Holland Heavy Vehicles (>3T) using the proposed routes.
- Noting the above is there any requirements for John Holland to implement to allow heavy vehicles to use these routes. John Holland note existing 3T limited signage is in place on Wellington St.

Regards,

Matthew Kerry Site Engineer Waterloo Station



Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





From: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>
Sent: Wednesday, 1 December 2021 3:16 PM
To: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Cc: Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>; Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Julian Paul-JHG <<u>Julian.Paul@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>;
Subject: FW: Cope St Closure - Revised Haulage Routes

Hi Matt,

See below no objection to the proposed short term change in haulage routes.

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



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The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Joseph Gomes <jgomes@cityofsydney.nsw.gov.au>
Sent: Wednesday, 1 December 2021 3:10 PM
To: Joshua Faull <jfaull@cityofsydney.nsw.gov.au>
Subject: RE: Cope St Closure - Revised Haulage Routes

Just to confirm our discussion - this is okay

From: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>
Sent: Wednesday, 1 December 2021 1:14 PM
To: Joseph Gomes <<u>igomes@cityofsydney.nsw.gov.au</u>>
Cc: Ganesh Vengadasalam <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>
Subject: FW: Cope St Closure - Revised Haulage Routes

Hi Joe,

See below and attached, Sydney Metro will have Cope St closed for around 6 weeks, during that time they will need to temporarily change their route from Wellington St to the Botany Rd gate. Are you okay for the short period?

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 <u>cityofsydney.nsw.gov.au</u>



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Sent: Wednesday, 1 December 2021 8:46 AM

To: Joshua Faull <ifaull@cityofsydney.nsw.gov.au>

Cc: Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>; Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Julian Paul-JHG <<u>Julian.Paul@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>> **Subject:** Cope St Closure - Revised Haulage Routes

Josh,

As discussed last week, John Holland wish to obtain approval to alter our haulage route around site whilst the Cope St closure is in place. As such, the below haulage routes for the Waterloo Project are proposed for heavy vehicles for City of Sydney Approval.

- Scenario 1: Vehicles approaching site North Bound on Botany Rd required to enter site on Botany Rd from south bound.
 - Proposed Route
 - Right turn on Wellington St, Left Turn on George St, Left Turn on Raglan St, Left Turn on Botany Rd and Left into site
 - Once unloaded heavy vehicles will exit left from site onto Botany Rd and head South Bound on Wellington St
- Scenario 2: Vehicles approaching site North Bound or South Bound on Botany Rd required to be unloaded off Wellington St or Inside wellington St Gate
 - Proposed Route

- Left/Right Turn onto Wellington St, left into site (reverse) or park up on east bound parking lane.
- Once unloaded heavy vehicles will exit left from site onto Wellington St and head east bound on wellington to Elizabeth St.

Refer attached markup routes.

Can you please assist in passing this information onto the relevant department in council for approval and advise if there is any additional information required to obtain approval for the temporary haulage routes while Cope St is closed.

Regards,



Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





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Site Layout and Planned Routes and Closures



Appendix D – SIDRA Modelling Technical Note

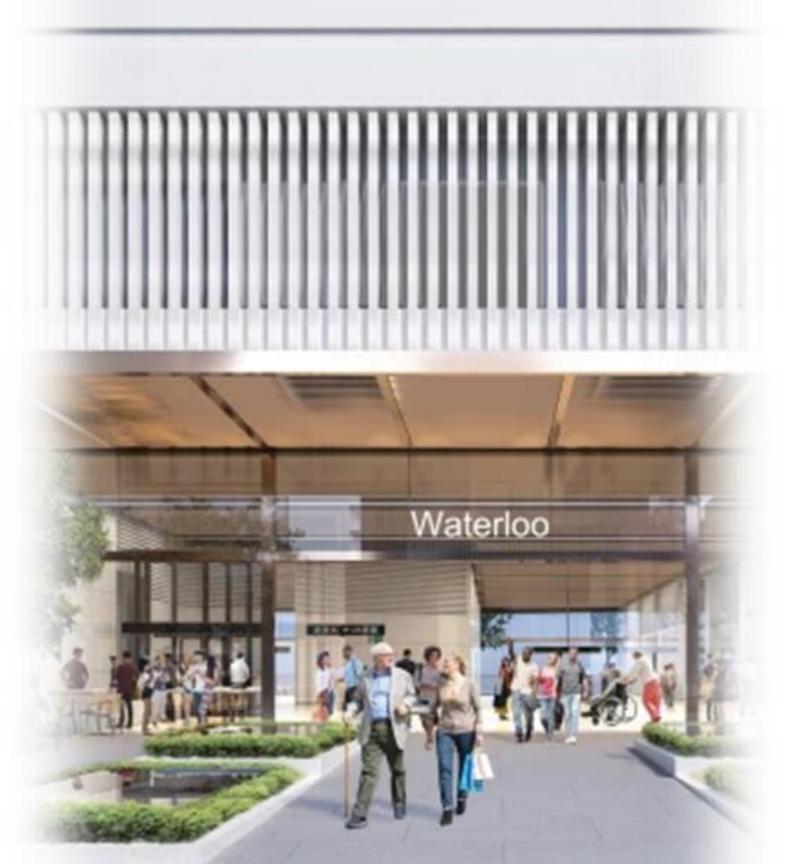


Waterloo Integrated Station CTMP

Traffic Modelling Report



19 November 2021



Gold Coast

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1. INTRODUCTION

1.1 Background

The Waterloo Integrated Station Development (ISD) works under the Project Planning Approval includes the design and construction of the Waterloo Metro Station and associated infrastructure within the precinct. The study area consists of Raglan Street in the north, Cope Street in the east, Wellington Street in the south and Botany Road in the west as shown in Figure 1.1.

To facilitate the ongoing construction work, it is proposed to temporarily close one directional traffic on the following streets until at least May 2024:

- Raglan Street
- Cope Street
- Wellington Street.



Figure 1.1: Study Area

To understand the traffic impacts of the proposed closures, John Holland has engaged Bitzios Consulting to undertake traffic modelling assessment. This report summarises the outcomes of the traffic modelling assessment.



1.2 Scope of Work and Process

SIDRA network models were used as the basis to determine potential intersection delay impacts associated with the closures. The scope of works include:

- Undertake recent traffic surveys at all the five intersections
- Develop the existing condition calibrated and validated SIDRA model
- Manual redistribution of the diverted traffic resulting from the proposed closures
- Develop 'closure case' SIDRA model
- Prepare a brief technical report summarising data collection and collation, SIDRA modelling development, assessment of closure case and findings from the assessment and recommendations.

1.3 Study Area

The study area has the following five key intersections that are expected to be impacted by the proposed closure:

- Raglan Street / Botany Road
- Raglan Street / Cope Street
- Botany Road / Buckland Street / Wellington
- Cope Street / Wellington
- Henderson Road / Wyndham Street.

The locations of these intersections and the streets impacted by the proposed closures are shown in Figure 1.2.



Figure 1.2: Key Intersections Within the Study Area



2. EXISTING ROAD NETWORK

2.1 Key intersections

The features of the five key interactions within the study area are discussed in Table 2.1.

Table 2.1: Key Intersection Descriptions

Int	Description	Intersection Configuration
Botany Road / Raglan Street / Henderson Road	This is a four-way signalised intersection. The northern approach is 'one-way' southbound and has two lanes for the through and left turning traffic and two dedicated right turn lanes. The western and eastern approaches have two lanes. The traffic on the southern approach is restricted to left turn only.	
Raglan Street / Cope Street	This intersection is a four-leg roundabout intersection with a single approach lane and a wide singe circulatory lane. There is a zebra crossing located on the northern approach.	



Int	Description	Intersection Configuration
Botany Road / Wellington Street	This is a four-way signalised intersection. The Buckland Street is 'one way' in the eastbound direction. All four approaches have two lanes at the stopline.	
Cope Street / Wellington Street	This intersection is a four-leg roundabout intersection with a single approach lane and a wide singe circulatory lane.	
Henderson Street / Wyndham Street	This is a four-way signalised intersection. The western approach has two through lanes, a left turn slips lane with the right turn restricted from this approach. The eastern approach has 4 lanes with two shared through and left turn lanes and two right turn-only lanes. The southern approach has two lanes. The northern approach is 'one-way' northbound.	



2.2 Speed Limit

Within the study area the speed limits vary from 40 km/h on Cope Street and Buckland Street and 50 km/h on Botany Road, Henderson Road, Raglan Street and Wellington Street as shown in Figure 2.1.



Figure 2.1: Existing Speed Limits



2.3 Public Transport Services

The study area is serviced by nine bus services with the service numbers, routes and bus stop locations are shown in Figure 2.2.



Figure 2.2: Existing Public Transport Services

The following bus services will be impacted by the proposed closures:

- Service 355 southbound along Cope Street
- Services 301, 302 and 303 eastbound along Raglan Street.



3. DATA SOURCES

The available traffic data and the sources of this data are summarised below:

- Intersection counts: At five intersections. Used for SIDRA model calibration
- Queue surveys: Queue survey at all approaches to the intersections. Used to validate the SIDRA model
- SCATS data: Intersection Diagnostic Monitor (IDM) data for the three signalised intersections in the study area plus the LX file for the SCATS 'region'. Used to code the traffic signals, replicate traffic signal operations and to reflect signal offset times for coordination.

It is important to highlight that the intersection count and queue surveys were undertaken during the Sydney lockdown. A high-level review suggests that during the lockdown periods traffic flows within the study area were reduced by about half of normal operation. Therefore, additional traffic count data were sourced for the normal operation.

3.1 Intersection Count

Intersection turning count data were sourced from the following two sources:

- Lockdown Period: Thursday 12 August 2021
- Normal Operation (i.e. Before Lockdown): Thursday 29 April 2021

3.1.1 During Lockdown

Matrix was commissioned to undertake intersection turning count surveys at five intersections within the study area. The surveys were undertaken on Thursday 12 August 2021 and Saturday 14 August 2021 for the following time periods:

- AM peak: 7:00am-9:00am
- PM peak: 4:00pm-6:00pm
- Weekend: 11am-1pm

The AM, PM and weekend peak data was analysed to determine the peak periods. The analysis suggest that:

- AM peak: between 7:30am and 8:30am
- PM peak: between 4:00pm and 5:00pm
- Weekend: between 12:00pm and 1:00pm.

The AM, PM and weekend peak 'stick diagrams' which show these peak flows are included in Figure 3.1, Figure 3.2 and Figure 3.3.



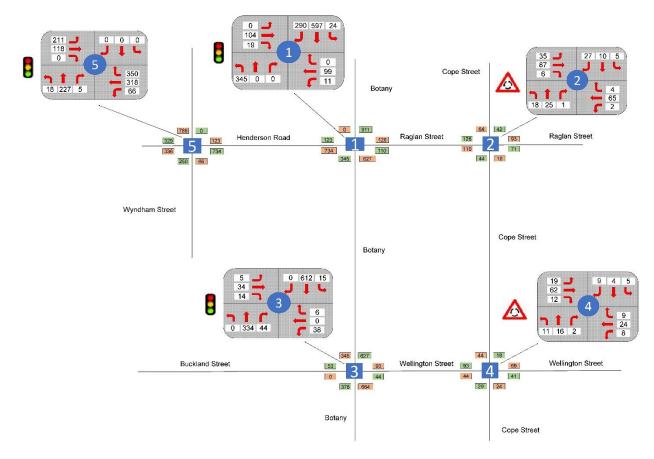


Figure 3.1: AM Peak Stick Diagram – 7.30am-8.30am – During Lockdown

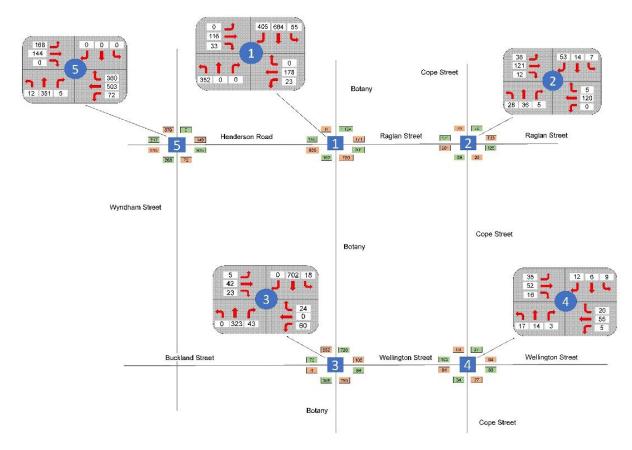


Figure 3.2: PM Peak Stick Diagram – 4.00pm-5.00pm – During Lockdown



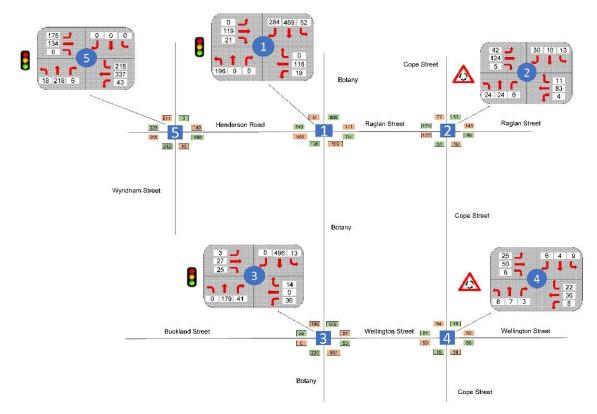


Figure 3.3: Weekend Peak Stick Diagram – 12.00pm-1.00pm – During Lockdown

3.1.2 Normal Operation

Bitzios Consulting sourced the AM, PM and Weekend peak traffic count data for the normal operation for the following intersections:

- Botany Road / Henderson Road / Raglan Street
- Henderson Road / Wyndham Road
- Botany Road / Wellington Street / Buckland Street

Traffic surveys at the first two intersections were carried out in April 2021 while traffic data at the third intersection was carried out in 2016.

No recent traffic data was available for the two roundabout intersections on Cope Street at Raglan Street and Wellington Street.

A combination of Lockdown data and Normal operation data was used to estimate the missing roundabout data. The AM, PM and weekend peak 'stick diagrams' for the normal operation are included in Figure 3.4, Figure 3.5 and Figure 3.6.



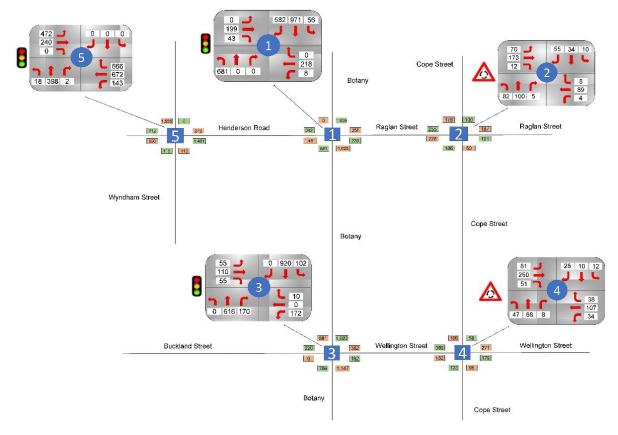


Figure 3.4: AM Peak Stick Diagram – 7.30am-8.30am – Normal Period

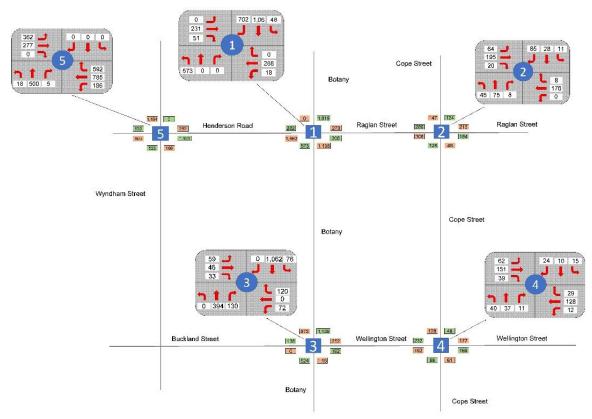


Figure 3.5: PM Peak Stick Diagram – 4.00pm-5.00pm – Normal Period



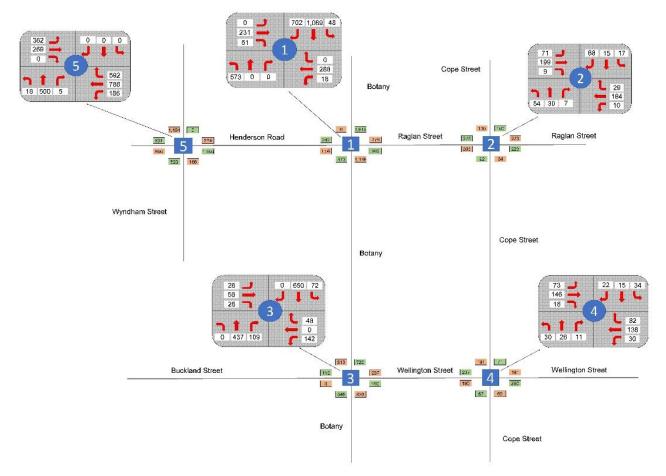


Figure 3.6: Weekend Peak Stick Diagram – 12.00pm-1.00pm – Normal Period



3.2 Queue Surveys

Queue surveys were carried out during the Lockdown Period on the same day as the intersection count survey. The queue survey results are summarised in Table 3.1. Generally, the AM and PM peak queues are similar, However, when compared with the AM and PM peak queues, the weekend peak queues are substantially shorter.

Internetien	Ammanaak	Observ	ved 95 th Percentile Queue (m)			
Intersection	Approach -	АМ	РМ	WE		
Henderson Road / Botany	North (L1-2)	89	79	10		
Road	North (L3-4)	55	66	8		
	East	33	40	4		
	South	44	50	6		
	West	22	17	4		
Raglan Street / Cope	North	6	11	1		
Street	East	6	8	2		
	South	6	13	1		
	West	18	17	3		
Botany Road / Buckland	North	39	22	7		
Street / Wellington Street	East	18	22	2		
	South	23	33	6		
	West	22	17	2		
Cope Street / Wellington	North	6	6	1		
Street	East	6	8	1		
	South	7	8	1		
	West	2	6	1		
Henderson Road /	East (L1-2)	50	55	7		
Wyndham Street	East (L3-4)	28	22	3		
	South	50	66	9		
	West	35	32	4		

 Table 3.1: Queue Survey Data Summary – During Lockdown



3.3 SCATS Data

Bitzios Consulting Sourced SCATS IDM for the normal operation for the three signalised intersections within the study area for 24 hours and in 15-minute increments. The locations of these signalised intersections and TCS numbers are shown in Figure 3.7 and Table 3.2.



Figure 3.7: SCATS IDM Data

Table 3.2: SCATS Data

SI	Intersection	TCS No
1	Henderson Road / Botany Road	TCS 47
2	Botany Road / Buckland Street / Wellington Street	TCS 137
3	Henderson Road / Wyndham Street	TCS 55

The LX file for the region was also obtained. The LX file contains information on SCATS settings including interphase times, phase sequences, pedestrian green times and clearance times, SCATS zone, offsets and high and low cycle times. This information allows the operation of SCATS to be mimicked in the SIDRA model coding.



4. SIDRA MODEL DEVELOPMENT

4.1 Overview

SIDRA model was developed using SIDRA Intersection 9 software. The model network was coded using the extensive local knowledge and road layouts based on Google Maps and other mapping programs. A layout of the network SIDRA model is show in Figure 4.1.

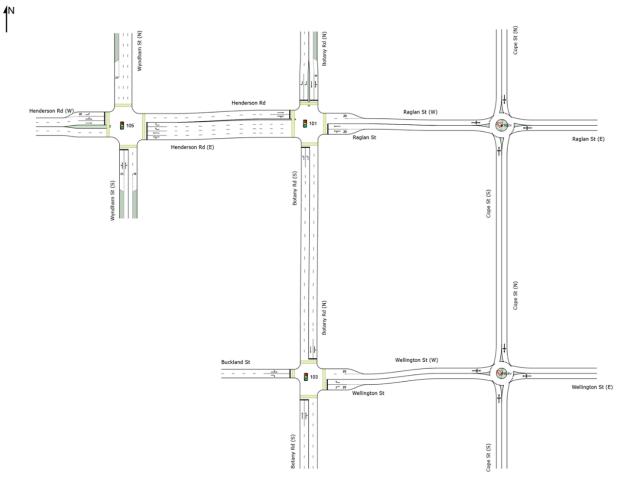


Figure 4.1: SIDRA Network Model

A comparison of weekday and weekend peak traffic flows is shown in Table 4.1. In general, the weekend peak flows are between 67% and 85% of the weekday PM peak flows. This suggests that the weekday PM peak traffic is critical for the assessment of the proposed closures.

Table 4.1:	Intersection	Traffic Flows
------------	--------------	---------------

SI		Intersed	ction Flows	Weekend	
	Intersection	АМ	РМ	WE	Flows as a % of Weekday Flows
1	Henderson Road / Botany Road	1,489	1,826	1,278	70%
2	Raglan Street / Cope Street	285	440	376	85%
3	Botany Road / Buckland Street / Wellington Street	1,102	1,240	834	67%
4	Cope Street / Wellington Street	181	244	184	75%
5	Henderson Road / Wyndham Street	1,313	1,615	1,149	71%



The AM and PM peak base models were developed, calibrated and validated to the 2021 Lockdown Period traffic conditions. The following sections summarise the calibration and validation of the base model.

4.2 Calibration

Table 4.2 summarised the input parameters which were adjusted in the base SIDRA models for calibration purposes.

latence of en		Peak Period			
Intersection	Parameters (default value)	AM	РМ		
Henderson Road / Botany	Area Type Factor (1)	1	1		
Road	Lane Utilisation Ratio (Program)	Program	Program		
	Peak Flow Factor (95%)	100%	100%		
Raglan Street / Cope	Environmental Factor (1)	1.5	1.5		
Street	Lane Utilisation Ratio (Program)	Program	Program		
	Peak Flow Factor (95%)	100%	100%		
Botany Road / Buckland	Area Type Factor (1)	1	1		
Street / Wellington Street	Lane Utilisation Ratio (Program)	Program	Program		
	Peak Flow Factor (95%)	100%	100%		
Cope Street / Wellington	Area Type Factor (1)	1.5	1.5		
Street	Lane Utilisation Ratio (Program)	Program	Program		
	Peak Flow Factor (95%)	100%	100%		
Henderson Road /	Area Type Factor (1)	1	1		
Wyndham Street	Lane Utilisation Ratio (Program)	South Approach L1: 100% South Approach L2: 100%			
	Peak Flow Factor (95%)	100%	100%		

 Table 4.2:
 Base Model Calibration Parameters



4.3 Validation

VicRoads Transport Modelling Guidelines Volume 5 sets our queue validation criteria. Table 28 of the VicRoads guide is re-produced in Table 4.3.

SI	Observed Queue Range (m)	Acceptable Validation Error (m)		
1	1-20	±10		
2	21-50	±15		
3	51-100	±20		
4	101-150	±25		
5	151-200	±30		
6	201-250	±35		
7	251-500	±100		
8	501-1000	±150		
9	1000+	±200		

 Table 4.3:
 Observed Queue Validation Targets

Source: VicRoads Transport Modelling Guidelines Volume 5: Intersection Modelling (DRAFT, June 2020), Table 28

The AM and PM peak observed and modelled 95th percentile queue lengths for each peak are compared in Table 4.4 and Table 4.5. The base SIDRA model queues validate well with the observed queue. Only at a few approaches the SIDRA model queues fall outside the validation criteria and in majority of the cases the modelled queues are only few meters outside the criteria.



Intersection	Approach	(m) (m)		Modelled	Within Range?	Difference if Outside	
		АМ	Upper	Lower			Acceptable Range (m)
Henderson Raod /	North (L1-2)	89	69	109	49	No	-41
Botany Road	North (L3-4)	55	35	75	49	Yes	
	East	33	18	48	20	Yes	
	South	44	29	59	53	Yes	
	West	22	7	37	34	Yes	
Raglan Street /	North	6	-5	16	2	Yes	
Cope Street	East	6	-5	16	3	Yes	
	South	6	-5	16	2	Yes	
	West	18	8	28	5	No	-14
Botany Road /	North	39	24	54	29	Yes	
Buckland Street /	East	18	8	28	15	Yes	
Wellington Street	South	23	8	38	19	Yes	
	West	22	7	37	15	Yes	
Cope Street /	North	6	-5	16	1	Yes	
Wellington Street	East	6	-5	16	2	Yes	
	South	7	-3	17	1	Yes	
	West	2	-8	12	3	Yes	
Henderson Road /	East (L1-2)	50	35	65	19	No	-31
Wyndham Street	East (L3-4)	28	13	43	17	Yes	
	South	50	35	65	41	Yes	
	West	35	20	50	37	Yes	

Table 4.4: Queue Data Validation – AM Peak

Table 4.5: Queue Data Validation – PM Peak

Intersection	Approach	Observed (m)	Acceptable Range (m)		Modelled	Within Range?	Difference if Outside
		АМ	Upper	Lower	-		Acceptable Range (m)
Henderson Road /	North (L1-2)	79	59	99	59	Yes	
Botany Road	North (L3-4)	66	46	86	73	Yes	
	East	40	25	55	38	Yes	
	South	50	35	65	65	No	15
	West	17	7	27	38	No	21
Raglan Street / Cope Street	North	11	1	21	4	Yes	
	East	8	-2	18	6	Yes	
	South	13	3	23	4	Yes	
	West	17	7	27	7	Yes	
Botany Road / Buckland Street / Wellington Street	North	22	7	37	78	No	56
	East	22	7	37	22	Yes	
	South	33	18	48	31	Yes	
	West	17	7	27	16	Yes	
Cope Street / Wellington Street	North	6	-5	16	1	Yes	
	East	8	-2	18	3	Yes	
	South	8	-2	18	2	Yes	
	West	6	-5	16	4	Yes	
Henderson Road /	East (L1-2)	55	35	75	59	Yes	
Wyndham Street	East (L3-4)	22	7	37	40	No	18
	South	66	46	86	58	Yes	
	West	32	17	47	38	Yes	



4.4 Conclusion

The AM and PM peak Lockdown Condition SIDRA models are deemed to validate well with the observed queues. The network SIDRA models is fit for purpose for undertaking assessment of the proposed closures of Cope Street, Raglan Street and Wellington Street.

4.5 Intersection Assessment Criteria

The results of each model scenario and each option have been compared using a range of typical criteria and metrics. The criteria that have been used included:

- Intersection Level of Service (LoS)
- Degree of Saturation
- 95th Percentile Queue.

4.5.1 Intersection Level of Service

Intersection Level of Service (LoS) based on average delay has been used as the primary metric for impact assessment in accordance with the TfNSW Guide to Traffic Generating Developments (GTTGD). LoS thresholds are summarised in Table 4.6.

LOS Level	Delay Range	Typical Intersection Operations		
А	≤14	Good operation		
В	15 to 28	Good with acceptable delays and spare capacity		
С	29 to 42	Satisfactory		
D	43 to 56	Operating near capacity		
E	57 to 70	At capacity		
F	70 and above	Unsatisfactory		

Table 4.6: Intersection Level of Service Criteria

The TfNSW GTTGD recommend that for roundabouts and sign-controlled intersections, the LoS value is determined by the critical movement with the highest delay whereas for signalised intersections, the LoS is based on the average delay measured in seconds per vehicle.

4.5.2 Degree of Saturation

The Degree of Saturation (DOS) in SIDRA is defined as the ratio of demand flow to capacity. DOS above 1.0 represent oversaturated conditions and DOS below 1.0 represent undersaturated conditions.

4.5.3 95th Percentile Queue

Generally, intersection approach 95th percentile queues have been compared between scenarios for selected key approaches.



4.6 2021 Lockdown Period Intersection Performance

The 2021 AM and PM peak Lockdown Period intersection performance are summarised in Table 4.7 and Table 4.8. The intersections operate at satisfactory LoS between LoS A and LoS C. All the intersections operate well within capacity in both the peak periods.

The SIDRA outputs are included in **Appendix A**.

Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	1,489	0.393	27	В	53
Raglan Street / Cope Street	285	0.184	3	A	5
Botany Road / Buckland Street / Wellington Street	1,102	0.267	8	A	29
Cope Street / Wellington Street	181	0.135	4	A	3
Henderson Road / Wyndham Street	1,313	0.328	23	В	41

 Table 4.7:
 2021 Lockdown Period SIDRA Model Outputs – AM Peak

Table 4.8: 2021 Lockdown Period SIDRA Model Outputs – PM Peak

Intersection	Traffic Volume (veh/h)			LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	1,826	0.461	32	С	73
Raglan Street / Cope Street	440	0.257	4	А	7
Botany Road / Buckland Street / Wellington Street	1,240	0.276	14	А	78
Cope Street / Wellington Street	244	0.152	5	А	4
Henderson Road / Wyndham Street	1,615	0.497	28	В	59



5. PROPOSED CLOSURES AND TRAFFIC RE-DISTRIBUTION METHODOLOGY

5.1 Overview

To facilitate the ongoing Waterloo Station construction works, it is proposed to introduce traffic management measures including closure of Raglan Street, Cope Street and Wellington Street to one directional traffic. The following two scenarios have been identified:

- Scenario A: Close Raglan Street to the eastbound traffic, Cope Street to the southbound traffic and Wellington Street to the westbound traffic. This is graphically illustrated in Figure 5.1
- Scenario B: Close Cope Street to the southbound traffic and Wellington Street to the westbound traffic with Reglan Street continue to operate as two-way. This is graphically illustrated in Figure 5.2



Figure 5.1: Proposed Closures – Scenario A





Figure 5.2: Proposed Closures – Scenario B

The proposed closures would divert the existing traffic to alternative routes. The following section of this report discusses the alternative routes around the block.

5.2 Raglan Street Eastbound Closure

The possible route of the diverted traffic resulting from the Raglan Street eastbound closure are illustrated in Figure 5.3. Traffic from the Botany Street / Henderson Road / Raglan Street intersection would travel south, turn left into Wellington Street and subsequently turn left again into Cope Street before reaching the Cope Street / Raglan Street intersection.



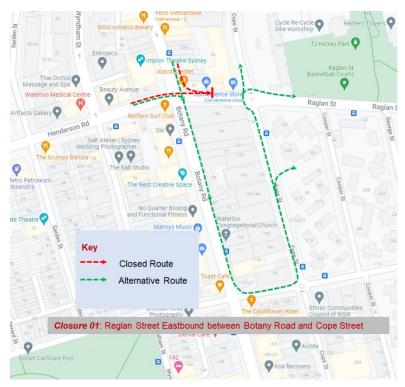


Figure 5.3: Raglan Street Eastbound Closure – Diverted Traffic Routes

5.3 Cope Street Southbound Closure

Due to the proposed closure, the southbound traffic on Cope Street would be diverted to the Raglan Street westbound and reach the Wellington Street / Cope Street roundabout after two successive left turns, first into Botany Road and then into Wellington Street, as shown in Figure 5.4.

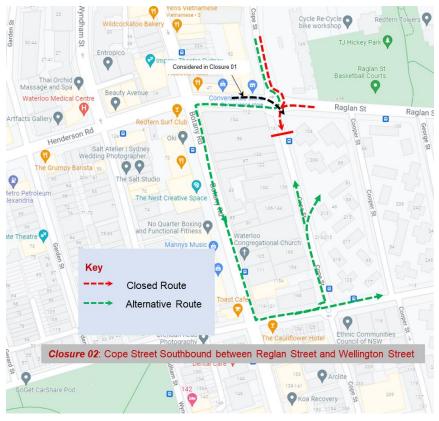


Figure 5.4: Cope Street Eastbound Closure – Diverted Traffic Routes



5.4 Wellington Street Westbound Closure

The westbound traffic on Wellington Street would be diverted to the Cope Street northbound, turn left into Raglan Street before turn left or go straight at the Botany Road / Henderson Road intersection as shown in Figure 5.5.

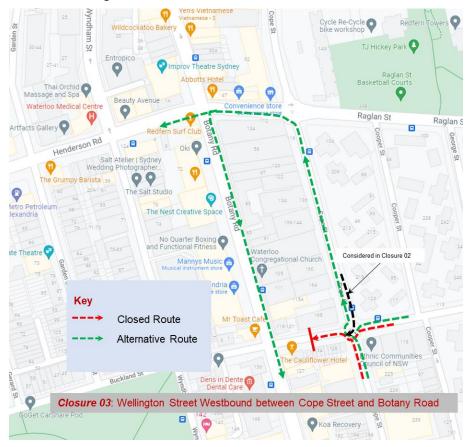


Figure 5.5: Cope Street Eastbound Closure – Diverted Traffic Routes



6. NORMAL OPERATION SIDRA ANALYSIS

6.1 Overview

When compared with the Lockdown Period intersection traffic flows, the Normal Operation traffic flows are around 60% to 100% higher. Therefore, the assessment of the closures with the Lockdown Period traffic flows would not be considered to be a conservative assessment. Therefore, the lockdown period 2021 AM and PM peak calibrated and validated SIDRA models were updated to Normal Operation. The updated models were then used to assess the closure case scenario.

6.2 2021 Normal Operation Intersection Performance

The 2021 AM and PM peak Normal Operation intersection performance are summarised in Table 6.1 and Table 6.2. The intersections operate at satisfactory LoS between LoS A and LoS C. All the intersections operate within capacity in both the peak periods.

The SIDRA outputs are included in Appendix B.

Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	2,758	0.776	28	В	125
Raglan Street / Cope Street	642	0.429	5	A	14
Botany Road / Buckland Street / Wellington Street	2,210	0.443	18	В	109
Cope Street / Wellington Street	734	0.636	7	A	30
Henderson Road / Wyndham Street	2,611	0.706	24	В	83

Table 6.1: 2021 Normal Period SIDRA Model Outputs – AM Peak

Table 6.2: 2021 Normal Period SIDRA Model Outputs – PM Peak

Intersection	Traffic Volume (veh/h)			LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	2,980	0.788	37	С	144
Raglan Street / Cope Street	716	0.454	5	A	16
Botany Road / Buckland Street / Wellington Street	1,992	0.532	19	В	136
Cope Street / Wellington Street	558	0.396	5	A	13
Henderson Road / Wyndham Street	2,725	0.831	30	С	99



7. ASSESSMENT OF THE PROPOSED CLOSURES

7.1 Construction Traffic Management Plan (CTMP)

Bitzios Consulting has developed a CTMP that includes upgrades at the following two roundabouts

- Cope Street / Raglan Street
- Cope Street / Wellington Street

The proposed layouts of this intersections are shown in Figure 7.1 and Figure 7.2. The key observations include

- The East-West movement will have priority over the North-South movement at both intersections.
- The existing roundabout central islands will be removed.
- The North-South will be Stop Controlled.

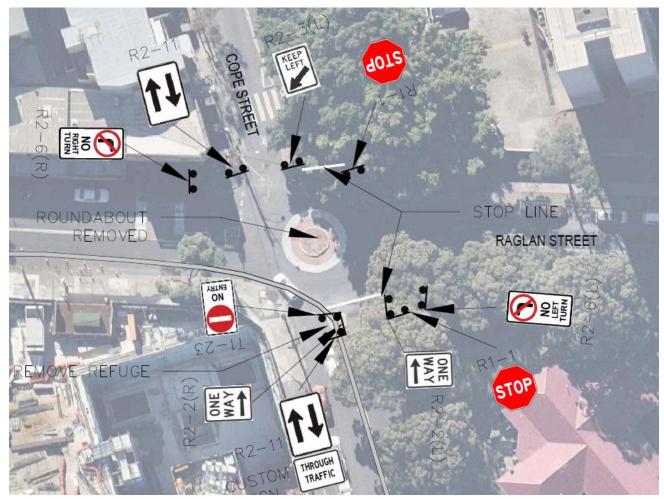


Figure 7.1: Cope Street / Raglan Street CTMP Layout



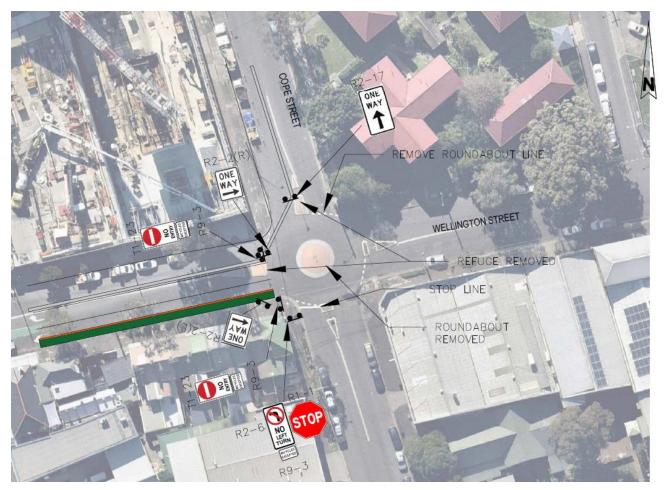


Figure 7.2: Cope Street / Wellington Street CTMP Layout

7.2 Assessment Summary - Scenario A

7.2.1 Traffic Flows

The methodology adopted to re-distribute traffic flows as a result of the proposed closures is discussed in Chapter 5. The resulting AM and PM peak traffic flows are shown in Figure 7.3 and Figure 7.4. The observations include:

- The traffic volumes on the western approach of the Wellington Street / Cope Street intersection are predicted to increase by 80% to 130% or 250 veh/hr to 300 veh/hr during the AM and PM peaks
- On the Raglan Street at its intersection with Botany Road and Henderson Road, the increase is predicted to be between 80% and 100% or over 230 veh/hr.



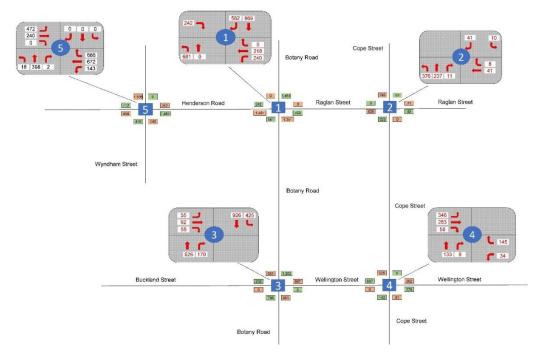


Figure 7.3: Traffic Re-Distribution Due to the Proposed Closures – AM Peak

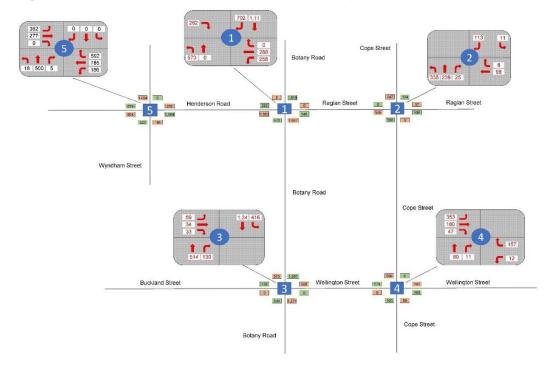


Figure 7.4: Traffic Re-Distribution Due to the Proposed Closures – PM Peak

7.2.2 SIDRA Assessment Results

The 2021 AM and PM peak closure case SIDRA assessment results are included in Table 7.1 and Table 7.2. The Henderson Road / Botany Road intersection would operate slightly over capacity with LoS F in PM peak period and delays to traffic on the Botany Road northern approach. This is attributed to substantial increase in traffic volumes. As discussed in Section 7.1. Traffic volumes on this approach are predicted to increase by 80% to 130% or 250 veh/hr to 300 veh/hr.

The SIDRA outputs are included in Appendix C.



Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	2,832	0.897	43	С	132
Raglan Street / Cope Street	724	0.625	8	A	21
Botany Road / Buckland Street / Wellington Street	2,349	0.499	10	A	89
Cope Street / Wellington Street	1,007	0.358	6	A	10
Henderson Road / Wyndham Street	2,606	0.695	25	В	74

Table 7.1: 2021 Normal Period SIDRA Model Outputs – Closure Case, AM Peak

Table 7.2: 2021 Normal Period SIDRA Model Outputs – Closure Case, PM Peak

Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	3,220	1.031	73	F	230
Raglan Street / Cope Street	829	0.753	10	А	31
Botany Road / Buckland Street / Wellington Street	2,427	0.544	10	A	163
Cope Street / Wellington Street	849	0.303	5	A	6
Henderson Road / Wyndham Street	2,725	0.645	30	С	113

7.2.3 Discussion

7.2.3.1 Intersection Performance

The AM and PM peak intersection performance between Normal Operation and Closure Case are compared in Table 7.3 and Table 7.4. When compared with the Normal Operation, the Henderson Road signalised intersections with Botany Road would perform poorly with the closure case during the PM peak. This is attributed to increased traffic flows of 240 veh/hr (or 8%) resulting traffic diversion from the proposed closures.

The SIDRA assessment suggests that the other intersections including the Cope Street and Raglan Street roundabouts would operate at a satisfactory LoS.



Intersection	Traffic Volume (veh/h)		Do	S (v/c)	Average Delay (s)		LoS	
	Base	Closure	Base	Closure	Base	Closure	Base	Closure
Henderson Road / Botany Road	2,758	2,832	0.776	0.897	28	43	В	С
Raglan Street / Cope Street	642	724	0.429	0.625	5	8	A	А
Botany Road / Buckland Street / Wellington Street	2210	2,349	0.443	0.499	18	10	В	А
Cope Street / Wellington Street	734	1,007	0.636	0.358	7	6	А	А
Henderson Road / Wyndham Street	2611	2,606	0.706	0.695	24	25	В	В

Table 7.3: 2021 SIDRA Intersection Performance Comparison – AM Peak

Table 7.4: 2021 SIDRA Intersection Performance Comparison – PM Peak

Intersection	Traffic Volume (veh/h)		Do	S (v/c)	Average Delay (s)		LoS	
	Base	Closure	Base	Closure	Base	Closure	Base	Closure
Henderson Road / Botany Road	2,980	3,220	0.788	1.031	37	73	С	F
Raglan Street / Cope Street	716	829	0.454	0.753	5	10	A	А
Botany Road / Buckland Street / Wellington Street	1,992	2,427	0.532	0.544	19	10	В	A
Cope Street / Wellington Street	558	849	0.396	0.303	5	5	А	А
Henderson Road / Wyndham Street	2,725	2,725	0.831	0.645	30	30	С	С

7.2.3.2 Potential Alternative Routes

It is understood that the closures are proposed to stay until at least May 2024. Once the closures are introduced, after a short period of long delays and congestion, some road users would find alternative routes such as one shown in Figure 7.5. However, the existing traffic management measures including 'no-though road' and 'one way street' especially on the south eastern side of the study area and low level of permeability on the northern side of the study area mean the number of alternative routes would be limited.



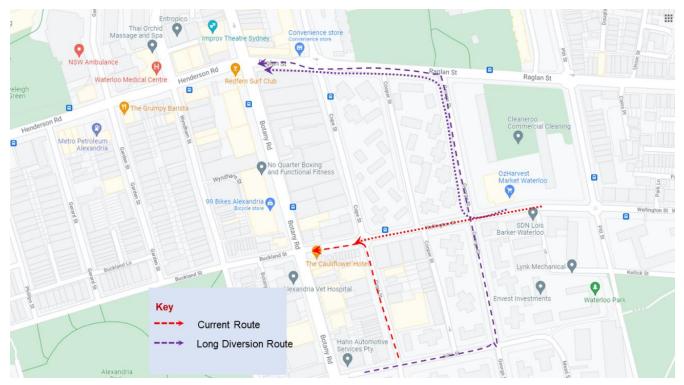


Figure 7.5: Potential Long Detours

7.3 Assessment Summary - Scenario B

7.3.1 Traffic Flows

The methodology adopted to re-distribute traffic flows as a result of the proposed closures is discussed in Chapter 5. The resulting AM and PM peak traffic flows are shown in Figure 7.6 and Figure 7.7. The observations include:

- The traffic volumes on the western approach of the Wellington Street / Cope Street intersection are predicted to increase by 13% to 19% or 50 veh/hr during the AM and PM peaks. This increase is substantially lower than the predicted in traffic flows on this approach as a result of Scenario A (80%to 130%)
- The hourly traffic flows at the Henderson Road / Botany Road intersection would increase by 100 to 210 vehicles or 3% to 8%
- On the Raglan Street at its intersection with Botany Road and Henderson Road, the increase is predicted to be between 80% and 100% or over 230 veh/hr.



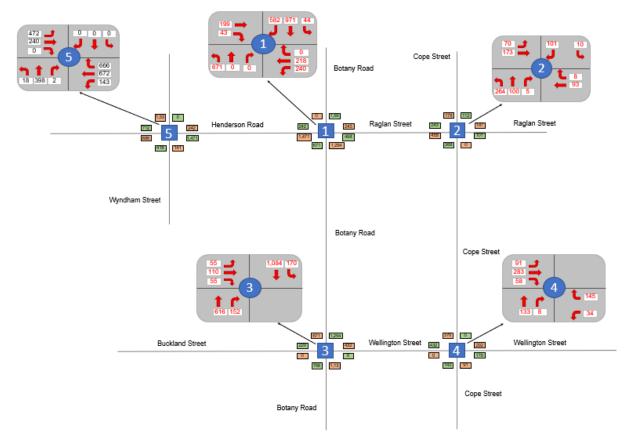


Figure 7.6: Traffic Re-Distribution Due to the Scenario B Closures – AM Peak

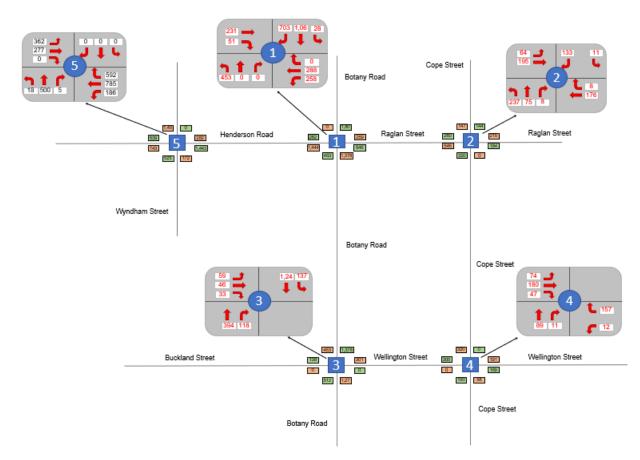


Figure 7.7: Traffic Re-Distribution Due to the Scenario B Closures – PM Peak



7.3.2 SIDRA Assessment Results

The 2021 AM and PM peak second closure case SIDRA evaluation results are summarised in Table 7.5 and Table 7.6. All intersections will operate satisfactory at a LoS between A and D.

The SIDRA outputs are included in Appendix D.

Table 7.5: 2021 Normal Period SIDRA Model Outputs – Scenario B , AM Peak

Intersection	Traffic Volume (veh/h)	DoS (v/c)	Average Delay (s)	LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	2,968	0.897	38	С	79
Raglan Street / Cope Street	824	0.454	6	A	5
Botany Road / Buckland Street / Wellington Street	2,242	0.479	12	A	55
Cope Street / Wellington Street	752	0.226	5	A	3
Henderson Road / Wyndham Street	2,601	0.695	25	В	45

Table 7.6: 2021 Normal Period SIDRA Model Outputs – Scenario B, PM Peak

Intersection	Traffic Volume (veh/h)			LoS	95th Percentile Queue (m)
Henderson Road / Botany Road	3,081	0.925	47	D	101
Raglan Street / Cope Street	907	0.594	7	А	6
Botany Road / Buckland Street / Wellington Street	2,028	0.475	8	A	56
Cope Street / Wellington Street	570	0.157	5	A	2
Henderson Road / Wyndham Street	2,606	0.64	27	В	58



7.3.3 **Discussions**

7.3.3.1 Intersection Performance

The AM and PM peak intersection performance between Normal Operation and Scenario B Closure Case are compared in Table 7.7 and Table 7.8. When compared with the Normal Operation, all intersection would perform satisfactory with the Scenario B closures.

The SIDRA assessment suggests that the traffic re-distributions as a result of the proposed simultaneous closure of Cope Street and Wellington Street would not adversely impact the traffic performance of the study area intersections despite a slight increase in traffic volumes at the key intersections.

Table 7.7:2021 SIDRAAM Peak	Intersection Perf	ormance Compari	son for Scenario	B Closure case –

Intersection	Traffic Volume (veh/h)		Do	S (v/c)		ge Delay (s)	LoS	
	Base	Closure	Base	Closure	Base	Closure	Base	Closure
Henderson Road / Botany Road	2,758	2,968	0.776	0.897	28	38	В	С
Raglan Street / Cope Street	642	824	0.429	0.454	5	6	А	A
Botany Road / Buckland Street / Wellington Street	2210	2,242	0.443	0.479	18	12	В	A
Cope Street / Wellington Street	734	752	0.636	0.226	7	5	А	А
Henderson Road / Wyndham Street	2611	2,601	0.706	0.695	24	25	В	В

Table 7.8: 2021 SIDRA Intersection Performance Comparison for Scenario B Closure case – PM Peak

Intersection		Volume h/h)	Do	S (v/c)		ge Delay (s)	LoS		
	Base	Closure	Base	Closure	Base	Closure	Base	Closure	
Henderson Road / Botany Road	2,980	3,081	0.788	0.925	37	47	С	D	
Raglan Street / Cope Street	716	907	0.454	0.594	5	7	A	A	
Botany Road / Buckland Street / Wellington Street	1,992	2,028	0.532	0.475	19	8	В	A	
Cope Street / Wellington Street	558	570	0.396	0.157	5	5	А	А	
Henderson Road / Wyndham Street	2,725	2,606	0.831	0.64	30	27	С	В	



8. SUMMARY AND RECOMMENDATIONS

To facilitate the ongoing Waterloo Station construction works, it is proposed to introduce traffic management measures including closure of Raglan Street, Cope Street and Wellington Street to one directional traffic. The following two scenarios have been identified:

- Scenario A: Close Raglan Street to the eastbound traffic, Cope Street to the southbound traffic and Wellington Street to the westbound traffic.
- Scenario B: Close Cope Street to the southbound traffic and Wellington Street to the westbound traffic with Reglan Street continue to operate as two-way.

For the purpose of this assessment the layout adapted for the two roundabout intersections at Raglan Street and Wellington Street is similar to the CTMP plans developed for this project. As per the CTMP plan the roundabout intersections will be removed and replaced by Stop Control intersections.

8.1 Assessment Summery - Scenario A

The proposed closures of the eastbound Raglan Street, the southbound Cope Street and the westbound Wellington Street would not introduce any notable delays to any of the study area intersections. The only exception is the Henderson Road / Botany Road intersection which is predicted to operate slightly over capacity in the PM peak. After a short period of long delays and congestion, some road users would find alternative routes. However, the existing traffic management measures including 'no-though road' and 'one way street' especially on the south eastern side of the study area and low level of permeability on the northern side of the study area mean the number of alternative routes would be limited.

8.2 Assessment Summery - Scenario B

Traffic volumes at key intersections including the Henderson Road / Botany Road intersection would increase slightly. The SIDRA assessment suggests that when compared with the Normal Operation, all intersection would perform satisfactory with the Scenario B closures. All intersections will operate satisfactory at a LoS between A and D.

8.3 Recommendations

The SIDRA modelling assessment suggests that both Scenario A and B would provide satisfactory intersection performance as a result of the proposed closures.





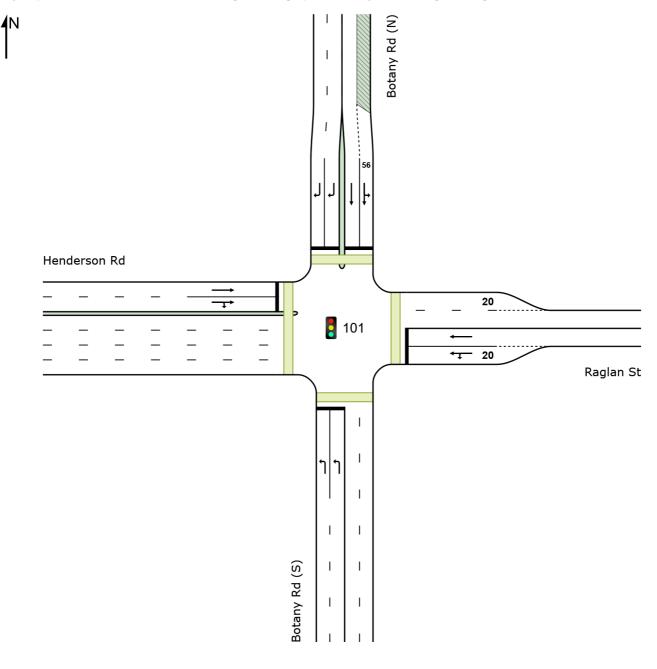
Appendix A: Lockdown Period SIDRA Model Outputs

SITE LAYOUT

Site: 101 [Botany Rd / Henderson Rd - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Botany Rd / Henderson Rd - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	South: Botany Rd (S)													
1	L2	345	2.0	345	2.0	*0.393	37.2	LOS C	7.5	53.4	0.77	0.74	0.77	14.5
Appr	oach	345	2.0	345	2.0	0.393	37.2	LOS C	7.5	53.4	0.77	0.74	0.77	14.5
East	Raglan	St												
4	L2	11	2.0	11	2.0	0.161	50.2	LOS D	2.7	19.1	0.89	0.69	0.89	5.9
5	T1	99	2.0	99	2.0	0.161	45.5	LOS D	2.8	20.0	0.89	0.68	0.89	5.9
Appr	oach	110	2.0	110	2.0	0.161	46.0	LOS D	2.8	20.0	0.89	0.68	0.89	5.9
North	n: Botan	y Rd (N)												
7	L2	24	2.0	24	2.0	0.225	10.4	LOS A	5.8	41.0	0.35	0.47	0.35	41.8
8	T1	597	2.0	597	2.0	0.225	7.1	LOS A	5.9	41.9	0.35	0.46	0.35	42.0
9	R2	290	2.0	290	2.0	*0.299	42.4	LOS C	6.8	48.6	0.84	0.78	0.84	23.3
Appr	oach	911	2.0	911	2.0	0.299	18.4	LOS B	6.8	48.6	0.51	0.56	0.51	33.5
West	: Hende	rson Rd												
11	T1	104	2.0	104	2.0	*0.376	39.4	LOS C	4.8	34.3	0.76	0.60	0.76	6.9
12	R2	19	2.0	19	2.0	0.376	50.2	LOS D	4.8	34.3	0.88	0.70	0.88	6.1
Appr	oach	123	2.0	123	2.0	0.376	41.0	LOS C	4.8	34.3	0.78	0.62	0.78	6.8
All V	ehicles	1489	2.0	1489	2.0	0.393	26.7	LOS B	7.5	53.4	0.62	0.61	0.62	25.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	Pedestrian Movement Performance											
Mov	Dem.	Aver.	Level of			Prop. Ef		Travel	Travel	Aver.		
ID Crossing	Flow	Delay	Service	QUE [Ped	UE Dist]	Que	Stop Rate	Time	Dist.	Speed		
	ped/h	sec		ped	m			sec	m	m/sec		
South: Botany R	d (S)											
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98		
East: Raglan St												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98		
North: Botany Ro	d (N)											
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.8	0.98		
West: Henderson	n Rd											

P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.5	222.6	0.99
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	221.8	217.8	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: 101 [Botany Rd / Henderson Rd - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

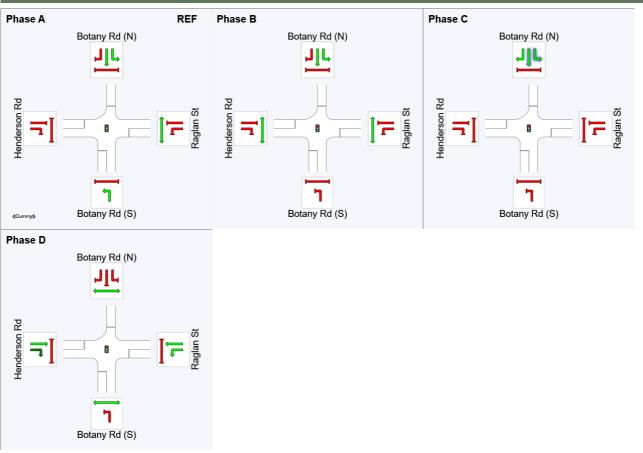
Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase A Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	17	52	74	110
Green Time (sec)	29	16	32	21
Phase Time (sec)	35	20	38	27
Phase Split	29%	17%	32%	23%

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



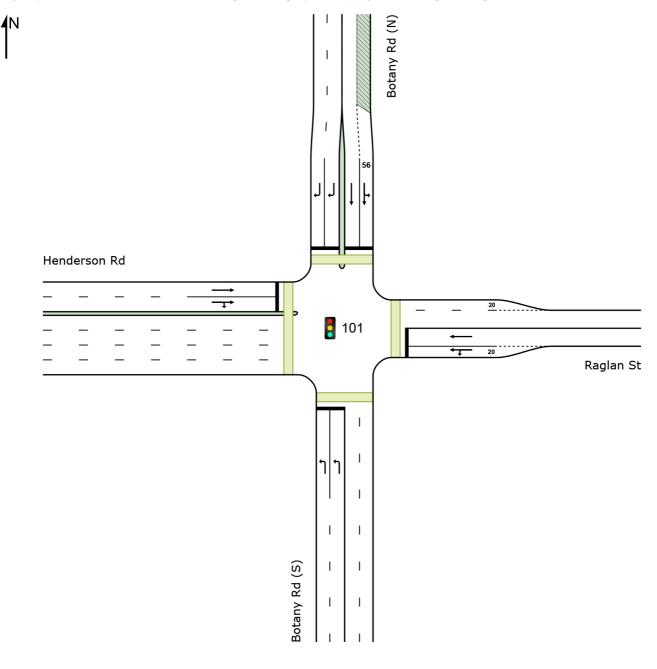
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SITE LAYOUT

Site: 101 [Botany Rd / Henderson Rd - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Botany Rd / Henderson Rd - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

■ Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

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

Vehi	cle Mo	vement	Perfo	rmano	e:									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botar	ny Rd (S)												
1	L2	352	2.0	352	2.0	*0.401	44.8	LOS D	9.1	64.8	0.91	0.79	0.91	12.9
Appr	oach	352	2.0	352	2.0	0.401	44.8	LOS D	9.1	64.8	0.91	0.79	0.91	12.9
East	Raglan	n St												
4	L2	23	2.0	23	2.0	0.302	50.9	LOS D	5.0	35.4	0.91	0.73	0.91	5.8
5	T1	178	2.0	178	2.0	*0.302	46.0	LOS D	5.3	37.7	0.91	0.72	0.91	5.9
Appr	oach	201	2.0	201	2.0	0.302	46.6	LOS D	5.3	37.7	0.91	0.72	0.91	5.9
North	n: Botan	y Rd (N)												
7	L2	55	2.0	55	2.0	0.235	10.7	LOS A	6.1	43.5	0.37	0.49	0.37	41.2
8	T1	664	2.0	664	2.0	0.294	7.7	LOS A	8.3	59.2	0.38	0.48	0.38	41.3
9	R2	405	2.0	405	2.0	*0.461	46.7	LOS D	10.4	72.9	0.90	0.81	0.90	22.1
Appr	oach	1124	2.0	1124	2.0	0.461	21.9	LOS B	10.4	72.9	0.57	0.60	0.57	31.5
West	: Hende	erson Rd												
11	T1	116	2.0	116	2.0	0.257	55.3	LOS D	5.3	37.5	1.00	0.78	1.00	5.2
12	R2	33	2.0	33	2.0	0.257	61.6	LOS E	3.5	24.6	1.00	0.77	1.00	5.0
Appr	oach	149	2.0	149	2.0	0.257	56.7	LOS E	5.3	37.5	1.00	0.78	1.00	5.1
All V	ehicles	1826	2.0	1826	2.0	0.461	31.8	LOS C	10.4	72.9	0.71	0.67	0.71	22.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist]		Prop. Ef Que	ffective Stop Rate	Travel Time	Travel Dist.	Aver. Speed		
	ped/h	sec		ped	m		rtato	sec	m	m/sec		
South: Botany Ro	d (S)											
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98		
East: Raglan St												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.5	214.8	0.98		
North: Botany Ro	I (N)											
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.8	0.98		
West: Henderson	n Rd											
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.5	222.6	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.

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PHASING SUMMARY

Site: 101 [Botany Rd / Henderson Rd - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

■■ Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

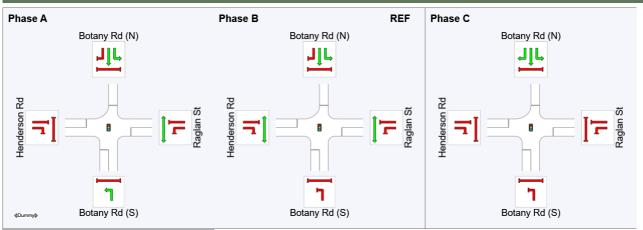
Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn **Reference Phase: Phase B** Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary		
Phase	Α	В

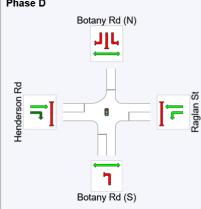
Phase	Α	В	С	D
Phase Change Time (sec)	77	112	15	49
Green Time (sec)	29	17	29	22
Phase Time (sec)	35	22	35	28
Phase Split	29%	18%	29%	23%

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



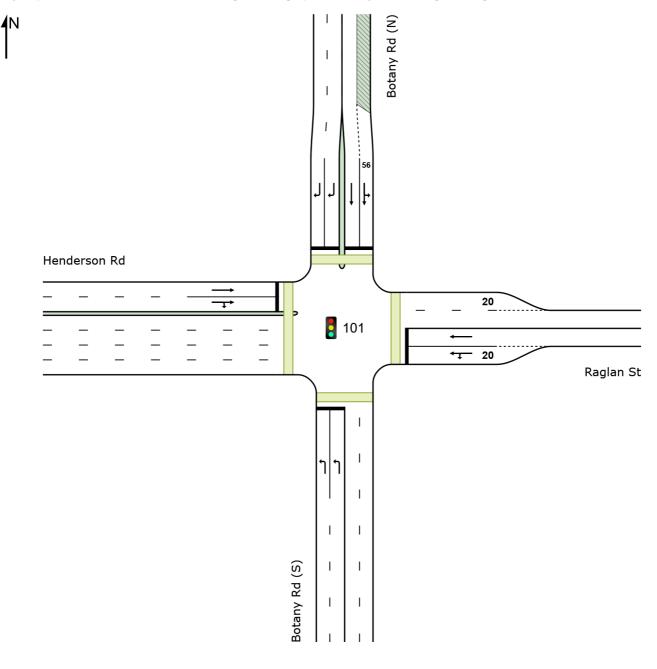
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SITE LAYOUT

Site: 101 [Botany Rd / Henderson Rd - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Botany Rd / Henderson Rd - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

■ Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
	urn	DEMA FLOV [Total veh/h	ND	ARRI FLO [Total veh/h	VAL WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver Speec km/r
South: B	South: Botany Rd (S)													
1 L	2	196	2.0	196	2.0	*0.539	35.4	LOS C	3.1	22.0	1.00	0.78	1.02	15.0
Approac	h	196	2.0	196	2.0	0.539	35.4	LOS C	3.1	22.0	1.00	0.78	1.02	15.0
East: Ra	glan	St												
4 L	2	19	2.0	19	2.0	0.177	26.8	LOS B	1.7	11.9	0.87	0.68	0.87	10.
5 T	Г1	118	2.0	118	2.0	0.177	22.1	LOS B	1.8	12.6	0.87	0.67	0.87	10.9
Approac	h	137	2.0	137	2.0	0.177	22.8	LOS B	1.8	12.6	0.87	0.67	0.87	10.9
North: B	otany	Rd (N)												
7 L	_2	52	2.0	52	2.0	0.230	10.7	LOS A	3.5	24.7	0.49	0.56	0.49	41.
8 T	Г1	469	2.0	469	2.0	0.230	7.4	LOS A	3.6	25.6	0.49	0.54	0.49	41.
9 F	R2	284	2.0	284	2.0	*0.586	33.1	LOS C	4.3	30.3	0.99	0.81	1.03	26.4
Approac	h	805	2.0	805	2.0	0.586	16.7	LOS B	4.3	30.3	0.67	0.64	0.68	34.
West: He	ender	son Rd												
11 T	Г1	119	2.0	119	2.0	*0.400	5.6	LOS A	0.7	5.0	0.26	0.26	0.26	25.
12 F	R2	21	2.0	21	2.0	0.400	8.9	LOS A	0.7	5.0	0.22	0.25	0.22	27.
Approac	h	140	2.0	140	2.0	0.400	6.1	LOS A	0.7	5.0	0.25	0.26	0.25	25.8
All Vehic	les	1278	2.0	1278	2.0	0.586	19.0	LOS B	4.3	30.3	0.69	0.62	0.71	29.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mov	Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed		
	ped/h	sec		ped	m			sec	m	m/sec		
South: Botany Rd	(S)											
P1 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	189.4	214.6	1.13		
East: Raglan St												
P2 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	192.0	218.0	1.14		
North: Botany Rd	(N)											
P3 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	190.4	215.8	1.13		
West: Henderson	Rd											
P4 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	195.6	222.6	1.14		
All Pedestrians	211	24.4	LOS C	0.1	0.1	0.90	0.90	191.9	217.8	1.13		

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: 101 [Botany Rd / Henderson Rd - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

■ Network: N101 [WE Peak Lockdown (11-12) (Network **Folder: Waterloo Integrated** Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

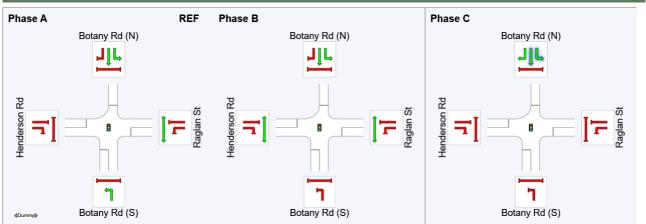
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase A Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

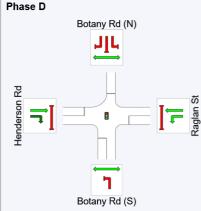
Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	0	12	28	42
Green Time (sec)	6	12	8	12
Phase Time (sec)	10	18	14	18
Phase Split	17%	30%	23%	30%

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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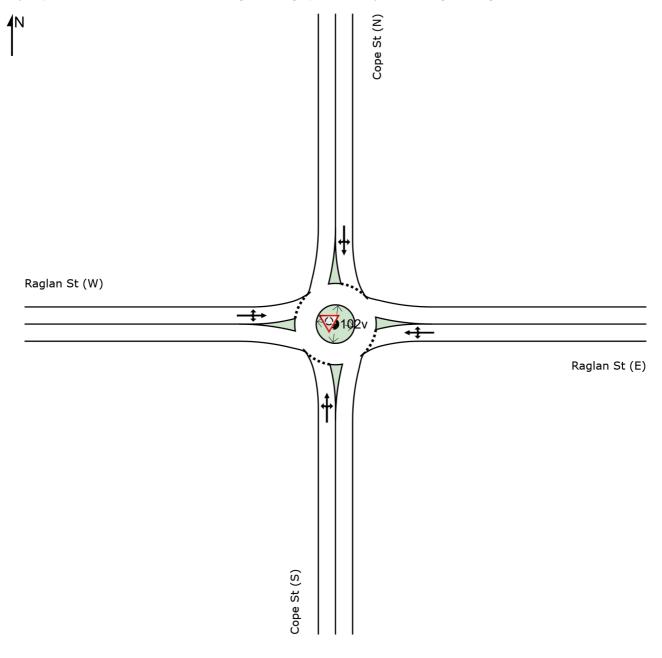
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SITE LAYOUT

W Site: 102v [Raglan St / Cope St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

V Site: 102v [Raglan St / Cope St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Cope	St (S)												
1	L2	18	2.0	18	2.0	0.061	6.0	LOS A	0.3	2.0	0.30	0.47	0.30	36.1
2	T1	25	2.0	25	2.0	0.061	3.5	LOS A	0.3	2.0	0.30	0.47	0.30	44.7
3	R2	1	2.0	1	2.0	0.061	6.5	LOS A	0.3	2.0	0.30	0.47	0.30	35.8
Appr	oach	44	2.0	44	2.0	0.061	4.6	LOS A	0.3	2.0	0.30	0.47	0.30	42.7
East: Raglan St (E)														
4	L2	2	2.0	2	2.0	0.088	3.4	LOS A	0.4	3.1	0.20	0.48	0.20	31.0
5	T1	65	2.0	65	2.0	0.088	4.5	LOS A	0.4	3.1	0.20	0.48	0.20	31.0
6	R2	4	2.0	4	2.0	0.088	5.9	LOS A	0.4	3.1	0.20	0.48	0.20	45.2
Appr	oach	71	2.0	71	2.0	0.088	4.6	LOS A	0.4	3.1	0.20	0.48	0.20	34.0
North	n: Cope	St (N)												
7	L2	5	2.0	5	2.0	0.057	3.9	LOS A	0.3	2.0	0.28	0.56	0.28	42.6
8	T1	10	2.0	10	2.0	0.057	3.4	LOS A	0.3	2.0	0.28	0.56	0.28	42.9
9	R2	27	2.0	27	2.0	0.057	8.7	LOS A	0.3	2.0	0.28	0.56	0.28	42.9
Appr	oach	42	2.0	42	2.0	0.057	6.9	LOS A	0.3	2.0	0.28	0.56	0.28	42.9
West: Raglan St (W)														
10	L2	35	2.0	35	2.0	0.184	0.4	LOS A	0.7	4.7	0.13	0.06	0.13	34.6
11	T1	87	2.0	87	2.0	0.184	0.4	LOS A	0.7	4.7	0.13	0.06	0.13	25.9
12	R2	6	2.0	6	2.0	0.184	1.6	LOS A	0.7	4.7	0.13	0.06	0.13	19.3
Appr	oach	128	2.0	128	2.0	0.184	0.5	LOS A	0.7	4.7	0.13	0.06	0.13	30.2
All Ve	ehicles	285	2.0	285	2.0	0.184	3.1	LOS A	0.7	4.7	0.19	0.30	0.19	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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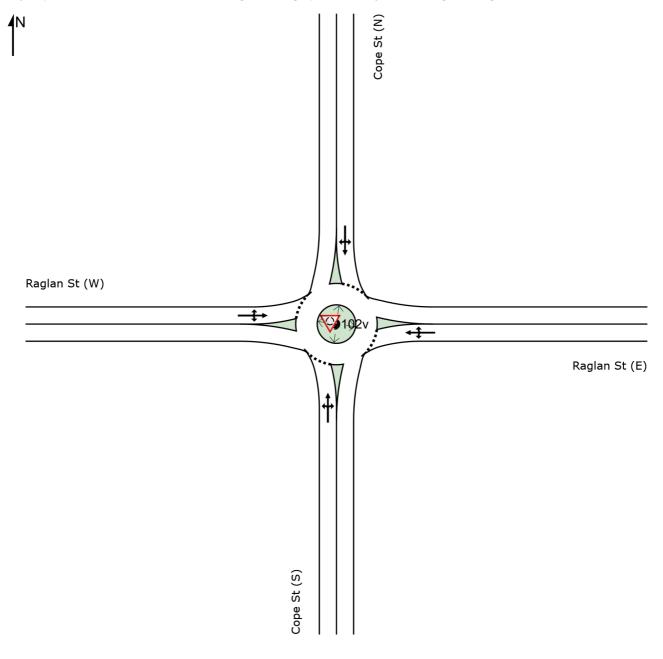
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SITE LAYOUT

W Site: 102v [Raglan St / Cope St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

₩ Site: 102v [Raglan St / Cope St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South: Cope St (S)				V011/11	70	110			Voli					KIT#TT
1	L2	28	2.0	28	2.0	0.109	7.2	LOS A	0.5	3.7	0.43	0.55	0.43	34.2
2	T1	36	2.0	36	2.0	0.109	4.7	LOS A	0.5	3.7	0.43	0.55	0.43	43.7
3	R2	5	2.0	5	2.0	0.109	7.7	LOS A	0.5	3.7	0.43	0.55	0.43	34.4
Appr	oach	69	2.0	69	2.0	0.109	5.9	LOS A	0.5	3.7	0.43	0.55	0.43	41.2
East: Raglan St (E)														
4	L2	1	2.0	1	2.0	0.166	4.0	LOS A	0.9	6.3	0.31	0.51	0.31	30.1
5	T1	120	2.0	120	2.0	0.166	5.0	LOS A	0.9	6.3	0.31	0.51	0.31	30.1
6	R2	5	2.0	5	2.0	0.166	6.4	LOS A	0.9	6.3	0.31	0.51	0.31	44.9
Appr	oach	126	2.0	126	2.0	0.166	5.1	LOS A	0.9	6.3	0.31	0.51	0.31	32.3
North	n: Cope	St (N)												
7	L2	7	2.0	7	2.0	0.106	4.5	LOS A	0.6	4.0	0.36	0.59	0.36	42.9
8	T1	14	2.0	14	2.0	0.106	4.0	LOS A	0.6	4.0	0.36	0.59	0.36	43.2
9	R2	53	2.0	53	2.0	0.106	9.3	LOS A	0.6	4.0	0.36	0.59	0.36	43.2
Appr	oach	74	2.0	74	2.0	0.106	7.8	LOS A	0.6	4.0	0.36	0.59	0.36	43.1
West: Raglan St (W)														
10	L2	38	2.0	38	2.0	0.257	0.7	LOS A	1.0	7.2	0.17	0.10	0.17	34.4
11	T1	121	2.0	121	2.0	0.257	0.7	LOS A	1.0	7.2	0.17	0.10	0.17	25.6
12	R2	12	2.0	12	2.0	0.257	1.8	LOS A	1.0	7.2	0.17	0.10	0.17	19.0
Appr	oach	171	2.0	171	2.0	0.257	0.8	LOS A	1.0	7.2	0.17	0.10	0.17	29.3
All Ve	ehicles	440	2.0	440	2.0	0.257	4.0	LOS A	1.0	7.2	0.28	0.37	0.28	35.8

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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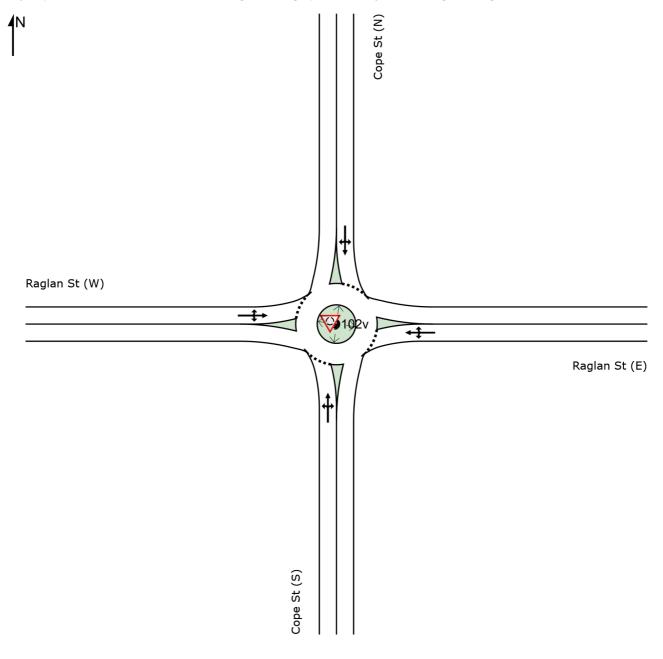
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₩ Site: 102v [Raglan St / Cope St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 102v [Raglan St / Cope St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Vehi	Vehicle Movement Performance													
Mov ID	Turn	DEMA FLOV [Total	VS HV]	ARRI FLO [Total	WS HV]	Deg. Satn	Delay	Level of Service	95% BA QUE [Veh.	EUE Dist]	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed
Sout	n: Cope	veh/h St (S)	%	veh/h	%	v/c	sec	_	veh	m	_	_	_	km/h
1	L2	24	2.0	24	2.0	0.078	6.4	LOS A	0.4	2.6	0.35	0.52	0.35	35.4
2	 T1	24	2.0	24	2.0	0.078	3.9	LOSA	0.4	2.6	0.35	0.52	0.35	44.3
3	R2	6	2.0	6	2.0	0.078	6.9	LOS A	0.4	2.6	0.35	0.52	0.35	35.4
Appro	oach	54	2.0	54	2.0	0.078	5.3	LOS A	0.4	2.6	0.35	0.52	0.35	41.3
East:	Raglar	n St (E)												
4	L2	4	2.0	4	2.0	0.118	3.5	LOS A	0.6	4.3	0.22	0.49	0.22	30.2
5	T1	83	2.0	83	2.0	0.118	4.5	LOS A	0.6	4.3	0.22	0.49	0.22	30.2
6	R2	11	2.0	11	2.0	0.118	5.9	LOS A	0.6	4.3	0.22	0.49	0.22	44.9
Appro	oach	98	2.0	98	2.0	0.118	4.6	LOS A	0.6	4.3	0.22	0.49	0.22	35.5
North	n: Cope	St (N)												
7	L2	13	2.0	13	2.0	0.077	4.5	LOS A	0.4	2.6	0.36	0.58	0.36	41.5
8	T1	10	2.0	10	2.0	0.077	4.0	LOS A	0.4	2.6	0.36	0.58	0.36	41.6
9	R2	30	2.0	30	2.0	0.077	9.3	LOS A	0.4	2.6	0.36	0.58	0.36	41.6
Appro	oach	53	2.0	53	2.0	0.077	7.1	LOS A	0.4	2.6	0.36	0.58	0.36	41.6
West	: Ragla	n St (W)												
10	L2	42	2.0	42	2.0	0.251	0.6	LOS A	1.1	7.6	0.19	0.09	0.19	34.4
11	T1	124	2.0	124	2.0	0.251	0.6	LOS A	1.1	7.6	0.19	0.09	0.19	25.6
12	R2	5	2.0	5	2.0	0.251	1.8	LOS A	1.1	7.6	0.19	0.09	0.19	19.0
Appro	oach	171	2.0	171	2.0	0.251	0.6	LOS A	1.1	7.6	0.19	0.09	0.19	29.7
All Ve	ehicles	376	2.0	376	2.0	0.251	3.3	LOS A	1.1	7.6	0.24	0.33	0.24	35.2

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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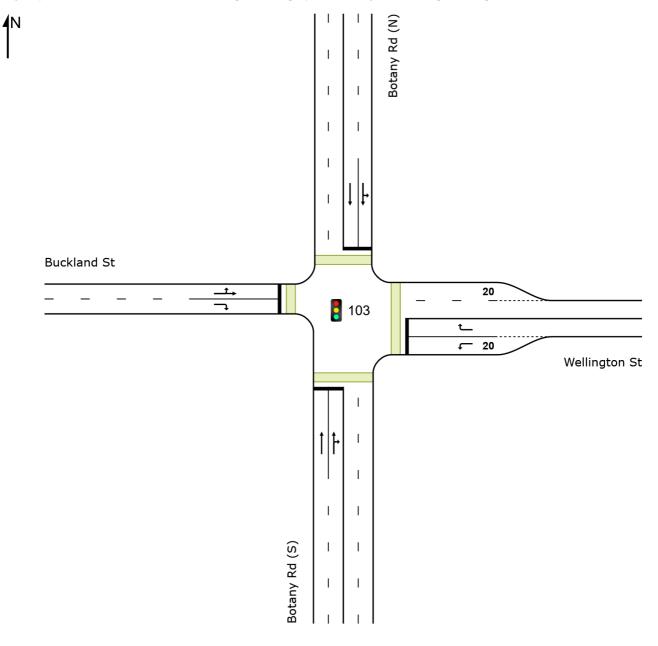
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Site: 103 [Botany Rd / Wellington St / Buckland St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 103 [Botany Rd / Wellington St / Buckland St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network User-Given Cycle Time)

			-										_	
Vehicle Movement Performance Mov Turn DEMAND ARRIVAL Dea, Aver, Level of 95% BACK OF Prop. Effective Aver, No. Aver,														
Mov	Turn	DEMA		ARRI		Deg.		Level of				EffectiveA		Aver.
ID		FLO\ [Total	NS HV1	FLO [Total		Satn	Delay	Service	QUE [Veh.	Dist]	Que	Stop Rate	Cycles	Speed
		veh/h	%	veh/h		v/c	sec		veh	m		Nate		km/h
Sout	h: Botar	ny Rd (S)												
2	T1	334	2.0	334	2.0	0.139	2.9	LOS A	2.7	19.4	0.24	0.25	0.24	38.4
3	R2	44	2.0	44	2.0	0.139	8.7	LOS A	2.2	15.7	0.25	0.33	0.25	39.7
Appr	oach	378	2.0	378	2.0	0.139	3.6	LOS A	2.7	19.4	0.24	0.26	0.24	38.5
East	: Welling	gton St												
4	L2	38	2.0	38	2.0	0.267	62.3	LOS E	2.1	15.3	0.96	0.72	0.96	19.6
6	R2	6	2.0	6	2.0	0.048	60.7	LOS E	0.3	2.3	0.93	0.65	0.93	4.1
Appr	oach	44	2.0	44	2.0	0.267	62.1	LOS E	2.1	15.3	0.96	0.71	0.96	18.2
Nort	h: Botan	y Rd (N)												
7	L2	15	2.0	15	2.0	*0.206	8.5	LOS A	4.1	29.0	0.25	0.24	0.25	42.5
8	T1	612	2.0	612	2.0	0.206	2.9	LOS A	4.1	29.1	0.24	0.22	0.24	47.4
Appr	oach	627	2.0	627	2.0	0.206	3.0	LOS A	4.1	29.1	0.24	0.22	0.24	47.4
Wes	t: Buckla	and St												
10	L2	5	2.0	5	2.0	0.212	58.5	LOS E	2.2	15.4	0.96	0.71	0.96	21.0
11	T1	34	2.0	34	2.0	*0.212	55.2	LOS D	2.2	15.4	0.96	0.71	0.96	21.0
12	R2	14	2.0	14	2.0	0.104	61.3	LOS E	0.8	5.6	0.96	0.69	0.96	25.2
Appr	oach	53	2.0	53	2.0	0.212	57.1	LOS E	2.2	15.4	0.96	0.70	0.96	22.5
All V	ehicles	1102	2.0	1102	2.0	0.267	8.2	LOS A	4.1	29.1	0.31	0.28	0.31	40.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	Pedestrian Movement Performance													
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	QUEUE		Prop. Ef Que	Stop	Travel Time	Travel Dist.	Aver. Speed				
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec				
South: Botany R	d (S)													
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98				
East: Wellington	St													
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98				
North: Botany R	d (N)													
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98				
West: Buckland	St													

P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	219.0	214.1	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: 103 [Botany Rd / Wellington St / Buckland St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

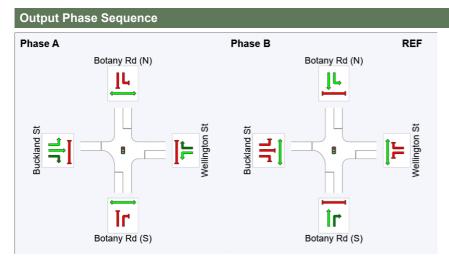
New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

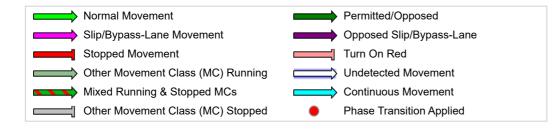
Phase Timing Summary

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

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%.



REF: Reference Phase VAR: Variable Phase



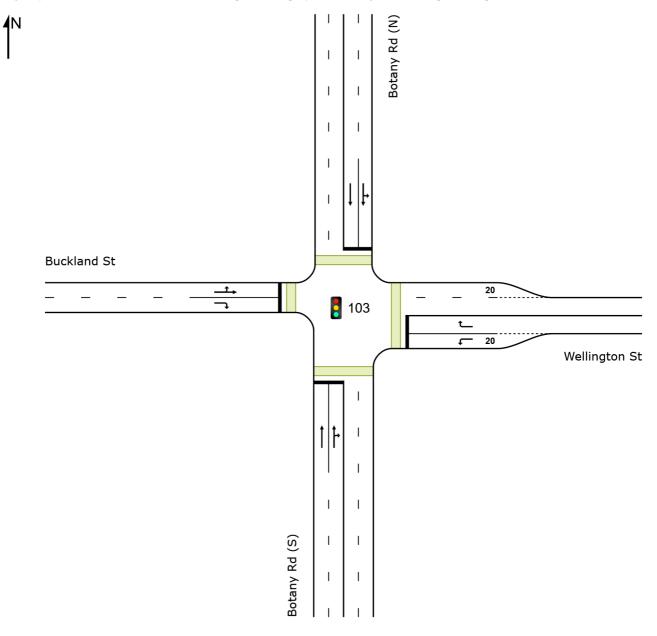
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Site: 103 [Botany Rd / Wellington St / Buckland St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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Site: 103 [Botany Rd / Wellington St / Buckland St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

■ Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botan	y Rd (S)												
2 3	T1 R2	323 43	2.0 2.0	323 43	2.0 2.0	0.164 0.164	7.9 15.1	LOS A LOS B	4.4 3.5	31.3 25.1	0.40 0.43	0.37 0.46	0.40 0.43	34.8 35.0
Appr	oach	366	2.0	366	2.0	0.164	8.8	LOS A	4.4	31.3	0.40	0.38	0.40	34.8
East	: Welling	ton St												
4	L2	60	2.0	60	2.0	*0.206	48.8	LOS D	3.0	21.5	0.89	0.74	0.89	22.4
6	R2	24	2.0	24	2.0	0.086	46.8	LOS D	1.2	8.3	0.85	0.69	0.85	5.1
Appr	oach	84	2.0	84	2.0	0.206	48.2	LOS D	3.0	21.5	0.88	0.73	0.88	19.2
Nort	h: Botan	y Rd (N)												
7	L2	18	2.0	18	2.0	*0.276	15.9	LOS B	10.8	76.9	0.57	0.51	0.57	31.1
8	T1	702	2.0	702	2.0	0.276	10.3	LOS A	11.0	78.1	0.57	0.50	0.57	41.9
Appr	oach	720	2.0	720	2.0	0.276	10.4	LOS A	11.0	78.1	0.57	0.50	0.57	41.7
Wes	t: Buckla	ind St												
10	L2	5	2.0	5	2.0	0.115	44.0	LOS D	2.2	15.7	0.84	0.65	0.84	25.3
11	T1	42	2.0	42	2.0	0.115	40.7	LOS C	2.2	15.7	0.84	0.65	0.84	25.3
12	R2	23	2.0	23	2.0	0.080	46.7	LOS D	1.1	7.9	0.85	0.70	0.85	28.0
Appr	oach	70	2.0	70	2.0	0.115	42.9	LOS D	2.2	15.7	0.84	0.66	0.84	26.5
All V	ehicles	1240	2.0	1240	2.0	0.276	14.3	LOS A	11.0	78.1	0.56	0.49	0.56	36.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	Pedestrian Movement Performance													
Mov Crossing	Dem.	Aver.	Level of	AVERAGE		Prop. Ef		Travel	Travel	Aver.				
ID Crossing	Flow	Delay	Service	QUE [Ped	:UE Dist]	Que	Stop Rate	Time	Dist.	Speed				
	ped/h	sec		ped	m			sec	m	m/sec				
South: Botany R	Rd (S)													
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98				
East: Wellington	St													
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	216.6	0.98				
North: Botany R	d (N)													
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98				
West: Buckland	St													

P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	218.7	213.8	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: 103 [Botany Rd / Wellington St / Buckland St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None)

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

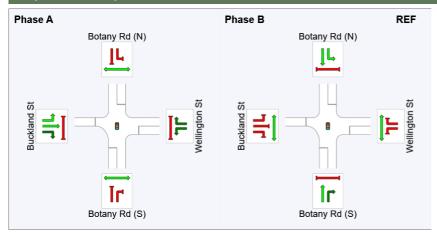
Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

Phase Timing Summary

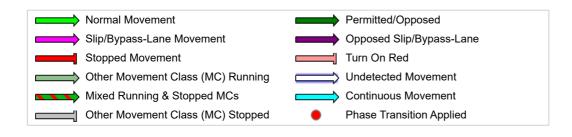
Phase	Α	В
Phase Change Time (sec)	88	0
Green Time (sec)	26	82
Phase Time (sec)	32	88
Phase Split	27%	73%

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



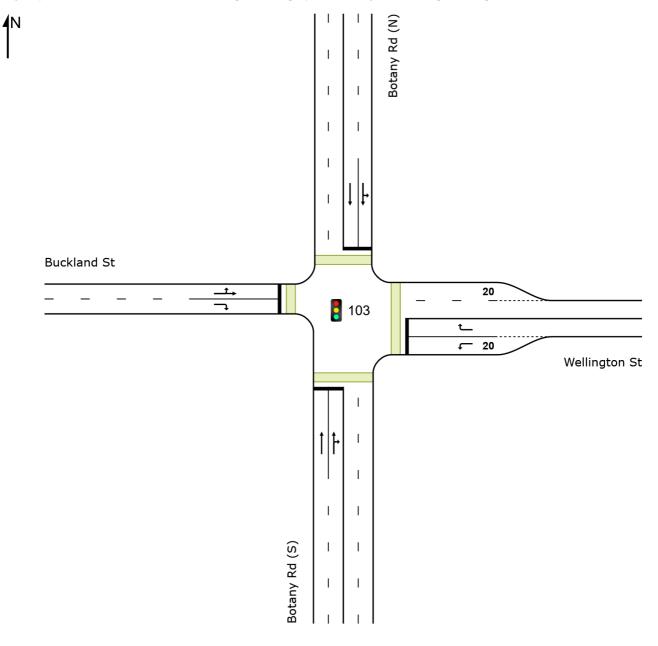
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 103 [Botany Rd / Wellington St / Buckland St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 103 [Botany Rd / Wellington St / Buckland St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

■ Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

Vehi	cle Mo	vement	Perfo	rmano	:e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botan	ıy Rd (S)												
2	T1	179	2.0	179	2.0	0.100	3.8	LOS A	1.3	9.4	0.38	0.35	0.38	37.9
3	R2	41	2.0	41	2.0	0.100	9.4	LOS A	1.0	6.9	0.38	0.46	0.38	40.5
Appr	oach	220	2.0	220	2.0	0.100	4.9	LOS A	1.3	9.4	0.38	0.37	0.38	38.4
East	Welling	ton St												
4	L2	36	2.0	36	2.0	*0.190	31.9	LOS C	1.0	7.1	0.92	0.70	0.92	27.5
6	R2	14	2.0	14	2.0	0.084	31.5	LOS C	0.4	2.7	0.90	0.67	0.90	7.3
Appr	oach	50	2.0	50	2.0	0.190	31.8	LOS C	1.0	7.1	0.92	0.69	0.92	24.1
North	n: Botan	y Rd (N)												
7	L2	13	2.0	13	2.0	*0.200	9.5	LOS A	2.3	16.6	0.34	0.31	0.34	40.6
8	T1	496	2.0	496	2.0	0.200	3.6	LOS A	2.3	16.6	0.31	0.28	0.31	46.8
Appr	oach	509	2.0	509	2.0	0.200	3.7	LOS A	2.3	16.6	0.31	0.28	0.31	46.7
West	: Buckla	and St												
10	L2	3	2.0	3	2.0	0.120	29.3	LOS C	0.8	5.8	0.91	0.66	0.91	31.6
11	T1	27	2.0	27	2.0	0.120	25.9	LOS B	0.8	5.8	0.91	0.66	0.91	31.6
12	R2	25	2.0	25	2.0	0.127	31.7	LOS C	0.7	5.0	0.94	0.70	0.94	31.7
Appr	oach	55	2.0	55	2.0	0.127	28.7	LOS C	0.8	5.8	0.93	0.68	0.93	31.6
All Ve	ehicles	834	2.0	834	2.0	0.200	7.4	LOS A	2.3	16.6	0.41	0.35	0.41	41.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance														
Mov ID Crossing			Level of Service	AVERAGE QUE	UE	Prop. Et Que	Stop	Travel Time	Travel Dist.	Aver. Speed				
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec				
South: Botany Ro	d (S)													
P1 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	189.9	215.2	1.13				
East: Wellington	St													
P2 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	192.0	218.0	1.14				
North: Botany Rd	(N)													
P3 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	189.4	214.6	1.13				
West: Buckland S	St													
P4 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	184.8	208.6	1.13				

All Pedestrians	211	24.4	LOS C	0.1	0.1	0.90	0.90	189.0	214.1	1.13
-----------------	-----	------	-------	-----	-----	------	------	-------	-------	------

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: 103 [Botany Rd / Wellington St / Buckland St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (No

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

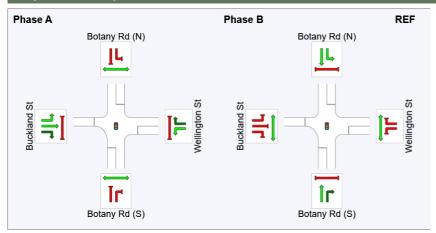
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

Phase Timing	Summary
--------------	---------

Phase	Α	В
Phase Change Time (sec)	46	0
Green Time (sec)	8	40
Phase Time (sec)	14	46
Phase Split	23%	77%

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

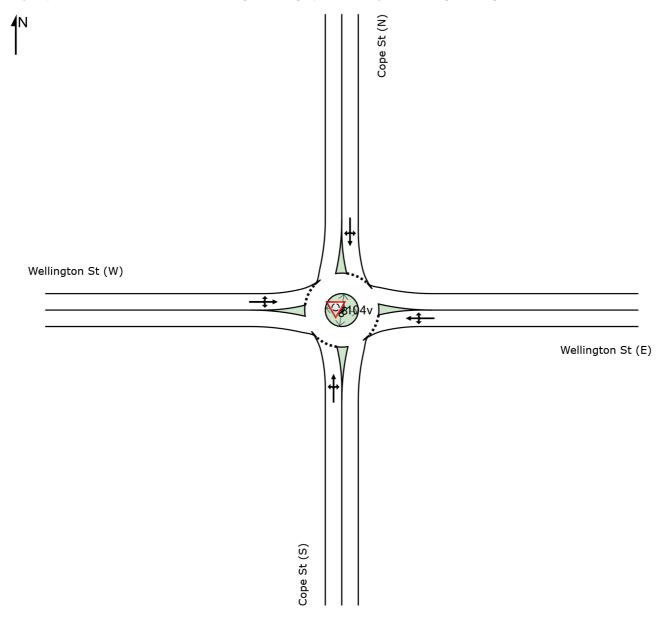


Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

W Site: 104v [Wellington St / Cope St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

New Site Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 104v [Wellington St / Cope St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Roundabout

Veh	icle Mo	vement	Perfo	rmano	ce _									
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARR FLO [Tota veh/h	WS I HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Cope	St (S)												
1	L2	11	2.0	11	2.0	0.037	3.6	LOS A	0.2	1.1	0.18	0.48	0.18	43.4
2	T1	16	2.0	16	2.0	0.037	5.2	LOS A	0.2	1.1	0.18	0.48	0.18	43.4
3	R2	2	2.0	2	2.0	0.037	5.8	LOS A	0.2	1.1	0.18	0.48	0.18	46.0
Appr	roach	29	2.0	29	2.0	0.037	4.6	LOS A	0.2	1.1	0.18	0.48	0.18	43.7
East	: Welling	ton St (E)											
4	L2	8	2.0	8	2.0	0.050	3.4	LOS A	0.2	1.6	0.14	0.44	0.14	43.2
5	T1	24	2.0	24	2.0	0.050	2.8	LOS A	0.2	1.6	0.14	0.44	0.14	39.3
6	R2	9	2.0	9	2.0	0.050	7.9	LOS A	0.2	1.6	0.14	0.44	0.14	39.3
Appr	roach	41	2.0	41	2.0	0.050	4.0	LOS A	0.2	1.6	0.14	0.44	0.14	40.5
Nort	h: Cope	St (N)												
7	L2	5	2.0	5	2.0	0.024	3.9	LOS A	0.1	0.8	0.24	0.50	0.24	41.8
8	T1	4	2.0	4	2.0	0.024	3.3	LOS A	0.1	0.8	0.24	0.50	0.24	42.4
9	R2	9	2.0	9	2.0	0.024	6.1	LOS A	0.1	0.8	0.24	0.50	0.24	32.0
Appr	roach	18	2.0	18	2.0	0.024	4.9	LOS A	0.1	0.8	0.24	0.50	0.24	39.2
Wes	t: Welling	gton St (\	N)											
10	L2	19	2.0	19	2.0	0.135	4.2	LOS A	0.5	3.2	0.12	0.52	0.12	30.6
11	T1	62	2.0	62	2.0	0.135	3.9	LOS A	0.5	3.2	0.12	0.52	0.12	51.5
12	R2	12	2.0	12	2.0	0.135	6.7	LOS A	0.5	3.2	0.12	0.52	0.12	50.8
Appr	roach	93	2.0	93	2.0	0.135	4.3	LOS A	0.5	3.2	0.12	0.52	0.12	50.2
All V	ehicles	181	2.0	181	2.0	0.135	4.4	LOS A	0.5	3.2	0.14	0.49	0.14	45.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

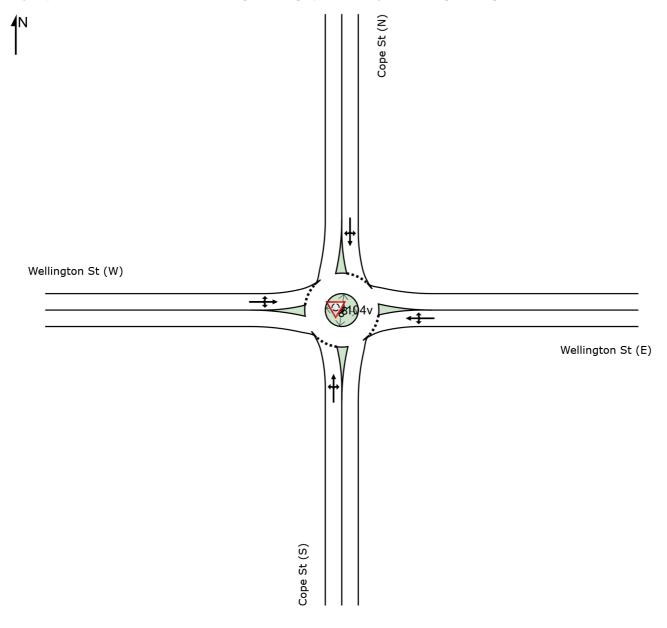
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₩ Site: 104v [Wellington St / Cope St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

New Site Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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₩ Site: 104v [Wellington St / Cope St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Roundabout

Vehi	cle Mo	vement	Perfo	rmano	e:									
Mov ID	Turn	DEMA FLOV [Total	WS HV]	ARRI FLO [Total	WS HV]	Deg. Satn	Delay	Level of Service	95% BA QUE [Veh.	EUE Dist]	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed
Sout	h: Cope	veh/h	%	veh/h	%	v/c	sec	_	veh	m	_	_	_	km/h
1	L2	17	2.0	17	2.0	0.047	4.1	LOS A	0.2	1.5	0.28	0.49	0.28	41.1
2	T1	14	2.0	14	2.0	0.047	5.7	LOSA	0.2	1.5	0.28	0.49	0.20	41.1
2	R2	3	2.0	3	2.0	0.047	6.3	LOSA	0.2	1.5	0.28	0.49	0.20	44.7
Appr		34	2.0	34	2.0	0.047	5.0	LOSA	0.2	1.5	0.28	0.49	0.28	41.7
Аррі	Uach	54	2.0	54	2.0	0.047	5.0	LUSA	0.2	1.5	0.20	0.49	0.20	41.7
East	Welling	gton St (E	.)											
4	L2	5	2.0	5	2.0	0.094	3.5	LOS A	0.5	3.4	0.17	0.44	0.17	43.4
5	T1	55	2.0	55	2.0	0.094	2.9	LOS A	0.5	3.4	0.17	0.44	0.17	39.5
6	R2	20	2.0	20	2.0	0.094	8.0	LOS A	0.5	3.4	0.17	0.44	0.17	39.5
Appr	oach	80	2.0	80	2.0	0.094	4.2	LOS A	0.5	3.4	0.17	0.44	0.17	39.9
North	n: Cope	St (N)												
7	L2	9	2.0	9	2.0	0.036	3.8	LOS A	0.2	1.2	0.24	0.49	0.24	41.9
8	T1	6	2.0	6	2.0	0.036	3.2	LOSA	0.2	1.2	0.24	0.49	0.24	42.5
9	R2	12	2.0	12	2.0	0.036	6.1	LOSA	0.2	1.2	0.24	0.49	0.24	32.2
Appr		27	2.0	27	2.0	0.036	4.7	LOSA	0.2	1.2	0.24	0.49	0.24	39.7
						0.000			0.2		0.2.	0110		
West	: Wellin	gton St (V	N)											
10	L2	35	2.0	35	2.0	0.152	4.3	LOS A	0.5	3.6	0.14	0.53	0.14	29.8
11	T1	52	2.0	52	2.0	0.152	4.1	LOS A	0.5	3.6	0.14	0.53	0.14	51.2
12	R2	16	2.0	16	2.0	0.152	6.9	LOS A	0.5	3.6	0.14	0.53	0.14	50.5
Appr	oach	103	2.0	103	2.0	0.152	4.6	LOS A	0.5	3.6	0.14	0.53	0.14	48.8
All V	ehicles	244	2.0	244	2.0	0.152	4.5	LOS A	0.5	3.6	0.18	0.49	0.18	43.0

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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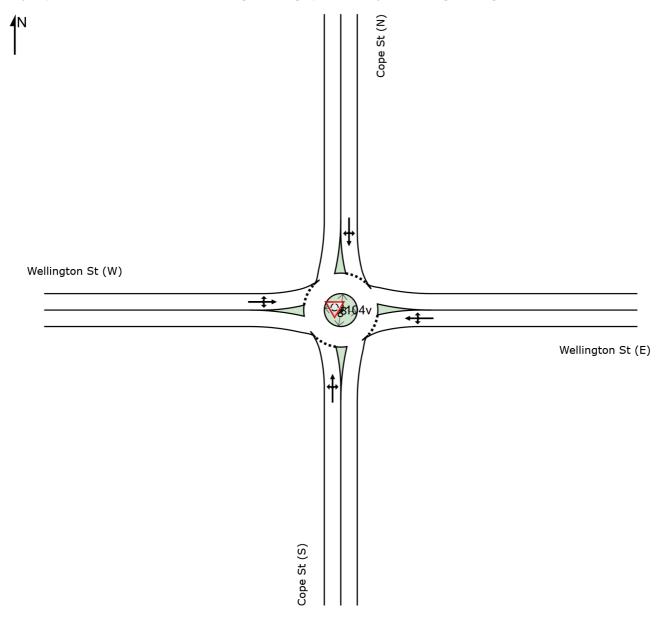
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

W Site: 104v [Wellington St / Cope St - DL - WE (Site Folder: WE

Peak Lockdown (11 - 12))]

New Site Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 104v [Wellington St / Cope St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Roundabout

Vehi	cle Mo	vement	Perfo	rmano	ce									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS I HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	n: Cope		70	Ven/m	70	V/C	360	_	Ven				_	KIII/11
1	L2	8	2.0	8	2.0	0.024	3.8	LOS A	0.1	0.7	0.23	0.49	0.23	40.9
2	T1	7	2.0	7	2.0	0.024	5.4	LOS A	0.1	0.7	0.23	0.49	0.23	40.9
3	R2	3	2.0	3	2.0	0.024	6.0	LOS A	0.1	0.7	0.23	0.49	0.23	44.5
Appr	oach	18	2.0	18	2.0	0.024	4.8	LOS A	0.1	0.7	0.23	0.49	0.23	41.9
East:	Welling	gton St (E)											
4	L2	8	2.0	8	2.0	0.071	3.3	LOS A	0.4	2.5	0.11	0.47	0.11	44.0
5	T1	36	2.0	36	2.0	0.071	2.7	LOS A	0.4	2.5	0.11	0.47	0.11	40.5
6	R2	22	2.0	22	2.0	0.071	7.8	LOS A	0.4	2.5	0.11	0.47	0.11	40.5
Appr	oach	66	2.0	66	2.0	0.071	4.4	LOS A	0.4	2.5	0.11	0.47	0.11	41.2
North	n: Cope	St (N)												
7	L2	9	2.0	9	2.0	0.025	3.7	LOS A	0.1	0.8	0.21	0.47	0.21	42.1
8	T1	4	2.0	4	2.0	0.025	3.1	LOS A	0.1	0.8	0.21	0.47	0.21	42.8
9	R2	6	2.0	6	2.0	0.025	5.9	LOS A	0.1	0.8	0.21	0.47	0.21	32.6
Appr	oach	19	2.0	19	2.0	0.025	4.3	LOS A	0.1	0.8	0.21	0.47	0.21	40.8
West	: Wellin	gton St (\	N)											
10	L2	25	2.0	25	2.0	0.118	4.2	LOS A	0.4	2.7	0.12	0.51	0.12	30.7
11	T1	50	2.0	50	2.0	0.118	4.0	LOS A	0.4	2.7	0.12	0.51	0.12	51.6
12	R2	6	2.0	6	2.0	0.118	6.8	LOS A	0.4	2.7	0.12	0.51	0.12	50.9
Appr	oach	81	2.0	81	2.0	0.118	4.3	LOS A	0.4	2.7	0.12	0.51	0.12	49.6
All Ve	ehicles	184	2.0	184	2.0	0.118	4.4	LOS A	0.4	2.7	0.14	0.49	0.14	43.9

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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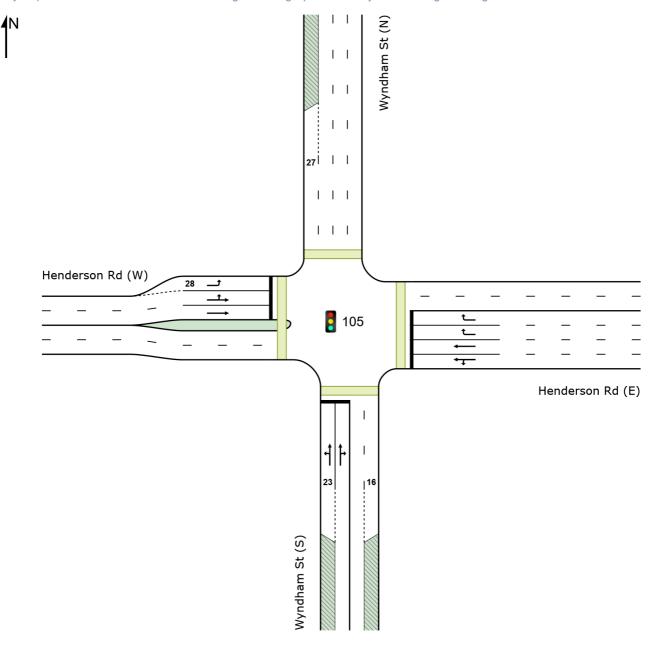
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Site: 105 [Henderson Rd / Wyndham St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 105 [Henderson Rd / Wyndham St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLO	NS	ARRI FLO	WS	Deg. Satn	Aver. Delay	Level of Service	QU	ACK OF EUE	Prop. Que	EffectiveA Stop	ver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h		v/c	sec		[Veh. veh	Dist] m		Rate		km/h
South	h: Wynd	lham St (S)											
1	L2	18	2.0	18	2.0	0.293	47.3	LOS D	5.6	39.8	0.81	0.67	0.81	34.8
2	T1	227	2.0	227	2.0	*0.293	41.7	LOS C	5.7	40.6	0.81	0.66	0.81	35.6
3	R2	5	2.0	5	2.0	0.293	47.3	LOS D	5.7	40.6	0.81	0.66	0.81	25.7
Appro	oach	250	2.0	250	2.0	0.293	42.2	LOS C	5.7	40.6	0.81	0.66	0.81	35.4
East:	Hende	rson Rd ((E)											
4	L2	66	2.0	66	2.0	0.150	10.8	LOS A	2.7	19.4	0.27	0.38	0.27	47.3
5	T1	318	2.0	318	2.0	0.150	5.2	LOS A	2.7	19.4	0.24	0.26	0.24	51.5
6	R2	350	2.0	350	2.0	*0.328	13.1	LOS A	2.4	17.1	0.43	0.68	0.43	41.7
Appro	oach	734	2.0	734	2.0	0.328	9.5	LOS A	2.7	19.4	0.33	0.47	0.33	46.0
West	: Hende	erson Rd	(W)											
10	L2	211	2.0	211	2.0	0.216	42.0	LOS C	4.8	34.2	0.82	0.76	0.82	34.9
11	T1	118	2.0	118	2.0	*0.216	35.2	LOS C	5.2	37.3	0.80	0.65	0.80	28.1
Appro	oach	329	2.0	329	2.0	0.216	39.6	LOS C	5.2	37.3	0.81	0.72	0.81	33.1
All Ve	ehicles	1313	2.0	1313	2.0	0.328	23.2	LOS B	5.7	40.6	0.54	0.57	0.54	38.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance													
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed			
	ped/h	sec		ped	m			sec	m	m/sec			
South: Wyndham	n St (S)												
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
East: Henderson	Rd (E)												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.9	221.8	0.99			
North: Wyndham	St (N)												
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
West: Hendersor	n Rd (W)												
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.3	221.0	0.99			
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	222.2	218.3	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: 105 [Henderson Rd / Wyndham St - DL - AM (Site Folder: AM Peak Lockdown (7:30-8:30 AM))]

Network: N101 [AM Peak Lockdown (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

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

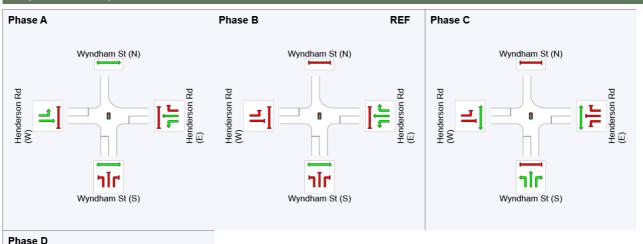
Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	102	22	52	85
Green Time (sec)	34	24	27	11
Phase Time (sec)	40	30	33	17
Phase Split	33%	25%	28%	14%

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



Wyndham St (N) Hengeland H

REF: Reference Phase VAR: Variable Phase



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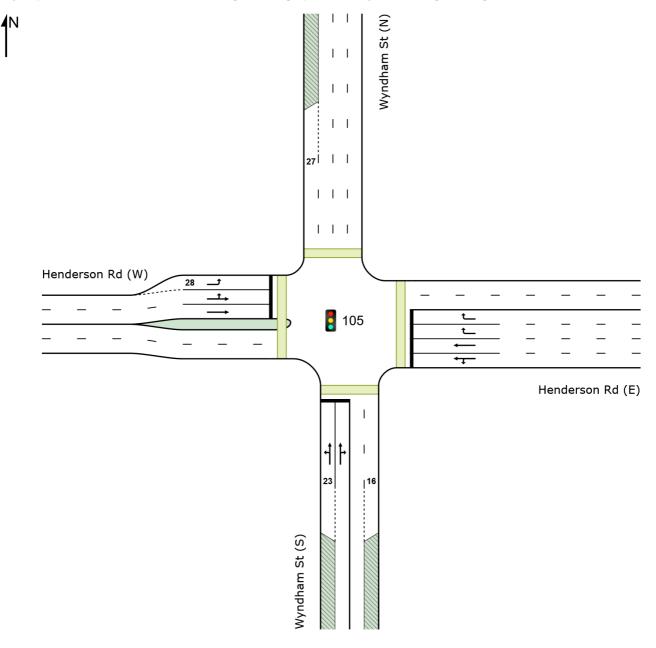
Site: 105 [Henderson Rd / Wyndham St - DL - PM (Site Folder:

PM Peak Lockdown (16-17 PM))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 105 [Henderson Rd / Wyndham St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLO\ [Total		ARRI FLO	WS	Deg. Satn	Aver. Delay	Level of Service		ACK OF EUE Dist]	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed
		veh/h	%	veh/h		v/c	sec		veh	m				km/h
South	n: Wynd	lham St (S)											
1	L2	12	2.0	12	2.0	0.497	44.9	LOS D	8.1	57.7	0.80	0.66	0.80	35.8
2	T1	351	2.0	351	2.0	*0.497	39.4	LOS C	8.1	57.9	0.80	0.66	0.80	36.5
3	R2	5	2.0	5	2.0	0.497	45.0	LOS D	8.1	57.9	0.80	0.66	0.80	26.6
Appro	bach	368	2.0	368	2.0	0.497	39.7	LOS C	8.1	57.9	0.80	0.66	0.80	36.3
East:	Hende	rson Rd (E)											
4	L2	72	2.0	72	2.0	0.236	12.1	LOS A	4.7	33.2	0.31	0.37	0.31	46.5
5	T1	503	2.0	503	2.0	0.236	9.2	LOS A	8.2	58.5	0.43	0.42	0.43	47.1
6	R2	360	2.0	360	2.0	*0.328	30.2	LOS C	5.6	39.9	1.00	0.82	1.00	31.1
Appro	bach	935	2.0	935	2.0	0.328	17.5	LOS B	8.2	58.5	0.64	0.57	0.64	39.3
West	Hende	erson Rd	(W)											
10	L2	168	2.0	168	2.0	0.245	47.5	LOS D	4.9	34.7	0.87	0.76	0.87	33.5
11	T1	144	2.0	144	2.0	*0.245	39.8	LOS C	5.4	38.2	0.85	0.69	0.85	25.9
Appro	bach	312	2.0	312	2.0	0.245	44.0	LOS D	5.4	38.2	0.86	0.73	0.86	30.8
All Ve	hicles	1615	2.0	1615	2.0	0.497	27.7	LOS B	8.2	58.5	0.72	0.62	0.72	36.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance													
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped	UE Dist]	Prop. Ef Que	fective Stop Rate	Travel Time					
	ped/h	sec		ped	m			sec	m	m/sec			
South: Wyndham	St (S)												
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
East: Henderson	Rd (E)												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.9	221.8	0.99			
North: Wyndham	St (N)												
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
West: Henderson	Rd (W)												
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.3	221.0	0.99			
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	222.2	218.3	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: 105 [Henderson Rd / Wyndham St - DL - PM (Site Folder: PM Peak Lockdown (16-17 PM))]

Network: N101 [PM Peak Lockdown (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

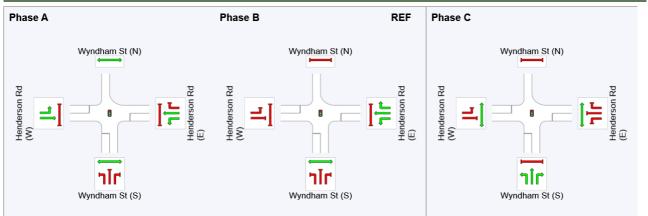
Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

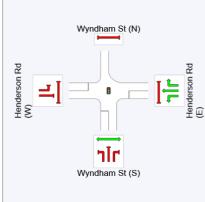
Phase Timing Summary				
Phase	Α	В	С	D
Phase Change Time (sec)	80	115	26	63
Green Time (sec)	29	25	31	11
Phase Time (sec)	35	31	37	17
Phase Split	29%	26%	31%	14%

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



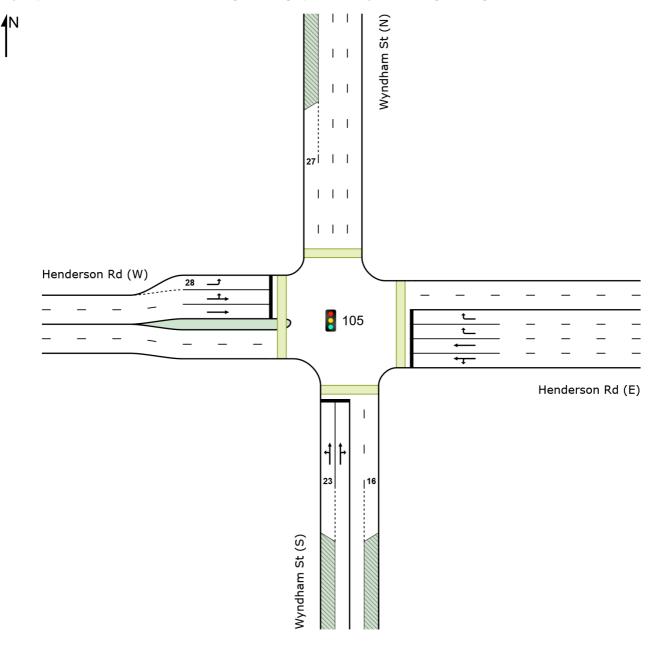
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Site: 105 [Henderson Rd / Wyndham St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 105 [Henderson Rd / Wyndham St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

■ Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h	ND	ARRI FLO [Total veh/h	VAL WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South: Wyndham St (S)														
1	L2	18	2.0	18	2.0	0.295	27.5	LOS B	2.8	20.1	0.82	0.66	0.82	42.8
2	T1	218	2.0	218	2.0	*0.295	22.0	LOS B	2.9	20.6	0.82	0.66	0.82	43.9
3	R2	6	2.0	6	2.0	0.295	27.6	LOS B	2.9	20.6	0.82	0.65	0.82	35.1
Appro	bach	242	2.0	242	2.0	0.295	22.5	LOS B	2.9	20.6	0.82	0.66	0.82	43.7
East: Henderson Rd (E)														
4	L2	43	2.0	43	2.0	0.171	9.8	LOS A	1.8	12.7	0.35	0.38	0.35	49.1
5	T1	337	2.0	337	2.0	0.171	4.8	LOS A	1.8	12.7	0.34	0.32	0.34	52.2
6	R2	218	2.0	218	2.0	*0.298	18.4	LOS B	1.7	12.0	0.97	0.77	0.97	37.7
Appro	bach	598	2.0	598	2.0	0.298	10.1	LOS A	1.8	12.7	0.57	0.49	0.57	45.7
West: Henderson Rd (W)														
10	L2	175	2.0	175	2.0	0.317	30.1	LOS C	2.7	19.1	0.91	0.76	0.91	39.6
11	T1	134	2.0	134	2.0	*0.317	23.9	LOS B	3.0	21.1	0.91	0.72	0.91	33.4
Appro	bach	309	2.0	309	2.0	0.317	27.4	LOS B	3.0	21.1	0.91	0.74	0.91	37.7
All Ve	hicles	1149	2.0	1149	2.0	0.317	17.4	LOS B	3.0	21.1	0.71	0.59	0.71	42.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Level of Delay Service				Prop. Effective Que Stop Rate		Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		ped	m		rtato	sec	m	m/sec	
South: Wyndham St (S)											
P1 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	189.9	215.2	1.13	
East: Henderson Rd (E)											
P2 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	195.0	221.8	1.14	
North: Wyndham St (N)											
P3 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	189.9	215.2	1.13	
West: Henderson Rd (W)											
P4 Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	194.4	221.0	1.14	
All Pedestrians	211	24.4	LOS C	0.1	0.1	0.90	0.90	192.3	218.3	1.14	

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: 105 [Henderson Rd / Wyndham St - DL - WE (Site Folder: WE Peak Lockdown (11 - 12))]

■ Network: N101 [WE Peak Lockdown (11-12) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Practical Cycle Time)

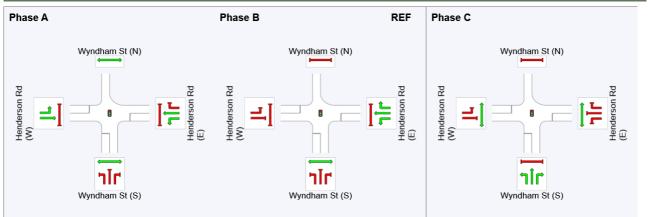
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase	Timing	Summary

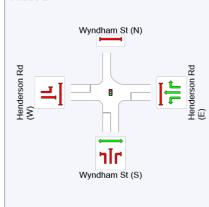
Phase	Α	В	С	D
Phase Change Time (sec)	43	0	12	31
Green Time (sec)	11	6	13	6
Phase Time (sec)	17	12	19	12
Phase Split	28%	20%	32%	20%

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



Phase D



REF: Reference Phase VAR: Variable Phase



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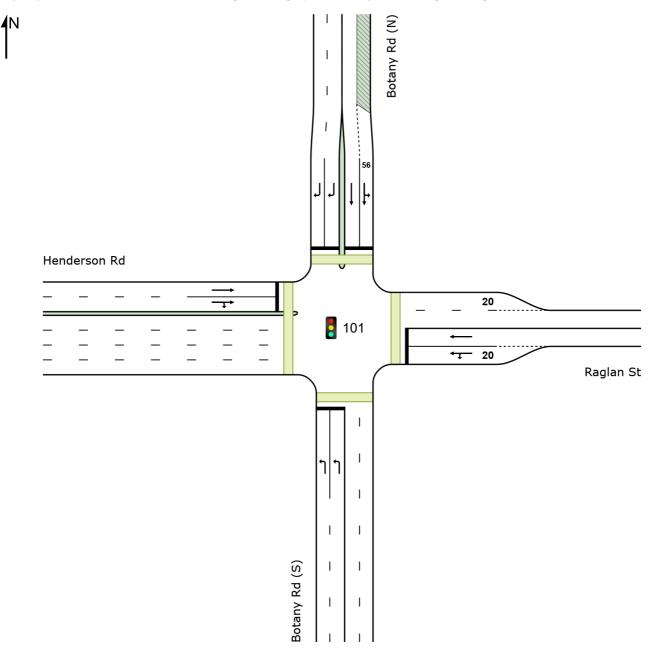
Appendix B: Normal Operation SIDRA Model Outputs

Site: 101 [Botany Rd / Henderson Rd - BL- AM (Site Folder: AM

Peak (7:30-8:30 AM))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Botany Rd / Henderson Rd - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

■ Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botar	ny Rd (S)												
1	L2	681	2.0	681	2.0	*0.776	37.6	LOS C	17.6	125.2	0.89	0.84	0.93	14.4
Appr	oach	681	2.0	681	2.0	0.776	37.6	LOS C	17.6	125.2	0.89	0.84	0.93	14.4
East:	Raglan	St												
4	L2	8	2.0	8	2.0	0.377	51.8	LOS D	5.8	41.5	0.92	0.73	0.92	5.7
5	T1	218	2.0	218	2.0	0.377	47.1	LOS D	5.9	41.8	0.92	0.73	0.92	5.8
Appr	oach	226	2.0	226	2.0	0.377	47.3	LOS D	5.9	41.8	0.92	0.73	0.92	5.8
North	n: Botan	y Rd (N)												
7	L2	56	2.0	56	2.0	0.373	11.4	LOS A	10.9	77.8	0.41	0.52	0.41	41.0
8	T1	971	2.0	971	2.0	0.373	7.9	LOS A	11.2	79.8	0.41	0.51	0.41	41.1
9	R2	582	2.0	582	2.0	*0.601	46.2	LOS D	15.1	107.4	0.93	0.83	0.93	22.2
Appr	oach	1609	2.0	1609	2.0	0.601	21.9	LOS B	15.1	107.4	0.60	0.62	0.60	31.5
West	: Hende	erson Rd												
11	T1	199	2.0	199	2.0	0.776	26.0	LOS B	9.1	64.6	0.69	0.59	0.71	9.8
12	R2	43	2.0	43	2.0	*0.776	35.2	LOS C	9.1	64.6	0.84	0.73	0.88	8.5
Appr	oach	242	2.0	242	2.0	0.776	27.6	LOS B	9.1	64.6	0.71	0.62	0.74	9.5
All Ve	ehicles	2758	2.0	2758	2.0	0.776	28.4	LOS B	17.6	125.2	0.71	0.68	0.72	24.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Ef Que	Stop	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec	
South: Botany Ro	d (S)										
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98	
East: Raglan St											
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98	
North: Botany Rd	(N)										
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.8	0.98	
West: Henderson	Rd										
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.5	222.6	0.99	

All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	221.8	217.8	0.98
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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: 101 [Botany Rd / Henderson Rd - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

■ Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

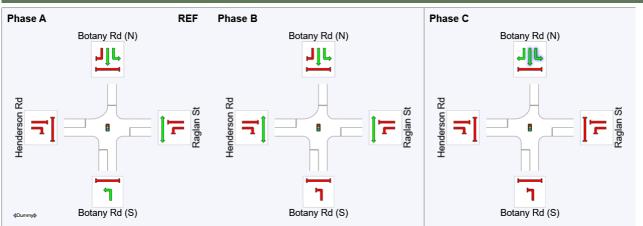
Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn **Reference Phase: Phase A** Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

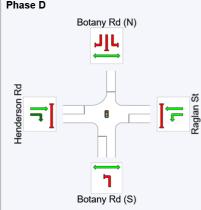
Phase Timing Summary				
Phase	Α	В	С	D
Phase Change Time (sec)	17	52	74	110
Green Time (sec)	29	16	32	21
Phase Time (sec)	35	20	38	27
Phase Split	29%	17%	32%	23%

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



Phase D



REF: Reference Phase VAR: Variable Phase



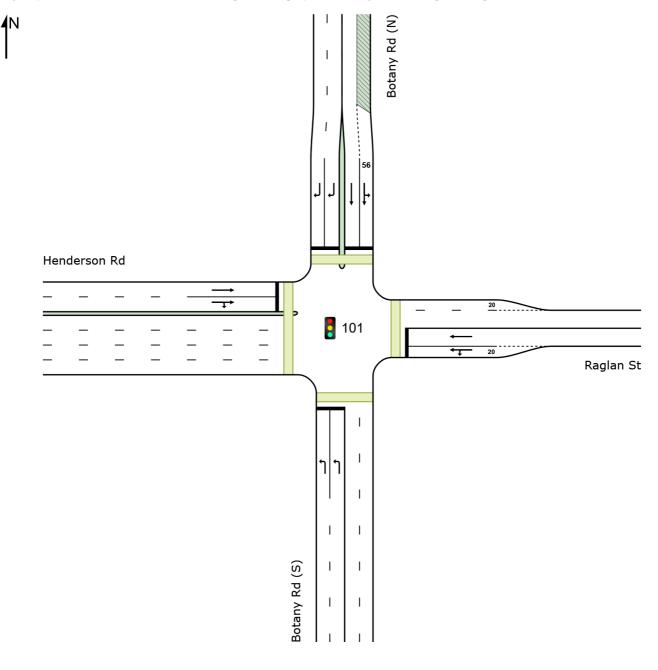
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Site: 101 [Botany Rd / Henderson Rd - BL- PM (Site Folder: PM

Peak (16-17 PM))]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Botany Rd / Henderson Rd - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	South: Botany Rd (S)													
1	L2	573	0.0	573	0.0	*0.727	53.7	LOS D	18.0	125.7	1.00	0.87	1.03	11.3
Appr	oach	573	0.0	573	0.0	0.727	53.7	LOS D	18.0	125.7	1.00	0.87	1.03	11.3
East:	Raglan	St												
4	L2	18	0.0	18	0.0	* 0.693	54.1	LOS D	8.7	60.7	0.94	0.81	1.02	5.5
5	T1	288	0.0	288	0.0	0.693	49.9	LOS D	8.7	60.7	0.95	0.81	1.03	5.5
Appr	oach	306	0.0	306	0.0	0.693	50.2	LOS D	8.7	60.7	0.95	0.81	1.03	5.5
North	n: Botan	y Rd (N)												
7	L2	48	0.0	48	0.0	0.371	11.5	LOS A	11.2	78.3	0.42	0.52	0.42	40.7
8	T1	1069	0.0	1069	0.0	0.464	8.6	LOS A	14.4	100.9	0.43	0.52	0.43	40.6
9	R2	702	0.0	702	0.0	*0.788	54.0	LOS D	20.5	143.6	1.00	0.90	1.08	20.3
Appr	oach	1819	0.0	1819	0.0	0.788	26.2	LOS B	20.5	143.6	0.65	0.67	0.68	29.4
West	: Hende	rson Rd												
11	T1	231	0.0	231	0.0	0.531	58.9	LOS E	11.2	78.2	1.00	0.82	1.00	4.9
12	R2	51	0.0	51	0.0	0.531	66.9	LOS E	5.6	39.1	1.00	0.79	1.00	4.6
Appr	oach	282	0.0	282	0.0	0.531	60.3	LOS E	11.2	78.2	1.00	0.81	1.00	4.8
All Ve	ehicles	2980	0.0	2980	0.0	0.788	37.2	LOS C	20.5	143.6	0.78	0.73	0.82	20.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Ef Que	fective Stop	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec	
South: Botany Ro	d (S)										
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98	
East: Raglan St											
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.5	214.8	0.98	
North: Botany Ro	I (N)										
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.3	215.8	0.98	
West: Hendersor	n Rd										
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.5	222.6	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.

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PHASING SUMMARY

Site: 101 [Botany Rd / Henderson Rd - BL- PM (Site Folder: PM Peak (16-17 PM))]

■■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

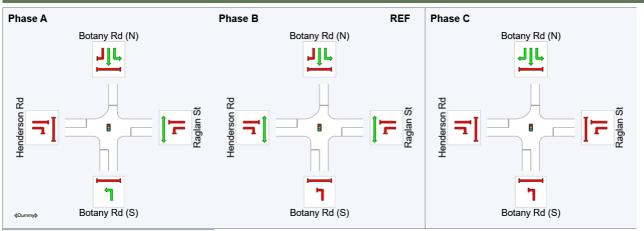
Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn **Reference Phase: Phase B** Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

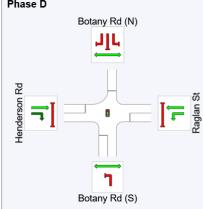
Phase Timing Summary				
Phase	Α	В	С	D
Phase Change Time (sec)	77	112	15	49
Green Time (sec)	29	17	29	22
Phase Time (sec)	35	22	35	28
Phase Split	29%	18%	29%	23%

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



Phase D



REF: Reference Phase VAR: Variable Phase

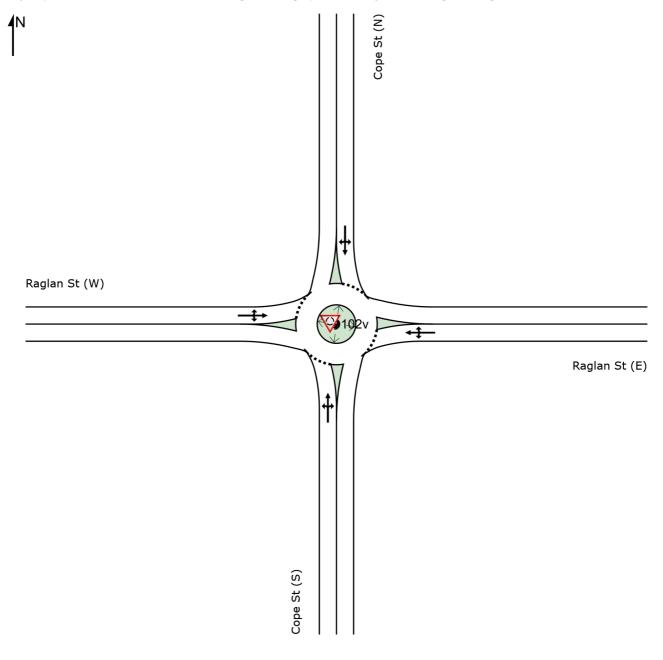


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₩ Site: 102v [Raglan St / Cope St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 102v [Raglan St / Cope St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

■ Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c		Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Cope													
1	L2	82	0.0	82	0.0	0.279	7.2	LOS A	1.6	10.9	0.46	0.57	0.46	34.6
2	T1	100	0.0	100	0.0	0.279	4.7	LOS A	1.6	10.9	0.46	0.57	0.46	44.0
3	R2	5	0.0	5	0.0	0.279	7.7	LOS A	1.6	10.9	0.46	0.57	0.46	34.8
Appro	oach	187	0.0	187	0.0	0.279	5.9	LOS A	1.6	10.9	0.46	0.57	0.46	41.6
East:	Raglar	n St (E)												
4	L2	4	0.0	4	0.0	0.141	4.2	LOS A	0.7	5.0	0.34	0.53	0.34	29.1
5	T1	89	0.0	89	0.0	0.141	5.3	LOS A	0.7	5.0	0.34	0.53	0.34	29.1
6	R2	8	0.0	8	0.0	0.141	6.7	LOS A	0.7	5.0	0.34	0.53	0.34	44.6
Appro	oach	101	0.0	101	0.0	0.141	5.4	LOS A	0.7	5.0	0.34	0.53	0.34	33.3
North	: Cope	St (N)												
7	L2	10	0.0	10	0.0	0.153	5.3	LOS A	0.8	5.8	0.46	0.61	0.46	40.9
8	T1	34	0.0	34	0.0	0.153	4.8	LOS A	0.8	5.8	0.46	0.61	0.46	40.9
9	R2	55	0.0	55	0.0	0.153	10.1	LOS A	0.8	5.8	0.46	0.61	0.46	40.9
Appro	oach	99	0.0	99	0.0	0.153	7.8	LOS A	0.8	5.8	0.46	0.61	0.46	40.9
West	: Ragla	n St (W)												
10	L2	70	0.0	70	0.0	0.429	2.1	LOS A	2.0	14.2	0.35	0.26	0.35	33.7
11	T1	173	0.0	173	0.0	0.429	2.1	LOS A	2.0	14.2	0.35	0.26	0.35	24.2
12	R2	12	0.0	12	0.0	0.429	3.2	LOS A	2.0	14.2	0.35	0.26	0.35	17.5
Appro	oach	255	0.0	255	0.0	0.429	2.1	LOS A	2.0	14.2	0.35	0.26	0.35	28.9
All Ve	ehicles	642	0.0	642	0.0	0.429	4.6	LOS A	2.0	14.2	0.40	0.44	0.40	36.0

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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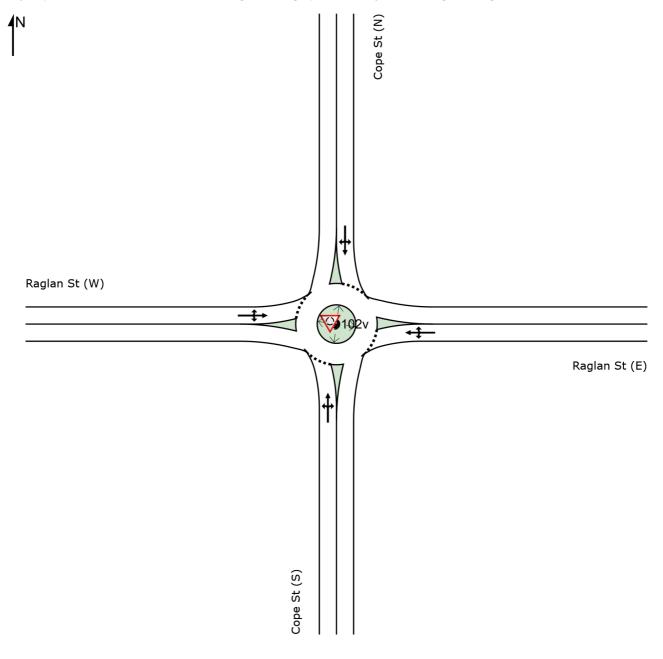
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Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

₩ Site: 102v [Raglan St / Cope St - BL- PM (Site Folder: PM Peak (16-17 PM))]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 102v [Raglan St / Cope St - BL- PM (Site Folder: PM Peak (16-17 PM))]

Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Roundabout

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh	ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	n: Cope		/0	VG11/11	70	0,0			Von					KIT#T
1	L2	45	0.0	45	0.0	0.227	8.7	LOS A	1.2	8.1	0.56	0.66	0.56	31.9
2	T1	75	0.0	75	0.0	0.227	6.2	LOS A	1.2	8.1	0.56	0.66	0.56	42.6
3	R2	8	0.0	8	0.0	0.227	9.2	LOS A	1.2	8.1	0.56	0.66	0.56	32.7
Appr	oach	128	0.0	128	0.0	0.227	7.3	LOS A	1.2	8.1	0.56	0.66	0.56	40.1
East:	Raglar	n St (E)												
4	L2	1	0.0	1	0.0	0.266	4.8	LOS A	1.5	10.8	0.44	0.57	0.44	28.3
5	T1	176	0.0	176	0.0	0.266	5.9	LOS A	1.5	10.8	0.44	0.57	0.44	28.3
6	R2	8	0.0	8	0.0	0.266	7.3	LOS A	1.5	10.8	0.44	0.57	0.44	44.3
Appr	oach	185	0.0	185	0.0	0.266	6.0	LOS A	1.5	10.8	0.44	0.57	0.44	30.8
North	: Cope	St (N)												
7	L2	11	0.0	11	0.0	0.194	5.7	LOS A	1.1	8.0	0.50	0.64	0.50	41.6
8	T1	28	0.0	28	0.0	0.194	5.2	LOS A	1.1	8.0	0.50	0.64	0.50	41.7
9	R2	85	0.0	85	0.0	0.194	10.5	LOS A	1.1	8.0	0.50	0.64	0.50	41.7
Appr	oach	124	0.0	124	0.0	0.194	8.9	LOS A	1.1	8.0	0.50	0.64	0.50	41.7
West	: Ragla	n St (W)												
10	L2	64	0.0	64	0.0	0.454	1.7	LOS A	2.3	16.0	0.29	0.20	0.29	33.8
11	T1	195	0.0	195	0.0	0.454	1.7	LOS A	2.3	16.0	0.29	0.20	0.29	24.5
12	R2	20	0.0	20	0.0	0.454	2.9	LOS A	2.3	16.0	0.29	0.20	0.29	17.8
Appr	bach	279	0.0	279	0.0	0.454	1.8	LOS A	2.3	16.0	0.29	0.20	0.29	28.5
All Ve	ehicles	716	0.0	716	0.0	0.454	5.1	LOS A	2.3	16.0	0.41	0.46	0.41	35.0

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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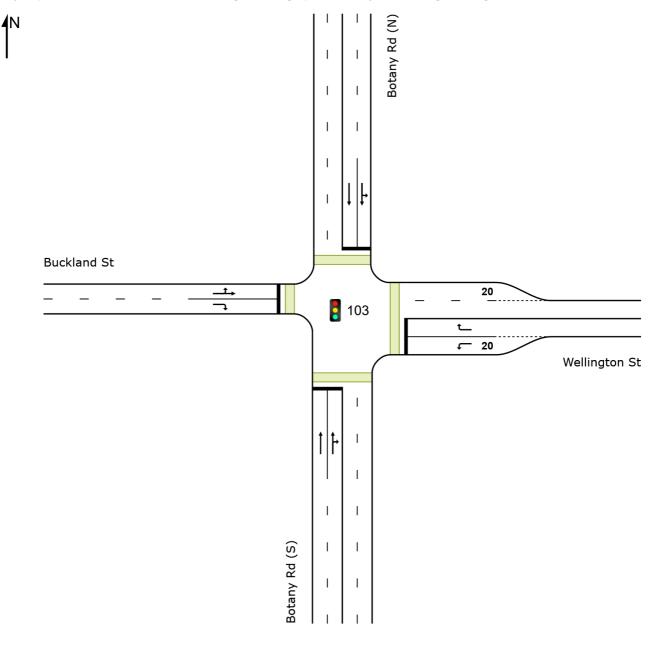
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 103 [Botany Rd / Wellington St / Buckland St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 103 [Botany Rd / Wellington St / Buckland St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

■ Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	n: Botar	ny Rd (S)												
2	T1	616	0.0	616	0.0	*0.441	10.4	LOS A	15.5	108.5	0.52	0.48	0.52	33.0
3	R2	170	0.0	170	0.0	0.441	22.4	LOS B	7.4	51.7	0.63	0.72	0.63	33.6
Appr	oach	786	0.0	786	0.0	0.441	13.0	LOS A	15.5	108.5	0.54	0.53	0.54	33.1
East:	Welling	gton St												
4	L2	172	0.0	172	0.0	*0.443	48.2	LOS D	8.3	58.3	0.87	0.77	0.87	22.6
6	R2	10	0.0	10	0.0	0.043	49.0	LOS D	0.5	3.3	0.81	0.65	0.81	5.0
Appr	oach	182	0.0	182	0.0	0.443	48.3	LOS D	8.3	58.3	0.86	0.76	0.86	22.0
North	n: Botan	iy Rd (N)												
7	L2	102	0.0	102	0.0	0.400	15.2	LOS B	12.9	90.0	0.48	0.49	0.48	31.7
8	T1	920	0.0	920	0.0	0.400	9.1	LOS A	12.9	90.0	0.47	0.45	0.47	42.5
Appr	oach	1022	0.0	1022	0.0	0.400	9.7	LOS A	12.9	90.0	0.47	0.45	0.47	42.0
West	: Buckla	and St												
10	L2	55	0.0	55	0.0	0.385	46.1	LOS D	8.2	57.7	0.90	0.75	0.90	23.2
11	T1	110	0.0	110	0.0	0.385	43.0	LOS D	8.2	57.7	0.90	0.75	0.90	23.2
12	R2	55	0.0	55	0.0	0.230	51.3	LOS D	2.9	20.0	0.91	0.74	0.91	27.0
Appr	oach	220	0.0	220	0.0	0.385	45.9	LOS D	8.2	57.7	0.90	0.75	0.90	24.6
All Ve	ehicles	2210	0.0	2210	0.0	0.443	17.7	LOS B	15.5	108.5	0.57	0.54	0.57	34.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance													
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service		AVERAGE BACK OF QUEUE		ffective Stop	Travel Time	Travel Dist.	Aver. Speed			
				[Ped	Dist]		Rate						
South: Botany Ro	ped/h	sec	_	ped	m	_	_	sec	m	m/sec			
	1(3)												
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
East: Wellington	St												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98			
North: Botany Ro	I (N)												
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98			
West: Buckland S	St												
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97			

All Pedestrians 211 5	54.3 LOS E	0.2	0.2	0.95	0.95	219.0	214.1	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: 103 [Botany Rd / Wellington St / Buckland St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network User-Given Cycle Time)

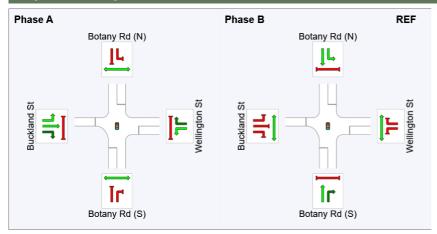
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

Phase Timing	Summary
--------------	---------

Phase	Α	В
Phase Change Time (sec)	86	0
Green Time (sec)	28	80
Phase Time (sec)	34	86
Phase Split	28%	72%

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



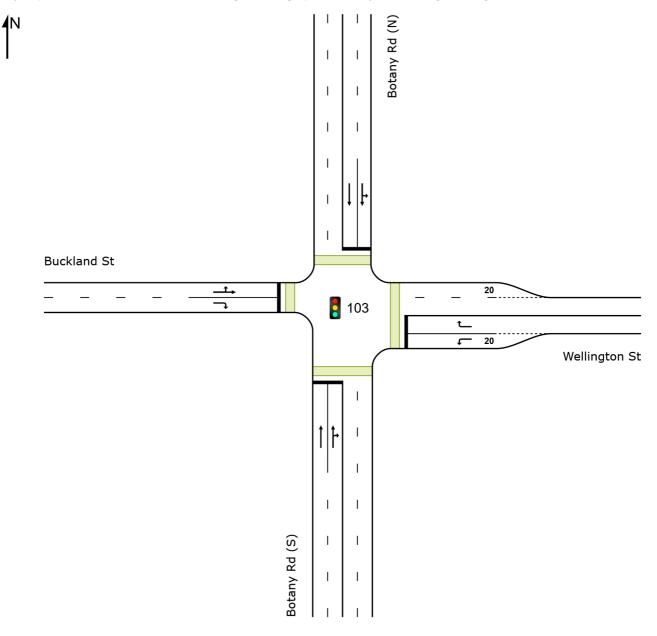
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 103 [Botany Rd / Wellington St / Buckland St - BL- PM (Site Folder: PM Peak (16-17 PM))]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 103 [Botany Rd / Wellington St / Buckland St - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South: Botany Rd (S)														
2 3	T1 R2	394 130	0.0 0.0	394 130	0.0 0.0	0.296 0.356	7.9 25.0	LOS A LOS B	8.9 4.7	62.6 32.6	0.43 0.64	0.38 0.75	0.43 0.64	34.2 33.2
Аррі	roach	524	0.0	524	0.0	0.356	12.2	LOS A	8.9	62.6	0.48	0.47	0.48	33.9
East	: Welling	ton St												
4	L2	72	0.0	72	0.0	0.250	50.1	LOS D	3.7	25.9	0.90	0.75	0.90	22.1
6	R2	120	0.0	120	0.0	*0.532	52.8	LOS D	6.5	45.6	0.95	0.79	0.95	4.6
Аррі	roach	192	0.0	192	0.0	0.532	51.8	LOS D	6.5	45.6	0.93	0.77	0.93	13.1
Nort	h: Botan	y Rd (N)												
7	L2	76	0.0	76	0.0	*0.433	17.9	LOS B	19.5	136.2	0.65	0.62	0.65	28.8
8	T1	1062	0.0	1062	0.0	0.433	12.0	LOS A	19.5	136.2	0.64	0.59	0.64	40.7
Аррі	roach	1138	0.0	1138	0.0	0.433	12.4	LOS A	19.5	136.2	0.64	0.59	0.64	40.3
Wes	t: Buckla	and St												
10	L2	59	0.0	59	0.0	0.276	46.7	LOS D	5.2	36.4	0.88	0.74	0.88	21.9
11	T1	46	0.0	46	0.0	0.276	43.6	LOS D	5.2	36.4	0.88	0.74	0.88	21.9
12	R2	33	0.0	33	0.0	0.116	48.0	LOS D	1.6	11.4	0.87	0.71	0.87	27.7
Аррі	roach	138	0.0	138	0.0	0.276	46.0	LOS D	5.2	36.4	0.88	0.73	0.88	23.8
All V	ehicles	1992	0.0	1992	0.0	0.532	18.5	LOS B	19.5	136.2	0.64	0.59	0.64	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance													
Mov חו Crossing	Dem.	Aver.	Level of			Prop. Ef		Travel	Travel	Aver.			
ID Crossing	Flow	Delay	Service	QUE [Ped	Dist]	Que	Stop Rate	Time	Dist.	Speed			
	ped/h	sec		ped	m			sec	m	m/sec			
South: Botany F	Rd (S)												
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
East: Wellington	n St												
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	216.6	0.98			
North: Botany R	d (N)												
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.3	214.6	0.98			
West: Buckland	St												

P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	218.7	213.8	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: 103 [Botany Rd / Wellington St / Buckland St - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

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

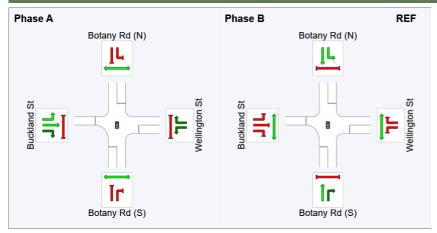
Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

Phase Timing Summary

Phase	Α	В
Phase Change Time (sec)	88	0
Green Time (sec)	26	82
Phase Time (sec)	32	88
Phase Split	27%	73%

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



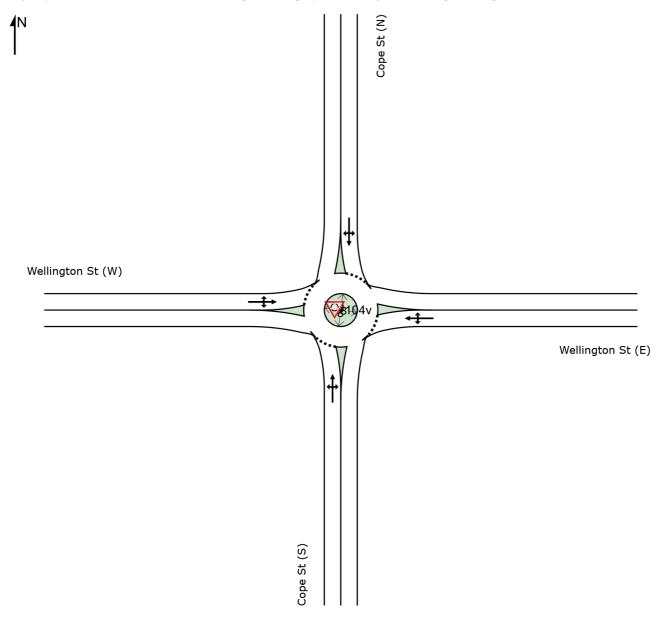
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W Site: 104v [Wellington St / Cope St - BL- AM (Site Folder: AM

Peak (7:30-8:30 AM))]

New Site Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 104v [Wellington St / Cope St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Roundabout

Vehi	cle Mo	vement	Perfo	rmano	e:									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c		Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Cope		70	ven/n	70	V/C	360	_	Ven				_	K11//11
1	L2	47	0.0	47	0.0	0.193	5.5	LOS A	1.0	6.9	0.46	0.60	0.46	41.8
2	T1	68	0.0	68	0.0	0.193	7.1	LOS A	1.0	6.9	0.46	0.60	0.46	41.8
3	R2	8	0.0	8	0.0	0.193	7.7	LOS A	1.0	6.9	0.46	0.60	0.46	45.1
Appr	oach	123	0.0	123	0.0	0.193	6.6	LOS A	1.0	6.9	0.46	0.60	0.46	42.2
East	Welling	gton St (E)											
4	L2	34	0.0	34	0.0	0.232	4.3	LOS A	1.3	9.3	0.34	0.49	0.34	42.8
5	T1	107	0.0	107	0.0	0.232	3.7	LOS A	1.3	9.3	0.34	0.49	0.34	38.5
6	R2	38	0.0	38	0.0	0.232	8.8	LOS A	1.3	9.3	0.34	0.49	0.34	38.5
Appr	oach	179	0.0	179	0.0	0.232	4.9	LOS A	1.3	9.3	0.34	0.49	0.34	39.8
North	n: Cope	St (N)												
7	L2	12	0.0	12	0.0	0.091	6.7	LOS A	0.5	3.3	0.54	0.65	0.54	39.9
8	T1	10	0.0	10	0.0	0.091	6.2	LOS A	0.5	3.3	0.54	0.65	0.54	40.5
9	R2	28	0.0	28	0.0	0.091	9.0	LOS A	0.5	3.3	0.54	0.65	0.54	28.7
Appr	oach	50	0.0	50	0.0	0.091	7.9	LOS A	0.5	3.3	0.54	0.65	0.54	36.1
West	: Wellin	gton St (V	V)											
10	L2	81	0.0	81	0.0	0.636	7.1	LOS A	4.3	29.8	0.45	0.64	0.46	23.2
11	T1	250	0.0	250	0.0	0.636	6.8	LOS A	4.3	29.8	0.45	0.64	0.46	48.2
12	R2	51	0.0	51	0.0	0.636	9.6	LOS A	4.3	29.8	0.45	0.64	0.46	47.6
Appr	oach	382	0.0	382	0.0	0.636	7.3	LOS A	4.3	29.8	0.45	0.64	0.46	46.4
All V	ehicles	734	0.0	734	0.0	0.636	6.6	LOS A	4.3	29.8	0.43	0.59	0.44	42.8

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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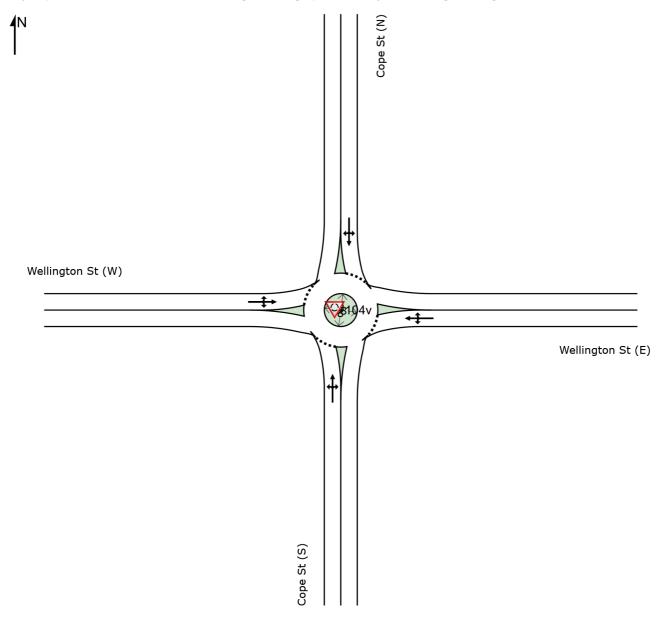
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

W Site: 104v [Wellington St / Cope St - BL- PM (Site Folder: PM

Peak (16-17 PM))]

New Site Site Category: (None) Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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V Site: 104v [Wellington St / Cope St - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Roundabout

Vehi	Vehicle Movement Performance													
Mov ID	Turn	DEMA FLOV [Total	VS HV]	ARRI FLO [Total	WS HV]	Deg. Satn	Delay	Level of Service	95% BA QUE [Veh.	EUE Dist]	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed
Sout	h: Cope	veh/h St (S)	%	veh/h	%	v/c	sec	_	veh	m	_	_	_	km/h
1	L2	40	0.0	40	0.0	0.139	5.5	LOS A	0.7	4.8	0.45	0.59	0.45	40.0
2	T1	37	0.0	37	0.0	0.139	7.1	LOSA	0.7	4.8	0.45	0.59	0.45	40.0
3	R2	11	0.0	11	0.0	0.139	7.7	LOSA	0.7	4.8	0.45	0.59	0.45	44.1
-	oach	88	0.0	88	0.0	0.139	6.5	LOSA	0.7	4.8	0.45	0.59	0.45	40.9
East	: Welling	gton St (E)											
4	L2	12	0.0	12	0.0	0.209	4.0	LOS A	1.2	8.3	0.29	0.45	0.29	42.7
5	T1	128	0.0	128	0.0	0.209	3.4	LOS A	1.2	8.3	0.29	0.45	0.29	38.4
6	R2	29	0.0	29	0.0	0.209	8.5	LOS A	1.2	8.3	0.29	0.45	0.29	38.4
Appr	oach	169	0.0	169	0.0	0.209	4.3	LOS A	1.2	8.3	0.29	0.45	0.29	38.9
Nort	h: Cope	St (N)												
7	L2	15	0.0	15	0.0	0.076	5.4	LOS A	0.4	2.7	0.43	0.57	0.43	40.9
8	T1	10	0.0	10	0.0	0.076	4.8	LOS A	0.4	2.7	0.43	0.57	0.43	41.5
9	R2	24	0.0	24	0.0	0.076	7.6	LOS A	0.4	2.7	0.43	0.57	0.43	30.3
Appr	oach	49	0.0	49	0.0	0.076	6.4	LOS A	0.4	2.7	0.43	0.57	0.43	38.0
Wes	t: Wellin	gton St (V	V)											
10	L2	62	0.0	62	0.0	0.396	5.2	LOS A	1.8	12.7	0.26	0.57	0.26	27.4
11	T1	151	0.0	151	0.0	0.396	5.0	LOS A	1.8	12.7	0.26	0.57	0.26	50.3
12	R2	39	0.0	39	0.0	0.396	7.8	LOS A	1.8	12.7	0.26	0.57	0.26	49.7
Appr	oach	252	0.0	252	0.0	0.396	5.5	LOS A	1.8	12.7	0.26	0.57	0.26	48.5
All V	ehicles	558	0.0	558	0.0	0.396	5.4	LOS A	1.8	12.7	0.32	0.54	0.32	42.6

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

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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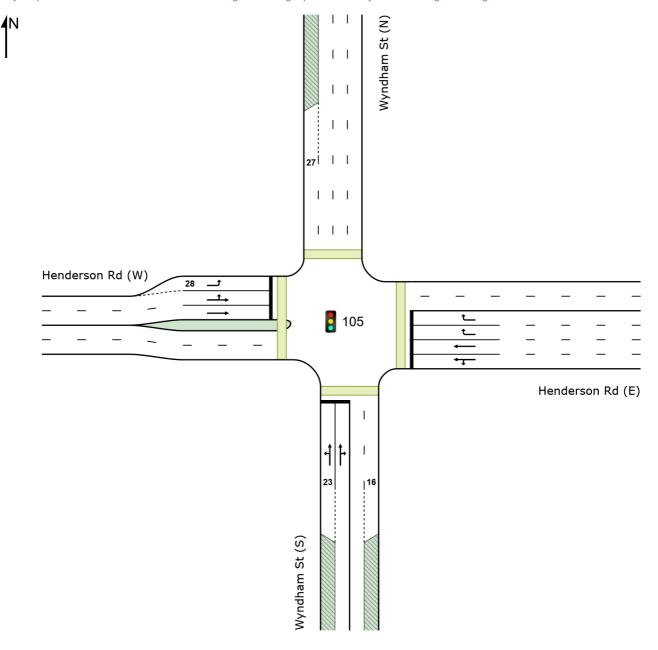
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 105 [Henderson Rd / Wyndham St - BL- AM (Site Folder:

AM Peak (7:30-8:30 AM))]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 105 [Henderson Rd / Wyndham St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLO	VS	ARRI FLO	NS	Deg. Satn	Aver. Delay	Level of Service	QUE	ACK OF	Prop. Que	Effective A Stop	ver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h		v/c	sec		[Veh. veh	Dist] m		Rate		km/h
South	n: Wync	lham St (S)											
1	L2	18	0.0	18	0.0	0.706	50.5	LOS D	10.3	71.8	0.87	0.75	0.91	33.9
2	T1	398	0.0	398	0.0	*0.706	45.0	LOS D	10.3	72.2	0.87	0.74	0.91	34.6
3	R2	2	0.0	2	0.0	0.706	50.5	LOS D	10.3	72.2	0.87	0.74	0.91	24.7
Appro	bach	418	0.0	418	0.0	0.706	45.2	LOS D	10.3	72.2	0.87	0.74	0.91	34.5
East:	Hende	rson Rd (E)											
4	L2	143	0.0	143	0.0	0.315	9.3	LOS A	4.6	32.2	0.22	0.35	0.22	49.0
5	T1	672	0.0	672	0.0	0.315	4.1	LOS A	4.6	32.2	0.20	0.24	0.20	52.9
6	R2	666	0.0	666	0.0	*0.615	13.2	LOS A	5.6	39.5	0.55	0.73	0.55	41.7
Appro	bach	1481	0.0	1481	0.0	0.615	8.7	LOS A	5.6	39.5	0.36	0.47	0.36	46.9
West	Hende	erson Rd	(W)											
10	L2	472	0.0	472	0.0	* 0.687	46.3	LOS D	11.8	82.7	0.89	0.82	0.92	33.6
11	T1	240	0.0	240	0.0	0.434	37.8	LOS C	11.5	80.3	0.87	0.73	0.87	27.0
Appro	bach	712	0.0	712	0.0	0.687	43.4	LOS D	11.8	82.7	0.88	0.79	0.90	32.0
All Ve	hicles	2611	0.0	2611	0.0	0.706	24.0	LOS B	11.8	82.7	0.58	0.60	0.59	38.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance													
Mov ID Crossin	Dem. 9 Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	ffective Stop Rate	Travel Time	Travel Dist.	Aver. Speed			
	ped/h	sec		ped	m			sec	m	m/sec			
South: Wyndham St (S)													
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
East: Henderson Rd (E)													
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.9	221.8	0.99			
North: Wyndham St (N)													
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98			
West: Henderson Rd (W)													
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.3	221.0	0.99			
All Pedestria	ans 211	54.3	LOS E	0.2	0.2	0.95	0.95	222.2	218.3	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: 105 [Henderson Rd / Wyndham St - BL- AM (Site Folder: AM Peak (7:30-8:30 AM))]

Network: N101 [AM Peak (7:30-8:30 AM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None)

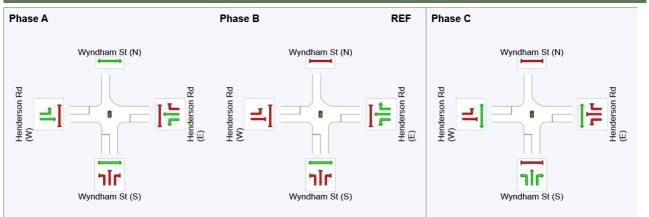
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

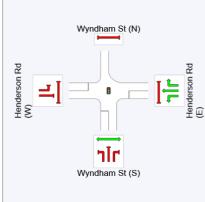
Phase Timing Summary										
Phase	Α	В	С	D						
Phase Change Time (sec)	102	22	52	85						
Green Time (sec)	34	24	27	11						
Phase Time (sec)	40	30	33	17						
Phase Split	33%	25%	28%	14%						

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



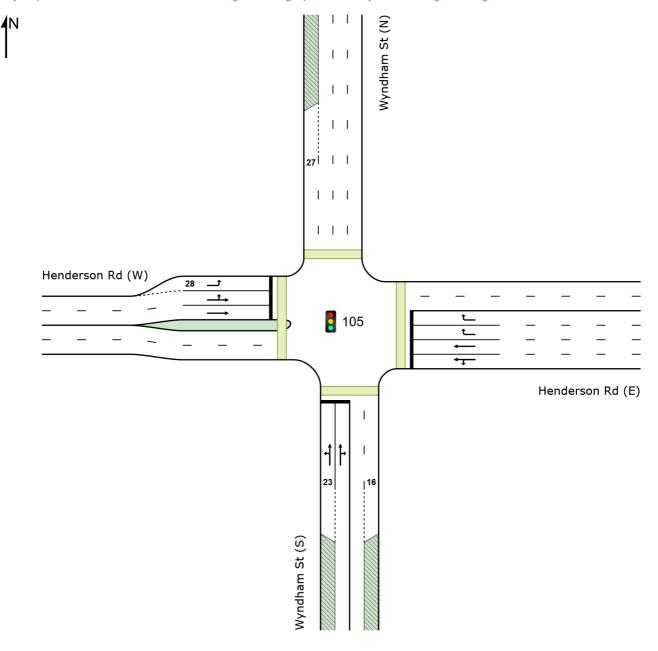
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Site: 105 [Henderson Rd / Wyndham St - BL- PM (Site Folder:

PM Peak (16-17 PM))]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 105 [Henderson Rd / Wyndham St - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

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

Vehi	cle Mo	vement	Perfo	rmanc	:e									
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh	ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Wynd	lham St (S)											
1 2	L2 T1	18 500	0.0 0.0	18 500	0.0 0.0	* 0.831 0.831	53.2 47.7	LOS D LOS D	13.5 13.6	94.8 95.1	0.85 0.85	0.82 0.81	1.01 1.01	33.1 33.7
3	R2	5	0.0	5	0.0	0.831	53.2	LOS D	13.6	95.1	0.85	0.81	1.01	23.8
Appro	bach	523	0.0	523	0.0	0.831	47.9	LOS D	13.6	95.1	0.85	0.81	1.01	33.6
East:	Hende	rson Rd (E)											
4	L2	186	0.0	186	0.0	0.395	9.7	LOS A	5.7	39.9	0.22	0.38	0.22	48.4
5	T1	785	0.0	785	0.0	0.395	8.1	LOS A	12.7	88.8	0.39	0.41	0.39	48.1
6	R2	592	0.0	592	0.0	*0.531	32.2	LOS C	9.3	65.1	1.00	0.84	1.00	30.3
Appro	bach	1563	0.0	1563	0.0	0.531	17.4	LOS B	12.7	88.8	0.60	0.57	0.60	39.4
West	Hende	erson Rd	(W)											
10	L2	362	0.0	362	0.0	*0.580	49.9	LOS D	9.4	66.0	0.92	0.80	0.92	32.6
11	T1	277	0.0	277	0.0	0.580	43.5	LOS D	14.2	99.4	0.94	0.79	0.94	25.0
Appro	bach	639	0.0	639	0.0	0.580	47.1	LOS D	14.2	99.4	0.92	0.80	0.92	30.0
All Ve	hicles	2725	0.0	2725	0.0	0.831	30.2	LOS C	14.2	99.4	0.72	0.67	0.75	34.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedest	rian Movemen	t Perforr	nance							
Mov ID Cro	Dem. Ssing Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped	EUE Dist]	Prop. Ef Que	fective Stop Rate	Travel Time		Aver. Speed
South: V	ped/h Vyndham St (S)	sec	_	ped	m	_	_	sec	m	m/sec
		54.0	100 5	0.0	0.0	0.05	0.05	040.0	045.0	0.00
P1 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
East: He	enderson Rd (E)									
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.9	221.8	0.99
North: W	/yndham St (N)									
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
West: He	enderson Rd (W)								
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.3	221.0	0.99
All Pede	strians 211	54.3	LOS E	0.2	0.2	0.95	0.95	222.2	218.3	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: 105 [Henderson Rd / Wyndham St - BL- PM (Site Folder: PM Peak (16-17 PM))]

■ Network: N101 [PM Peak (16-17 PM) (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

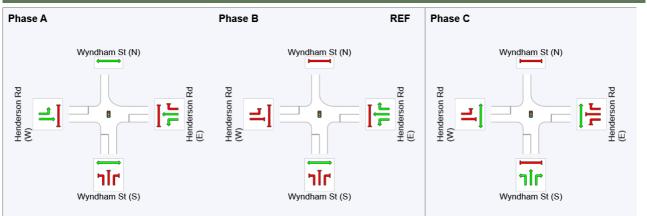
Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog Phase Times specified by the user Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

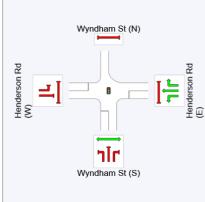
Phase Timing Summary	,			
Phase	Α	В	С	D
Phase Change Time (sec)	80	115	26	63
Green Time (sec)	29	25	31	11
Phase Time (sec)	35	31	37	17
Phase Split	29%	26%	31%	14%

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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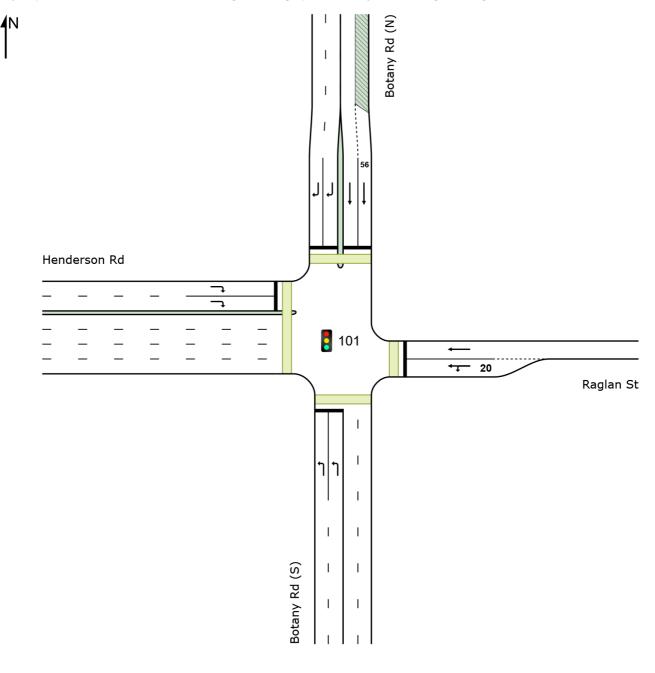


Appendix C: Closure Scenario A SIDRA Model Outputs

Site: 101 [Botany Rd / Henderson Rd - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Botany Rd / Henderson Rd - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

		vement												
Mov ID	Turn	DEMA FLO\		ARRI FLO		Deg. Satn	Aver. Delay	Level of Service		ACK OF EUE	Prop. Que	Effective A Stop	ver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h		v/c	sec		[Veh. veh	Dist] m		Rate		km/h
Sout	h: Botan	y Rd (S)												
1	L2	681	2.0	681	2.0	*0.892	59.8	LOS E	19.5	139.0	1.00	0.99	1.33	11.5
Appr	oach	681	2.0	681	2.0	0.892	59.8	LOS E	19.5	139.0	1.00	0.99	1.33	11.5
East	Raglan	St												
4	L2	240	2.0	240	2.0	0.897	58.3	LOS E	13.3	94.4	0.96	1.06	1.40	4.6
5	T1	218	2.0	218	2.0	0.831	46.1	LOS D	10.8	77.0	0.94	0.98	1.22	5.6
Appr	oach	458	2.0	458	2.0	0.897	52.5	LOS D	13.3	94.4	0.95	1.02	1.31	5.0
North	n: Botan	y Rd (N)												
8	T1	869	2.0	869	2.0	0.340	8.9	LOS A	9.0	63.9	0.46	0.52	0.46	40.5
9	R2	582	2.0	582	2.0	*0.890	60.1	LOS E	16.6	118.4	1.00	0.99	1.36	19.0
Appr	oach	1451	2.0	1451	2.0	0.890	29.4	LOS C	16.6	118.4	0.68	0.71	0.82	28.0
West	: Hende	erson Rd												
12	R2	242	2.0	242	2.0	*0.897	59.0	LOS E	6.7	47.7	1.00	0.96	1.34	5.2
Appr	oach	242	2.0	242	2.0	0.897	59.0	LOS E	6.7	47.7	1.00	0.96	1.34	5.2
All Ve	ehicles	2832	2.0	2832	2.0	0.897	43.0	LOS D	19.5	139.0	0.83	0.85	1.07	18.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	vement	Perform	nance							
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
	ped/h	sec		ped	m			sec	m	m/sec
South: Botany Ro	d (S)									
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.4	214.6	1.03
East: Raglan St										
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	205.8	210.0	1.02
North: Botany Ro	I (N)									
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	210.3	215.8	1.03
West: Hendersor	n Rd									
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	215.5	222.6	1.03
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	210.2	215.8	1.03

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: 101 [Botany Rd / Henderson Rd - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

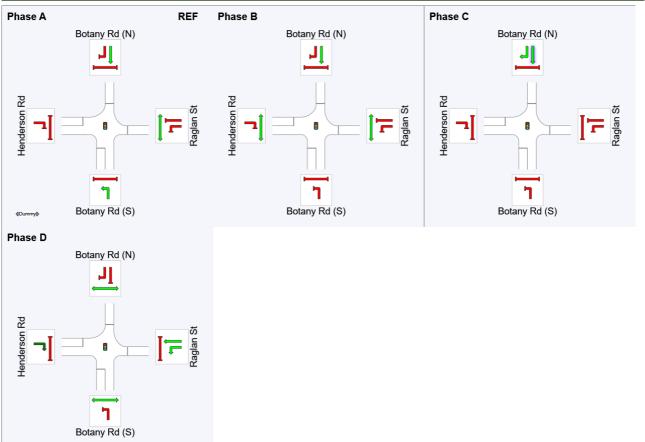
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase A Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	0	27	49	73
Green Time (sec)	21	17	18	21
Phase Time (sec)	26	23	24	27
Phase Split	26%	23%	24%	27%

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



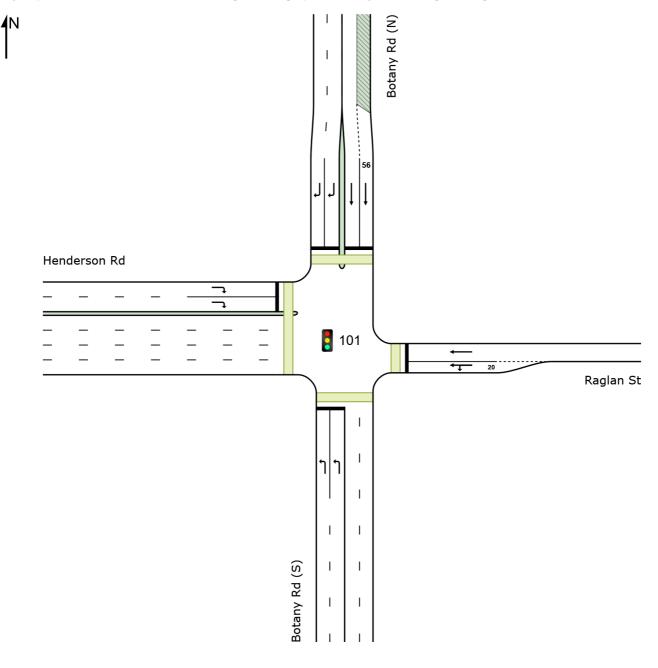
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Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011/SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 101 [Botany Rd / Henderson Rd - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Botany Rd / Henderson Rd - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

Vehi	cle Mo	vement	Perfo	rmanc	:e									
Mov ID	Turn	DEMA FLOV [Total veh/h	ND	ARRI FLO [Total veh/h	VAL WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botan	y Rd (S)												
1	L2	573	2.0	573	2.0	* 1.031	123.0	LOS F	29.6	210.7	1.00	1.13	1.68	6.1
Appr	oach	573	2.0	573	2.0	1.031	123.0	LOS F	29.6	210.7	1.00	1.13	1.68	6.1
East	Raglan	St												
4	L2	258	2.0	258	2.0	0.947	80.9	LOS F	15.6	111.0	0.90	1.08	1.38	3.4
5	T1	288	2.0	288	2.0	*0.947	78.6	LOS F	15.6	111.0	0.90	1.15	1.40	3.5
Appr	oach	546	2.0	546	2.0	0.947	79.7	LOS F	15.6	111.0	0.90	1.12	1.39	3.5
North	n: Botan	y Rd (N)												
8	T1	1117	2.0	1117	2.0	0.726	15.8	LOS B	21.3	151.9	0.59	0.62	0.59	35.2
9	R2	702	2.0	702	2.0	* 1.000	110.0	LOS F	32.9	230.0	1.00	1.12	1.61	12.5
Appr	oach	1819	2.0	1819	2.0	1.000	52.2	LOS D	32.9	230.0	0.75	0.81	0.98	20.9
West	: Hende	rson Rd												
12	R2	282	2.0	282	2.0	0.881	83.0	LOS F	10.1	72.1	1.00	0.95	1.24	3.8
Appr	oach	282	2.0	282	2.0	0.881	83.0	LOS F	10.1	72.1	1.00	0.95	1.24	3.8
All V	ehicles	3220	2.0	3220	2.0	1.031	72.1	LOS F	32.9	230.0	0.84	0.93	1.20	13.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	vement	Perform	nance							
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
	ped/h	sec		ped	m			sec	m	m/sec
South: Botany Ro	d (S)									
P1 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	224.3	214.6	0.96
East: Raglan St										
P2 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	219.7	208.5	0.95
North: Botany Ro	I (N)									
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	225.3	215.8	0.96
West: Hendersor	n Rd									
P4 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	230.5	222.6	0.97
All Pedestrians	211	59.3	LOS E	0.2	0.2	0.96	0.96	224.9	215.4	0.96

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: 101 [Botany Rd / Henderson Rd - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	102	0	24	58
Green Time (sec)	22	18	28	38
Phase Time (sec)	28	24	34	44
Phase Split	22%	18%	26%	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 Phase A Phase B REF Phase C Botany Rd (N) Botany Rd (N) Botany Rd (N) R Henderson Rd Henderson Rd Raglan St Raglan St Henderson aglan Г ٦ ٦ ٦ Botany Rd (S) Botany Rd (S) Botany Rd (S) Phase D Botany Rd (N) Rd lenderson aglan

REF: Reference Phase VAR: Variable Phase

Botany Rd (S)



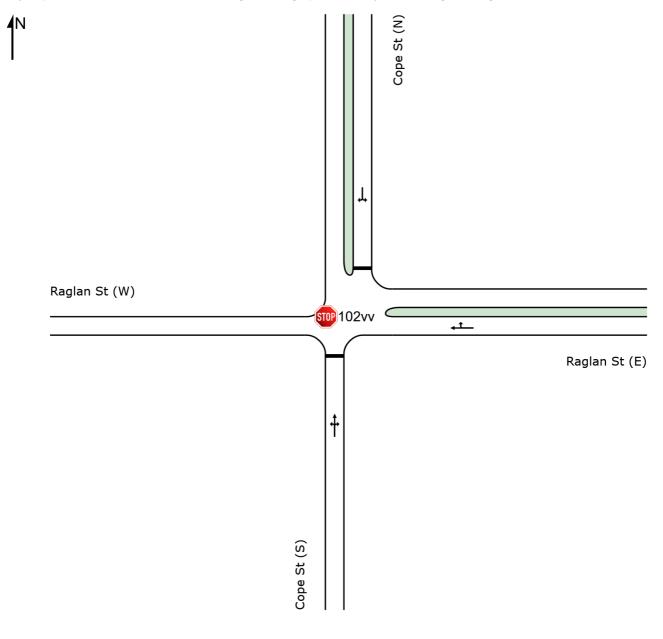
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Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011/SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 102vv [Raglan St / Cope St - CC- AM - S.C - Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 102vv [Raglan St / Cope St - CC- AM - S.C - Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Vehi	cle Mo	vement	Perfo	rmanc	:e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Cope	St (S)												
1 2 3	L2 T1 R2	376 237 11	2.0 2.0 2.0	376 237 11	2.0 2.0 2.0	0.625 0.625 0.625	7.0 6.8 6.8	LOS A LOS A LOS A	3.0 3.0 3.0	21.1 21.1 21.1	0.20 0.20 0.20	0.90 0.90 0.90	0.20 0.20 0.20	29.9 36.3 31.4
Appro		624	2.0	624	2.0	0.625	6.9	LOS A	3.0	21.1	0.20	0.90	0.20	33.9
East:	Raglar	n St (E)												
5 6	T1 R2	41 8	2.0 2.0	41 8	2.0 2.0	0.036 0.036	0.0 3.5	LOS A LOS A	0.0 0.0	0.0 0.0	0.00 0.00	0.08 0.08	0.00 0.00	37.2 39.5
Appro	bach	49	2.0	49	2.0	0.036	0.6	NA	0.0	0.0	0.00	0.08	0.00	38.5
North	: Cope	St (N)												
7	L2	10	2.0	10	2.0	0.130	6.8	LOS A	0.3	2.4	0.60	0.88	0.60	40.2
9	R2	41	2.0	41	2.0	0.130	14.1	LOS A	0.3	2.4	0.60	0.88	0.60	40.7
Appro	bach	51	2.0	51	2.0	0.130	12.7	LOS A	0.3	2.4	0.60	0.88	0.60	40.6
All Ve	hicles	724	2.0	724	2.0	0.625	6.9	NA	3.0	21.1	0.21	0.84	0.21	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

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

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

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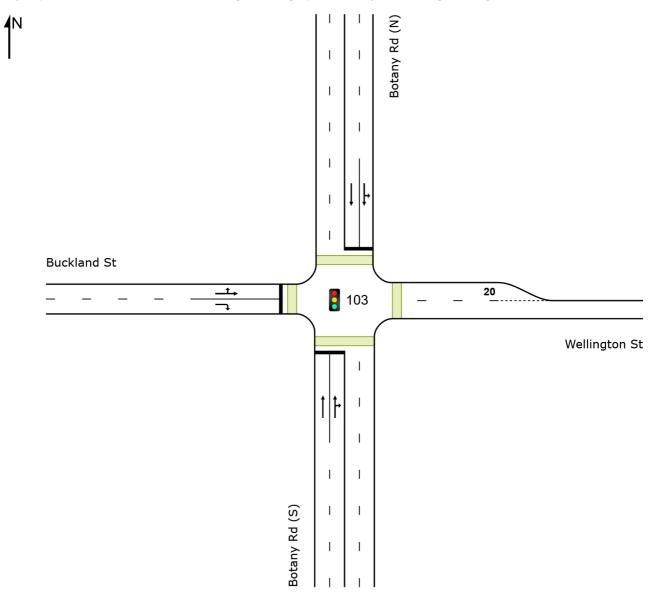
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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- AM -S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

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

Vehi	cle Mo	vement	Perfo	rmano	:e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Botan	ny Rd (S)												
2 3 Appro	T1 R2 pach	626 170 796	2.0 2.0 2.0	626 170 796	2.0 2.0 2.0	0.452 * 0.470 0.470	6.1 15.9 8.2	LOS A LOS B LOS A	12.5 4.8 12.5	88.7 34.0 88.7	0.45 0.60 0.48	0.41 0.72 0.47	0.45 0.60 0.48	35.3 29.7 33.9
North	: Botan	y Rd (N)												
7 8 Appro	L2 T1 pach	425 926 1351	2.0 2.0 2.0	425 926 1351	2.0 2.0 2.0	0.499 0.499 0.499	11.5 3.8 6.2	LOS A LOS A LOS A	10.9 10.9 10.9	77.5 77.5 77.5	0.37 0.27 0.30	0.58 0.31 0.39	0.37 0.27 0.30	34.9 46.3 44.4
West	: Buckla	and St												
10 11 12	L2 T1 R2	55 92 55	2.0 2.0 2.0	55 92 55	2.0 2.0 2.0	0.486 * 0.486 0.188	45.8 42.8 43.5	LOS D LOS D LOS D	6.7 6.7 2.4	47.8 47.8 16.9	0.96 0.96 0.90	0.78 0.78 0.73	0.96 0.96 0.90	23.1 23.1 28.7
Appro	oach ehicles	202 2349	2.0 2.0	202 2349	2.0 2.0	0.486 0.499	43.8 10.1	LOS D	6.7 12.5	47.8 88.7	0.94 0.42	0.77 0.45	0.94 0.42	25.2 37.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	vement	Perform	nance							
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE	EUE	Prop. Ef Que	Stop	Travel Time	Travel Dist.	Aver. Speed
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec
South: Botany Ro	l (S)									
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03
East: Wellington	St									
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	205.8	210.0	1.02
North: Botany Rd	(N)									
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.4	214.6	1.03
West: Buckland S	St									
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	207.4	212.1	1.02

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: 103 [Botany Rd / Wellington St / Buckland St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM) Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

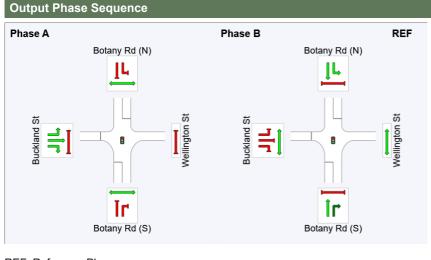
New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

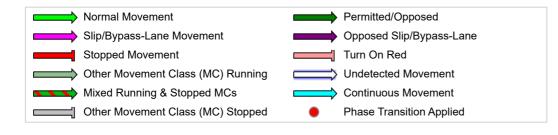
Phase Timing Summary

Phase	Α	В
Phase Change Time (sec)	78	0
Green Time (sec)	16	72
Phase Time (sec)	22	78
Phase Split	22%	78%

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%.



REF: Reference Phase VAR: Variable Phase



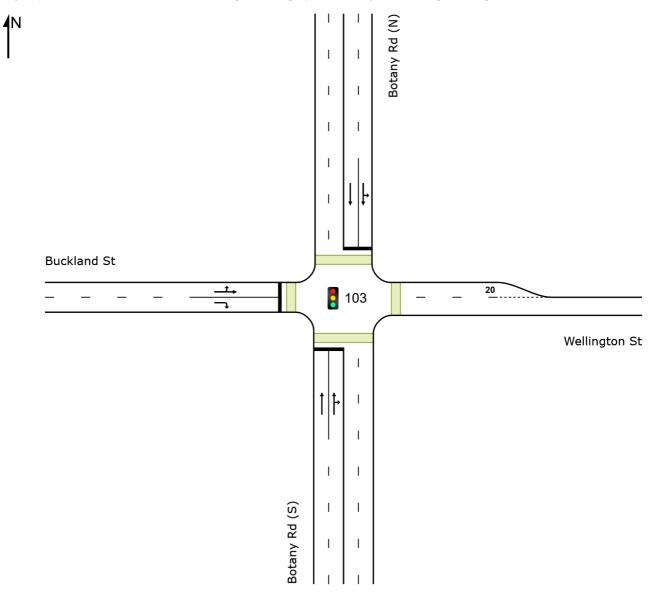
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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

Vehi	cle Mo	vement	Perfo	rmanc	e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF IEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Botan	iy Rd (S)												
2 3 Appro	T1 R2	514 130 644	2.0 2.0 2.0	514 130 644	2.0 2.0 2.0	0.331 *0.471 0.471	3.4 19.1 6.6	LOS A LOS B LOS A	8.3 4.7 8.3	59.2 33.3 59.2	0.28 0.59 0.34	0.26 0.71 0.35	0.28 0.59 0.34	37.2 28.3 35.0
North	: Botan	y Rd (N)												
7 8	L2 T1	416 1241	2.0 2.0	416 1241	2.0 2.0	0.544 0.544	9.7 5.0	LOS A LOS A	23.1 23.1	164.1 164.1	0.50 0.41	0.58 0.42	0.50 0.41	29.1 36.9
Appro		1657	2.0	1657	2.0	0.544	6.2	LOS A	23.1	164.1	0.44	0.46	0.44	36.0
	: Buckla			= 0		0.400								
10 11	L2 T1	59 34	2.0 2.0	59 34	2.0 2.0	0.499 * 0.499	65.2 62.7	LOS E LOS E	5.8 5.8	41.2 41.2	0.99 0.99	0.78 0.78	0.99 0.99	17.7 17.7
12	R2	33	2.0	33	2.0	0.180	62.7	LOS E	2.0	14.0	0.95	0.72	0.95	24.9
Appro	oach	126	2.0	126	2.0	0.499	63.9	LOS E	5.8	41.2	0.98	0.76	0.98	20.1
All Ve	ehicles	2427	2.0	2427	2.0	0.544	9.3	LOS A	23.1	164.1	0.44	0.45	0.44	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		ped	m			sec	m	m/sec	
South: Botany Ro	l (S)										
P1 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	224.8	215.2	0.96	
East: Wellington	St										
P2 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	220.3	209.3	0.95	
North: Botany Rd	(N)										
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	224.3	214.6	0.96	
West: Buckland S	St										
P4 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	219.7	208.6	0.95	
All Pedestrians	211	59.3	LOS E	0.2	0.2	0.96	0.96	222.3	211.9	0.95	

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: 103 [Botany Rd / Wellington St / Buckland St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

 Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

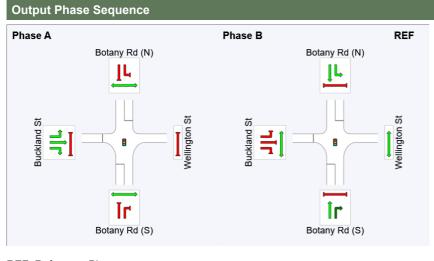
New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream lane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

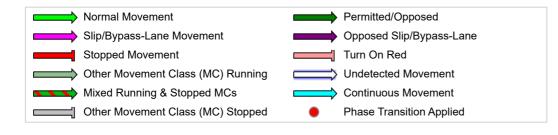
Phase Timing Summary

Phase	Α	В
Phase Change Time (sec)	111	0
Green Time (sec)	13	105
Phase Time (sec)	19	111
Phase Split	15%	85%

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%.



REF: Reference Phase VAR: Variable Phase

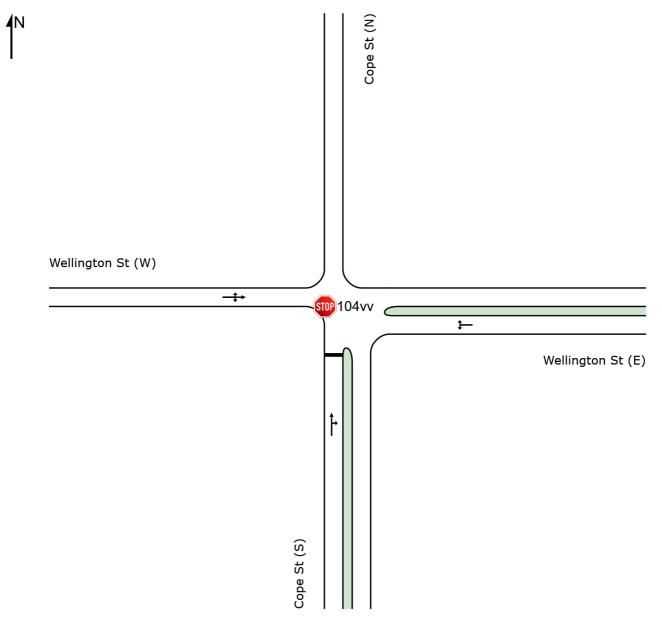


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Site: 104vv [Wellington St / Cope St - CC- AM - S.C -Conversion (2) (Site Folder: AM Peak Closure (7:30-8:30 AM) _Stop Control)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 104vv [Wellington St / Cope St - CC- AM - S.C -Conversion (2) (Site Folder: AM Peak Closure (7:30-8:30 AM) _Stop Control)] Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Cope	St (S)												
2 3	T1 R2	133 8	2.0 2.0	133 8	2.0 2.0	0.332	16.9 11.7	LOS B	1.4 1.4	10.0 10.0	0.72	1.06	0.89	39.6 43.5
Appro East:		141 gton St (E	2.0	141	2.0	0.332	16.6	LOS B	1.4	10.0	0.72	1.06	0.89	40.0
4	L2	34	2.0	34	2.0	0.172	6.5	LOS A	0.9	6.3	0.60	0.66	0.60	46.4
6	R2	145	2.0	145	2.0	0.172	8.6	LOS A	0.9	6.3	0.60	0.66	0.60	44.1
Appro	bach	179	2.0	179	2.0	0.172	8.2	NA	0.9	6.3	0.60	0.66	0.60	44.8
West	Wellin	gton St (\	N)											
10	L2	346	2.0	346	2.0	0.358	3.4	LOS A	0.6	4.1	0.03	0.27	0.03	30.3
11	T1	283	2.0	283	2.0	0.358	0.0	LOS A	0.6	4.1	0.03	0.27	0.03	38.4
12	R2	58	2.0	58	2.0	0.358	3.8	LOS A	0.6	4.1	0.03	0.27	0.03	38.0
Appro	bach	687	2.0	687	2.0	0.358	2.1	NA	0.6	4.1	0.03	0.27	0.03	37.2
All Ve	hicles	1007	2.0	1007	2.0	0.358	5.2	NA	1.4	10.0	0.23	0.45	0.25	39.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

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

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

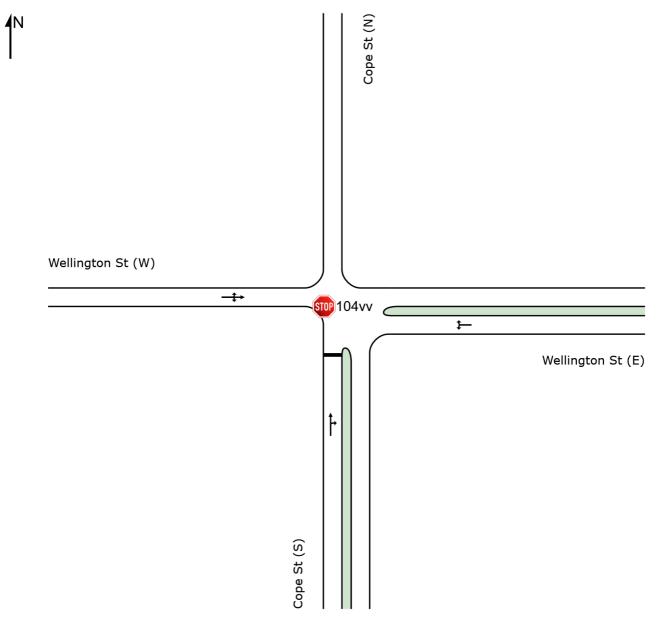
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Site: 104vv [Wellington St / Cope St - CC- PM - S.C -Conversion (2) (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 104vv [Wellington St / Cope St - CC- PM - S.C -Conversion (2) (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

New Site Site Category: (None) Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		ACK OF EUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Cope	St (S)												
2 3	T1 R2	89 11	2.0 2.0	89 11	2.0 2.0	0.194 0.194	12.4 9.3	LOS A LOS A	0.7 0.7	5.1 5.1	0.60 0.60	1.01 1.01	0.60 0.60	32.5 38.8
Appro	bach	100	2.0	100	2.0	0.194	12.0	LOS A	0.7	5.1	0.60	1.01	0.60	33.5
East:	Welling	gton St (E)											
4	L2	12	2.0	12	2.0	0.154	5.8	LOS A	0.8	5.5	0.55	0.68	0.55	47.7
6	R2	157	2.0	157	2.0	0.154	7.9	LOS A	0.8	5.5	0.55	0.68	0.55	46.6
Appro	bach	169	2.0	169	2.0	0.154	7.7	NA	0.8	5.5	0.55	0.68	0.55	46.8
West	Wellin	gton St (\	N)											
10	L2	353	2.0	353	2.0	0.303	3.4	LOS A	0.4	3.0	0.01	0.32	0.01	29.4
11	T1	180	2.0	180	2.0	0.303	0.0	LOS A	0.4	3.0	0.01	0.32	0.01	38.2
12	R2	47	2.0	47	2.0	0.303	3.7	LOS A	0.4	3.0	0.01	0.32	0.01	37.8
Appro	bach	580	2.0	580	2.0	0.303	2.4	NA	0.4	3.0	0.01	0.32	0.01	36.3
All Ve	hicles	849	2.0	849	2.0	0.303	4.6	NA	0.8	5.5	0.19	0.47	0.19	38.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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).

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

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

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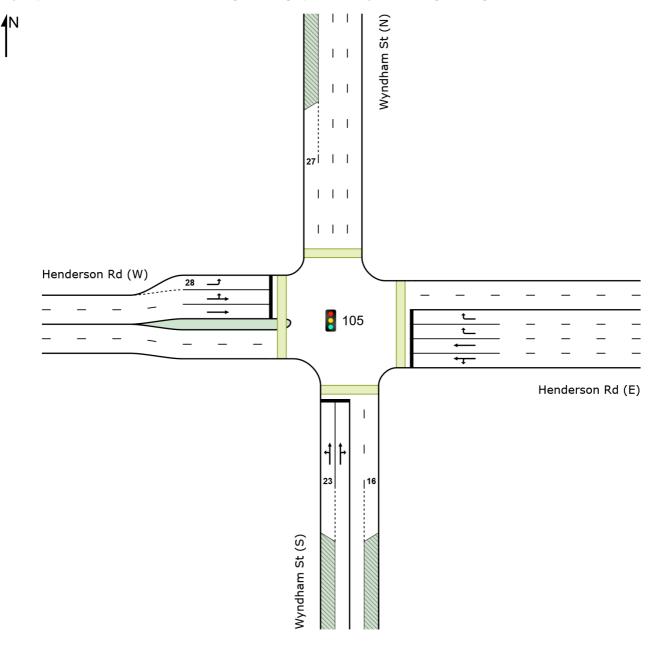
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Site: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

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

Vehi	cle Mo	vement	Perfo	rmanc	e									
Mov ID	Turn	DEMA FLO\		ARRI FLO		Deg. Satn	Aver. Delay	Level of Service	C	BACK OF QUEUE	Prop. Que	EffectiveA Stop	ver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h		v/c	sec		[Veh veh	. Dist] m		Rate		km/h
South	n: Wynd	ham St (S)											
1	L2	13	2.0	13	2.0	*0.668	43.5	LOS D	8.5	60.8	0.87	0.74	0.90	36.3
2	T1	398	2.0	398	2.0	0.668	37.9	LOS C	8.6	61.1	0.87	0.74	0.90	37.0
3	R2	2	2.0	2	2.0	0.668	43.5	LOS D	8.6	61.1	0.87	0.74	0.90	27.2
Appro	bach	413	2.0	413	2.0	0.668	38.1	LOS C	8.6	61.1	0.87	0.74	0.90	37.0
East: Henderson Rd (E)														
4	L2	143	2.0	143	2.0	0.327	12.7	LOS A	8.2	58.3	0.46	0.52	0.46	45.4
5	T1	672	2.0	672	2.0	0.327	6.3	LOS A	8.2	58.3	0.36	0.36	0.36	50.1
6	R2	666	2.0	666	2.0	*0.674	23.2	LOS B	8.1	57.7	0.94	0.83	0.94	34.7
Appro	bach	1481	2.0	1481	2.0	0.674	14.5	LOS B	8.2	58.3	0.63	0.59	0.63	41.5
West	Hende	rson Rd	(W)											
10	L2	472	2.0	472	2.0	*0.695	42.1	LOS C	10.3	73.5	0.91	0.83	0.97	34.9
11	T1	240	2.0	240	2.0	0.462	33.0	LOS C	9.8	70.1	0.88	0.74	0.88	29.0
Appro	bach	712	2.0	712	2.0	0.695	39.0	LOS C	10.3	73.5	0.90	0.80	0.94	33.5
All Ve	hicles	2606	2.0	2606		0.695	25.0	LOS B	10.3	73.5	0.74	0.67	0.76	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE	UE	Prop. Ef Que	Stop	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec	
South: Wyndham	St (S)										
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03	
East: Henderson	Rd (E)										
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.9	221.8	1.03	
North: Wyndham	St (N)										
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03	
West: Henderson	Rd (W)										
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.3	221.0	1.03	
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	212.2	218.3	1.03	

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: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

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

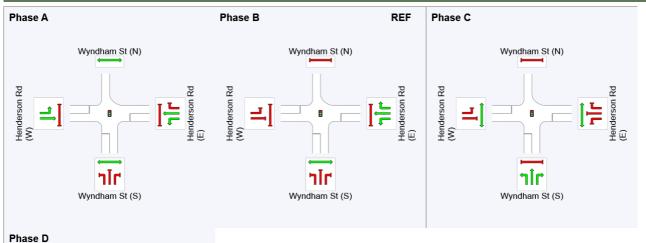
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	67	0	20	48
Green Time (sec)	27	14	22	13
Phase Time (sec)	33	20	28	19
Phase Split	33%	20%	28%	19%

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



Wyndham St (N) Hengeson Rd Hen

REF: Reference Phase VAR: Variable Phase



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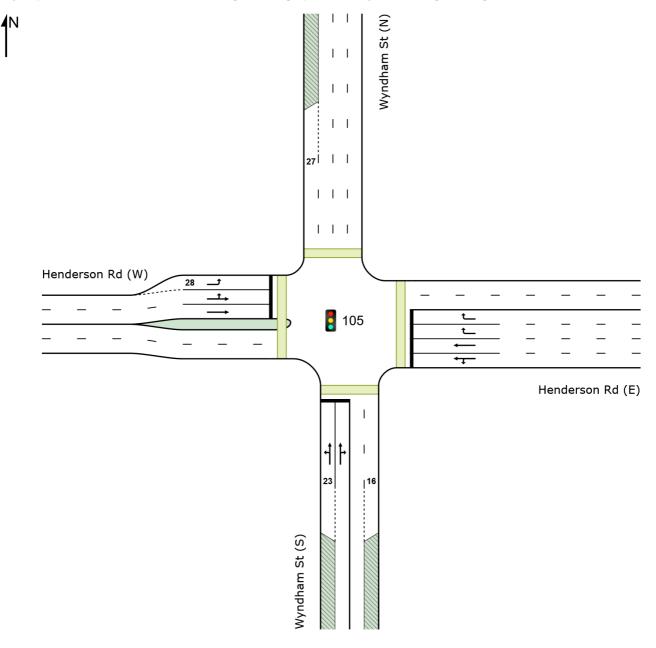
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011/SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

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Site: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h	ND	ARRI FLO [Total veh/h	VAL WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BA QUE [Veh. veh		Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Wynd	ham St (S)											
1	L2	18	2.0	18	2.0	*0.645	40.2	LOS C	11.2	80.0	0.73	0.62	0.73	37.5
2	T1	500	2.0	500	2.0	0.645	34.7	LOS C	11.3	80.3	0.73	0.62	0.73	38.3
3	R2	5	2.0	5	2.0	0.645	40.2	LOS C	11.3	80.3	0.73	0.62	0.73	28.5
Appro	bach	523	2.0	523	2.0	0.645	34.9	LOS C	11.3	80.3	0.73	0.62	0.73	38.2
East:	Hender	rson Rd (E)											
4	L2	186	2.0	186	2.0	0.446	5.9	LOS A	1.4	9.7	0.05	0.26	0.05	52.9
5	T1	785	2.0	785	2.0	0.446	7.8	LOS A	12.0	85.3	0.28	0.33	0.28	48.4
6	R2	592	2.0	592	2.0	*0.637	36.9	LOS C	10.9	77.4	1.00	0.84	1.00	28.3
Appro	bach	1563	2.0	1563	2.0	0.637	18.6	LOS B	12.0	85.3	0.53	0.52	0.53	38.5
West	: Hende	rson Rd	(W)											
10	L2	362	2.0	362	2.0	*0.643	55.2	LOS D	10.2	72.6	0.93	0.81	0.93	31.1
11	T1	277	2.0	277	2.0	0.626	48.7	LOS D	15.9	113.1	0.96	0.81	0.96	23.3
Appro	bach	639	2.0	639	2.0	0.643	52.4	LOS D	15.9	113.1	0.94	0.81	0.94	28.5
All Ve	hicles	2725	2.0	2725	2.0	0.645	29.7	LOS C	15.9	113.1	0.66	0.60	0.66	35.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	vement	Perform	nance							
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE	EUE	Prop. Ef Que	Stop	Travel Time	Travel Dist.	Aver. Speed
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec
South: Wyndham	St (S)									
P1 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	224.8	215.2	0.96
East: Henderson	Rd (E)									
P2 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	229.9	221.8	0.96
North: Wyndham	St (N)									
P3 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	224.8	215.2	0.96
West: Henderson	Rd (W)									
P4 Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	229.3	221.0	0.96
All Pedestrians	211	59.3	LOS E	0.2	0.2	0.96	0.96	227.2	218.3	0.96

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: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM) - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network Practical Cycle Time)

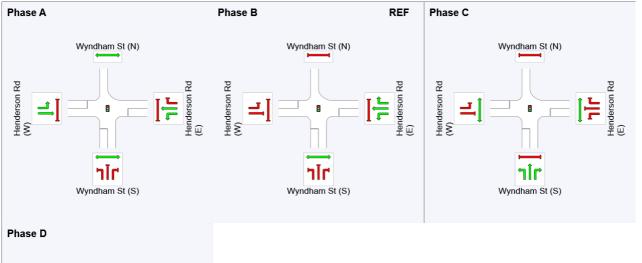
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	94	0	20	69
Green Time (sec)	30	14	43	19
Phase Time (sec)	36	20	49	25
Phase Split	28%	15%	38%	19%

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



Wyndham St (N) Pu uosapue H Husapue H Husapue

REF: Reference Phase VAR: Variable Phase



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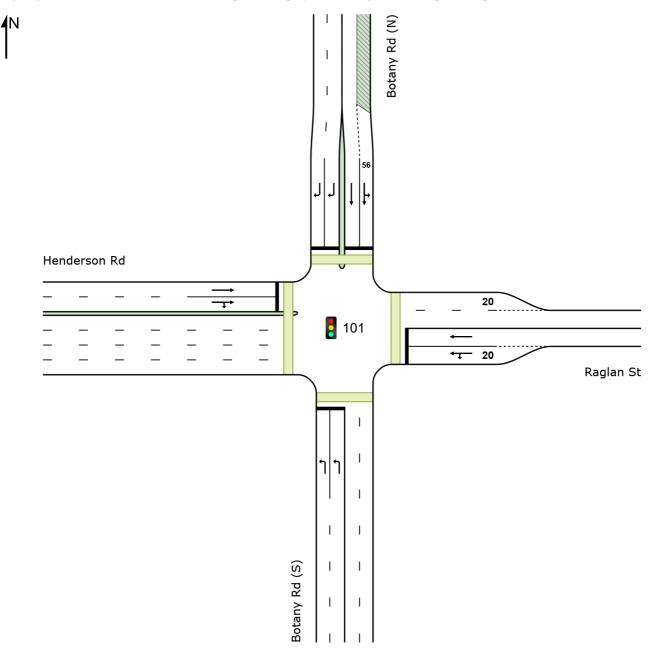


Appendix D: Closure Scenario B SIDRA Model Outputs

Site: 101 [Botany Rd / Henderson Rd - CC- AM - 2way - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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Site: 101 [Botany Rd / Henderson Rd - CC- AM - 2way - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

■ Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Vehicle Movement Performance Mov Turn DEMAND ARRIVAL Deg. Aver. Level of AVERAGE BACK Prop. Effective Aver. No. Aver														
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAG OF QL [Veh. veh		Prop. Que	Effective <i>A</i> Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	n: Botar	ny Rd (S)												
1	L2	671	2.0	671	2.0	* 0.879	57.7	LOS E	11.0	78.6	1.00	0.95	1.16	10.8
Appr	oach	671	2.0	671	2.0	0.879	57.7	LOS E	11.0	78.6	1.00	0.95	1.16	10.8
East	Raglan	St												
4	L2	240	2.0	240	2.0	* 0.897	58.3	LOS E	8.1	57.9	0.96	1.06	1.40	4.6
5	T1	218	2.0	218	2.0	0.831	46.1	LOS D	6.6	47.2	0.94	0.98	1.22	5.6
Appr	oach	458	2.0	458	2.0	0.897	52.5	LOS D	8.1	57.9	0.95	1.02	1.31	5.0
North	n: Botan	y Rd (N)												
7	L2	44	2.0	44	2.0	0.397	12.7	LOS A	6.6	47.3	0.48	0.56	0.48	39.9
8	T1	971	2.0	971	2.0	0.397	9.3	LOS A	6.8	48.3	0.48	0.55	0.48	40.0
9	R2	582	2.0	582	2.0	*0.890	60.1	LOS E	10.2	72.6	1.00	0.99	1.36	19.0
Appr	oach	1597	2.0	1597	2.0	0.890	27.9	LOS B	10.2	72.6	0.67	0.71	0.80	28.6
West	: Hende	erson Rd												
11	T1	199	2.0	199	2.0	0.718	19.7	LOS B	4.4	31.2	0.60	0.51	0.61	12.0
12	R2	43	2.0	43	2.0	0.718	30.0	LOS C	4.4	31.2	0.82	0.71	0.84	9.4
Appr	oach	242	2.0	242	2.0	0.718	21.5	LOS B	4.4	31.2	0.63	0.55	0.66	11.5
All Ve	ehicles	2968	2.0	2968	2.0	0.897	37.9	LOS C	11.0	78.6	0.79	0.80	0.95	19.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	ovement	Perform	nance							
Mov ID Crossing			AVERAGE BACK OF QUEUE [Ped Dist]		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		ped	m		TALE	sec	m	m/sec
South: Botany R	td (S)									
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.4	214.6	1.03
East: Raglan St										
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
North: Botany R	d (N)									
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	210.3	215.8	1.03
West: Henderso	n Rd									

P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	215.5	222.6	1.03
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	211.8	217.8	1.03

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: 101 [Botany Rd / Henderson Rd - CC- AM - 2way - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

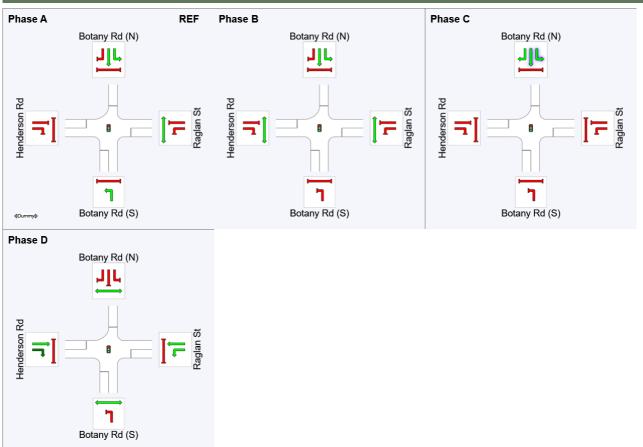
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase A Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	0	27	49	73
Green Time (sec)	21	17	18	21
Phase Time (sec)	26	23	24	27
Phase Split	26%	23%	24%	27%

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



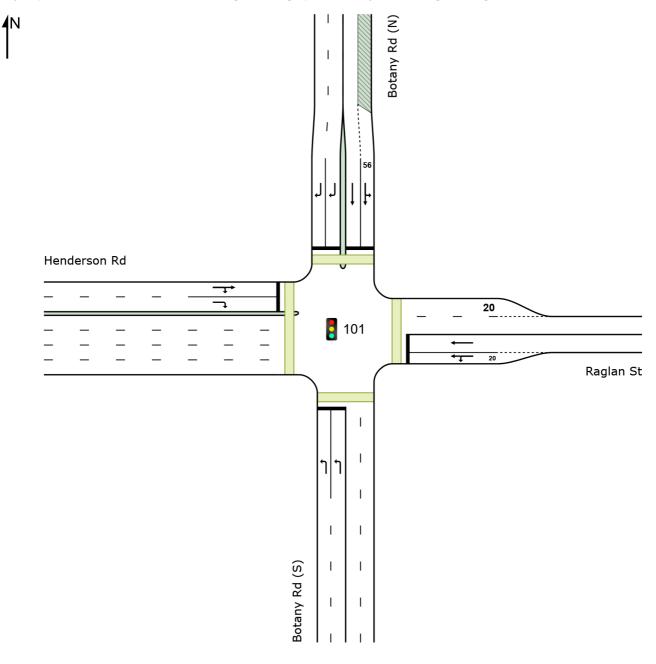
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Site: 101 [Botany Rd / Henderson Rd - CC- PM - 2way - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Botany Rd / Henderson Rd - CC- PM - 2way - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAG OF QL [Veh. veh		Prop. Que	Effective <i>A</i> Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Botan	iy Rd (S)												
1	L2	453	2.0	453	2.0	*0.918	69.7	LOS E	9.3	65.9	1.00	0.98	1.38	10.1
Appr	oach	453	2.0	453	2.0	0.918	69.7	LOS E	9.3	65.9	1.00	0.98	1.38	10.1
East	Raglan	St												
4	L2	258	2.0	258	2.0	0.917	64.0	LOS E	9.6	68.0	0.90	1.06	1.36	4.2
5	T1	288	2.0	288	2.0	*0.917	60.8	LOS E	9.6	68.0	0.91	1.12	1.36	4.4
Appr	oach	546	2.0	546	2.0	0.917	62.3	LOS E	9.6	68.0	0.91	1.09	1.36	4.3
North	n: Botan	y Rd (N)												
7	L2	28	2.0	28	2.0	0.505	16.8	LOS B	9.0	63.9	0.58	0.62	0.58	36.6
8	T1	1069	2.0	1069	2.0	0.632	13.9	LOS A	10.5	75.1	0.59	0.62	0.59	36.5
9	R2	703	2.0	703	2.0	*0.925	69.7	LOS E	14.4	101.1	1.00	1.03	1.40	17.3
Appr	oach	1800	2.0	1800	2.0	0.925	35.7	LOS C	14.4	101.1	0.75	0.78	0.91	25.5
West	: Hende	rson Rd												
11	T1	231	2.0	231	2.0	0.426	47.5	LOS D	7.5	53.6	1.00	0.84	1.00	5.9
12	R2	51	2.0	51	2.0	0.307	58.6	LOS E	1.7	12.4	1.00	0.77	1.00	5.2
Appr	oach	282	2.0	282	2.0	0.426	49.5	LOS D	7.5	53.6	1.00	0.83	1.00	5.8
All Ve	ehicles	3081	2.0	3081	2.0	0.925	46.7	LOS D	14.4	101.1	0.84	0.87	1.06	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Mo	vement	Perforr	nance							
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	QUEUE		Prop. Effective Que Stop		Travel Time	Travel Dist.	Aver. Speed
	ped/h	sec		[Ped ped	Dist] m		Rate	sec	m	m/sec
South: Botany R	d (S)									
P1 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00
East: Raglan St										
P2 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.8	216.5	1.00
North: Botany R	d (N)									
P3 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	215.3	215.8	1.00
West: Henderso	n Rd									

P4 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	220.5	222.6	1.01
All Pedestrians	211	49.3	LOS E	0.2	0.2	0.95	0.95	216.5	217.4	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.

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PHASING SUMMARY

Site: 101 [Botany Rd / Henderson Rd - CC- PM - 2way - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Signalized Intersection Site Category: Existing Design Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

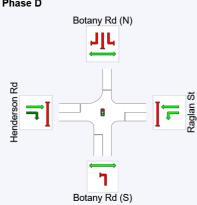
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	88	0	22	51
Green Time (sec)	16	17	23	31
Phase Time (sec)	21	23	29	37
Phase Split	19%	21%	26%	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 Phase A Phase B REF Phase C Botany Rd (N) Botany Rd (N) Botany Rd (N) **⅃**┃Ļ ┛┃┖ ┛║┖ Henderson Rd Henderson Rd Henderson Rd Raglan St Raglan St aglan St 7 F **-**1 **_** 7 < ٦ ٦ Botany Rd (S) Botany Rd (S) Botany Rd (S) ¢Dummy\$ Phase D Botany Rd (N)



REF: Reference Phase VAR: Variable Phase



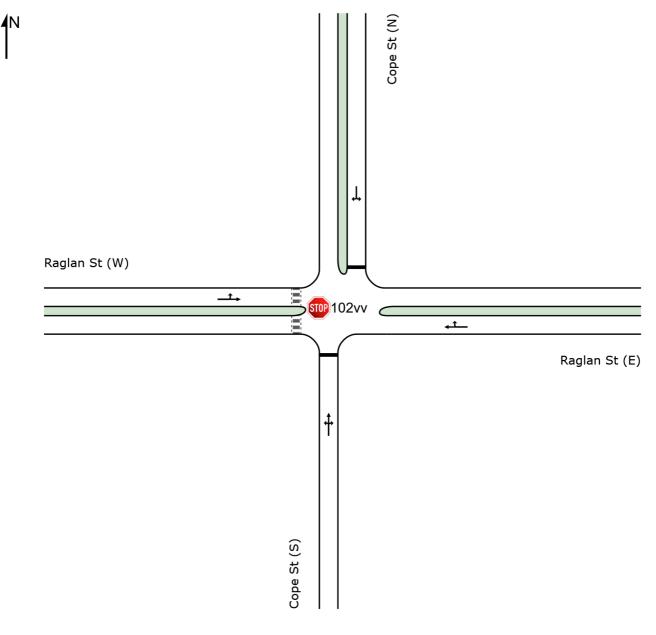
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Site: 102vv [Raglan St / Cope St - CC- AM - 2way - S.C -Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 102vv [Raglan St / Cope St - CC- AM - 2way - S.C -Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Vehicle Movement Performance Mov Turn DEMAND ARRIVAL Deg. Aver. Level of AVERAGE BACK Prop. EffectiveAver. No. Aver.														
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Cope	St (S)												
1	L2	264	2.0	264	2.0	0.454	7.2	LOS A	0.7	4.7	0.27	0.91	0.27	29.4
2	T1	100	2.0	100	2.0	0.454	9.0	LOS A	0.7	4.7	0.27	0.91	0.27	36.0
3	R2	5	2.0	5	2.0	0.454	8.7	LOS A	0.7	4.7	0.27	0.91	0.27	30.9
Appr	oach	369	2.0	369	2.0	0.454	7.7	LOS A	0.7	4.7	0.27	0.91	0.27	32.7
East	: Raglar	n St (E)												
5	T1	93	2.0	93	2.0	0.078	0.1	LOS A	0.0	0.2	0.07	0.04	0.07	37.3
6	R2	8	2.0	8	2.0	0.078	4.3	LOS A	0.0	0.2	0.07	0.04	0.07	46.4
Appr	oach	101	2.0	101	2.0	0.078	0.4	NA	0.0	0.2	0.07	0.04	0.07	40.2
Nort	h: Cope	St (N)												
7	L2	10	2.0	10	2.0	0.347	8.5	LOS A	0.4	2.7	0.55	1.04	0.68	32.2
9	R2	101	2.0	101	2.0	0.347	13.9	LOS A	0.4	2.7	0.55	1.04	0.68	31.6
Appr	oach	111	2.0	111	2.0	0.347	13.4	LOS A	0.4	2.7	0.55	1.04	0.68	31.7
Wes	t: Ragla	n St (W)												
10	L2	70	2.0	70	2.0	0.124	3.4	LOS A	0.0	0.0	0.00	0.13	0.00	39.5
11	T1	173	2.0	173	2.0	0.124	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	37.3
Appr	oach	243	2.0	243	2.0	0.124	1.0	NA	0.0	0.0	0.00	0.13	0.00	38.6
All V	ehicles	824	2.0	824	2.0	0.454	5.6	NA	0.7	4.7	0.20	0.59	0.22	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

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

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

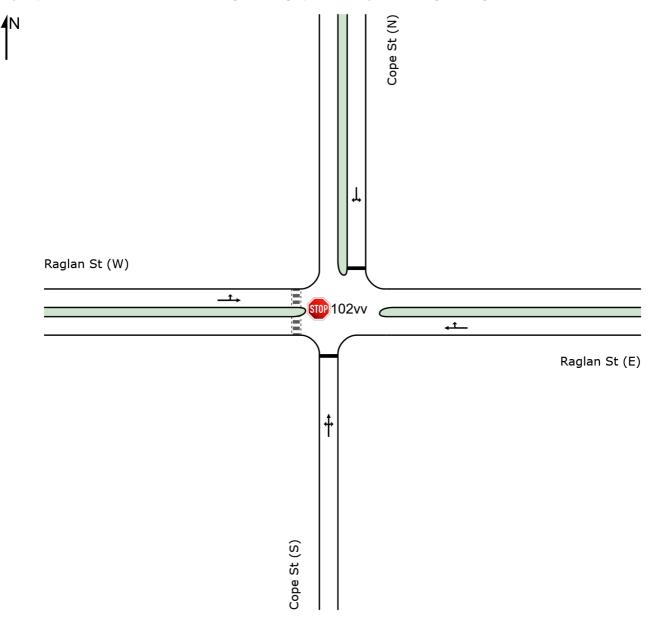
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Site: 102vv [Raglan St / Cope St - CC- PM - 2way - S.C -Conversion (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 102vv [Raglan St / Cope St - CC- PM - 2way - S.C -Conversion (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

Roundabout turned to Give Way - Raglan St main road Site Category: (None) Stop (Two-Way)

Vehi	cle Mo	vement	Perfo	rmano	:e									
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	h: Cope													
1	L2	237	2.0	237	2.0	0.534	8.8	LOS A	0.8	6.0	0.38	0.97	0.48	28.0
2	T1	75	2.0	75	2.0	0.534	10.6	LOS A	0.8	6.0	0.38	0.97	0.48	35.3
3	R2	8	2.0	8	2.0	0.534	10.6	LOS A	0.8	6.0	0.38	0.97	0.48	29.7
Appr	oach	320	2.0	320	2.0	0.534	9.3	LOS A	0.8	6.0	0.38	0.97	0.48	31.3
East	Raglar	n St (E)												
5	T1	176	2.0	176	2.0	0.094	0.1	LOS A	0.2	1.2	0.04	0.02	0.04	55.3
6	R2	8	2.0	8	2.0	0.094	4.5	LOS A	0.2	1.2	0.04	0.02	0.04	49.3
Appr	oach	184	2.0	184	2.0	0.094	0.3	NA	0.2	1.2	0.04	0.02	0.04	53.8
North	n: Cope	St (N)												
7	L2	11	2.0	11	2.0	0.594	11.9	LOS A	0.7	4.7	0.59	1.11	0.97	37.6
9	R2	133	2.0	133	2.0	0.594	18.8	LOS B	0.7	4.7	0.59	1.11	0.97	37.7
Appr	oach	144	2.0	144	2.0	0.594	18.3	LOS B	0.7	4.7	0.59	1.11	0.97	37.7
West	: Ragla	n St (W)												
10	L2	64	2.0	64	2.0	0.131	3.4	LOS A	0.0	0.0	0.00	0.11	0.00	39.6
11	T1	195	2.0	195	2.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.11	0.00	37.7
Appr	oach	259	2.0	259	2.0	0.131	0.9	NA	0.0	0.0	0.00	0.11	0.00	38.7
All V	ehicles	907	2.0	907	2.0	0.594	6.5	NA	0.8	6.0	0.24	0.55	0.33	35.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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).

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

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

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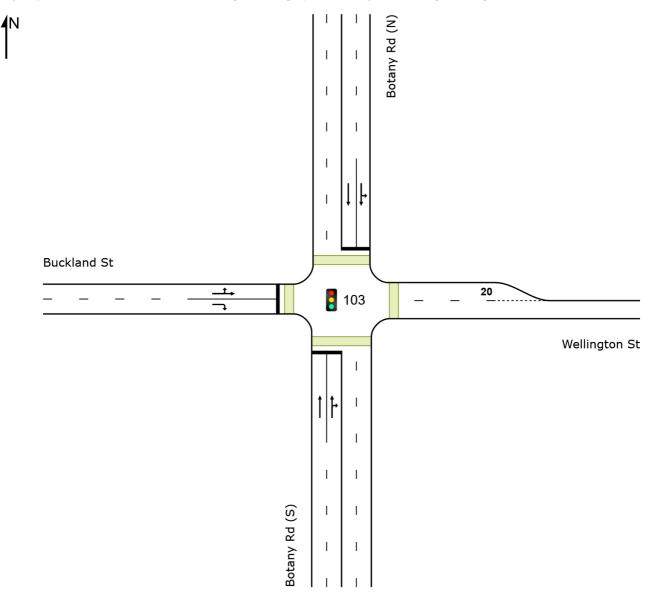
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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

New Site Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- AM -S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Vehio	cle Mo	vement	Perfo	rmanc	e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South: Botany Rd (S)														
2 3 Appro	T1 R2 bach	616 152 768	2.0 2.0 2.0	616 152 768	2.0 2.0 2.0	0.443 * 0.443 0.443	7.6 17.2 9.5	LOS A LOS B LOS A	7.7 3.2 7.7	55.0 22.6 55.0	0.49 0.61 0.51	0.45 0.69 0.49	0.49 0.61 0.51	47.2 30.6 42.6
North: Botany Rd (N)														
7 8 Appro	L2 T1 bach	170 1084 1254	2.0 2.0 2.0	170 1084 1254	2.0 2.0 2.0	0.479 0.479 0.479	13.5 6.4 7.3	LOS A LOS A LOS A	7.6 7.6 7.6	54.4 54.4 54.4	0.45 0.39 0.40	0.50 0.39 0.40	0.45 0.39 0.40	33.4 44.4 43.7
West:	Buckla	and St												
10 11 12	L2 T1 R2	55 110 55	2.0 2.0 2.0	55 110 55	2.0 2.0 2.0	0.459 *0.459 0.158	44.1 39.8 41.5	LOS D LOS C LOS C	4.5 4.5 1.4	31.8 31.8 9.9	0.94 0.94 0.87	0.77 0.77 0.74	0.94 0.94 0.87	25.1 25.1 31.5
Appro		220 2242	2.0 2.0	220 2242	2.0	0.459 0.479	41.3	LOS C	4.5 7.7	31.8 55.0	0.92	0.76	0.92	27.3 40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID Cros	Dem. Aver. Level of A Crossing Flow Delay Service			AVERAGE BACK OF QUEUE [Ped Dist]		fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed			
	ped/h	sec		ped	m			sec	m	m/sec		
South: Bo	otany Rd (S)											
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03		
East: Wel	lington St											
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	205.8	210.0	1.02		
North: Bo	tany Rd (N)											
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.4	214.6	1.03		
West: Bu	ckland St											
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02		
All Pedes	trians 211	44.3	LOS E	0.1	0.1	0.94	0.94	207.4	212.1	1.02		

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: 103 [Botany Rd / Wellington St / Buckland St - CC- AM -S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

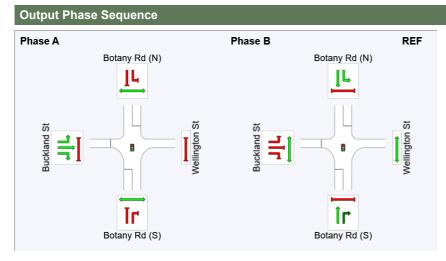
New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

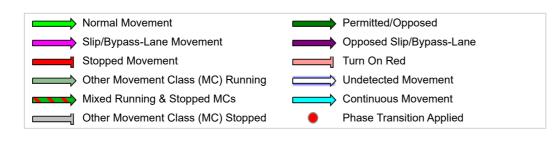
Phase Timing Summary

Phase	Α	В
Phase Change Time (sec)	75	0
Green Time (sec)	19	69
Phase Time (sec)	25	75
Phase Split	25%	75%

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%.



REF: Reference Phase VAR: Variable Phase



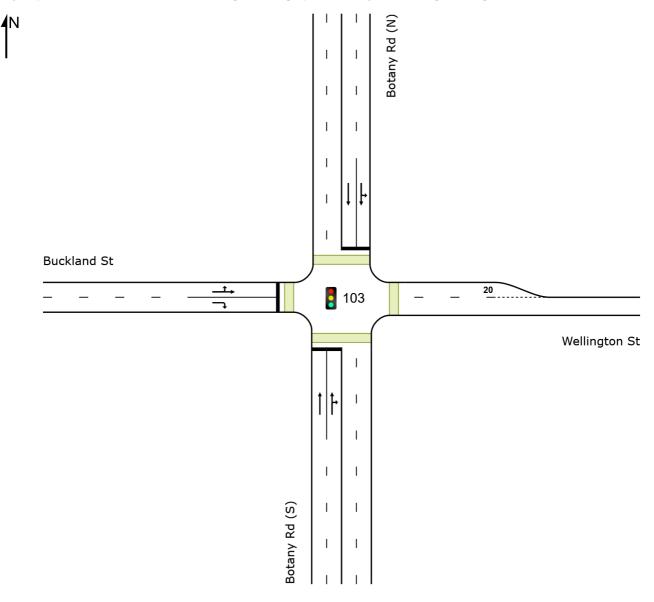
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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- PM -S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

New Site

Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 103 [Botany Rd / Wellington St / Buckland St - CC- PM -S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

Vehi	cle Mo	vement	Perfo	rmanc	e									
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	South: Botany Rd (S)													
2 3 Appre	T1 R2 oach	394 118 512	2.0 2.0 2.0	394 118 512	2.0 2.0 2.0	0.265 0.317 0.317	4.8 15.1 7.2	LOS A LOS B LOS A	3.6 1.8 3.6	25.7 12.6 25.7	0.31 0.47 0.35	0.41 0.72 0.48	0.31 0.47 0.35	51.8 40.3 48.6
North	n: Botan	y Rd (N)												
7 8 Appre	L2 T1 oach	137 1241 1378	2.0 2.0 2.0	137 1241 1378	2.0 2.0 2.0	0.469 * 0.469 0.469	10.3 4.1 4.7	LOS A LOS A LOS A	7.8 7.8 7.8	55.6 55.6 55.6	0.39 0.32 0.33	0.43 0.33 0.34	0.39 0.32 0.33	38.0 46.2 45.9
West	: Buckla	and St												
10 11 12	L2 T1 R2	59 46 33	2.0 2.0 2.0	59 46 33	2.0 2.0 2.0	0.475 *0.475 0.152	55.1 50.9 52.7	LOS D LOS D LOS D	3.3 3.3 1.0	23.8 23.8 7.1	0.98 0.98 0.93	0.78 0.78 0.72	0.98 0.98 0.93	21.2 21.2 28.7
Appr		138	2.0	138	2.0	0.475	53.1	LOS D	3.3	23.8	0.97	0.76	0.97	23.6
All Ve	ehicles	2028	2.0	2028	2.0	0.475	8.6	LOS A	7.8	55.6	0.38	0.40	0.38	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pec	Pedestrian Movement Performance											
Mov ID	/ Crossing	Dem. Flow	Aver. Delay			BACK OF UE Dist]	Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
		ped/h	sec		ped	m			sec	m	m/sec	
Sou	th: Botany Ro	d (S)										
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.8	215.2	1.00	
Eas	t: Wellington	St										
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	210.3	209.3	1.00	
Nor	th: Botany Ro	l (N)										
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.3	214.6	1.00	
Wes	st: Buckland \$	St										
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	209.7	208.6	0.99	
All F	Pedestrians	211	49.3	LOS E	0.2	0.2	0.95	0.95	212.3	211.9	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.

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PHASING SUMMARY

Site: 103 [Botany Rd / Wellington St / Buckland St - CC- PM -S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

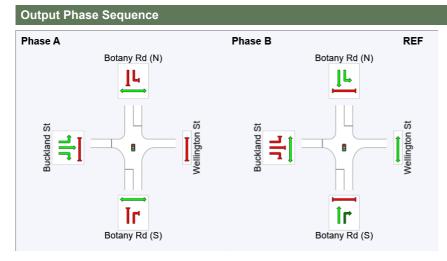
New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B Output Phase Sequence: A, B

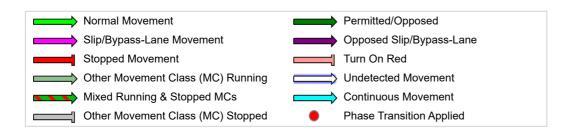
Phase Timing Summary

Phase	Α	В
Phase Change Time (sec)	90	109
Green Time (sec)	13	85
Phase Time (sec)	19	91
Phase Split	17%	83%

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%.



REF: Reference Phase VAR: Variable Phase

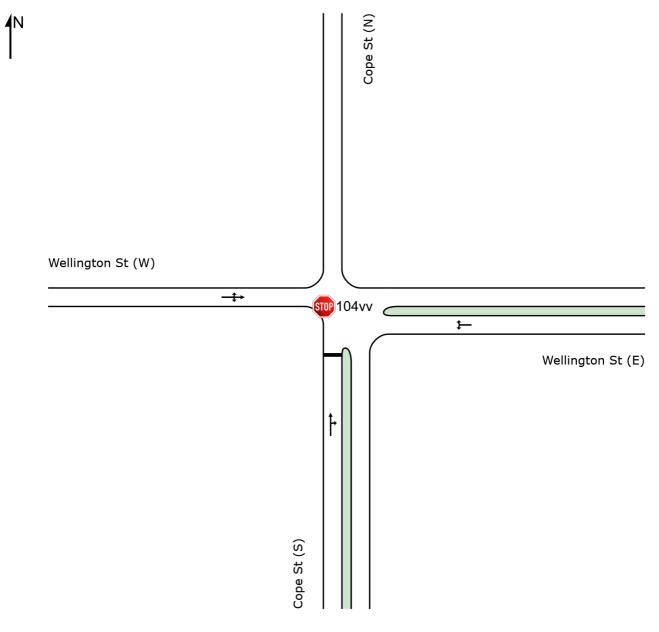


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Site: 104vv [Wellington St / Cope St - CC- AM - S.C -Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 104vv [Wellington St / Cope St - CC- AM - S.C -Conversion (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle Mo	vement	Perfo	rmano	:e									
Mov ID	Turn	DEMA FLO\ [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Cope	St (S)												
2	T1	133	2.0	133	2.0	0.226	10.7	LOS A	0.4	2.5	0.57	1.01	0.57	33.2
3	R2	8	2.0	8	2.0	0.226	10.6	LOS A	0.4	2.5	0.57	1.01	0.57	36.2
Appro	oach	141	2.0	141	2.0	0.226	10.6	LOS A	0.4	2.5	0.57	1.01	0.57	33.5
East:	Welling	gton St (E)											
4	L2	34	2.0	34	2.0	0.131	4.9	LOS A	0.3	2.1	0.46	0.52	0.46	38.0
6	R2	145	2.0	145	2.0	0.131	5.1	LOS A	0.3	2.1	0.46	0.52	0.46	35.9
Appro	oach	179	2.0	179	2.0	0.131	5.0	NA	0.3	2.1	0.46	0.52	0.46	36.6
West	: Wellin	gton St (\	N)											
10	L2	91	2.0	91	2.0	0.224	3.5	LOS A	0.2	1.3	0.04	0.16	0.04	33.2
11	T1	283	2.0	283	2.0	0.224	0.0	LOS A	0.2	1.3	0.04	0.16	0.04	39.0
12	R2	58	2.0	58	2.0	0.224	3.8	LOS A	0.2	1.3	0.04	0.16	0.04	38.5
Appro	oach	432	2.0	432	2.0	0.224	1.3	NA	0.2	1.3	0.04	0.16	0.04	38.7
All Ve	ehicles	752	2.0	752	2.0	0.226	3.9	NA	0.4	2.5	0.24	0.41	0.24	37.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

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

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

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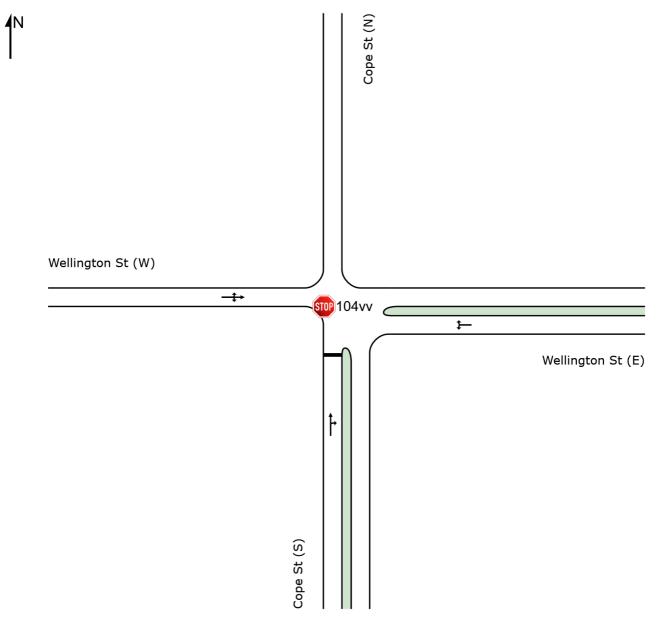
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Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Site: 104vv [Wellington St / Cope St - CC- PM - S.C -Conversion (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 104vv [Wellington St / Cope St - CC- PM - S.C -Conversion (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle Mo	vement	Perfo	rmanc	:e									
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
Sout	n: Cope	St (S)												
2	T1	89	2.0	89	2.0	0.139	10.5	LOS A	0.2	1.5	0.48	0.95	0.48	44.2
3 Appre	R2 oach	11 100	2.0 2.0	11 100	2.0 2.0	0.139 0.139	9.3 10.4	LOS A LOS A	0.2	1.5 1.5	0.48 0.48	0.95 0.95	0.48 0.48	46.2 44.6
East:	Welling	gton St (E)											
4	L2	12	2.0	12	2.0	0.116	4.3	LOS A	0.2	1.7	0.37	0.57	0.37	43.8
6	R2	157	2.0	157	2.0	0.116	6.4	LOS A	0.2	1.7	0.37	0.57	0.37	47.9
Appr	oach	169	2.0	169	2.0	0.116	6.2	NA	0.2	1.7	0.37	0.57	0.37	47.3
West	: Wellin	gton St (\	N)											
10	L2	74	2.0	74	2.0	0.157	3.4	LOS A	0.1	0.9	0.02	0.20	0.02	33.5
11	T1	180	2.0	180	2.0	0.157	0.0	LOS A	0.1	0.9	0.02	0.20	0.02	39.0
12	R2	47	2.0	47	2.0	0.157	4.4	LOS A	0.1	0.9	0.02	0.20	0.02	51.0
Appr	oach	301	2.0	301	2.0	0.157	1.5	NA	0.1	0.9	0.02	0.20	0.02	40.7
All Ve	ehicles	570	2.0	570	2.0	0.157	4.5	NA	0.2	1.7	0.21	0.44	0.21	43.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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).

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

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

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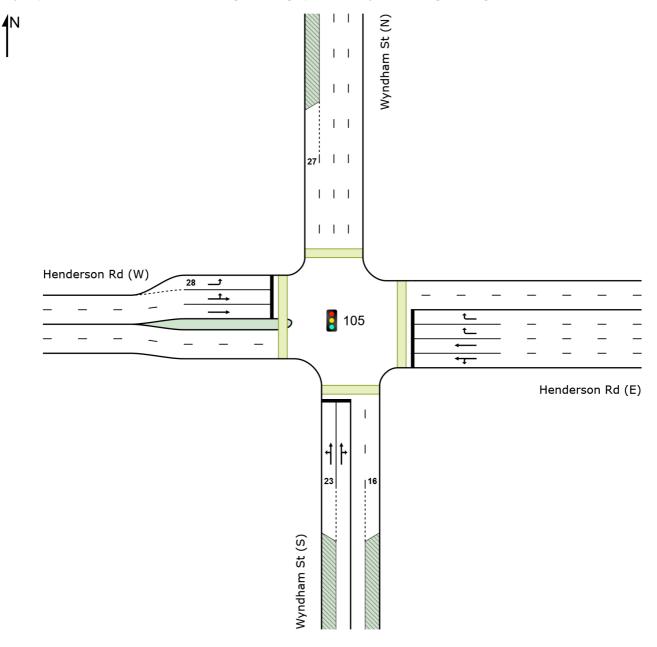
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Site: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

■ Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Wync	lham St (S)											
1	L2	18	2.0	18	2.0	*0.683	43.8	LOS D	5.3	38.0	0.88	0.75	0.92	36.1
2	T1	398	2.0	398	2.0	0.683	38.2	LOS C	5.4	38.2	0.88	0.75	0.92	36.9
3	R2	2	2.0	2	2.0	0.683	43.7	LOS D	5.4	38.2	0.87	0.74	0.92	27.1
Appro	bach	418	2.0	418	2.0	0.683	38.5	LOS C	5.4	38.2	0.88	0.75	0.92	36.8
East:	Hende	rson Rd (E)											
4	L2	141	2.0	141	2.0	0.324	12.8	LOS A	5.0	35.6	0.46	0.52	0.46	45.3
5	T1	668	2.0	668	2.0	0.324	6.3	LOS A	5.0	35.6	0.36	0.36	0.36	50.1
6	R2	662	2.0	662	2.0	*0.670	23.2	LOS B	4.9	35.1	0.94	0.83	0.94	34.7
Appro	bach	1471	2.0	1471	2.0	0.670	14.6	LOS B	5.0	35.6	0.63	0.59	0.63	41.4
West	: Hende	erson Rd	(W)											
10	L2	472	2.0	472	2.0	*0.695	42.1	LOS C	6.3	45.0	0.91	0.83	0.97	34.9
11	T1	240	2.0	240	2.0	0.462	33.0	LOS C	6.0	43.0	0.88	0.74	0.88	29.0
Appro	bach	712	2.0	712	2.0	0.695	39.0	LOS C	6.3	45.0	0.90	0.80	0.94	33.5
All Ve	hicles	2601	2.0	2601	2.0	0.695	25.1	LOS B	6.3	45.0	0.75	0.67	0.76	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Et Que	ffective Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		ped	m			sec	m	m/sec	
South: Wyndham St (S)											
P1 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03	
East: Henderson	Rd (E)										
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.9	221.8	1.03	
North: Wyndham	St (N)										
P3 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	209.8	215.2	1.03	
West: Henderson	n Rd (W)										
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.3	221.0	1.03	
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	212.2	218.3	1.03	

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: 105 [Henderson Rd / Wyndham St - CC- AM - S.C (Site Folder: AM Peak Closure (7:30-8:30 AM)_2way Raglan St_Stop Control)]

Network: N101 [AM Peak Closure (7:30-8:30 AM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

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

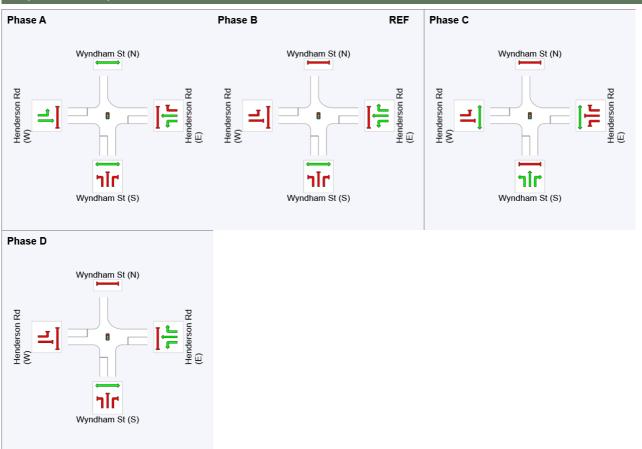
Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	67	0	20	48
Green Time (sec)	27	14	22	13
Phase Time (sec)	33	20	28	19
Phase Split	33%	20%	28%	19%

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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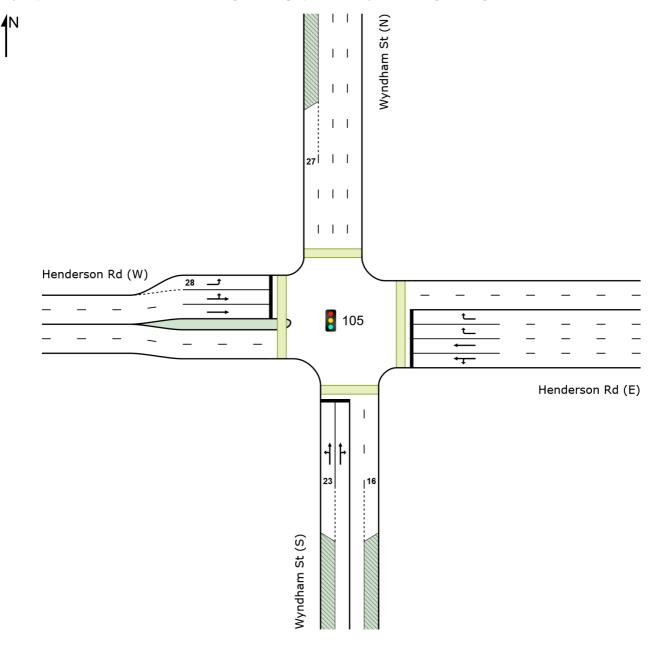
Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

SITE LAYOUT

Site: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMA FLOV [Total veh/h		ARRI FLO [Total veh/h	WS HV]	Deg. Satn v/c	Aver. Delay sec	Level of Service		GE BACK UEUE Dist] m	Prop. Que	EffectiveA Stop Rate	ver. No. Cycles	Aver. Speed km/h
South	n: Wynd	dham St (S)											
1	L2	18	2.0	18	2.0	*0.640	36.5	LOS C	6.0	43.0	0.75	0.64	0.75	38.9
2	T1	500	2.0	500	2.0	0.640	31.0	LOS C	6.1	43.2	0.75	0.64	0.75	39.8
3	R2	5	2.0	5	2.0	0.640	36.6	LOS C	6.1	43.2	0.75	0.63	0.75	30.2
Appro	bach	523	2.0	523	2.0	0.640	31.3	LOS C	6.1	43.2	0.75	0.64	0.75	39.7
East:	Hende	rson Rd (E)											
4	L2	172	2.0	172	2.0	0.415	5.5	LOS A	0.5	3.4	0.04	0.25	0.04	53.4
5	T1	725	2.0	725	2.0	0.415	8.2	LOS A	6.9	49.0	0.33	0.37	0.33	47.9
6	R2	547	2.0	547	2.0	*0.632	32.5	LOS C	5.2	37.0	1.00	0.83	1.00	30.1
Appro	bach	1444	2.0	1444	2.0	0.632	17.1	LOS B	6.9	49.0	0.55	0.53	0.55	39.6
West	: Hende	erson Rd	(W)											
10	L2	362	2.0	362	2.0	*0.622	48.4	LOS D	5.5	39.0	0.94	0.80	0.94	33.0
11	T1	277	2.0	277	2.0	0.622	41.7	LOS C	8.2	58.1	0.95	0.81	0.95	25.5
Appro	bach	639	2.0	639	2.0	0.622	45.5	LOS D	8.2	58.1	0.94	0.80	0.94	30.5
All Ve	ehicles	2606	2.0	2606	2.0	0.640	26.9	LOS B	8.2	58.1	0.69	0.62	0.69	36.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Vehicle movement LOS values are based on average delay per movement.

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE QUE [Ped		Prop. Ef Que	fective Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	sec		ped	m			sec	m	m/sec	
South: Wyndham St (S)											
P1 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.8	215.2	1.00	
East: Hendersor	n Rd (E)										
P2 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.9	221.8	1.01	
North: Wyndhan	n St (N)										
P3 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	214.8	215.2	1.00	
West: Henderso	n Rd (W)										
P4 Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.3	221.0	1.01	
All Pedestrians	211	49.3	LOS E	0.2	0.2	0.95	0.95	217.2	218.3	1.01	

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: 105 [Henderson Rd / Wyndham St - CC- PM - S.C (Site Folder: PM Peak Closure (16-17 PM)_2way Raglan St_Stop Control)]

Network: N101 [PM Peak Closure (16-17 PM)_2way Raglan St - Stop Control (Network Folder: Waterloo Integrated Station Traffic Services)]

New Site Site Category: (None) Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog Phase Times determined by the program Downstream Iane blockage effects included in determining phase times Phase Sequence: Leading Right Turn Reference Phase: Phase B Input Phase Sequence: A, B, C, D Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	Α	В	С	D
Phase Change Time (sec)	78	109	16	57
Green Time (sec)	25	11	35	15
Phase Time (sec)	31	17	41	21
Phase Split	28%	15%	37%	19%

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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Project: P:\P4586 Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services\Technical Work\Variation 011\SIDRA analysis\P4586.001M Waterloo Integrated Station Traffic Services SIDRA Review.sip9

Appendix E – Road Safety Audit



Waterloo Integrated Station Development – CTMP: Half-Road Closures

CTMP Road Safety Audit Report

September 2021



Samsa Consulting Pty Ltd

Transport Planning & Traffic Engineering ABN: 50 097 299 717 46 Riverside Drive, Sandringham, NSW 2219, AUSTRALIA Phone: (+61) 414 971 956 E-mail: alansamsa@gmail.com Skype: alan_samsa Web: www.samsaconsulting.com

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Waterloo_CTMP RSA

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

This report details an independently undertaken road safety audit of the CTMP for half-road closure works as part of the Waterloo ISD project.

While a number of minor risk road safety issues were identified, the principal concerns of the audit team relate to the following issues:

- There is an absence of detour signage and/or turn restrictions for the Cope Street and for Wellington Street half-road closures, which would also affect cyclists.
- For the pedestrian path closures along the southern side of Raglan Street, western side of Cope Street and northern side of Wellington Street, there is no pedestrian path closure or detour signage around the development site, including diversions to paths on the opposite side of roads.
- For both Botany Road turns into Wellington Street eastbound, the swept path diagrams indicate that longer vehicles will need to turn from the adjacent lanes, which is undesirable and may result in side-swipe crashes.
- There is no consideration of the impacts on the bus stop (serving Sydney Buses route 309) along the eastern side of Botany Road, near the Waterloo Congregational Church.

1. Introduction

1.1 Background

The Waterloo integrated station development (ISD) project works comprise the construction of new station infrastructure to support customer movement and experience.

The Waterloo ISD is located in the suburb of Waterloo, within the Metro Quarter. The Metro Quarter Development (MQD) comprises the land bounded by Botany Road, Raglan Street, Cope Street and Wellington Street, but excluding the Congregational Church located at 103 Botany Road. It is situated approximately 3 km south of the Sydney CBD and is surrounded by established residential properties.

As part of the Waterloo ISD, works on Raglan, Cope and Wellington Streets will include trenching for installation of new utilities including relocation of Ausgrid high and low voltage cables, adjustments to the existing Sydney Water potable water mains and wastewater connections as well as installation of new City of Sydney smart poles and reticulation.

These works are required both sides of the street on the surrounding streets of the Waterloo ISD site. The nature and location of works require traffic changes, including half-road closures along Cope Street (northbound travel only) and Wellington Street (eastbound travel only), for the safety of the general public and construction workers in the area.

Concrete barriers with anti-gawking screens will be placed along the road to allow for traffic to flow in a one-way circuit around the site for the duration of works. Short-term works including setup of barriers, line marking, sign changes, utility crossings and other associated works will require traffic management to be implemented at nights or during off-peak hours.

As part of the works design process, *Bitzios Consulting* (Bitzios) are preparing the traffic guidance schemes (TGSs) and undertaking swept path analysis for the construction traffic management plan (CTMP) and subject works.

The subject works will continue for approximately nine months with a start date in November 2021.

The aim of the CTMP is to detail the traffic changes to facilitate construction for local area works around the Waterloo ISD. The CTMP will set-out the traffic management requirements that will be deployed to minimise disruption to and ensure the safety of the wide range of stakeholders potentially affected by the works, including but not limited to the following:

- Motorists and pedestrians.
- Cyclists.
- Public transport users, local residents and property owners.
- Business owners.
- Workers / staff engaged on the Project

This road safety audit report details an independently undertaken road safety audit of the CTMP for half-road closure works as part of the Waterloo ISD project. The road safety audit was undertaken by *Samsa Consulting Pty Ltd*, Transport Planning & Traffic Engineering Consultants.

The extent and location of the audit is shown in Figure 1 following.



Figure 1: Project Audit Extent and Location

1.2 Report Structure

The remainder of this report is presented as follows:

- **Chapter 2** describes details of the audit undertaken including the methodology, administration and documentation audited.
- Chapter 3 details the safety issues identified and audit findings.
- Chapter 4 provides a formal audit statement.

2. Audit Details

2.1 Audit Methodology

A road safety audit is "... a formal examination of a future road or traffic project or an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance" (Austroads 2009).

This audit followed a standard practice in identifying safety related issues of a project CTMP. It involved a desktop assessment of the proposed traffic management and guidance schemes, as well as identification of any background issues on site during day inspections.

The road safety audit focussed on safety issues such as temporary warning signage and linemarking, delineation, speed zoning, temporary pedestrian facilities and bus stops, safety barriers and proximity between travel lanes and work zones, sight distances, appropriateness of TGSs for the predicted traffic volumes, and overall road legibility adjacent and through work zones (amongst other issues).

The scope of the audit is in accordance with the requirements in Austroads' "*Guide to Road Safety, Part 6 / Part 6A*" and is structured around a standard checklist provided in the *Part 6A* manual as well as RTA's "*Accident Reduction Guide – Part 2: Road Safety Audits*".

The site inspections were undertaken on Friday 24 September 2021. An audit exit meeting was held at the completion of the road safety audit report.

2.2 Audit Administration

Bitzios Consulting Project Manager: Matthew Hearne

Road Safety Auditors: Carolyn Samsa (*RMS Accredited Level 3 Lead Road Safety Auditor*) (*Auditor ID: RSA-02-0585*) Alan Samsa (*RMS Accredited Level 3 Lead Road Safety Auditor*) (*Auditor ID: RSA-02-0056*)

2.3 References & Documentation Audited

- Austroads "Guide to Road Design Part 3: Geometric Design (Edition 3.3)", April 2020
- Austroads "Guide to Road Design Part 4: Intersections and Crossings General", 2017
- Austroads "Guide to Road Design Part 4A: Unsignalised and Signalised Intersections", October 2017
- Austroads "Guide to Road Safety, Part 6: Managing Road Safety Audits", February 2019
- Austroads "Guide to Road Safety, Part 6A: Implementing Road Safety Audits", February 2019
- Bitzios Consulting "Waterloo ISD Half Road Closure Construction Traffic Management Plan: Traffic Guidance Scheme", 21/09/2021
- Bitzios Consulting "Waterloo ISD Cope / Raglan / Wellington Works: Barangaroo Storage Yard, Truck Access / Egress Management, Traffic Guidance Scheme", 13/09/2021

- John Holland "Waterloo Integrated Station Development: Construction Traffic Management Plan, Addendum 2, Half Road Closures, (Document no. SMCSWSWL-JHG-SWL-EM-PLN-000013)", 13/09/2021
- RTA "Accident Reduction Guide Part 2: Road Safety Audits", 2005
- RTA "Road Safety Audit Technical Direction TD2003/RS03, Version 2", August 2005
- RTA "Delineation Guidelines: Parts 1 to 19 & Appendices A & B", assorted dates
- RTA "Guidelines for Road Safety Audit Practices Part 1: Road Safety Audit", July 2011
- Standards Australia "AS 1742.1 2003: Manual of uniform traffic control devices, Part 1: General introduction and index of signs", 2003
- Standards Australia "AS 1742.3 2009: Manual of uniform traffic control devices, Part 3: Traffic control for works on roads", 2009
- Transport for NSW "Traffic Control at Work Sites, Technical Manual Issue 6.0", 14 September 2020

3. Identified Safety Issues

The audit of the CTMP focussed on providing an independent identification of potential safety hazards, regardless of current practices, standards and operations, to allow Bitzios to identify remedial measures as part of its CTMP design preparation.

In categorising and prioritising identified safety issues, a risk assessment process was adopted. Risk assessment is the overall process of risk identification, analysis and evaluation. Preliminary risk ratings for each identified issue are assessed based on subjective professional judgement by the Road Safety Audit team with guidance from *Section 4.8 C* of Austroads "*Guide to Road Safety, Part 6A: Implementing Road Safety Audits*". The Austroads' document provides an indication of the level of risk and what response may be appropriate. The identified road safety issue is first categorised based on its likely frequency of occurrence and severity ('likelihood' and 'consequence' of crash potential) – refer to *Figures 3.1* and *3.2* below (extracted from the Austroads' document).

Crash frequency	Description
Frequent (F)	Once or more per week
Probable (P)	Once or more per year but less than once per week
Occasional (O)	Once every five to ten years
Improbable (I)	Less than once every ten years

Severity	Description	Examples
Catastrophic (C)	Likely multiple deaths	 High-speed, multi-vehicle crash on a freeway Car runs into crowded bus stop Bus and petrol tanker collide Collapse of a bridge or tunnel
Serious (S)	Likely death or serious injury	 High or medium-speed vehicle / vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian struck at high speed Cyclist is hit by a car
Minor (M)	Likely minor injury	 Some low-speed vehicle collisions Cyclist falls from bicycle at low speed Left-turn rear-end crash in a slip lane
Limited (L)	Likely trivial injury or property damage only	Some low speed collisionsPedestrian walks into object (no head injury)Car reverses into post

Figure 3.1: Likely Frequency of Issue

Figure 3.2: Likely Severity of Issue

An appropriate risk rating is then selected from the risk categories in the risk matrix with a preferred treatment approach for each risk rating (refer to *Figures 3.3* and *3.4* below, both extracted from Austroads).

	Frequent (F)	Probable (P)	Occasional (O)	Improbable (I)
Catastrophic (C)	Intolerable (I)	Intolerable (I)	Intolerable (I)	High (H)
Serious (S)	Intolerable (I)	Intolerable (I)	High (H)	Medium (M)
Minor (M)	Intolerable (I)	High (H)	Medium (M)	Low (L)
Limited (L)	High (H)	Medium (M)	Low (L)	Low (L)

Figure 3.3: Risk Matrix

Risk	Suggested treatment approach
Intolerable (I)	Must be corrected
High (H)	Should be corrected or the risk significantly reduced, even if the treatment cost is high
Medium (M)	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
Low (L)	Should be corrected or the risk reduced, if the treatment cost is low

Figure 3.4: Treatment Approach

This report may provide recommendations about possible remedial measures in response to identified deficiencies. Any remedial actions recommended are based on current standards and practices. However, it should be noted that it is ultimately the responsibility of Bitzios to determine how to respond to each identified safety deficiency.

The audit of the project CTMP identified a number of potential road safety issues. The safety audit process requires that the safety issues identified during an audit be acknowledged by the Audit Team and accordingly responded to by Bitzios. The issues are characterised according to their risk, and detailed in *Table 3.1* following.

It should be noted that not all road safety issues identified may necessarily be within the scope of the project CTMP area. This is because while the scope of the audit is generally within the project area described earlier, to complete a full audit of the project, the approaches and transitions to the project area were also audited to identify potential safety issues that may affect road safety within the project area. Therefore, some safety issues that are outside the project area may be the responsibility of the relevant controlling road authority.

Also note that while this audit focussed on identifying road safety issues related to the project CTMP and not the background existing conditions, some existing road conditions may have been recorded where they were deemed notable.

			For completion by Bitzios				
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date		
1.	For both Raglan Street approaches to the Cope Street half-road closure, there is no detour or turn restriction signage. Similarly, for southbound travel along Cope Street approaching Raglan Street and for the Wellington Street half-road closure at Cope Street, there is no detour signage, the latter which would also affect cyclists who are meant to follow the light vehicle detour routes.	Medium - High	Additional detour signage added.				
2.	For the pedestrian path closures along the southern side of Raglan Street, western side of Cope Street and northern side of Wellington Street, there is no pedestrian path closure or detour signage around the development site, including diversions to paths on the opposite side of roads.	Medium - High	Added signage stating "USE OTHER FOOTPATH"				

Table 3.1: Identified Safety Issues

			For completion by Bitzios		
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date
3.	For the right-turn from Botany Road northbound into Wellington Street eastbound, the swept path diagram indicates that articulated vehicles will need to turn from the Botany Road northbound left lane, which is undesirable and may result in side- swipe crashes. Similarly, for the left-turn from Botany Road southbound into Wellington Street eastbound, where the swept path diagram indicates that articulated vehicles and buses will need to turn from the Botany Road southbound centre lane.	Medium	Swept paths have been adjusted to updated arrangement. Heavy vehicles are permitted to straddle lanes to complete turning movements.		
4.	There is no consideration of the impacts on the bus stop (serving Sydney Buses route 309) along the eastern side of Botany Road, near the Waterloo Congregational Church.	Medium	Bus impacts have been undertaken in consultation with transport authorities.		
5.	Section 5.7 of the CTMP (page 24) indicates that bus movements will need to travel from Raglan Street westbound into Botany Road southbound but the left-turn swept path assessment has not been provided.	Low - Medium	Existing arrangement along Raglan Street is now retained.		

			For completion by Bitzios		
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date
6.	The issue of sun-glare during certain periods of the year at sunrise and sunset may be applicable to east-west alignments along the surrounding road network, eg. along Raglan Street and Wellington Street. Consequently, the temporary traffic conditions including signage and traffic control devices may be difficult to sight due to sun glare.	Low - Medium	Noted. Traffic controllers		
7.	For the site access gates off Raglan Street, Cope Street and Wellington Street, there is no warning or advisory signage to warn general traffic of construction traffic turning and to advise approaching construction traffic of site access points.	Low - Medium	"NO ENTRY" and "CONSTRUCTION VEHICLES EXCEPTED" signage has been added to the TGS.		

			For completion by Bitzios		
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date
8.	There is inconsistency in the series of warning / advisory signage proposed ('Roadwork Ahead', 'Changed Traffic Conditions', '40 km/h Roadwork') on the Botany Road southbound, Henderson Road eastbound and Buckland Street eastbound approaches to the subject roadworks area.	Low - Medium	Given the situation is different depending on which part of the work site		
9.	Apart from travel along Raglan Street eastbound, east of Cope Street, there is no speed reinstatement signage proposed (to change from the temporary 40 km/h roadworks speed zoning). This includes along Botany Road northbound, Cope Street (at either end), Wellington Street eastbound, Buckland Street westbound, Henderson Road westbound, etc.	Low - Medium	Noted. The surrounding streets are the default 50km/h speed limit and vehicles will use this upon exiting the roadworks area.		
10.	For westbound travel along Henderson Road, exiting the roadworks area from Raglan Street, there is no 'End Roadworks' advisory signage.	Low	Noted. Sign added.		

			For completion by Bitzios			
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date	
11.	The CTMP assumes that there is sufficient capacity in the surrounding local area to offset the impacts of a reduction in on- street parking (43 spaces) created by the subject works. However, this level of decrease in parking has the potential to increase traffic circulation in the surrounding area due to drivers searching for on-street parking, which potentially increases congestion and results in reduced road safety.	Low	Parking impacts are being negotiated between Sydney Metro and Council.			
12.	The locations of the proposed 'End Roadwork' signage for Raglan Street eastbound and Wellington Street eastbound (east of Cope Street) do not capture Cooper Street, which may appear to be part of the roadworks area – consider relocation west of Cooper Street.	Low	The positioning of this signage supports the "ROADWORK ON SIDE ROAD" signage used on nearby streets.			

			For completion by Bitzios		_
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date
13.	All 'Roadwork on Side Road' signs in the surrounding road network approaches, do not indicate in which direction the roadwork is on the side road.	Low	These signs are supported by other roadworks signage on adjacent roads.		
14.	It is assumed that there will be appropriate night delineation along the subject road network including (where necessary) reflectors on safety barriers and RRPMs along lane lines, edge-lines, centrelines, etc.	Note only	Noted.		
15.	<i>Figure 8</i> (on <i>page 14</i> of the CTMP) is inconsistent with the description of the proposed Raglan Street arrangement under <i>Section 4.2</i> (on <i>page 13</i> of the CTMP), which indicates 3.5 m travel lane widths.	Note only	Section updated.		

			For completion by Bitzios		
No.	Description of Road Safety Issue	Risk Rating	Response	Action by	Close- Out Date
16.	<i>Figures 18</i> and <i>19</i> (on <i>page 23</i> of the CTMP) are inconsistent with the description of existing vehicle routes under <i>Section 5.6</i> (<i>page 22</i> of the CTMP).	Note only	Section updated.		

4. Formal Audit Statement

This road safety audit has been undertaken by *Samsa Consulting Pty Ltd*, using the references and documentation detailed previously and site inspections of the subject project area during daylight conditions.

While the road safety audit may provide recommendations about possible remedial measures in response to identified road safety issues, it is ultimately the responsibility of Bitzios to determine how best to respond to each identified safety issue.

The audit has been undertaken for the sole purpose of identifying any safety-deficient features and road safety risks of the subject project CTMP. Every effort was made to ensure that all relevant safety issues were considered and the findings are the opinion and judgement of the audit team.

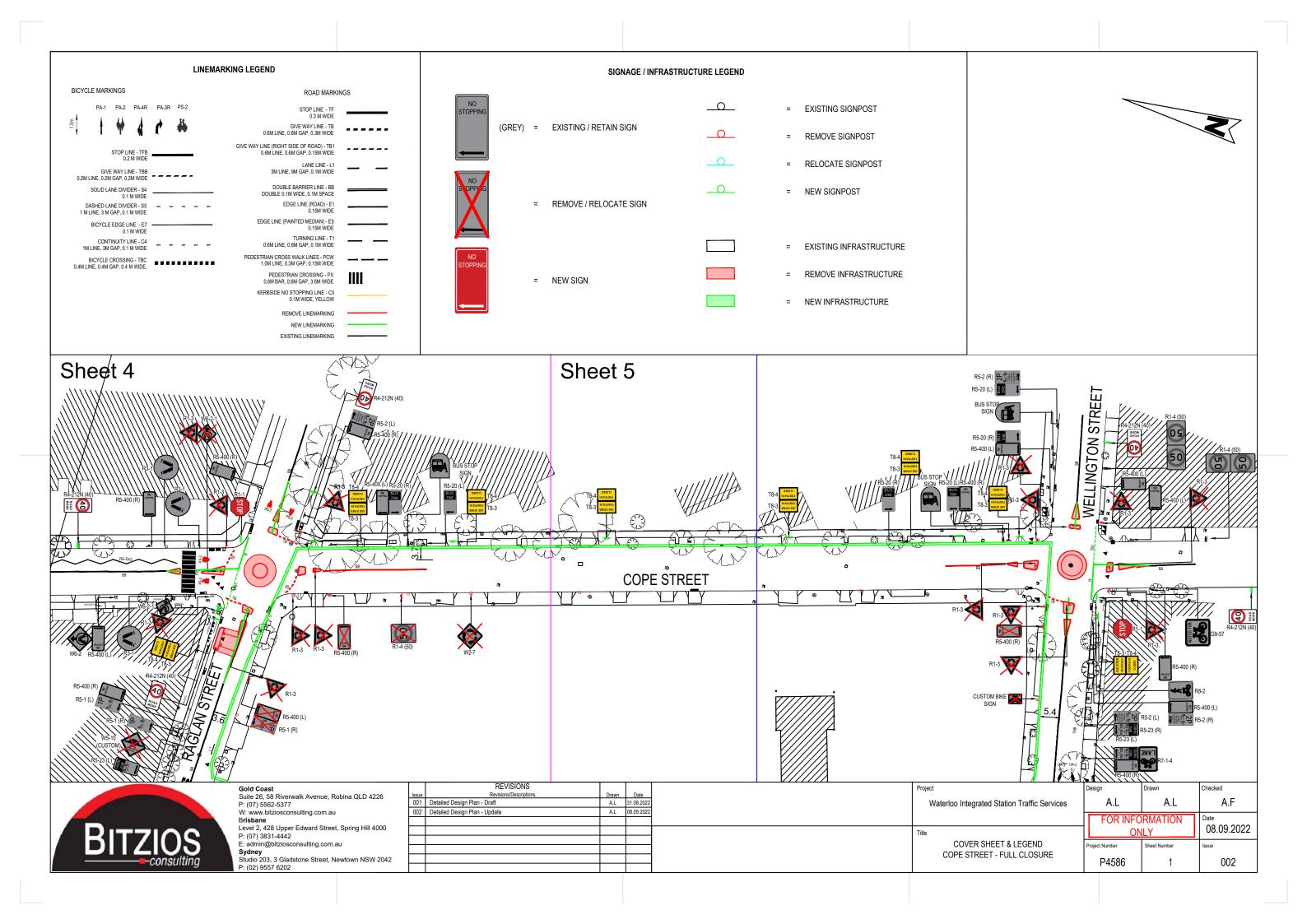
26 September 2021

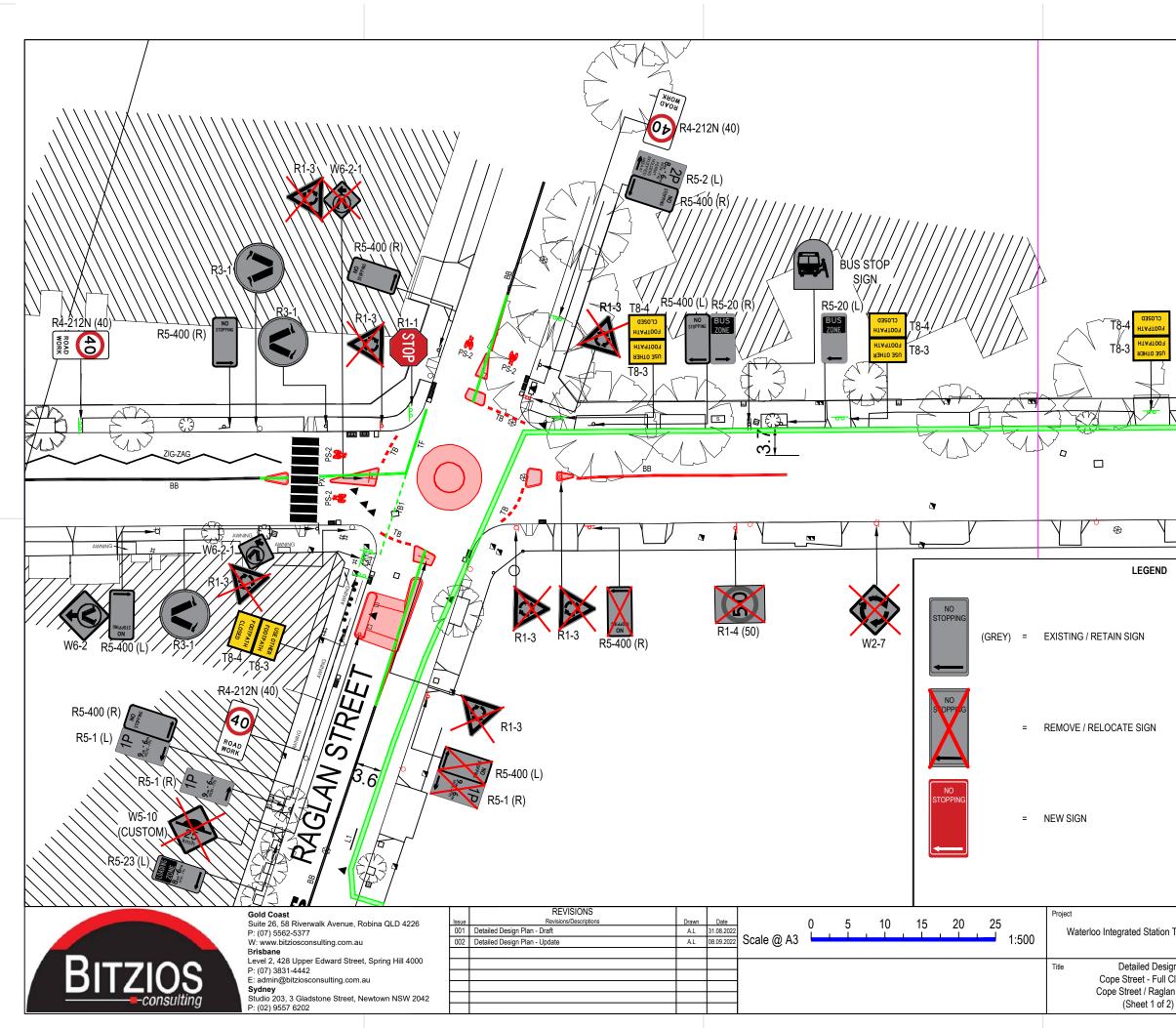
CAROLYN SAMSA RMS Accredited Road Safety Auditor: Level 3 Lead Auditor (Auditor ID: RSA-02-0585)

26 September 2021

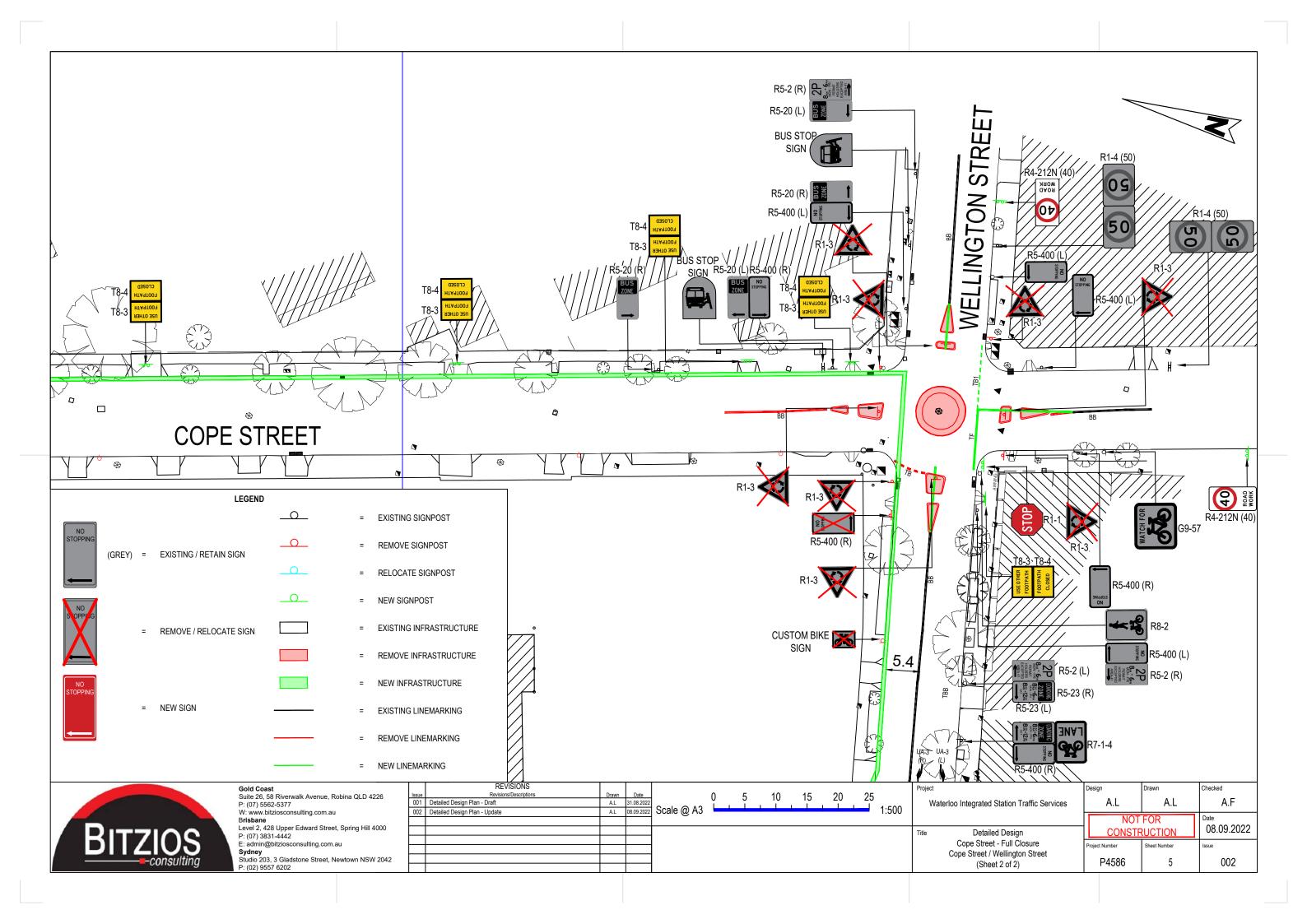
ALAN SAMSA RMS Accredited Road Safety Auditor: Level 3 Lead Auditor (Auditor ID: RSA-02-0056)

Appendix F – Final Intersection Arrangement





				X
Y	COPE		EET	
LEGEND	•			
	0		STING SIGNPOST	
GN			MOVE SIGNPOST	
			OCATE SIGNPOS	51
SIGN			STING INFRASTR	UCTURE
SIGN			MOVE INFRASTRU	
		= NE\	W INFRASTRUCT	JRE
		= EXI	STING LINEMARK	ING
		= REM	MOVE LINEMARKI	NG
		= NEV	W LINEMARKING	
ed Station 1	Traffic Services	Design A.L	Drawn A.L	Checked A.F Date
ailed Desigi eet - Full C	losure		RUCTION Sheet Number	08.09.2022
et / Raglan	Street	P4586	4	002



Appendix G – COS Removal of Roundabout Endorsements

Nathaniel Lasky-JHG

From: Sent: To: Subject: Joshua Faull <jfaull@cityofsydney.nsw.gov.au> Friday, 10 December 2021 6:57 PM Nathaniel Lasky-JHG RE: Waterloo - Removal of Roundabout

Hi Nathaniel,

I can confirm that the City has approved the removal of the roundabouts as per the below details. The CTMP has been to traffic committee and been endorsed by all parties. The temporary measures that will be in place until the final design have also been approved.

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 cityofsydney.nsw.gov.au



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Nathaniel Lasky-JHG <Nathaniel.Lasky@jhg.com.au> Sent: Friday, 10 December 2021 3:57 PM To: Joshua Faull <jfaull@cityofsydney.nsw.gov.au> Subject: Waterloo - Removal of Roundabout

Hi Josh,

As discussed, part of the Waterloo ISD works requires the roundabouts (1x Cope & Wellington intersection and 1x Cope & Raglan intersection) to be removed permanently.

The final arrangement for Cope & Wellington intersection is a stop line North/Southbound with preference given to traffic going East/Westbound.

The final arrangement for Cope & Raglan will be a RMS traffic signalled intersection.

The interim (from current to final) will be as per the CTMP (already approved by City of Sydney and Traffic Committee).

Please confirm if this is your understanding and approval of the above.

Any questions, please let me know.

Kind Regards,



84 – 88 Botany Road Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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Appendix H – COS Garbage Bins Endorsement

Nathaniel Lasky-JHG

From:	Joshua Faull
Sent:	Monday, 6 December 2021 3:16 PM
То:	Matthew Kerry-JHG
Cc:	Baria Mahdy-JHG; Nathaniel Lasky-JHG; Bj Jordan-JHG; Sally Reynolds-JHG
Subject:	RE: Cope St Closure - Resident Bin Requirements

Okay thanks I have advised our team and will let you know the details once I hear back.

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 <u>cityofsydney.nsw.gov.au</u>



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Matthew Kerry-JHG <Matthew.Kerry@jhg.com.au>
Sent: Monday, 6 December 2021 1:27 PM
To: Joshua Faull <jfaull@cityofsydney.nsw.gov.au>
Cc: Baria Mahdy-JHG <Baria.Mahdy@jhg.com.au>; Nathaniel Lasky-JHG <Nathaniel.Lasky@jhg.com.au>; Bj Jordan-JHG <Bj.Jordan@jhg.com.au>; Sally Reynolds-JHG <Sally.Reynolds@jhg.com.au>
Subject: RE: Cope St Closure - Resident Bin Requirements

Josh,

Yes this can be accommodated.

Please advised on collection days and times to best ensure bins can be taken out. Alternatively, John Holland can assist upon arrival with CoS personnel notifying John Holland and we can arrange for the bins to be brought out and taken in at the same time.

Regards,

Matthew Kerry Site Engineer



Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





From: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>
Sent: Monday, 6 December 2021 11:51 AM
To: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Cc: Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bj Jordan-JHG <<u>Bj.Jordan@jhg.com.au</u>>; Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>;
Subject: RE: Cope St Closure - Resident Bin Requirements

Okay so if they need to collect at Wellington St or Raglan then you will need to get the bins taken out to the location and then take them back in as they wont do that.

Can this be accommodated?

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 <u>cityofsydney.nsw.gov.au</u>



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Sent: Monday, 6 December 2021 11:26 AM
To: Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bj Jordan-JHG <<u>Bj.Jordan@jhg.com.au</u>>; Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>;
Subject: RE: Cope St Closure - Resident Bin Requirements

Josh,

Thanks for your response. Please note the following in relation to the queries:

- The Bins would be able to be collected during the usual collection time during the week.
- The Truck will not be able to access directly to the bin storage as cranes will be setup on the full width of the roadway. However, can park up on wellington or cope St outside the closure.
- The footpath on the eastern side of Cope St will be open and as such the bin storage unit can be accessed from the footpath for CoS collection Personnel to access the unit without interfacing with John Holland.

Can you please pass the above onto the appropriate team for comment.

Regards,

Matthew Kerry Site Engineer Waterloo Station



Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





From: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>
Sent: Monday, 6 December 2021 11:10 AM
To: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Cc: Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bj Jordan-JHG <<u>Bj.Jordan@jhg.com.au</u>>; Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>;
Subject: RE: Cope St Closure - Resident Bin Requirements

I have been speaking to our waste team and they have asked the below.

Is there a specific time that the bins would need to be collected? If so will the truck be able to access into the street under control to get the bins?

Otherwise can John Holland bring the bins to the nearest accessible intersection and return them back after collection?

Joshua Faull Construction Liaison Coordinator Construction & Building Certification Services



Telephone: +612 9265 9767 Mobile: +61 448 488 384 <u>cityofsydney.nsw.gov.au</u>



The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

From: Matthew Kerry-JHG <<u>Matthew.Kerry@jhg.com.au</u>>
Sent: Monday, 6 December 2021 11:07 AM
To: Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bj Jordan-JHG <<u>Bj.Jordan@jhg.com.au</u>>; Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>;
Subject: RE: Cope St Closure - Resident Bin Requirements

Hi Josh,

Just following up on the below regarding resident bins on Cope St. Can you please advise at your earliest convenience on the below.

Regards,





Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





From: Matthew Kerry-JHG
Sent: Friday, 3 December 2021 11:35 AM
To: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>
Cc: Baria Mahdy-JHG <<u>Baria.Mahdy@jhg.com.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bj Jordan-JHG <<u>Bj.Jordan@jhg.com.au</u>>; Sally Reynolds-JHG <<u>Sally.Reynolds@jhg.com.au</u>>
Subject: Cope St Closure - Resident Bin Requirements

Josh,

The residents on the eastern side of Cope St have bin storage units that will have access affected during the road closure on Cope St.

Can City of Sydney please advise the requirements to facilitate access to these bin storage units during the closure of Cope St.

If you have any questions please feel free to give me a call.

Regards,

Matthew Kerry Site Engineer Waterloo Station



Level 10, 54 Park Street Sydney NSW 2000 M. +61 429 163 644 E. <u>Matthew.Kerry@jhg.com.au</u> W. johnholland.com.au





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Appendix I – Temporary Bus Shelter Correspondence

Nathaniel Lasky-JHG

From: Sent:	Frankie Passarelli <frankie.passarelli@transport.nsw.gov.au> Monday, 23 May 2022 8:21 AM</frankie.passarelli@transport.nsw.gov.au>
То:	Nathaniel Lasky-JHG; Bushara Gidies; James Forsyth; Joshua Faull
Cc:	Rabih Bekdache; Elizabeth Harrison; Jim Niahos; Jake Coles; Giovanny Ramirez cordoba; Lucinda Cook; tjh.networkplanning@transdevjohnholland.com.au
Subject:	RE: Waterloo - Bus Shelter Relocation
Attachments:	TimePhoto_20220518_094444.jpeg

Nathaniel,

Thank you.

Regards, Frankie Passarelli Transport Planning Project Manager Customer Journey Planning – Short Term & Temporary Transport Planning Greater Sydney | Transport for NSW

E: <u>Frankie.PASSARELLI@transport.nsw.gov.au</u>

T: 0447 174 312 231 Elizabeth St | Sydney NSW 2000





I acknowledge the Aboriginal people of the country on which I work, their traditions, culture and a shared history and identity. I also pay my respects to Elders past and present and recognise the continued connection to country.

Please consider the environment before printing this email.

From: Nathaniel Lasky-JHG <Nathaniel.Lasky@jhg.com.au>

Sent: Sunday, 22 May 2022 4:25 PM

To: Bushara Gidies <Bushara_Gidies@sta.nsw.gov.au>; James Forsyth <James_Forsyth@sta.nsw.gov.au>; Frankie Passarelli <Frankie.PASSARELLI@transport.nsw.gov.au>; Joshua Faull <jfaull@cityofsydney.nsw.gov.au> **Cc:** Rabih Bekdache <Rabih.Bekdache@transport.nsw.gov.au>; Elizabeth Harrison

<Elizabeth.Harrison@transport.nsw.gov.au>; Jim Niahos <Jim.Niahos@transport.nsw.gov.au>; Jake Coles <Jake.COLES@transport.nsw.gov.au>; Giovanny Ramirez cordoba <Giovanny.Ramirez@transport.nsw.gov.au> Subject: RE: Waterloo - Bus Shelter Relocation

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Apologises. Photo attached.

Kind Regards,

Nathaniel Lasky

Senior Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Nathaniel Lasky-JHG
Sent: Sunday, 22 May 2022 4:22 PM
To: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>; Frankie
Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; Frankie
Cc: Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>; Elizabeth Harrison
<<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Jake Coles
<<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>
Subject: RE: Waterloo - Bus Shelter Relocation

Dear All,

Please note, the bus stop has been changed (not done by JH).

Kind Regards,

Nathaniel Lasky Senior Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>> Sent: Monday, 14 March 2022 7:40 AM To: Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>; Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; Cc: Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>; Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>> Subject: RE: Waterloo - Bus Shelter Relocation

Thanks Nathaniel.

Regards

Bushara Gidiess

Traffic & Services Manager Eastern Region I State Transit MOB : 0403 073 658 Port Botany Depot Bushara_Gidies@sta.nsw.gov.au www.transport.nsw.gov.au/state-transit

From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]
Sent: Saturday, 12 March 2022 9:45 AM
To: James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>; Frankie Passarelli
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>;
Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>;
Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba
<<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>;
Subject: RE: Waterloo - Bus Shelter Relocation

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Hi All,

Apologises for the delay. Please see attached photo of the rectification of the bus stop sign.

Any questions, please let me know.

Kind Regards,

Nathaniel Lasky Senior Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Nathaniel Lasky-JHG
Sent: Tuesday, 1 March 2022 8:06 AM
To: 'James Forsyth' <<u>James_Forsyth@sta.nsw.gov.au</u>>; 'Frankie Passarelli'
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: 'Bushara Gidies' <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; 'Rabih Bekdache' <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>;
'Elizabeth Harrison' <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; 'Jim Niahos' <<u>Jim.Niahos@transport.nsw.gov.au</u>>;
'Jake Coles' <<u>Jake.COLES@transport.nsw.gov.au</u>>; 'Giovanny Ramirez cordoba'
Subject: RE: Waterloo - Bus Shelter Relocation

Hi All,

By way of update, we are planning to rectify the pole on Friday 4th (due to the inclement weather forecasted this week).

I will send through photo of the rectified sign when completed.

Any questions, please let me know.

Kind Regards,



Alexandria NSW 2017 M. +61 409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Nathaniel Lasky-JHG
Sent: Thursday, 24 February 2022 11:06 AM
To: James Forsyth <<u>James Forsyth@sta.nsw.gov.au</u>>; Frankie Passarelli
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: Bushara Gidies <<u>Bushara Gidies@sta.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>;
Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>;
Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba
<<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>;
Subject: RE: Waterloo - Bus Shelter Relocation

Hi All,

We are planning on rectifying these works immediately. We have been delayed due to the inclement weather we are experiencing.

I will advise once works are complete and take photo for evidence.

Any questions, please let me know.

Kind Regards,

Nathaniel Lasky Senior Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: James Forsyth <James_Forsyth@sta.nsw.gov.au>
Sent: Thursday, 24 February 2022 10:54 AM
To: Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Frankie Passarelli
<Frankie.PASSARELLI@transport.nsw.gov.au>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>
Cc: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>;
Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>;
Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba
<<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>
Subject: RE: Waterloo - Bus Shelter Relocation

Hi All,

Any update on this issue? We have another bus mirror clip the post today. Occurred when bus suspension "kneeled" for passenger with mobility issues (ie not driver collision when pulling in/out of stop).

Cost of replacement bus mirrors ~\$400 and inconvenience to customers if bus cannot continue in service without a functioning mirror.

If post is installed per guidelines we won't experience these issues.

Thank you.

Regards,

James Forsyth Customer Operations Manager Eastern Suburbs I State Transit P: 02 9582 7630 1 Bumborah Point Road, Port Botany

From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]

Sent: Tuesday, 15 February 2022 8:22 AM

To: Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>> Cc: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>; Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>> Subject: RE: Waterloo - Bus Shelter Relocation

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Hi Frankie,

Welcome back.

I'll do some investigation and get back to you on the below item.

Any questions, please let me know.

Kind Regards,

Nathaniel Lasky Senior Project Engineer Waterloo Station



84 – 88 Botany Road
Alexandria NSW 2017
M. +61 409 414 866
E. <u>Nathaniel.Lasky@jhg.com.au</u>
W. johnholland.com.au



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From: Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>
Sent: Tuesday, 15 February 2022 8:18 AM
To: Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>; Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>
Cc: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>>;
Elizabeth Harrison <<u>Elizabeth.Harrison@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>;
Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Giovanny Ramirez
cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>
Subject: RE: Waterloo - Bus Shelter Relocation

Nathaniel,

Have been on leave an yesterday was my first day back.

Can you please provide and update on issue highlighted below.

Regards, Frankie Passarelli Transport Planning Project Manager Customer Journey Planning – Short Term & Temporary Transport Planning Greater Sydney | Transport for NSW

E: Frankie.PASSARELLI@transport.nsw.gov.au T: 0447 174 312 231 Elizabeth St | Sydney NSW 2000



From: James Forsyth
Sent: Monday, 14 February 2022 2:29 PM
To: Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>
Cc: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>
Subject: FW: Waterloo - Bus Shelter Relocation

Hi Jim & Frankie,

Hope you are both well.

Is there any chance you can escalate this one? J-Stem is still positioned incorrectly and appears to have now been hit as it is at a lean.

Thank you for your time and assistance.

James.

Regards,

James Forsyth Customer Operations Manager Eastern Suburbs I State Transit P: 02 9582 7630 1 Bumborah Point Road, Port Botany

From: James Forsyth
Sent: Wednesday, 19 January 2022 2:42 PM
To: 'Nathaniel Lasky-JHG' <<u>Nathaniel.Lasky@jhg.com.au</u>>; Bushara Gidies <<u>Bushara Gidies@sta.nsw.gov.au</u>>;

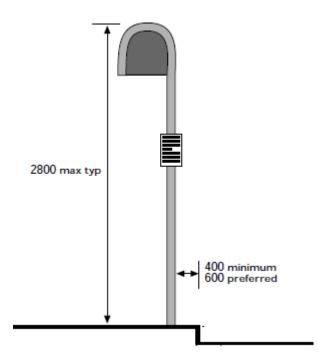
Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh Vengadasalam' <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>> **Cc:** Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina <<u>Ana.Garcia@transport.nsw.gov.au</u>>; Karina D'silva <Karina.D'Silva@transport.nsw.gov.au>; Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; Rabih Bekdache <<u>Rabih.Bekdache@transport.nsw.gov.au</u>> **Subject:** RE: Waterloo - Bus Shelter Relocation

Hi Nathaniel,

Thanks for the update and advice. On attending site today to display the timetables for both bus operators, I have found the installation of the J-Stem is reverse to the standards, with the flag/hook part of the stem facing the roadway instead of away (see diagram below for correct positioning).

This poses a hazard as the nearside mirror on buses can come into contact with objects such as this when they are too close to the kerb. This can result in property damage (stem/mirror) and/or personal injury is parts hit someone standing close by.

Would it be possible for your team/supplier to rotate the stem to sit in the correct position to avoid potential for collisions. Thank you for your assistance.



Regards,

James Forsyth Customer Operations Manager Eastern Suburbs I State Transit P: 02 9582 7630 1 Bumborah Point Road, Port Botany

From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au] Sent: Thursday, 13 January 2022 1:52 PM To: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Frankie Passarelli

<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>ifaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh Vengadasalam' <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>

Cc: Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina <<u>Ana.Garcia@transport.nsw.gov.au</u>>; Karina D'silva <Karina.D'Silva@transport.nsw.gov.au>; Jake Coles <<u>Jake.COLES@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>; Rabih Bekdache <Rabih.Bekdache@transport.nsw.gov.au>

Subject: RE: Waterloo - Bus Shelter Relocation

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Hi Bushara,

Please see attached photo of bus stop with timetable attachments.

Any questions, please let me know.

Kind Regards,

Nathaniel Lasky Senior Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>
Sent: Tuesday, 11 January 2022 11:47 AM
To: Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Frankie Passarelli
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh
Vengadasalam' <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>
Cc: Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony
Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez
cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos
<<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina
<<u>Ana.Garcia@transport.nsw.gov.au</u>>; James Forsyth@sta.nsw.gov.au>; Rabih Bekdache

<<u>Rabih.Bekdache@transport.nsw.gov.au</u>>

Subject: RE: Waterloo - Bus Shelter Relocation

Hi Nathaniel,

Can you please advise when timetable cases will be installed as agreed previously.



Regards

Bushara Gidiess

Traffic & Services Manager Eastern Region I State Transit MOB : 0403 073 658 Port Botany Depot <u>Bushara_Gidies@sta.nsw.gov.au</u> www.transport.nsw.gov.au/state-transit Transport State Transit

From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]
Sent: Wednesday, 15 December 2021 1:06 PM
To: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>; Frankie Passarelli
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh
Vengadasalam' <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>
Cc: Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony
Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez
cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos
<<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina
<<u>Ana.Garcia@transport.nsw.gov.au</u>>; Karina D'silva <Karina.D'Silva@transport.nsw.gov.au>; Jake Coles
<<u>Jake.COLES@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>

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Hi Bushara,

Please be advised, JHG will be implementing the bus stop on Botany Rd by Wednesday 22nd.

Kind Regards,

Nathaniel Lasky Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Bushara Gidies < Bushara Gidies@sta.nsw.gov.au> Sent: Wednesday, 10 November 2021 2:37 PM To: Nathaniel Lasky-JHG <Nathaniel.Lasky@jhg.com.au>; Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh Vengadasalam' < GVengadasalam@cityofsydney.nsw.gov.au> Cc: Ryan Madden-JHG <Ryan.Madden@jhg.com.au>; Murtaza Tahiri-JHG <Murtaza.Tahiri@jhg.com.au>; Anthony Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos <<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina <<u>Ana.Garcia@transport.nsw.gov.au</u>>; Karina D'silva <Karina.D'Silva@transport.nsw.gov.au>; Jake Coles <Jake.COLES@transport.nsw.gov.au>; James Forsyth <James Forsyth@sta.nsw.gov.au> Subject: RE: Waterloo - Bus Shelter Relocation

Hi Nathaniel,

Below supplier have them and product detail as below is:

[B03-A3 std 50nb Yel] Virtex A3 Portrait Timetable Display Case, 50nb, Yellow, complete including cover and fasteners,

CIVIQ[™]

CIVIQ Pty Ltd A.C.N 626 744 367 A.B.N. 35 626 744 367 8-10 Giffard St Silverwater NSW 2128 Australia PO Box 6346, SILVERWATER NSW 1811 Ph: +61 2 9737 0022 Fax: Email: admin@civig.com.au

Regards

Bushara Gidiess Traffic & Services Manager Eastern Region I State Transit MOB: 0403 073 658 Port Botany Depot Bushara Gidies@sta.nsw.gov.au www.transport.nsw.gov.au/state-transit AND-NSW State Transit

From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]

Sent: Wednesday, 10 November 2021 1:44 PM

To: Bushara Gidies; Frankie Passarelli; Joshua Faull; 'Ganesh Vengadasalam'

Cc: Ryan Madden-JHG; Murtaza Tahiri-JHG; Anthony Dodds-JHG; Leanna Fuller-JHG; Giovanny Ramirez cordoba; Peter Keyes; Jim Niahos; Craig Dunn; Ana milena Garcia remolina; Karina D'silva; Jake Coles; James Forsyth Subject: RE: Waterloo - Bus Shelter Relocation

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Hi Bushara,

I have touched base with David McGowen (contact provided by yourself). He only has A4 size timetable cases (not A3) as specified. Is this something STA can provide? Please confirm.

Kind Regards,



84 – 88 Botany Road Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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From: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>
Sent: Wednesday, 10 November 2021 7:26 AM
To: Nathaniel Lasky-JHG <<u>Nathaniel.Lasky@jhg.com.au</u>>; Frankie Passarelli
<<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh
Vengadasalam' <<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>
Cc: Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony
Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez
cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos
<Jim.Niahos@transport.nsw.gov.au>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina
<<u>Ana.Garcia@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>
Subject: RE: Waterloo - Bus Shelter Relocation

Nathaniel,

Thanks for your email & feedback, comment highlighted below;

Regards

Bushara Gidiess Traffic & Services Manager Eastern Region I State Transit MOB : 0403 073 658 Port Botany Depot Bushara Gidies@sta.nsw.gov.au From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]
Sent: Tuesday, 9 November 2021 6:34 PM
To: Bushara Gidies; Frankie Passarelli; Joshua Faull; 'Ganesh Vengadasalam'
Cc: Ryan Madden-JHG; Murtaza Tahiri-JHG; Anthony Dodds-JHG; Leanna Fuller-JHG; Giovanny Ramirez cordoba; Peter Keyes; Jim Niahos; Craig Dunn; Ana milena Garcia remolina; Karina D'silva; Jake Coles; James Forsyth
Subject: RE: Waterloo - Bus Shelter Relocation

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Hi Bushara & Frankie,

Thankyou for your quick response.

Can you please clarify the below:

Can we please procure the J-stem pole now since it has a three week lead time? What is the process? Can you please submit a quote so JHG can raise a PO to complete the works? Alternatively, JHG will acquire a pole and STA/Council can attach their timetable to it. Is this acceptable?
 Considering it's been agreed infrastructure will be J-Stem, procurement & instalment should be arranged with the below contractor. Pole should be installed with 4 (A3) timetable cases.

David McGowen

Senior Project Manager

SINGLETON MOORE SIGNS

0404 698 867 02 9545 5665 3 Ethell Road, Kirrawee NSW 2232 smsco.com.au

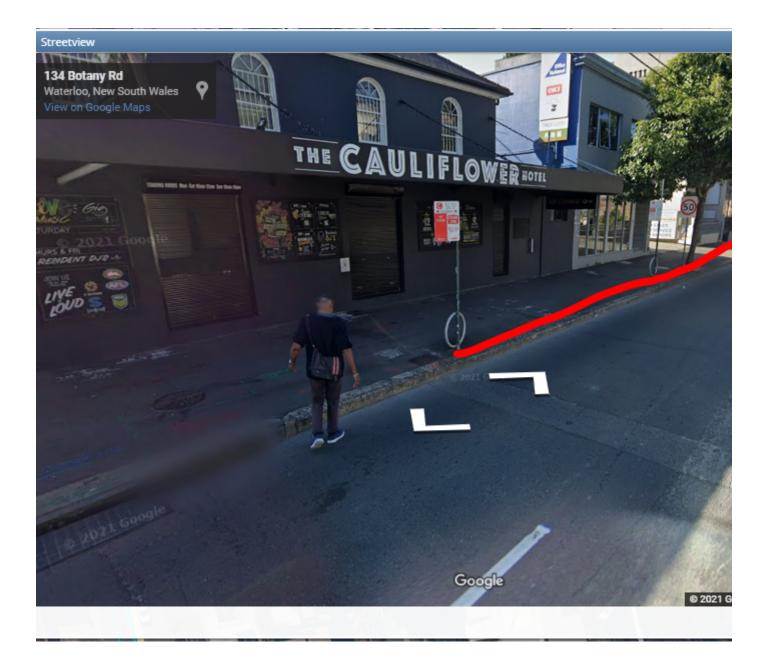
• In Bushara's email, the insert is of location 2. My understanding was the bus stop was to be outside the Cauliflower Hotel (Location 1). Why are we changing the location of the bus stop? For ease, I have copied and pasted Frankie's inserts from his email.

Location 2 agreed too after site walk attended by Mr. Jim Niahos & Project representative , and rational as below:

- Kerb side distance wouldn't be suffice for multiple high frequency services using Articulated buses (18M).
- Buses can't/ shouldn't dwell at No stopping which must be used due kerb side length at location 1.
- Dwelling Buses will block driveway.
- Shelter should be installed. (No shelter required location 2 as there's awning).

Is it possible to organise a site walk so we can discuss the agreed location of the bus stop?





Kind Regards,

Nathaniel Lasky Project Engineer Waterloo Station



84 – 88 Botany Road Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. <u>johnholland.com.au</u>



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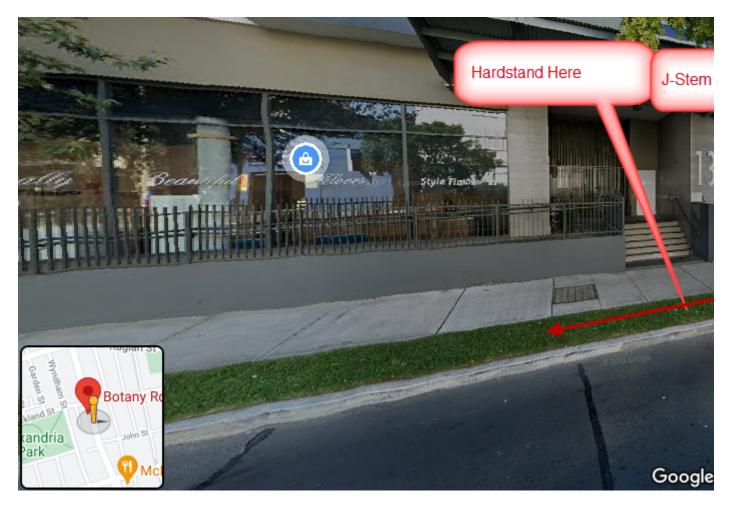
From: Bushara Gidies <<u>Bushara_Gidies@sta.nsw.gov.au</u>>
Sent: Tuesday, 9 November 2021 5:36 PM
To: Frankie Passarelli <<u>Frankie.PASSARELLI@transport.nsw.gov.au</u>>; Nathaniel Lasky-JHG
<<u>Nathaniel.Lasky@jhg.com.au</u>>; Joshua Faull <<u>jfaull@cityofsydney.nsw.gov.au</u>>; 'Ganesh Vengadasalam'
<<u>GVengadasalam@cityofsydney.nsw.gov.au</u>>
Cc: Ryan Madden-JHG <<u>Ryan.Madden@jhg.com.au</u>>; Murtaza Tahiri-JHG <<u>Murtaza.Tahiri@jhg.com.au</u>>; Anthony
Dodds-JHG <<u>Anthony.Dodds@jhg.com.au</u>>; Leanna Fuller-JHG <<u>Leanna.Fuller@jhg.com.au</u>>; Giovanny Ramirez
cordoba <<u>Giovanny.Ramirez@transport.nsw.gov.au</u>>; Peter Keyes <<u>Peter.KEYES@transport.nsw.gov.au</u>>; Jim Niahos
<<u>Jim.Niahos@transport.nsw.gov.au</u>>; Craig Dunn <<u>craig.dunn@transport.nsw.gov.au</u>>; Ana milena Garcia remolina
<<u>Ana.Garcia@transport.nsw.gov.au</u>>; James Forsyth <<u>James_Forsyth@sta.nsw.gov.au</u>>

Subject: RE: Waterloo - Bus Shelter Relocation

Frankie,

Below what was discussed and agreed with:

- Bus zone (South direction) on the power pole just South of Office National driveway.
- Bus zone (North direction) on the power pole in front of #133 Botany Rd.
- Hardstand, Tactile & J-Stem as indicated below.
- Community consultation carried out and council approval arranged by proponent.
- 3 Weeks Lead time for J- Stem installation required.



Regards

Bushara Gidiess Traffic & Services Manager Eastern Region I State Transit MOB : 0403 073 658 Port Botany Depot Bushara Gidies@sta.nsw.gov.au www.transport.nsw.gov.au/state-transit Transport State Transit

From: Frankie Passarelli
Sent: Tuesday, 9 November 2021 4:52 PM
To: 'Nathaniel Lasky-JHG'; Joshua Faull; 'Ganesh Vengadasalam'
Cc: Ryan Madden-JHG; Murtaza Tahiri-JHG; Anthony Dodds-JHG; Leanna Fuller-JHG; Giovanny Ramirez cordoba; Peter Keyes; Jim Niahos; Craig Dunn; Bushara Gidies; Ana milena Garcia remolina; Karina D'silva; Jake Coles
Subject: RE: Waterloo - Bus Shelter Relocation

Nathaniel,

Thanks for the email.

I have included a few people in this email who were involved in initial discussions for this particular bus stop move, Jim Niahos and Bushara Gidiess.

They may add further commentary to my thoughts below and can provide feedback on previously agreed position.

Due to high capacity vehicles being used along this corridor, generally we require 40m zones (18m for bus, 14m draw in , 8m draw out).

Given Draw in and Draw out are really not an issue here, the only issue will be if the bus can wholly stop within the regulatory signs and not protrude in the no stopping area when setting down or picking up intending passengers.

Location 1 below is probably the most suitable place for head of Rank of bus stop if an articulated bus can fit within the confines of the regulatory signs – we shouldn't have any issues with 12.5m standard buses.

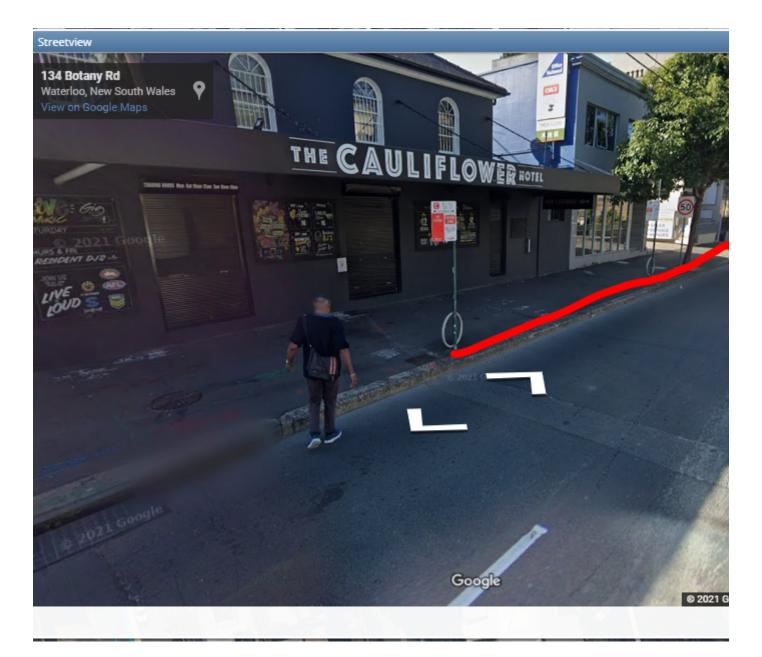
If location 1 is suitable, then no shelter is required as intending customers can seek shelter from the element under the awning of the building.

The attached PDF is current for bus stop layout, I'm sure Bushara can assist with marking out STA preferred position for head of rank at location to assist with installation of bus infrastructure(Pole/ Tactiles)

As for J-stem or B-pole procurement – both Bushara and Ana may wish to provide advice on lead times and process for procurement.

As always, all associated costs associated with these changes need to be funded by the project.





Regards, Frankie Passarelli Transport Planning Project Manager Customer Journey Planning - Transport Integration Greater Sydney | Transport for NSW

E: Frankie.PASSARELLI@transport.nsw.gov.au T: 0447 174 312 231 Elizabeth St | Sydney NSW 2000



From: Nathaniel Lasky-JHG [mailto:Nathaniel.Lasky@jhg.com.au]
Sent: Tuesday, 9 November 2021 2:06 PM
To: Frankie Passarelli < Frankie Passarelli Frankie PassARELLI@transport.nsw.gov.au
'Ganesh Vengadasalam' GVengadasalam@cityofsydney.nsw.gov.au
Cc: Ryan Madden-JHG Frankie.Passarelli
'Anthony Dodds-JHG Anthony Dodds@jhg.com.au
Subject: Waterloo - Bus Shelter Relocation
Importance: High

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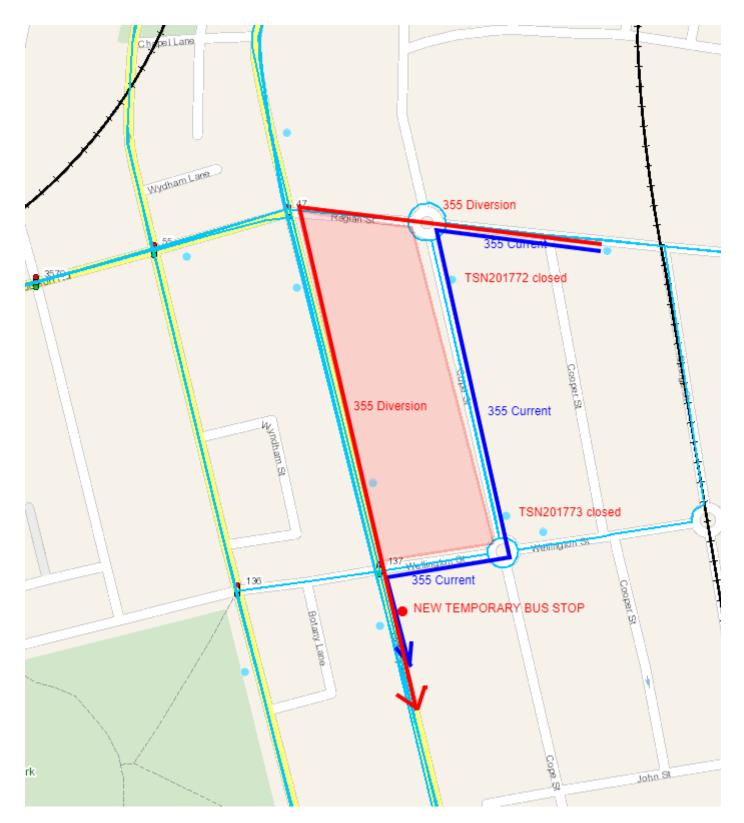
Hi Frankie,

As mentioned in today's TCG, you mentioned JHG are to install the temporary bus shelter/stop on Botany Rd outside of the Cauliflower Hotel by 05/12/21?

Can you confirm the attached pdf is to be installed (no bus shelter required due to existing awning)? Who provides the Bus Stop timetable pole (typically supplied by STA or Council)?

And can you please confirm the distance from the intersection the bus stop is to be constructed (measured from Wellington to the bus stop timetable pole)?

Any questions, please let me know.



Kind Regards,

Nathaniel Lasky Project Engineer Waterloo Station



Alexandria NSW 2017 M. +61 0409 414 866 E. <u>Nathaniel.Lasky@jhg.com.au</u> W. johnholland.com.au



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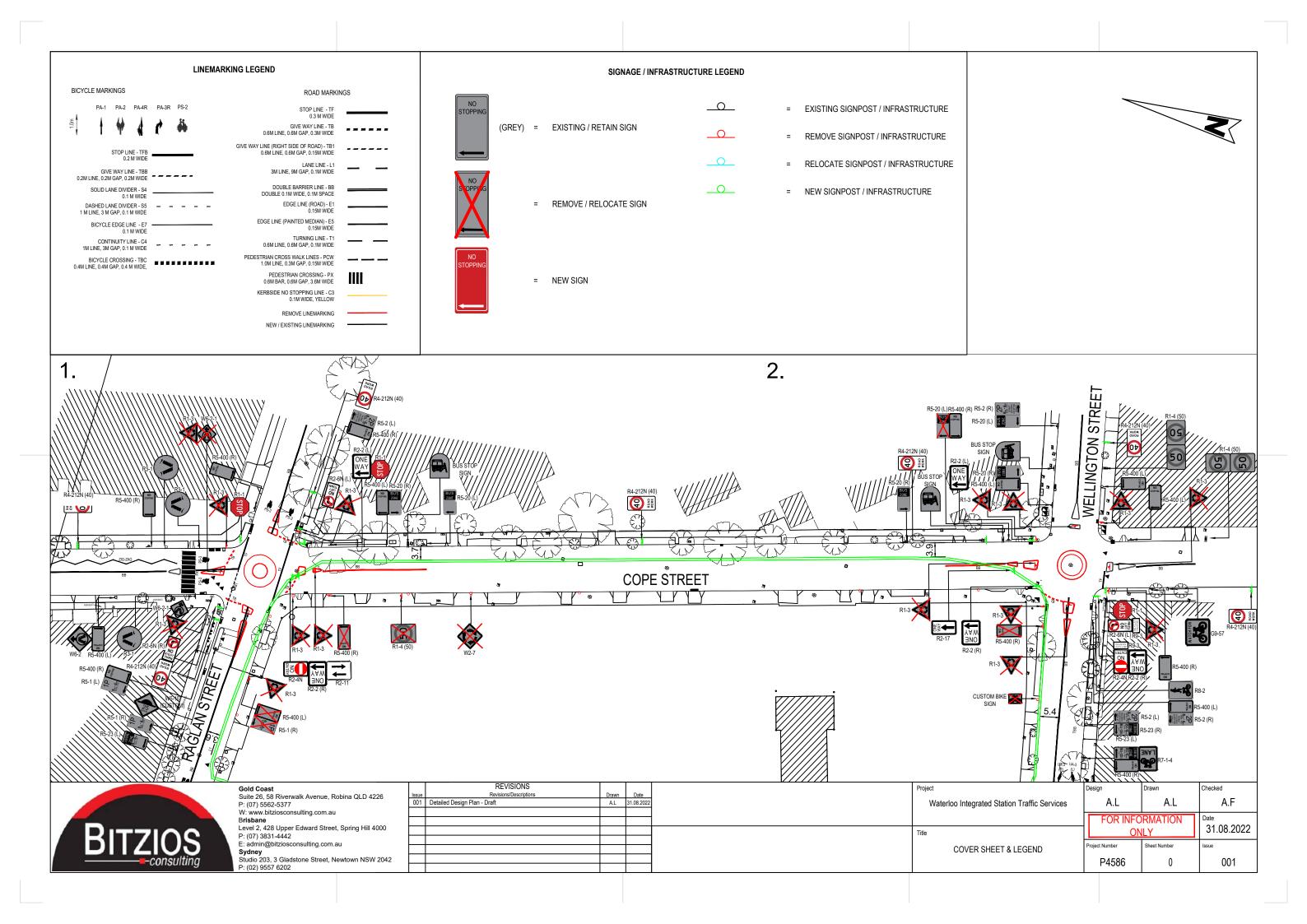
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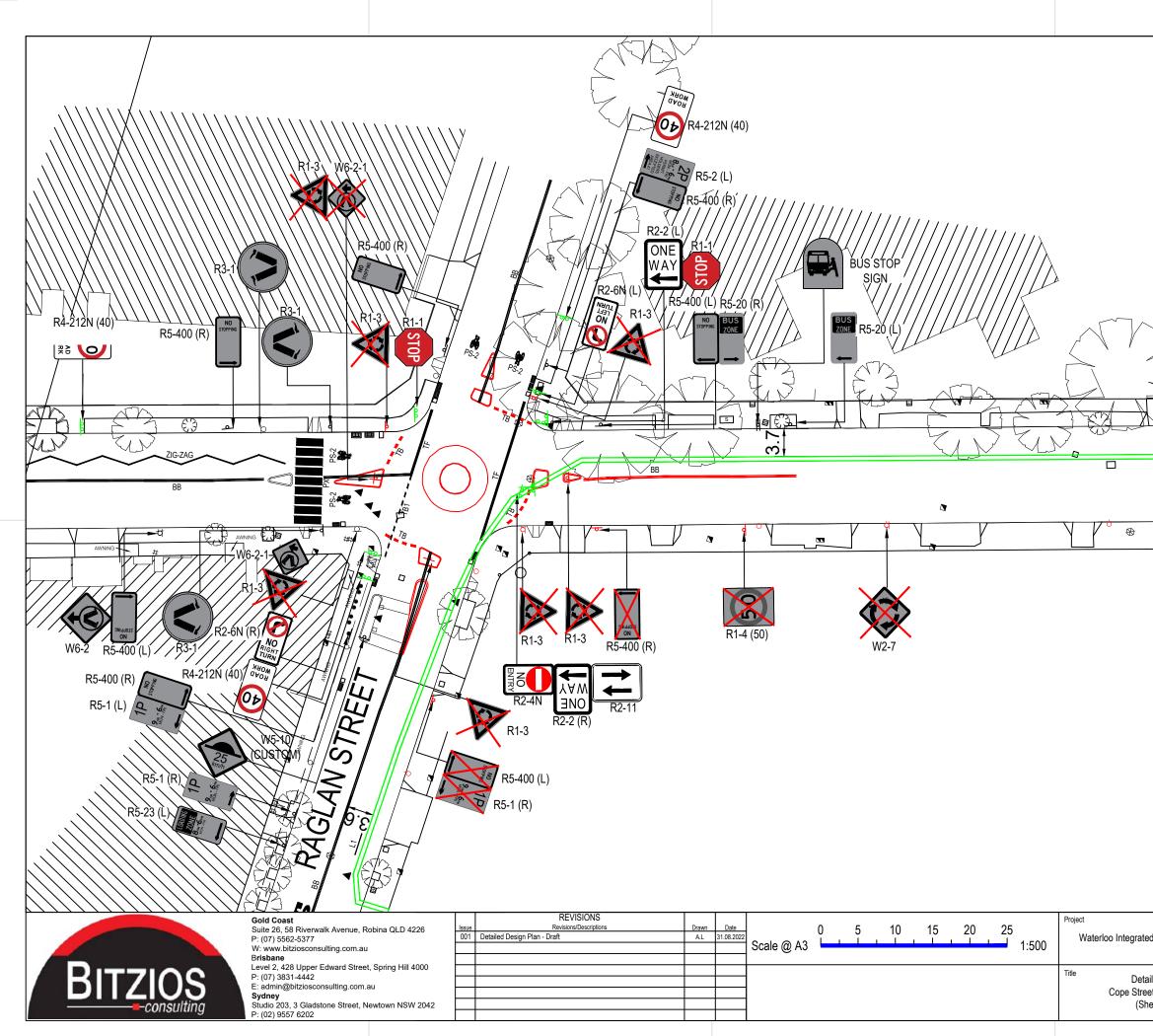
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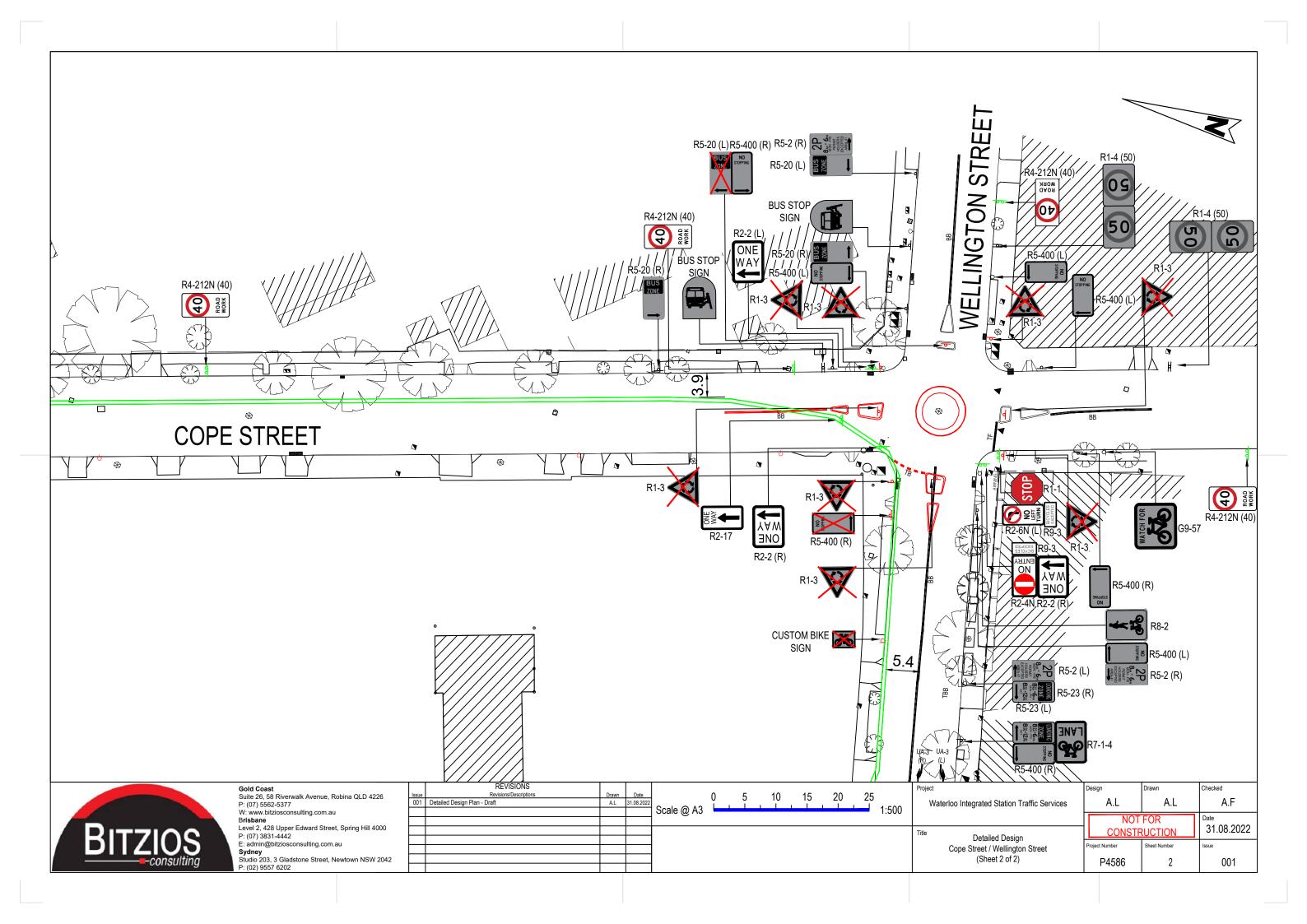
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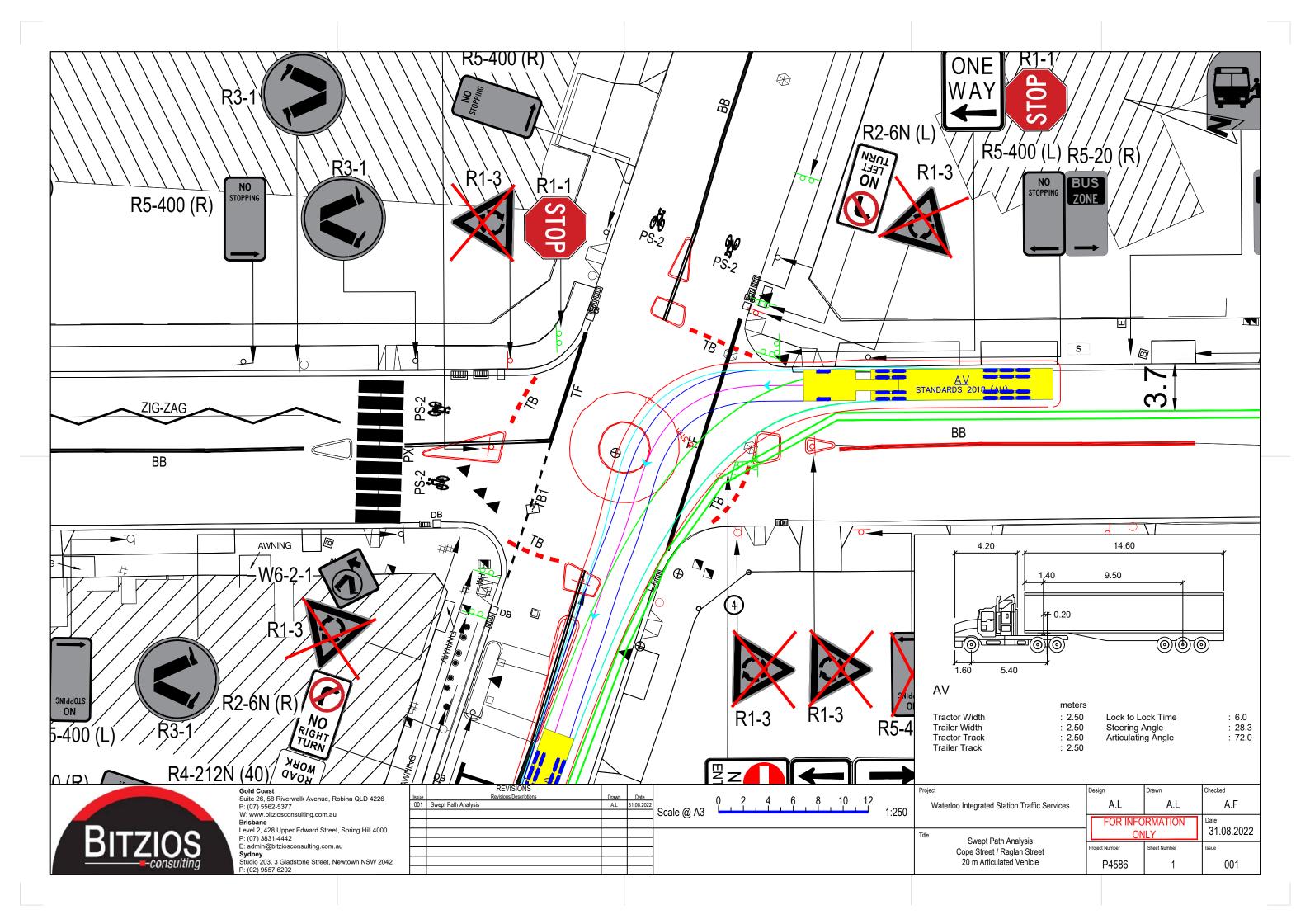
Appendix J – Detailed Design of Intersections

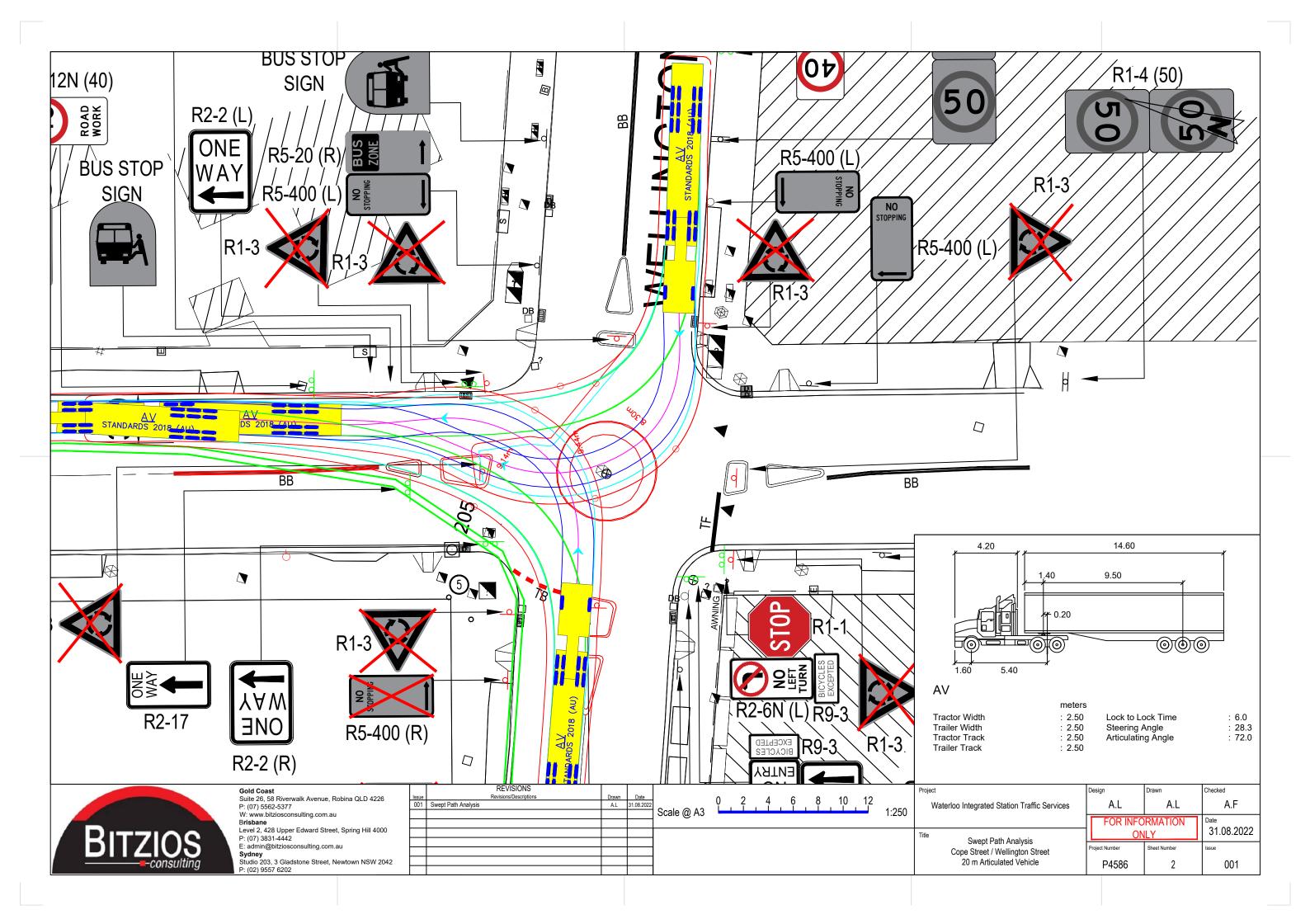


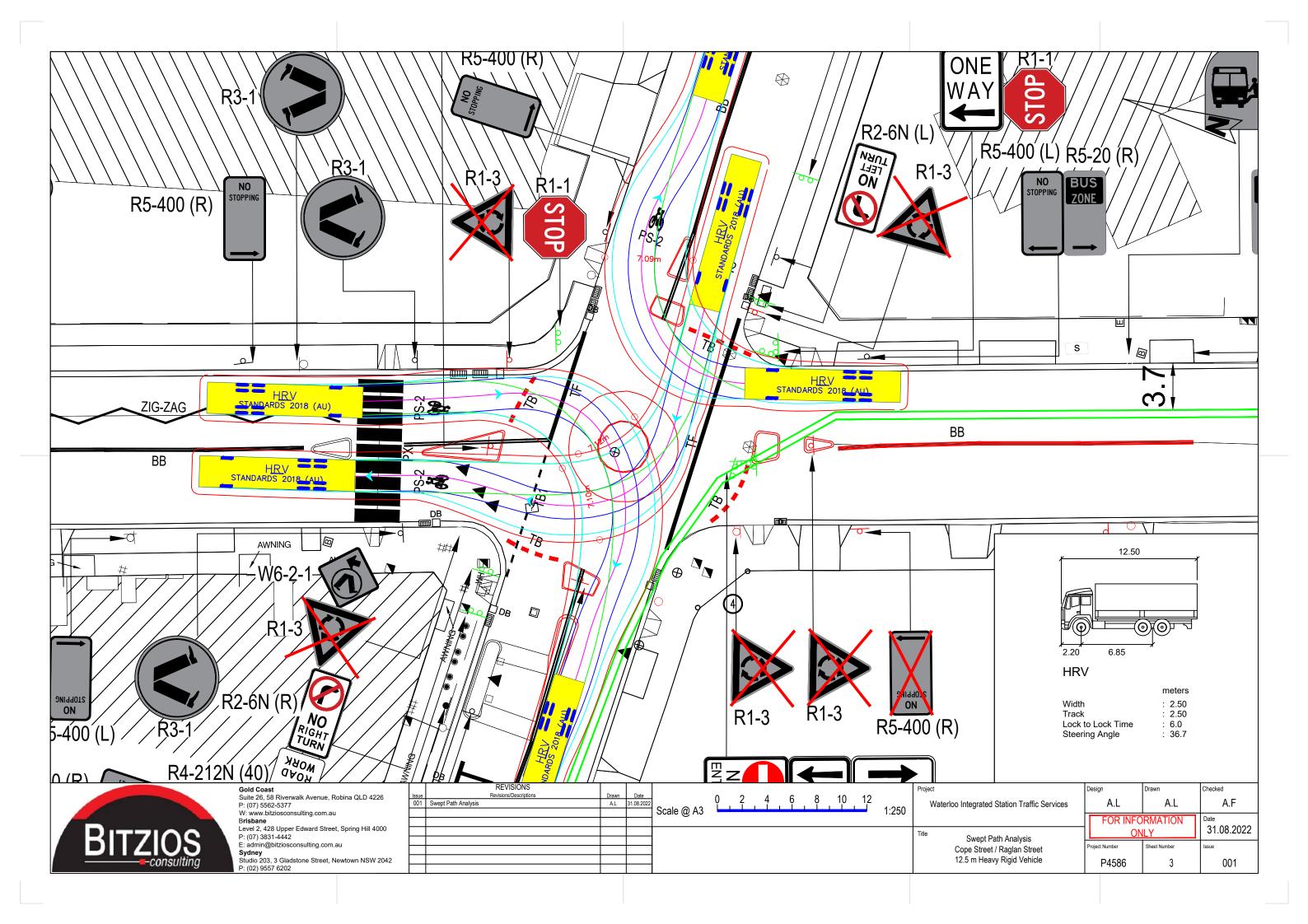


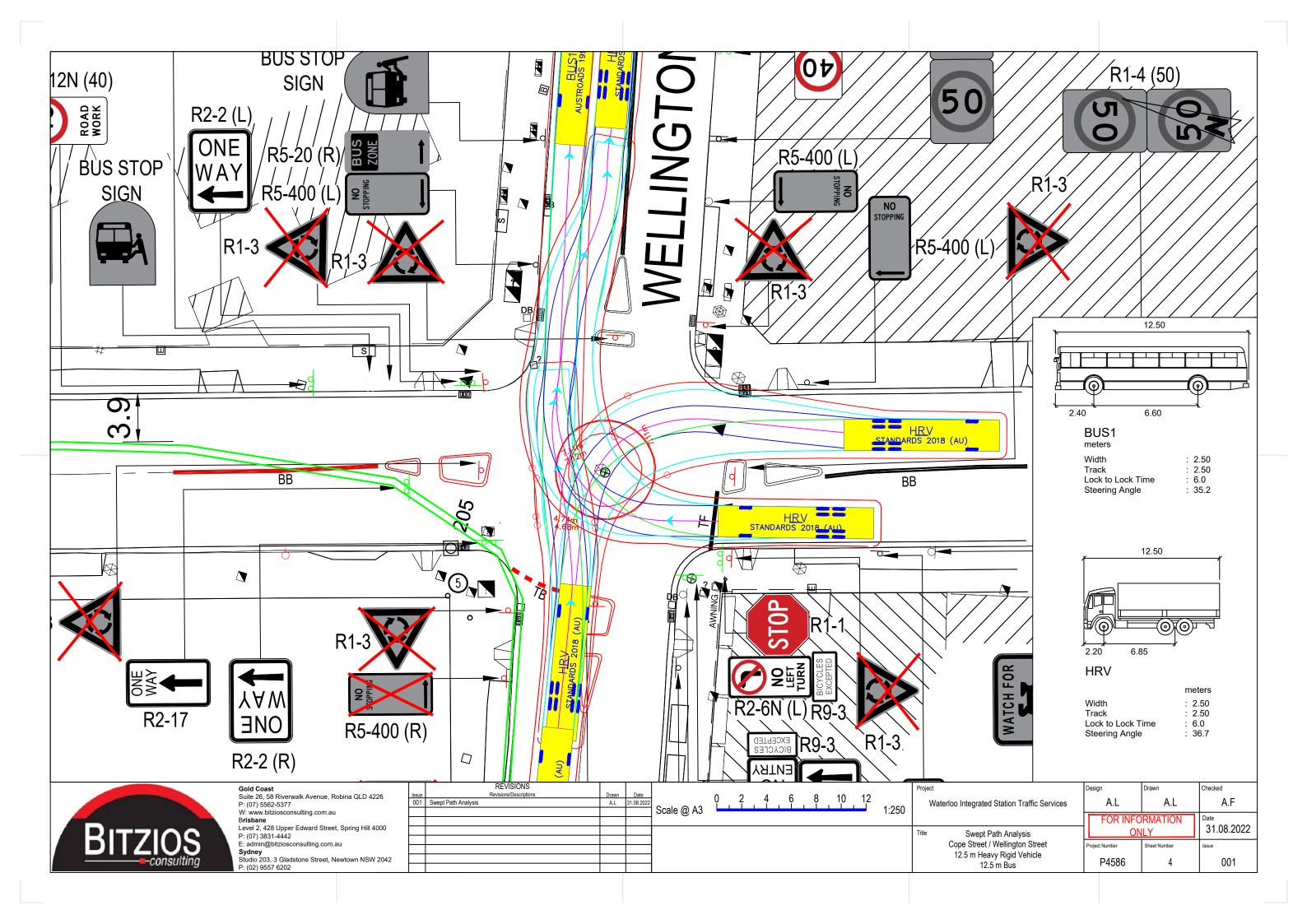
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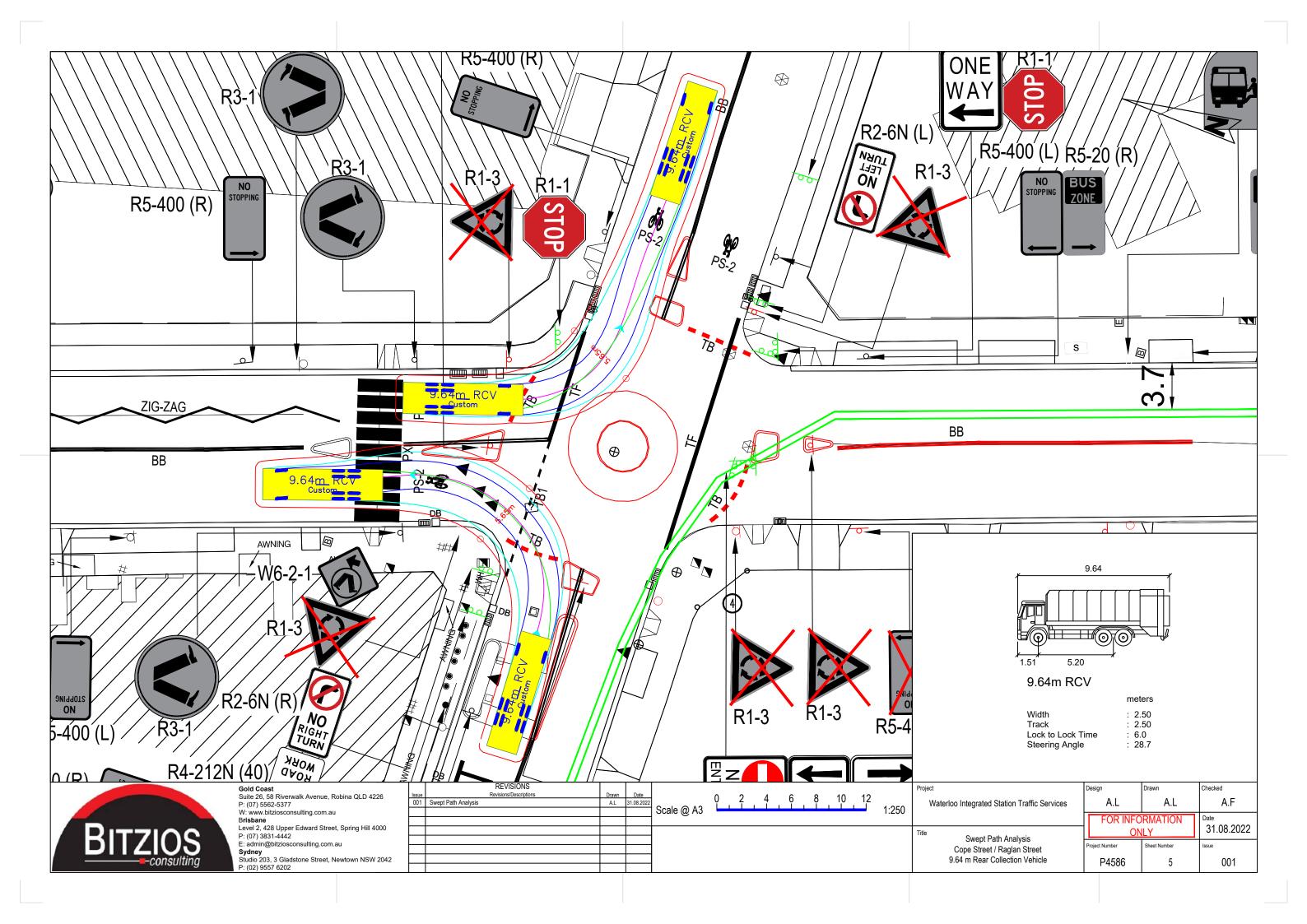


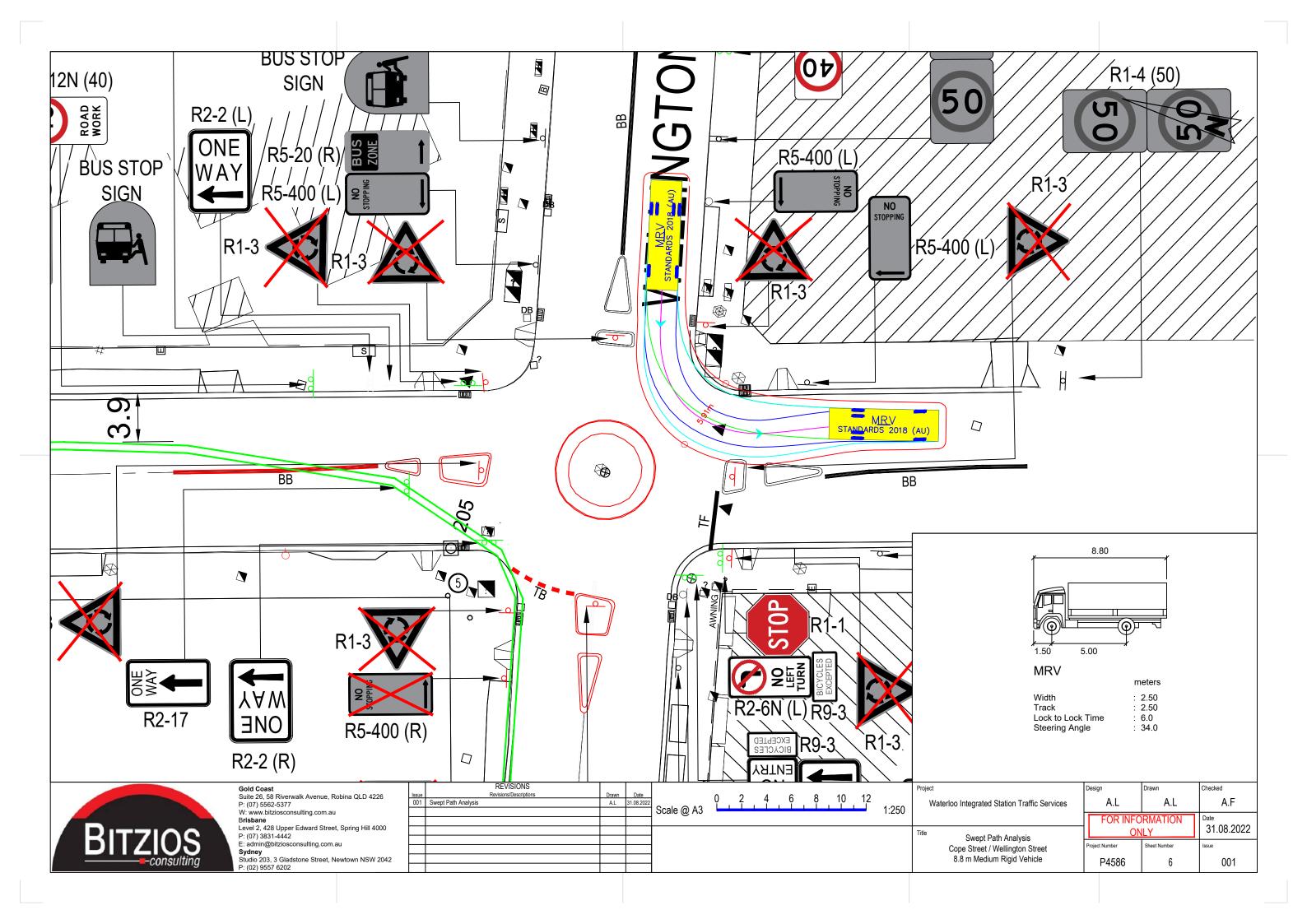












Appendix K – Pedestrian Management Plan

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QUALITY • COMPETENCE • COMPLIANCE

1300 008 274 Traffic@varigroup.com.au

Client:	John Holland
Road Name:	Cope St
Suburb:	Waterloo
Road Type:	2 Lane 2 Way
Operation:	Pedestrian Route
Term:	Long
Speed Limit:	40km/h
Speed Reduction:	N/A
ROL Number:	ТВС
ROL Classification:	ТВС
Date Prepared:	08/09/22
Date Approved:	08/09/22
Date Revised:	N/A
TCOPWS REFERENCE BASED ON TCP #92	PWZTMP
N.C.S:	Raglan St
Designed By:	Noah Nguyen-Luu #1025516
Approved By:	Daneil Marzetti #0052242601
Size:	A1
Plan Reference Number:	00JHCS77
TCs Required:	0

D TAPER LENGTH

Traffic Speed (Km/H)	Traffic Control at beginning of Taper	Later shift taper	Merge Taper
45 or less	15	0	15
45 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
>105	N/A	110	180

J<u>O</u>HN HOLL∧ND

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Cover Control Barrers With Signage	GENERAL NOTES	QUEUE MANAGEMENT AT ALL TIMES DURING THE COURSE OF THE WORK, TRAFEIC OLIES SHALL BE MONITORED TO	VEHICLE MOVEMENT PLAN ALL WORK VENICES TO ALL WORK VENICES TO PROVIDED
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Appendix L – LAHC Endorsement to Close Parking