LENDLEASE

Jordan Springs East Stage 3B2

Traffic Impact Assessment

SEPTEMBER 2017

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Jordan Springs East Stage 3B2
Traffic Impact Assessment

Lendlease

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1 INTRODUCTION

1.1 BACKGROUND

WSP has been engaged by the Maryland Development Company to prepare a Traffic Impact Assessment report for the proposed Stages 3B2 development comprising of four super-lots within Jordan Springs East with each lot measuring at 1,790 m^2, 2,685 m^2, 1,362 m^2, and 1,511 m^2.

As depicted in Figure 1.1, Jordan Springs East is located within the Penrith City Council Local Government Area (LGA) and forms part of the Central Precinct of the St Marys Development site. It is bounded by existing residential development in the suburbs of Werrington County and Werrington Downs to the south, land zoned for Regional Open Space to the east and land zoned for Regional Park to the north and west. There is also an area zoned for drainage that adjoins the northern boundary of the precinct.

Figure 1.1 St Marys development site showing precinct locations

The Jordan Springs East site covers an area of approximately 133.1 hectares and is envisaged to consist of 1,436 residential dwellings to accommodate a population of between 3,900 and 4,300. It is also proposed to consist of approximately 38 hectares of employment land use to accommodate approximately 760 jobs in light industrial and light manufacturing sectors.

The delivery of the Jordan Springs East master plan is staged with 768 residential dwellings proposed under Stages 1, 2 and 3A. The approval of these stages had been obtained with consideration of all trips being assigned to The Northern Road via the internal roads in Jordan Springs (shown as Western Precinct in Figure 1.1).

Approval has also been sought for a further 143 residential lots under Stage 4A/4B and 52 residential lots under Stage 3B1. These lots are proposed to accommodate approximately 215 low-density dwellings in total (163 low-density dwellings under Stage 4A/4B and 52 low-density dwellings under Stage 3B1).

The Development Applications for Stage 4A/4B and 3B1 had been submitted for Penrith City Council's consideration in June 2017 and July 2017 respectively. According to Maryland Development Company's construction schedule, the occupation of Stage 4A/4B and 3B1 are scheduled to occur following the opening of the East-West connector road. The opening of the East-West Connector Road will vastly change the distribution of trips made into/out of Jordan Springs East, and is likely to align with the trip distribution found in the ultimate year of the development, where 55% and 53% of trips are made towards the east in the respective AM and PM peak.

This Traffic Impact Assessment (TIA) has been prepared to consider the in-principle impact of the accessibility and safety of the super-lots and associated road layouts proposed in Stages 3B2. The assessment takes into consideration the existing traffic volumes and growth in Jordan Springs, trips generated from the approved Stages in Jordan Springs East and distribution of trips made with consideration of the opening of the East-West Connector Road.

WSP has been advised that the dwelling development proposed on the super-lots are not finalised at this stage and any dwelling that are proposed at the sites will be subject to a separate Development Application and supporting Traffic Impact Assessment in the future. At this stage, these lots are assumed to be non-traffic generating sites.

It is noted that based on the construction schedule developed by the Maryland Development Company, construction works of the super-lots and associated infrastructure in Stages 3B2 are planned to be undertaken concurrently with Stage 3B1 and 4A/4B.

The extent and location of Stages 3B2 in relation to the other stages of Jordan Springs East are further detailed in section 5.

1.2 OBJECTIVES

This Traffic Impact Assessment report seeks to outline the following:

- Undertake an assessment of peak hour trip demand by the Jordan Springs East precinct up to the latest proposed Stage 3B2, in line with the trip generation rates published in Roads and Maritime's Guide to Traffic Generating Developments.
- Examine and analyse the existing intersection performance and mid-block volumes of the internal road network within Jordan Springs that are likely to be impacted by the latest proposed development in Jordan Springs East Stage 3B2.
- Assess the cumulative impact of the development in corresponding stages within Jordan Springs East, Jordan Springs and Ropes Crossing at key intersections and mid-block road capacity within the confines of the St Marys development site.
- Provide recommendation of remedial works (if any) to address the impact of the proposed Stages 3B2 development.
- Assess the accessibility of the proposed development to the existing public transport services in the vicinity of the proposed development.

1.3 ASSUMPTIONS

The following assumptions apply to this report:

- Trip generation rates are as per the Roads and Traffic Authority *Guide to Traffic Generating Development* v2.2 and those agreed to by the Steering Committee in the Technical Memo.
- Assumption of traffic growth generated by developments in Jordan Springs to reflect the status of occupied dwellings (as surveyed by Lendlease and provided to Council on 24 November 2016) with respect to the ultimate number of dwellings proposed for Jordan Springs. This assumption is further detailed in section 4.2.1 of this report.

- Assumption that traffic growth on The Northern Road is consistent with the Roads and Maritime EMME strategic model.

1.4 EXCLUSION

The following exclusions apply to this report:

- Any assessment of the road network outside of the St Marys Development site. A separate study is currently being undertaken to determine the holistic impact of the St Marys development to the external road network.
- This report excludes any assessments of turning path assessments as these assessments have been undertaken as part of the road design prepared by others.

1.5 REFERENCE DOCUMENTS

The following documents were reviewed and referenced in this report:

- *Guide to Traffic Generating Developments* v2.2 (2002) and TDT 2013/04a (Roads and Traffic Authority)
- St Marys Jordan Springs East Plan – Traffic and Transport Report, May 2009 (SKM)
- Stage 3A: Jordan Springs East – Traffic Impact Assessment, January 2016 (Cardno)
- Central Precinct Plan and Development Control Strategy Amendment No.1, May 2016 (JBA)
- Jordan Springs East Stage 3B1 – Civil Works Development Application, June 2017 (Cardno)
- Proposed Traffic Modelling Methodology for St Marys Development Site, 27 March 2017 (WSP)
- Civil Engineering and Infrastructure Report Stage 3B1: Jordan Springs East, July 2017 (Cardno).

2 MEASURE OF PERFORMANCE AND CAPACITY

2.1 INTERSECTION PERFORMANCE

Level of Service (LoS) and Degree of Saturation (DoS) are both basic performance parameters used to describe the operation of an intersection. The LoS range from A to F based on the operational performance primarily determined by the average traffic delay at the signalised intersections and roundabouts as indicated in Table 2.1.

Table 2.1 Level of service criteria for signalised intersections

Level of Service	Average delay (seconds per vehicle)	Traffic signals
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity and incident would cause excessive delays
F	Greater than 71	Unsatisfactory with excessive queuing

Source: Roads and Traffic Authority *2002 Guide to Traffic Generating Developments*

2.2 MID-BLOCK CAPACITY

Extracted from Austroads *Guide to Traffic Management Part 3*, Table 2.2 sets out typical mid-block capacities for various types of urban roads with interrupted flow, with unflared major intersections and with interruptions from cross and turning traffic at minor intersections.

Table 2.2 Typical mid-block capacities for urban roads with interrupted flow

Type of Lane	One-Way Mid-Block Capacity (pc/h)
Median or inner lane	
Divided road	1000
Undivided road	900
Middle lane (of a three lane carriageway)	
Divided road	900
Undivided road	1000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Sources: Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis*

3 EXISTING CONDITIONS

3.1 SITE LOCATION

The location of Stage 3B2 relative to the greater Jordan Springs East development site area is presented in Figure 3.1 below.

Figure 3.1 Location of Stages 3B2 in Jordan Springs East

At the time this report is prepared, Jordan Springs East is a green field development area with no trips generated from the site, other than those made by construction vehicles undertaking works within the site.

Construction traffic for Stage 3B2 will access the site via The Northern Road, Jordan Springs Boulevarde, Lakeside Parade and its continuation (Wianamatta Parkway). Details of the number of construction vehicles and the relevant haulage routes can be found with the Construction Traffic Management Plans (CTMP) submitted for each stage of the development.

3.2 ROAD NETWORK

The existing (external) road network impacted by the proposed development of Stage 3B2 are listed below. The operation of the relevant internal road network is further assessed in section 4 of this report. This considers the traffic volumes likely to be generated from the approved stages, which we note, were not constructed at the time that this report was prepared.

Figure 3.2 Road Network Adjoining Jordan Springs

3.2.1 THE NORTHERN ROAD

The Northern Road is a State Road (Road Number 154) which travels in a north-south direction between Bringelly and Windsor. The Northern Road is located west of the St Marys development site, with direct available via Jardine Way (priority controlled left-in/left-out), Greenwood Parkway (signalised cross intersection), Watkin Street (priority controlled left-in/left-out) and Jordan Springs Boulevarde (signalised T-intersection) in the north to south direction.

North of Greenwood Parkway, The Northern Road is generally an undivided two-lane/two-way rural type road with approximately 3 metres wide travel lanes and 2 metres wide shoulders in each direction. This section of The Northern Road has a posted speed limit of 70 km/h.

South of Greenwood Parkway, The Northern Road is generally a divided four-lane/two-way urban type road with localised intersection flaring treatments commonplace at all major intersections. On-street bicycle lanes measuring approximately 2 metres wide are available along the kerbside in both direction. Off-street shared paths are generally available along the eastern kerbside of the Northern Road. This section of The Northern Road has a posted speed limit of 70 km/h.

A survey undertaken at the intersection of The Northern Road/Jordan Springs Boulevarde in October 2016 revealed a mid-block traffic volume south of Jordan Springs Boulevarde of approximately 1,000 vehicles travelling northbound and 1,400 vehicles travelling southbound during the AM peak. The survey undertaken during the PM peak revealed 1,350 vehicles northbound and 1,300 southbound.

3.2.2 JORDAN SPRINGS BOULEVARDE

Jordan Springs Boulevarde is a collector road located south of the Jordan Springs development which travels east-west between The Northern Road and Lakeside Parade. For the most part, it is a divided four-lane/two-way road measuring approximately 17.5 metres kerb to kerb with a 4 metre wide median island dividing the carriageway. Kerb narrowing treatments exist at its intersection with Tyler Street, reducing the travel lane to one-lane eastbound. Similar narrowing treatment also exist at its intersection with Lakeside Parade, reducing the travel lane at this intersection to one-lane westbound.

Jordan Springs Boulevarde consist of a shared path along the northern kerbside and a footpath network along the southern kerbside. Access to properties and on-street parking are generally restricted along the road, which maximises the operational capacity of the road. Jordan Springs Boulevarde is subjected to a posted speed limit of 50 km/h throughout.

3.2.3 LAKESIDE PARADE

Lakeside Parade is a two-way/two-lane undivided collector road in Jordan Springs which travels north-south between Greenwood Parkway and Jordan Springs Boulevarde, and east-west between Jordan Springs Boulevarde and Jubilee Drive. Lakeside Parade is measured at approximately 11.8 metres wide kerb to kerb with unrestricted on-street parking permitted, with the exception of the on-street parking at the Jordan Springs village centre where 1-hour parking restriction applies.

In the section between Jordan Springs Boulevarde and Jubilee Drive (east), pedestrian refuges have been installed at each intersection to Lakeside Parade to provide a staged crossing for pedestrians. A shared path of approximately 2.5 metres wide has been provided along the southern kerbside of Lakeside Parade. Similarly, a footpath of approximately 1.5 metres wide have been provided along the northern kerbside.

Lakeside Parade is subjected to a posted speed limit of 50 km/h throughout.

3.2.4 WIANAMATTA PARKWAY

Wianamatta Parkway is an extension of Lakeside Parade of the same road function which is as a collector road in the east-west direction connecting Jordan Springs East with Jordan Springs. Currently, it is partially under construction with ongoing works in the verge area observed during a site visit in September. The road however is trafficable in both direction and the ongoing road construction work is expected to have minimal impact to provide continued accessibility to Jordan Springs East from Jordan Springs.

3.3 PUBLIC TRANSPORT

3.3.1 RAIL

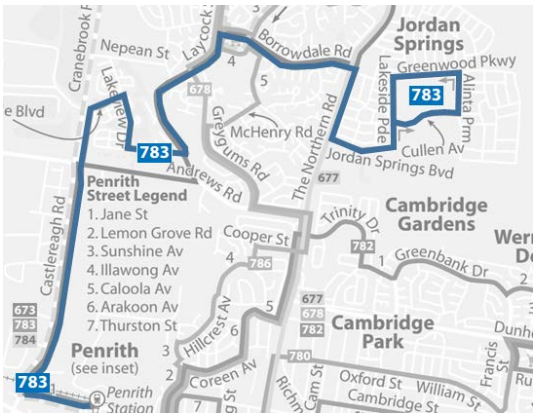
Kingswood Station is the closest train station, which is located approximately 8 km from the location of Stage 3B2 in Jordan Springs East.

Penrith interchange is located approximately 9 km from the location of Stage 3B2.

Both train stations are serviced by the T1 Western Line (Emu Plains to the City). Penrith interchange provides access to the regional train network for the train line between Bathurst and the City, and an interchange for the local buses servicing suburbs surrounding Penrith.

3.3.2 BUS

Route 783 currently provides services between Jordan Springs and Penrith Station via Borrowdale Road and Castlereagh Road. Future planning of bus routes within Jordan Springs East are further detailed in section 6.3 of this report.



4 APPROVED DEVELOPMENTS

4.1 JORDAN SPRINGS EAST: STAGES 1, 2 AND 3A

It is understood that at the time of writing, Lendlease has obtained approval for a combined total of 768 residential lots across the development of Stages 1, 2 and 3A. These stages have been approved with all development traffic proposed to access to The Northern Road only (i.e. west side of the development) via Lakeside Parade in Jordan Springs. It should be noted that, there had been no other types of land uses (i.e. retail, child care) included in any part of the approved stages of the development to attract any supplementary trips to the Jordan Springs East development other than those generated by the residential developments.

The proposed East-West Connector Roads with access to Forrester Road is currently closed to the public as it still serves as construction access for Stage 1, 2 and 3A. This is to ensure that the impact of construction vehicles during the development of various stages of Jordan Springs East would not adversely impact the established residential developments including those in Jordan Springs.

Stages 1, 2, and 3A combined will generate 584 trips and 745 trips in the respective weekday AM and PM peak hours. Table 4.1 below provides a breakdown of the combined trip generation for the approved stages in Jordan Springs East.

Table 4.1 Trip Generation of Committed Developments in Jordan Springs East

	Number of low-density residential dwellings	AM peak – Trip generation rate	Total trips	PM peak – Trip generation rate	Total trips
Stage 1	400	0.76 trips/dwelling	304 trips	0.97 trips/dwelling	388 trips
Stage 2	278		211 trips		270 trips
Stage 3A	90		69 trips		87 trips
TOTAL	**768**		**584 trips**		**745 trips**

Using an in/out trip distribution assumption of 20/80 in the AM peak and conversely 80/20 in the PM peak for residential developments, the resulting number of trips above are separated into the following inbound and outbound traffic trips.

Table 4.2 Inbound/outbound trips of Committed Developments in Jordan Springs East

	Inbound	Outbound
AM peak – 584 trips	117 trips	467 trips
PM peak – 745 trips	596 trips	149 trips

4.2 JORDAN SPRINGS

Jordan Springs is a residential suburb which forms part of the western precinct of the St Marys Development Site. In brief, Jordan Springs consists of over 3,400 dwellings, apartments, retail and community facilities such as a school, childcare and medical centre.

The development and occupation of Jordan Springs is ongoing with the most current known progress detailed in Table 4.3 below. The development of Jordan Springs is envisaged to be completed and occupied prior to the occupation of Stages 3B2 of Jordan Springs East development.

This section aims to analyse the impact of growth in Jordan Springs to the road network in Jordan Springs before any Jordan Springs East traffic are added to the intersection.

4.2.1 GROWTH

At the time of the survey, construction of Jordan Springs had been ongoing with the status of the development summarised as follows:

Table 4.3 Land use and resulting trips in Jordan Springs

Land use	Occupied land use November 2016	Ultimate land use	Trip generating rates (AM/PM)	2016 resulting AM trips	2016 resulting PM trips	Ultimate resulting AM trips	Ultimate resulting PM trips
Residential dwellings	1,897	3,437	AM: 0.76 trips/dwelling PM: 0.97 trips/dwelling	1441.72	1840.09	2612.12	3333.89
Apartments	0	599	AM and PM: 0.5 trips/apartment	0	0	299.5	299.5
Retail (m^2) GFA	4,920	8,200	(<10,000 m^2 GLFA): AM: ½ of PM trips. PM: 12.3 trips/100 m^2	302.58	605.16	504.3	1008.6
Childcare	60	200	AM: 1.4 trips per child PM: 0.8 trips per child	84	48	280	160
Medical Centre	3	3	AM and PM: 5.8 movements/practitioner	17.4	17.4	17.4	17.4
School (children)	0	460	AM: 0.8 trips per child	0	0	368	0
School Staff	0	15	AM and PM: 1 trip per 30 children	0	0	15	0
			TOTAL	1846	2511	4097	4819
			Proportion of 2016 resulting trip to 2021 (ultimate) resulting trip	1,846/4,097 45.1%	2,511/4,819 52.1%	-	-

Based on the above assessment, it is therefore estimated that the traffic volumes surveyed in October 2016 which also corresponds with the total of occupied developments in Jordan Springs account for approximately 45.1% and 52.1% of the respective AM and PM traffic volumes envisaged to be experienced in the ultimate completion year of 2021.

4.2.2 LAKESIDE PARADE/JORDAN SPRINGS BOULEVARDE

4.2.2.1 INTERSECTION COUNT

An intersection count undertaken in October 2016 revealed the following volumes for the intersection of Lakeside Parade/Jordan Springs Boulevarde.

Table 4.4 October 2016 Intersection Count at Lakeside Parade/Jordan Springs Boulevarde

2016	Lakeside Parade (North)		Lakeside Parade (South)		Jordan Springs Boulevarde	
Peak hour	T	R	L	T	L	R
AM (7.45–8.45)	10	92	143	16	61	54
PM (5.00–6.00)	22	125	97	8	168	155

Based on the growth of 45.1% and 52.1% in the respective AM and PM peak calculated in section 4.2.1 above, the following traffic volumes are calculated.

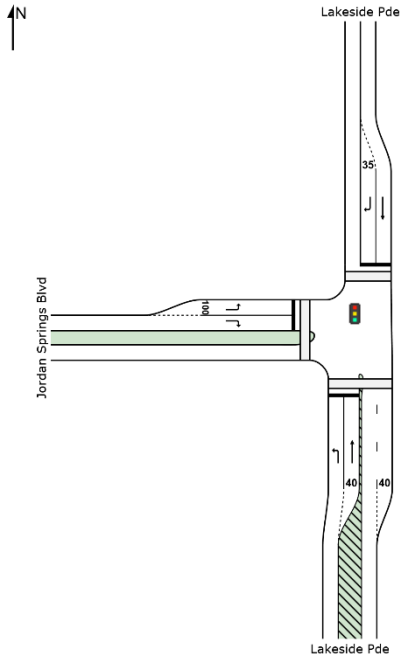
Table 4.5 Lakeside Parade/Jordan Springs Boulevarde predicted intersection volume at completion of Jordan Springs

2021	Lakeside Parade (North)		Lakeside Parade (South)		Jordan Springs Boulevarde	
Peak hour	T	R	L	T	L	R
AM (with 45.1% growth) (7.45-8.45)	22	204	317	35	135	120
PM (with 52.1% growth) (5.00-6.00)	42	240	186	15	322	298

4.2.2.2 INTERSECTION PERFORMANCE

The performance of Lakeside Parade/Jordan Springs Boulevarde intersection based on the October 2016 counts and the predicted volume at the completion of Jordan Springs is summarised below.

Table 4.6 Lakeside Parade/Jordan Spring Boulevarde Performance Summary with Jordan Springs Traffic Only

Lakeside Parade/Jordan Springs Boulevarde Performance summary	
	
2016 AM peak Total Vehicle: 376 veh/h Degree of Saturation: 0.132 Average Delay: 17.2 Level of Service: B 95% Back of Queue: 16.7 metres (West approach)	**2021 AM peak with ultimate Jordan Springs Development** Total Vehicle: 833 veh/h Degree of Saturation: 0.340 Average Delay: 18.6 Level of Service: B 95% Back of Queue: 40.6 metres (West approach)
2016 PM peak Total Vehicle: 575 veh/h Degree of Saturation: 0.228 Average Delay: 21.3 Level of Service: C 95% Back of Queue: 38.7 metres (West approach)	**2021 PM peak with ultimate Jordan Springs Development** Total Vehicle: 1,103 veh/h Degree of Saturation: 0.460 Average Delay: 23.8 Level of Service: C 95% Back of Queue: 85.2 metres (West approach)

Based on the assessment above, it is determined that the estimated traffic volumes upon the ultimate completion of Jordan Springs can be satisfactorily accommodated with the current layout of Jordan Springs Boulevarde/Lakeside Parade. The worst performing Level of Service 'C' was assessed at the intersection during the PM peak for 2016 and 2021 conditions with the Degree of Saturation (volume/capacity) observed to be reduced from 0.228 to 0.460.

The SIDRA output of the above assessments are attached in Appendix A.

4.2.3 THE NORTHERN ROAD/JORDAN SPRINGS BOULEVARDE

4.2.3.1 INTERSECTION COUNT

An intersection count undertaken in October 2016 revealed the following volumes for the intersection of The Northern Road/Jordan Springs Boulevarde

Table 4.7 October 2016 Intersection Count at Lakeside Parade/Jordan Springs Boulevarde

2016	The Northern Road (North)		The Northern Road (South)		Jordan Springs Boulevarde	
Peak hour	T	L	R	T	L	R
AM (7.45–8.45)	1189	37	174	844	261	32
PM (5.00–6.00)	1050	63	455	895	281	50

A check in the Roads and Maritime EMME strategic model revealed an annual growth in the Northern Road as follows:

Table 4.8 The Northern Road Annual Growth Rate from 2016 to 2021

	The Northern Road – North of Jordan Springs Boulevarde		The Northern Road – South of Jordan Springs Boulevarde	
	Northbound	Southbound	Northbound	Southbound
AM	0.8% p.a.	1.0% p.a.	1.6% p.a.	2.8% p.a.
PM	0.1% p.a.	0.8% p.a.	1.9% p.a.	2.4% p.a.

Applying the growth subjected to The Northern Road as detailed above and the growth of trips generated from the Jordan Springs development, being 45.1% and 52.1% in the respective AM and PM peak calculated in section 4.2.1 above, the following traffic volumes are calculated.

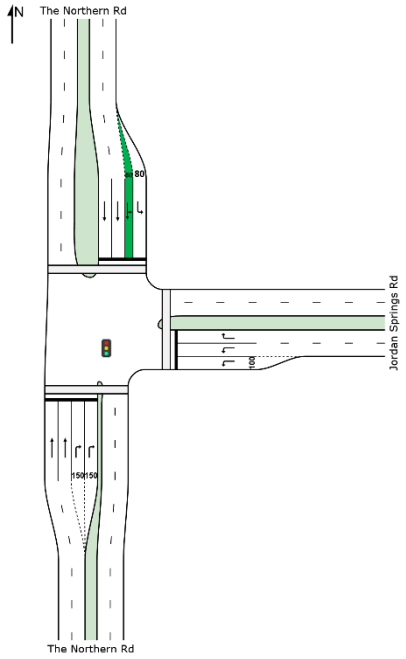
Table 4.9 Lakeside Parade/Jordan Springs Boulevarde predicted intersection volume at completion of Jordan Springs

2021	The Northern Road (North)		The Northern Road (South)		Jordan Springs Boulevarde	
Peak hour	T	L	R	T	L	R
AM (7.45–8.45)	1247	82	386	915	579	71
PM (5.00–6.00)	1091	121	873	982	539	96

4.2.3.2 INTERSECTION PERFORMANCE

The performance of The Northern Road/Jordan Springs Boulevarde intersection based on the October 2016 counts and the predicted volume at the completion of Jordan Springs is summarised below.

Table 4.10 The Northern Road/Jordan Springs Boulevarde Performance Summary with Jordan Springs Traffic Only

The Northern Road/Jordan Springs Boulevarde Performance Summary	
	
2016 AM peak Total Vehicle: 2,540 veh/h Degree of Saturation: 0.508 Average Delay: 14.9 Level of Service: B 95% Back of Queue: 121.7 metres (North approach)	**2021 AM peak with ultimate Jordan Springs Development** Total Vehicle: 3,280 veh/h Degree of Saturation: 0.618 Average Delay: 21.1 Level of Service: B 95% Back of Queue: 160.3 metres (North approach)
2016 PM peak Total Vehicle: 2,796 veh/h Degree of Saturation: 0.573 Average Delay: 20.4 Level of Service: B 95% Back of Queue: 133.9 metres (North approach)	**2021 PM peak with ultimate Jordan Springs Development** Total Vehicle: 3,702 veh/h Degree of Saturation: 0.747 Average Delay: 24.5 Level of Service: B 95% Back of Queue: 170.6 metres (North approach)

Based on the assessment above, it is determined that the estimated traffic volumes upon the ultimate completion of Jordan Springs can be satisfactorily accommodated with the current layout of Jordan Springs Boulevarde/The Northern Road. The worst performing Level of Service 'B' was assessed at the intersection during both AM and PM peak for 2016 and 2021 conditions.

The SIDRA output of the above assessments are attached in Appendix B.

5 PROPOSED DEVELOPMENT

5.1 DESCRIPTION

The proposed Stage 3B2 developments are located towards east of the Jordan Springs East precinct. It consists of four super-lots measuring 1,790 m^2, 2,685 m^2, 1,362 m^2, and 1,511 m^2. These lots are located abutting the east-west Collector Road 001 which is the main collector road connecting Jordan Springs East with Jordan Springs and Ropes Crossing. The extent and location of Stage 3B2 in relation to the other stages of Jordan Springs East are shown in Figure 5.1 below.

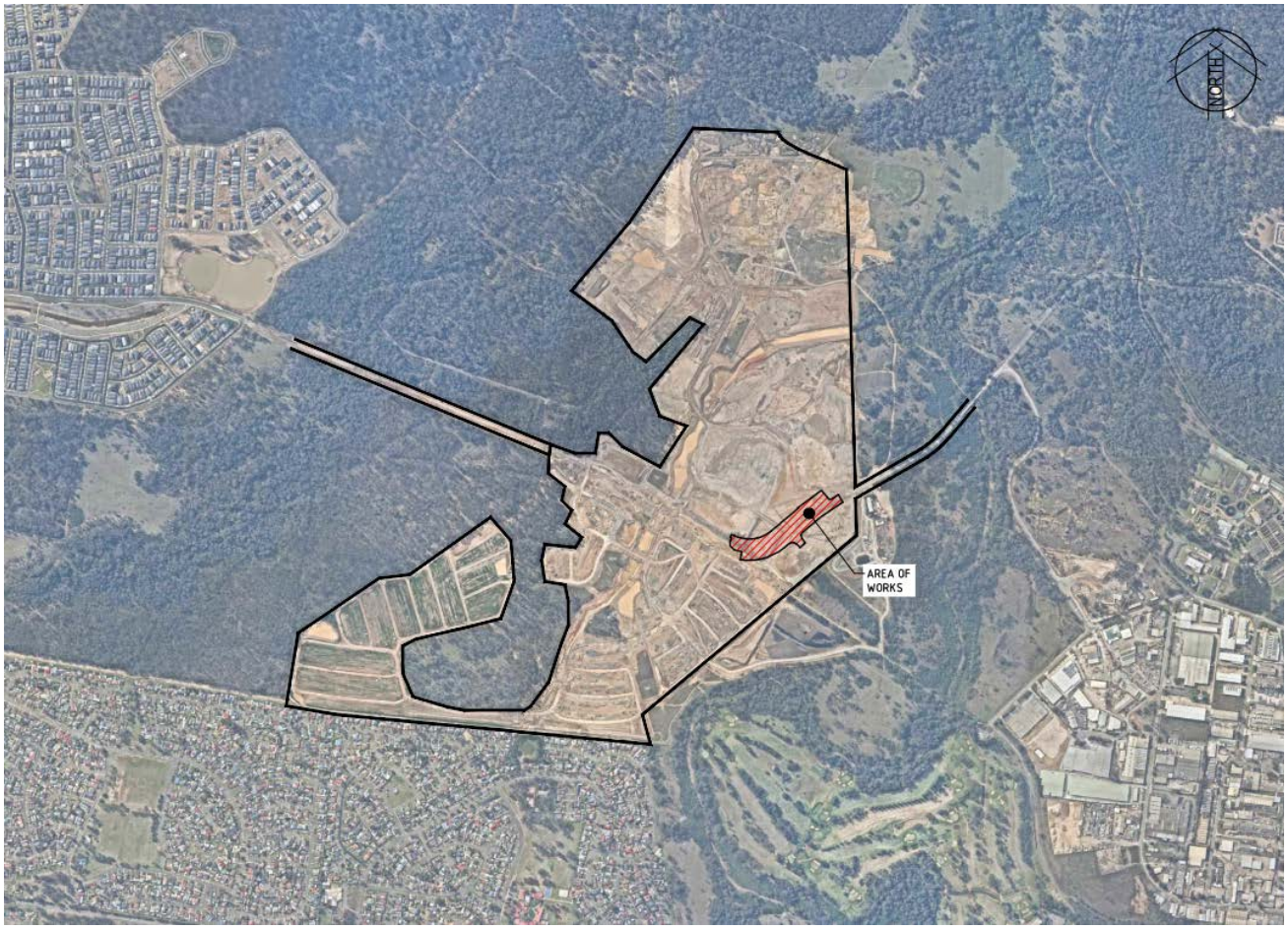


Figure 5.1 Stages 3B2 Location with Jordan Springs East

5.2 CONSTRUCTION PROGRAM

The civil construction program detailed in the *Civil Engineering and Infrastructure Report Stage 3B2: Jordan Springs East* (Cardno, September 2017) revealed the following key program dates:

Table 5.1 Jordan Springs East Construction Program Key Dates (Cardno, 2017)

Stages	Description	Anticipated Start Date	Anticipated End Date
Precinct wide	Fill	June 2015	July 2017
Stage 1	Civil Works	May 2016	May 2017
	Lot Registration	May 2017	July 2017
	Occupation	February 2018	-
Stage 2	Civil Works	December 2016	May 2017
	Lot Registration	July 2017	July 2017
	Occupation	March 2018	
Stage 3A	Civil Works	July 2017	October 2017
	Lot Registration	November 2017	December 2017
	Occupation	October 2018	
Stage 4A and 4B	Civil Works	October 2017	April 2018
	Lot Registration	May 2018	June 2018
	Occupation	March 2019	
Stage 3B1	Civil Works	November 2017	May 2018
	Lot Registration	May 2018	June 2018
	Occupation	March 2019	
Stage 3B2	Civil Works	November 2017	May 2018
	Lot Registration	May 2018	June 2018
	Occupation	N/A	

The East-West Connector Road is understood to be scheduled for completion by December 2018, which will occur before further residential development and occupation of Stage 3B2. If this is not achieved, the internal road network west of Jordan Springs East is expected to have reduced capacity temporarily over a short duration.

5.3 PROPOSED TRIP GENERATION

As detailed in Stage 4A and 4B Traffic Impact Assessment report, Stages 4A and 4B have been estimated to generate 125 trips and 159 trips in the respective AM and PM peak. The proposed 52 dwellings in Stage 3B1 will generate 40 trips and 51 trips in the respective AM and PM peak.

With regards to Stage 3B2 development, the four super-lots are assumed to be non-traffic generating at this stage. Future developments on these lots are subject to future Development Application and supporting Traffic Impact Assessment to be submitted to Council for consideration.

Table 5.2 below provides a breakdown of the combined trip generation in addition to the approved stages in Jordan Springs East.

Table 5.2 Trip Generation of Committed and Proposed Developments in Jordan Springs East

	Number of low-density residential dwellings	AM peak – Trip generation rate	Total trips	PM peak – Trip generation rate	Total trips
Stage 1	400	0.76 trips/ dwelling	304 trips	0.97 trips/ dwelling	388 trips
Stage 2	278		211 trips		270 trips
Stage 3A	90		69 trips		87 trips
Subtotal	*768*		*584 trips*		*745 trips*
Stage 4A and 4B	163		125 trips		159 trips
Stage 3B1	52		40 trips		51 trips
Subtotal	*983*		*749 trips*		*955 trips*
Stage 3B2	**0**		**0 trips**		**0 trips**
TOTAL	***983***		***749 trips***		***955 trips***

Using an in/out trip distribution assumption of 20/80 in the AM peak and conversely 80/20 in the PM peak for residential developments, the resulting number of trips above are separated into the following inbound and outbound traffic.

Table 5.3 Inbound/outbound trips of Committed and Proposed Developments in Jordan Springs East

		Inbound	Outbound
Trips Generated from Approved Stages 1, 2 and 3A	AM peak - 584 trips	117 trips	468 trips
	PM peak - 745 trips	596 trips	149 trips
Trips Generated from Approved Stages 1, 2 and 3A + Proposed Stages 4A, 4B, 3B1 and 3B2	AM peak - 749 trips	150 trips	599 trips
	PM peak - 955 trips	764 trips	191 trips

No trips will be generated from Stage 3B2 as it will require further development before residential lots and dwellings are delivered. As such, the trips estimated with the inclusion of Stage 3B2 is equal to the estimated trips generated by the approved Stages 1, 2, 3A and the proposed stage 4A, 4B and 3B1 that had been submitted to Council for consideration.

5.4 TRIP ASSIGNMENT

5.4.1 ORIGIN-DESTINATION SURVEY RESULT

The Origin-Destination survey undertaken for trips currently generated and attracted from Jordan Springs to The Northern Road are as follows:

Table 5.4 Origin-Destination survey result of Jordan Springs traffic on The Northern Road

	AM outbound	AM inbound	PM outbound	PM inbound
To/From North	29%	32%	24%	31%
To/From West	7%	20%	15%	20%
To/From South	64%	48%	61%	49%

Assuming that this pattern is followed by traffic into and out of Jordan Springs East. The distribution of the resulting trips out of Jordan Springs East to The Northern Road before and after proposed Stages 3B1 and 3B2 are shown in Table 5.5 below.

Due to the opening of East-West Connector Road in parallel with Stage 3B1, it is expected that there will be reduced trips from the Jordan Springs East development being distributed to The Northern Road. Trips distributed from Jordan Springs East to The East-West Connector Road is likely to align with the trip distribution found in the ultimate year of the development. 55% and 53% of trips from Jordan Springs East will be distributed to the East-West Connector Road in the respective AM and PM peak.

Table 5.5 Applied Origin-Destination Survey to trips made to The Northern Road

		AM outbound	AM inbound	PM outbound	PM inbound
Trips Generated from Approved Stage 1, 2 and 3A	To/From North	136	37	36	185
	To/From West	33	23	22	119
	To/From South	300	56	91	292
Trips Generated from Approved Stages + Proposed Stages 4A and 4B	To/From North	164	45	43	224
	To/From West	40	28	27	145
	To/From South	363	68	110	354
Trips Generated from Approved Stages + Proposed Stages 4A and 4B + Proposed Stages 3B1 and 3B2*	To/From North	78	22	22	111
	To/From West	19	14	13	72
	To/From South	173	32	55	176

**Note:* *Only 45% and 47% of the respective AM and PM peak trips are distributed to The Northern Road from Jordan Springs East. This is due to the scheduled opening of the East-West Connector Road between Jordan Springs East and the Ropes Crossing precinct, prior to the commencement of Stage 3B1.*

5.5 IMPACT OF PROPOSED DEVELOPMENT TO JORDAN SPRINGS INTERNAL ROAD

5.5.1 LAKESIDE PARADE/JORDAN SPRINGS BOULEVARDE

For the purpose of this study, the following route option assumptions are made at the intersection of Jordan Springs Boulevarde and Lakeside Parade with regards to the turning movements made by the combined trips out of Jordan Springs East of the approved Stages 1, 2 and 3A, committed Stages 4A and 4B and proposed Stages 3B1 and 3B2.

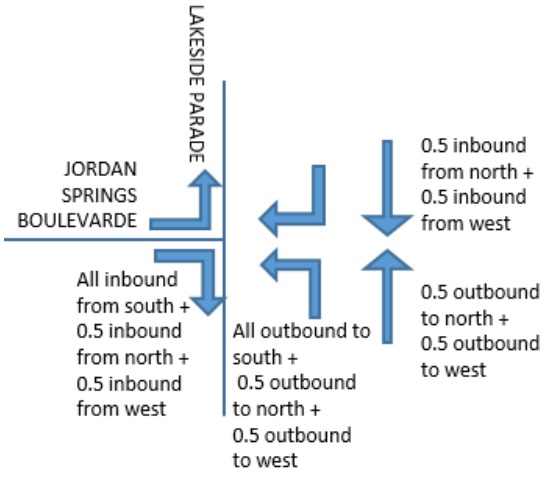


Figure 5.2 Route Option Lakeside Parade/Jordan Springs Boulevarde

5.5.1.1 JORDAN SPRINGS BOULEVARDE/LAKESIDE PARADE INTERSECTION VOLUMES UNDER PROPOSED CONDITIONS

The resulting traffic volume at the intersection of Jordan Springs Boulevarde and Lakeside Parade is summarised in Table 5.6 below, taking into account of the traffic growth in Jordan Springs as calculated in section 4.2.1 and the trips generated from Jordan Springs East approved and proposed developments as detailed in section 5.2.

Table 5.6 Lakeside Parade/Jordan Springs Boulevarde – Estimated intersection volumes with inclusion of Jordan Springs East Development Traffic in 2021

		Lakeside Parade (North)		**Lakeside Parade (South)**		**Jordan Springs Boulevarde**	
	Peak hour	T	R	L	T	L	R
Trips Generated from Approved Stage 1, 2 and 3A Submitted Stages 4A +4B and Proposed Stages 3B1 and 3B2	AM peak	40	204	538	84	135	170
	PM peak	134	240	258	33	322	566

Table 5.7 below summarises the mid-block traffic volume envisaged in the ultimate completion year of the Stage 3B2 super-lots.

Table 5.7 Lakeside Parade and Jordan Springs Boulevarde – Estimated mid-block volumes including Stage 3B1

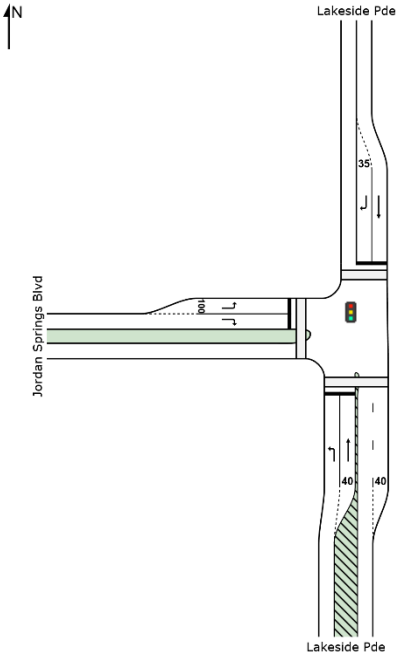
	AM peak		PM peak	
Lakeside Parade (North)	NB: 219	SB: 244	NB: 355	SB: 374
Lakeside Parade (South)	NB: 622	SB: 210	NB: 291	SB: 699
Jordan Springs Boulevarde	EB: 305	WB: 742	EB: 888	WB: 498

Based on the above, the traffic volumes assessed at the approaches to Lakeside Parade and Jordan Springs Boulevarde intersection will be within the typical mid-block capacities recommended in the Austroads *Guide to Traffic Management Part 3*.

5.5.1.2 SIDRA ASSESSMENT

The resulting trips as shown in Table 5.6 was modelled in SIDRA using the existing layout of the intersection of Jordan Springs Boulevarde and Lakeside Parade. As shown in the performance summary Table 5.8 the intersection has been assessed to be performing satisfactorily. The worst performing condition has been assessed at a Level of Service (LoS) 'C' during the PM peak under the proposed condition.

Table 5.8 Lakeside Parade/Jordan Springs Boulevarde Performance Summary with inclusion of Jordan Springs East Development Traffic in 2021

Lakeside Parade/Jordan Springs Boulevarde Performance Summary		
	**AM peak conditions with all trips from Stage 1, 2, 3A, 4A and 4B to The Northern Road only**	**AM peak conditions with proposed Stage 3B1, 3B2 and opening of the East-West Connector Road**
	Total Vehicle: 1,542 veh/h Degree of Saturation: 0.662 Average Delay: 17.3 Level of Service: B 95% Back of Queue: 74.2 metres (West approach)	Total Vehicle: 1,171 veh/h Degree of Saturation: 0.452 Average Delay: 17.3 Level of Service: B 95% Back of Queue: 52.3 metres (West approach)
	PM peak conditions with all trips from Stage 1, 2, 3A, 4A and 4B to The Northern Road only	**PM peak conditions with proposed Stage 3B1, 3B2 and opening of the East-West Connector Road**
	Total Vehicle: 2,007 veh/h Degree of Saturation: 0.965 Average Delay: 43.2 Level of Service: D 95% Back of Queue: 377 metres (West approach)	Total Vehicle: 1,553 veh/h Degree of Saturation: 0.654 Average Delay: 22.8 Level of Service: C 95% Back of Queue: 147.1 metres (West approach)

The SIDRA output of the above assessments are attached in Appendix C.

5.5.2 THE NORTHERN ROAD/JORDAN SPRINGS BOULEVARDE

For the purpose of this study, the route option assumptions shown in Figure 5.3 are made at the intersection of Jordan Springs Boulevarde and The Northern Road with regards to the turning movements made by the combined trips out of Jordan Springs East of the approved Stages 1, 2 and 3A, committed Stages 4A and 4B, and proposed Stages 3B1 and 3B2.

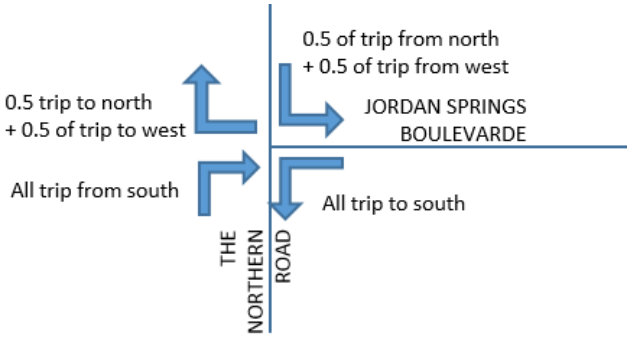


Figure 5.3 Route option Lakeside Parade/Jordan Springs Boulevarde

5.5.2.1 THE NORTHERN ROAD/JORDAN SPRINGS BOULEVARDE INTERSECTION VOLUMES UNDER PROPOSED CONDITIONS

The resulting traffic volumes at the intersection of Jordan Springs Boulevarde and The Northern Road is summarised in Table 5.9 below, which takes into account of the traffic growth in Jordan Springs as calculated in section 4.2.3 and the trips generated from Jordan Springs East approved and proposed developments as detailed in section 5.2.

Table 5.9 The Northern Road/Jordan Springs Boulevarde – Estimated intersection volumes with inclusion of Jordan Springs East Development Traffic in 2021

		The Northern Road (North)		The Northern Road (South)		Jordan Springs Boulevarde	
	Peak hour	T	L	R	T	L	R
Trips Generated from Approved Stage 1, 2 and 3A	AM peak	1247	100	425	915	752	120
Submitted Stages 4A, 4B and Proposed Stages 3B1 and 3B2	PM peak	1091	213	1085	982	594	114

Table 5.10 below summarises the mid-block traffic volume envisaged in the ultimate completion year of the Stage 3B2 super-lots.

Table 5.10 The Northern Road and Jordan Springs Boulevarde – Estimated mid-block volumes including Stage 3B1

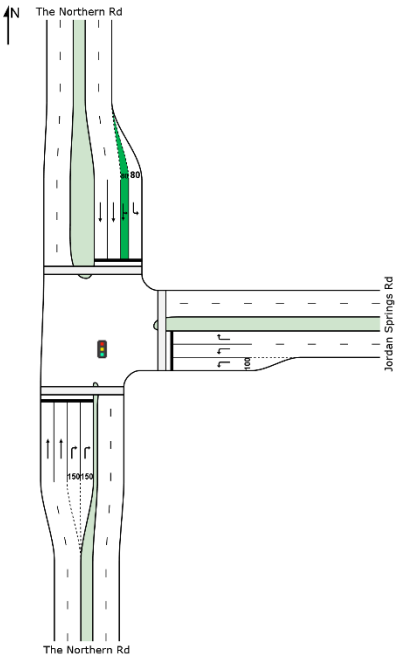
	AM peak		PM peak	
	NB/EB	SB/WB	NB/EB	SB/WB
The Northern Road (North)	1035	1347	1096	1304
The Northern Road (south)	1340	1999	2067	1685
Jordan Springs Boulevarde	525	872	1298	708

It is noted that the traffic volumes assessed for Jordan Springs Boulevarde are found to be within the typical two-lane capacity of 1,900 passenger car unit (pcu)/hour as shown in Table 2.2, where a volume of 872 westbound and 1,298 eastbound assessed during the respective AM and PM peak.

5.5.2.2 SIDRA ASSESSMENT

The resulting trips as shown in Table 5.9 were modelled in SIDRA using the existing layout of the intersection of The Northern Road and Jordan Springs Boulevarde. The performance of the intersection is summarised in Table 5.11 below.

Table 5.11 The Northern Road/Jordan Springs Boulevarde Performance Summary with inclusion of Jordan Springs East Development Traffic in 2021

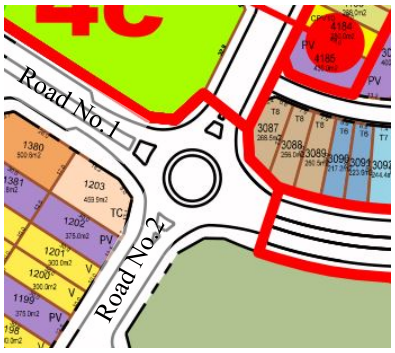
The Northern Road/Jordan Springs Boulevarde Performance Summary		
	**AM peak conditions with all trips from Stage 1, 2, 3A, 4A and 4B to The Northern Road only**	**AM peak conditions with proposed Stage 3B1, 3B2 and opening of the East-West Connector Road**
	Total Vehicle: 3,864 veh/h Degree of Saturation: 0.678 Average Delay: 24.8 Level of Service: B 95% Back of Queue: 177.3 metres (North approach)	Total Vehicle: 3,559 veh/h Degree of Saturation: 0.629 Average Delay: 22.8 Level of Service: B 95% Back of Queue: 163.7 metres (North approach)
	PM peak conditions with all trips from Stage 1, 2, 3A, 4A and 4B to The Northern Road only	**PM peak conditions with proposed Stage 3B1, 3B2 and opening of the East-West Connector Road**
	Total Vehicle: 4,459 veh/h Degree of Saturation: 0.911 Average Delay: 35.4 Level of Service: C 95% Back of Queue: 259.2 metres (South approach)	Total Vehicle: 4,079 veh/h Degree of Saturation: 0.829 Average Delay: 28.2 Level of Service: B 95% Back of Queue: 190.4 metres (South approach)

As shown in the intersection performance summary table above, the addition of Stages 3B1 and 3B2 to the approved developments Stages 1, 2 and 3A and committed Stages 4A, and 4B in Jordan Springs East in parallel with the opening of East-West Connector Road will result in a satisfactory operation of The Northern Road/Jordan Springs Boulevarde intersection. The resulting Level of Service at the intersection have been assessed at a Level of Service 'B' in both the AM and PM peak.

The SIDRA output of the above assessments are attached in Appendix D.

5.6 DEVELOPMENT IMPACT TO JORDAN SPRINGS EAST INTERNAL ROAD

Assessment of the internal road in Jordan Springs East has been undertaken for the intersection of Road No. 1 (collector road east-west) and Road No. 2 (collector road north-south). This intersection provides direct access to Stage 1 and 2 to the south and Stages 3A, 4A, 4B, 3B1 and 3B2 to the north.



Internal roads proposed to be connected to Road No. 1 that are located to the east of Road No. 2 are understood to be connected to Road No.1 under the development in future stages of Jordan Springs East.

With the development of Stages 1, 2, 3A 4A, 4B, 3B1 and 3B2 the intersection of Road No.1 and No. 2 will generate the traffic volume shown in Table 5.12 below.

This intersection is controlled by a single lane roundabout with an inscribed radius of approximately 20 metres. Concrete median island is proposed along Road Number 1 which would prohibit any right turn movements into and out of side streets and property accesses.

Table 5.12 Traffic Volume Intersection Road No.1 and No.2

	Road No.2 (South)			Road No.1 (East)			Road No.2 (North)			Road No.1 (West)		
	L	T	R	L	T	R	L	T	R	L	T	R
AM	185	0	227	57	0	26	103	0	84	21	0	46
PM	59	0	72	290	0	131	33	0	27	107	0	237

The intersection has been modelled in SIDRA Intersections and was found to be performing satisfactorily. The result is summarised below:

Table 5.13 Intersection Road No.1 and No.2 Performance Summary

	Intersection performance with all trips from Stage 1, 2, 3A, 4A and 4B to The Northern Road only		Intersection performance with proposed Stage 3B1, 3B2 and opening of the East-West Connector Road	
	AM peak	PM peak	AM peak	PM peak
Total Volume	717 vehicles	912 vehicles	753 vehicles	960 vehicles
Degree of Saturation	0.339 (Road No 2. South Approach)	0.427 (Road No 1. West Approach)	0.320 (Road No 2. South Approach)	0.394 (Road No 1. West Approach)
Average Delay	9.1 seconds (Road No. 2 North Approach)	11.3 seconds (Road No 2. North Approach)	7.5 seconds (Road No. 2 North Approach)	8.4 seconds (Road No 1. West Approach)
Level of Service	LoS A	LoS A	LoS A	LoS A
95% Back of Queue	15.7 metres (Road No 2. South Approach)	23.1 metres (Road No 1. West Approach)	15.1 metres (Road No 2. South Approach)	19.2 metres (Road No 1. East Approach)

For priority (sign) and roundabout controlled intersections, Level of Service is based upon the traffic movement with the worst vehicle average delay.

Based on the above performance it is considered that the intersection of Road 001 and Road 002 will be performing satisfactorily with trips from approved Stages 1, 2 and 3A, committed Stages 4A and 4B and proposed Stage 3B1, 3B2 being distributed to the east and west of Jordan Springs East development.

The mid-block volume will be within the maximum of 900 passenger car unit (pcu) per lane per hour with a maximum of 330 vehicles/hour observed in the AM peak in the eastbound direction east of Road 1/Road 2 intersection. A maximum of 421 vehicles/hour observed in the PM peak in the westbound direction east of Road 1/Road 2 intersection. The SIDRA output of the above assessments are attached in Appendix E.

6 JORDAN SPRINGS EAST PRECINCT PLAN

6.1 ROAD LAYOUT

The internal road layout and functions planned for Jordan Springs East is shown in Figure 6.1 below. Stage 3B2, located toward the eastern side of the Jordan Springs East development will be predominantly serviced by Road 001.

Lendlease has indicated that the East-West connector road will be opened to traffic by the end of 2018. The opening of the East-West Connector Road will vastly change trip distribution for Jordan Springs East, where 55% and 53% of trips are made towards the east in the respective AM and PM peak. This trip redistribution will consequently reduce the traffic impact in the Jordan Springs road network.

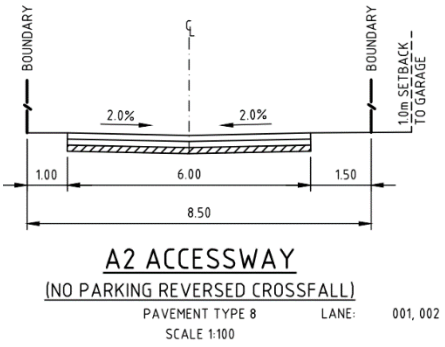
Figure 6.1 Road layout and functions Jordan Springs East

6.2 PROPOSED CROSS SECTION

Stage 3B2 consists of the road types listed in this section. The design of the road cross section takes into consideration of the function of each road and the road users that are likely to utilise the road space which include cars, buses, pedestrians and cyclists.

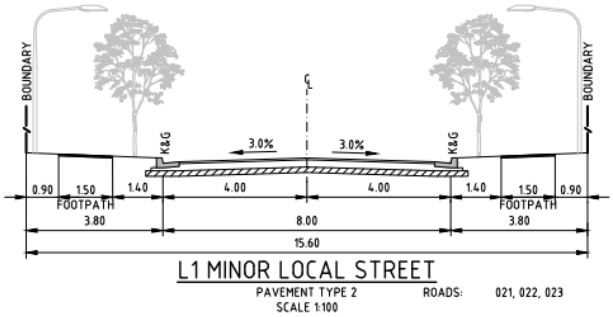
6.2.1 A2 ACCESSWAY

A2 Accessway cross section will be used for the low-traffic rear-lane access of the super-lots. No kerb and gutter is proposed for the road with surface drainage is managed by providing a reverse cross fall with the drainage pits located along the centre line of the road. The cross-section measures 8.5 metres between boundaries with 6 metres of pavement trafficable in both direction. No parking restrictions will apply along both sides of the road to ensure accessibility.



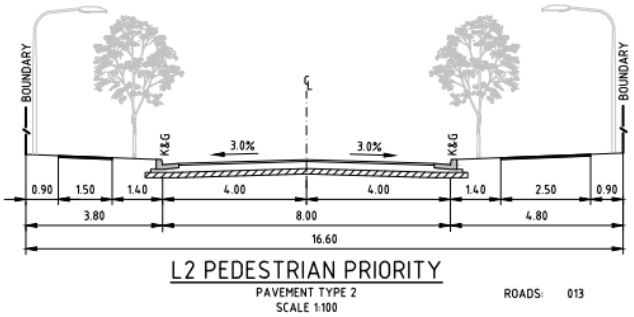
6.2.2 L1 MINOR LOCAL ROADS

L1 Minor Local Roads are local access roads to the residential properties. The kerb to kerb dimension is typically 8 metres wide, with street lighting and 1.5 metres footpath available on either side of the road. Parking are generally made available on both sides of the road, unless otherwise restricted.

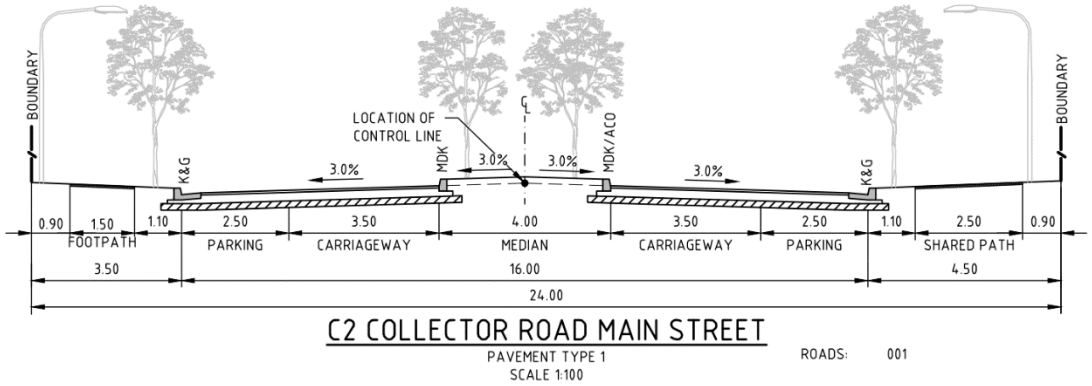


6.2.3 L2 PEDESTRIAN PRIORITY

L2 Pedestrian Priority road are local access roads to the residential properties. Similar to L1 Minor Local Roads, it is typically 8 metres wide, however L2 Pedestrian priority roads generally accommodate a 1.5 metres pedestrian path and a 2.5 metres shared path on either side of the road. Parking are generally made available on both sides of the road, unless otherwise restricted.



6.2.4 C2 COLLECTOR ROAD MAIN STREET



C2 Collector Road cross section will be used for Road 001, which is the collector road which runs in the east-west direction through the centre of Jordan Springs East. It is a divided carriageway consisting of a 3.5 metres travel lane, 2.5 meters parking lane in each direction and a centre median measuring 4 metres. Street lighting, 1.5 metres footpath along the northern kerbside and 2.5 metres shared path along the southern kerbside are proposed.

6.3 SUPER-LOT PROPERTY ACCESSES

The four super-lots generally consist of four frontages each and all have been provided with an access laneway which runs parallel with Road 001. Vehicular access to provide future servicing (i.e. delivery) of the proposed developments in the super-lots are envisaged to be provided via the access laneway to minimise conflict with other road users in the main collector road (Road 001). Intersections between the access laneways and the corresponding side streets will be treated with a continuous footpath treatment to ensure pedestrian priority at the intersections.

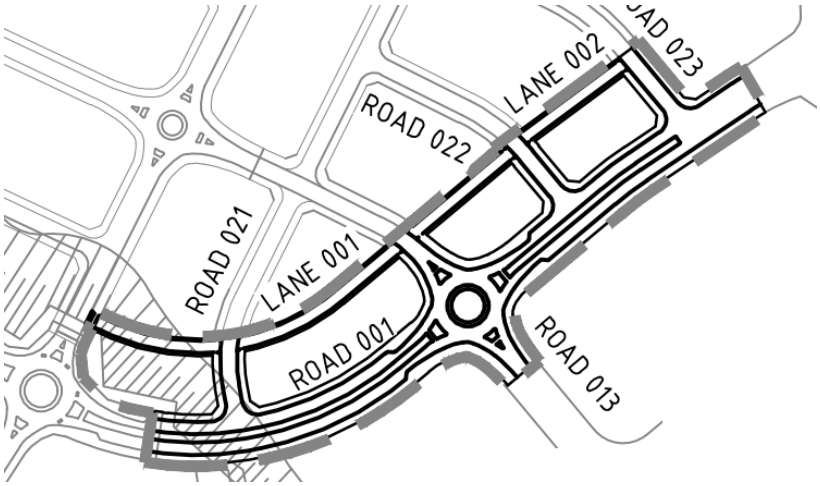
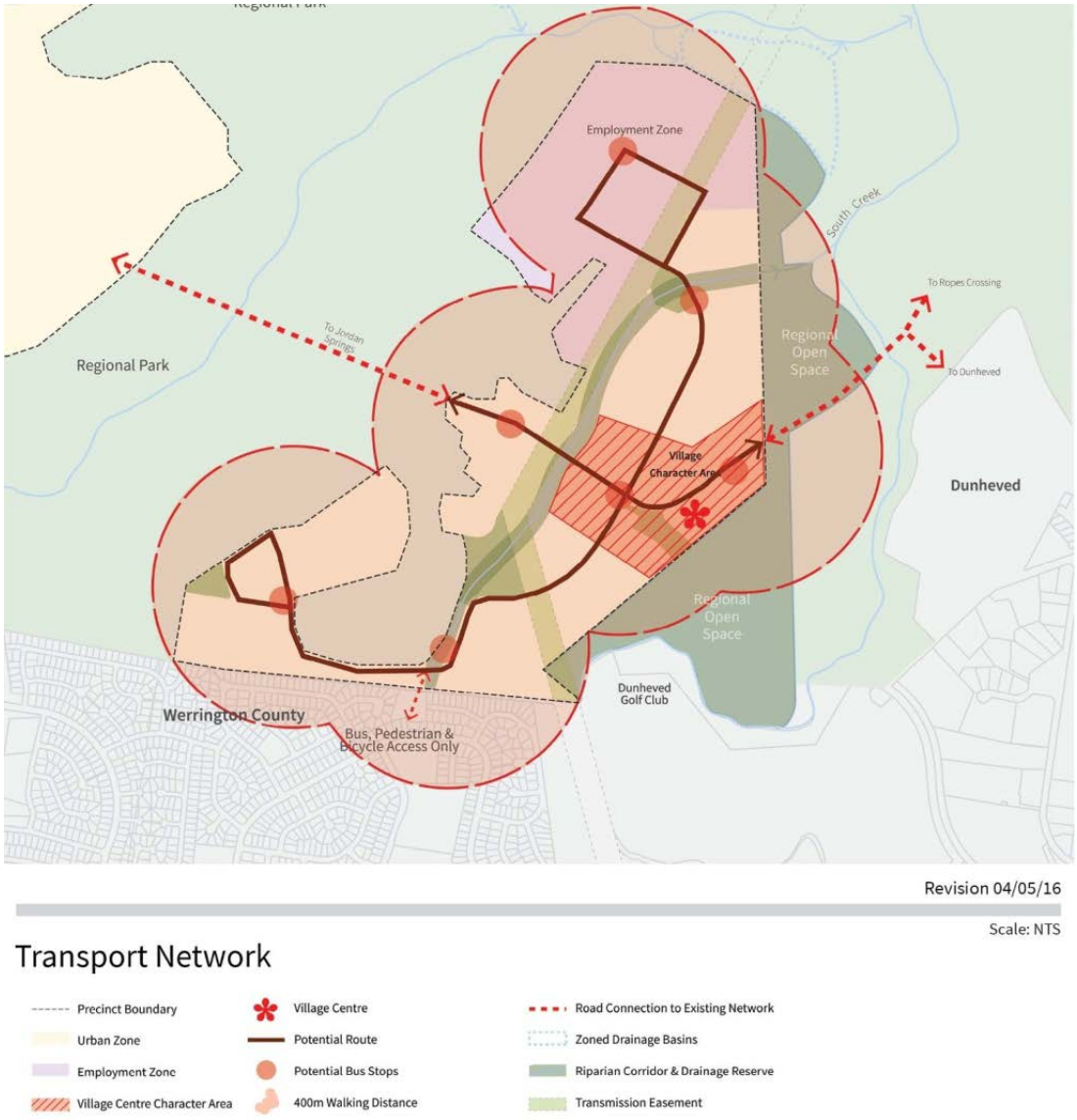


Figure 6.2 Super-lot layouts (Cardno, 2017)

6.4 PUBLIC TRANSPORT

In the JBA Jordan Springs East Precinct Plan 1 May 2016, it is envisaged that the various character areas (including urban area/neighbourhood character, village centre, parkland node, bushland edge and employment zone) within Jordan Springs East will be within 5–10 minutes of walking distance of a bus stop.

Figure 6.3 below depicts the proposed bus services and bus stop locations in Jordan Springs East, which will be mainly servicing both the north-south and east-west collector roads. As indicated in section 6.2 above, wider road widths apply to roads that are indicated to be part of the bus routes.

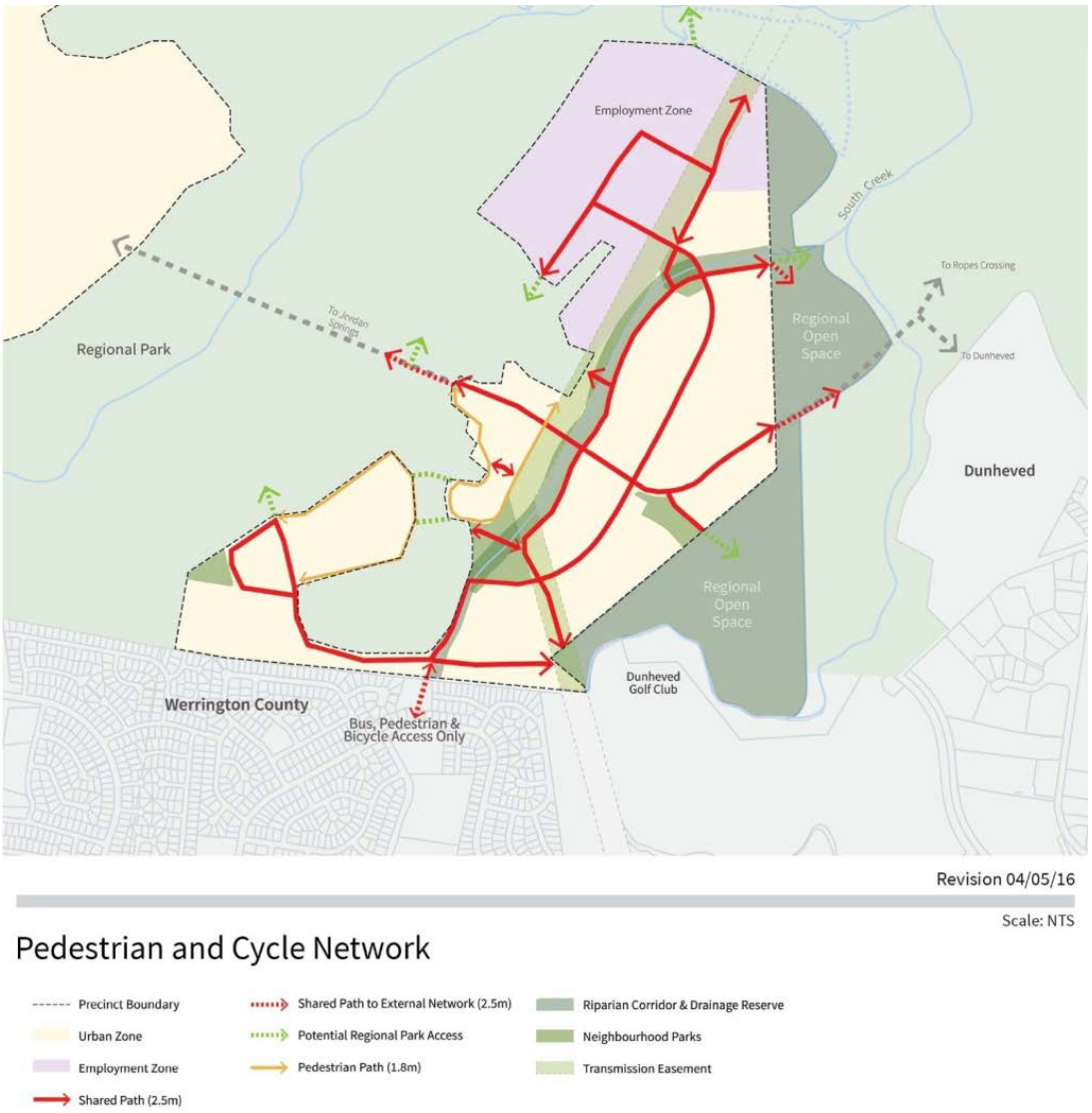


Source: JBA, May 2016, Jordan Springs East Precinct Plan

Figure 6.3 Proposed Bus Services and Bus Stops in Jordan Springs East

6.5 PEDESTRIAN AND CYCLE NETWORK

As shown in section 6.2 – Road Cross Section, it is proposed that all roads within Stage 3B2 of Jordan Springs East to consist of pedestrian paths in every street and shared paths along the major collector roads, including Road 002. Figure 6.4 below shows the extent of the shared path network in Jordan Springs East.



Source: JBA, May 2016, Jordan Springs East Precinct Plan

Figure 6.4 Pedestrian and Cycle Network in Jordan Springs East

7 CONCLUSIONS

This report has been undertaken to consider the traffic, accessibility and safety impact of the super-lots proposed in Stage 3B2, taking into consideration the existing traffic volumes and growth in Jordan Springs, trips generated from the approved Stages in Jordan Springs East and distribution of trips made with consideration of the opening of the East-West Connector Road. Stage 3B2 is located approximately to the east of Jordan Springs East development consisting of four super-lots that abuts the east-west Collector Road 001. WSP has been advised that the development proposed in the super-lots are not finalised at this stage and any developments that are proposed at the sites will be subject to a separate Development Application and supporting Traffic Impact Assessment in the future. At this stage, these lots are assumed to be non-traffic generating sites.

The occupation of Stage 3B1 and development of Stage 3B2 are scheduled to be undertaken after the opening of East-West Connector Road which will significantly alter the trip distribution out of Jordan Springs East. It is expected that 55% and 53% of trips out of Jordan Springs East will utilise the East-West Connector Road during the respective AM and PM peak periods.

Assessments have been undertaken to investigate the performance of the affected intersections and mid-block capacity on Lakeside Parade in Jordan Springs. The following concludes the findings of the assessment:

1. The intersection of Lakeside Parade/Jordan Springs Boulevarde and The Northern Road/Jordan Springs Boulevarde have been assessed to be performing with a satisfactory Level of Service (LoS) with the inclusion of Jordan Springs East Stages 3B1 and 3B2 development traffic in addition to approved Stage 1, 2, 3A and committed stages 4A, and 4B.
2. The cross-section details of the roads within Stage 3B2 designed by others have been checked to take into consideration of the function of each road and the road users that are likely to utilise the road space which include cars, buses, pedestrians and cyclists.
3. At this stage, the proposed Stage 3B2 development will not be serviced by buses however a check of the Jordan Springs East Precinct Plan revealed that all areas of the precinct will ultimately be within 5–10 minutes' walk of a bus stop under the proposed ultimate development year (2021).
4. It is considered that the four super-lots proposed in Stage 3B2 will not have an adverse impact to the road network.

APPENDIX A

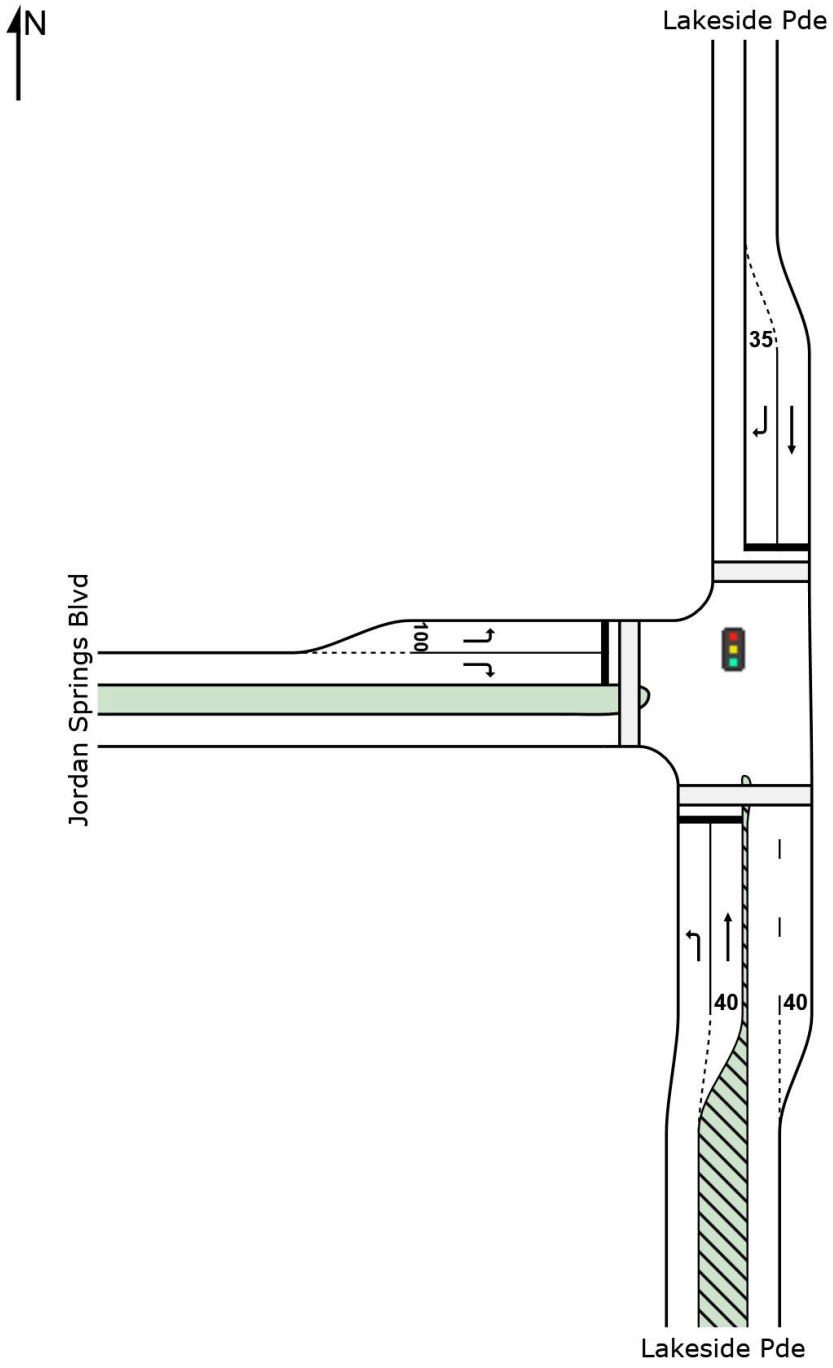
SIDRA OUTPUT – JORDAN SPRINGS BOULEVARDE/LAKESIDE PARADE

Intersection performance summary of trips generated by Jordan Springs precinct only

SITE LAYOUT

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing - Growth Only]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated



Organisation: PARSONS BRINCKERHOFF AUSTRALIA | Created: Thursday, 18 May 2017 12:27:10 PM
Project: \\APSYDFIL03\proj\M\MARYLAND_DVLPMNT_CO\2197037A_Central_Precinct_Traffic_Mode\05_WrkPapers\WP\Draft\TIA STAGES 4A & 4B\SIDRA\internal road.sip7

LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2016 - Existing]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Lakeside Pde													
Lane 1	143	0.3	1575	0.091	100	5.2	LOS A	0.7	4.7	Full	240	0.0	0.0
Lane 2	16	0.0	1151	0.014	100	8.8	LOS A	0.3	2.2	Short	40	0.0	NA
Approach	159	0.3		0.091		5.6	LOS A	0.7	4.7				
North: Lakeside Pde													
Lane 1	10	1.3	1141	0.009	100	8.8	LOS A	0.2	1.4	Full	160	0.0	0.0
Lane 2	92	1.1	698	0.132	100	15.8	LOS B	2.1	15.0	Short	35	0.0	NA
Approach	102	1.2		0.132		15.1	LOS B	2.1	15.0				
West: Jordan Springs Blvd													
Lane 1	61	5.0	466	0.131	100	35.2	LOS D	2.3	16.7	Short	100	0.0	NA
Lane 2	54	1.9	477	0.113	100	35.0	LOS C	2.0	14.3	Full	130	0.0	0.0
Approach	115	3.5		0.131		35.1	LOS D	2.3	16.7				
Intersection	376	1.5		0.132		17.2	LOS B	2.3	16.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

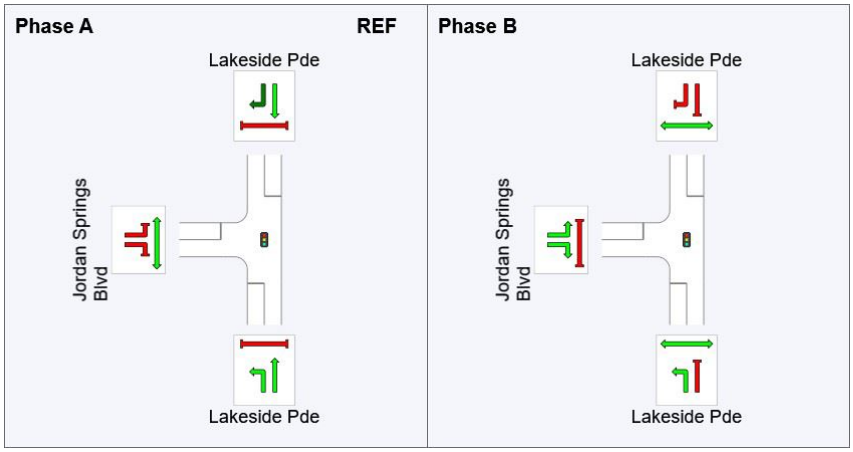
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2016 - Existing]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	65
Green Time (sec)	59	29
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	65	35
Phase Split	65%	35%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2016 - Existing]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Lakeside Pde													
Lane 1	97	0.3	1575	0.062	100	5.2	LOS A	0.4	3.1	Full	240	0.0	0.0
Lane 2	8	0.0	858	0.009	100	16.5	LOS B	0.2	1.5	Short	40	0.0	NA
Approach	105	0.3		0.062		6.1	LOS A	0.4	3.1				
North: Lakeside Pde													
Lane 1	22	1.3	851	0.026	100	16.7	LOS B	0.6	4.2	Full	160	0.0	0.0
Lane 2	125	1.1	547	0.228	100	25.3	LOS C	4.0	28.2	Short	35	0.0	NA
Approach	147	1.2		0.228		24.0	LOS C	4.0	28.2				
West: Jordan Springs Blvd													
Lane 1	168	5.0	735	0.228	100	25.2	LOS C	5.3	38.7	Short	100	0.0	NA
Lane 2	155	1.9	751	0.206	100	24.9	LOS C	4.8	34.4	Full	130	0.0	0.0
Approach	323	3.5		0.228		25.0	LOS C	5.3	38.7				
Intersection	575	2.3		0.228		21.3	LOS C	5.3	38.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

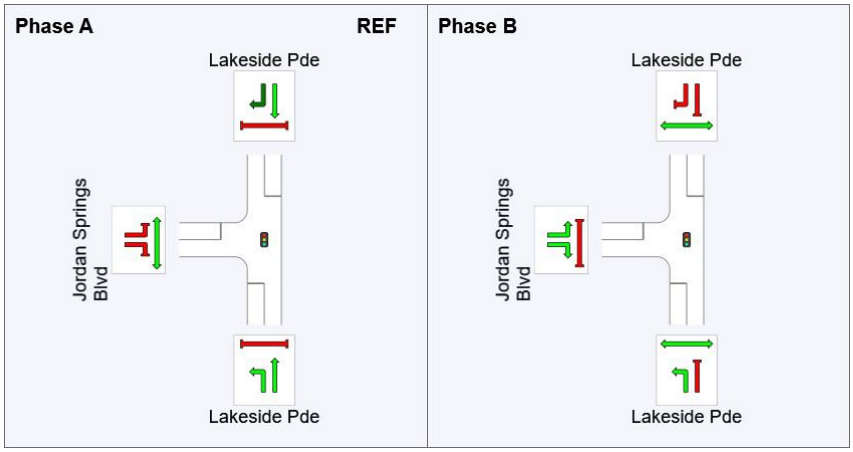
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2016 - Existing]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	50
Green Time (sec)	44	44
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	50	50
Phase Split	50%	50%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing - Growth Only]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Lakeside Pde													
Lane 1	317	0.3	1575	0.201	100	5.3	LOS A	1.7	11.6	Full	240	0.0	0.0
Lane 2	35	0.0	1209	0.029	100	7.7	LOS A	0.6	4.5	Short	40	0.0	NA
Approach	352	0.3		0.201		5.6	LOS A	1.7	11.6				
North: Lakeside Pde													
Lane 1	22	1.3	1199	0.018	100	7.6	LOS A	0.4	2.8	Full	160	0.0	0.0
Lane 2	204	1.1	600	0.340	100	16.5	LOS B	5.2	37.0	Short	35	0.0	NA
Approach	226	1.2		0.340		15.6	LOS B	5.2	37.0				
West: Jordan Springs Blvd													
Lane 1	135	5.0	413	0.327	100	39.6	LOS D	5.6	40.6	Short	100	0.0	NA
Lane 2	120	1.9	422	0.285	100	39.1	LOS D	4.9	34.7	Full	130	0.0	0.0
Approach	255	3.5		0.327		39.4	LOS D	5.6	40.6				
Intersection	833	1.5		0.340		18.6	LOS B	5.6	40.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

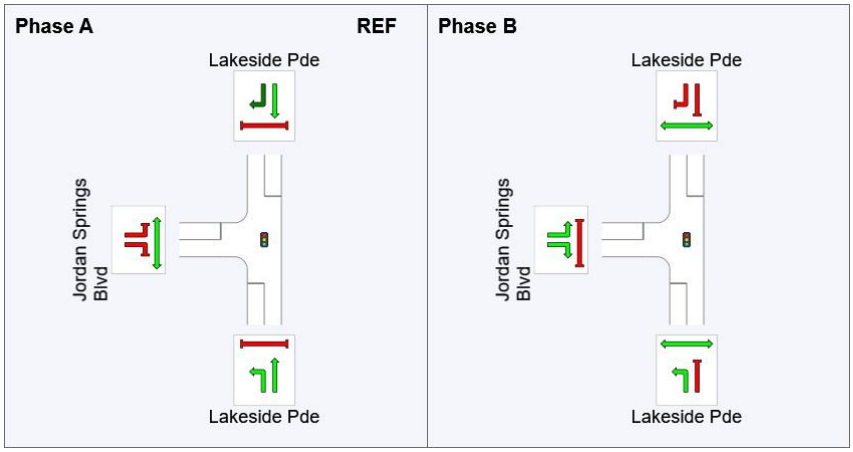
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing - Growth Only]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	68
Green Time (sec)	62	26
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	68	32
Phase Split	68%	32%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing - Growth Only]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Lakeside Pde													
Lane 1	186	0.3	1575	0.118	100	5.3	LOS A	0.9	6.3	Full	240	0.0	0.0
Lane 2	15	0.0	897	0.017	100	15.4	LOS B	0.4	2.7	Short	40	0.0	NA
Approach	201	0.3		0.118		6.0	LOS A	0.9	6.3				
North: Lakeside Pde													
Lane 1	42	1.3	889	0.047	100	15.7	LOS B	1.1	7.8	Full	160	0.0	0.0
Lane 2	240	1.1	521	0.460	100	27.3	LOS C	8.5	60.2	Short	35	0.0	NA
Approach	282	1.2		0.460		25.6	LOS C	8.5	60.2				
West: Jordan Springs Blvd													
Lane 1	322	5.0	700	0.460	100	29.0	LOS C	11.7	85.2	Short	100	0.0	NA
Lane 2	298	1.9	715	0.417	100	28.5	LOS C	10.6	75.2	Full	130	0.0	0.0
Approach	620	3.5		0.460		28.8	LOS C	11.7	85.2				
Intersection	1103	2.3		0.460		23.8	LOS C	11.7	85.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

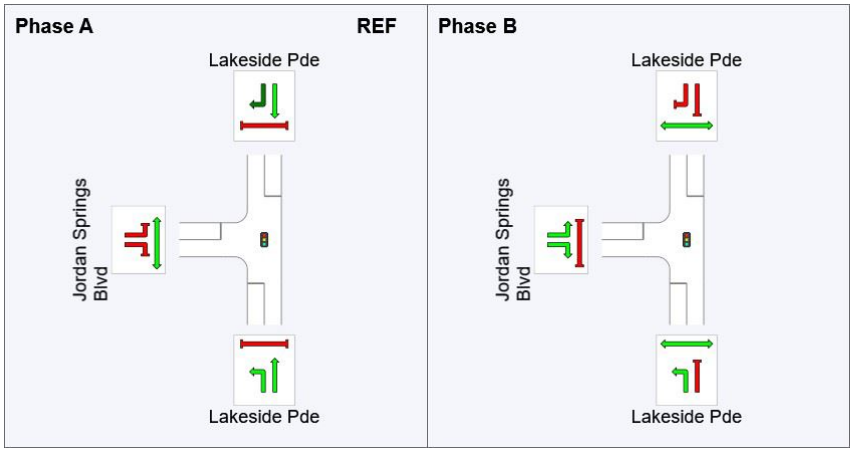
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing - Growth Only]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	52
Green Time (sec)	46	42
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	52	48
Phase Split	52%	48%



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APPENDIX B

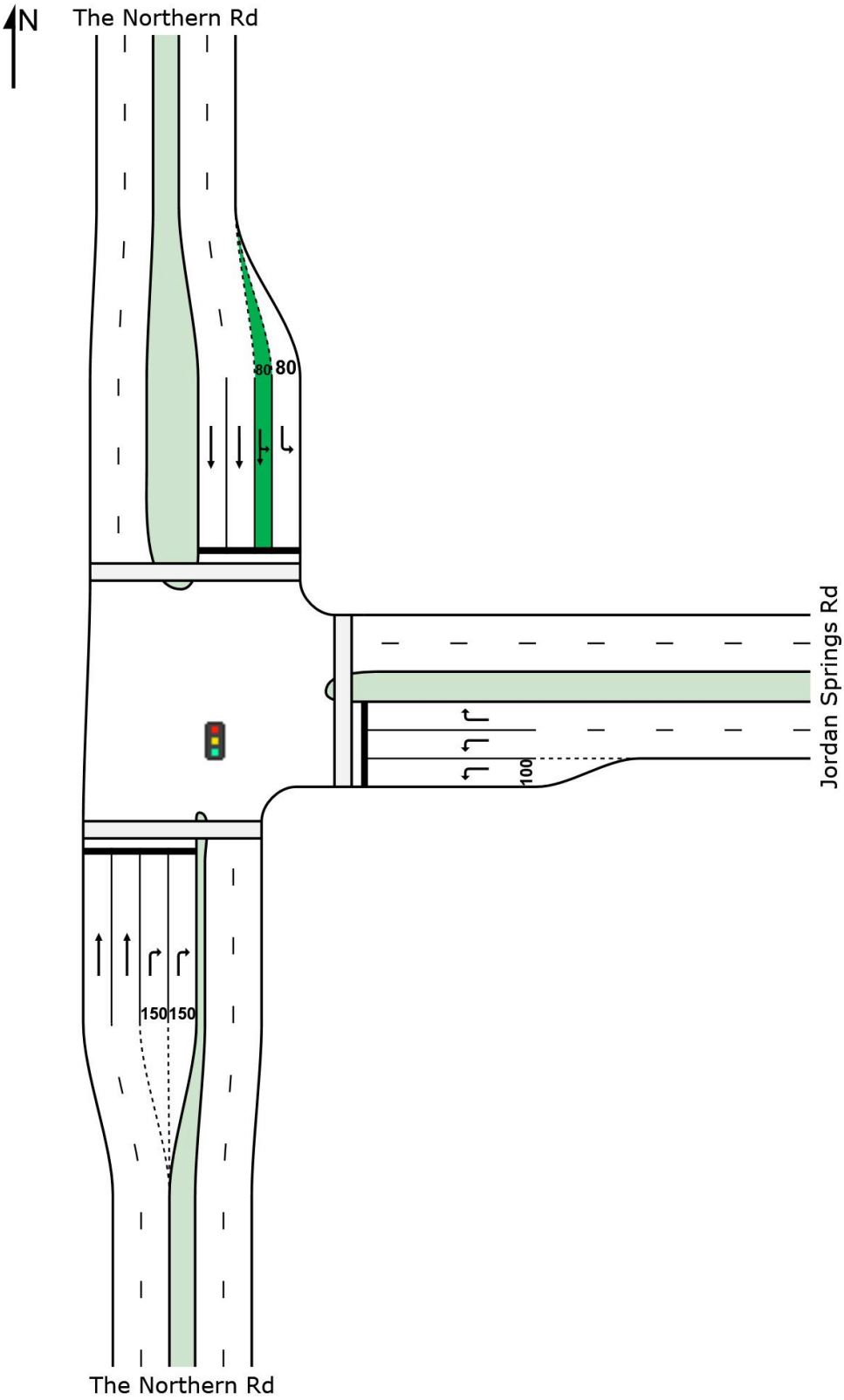
SIDRA OUTPUT – THE NORTHERN ROAD/JORDAN SPRINGS BOULEVARDE

Intersection performance summary of trips generated by Jordan Springs precinct only

SITE LAYOUT

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2016 Existing]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2016 Existing]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Phase Times)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	422	7.9	1466	0.288	100	3.1	LOS A	5.7	42.9	Full	300	0.0	0.0
Lane 2	422	7.9	1466	0.288	100	3.1	LOS A	5.7	42.9	Full	300	0.0	0.0
Lane 3	87	4.6	223	0.391	100	53.8	LOS D	4.3	31.0	Short	150	0.0	NA
Lane 4	87	4.6	223	0.391	100	53.8	LOS D	4.3	31.0	Short	150	0.0	NA
Approach	1018	7.4		0.391		11.8	LOS A	5.7	42.9				
East: Jordan Springs Rd													
Lane 1	131	1.5	525	0.249	100	35.7	LOS C	5.2	36.5	Short	100	0.0	NA
Lane 2	131	1.5	525	0.249	100	35.7	LOS C	5.2	36.5	Full	151	0.0	0.0
Lane 3	32	3.1	156	0.206	100	54.8	LOS D	1.6	11.5	Full	151	0.0	0.0
Approach	293	1.7		0.249		37.8	LOS C	5.2	36.5				
North: The Northern Rd													
Lane 1	37	10.8	1018	0.036	100	16.0	LOS B	0.8	5.9	Short	80	0.0	NA
Lane 2	2	0.0	3603	0.001	100	11.7	LOS A	0.0	0.1	Short	80	0.0	NA
Lane 3	595	4.8	1171	0.508	100	11.8	LOS A	16.7	121.7	Full	500	0.0	0.0
Lane 4	595	4.8	1171	0.508	100	11.8	LOS A	16.7	121.7	Full	500	0.0	0.0
Approach	1229	5.0		0.508		11.9	LOS A	16.7	121.7				
Intersection	2540	5.6		0.508		14.9	LOS B	16.7	121.7				

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

PHASING SUMMARY

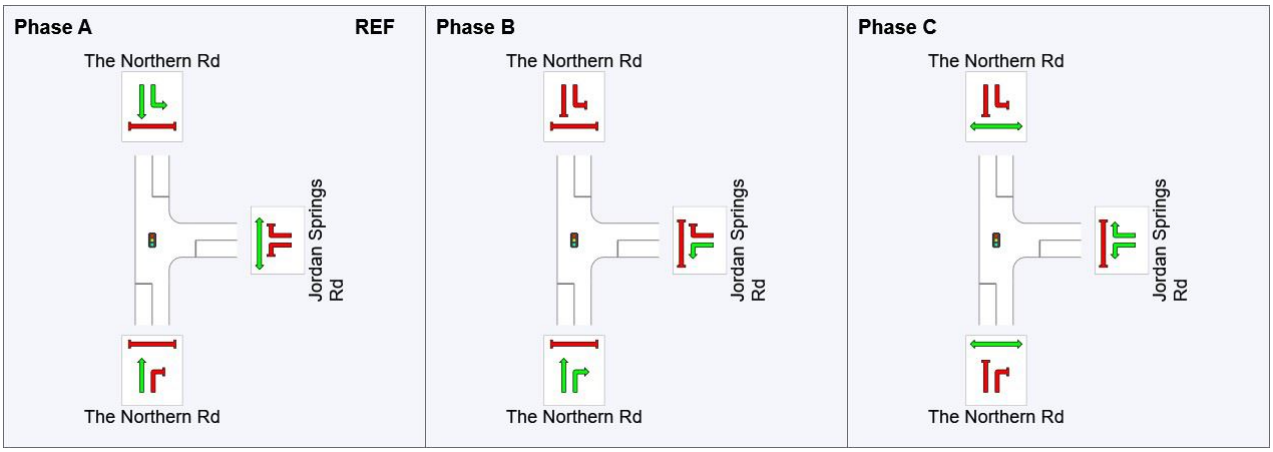
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2016 Existing]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	70	88
Green Time (sec)	65	13	12
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	70	18	17
Phase Split	67%	17%	16%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2016 Existing]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Phase Times)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	448	3.0	1425	0.314	100	4.6	LOS A	7.3	52.1	Full	300	0.0	0.0
Lane 2	448	3.0	1425	0.314	100	4.6	LOS A	7.3	52.1	Full	300	0.0	0.0
Lane 3	228	0.2	400	0.569	100	45.7	LOS D	10.3	72.3	Short	150	0.0	NA
Lane 4	228	0.2	400	0.569	100	45.7	LOS D	10.3	72.3	Short	150	0.0	NA
Approach	1350	2.1		0.569		18.4	LOS B	10.3	72.3				
East: Jordan Springs Rd													
Lane 1	141	1.1	777	0.181	100	24.3	LOS B	4.3	30.6	Short	100	0.0	NA
Lane 2	141	1.1	777	0.181	100	24.3	LOS B	4.3	30.6	Full	151	0.0	0.0
Lane 3	50	6.0	227	0.220	100	48.9	LOS D	2.3	17.0	Full	151	0.0	0.0
Approach	331	1.8		0.220		28.0	LOS B	4.3	30.6				
North: The Northern Rd													
Lane 1	63	4.8	810	0.078	100	23.3	LOS B	1.8	12.8	Short	80	0.0	NA
Lane 2	2	0.0	2760	0.001	100	18.3	LOS B	0.1	0.1	Short	80	0.0	NA
Lane 3	525	3.3	917	0.573	100	20.3	LOS B	18.6	133.9	Full	500	0.0	0.0
Lane 4	525	3.3	917	0.573	100	20.3	LOS B	18.6	133.9	Full	500	0.0	0.0
Approach	1115	3.4		0.573		20.5	LOS B	18.6	133.9				
Intersection	2796	2.6		0.573		20.4	LOS B	18.6	133.9				

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

PHASING SUMMARY

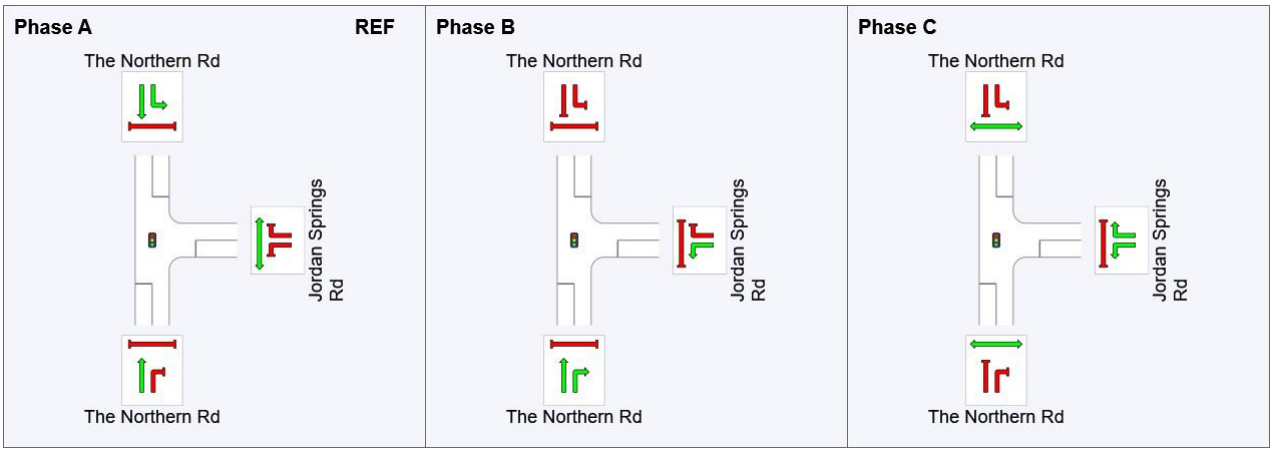
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2016 Existing]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	54	81
Green Time (sec)	49	22	16
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	54	27	21
Phase Split	53%	26%	21%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - Growth Only]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	458	7.9	1413	0.324	100	4.2	LOS A	7.3	54.2	Full	300	0.0	0.0
Lane 2	458	7.9	1413	0.324	100	4.2	LOS A	7.3	54.2	Full	300	0.0	0.0
Lane 3	193	4.6	325	0.593	100	50.1	LOS D	9.3	67.7	Short	150	0.0	NA
Lane 4	193	4.6	325	0.593	100	50.1	LOS D	9.3	67.7	Short	150	0.0	NA
Approach	1301	6.9		0.593		17.8	LOS B	9.3	67.7				
East: Jordan Springs Rd													
Lane 1	290	1.5	682	0.424	100	31.0	LOS C	11.0	78.4	Short	100	0.0	NA
Lane 2	290	1.5	682	0.424	100	31.0	LOS C	11.0	78.4	Full	151	0.0	0.0
Lane 3	71	3.1	208	0.342	100	52.5	LOS D	3.5	25.0	Full	151	0.0	0.0
Approach	650	1.7		0.424		33.4	LOS C	11.0	78.4				
North: The Northern Rd													
Lane 1	80	10.8	870	0.092	100	20.8	LOS B	2.1	16.0	Short	80	0.0	NA
Lane 2	3	0.0	3042	0.001	100	16.9	LOS B	0.1	0.2	Short	80	0.0	NA
Lane 3	623	4.8	1008[1]	0.618	100	18.2	LOS B	22.0	160.3	Full	500	0.0	0.0
Lane 4	623	4.8	1009	0.618	100	18.2	LOS B	22.0	160.3	Full	500	0.0	0.0
Approach	1329	5.1		0.618		18.3	LOS B	22.0	160.3				
Intersection	3280	5.2		0.618		21.1	LOS B	22.0	160.3				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

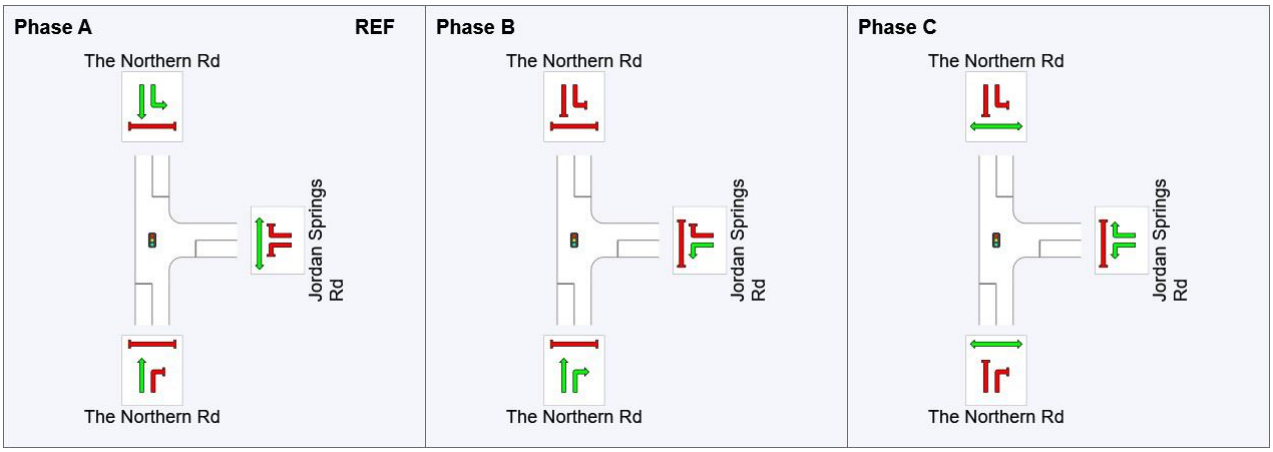
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - Growth Only]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	61	85
Green Time (sec)	56	19	15
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	61	24	20
Phase Split	58%	23%	19%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - Growth Only]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 2	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 3	437	0.2	600	0.728	100	40.1	LOS C	19.6	137.3	Short	150	0.0	NA
Lane 4	437	0.2	600	0.728	100	40.1	LOS C	19.6	137.3	Short	150	0.0	NA
Approach	1855	1.7		0.728		21.2	LOS B	19.6	137.3				
East: Jordan Springs Rd													
Lane 1	270	1.1	958	0.281	100	19.2	LOS B	7.5	52.7	Short	100	0.0	NA
Lane 2	270	1.1	958	0.281	100	19.2	LOS B	7.5	52.7	Full	151	0.0	0.0
Lane 3	96	6.0	210	0.458	100	51.7	LOS D	4.6	34.2	Full	151	0.0	0.0
Approach	635	1.8		0.458		24.1	LOS B	7.5	52.7				
North: The Northern Rd													
Lane 1	119	4.8	634	0.188	100	30.9	LOS C	4.1	29.8	Short	80	0.0	NA
Lane 2	3	0.0	2138	0.001	100	25.3	LOS B	0.1	0.2	Short	80	0.0	NA
Lane 3	545	3.3	730[1]	0.747	100	29.8	LOS C	23.7	170.5	Full	500	0.0	0.0
Lane 4	545	3.3	730	0.747	100	29.8	LOS C	23.7	170.6	Full	500	0.0	0.0
Approach	1212	3.5		0.747		29.9	LOS C	23.7	170.6				
Intersection	3702	2.3		0.747		24.5	LOS B	23.7	170.6				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

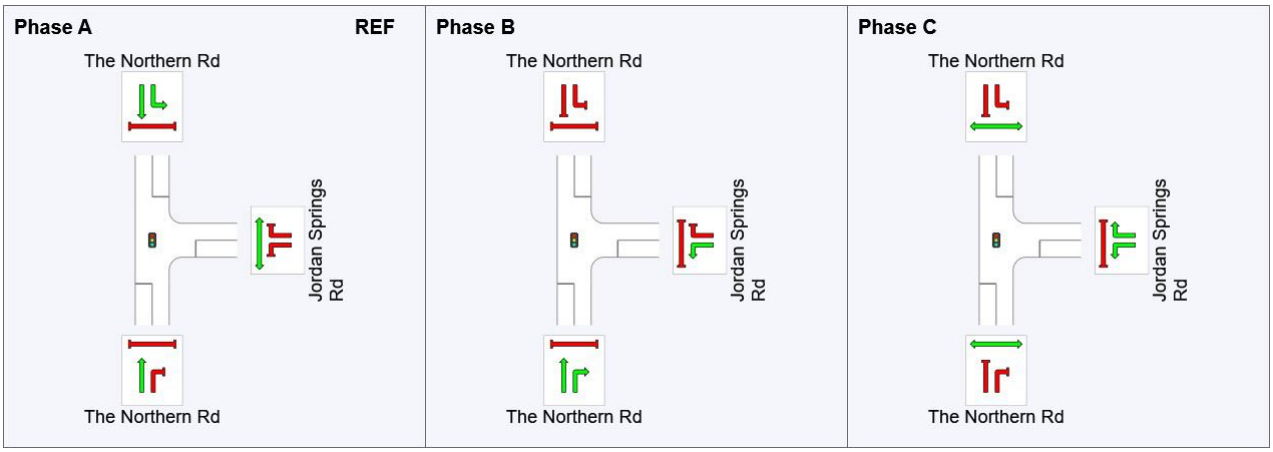
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - Growth Only]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	44	82
Green Time (sec)	39	33	15
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	44	38	20
Phase Split	43%	37%	20%



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APPENDIX C

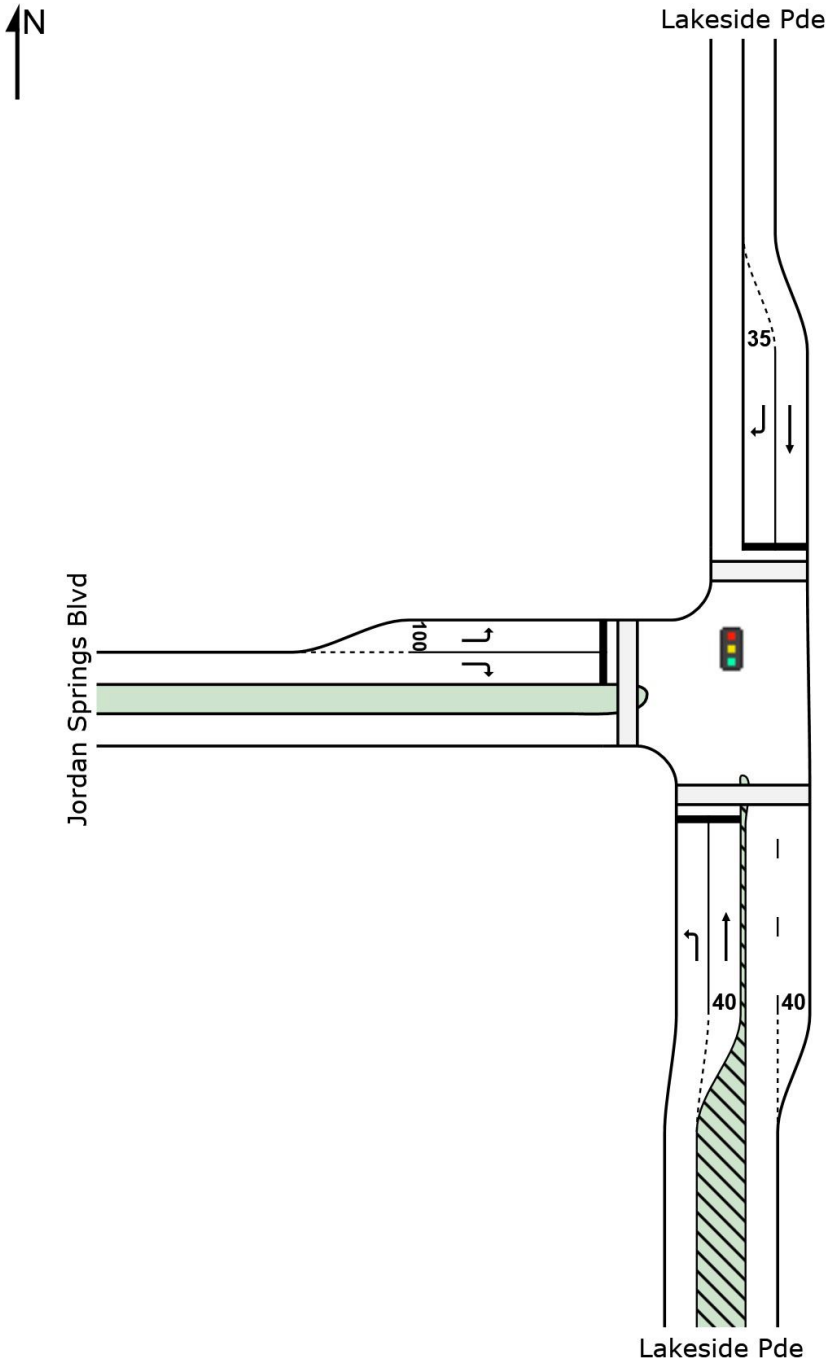
SIDRA OUTPUT – JORDAN SPRINGS BOULEVARDE/LAKESIDE PARADE

Intersection performance summary of trips generated by Jordan Springs and Jordan Springs East precinct

SITE LAYOUT

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing with 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing WO 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Pde													
Lane 1	701	0.3	1575	0.445	100	5.6	LOS A	4.9	34.4	Full	240	0.0	0.0
Lane 2	119	0.0	1268	0.094	100	6.9	LOS A	2.1	14.8	Short	40	0.0	NA
Approach	820	0.3		0.445		5.8	LOS A	4.9	34.4				
North: Lakeside Pde													
Lane 1	52	1.3	1257	0.041	100	6.6	LOS A	0.9	6.3	Full	160	0.0	0.0
Lane 2	204	1.1	351	0.582	100	20.0	LOS B	6.6	46.9	Short	35	0.0	NA
Approach	256	1.2		0.582		17.3	LOS B	6.6	46.9				
West: Jordan Springs Blvd													
Lane 1	135	5.0	359	0.376	100	42.6	LOS D	5.8	42.4	Short	100	0.0	NA
Lane 2	207	1.9	367	0.565	100	44.3	LOS D	9.3	66.2	Full	130	0.0	0.0
Approach	342	3.1		0.565		43.6	LOS D	9.3	66.2				
Intersection	1418	1.1		0.582		17.0	LOS B	9.3	66.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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PHASING SUMMARY

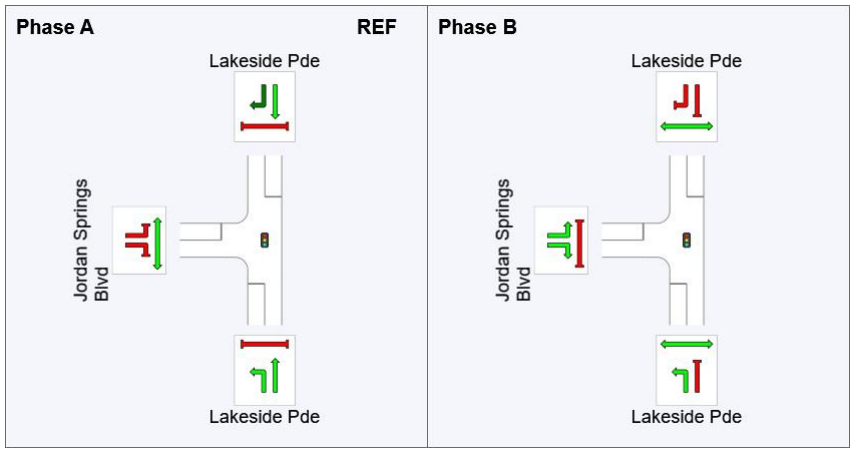
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing WO 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	71
Green Time (sec)	65	23
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	71	29
Phase Split	71%	29%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing WO 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Pde													
Lane 1	306	0.3	1575	0.194	100	5.3	LOS A	1.6	11.4	Full	240	0.0	0.0
Lane 2	44	0.0	624	0.071	100	25.2	LOS C	1.5	10.4	Short	40	0.0	NA
Approach	350	0.3		0.194		7.8	LOS A	1.6	11.4				
North: Lakeside Pde													
Lane 1	194	1.3	619	0.314	100	27.7	LOS C	7.2	50.7	Full	160	0.0	0.0
Lane 2	240	1.1	283[1]	0.849	100	53.5	LOS D	13.2	93.4	Short	35	0.0	NA
Approach	434	1.2		0.849		42.0	LOS D	13.2	93.4				
West: Jordan Springs Blvd													
Lane 1	322	5.0	951	0.339	100	19.0	LOS B	8.9	65.0	Short	100	0.0	NA
Lane 2	742	1.9	898[1]	0.826	100	28.4	LOS C	31.0	220.7	Full	130	0.0	53.7
Approach	1064	2.8		0.826		25.6	LOS C	31.0	220.7				
Intersection	1848	2.0		0.849		26.1	LOS C	31.0	220.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

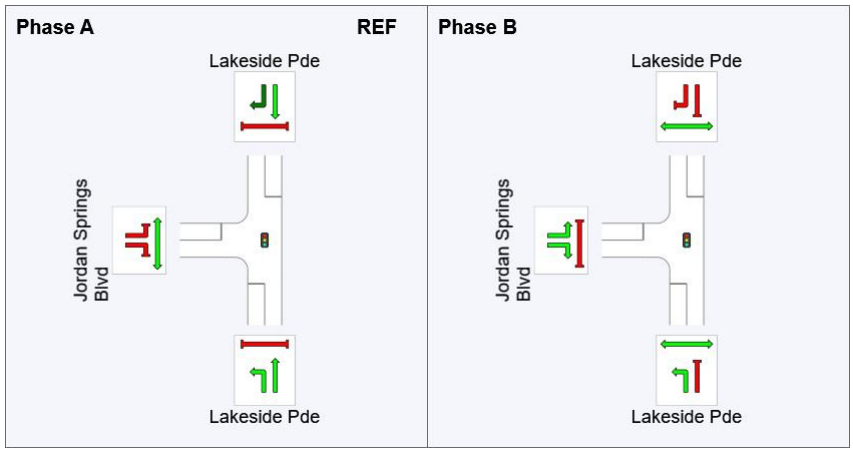
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing WO 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	38
Green Time (sec)	32	56
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	38	62
Phase Split	38%	62%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing with 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Pde													
Lane 1	782	0.3	1575	0.497	100	5.7	LOS A	5.9	41.2	Full	240	0.0	0.0
Lane 2	137	0.0	1287	0.106	100	6.5	LOS A	2.4	16.7	Short	40	0.0	NA
Approach	919	0.3		0.497		5.8	LOS A	5.9	41.2				
North: Lakeside Pde													
Lane 1	59	1.3	1276	0.046	100	6.2	LOS A	1.0	7.0	Full	160	0.0	0.0
Lane 2	204	1.1	308	0.662	100	23.0	LOS C	7.5	53.0	Short	35	0.0	NA
Approach	263	1.2		0.662		19.2	LOS B	7.5	53.0				
West: Jordan Springs Blvd													
Lane 1	135	5.0	341	0.396	100	43.6	LOS D	5.9	43.0	Short	100	0.0	NA
Lane 2	225	1.9	348	0.646	100	46.1	LOS D	10.4	74.2	Full	130	0.0	0.0
Approach	360	3.0		0.646		45.2	LOS D	10.4	74.2				
Intersection	1542	1.1		0.662		17.3	LOS B	10.4	74.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

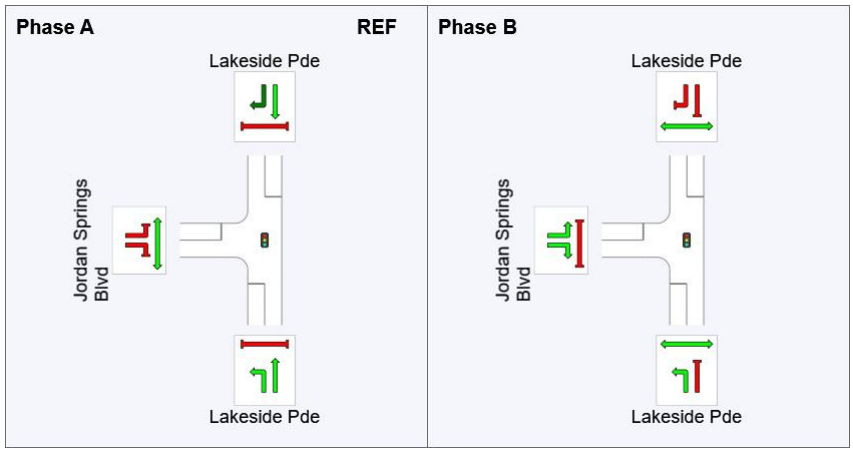
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-AM - 2021 - Existing with 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	72
Green Time (sec)	66	22
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	72	28
Phase Split	72%	28%



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LANE SUMMARY

Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing with 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Pde													
Lane 1	332	0.3	1575	0.211	100	5.3	LOS A	1.8	12.6	Full	240	0.0	0.0
Lane 2	50	0.0	585	0.085	100	26.9	LOS C	1.7	12.2	Short	40	0.0	NA
Approach	382	0.3		0.211		8.2	LOS A	1.8	12.6				
North: Lakeside Pde													
Lane 1	226	1.3	570[1]	0.397	100	30.0	LOS C	8.8	62.1	Full	160	0.0	0.0
Lane 2	240	1.1	249[1]	0.965	100	94.5	LOS F	18.5	130.9	Short	35	0.0	NA
Approach	466	1.2		0.965		63.2	LOS E	18.5	130.9				
West: Jordan Springs Blvd													
Lane 1	322	5.0	987	0.326	100	17.7	LOS B	8.5	62.2	Short	100	0.0	NA
Lane 2	837	1.9	884[1]	0.946	100	57.9	LOS E	53.0	377.0	Full	130	0.0	100.0
Approach	1159	2.7		0.946		46.7	LOS D	53.0	377.0				
Intersection	2007	1.9		0.965		43.2	LOS D	53.0	377.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

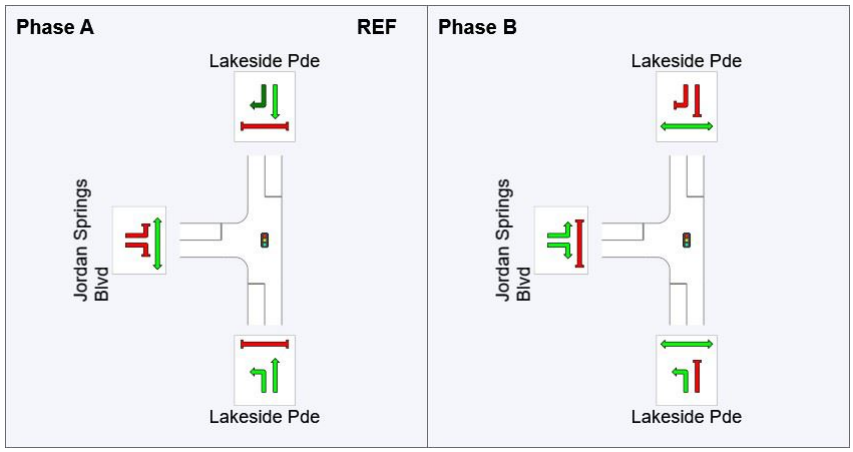
Site: 101 [I-28JordanSpringsBlvd-LakesideParade-PM - 2021 - Existing with 4A 4B]

Jordan Springs Blvd-Lakeside Parade
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Movement Class: All Movement Classes
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Reference Phase	Yes	No
Phase Change Time (sec)	0	36
Green Time (sec)	30	58
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	36	64
Phase Split	36%	64%



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APPENDIX D

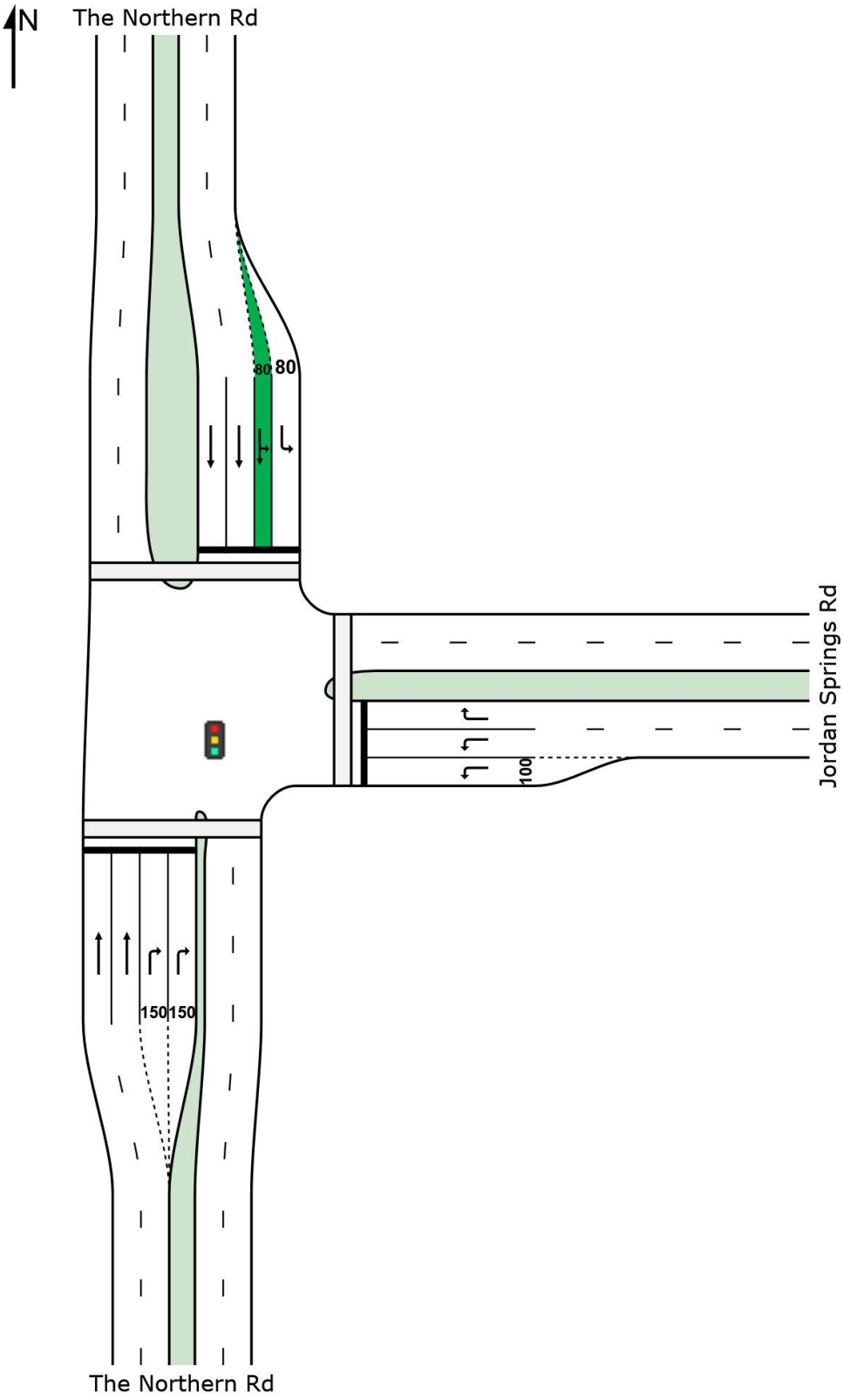
SIDRA OUTPUT – THE NORTHERN ROAD/JORDAN SPRINGS BOULEVARDE

Intersection performance summary of trips generated by Jordan Springs and Jordan Springs East precinct

SITE LAYOUT

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - WO4a4b]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - WO4a4b]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	458	7.9	1377	0.332	100	4.9	LOS A	7.8	58.6	Full	300	0.0	0.0
Lane 2	458	7.9	1377	0.332	100	4.9	LOS A	7.8	58.6	Full	300	0.0	0.0
Lane 3	227	4.6	343	0.663	100	50.3	LOS D	11.1	80.9	Short	150	0.0	NA
Lane 4	227	4.6	343	0.663	100	50.3	LOS D	11.1	80.9	Short	150	0.0	NA
Approach	1369	6.8		0.663		19.9	LOS B	11.1	80.9				
East: Jordan Springs Rd													
Lane 1	440	1.5	735	0.598	100	31.3	LOS C	17.7	125.8	Short	100	0.0	NA
Lane 2	440	1.5	735	0.598	100	31.3	LOS C	17.7	125.8	Full	151	0.0	0.0
Lane 3	155	3.1	242	0.640	100	53.1	LOS D	7.9	56.6	Full	151	0.0	0.0
Approach	1034	1.8		0.640		34.6	LOS C	17.7	125.8				
North: The Northern Rd													
Lane 1	109	10.8	821	0.133	100	22.8	LOS B	3.1	23.6	Short	80	0.0	NA
Lane 2	4	0.0	2858	0.001	100	18.9	LOS B	0.1	0.3	Short	80	0.0	NA
Lane 3	623	4.8	954[1]	0.653	100	20.5	LOS B	23.4	170.4	Full	500	0.0	0.0
Lane 4	623	4.8	955	0.653	100	20.5	LOS B	23.4	170.5	Full	500	0.0	0.0
Approach	1359	5.3		0.653		20.7	LOS B	23.4	170.5				
Intersection	3762	4.9		0.663		24.2	LOS B	23.4	170.5				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

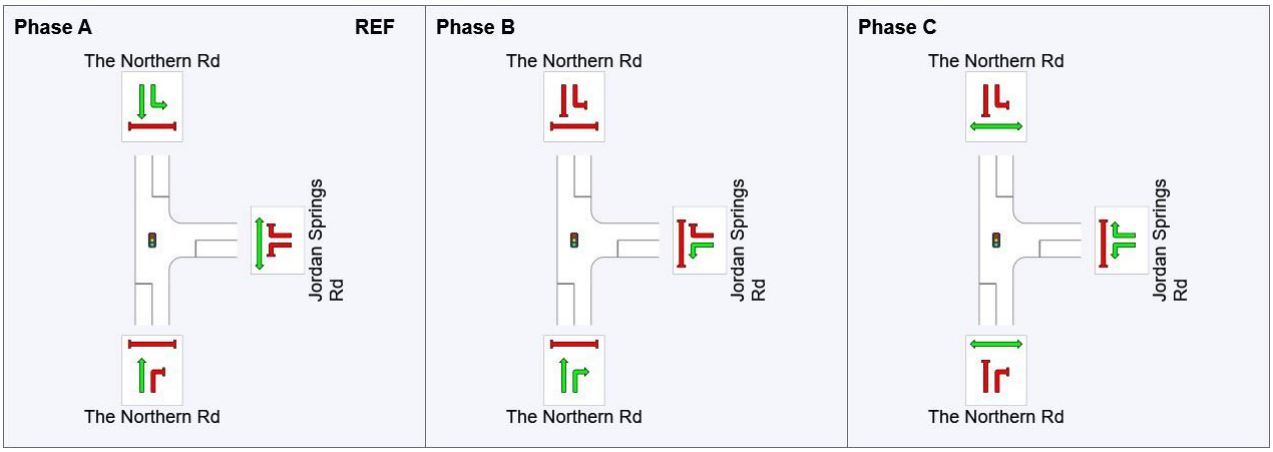
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - WO4a4b]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	58	83
Green Time (sec)	53	20	17
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	58	25	22
Phase Split	55%	24%	21%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - WO4a4b]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 2	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 3	613	0.2	709	0.864	100	46.2	LOS D	32.4	227.0	Short	150	0.0	NA
Lane 4	613	0.2	709	0.864	100	46.2	LOS D	32.4	227.0	Short	150	0.0	NA
Approach	2207	1.5		0.864		27.6	LOS B	32.4	227.0				
East: Jordan Springs Rd													
Lane 1	315	1.1	1066	0.295	100	16.2	LOS B	7.9	55.5	Short	100	0.0	NA
Lane 2	315	1.1	1066	0.295	100	16.2	LOS B	7.9	55.5	Full	151	0.0	0.0
Lane 3	125	6.0	210	0.597	100	52.8	LOS D	6.2	45.6	Full	151	0.0	0.0
Approach	755	1.9		0.597		22.2	LOS B	7.9	55.5				
North: The Northern Rd													
Lane 1	269	4.8	528	0.509	100	38.9	LOS C	11.2	81.6	Short	80	0.0	NA
Lane 2	5	0.0	1760	0.003	100	30.5	LOS C	0.2	0.5	Short	80	0.0	NA
Lane 3	545	3.3	617[1]	0.883	100	46.5	LOS D	30.5	219.6	Full	500	0.0	0.0
Lane 4	545	3.3	618	0.883	100	46.5	LOS D	30.5	219.8	Full	500	0.0	0.0
Approach	1364	3.6		0.883		44.9	LOS D	30.5	219.8				
Intersection	4326	2.2		0.883		32.1	LOS C	32.4	227.0				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

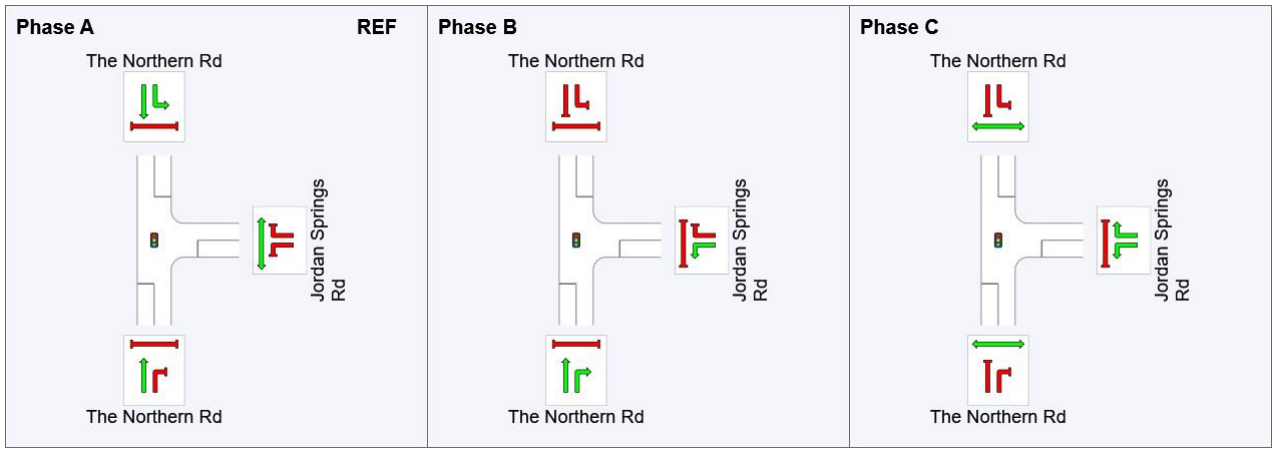
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - WO4a4b]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	38	82
Green Time (sec)	33	39	15
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	38	44	20
Phase Split	37%	43%	20%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - With 4A 4B]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 2	491	3.0	1444	0.340	100	4.3	LOS A	7.9	56.7	Full	300	0.0	0.0
Lane 3	650	0.2	727	0.894	100	50.9	LOS D	37.0	259.2	Short	150	0.0	NA
Lane 4	650	0.2	727	0.894	100	50.9	LOS D	37.0	259.2	Short	150	0.0	NA
Approach	2282	1.4		0.894		30.9	LOS C	37.0	259.2				
East: Jordan Springs Rd													
Lane 1	325	1.1	1084	0.299	100	15.7	LOS B	8.0	56.2	Short	100	0.0	NA
Lane 2	325	1.1	1084	0.299	100	15.7	LOS B	8.0	56.2	Full	151	0.0	0.0
Lane 3	131	6.0	210	0.625	100	53.2	LOS D	6.5	48.2	Full	151	0.0	0.0
Approach	780	1.9		0.625		22.0	LOS B	8.0	56.2				
North: The Northern Rd													
Lane 1	301	4.8	511	0.590	100	40.6	LOS C	13.0	94.9	Short	80	0.0	NA
Lane 2	6	0.0	1700	0.003	100	31.4	LOS C	0.2	0.5	Short	80	0.0	NA
Lane 3	545	3.3	598[1]	0.911	100	53.0	LOS D	32.8	236.3	Full	500	0.0	0.0
Lane 4	545	3.3	599	0.911	100	53.0	LOS D	32.9	236.6	Full	500	0.0	0.0
Approach	1397	3.6		0.911		50.2	LOS D	32.9	236.6				
Intersection	4459	2.2		0.911		35.4	LOS C	37.0	259.2				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

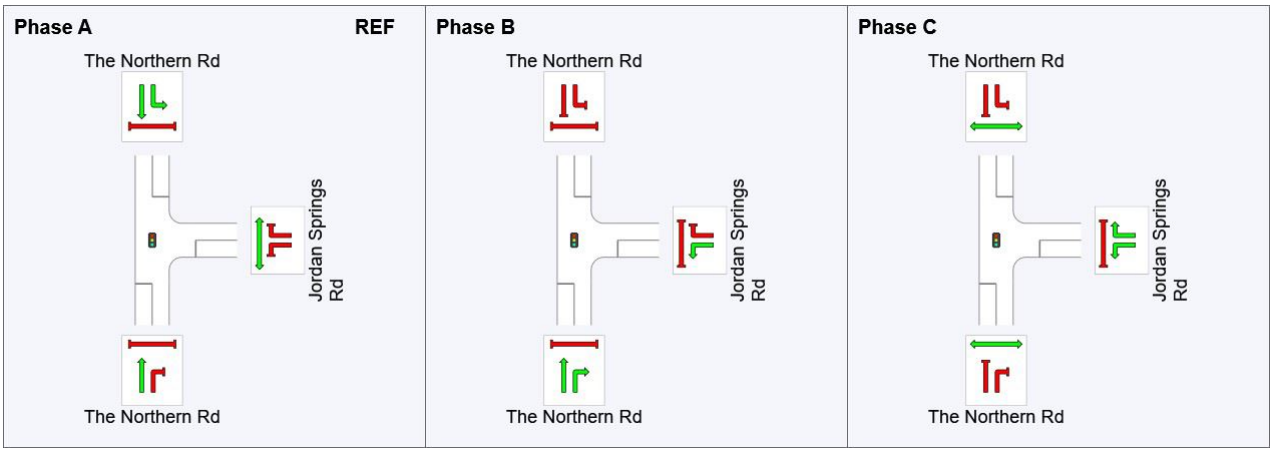
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-pm - 2021 - With 4A 4B]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 102 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	37	82
Green Time (sec)	32	40	15
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	37	45	20
Phase Split	36%	44%	20%



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LANE SUMMARY

Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - With 4A 4B]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: The Northern Rd													
Lane 1	458	7.9	1360	0.336	100	5.2	LOS A	8.1	60.8	Full	300	0.0	0.0
Lane 2	458	7.9	1360	0.336	100	5.2	LOS A	8.1	60.8	Full	300	0.0	0.0
Lane 3	234	4.6	360	0.651	100	49.2	LOS D	11.3	82.3	Short	150	0.0	NA
Lane 4	234	4.6	360	0.651	100	49.2	LOS D	11.3	82.3	Short	150	0.0	NA
Approach	1383	6.8		0.651		20.1	LOS B	11.3	82.3				
East: Jordan Springs Rd													
Lane 1	471	1.5	770	0.612	100	30.2	LOS C	18.8	133.4	Short	100	0.0	NA
Lane 2	471	1.5	770	0.612	100	30.2	LOS C	18.8	133.4	Full	151	0.0	0.0
Lane 3	173	3.1	260	0.667	100	52.8	LOS D	8.8	63.3	Full	151	0.0	0.0
Approach	1115	1.8		0.667		33.7	LOS C	18.8	133.4				
North: The Northern Rd													
Lane 1	116	10.8	788	0.147	100	24.2	LOS B	3.4	26.1	Short	80	0.0	NA
Lane 2	4	0.0	2742	0.002	100	20.0	LOS B	0.1	0.3	Short	80	0.0	NA
Lane 3	623	4.8	918[1]	0.678	100	22.1	LOS B	24.3	177.1	Full	500	0.0	0.0
Lane 4	623	4.8	919	0.678	100	22.1	LOS B	24.3	177.3	Full	500	0.0	0.0
Approach	1366	5.3		0.678		22.3	LOS B	24.3	177.3				
Intersection	3864	4.8		0.678		24.8	LOS B	24.3	177.3				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

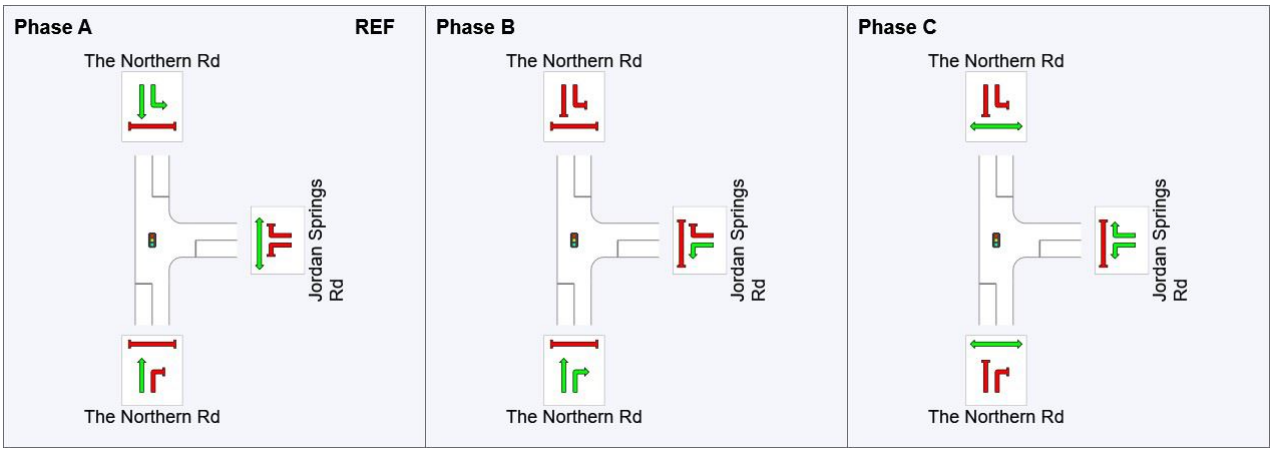
Site: 1 [I-05TheNorthernRd-JordanSpringsBlvd-am - 2021 - With 4A 4B]

The Northern Rd/Jordan Springs Blvd
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: TCS 4396
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	56	82
Green Time (sec)	51	21	18
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	56	26	23
Phase Split	53%	25%	22%



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APPENDIX E

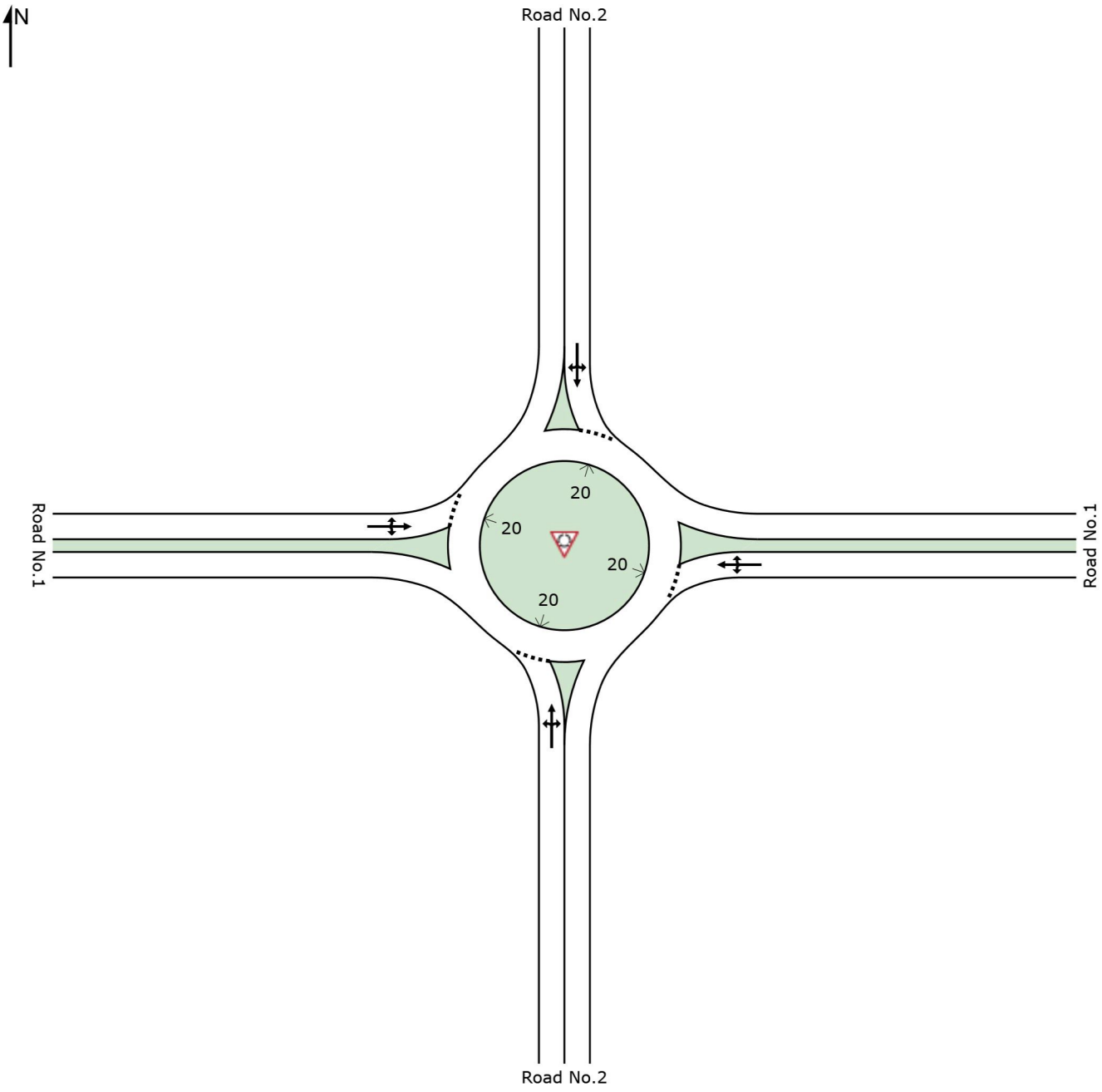
SIDRA OUTPUT – INTERSECTION OF ROAD NO.1 AND ROAD NO.2 IN JORDAN SPRINGS EAST

Intersection performance summary of trips generated by Jordan Springs East precinct

SITE LAYOUT

Site: I-Int_2 [AM_Road No.1, No.2]

Intersection of Road No.1, No.2
Roundabout



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LANE SUMMARY

Site: I-Int_2 [AM_Road No.1, No.2]

Intersection of Road No.1, No.2
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Road No.2													
Lane 1[d]	414	3.0	1220	0.339	100	4.9	LOS A	2.2	15.7	Full	500	0.0	0.0
Approach	414	3.0		0.339		4.9	LOS A	2.2	15.7				
East: Road No.1													
Lane 1[d]	3	3.0	1076	0.003	100	6.6	LOS A	0.0	0.1	Full	180	0.0	0.0
Approach	3	3.0		0.003		6.6	LOS A	0.0	0.1				
North: Road No.2													
Lane 1[d]	157	3.0	1245	0.126	100	9.1	LOS A	0.6	4.5	Full	110	0.0	0.0
Approach	157	3.0		0.126		9.1	LOS A	0.6	4.5				
West: Road No.1													
Lane 1[d]	143	3.0	1635	0.087	100	7.3	LOS A	0.5	3.3	Full	420	0.0	0.0
Approach	143	3.0		0.087		7.3	LOS A	0.5	3.3				
Intersection	717	3.0		0.339		6.3	LOS A	2.2	15.7				

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

d Dominant lane on roundabout approach

LANE SUMMARY

Site: I-Int_2 [PM_Road No.1, No.2]

Intersection of Road No.1, No.2
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Road No.2													
Lane 1[d]	134	3.0	1336	0.100	100	4.2	LOS A	0.6	4.0	Full	500	0.0	0.0
Approach	134	3.0		0.100		4.2	LOS A	0.6	4.0				
East: Road No.1													
Lane 1[d]	3	3.0	859	0.003	100	8.4	LOS A	0.0	0.1	Full	180	0.0	0.0
Approach	3	3.0		0.003		8.4	LOS A	0.0	0.1				
North: Road No.2													
Lane 1[d]	51	3.0	891	0.057	100	11.3	LOS A	0.3	2.1	Full	110	0.0	0.0
Approach	51	3.0		0.057		11.3	LOS A	0.3	2.1				
West: Road No.1													
Lane 1[d]	724	3.0	1696	0.427	100	7.4	LOS A	3.2	23.1	Full	420	0.0	0.0
Approach	724	3.0		0.427		7.4	LOS A	3.2	23.1				
Intersection	912	3.0		0.427		7.1	LOS A	3.2	23.1				

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

d Dominant lane on roundabout approach