

6.2.2 Mulcahy Road, Pakenham - Road Closure

Responsible GM: Peter Benazic
Report Authors Roland Rozario, David Fice

Recommendation(s)

That Council:

2. Resolve to acknowledge the consultation process that has been undertaken for the Proposed Mulcahy Road Road Closure
3. Resolve to proceed to close Mulcahy Road, Pakenham between Thewlis Road and Moritz Street in accordance with clause 9 schedule 11 of the Local Government Act, 1989, (the Act),
4. Resolve to proceed, in accordance with clause 3 of Schedule 10 to the Local Government Act, 1989 to discontinue the section of Mulcahy Road, adjoining the Pakenham Cemetery, in order that the Department of Energy Environment and Climate Action (DEECA) formerly Department of Environment Land Water and Planning (DELWP) can include this parcel of crown land under the management of the Pakenham Cemetery Trust.

Attachments

1. Permanent closure of Mulcahy Road Pakenham - reply to Council [6.2.2.1 - 1 page]
2. Mulcahy Road Pakenham_-_ Road__ Sept 2022 Council Report [6.2.2.2 - 12 pages]
3. 220269 Mulcahy Road Pakenham TI A 230821 [6.2.2.3 - 53 pages]

Executive Summary

At the September 2022 Council meeting, Council resolved to commence the process into closing Mulcahy Road, between Thewlis Road and Moritz Street in accordance with Clause 9 Schedule 11 of the Local Government Act, 1989, (the Act).

As per the Report put to the September 2022 Council Meeting (See Attachment), Mulcahy Road, Pakenham, runs from Thewlis Road, east past Purton Road. The road is located on Department of Environment, Land, Water and Planning land (now called DEECA). Some parts have kerb and channel and sealed pavement whilst other sections are totally unconstructed.

The western end of Mulcahy Road, Thewlis Road to Moritz Street, is currently blocked to motor traffic. This was done as a temporary arrangement by the developer of the Mount Pleasant Estate, which includes Moritz Street and Mammoth Court. As this developer has nearly completed works associated with the development Council must either open Up Mulcahy Road or instigate a formal closure. Note: the developer has already completed constructing the road between Moritz Street and Pointer Drive. No road pavement is proposed west of Moritz Street.

The closure of Mulcahy Road at Thewlis Road is proposed as the designated, unsignalised intersection treatment (i.e. roundabout) as shown within the Cardinia Road Precinct Structure Plan is not able to be achieved. The roundabout was investigated and would have required land acquisition from the adjacent cemetery, most probably including relocation of graves, and was thus not deemed reasonable. This was reviewed and confirmed a number of years ago, and developments in the area have proceeded on this basis with alternate access being provided through the adjacent developments (existing and future).

The Cardinia Road Precinct Structure Plan also shows the road priority at the intersection as a local arterial road connection from Thewlis Road (southern approach), to Kenneth Road (western approach). This will still be able to be maintained with a developer delivered alternative intersection treatment and the proposed Mulcahy Road road closure in place.

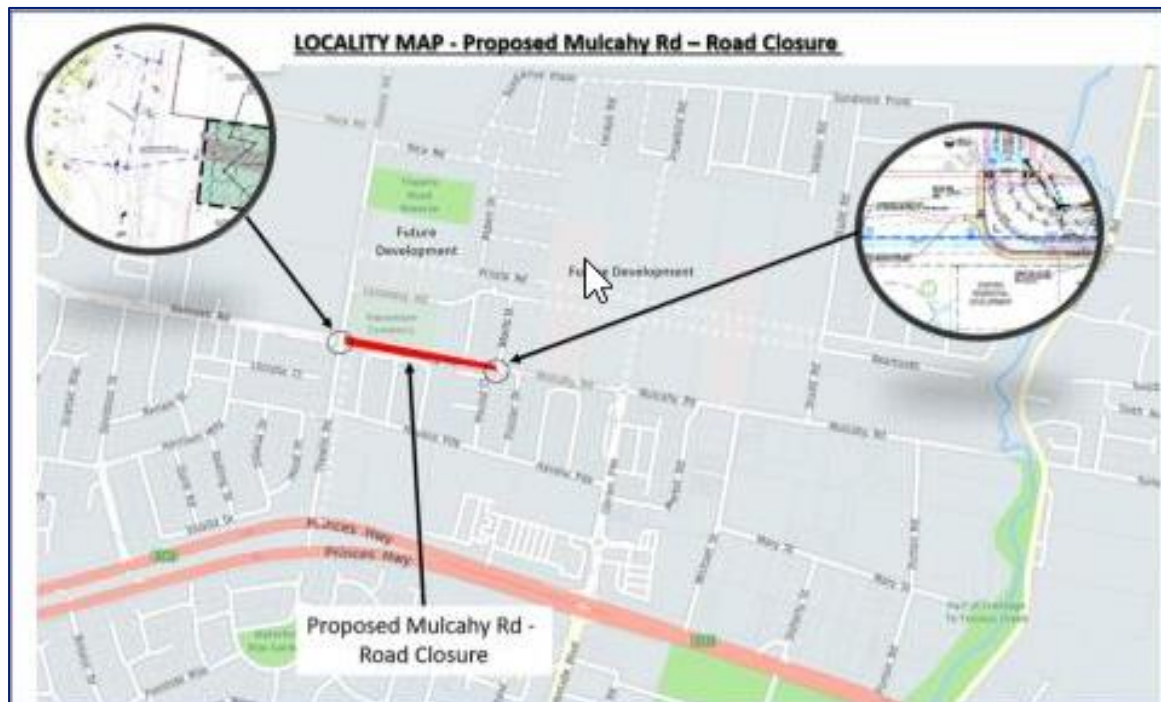
The Pakenham Cemetery has expressed interest in acquiring a portion of the Mulcahy Road, road reserve. This will require a discontinuance in accordance with Clause 3, Schedule 10 of the Local Government Act, 1989 (the Act)

Background

Detailed below is the process that was followed to arrive at the recommendation.

- At the September 2022 Council meeting, Council resolved to commence the process into closing Mulcahy Road, between Thewlis Road and Moritz Street in accordance with Clause 9 Schedule 11 of the Local Government Act, 1989, (the Act). The September 2022 Council Report is attached.

Figure 1. Plan and aerial photo showing proposed Mulcahy Road closure

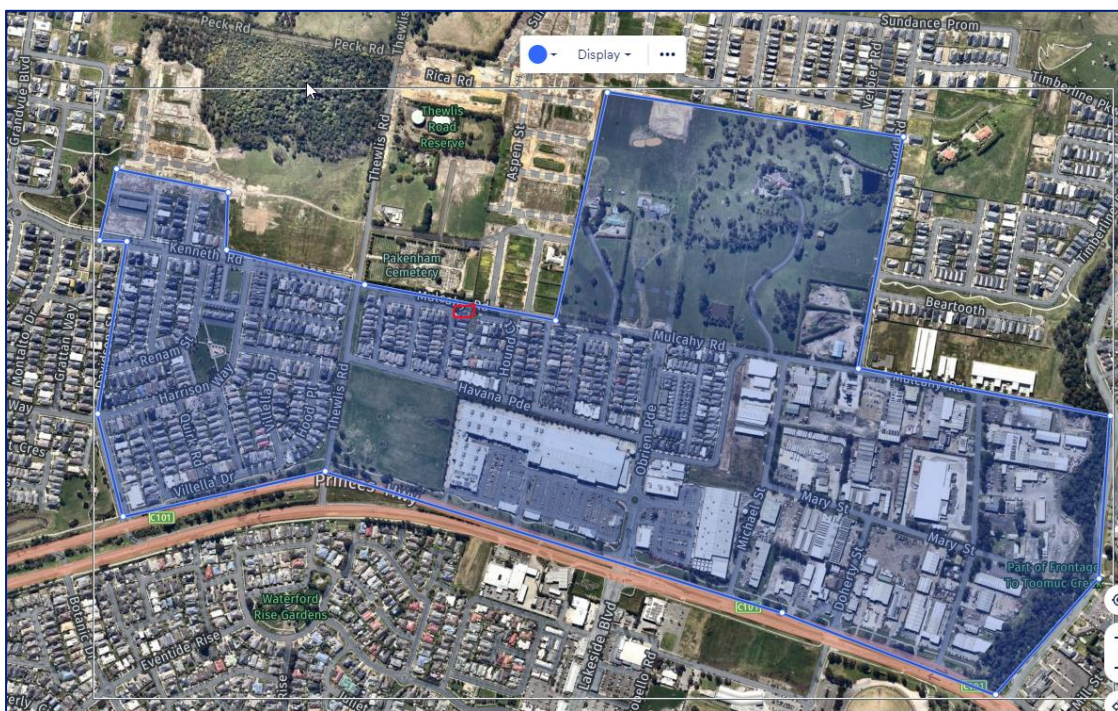




Following the September 2022 Council meeting,

- a letter was sent to Owners/Occupiers in the area highlighted below in Figure 2. in October 2022 advising of the proposed closure.

Figure 2. Aerial photo showing properties that received letter regarding propose Mulcahy Road closure



- In addition to the letter sent to Owners/Occupiers, letters were also sent to the following
 - Telstra
 - Optus
 - NBN
 - South East Water
 - Ausnet
 - APA Group

- Victoria Police
 - CFA
 - Ambulance Vic
 - DELWP (now Department of Energy Environment and Climate Action- DEECA)
 - Cemetery Trust
 - 'Head of Transport Victoria' requesting a Report on the proposed closure as per the Local Government Act
- A Traffic Impact Assessment (report attached for further information) of the proposed road network alterations for Mulcahy Road was undertaken by consultant (Traffic Works). The assessment determined:
 - 'based on the indicative traffic volumes within the PSP, the anticipated traffic volumes utilising the Mulcahy Road leg from the Mulcahy Road / Thewlis Road /Kenneth Road intersection have been redistributed along the surrounding road network. SIDRA analysis reveals that the surrounding intersections will operate under practical capacity during both the AM and PM Peak period with the proposed Mulcahy Road closure between Thewlis Road and Moritz Street in the ultimate condition's layout configurations'.
 - Future east west access from Thewlis Road will also be provided north of the cemetery as part of future residential developments via an extension of Prizzle Road. This access will link with Studd Road which intersects Mulcahy Road to the east in the industrial area.
 - Bus Routes/access will not be impacted as alternative east west access will be provided in the area north of Mulcahy Road.
 - A letter was hand delivered to a property in Botham Crescent, requesting the use of Mulcahy Road cease for vehicle access to that property which does not have access off Mulcahy Road, no response was received from this property owner.
 - A Drop In Session was held on Wednesday 2nd November, 2022 at the Civic Centre to give residents and business owners the opportunity to discuss the proposed closure and ask questions. One resident attended this session. She had no concerns with the proposed road closure.
 - Telstra, South East Water, Ausnet and DELWP sent acknowledgements confirming that they received our letter but did not send any follow up letter. Accordingly, it is taken that there is no objection to the proposed road closure these authorities and the other authorities who did not respond.
 - A letter has been received from 'The Head of Transport Victoria' (Department of Transport and Planning) advising that their office has no objection to the proposed permanent closure of Mulcahy Road. See attachment.
 - As part of the developer delivered modified T intersection, landscape plans have been approved for landscape treatments east of the intersection within the Mulcahy Road reserve. If these require further changes or if any other works were going to occur along the discontinued section of Mulcahy Road, it will need to be delivered and funded by Council.

Further investigation and discussions are required with the Department of Health Human Services (Pakenham Cemetery Trust) into the exact size of the parcel of land they are seeking to acquire. The

use of a licensed surveyor and a title search is also recommended in determining the exact dimensions of the parcel of land (road reserve) to be discontinued.

The width of this parcel of land is yet to be established but would be dependent on

- the slope of the land
- underground services
- existing trees and vegetation, i.e., what can be lost/removed or should be retained?
- amenity of the shared path, i.e., would landscaping be required on either side of shared path?
- stormwater drainage and overland flow and how these would be managed.
- future upgrade of the Kenneth/Thewlis intersection.

Policy Implications

There are no policy implications.

Relevance to Council Plan

2.1 We support the creation of liveable spaces and places

2.1.1 Advocate, plan for and deliver accessible community infrastructure and services that address community need.

2.1.2 Plan and maintain safe, inclusive and connected open spaces, places and active travel routes.

2.1 We support the creation of liveable spaces and places

2.1.1 Advocate, plan for and deliver accessible community infrastructure and services that address community need.

2.1.5 Upgrade Council's road network to improve safety and connectivity while considering traffic demand and freight transport needs.

Climate Emergency Consideration

This proposal has no impact on Climate Emergency.

Consultation/Communication

Council's Communications Team prepared the Engagement and Communications Plan for the consultation. As there were no objections to the proposed road closure, it is proposed that only properties abutting the closure will be notified at the time when the physical road closure works are to occur.

Financial and Resource Implications

Costs for the closure of western end of Mulcahy Road are outlined in Table 1.

Table 1. Thewlis Road to Moritz Street closure

Proposed works	Cost
Construction of physical barriers such as bollards to prevent access to motor vehicles, 40 round, dome top timber bollards 1800 long (to be installed 600mm in ground)	\$8,000
Landscaping including tree planting	\$11,000
Supply and installation of signs	\$1,000
Total cost	\$20,000

This \$20,000 can be funded through the Council's Annual Traffic Management Devices Capital Works Budget which is \$297,138 for 2023/24.

Conclusion

There were no submissions regarding the proposed closure of Mulcahy Road to motorised traffic.

As the existing temporary closure, at the western end of Mulcahy Road, needs to be formalised, this road closure should now proceed as there were no objections received from the 'Head of Transport Victoria' (Department of Transport and Planning) or any other authority.

Council can then also investigate discontinuing a section of land along the cemetery southern boundary as the cemetery would like to incorporate a part of the adjacent road reserve.



Department of Transport and Planning

Ref: [Registration Number]

Mr Roland Rozario
Coordinator Community Infrastructure
Cardinia Shire Council
P O Box 7
Pakenham VIC 3810
R.Rozario@cardinia.vic.gov.au

Dear Mr Rozario

PROPOSED PERMANENT CLOSURE OF MULCAHY ROAD BETWEEN THEWLIS ROAD AND MORITZ STREET, PAKENHAM

Thank you for your letter of 2 December 2022 requesting our office consider Council's proposal to permanently close Mulcahy Road between Thewlis Road and Moritz Street in Pakenham. It is understood that:

- Mulcahy Road is classified as a local road under the care and management of Cardinia Shire Council.
- Based on Council observations, displaced traffic and property access has been accommodated safely and within the capacity of the surrounding local road network.
- The permanent closure is not expected to cause long-term or significant impact to the movement of people or goods through the area, including along nearby roads. Furthermore, it is noted that public transport services do not operate along Mulcahy Road.
- Your office has undertaken an appropriate level of community engagement including via Public Notice published in Pakenham Gazette on 19 October 2022, - drop to local resident and businesses, and accommodated the needs of affected stakeholders, including landowners, and emergency services.

Considering the above, our office has no objection to the proposed permanent closure of Mulcahy Road. Should you have any queries, Mr James Fernando, Traffic Officer (Tel: 9881 8997), would be pleased to assist.

Yours sincerely

A handwritten signature in blue ink that reads "Niloo Karimi".

NILOO KARIMI
Acting Executive Director – Greater Metro Region

04 /08 /2023





6.2.9 Mulcahy Road, Pakenham - Road Closure

Responsible GM: Peter Benazic
Author: Roland Rozario, David Fice

Recommendation(s)

That Council:

1. Resolve to commence the statutory procedures in accordance with clause 9 schedule 11 of the Local Government Act, 1989, (the Act) to close Mulcahy Road, Pakenham between Thewlis Road and Moritz Street, and
2. Resolve to commence the statutory procedures in accordance with clause 3 of Schedule 10 to the Local Government Act 1989 to discontinue the section of Mulcahy road adjoining the Pakenham Cemetery in order that the Department of Environment Land Water and Planning can include this parcel of crown land under the management of the Pakenham Cemetery Trust.
3. Resolve to appoint a Committee comprising of the Mayor and Deputy Mayor to hear any submissions, and the Chief Executive Officer be authorised to set the day, time and place for the hearing of such submissions.

Attachments

1. Mulcahy Road Overview and Engagement Strategy Timeline [6.2.9.1 - 2 pages]

Executive Summary

Mulcahy Road, Pakenham, runs from Thewlis Road, east past Purton Road. The road is located on Department of Environment, Land, Water and Planning (DELWP) land. Some parts have kerb and channel and sealed pavement whilst other sections are totally unconstructed.

The closure of Mulcahy Road at Thewlis Road is proposed as the designated, unsignalised intersection treatment (i.e. roundabout) as shown within the Cardinia Road Precinct Structure Plan is not able to be achieved. The roundabout was investigated and would have required land acquisition from the adjacent cemetery, most probably including relocation of graves, and was thus not deemed reasonable. This was reviewed and confirmed a number of years ago, and developments in the area have proceeded on this basis with alternate access being provided through the adjacent developments (existing and future).

The Cardinia Road Precinct Structure Plan also shows the road priority at the intersection as a local arterial road connection from Thewlis Road (southern approach), to Kenneth Road (western approach). This will still be able to be maintained with a developer delivered alternative intersection treatment and the proposed Mulcahy Road road closure in place.

Council must either open up Mulcahy Road to motor traffic or instigate a permanent closure at this location.

Motorists wishing to enter the Mt Pleasant estate will be able to do so via Havana Parade and Pointer Drive. The Pakenham Cemetery abuts the northern side of Mulcahy Road from Thewlis Road to Mammoth Court.



In order to close Mulcahy Road at Thewlis Road, Council must resolve to do so in accordance with Clause 9 Schedule 11 of the Local Government Act, 1989, (the Act).

The Pakenham Cemetery has expressed interest in acquiring a portion of the Mulcahy Road, road reserve. This will require a discontinuance in accordance with Clause 3, Schedule 10 of the Local Government Act, 1989 (the Act)

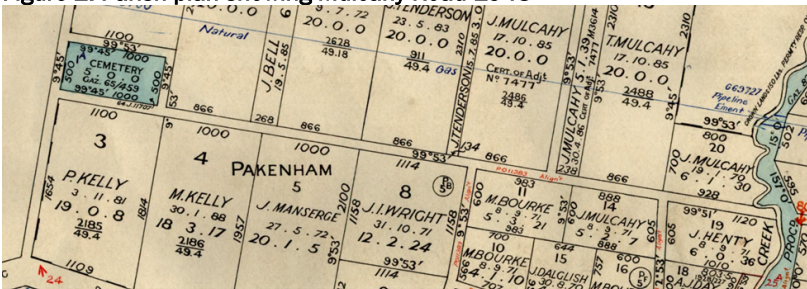
Background

Mulcahy Road, Pakenham runs from Thewlis Road east past Purton Road. It is located on Department of Environment, Land Water and Planning (DELWP) land, see Figures 1 and 2.

Figure 1. Aerial photo of Mulcahy Rd



Figure 2. Parish plan showing Mulcahy Road 1948



Most of the eastern part of Mulcahy Road has kerb and channel on both sides of the road and underground drainage (this excludes the very eastern section near Toomuc Creek). There is no formal footpath in Mulcahy Road between Purton Road and Studd Road, see Figure 3. A gravel path exists along the southern boundary of Mulcahy Road between Merlot Street and Studd Road. A concrete path has been provided along the southern boundary of Mulcahy Rd between O'Brien Parade and Merlot Street where residential properties front Mulcahy Road.

Figure 3. Mulcahy Road looking east near Studd Road





The western end of Mulcahy Road, Thewlis Road to Moritz Street, is currently blocked to motor traffic. This was done as a temporary arrangement by the developer of the Mount Pleasant Estate, which includes Moritz Street and Mammoth Court. See Figure 4. As this developer has nearly completed works associated with the development Council must either open Up Mulcahy Road or instigate a formal closure. Note the developer has already commenced constructing the road between Moritz Street and Pointer Drive. No road pavement is proposed west of Moritz Street.

The formal closure of Mulcahy Road at Thewlis Road is proposed as the designated, unsignalised intersection treatment (i.e. roundabout) as shown within the Cardinia Road Precinct Structure Plan is not able to be achieved. The roundabout was investigated and would have required land acquisition from the adjacent cemetery, most probably including relocation of graves, and was thus not deemed reasonable. This was reviewed and confirmed a number of years ago, and developments in the area have proceeded on this basis with alternate access being provided through the adjacent developments (existing and future).

Although Mulcahy Road was shown in the Precinct Structure Plan as providing a connection to Thewlis Road, it is not considered necessary as alternative east-west access to Thewlis Road will be provided.

Currently Havanna Parade provides access from Thewlis Road through to O' Brien Parade, immediately south of Mulcahy Road. The intersection of O'Brien Parade and Princes Highway is also signalised.

Future east west access from Thewlis Road will also be provided north of the cemetery as part of future residential developments via an extension of Prizzle Road. This access will link with Studd Road which intersects Mulcahy Road to the east in the industrial area.

The intersection of Thewlis Road and Princes Highway will also be signalised in the future to provide for enhanced safety for vehicles entering and exiting the highway from Thewlis Road.

If Mulcahy Road is not closed to motor traffic then the intersection of Thewlis Road, Kenneth Road and Mulcahy Road would require redesign and reconstruction.

One possible option is signalisation of this intersection.

This would present the following issues to Council:

- Signalisation of the intersection would cost approximately \$750,000 to \$1 M depending on services, alignment etc.
- The design of Kenneth Road is such that alignment of traffic lanes with current road space i.e. the alignment of the traffic lanes are likely to be impacted by the cemetery therefore it is likely traffic signals would need to occupy the same construction footprint as a roundabout.
- The modified T intersection of Thewlis Rd and Kenneth Rd is being developer delivered based on approved plans. Any modifications to this design, or redesign to signalise the intersection would be at Councils cost.
- Any signalisation of an intersection requires approval from the Department of Transport (DoT) with DoT unlikely to support signals at a local intersection.
- Traffic Signals would be out of character with the area.
- Ongoing maintenance costs may come back to Council if the DoT does not support traffic signals.

Given the above, Traffic signals are not supported.

Another option would be to include Mulcahy Road in the Modified T intersection. Possibly with a 'Left In' and 'Left out' arrangement, however this is not recommended on safety grounds.

The 'modified T' is designed to accommodate the priority traffic movements from Thewlis Road to Kenneth Road as per the intent of the Cardinia Road Precinct Structure Plan. Given this forms part of the local arterial road network, which is designed to carry traffic volumes greater than 7000 vehicles per day, introducing additional vehicle conflicts within the intersection which are not appropriately controlled (E.g. via a roundabout or signalisation) poses serious safety risks and cannot be supported on safety grounds.

The current 'Modified T' intersection is considered the most appropriate treatment for this location and is to be developer funded.

Council must either open up Mulcahy Road to motor traffic or instigate a permanent closure at this location.

Figure 4. Intersection of Thewlis Road and Mulcahy Road showing current (temporary) road closure and Mulcahy Rd - looking east from Thewlis Rd



The developer of the Mount Pleasant estate will also be connecting (constructing) Moritz Street to Pointer Drive in the near future as works in this development site near completion, see Figure 5.

Figure 5. Mulcahy Road looking west to Moritz Street from Pointer Drive- soon to be constructed by developer



The developer of the Worthington Estate (west of Thewlis Road) will be constructing the modified T intersection of Kenneth Road and Thewlis Road in the near future. The new intersection will maintain road priority as per the Cardinia Road Precinct Structure Plan with a local arterial road connection from Thewlis Road (southern approach), to Kenneth Road (western approach). Motorists wanting to continue straight (north) along Thewlis Road will in effect have to make a right hand turn. This can be seen in Figure 7.

There are some services in Mulcahy Road particularly at the intersection with Thewlis Road, see Figure 6. The extent of underground services is being investigated as the owners of these services will require access for maintenance.

Figure 6. Services in Mulcahy Rd at Thewlis Rd



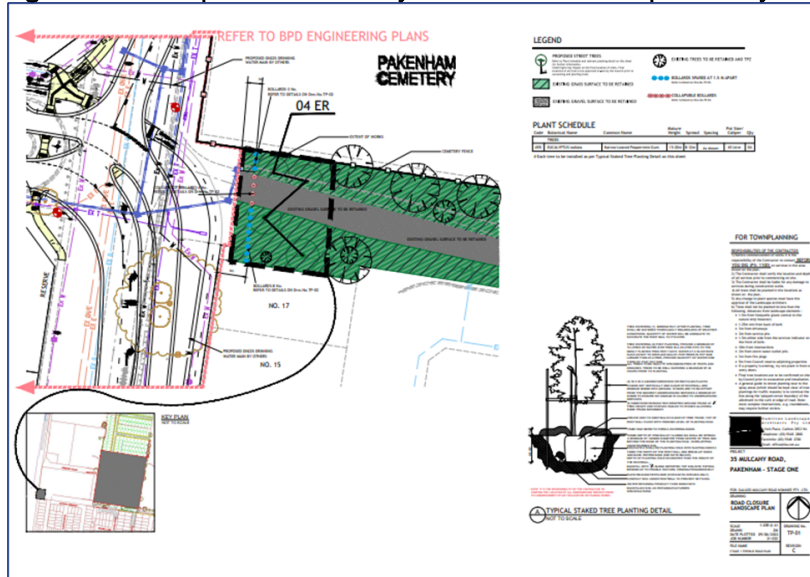
The Cemetery Committee of Management, which is the 'Department of Health and Human Services', has expressed some interest in acquiring or incorporating part of the road reserve adjacent to the cemetery. This will require a discontinuance. If this is deemed feasible and a portion of road is discontinued, the land vests in DELWP not Council. Therefore, DELWP will be dealing with the land transfer. The length of land to be discontinued is assumed to be the length of the Cemetery- believed to be 221.1 m (1100 links) but to be confirmed. The width is yet to be established but would be dependent on

- the slope of the land
- underground services
- existing trees and vegetation, i.e., what can be lost/removed or should be retained?
- amenity of the shared path, i.e., would landscaping be required on either side of shared path?
- stormwater drainage and overland flow and how these would be managed.
- future upgrade of the Kenneth/Thewlis intersection.

As part of the developer delivered modified T intersection, landscape plans have been approved for landscape treatments east of the intersection within the Mulcahy Road road reserve. If these require further changes or if any other works were going to occur along the discontinued section of Mulcahy Road, it would need to be delivered and funded by Council.

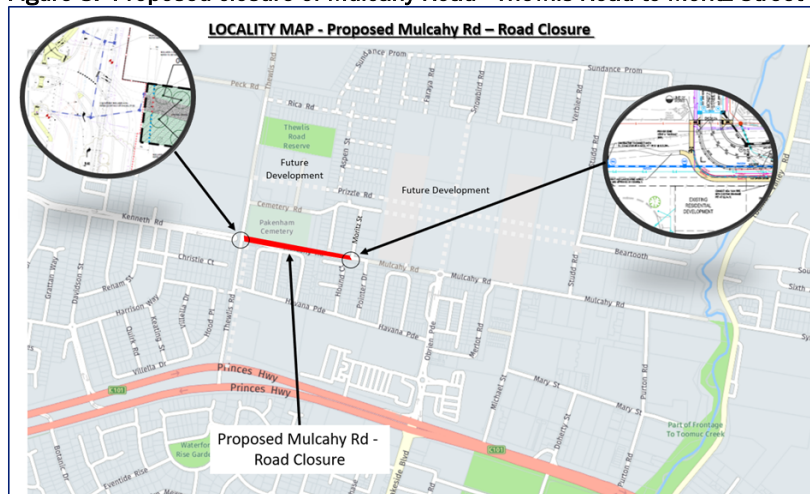


Figure 7. Landscape Plan for Mulcahy Road at Thewlis Road provided by Developer



Further investigation and discussions are required with the DHHS into the exact size of the parcel of land they are seeking to acquire. The use of a licensed surveyor and a title search is also recommended in determining the exact dimensions of the parcel of land (road reserve) to be discontinued.

Figure 8. Proposed closure of Mulcahy Road - Thewlis Road to Moritz Street



It appears that a property on Botham Crescent is using Mulcahy Road for additional vehicle access from the side boundary of their property. A strip of land actually separates this property from Mulcahy Road. A check with Statutory Planning has determined that while a building permit was obtained for the shed at the rear of the property, no approval has been provided



for vehicle access to this property from Mulcahy Road. Consultation will be required with this owner.

As the closure of the western end of Mulcahy Road is a permanent road obstruction, it must be completed in accordance with Clause 9, Schedule 11 of the Local Government Act, 1989 and requires a public notice to be published by Council under sections 207A and 223 of the Act.

The process Council has to take can be summarised in the following steps

1. resolve to commence the statutory procedures in accordance with Clause 9 Schedule 11 of the Local Government Act, 1989, (the Act) to close Mulcahy Road, Pakenham between Thewlis Road and Moritz Street, and
2. resolve to commence the statutory procedures in accordance with Clause 3 of Schedule 10 to the Local Government Act 1989 to discontinue the section of Mulcahy road adjoining the Pakenham Cemetery in order that the Department of Environment Land Water and Planning can include this parcel of crown land under the management of the Pakenham Cemetery Trust.
3. resolve to appoint a committee comprising of the Mayor and Deputy Mayor to hear any submissions, and the Chief Executive Officer be authorised to set the day, time and place for the hearing of such submissions.

Policy Implications

There are no Policy Implications.

Relevance to Council Plan

2.1 We support the creation of liveable spaces and places

2.1.1 Advocate, plan for and deliver accessible community infrastructure and services that address community need.

2.1.2 Plan and maintain safe, inclusive and connected open spaces, places and active travel routes.

2.1 We support the creation of liveable spaces and places

2.1.1 Advocate, plan for and deliver accessible community infrastructure and services that address community need.

2.1.5 Upgrade Council's road network to improve safety and connectivity while considering traffic demand and freight transport needs.

Climate Emergency Consideration

This proposal has no impact on Climate Emergency.

Consultation/Communication

A permanent road obstruction under clause 9, Schedule 11 of the Local Government Act, 1989, requires that under sections 207A and 223 that a person be given the opportunity to make a submission. This requires the issuing of a public notice and a minimum 28 days for submissions to be made following the issuing of the public notice. A person making a submission who wishes, may request to be heard in person at a meeting of Council, in this case a committee comprising the Mayor and Deputy Mayor should be appointed and the Chief



Executive Officer be authorised to set the day, time and place for the hearing of such submissions.

As Mulcahy Road is located on Department of Environment, Land, Water and Planning (DELWP) land, Council will have to liaise/consult with DELWP.

Consultation will be required with some property owners. While the community cannot change the need for the road closure, it can influence the appearance of the physical road closure.

Shortly after the Council meeting it is proposed that letters be sent to residents and other stakeholders advising of the proposed road closure. A 'drop in' session will also be organised at the the Council Civic Centre where residents and stakeholders can ask questions.

Emergency Services will also be contacted and asked for their support for the proposal. Emergency Services will be invited to the 'drop in' session.

The owner of 21 Botham Crescent appears to be using Mulcahy Road for vehicle access to their property. It is believed this was never approved as vehicle access to this property is provided off Botham Crescent, see Figure 9. Consultation will be required with this owner.

Consultation will also be required as part of the discontinuance process. Property owners directly south of the cemetery could have an interest in the discontinuance due to the proximity of their properties to the cemetery. Therefore, consultation with these owners is recommended.

Council's Communications Team has been asked to prepare an Engagement and Communications Plan. A community engagement strategy overview plan is attached to this report.

Financial and Resource Implications

Costs for the closure of western end of Mulcahy Road are outlined in Table 1.

T. Table 1. Thewlis Road to Moritz Street closure

Proposed works	Cost
Construction of physical barriers such as bollards to prevent access to motor vehicles, 40 round, dome top timber bollards 1800 long (to be installed 600mm in ground)	\$8,000
Landscaping including tree planting	\$11,000
Supply and installation of signs	\$1,000
Total cost	\$20,000

Conclusion

The western end of Mulcahy Road up to Moritz Street is not needed for the movement of motor traffic in this area. The existing temporary closure, at the western end of Mulcahy Road, needs to be formalised. To close this section of Mulcahy Road, Council must resolve to do so in accordance with Clause 9 Schedule 11 of the Local Government Act, 1989, (the Act). This will require consultation with DELWP who own the land, property owners and emergency services. As the cemetery would also like to incorporate a part of the adjacent road reserve, Council must resolve to discontinue a section of the road adjacent to the cemetery to facilitate this.

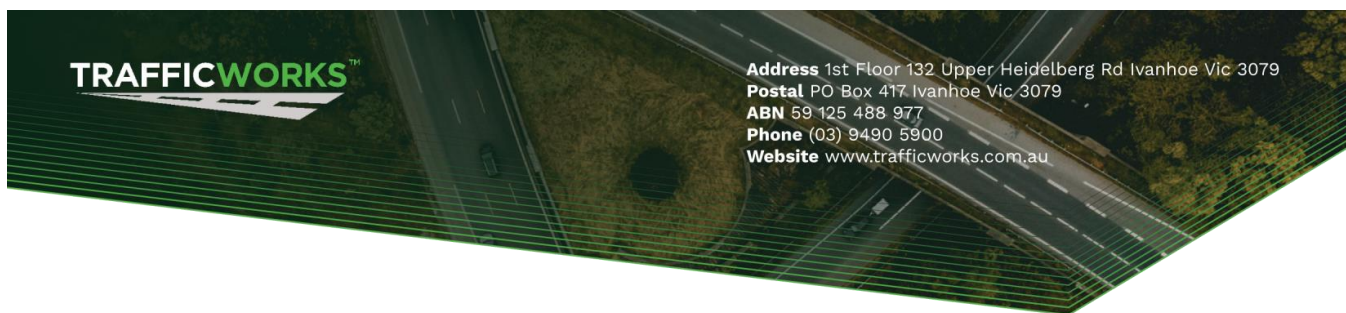


Overview - Engagement strategy & timeline

Each column is a separate stakeholder related action item (read table from top to bottom). Includes Engagement Stages, Phases, Objectives and Proposed Activities

ACTIVITY TYPE	ENGAGE	ENGAGE	ENGAGE	CONSIDER	ENGAGE	ENGAGE / DECIDE	ENGAGE
STAGE	Stage 1 Phase 1: Internal consultation	Stage 1 Phase 2: Internal consultation	Stage 1 Phase 3 Internal consultation		Stage 1: Phase 4: External consultation (public notice period)	Stage 1: Phase 5: Engagement report to Council	Stage 1: Phase 6 – external 'Close the Loop' with stakeholders / community (outcome or next steps)
LEVEL OF ENGAGEMENT	Consult	Consult	Consult	Consult	Consult	Inform	Inform
ACTIVITY DATE	May 2022	29 June 2022 and 24 August	5 September 2022 Council Briefing	Council Meeting date is 19 September 2022	Statutory Public notice period TBC if Council approves proposal *Drop in session date: TBC	Council Meeting Date TBC to consider written submissions	TBC
TARGET AUDIENCE	Relevant Council Departments about the project	SLT	Council	Council	Key affected residents / businesses / stakeholder groups General public / local community	SLT & Councillors	Key affected residents / businesses / stakeholder groups General public / local community
ENGAGEMENT PURPOSE	Raise awareness about the proposal Seek input about issues and impacts	<u>Raise awareness about the officers' proposal to seek formal closure of the western end of Mulcahy Rd and potentially discontinue a small portion near the Pakenham Cemetery. Seek input about issues and impacts.</u>	Briefing Raise awareness about the officers' proposal to seek formal closure of the west end of 2 sections of Mulcahy Rd and potentially discontinue a small portion near the Pakenham Cemetery. Seek input about issues and impacts	Council decision: consider officers' recommendation to endorse proposal for public exhibition of intention to close the western end of Mulcahy Rd and potentially discontinue a small portion of it.	Information session – provide information about the proposals and how to provide written submissions via <u>Creating Cardinia Have Your say page</u>	Close loop on submissions received	Close the loop
PERSON RESPONSIBLE	Roland Rozario	Roland Rozario	Roland Rozario	Roland Rozario	Roland Rozario	Roland Rozario	Roland Rozario
PROPOSED ENGAGEMENT ACTIVITY	Meeting or workshops as required to explore issues – especially	SLT briefing paper	Briefing Report	Report	Letter to directly affected landowners / occupiers <u>(along Mulcahy & Thewlis Rds and also within a</u>	SLT Report Council Report	Letters to directly affected land owners/occupiers advising of outcome

	with Rates & Property teams				<p>general radius of up to approximately 500m of the intersections of Mulcahy, Thewlis & Kenneth Roads) advising of public notice period and opportunity to /process for how to make written submissions</p> <p>Drop in / information session</p> <p>Creating Cardinia Have Your Say page</p>		<p>Update to Creating Cardinia Have Your Say page</p>
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Project no. 220269

Date 21/08/2023

Cardinia Shire Council
PO Box 7 Pakenham 3810

Attention Nicholas Charrett

Via email N.Charrett@cardinia.vic.gov.au

Dear Nicholas

Mulcahy Road, Pakenham — Traffic Impact Assessment

Introduction

Trafficworks has been engaged by Cardinia Shire Council to undertake a traffic impact assessment of the proposed road network alterations for Mulcahy Road that have changed from the Cardinia Road Precinct Structure Plan (PSP).

It is understood that due to insufficient available land, the proposed unsignalised intersection treatment (i.e. roundabout) as shown in the Cardinia Road PSP is unable to be implemented. Therefore, Council would like to understand the impacts of the decision to close Mulcahy Road onto the surrounding road network.

Background

Mulcahy Road is classified as a local access road as per the *Cardinia Shire Register of Public Roads* and is managed by the Cardinia Shire Council. It is aligned in an east west direction and provides a connection between Toomuc Creek to the east and Thewlis Road to the west. Mulcahy Road is configured as a sealed two-lane, two-way road between Toomuc Creek to the east and Moritz Street to the west. Mulcahy Road, between Thewlis Road and Moritz Street is an unsealed gravel road, which is currently closed to vehicular traffic as a temporary arrangement by the Mount Pleasant Estate developers.

Mulcahy Road has an urban default speed limit of 50 km/h.

Thewlis Road, in the vicinity of the subject area is classified as a sealed rural collector road as per the *Cardinia Shire Register of Public Roads* and is managed by the Cardinia Shire Council. It is aligned in a north south direction and provides a connection between Leppitt Road to the north and Princes Highway to the south.



Thewlis Road is currently configured as a two-lane, two-way undivided road. Ultimately Thewlis Road will from a two-lane, two-way divided road.

Thewlis Road has an urban default speed limit of 50 km/h.

The PSP indicates there are alternative east-west roads that will provide a connection between Thewlis Road and O’Brien Parade (or beyond), these include, Havana Parade and Prizzle Road.

The subject intersection and the surrounding road network are shown in Figure 1, with an aerial view photo of the site shown in Figure 2.

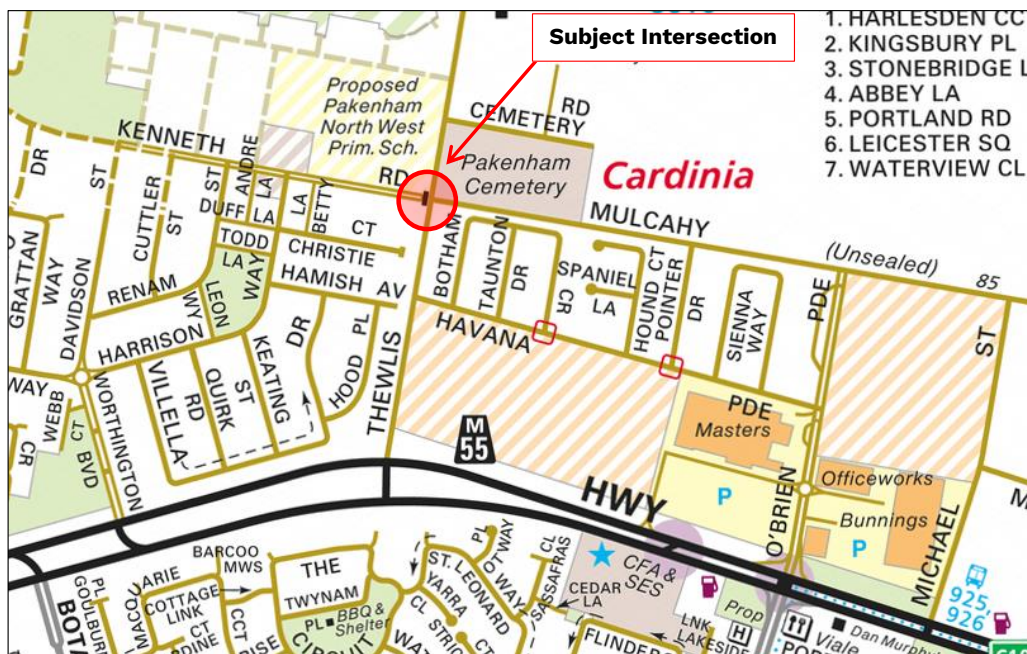


Figure 1: Location plan (reproduced with permission from Melway Publishing Pty Ltd)



Figure 2: Aerial Photo (reproduced with permission from Nearmap Ltd)

Modifications to the PSP

It is understood that Cardinia Shire councils' development team have modified the road network / layout from the original PSP as follows:

- Thewlis Road and Kenneth Road have been changed to a Boulevard Collector Road cross section to align with the adjacent Officer PSP.
- The bus capability has been transferred from Mulcahy Road, with an alternative east west connection, north of Mulcahy Road and Havana Parade designed as a bus capable route in conjunction with Department of Transport and Planning (DTP).

Options Considered

Several options have previously been considered at the Mulcahy Road / Thewlis Road / Kenneth Road intersection; these include:

- A roundabout (as per the PSP), however this is not achievable without land acquisition from the Pakenham Cemetery Trust in the north east corner. This will result in disturbing graves and thus not feasible.
- A Give Way sign controlled cross intersection; however, this was not supported by council from a safety aspect due to the increased number of conflict points, which may result in an increase to the likelihood of an intersection crash. This intersection would also operate above capacity.



- A signalised intersection was considered; however, there is insufficient land available within the road reserve to accommodate the signalised intersection layout required in this location.
- Closure of Mulcahy Road, east of the intersection to form an altered T-intersection of Thewlis Road / Kenneth Road (council preferred option). This is proposed to maintain the Cardinia Road PSP local arterial road (divided) priority connection from Thewlis Road and Kenneth Road (i.e. south to west and vice versa priority).
 - Additionally, the existing road reserve along Mulcahy Road will be retained, truncating vehicular access to Moritz Street, with paths connections between Thewlis Road / Kenneth Road to Moritz Street.

Traffic Volumes and Distribution

To understand the impacts of the proposed Mulcahy Road closure between Thewlis Road and Moritz Street, a high level traffic distribution assessment was undertaken based on the indicative vehicle per day (vpd) per Road / Street type as set out within the PSP (Table 3 – Road Hierarchy). This comprises of the following:

- Local Arterial Road (Divided) – 5,000 – 15,000 vpd
- Local Arterial Road (Undivided) - 5,000 – 10,000 vpd
- Collector Street < 5,000 vpd
- Local Street < 2,000 vpd

The indicative traffic distribution for the surrounding road network, with the inclusion of the Mulcahy Road / Thewlis Road / Kenneth Road connection (as per the PSP) is shown in Figure 1.

Based on the traffic distribution identified in Figure 1, the assumed traffic volumes utilising Mulcahy Road from Kenneth Road and or Thewlis Road have been redistributed along the surrounding road network to establish the likely traffic impacts with the proposed Mulcahy Road closure. The anticipated redistributed traffic volumes are shown in Figure 2.

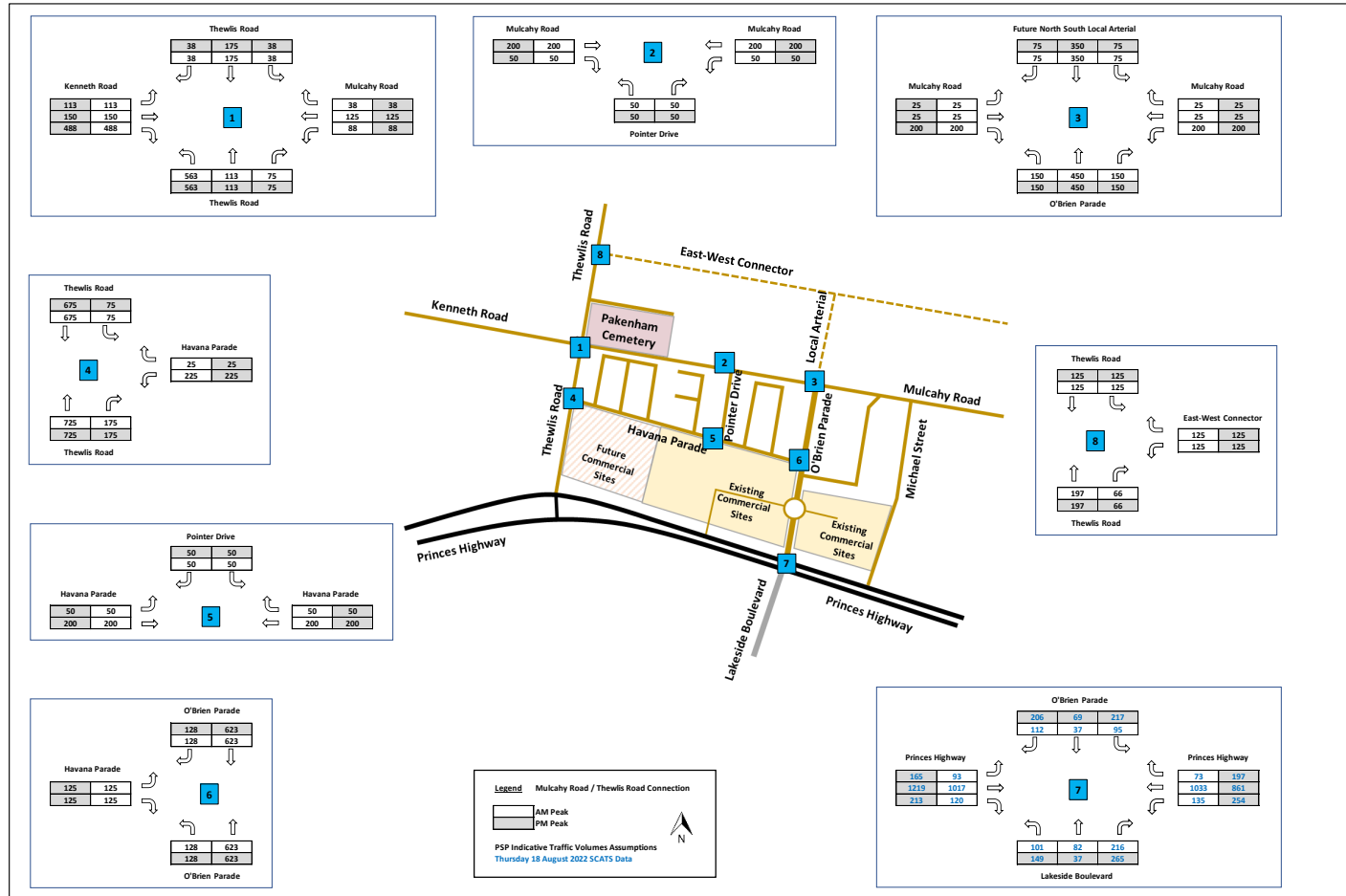


Figure 3: Indicative Traffic Distribution – Mulcahy Road / Thewlis Road / Kenneth Road connection as per the PSP

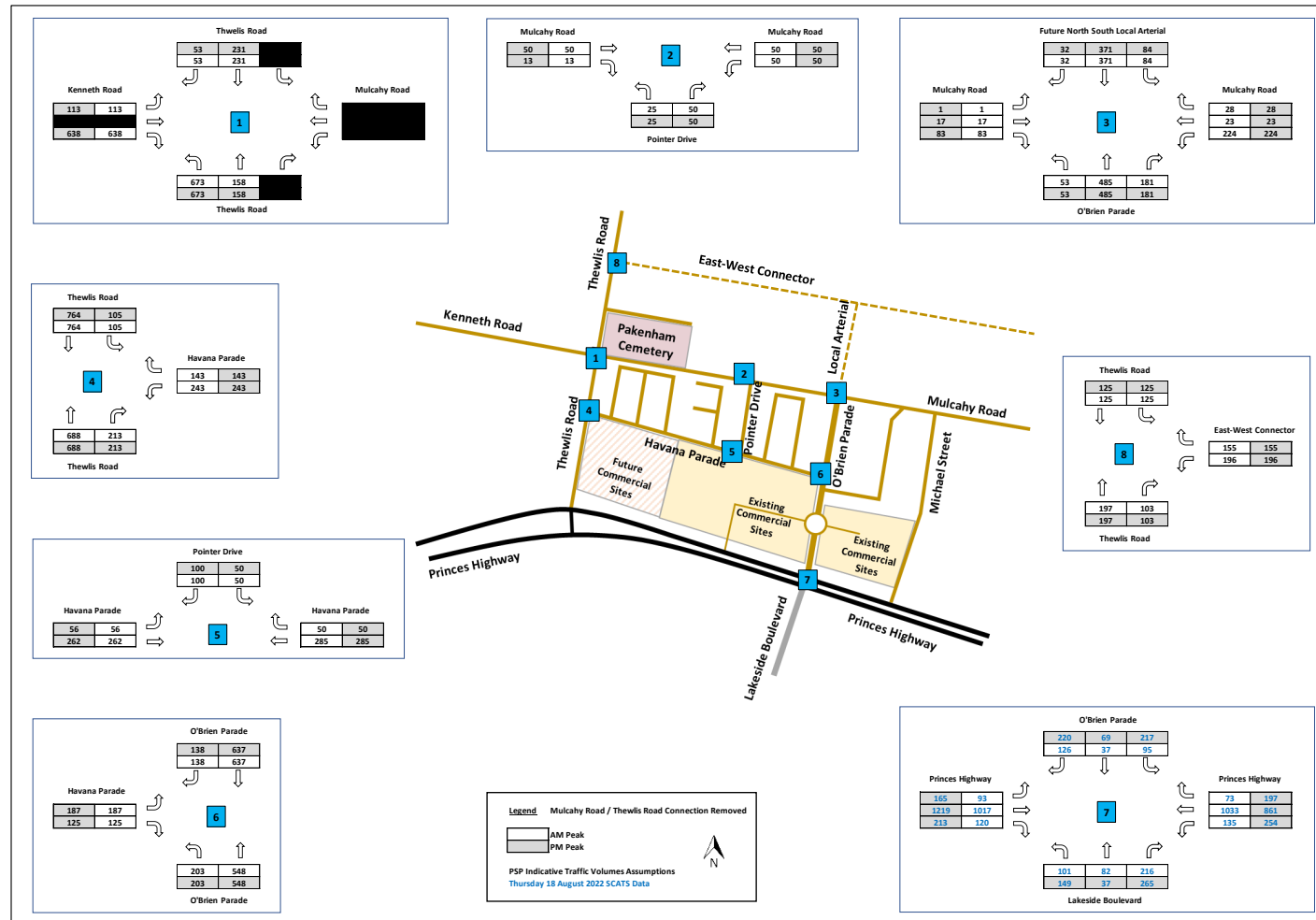


Figure 4: Indicative Traffic Distribution – Mulcahy Road / Thewlis Road / Kenneth Road connection removed



SIDRA Analysis

We use SIDRA software to analyse the intersections and determine anticipated intersection operations for the proposed development. Typically, the main characteristics used to assess intersection operation are the:

- degree of saturation (DOS)
- 95th percentile queue lengths
- average delay.

Table 1 provides an explanation of the intersection operating characteristics.

Table 1: Definitions of intersection operation characteristics

Degree of Saturation (DOS)			Operation
Sign control	Roundabout	Traffic signals	
< 0.6	< 0.6	< 0.6	Excellent operating conditions, minimal delays
0.6 - 0.699	0.6 - 0.699	0.6 - 0.699	Very good operating conditions, minimal delays
0.7 - 0.799	0.7 - 0.849	0.7 - 0.899	Good operating conditions, delays and queuing increasing
0.8 - 0.899	0.85 - 0.949	0.9 - 0.949	Fair operating conditions, delays and queues growing. Any interruption to flow such as minor incidents causes increasing delays
0.9 - 1.0	0.95 - 1.0	0.95 - 1.0	Poor operating conditions, flows starting to breakdown and queues and delays increase rapidly.
> 1.0	> 1.0	> 1.0	Very poor operating conditions with queues and delays increasing rapidly. Once queues develop it takes a significant time for queues to dissipate resulting in long delays to traffic movements

We completed intersection analysis at the following intersections:

- Thewlis Road / Kenneth Road
- Thewlis Road / Havana Parade
- Havana Parade / Pointer Drive
- Havana Parade / O'Brien Parade
- Princes Highway / O'Brien Parade / Lakeside Boulevard.



It is understood that a modified T-intersection will be constructed at the intersection of Thewlis Road / Kenneth Road by the developer of the Worthington Estate (west of Thewlis Road). The modified intersection is proposed to maintain the Cardinia Road PSP local arterial road (divided) priority connection from Thewlis Road and Kenneth Road (i.e. south to west and vice versa priority).

Table 2 provides a summary of the SIDRA assessment. For full SIDRA results, see Appendix 1.

Table 2: SIDRA outputs

Movements	Existing Conditions						Redistributed Traffic Volumes (Existing Layout Configuration)						
	DOS		95% queue (m)		Average delay (sec)		DOS		95% queue (m)		Average delay (sec)		
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
Thewlis Road / Havana Parade	Thewlis Road (south approach)	0.552	0.552	20.2	20.2	16.4	16.4	0.782	0.782	13.0	13.0	13.1	13.1
	Havana Parade (east approach)	0.410	0.410	0.0	0.0	0.6	0.6	2.023	2.023	135.8	135.8	946.9	946.9
	Thewlis Road (north approach)	0.661	0.661	50.3	50.3	7.2	7.2	0.475	0.475	0.0	0.0	0.7	0.7
Havana Parade / Pointer Drive	Havana Parade (east approach)	0.147	0.147	2.9	2.9	1.5	1.5	0.197	0.197	3.4	3.4	1.3	1.3
	Pointer Drive (north approach)	0.105	0.105	2.7	2.7	7.0	7.0	0.199	0.199	5.0	5.0	8.3	8.3
	Havana Parade (west approach)	0.137	0.137	0.0	0.0	1.1	1.1	0.174	0.174	0.0	0.0	1.0	1.0
Havana Parade / O'Brien Parade	O'Brien Parade (north approach)	0.177	0.177	0.0	0.0	1.0	1.0	0.173	0.173	0.0	0.0	1.0	1.0
	Centre Median (west approach)	0.220	0.220	6.1	6.1	6.9	6.9	0.216	0.216	5.9	5.9	6.7	6.7
	O'Brien Parade (south approach)	0.207	0.207	0.0	0.0	1.5	1.5	0.207	0.207	0.0	0.0	1.5	1.5
	Centre Median (east approach)	0.183	0.183	4.7	4.7	4.3	4.3	0.183	0.183	4.7	4.7	4.3	4.3
	Havana Parade (west approach)	0.297	0.297	8.9	8.9	6.7	6.7	0.296	0.296	8.9	8.9	6.7	6.7



Movements		Existing Conditions						Redistributed Traffic Volumes (Existing Layout Configuration)					
		DOS		95% queue (m)		Average delay (sec)		DOS		95% queue (m)		Average delay (sec)	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Princes Highway / O'Brien Parade / Lakeside Boulevard	Lakeside Boulevard (south approach)	0.729	0.745	68.5	69.4	49.7	47.1	0.729	0.745	68.5	69.4	49.7	47.2
	Princes Highway (east approach)	0.723	0.732	191.6	171.2	30.6	35.8	0.723	0.732	191.6	171.2	30.6	35.8
	O'Brien Parade (north approach)	0.341	0.629	31.3	67.4	40.6	44.0	0.373	0.661	34.4	67.4	41.7	44.8
	Princes Highway (west approach)	0.695	0.740	126.9	176.0	26.4	31.0	0.695	0.740	126.9	176.0	26.4	31.0

SIDRA analysis reveals that:

- all intersections are likely to operate below practical capacity during both the AM and PM peak periods as per the existing conditions configuration and indicative traffic volumes.
- closure of Mulcahy Road between Thewlis Road and Moritz Street will likely result in all existing intersections operating below practical capacity during both the AM and PM peak periods, except for the intersection of Thewlis Road / Havana Parade as per the existing layout configuration. However:
 - The intersection of Thewlis Road / Havana Parade traffic volumes have conservatively been assumed to reflect the intended future traffic volumes in conjunction with the existing layout configuration and is deemed to theoretically operate above practical capacity (this will not likely occur).
 - It is understood that Thewlis Road will be constructed to form a two-lane, two-way divided road prior to the connection between Kenneth Road and Thewlis Road as shown in Figure 5.

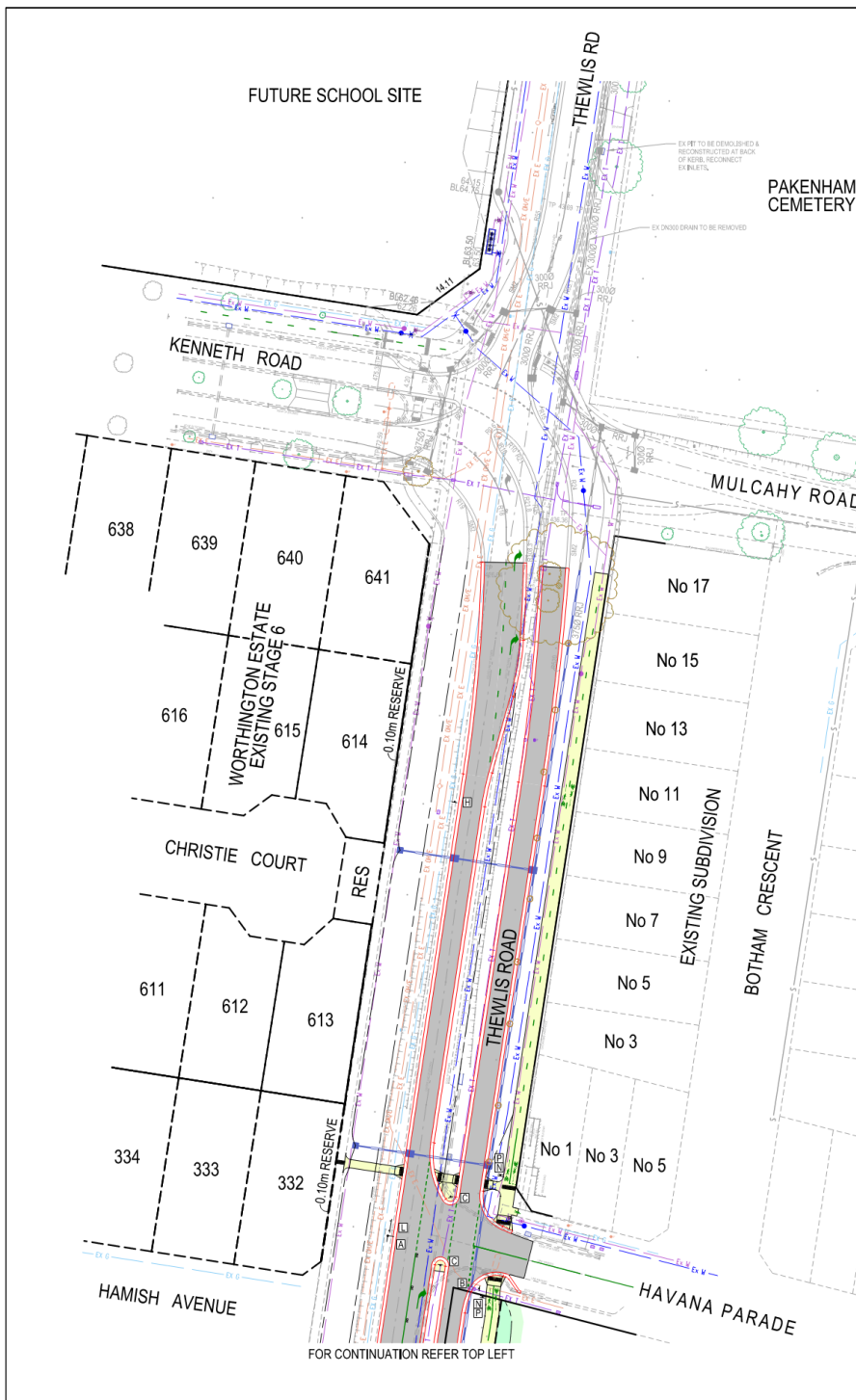


Figure 5: Worthington Estate – Thewlis Road / Havana Parade and Thewlis Road / Kenneth Road intersection layouts



Thewlis Road between the Princes Highway and Mulcahy Road and Kenneth Road between Thewlis Road and Upper Gum Scrub Creek will ultimately form a two lane divided road. As the traffic volumes are based on the ultimate indicative vpd per road / street type, further SIDRA analysis has been undertaken based on the ultimate condition’s layout and redistributed traffic volumes at the intersections of Thewlis Road / Havana Parade and Thewlis Road / Kenneth Road.

Table 3 provides a summary of the SIDRA assessment. For full SIDRA results, see Appendix 2

Table 3: Further SIDRA Analysis Outputs

Movements	Existing						Redistributed Traffic Volumes (Ultimate Layout Configuration)						
	DOS		95% queue (m)		Average delay (sec)		DOS		95% queue (m)		Average delay (sec)		
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
Thewlis Road / Kenneth Road	Thewlis Road (north approach)							0.482	0.482	6.9	6.9	11.0	11.0
	Kenneth Road (west approach)							0.429	0.429	0.0	0.0	5.8	5.8
	Centre Median (southwest approach)							0.256	0.256	2.9	2.9	6.7	6.7
	Thewlis Road (south approach)							0.384	0.384	0.0	0.0	5.5	5.5
	Centre Median (northeast approach)							0.106	0.106	0.9	0.9	6.5	6.5
Thewlis Road / Havana Parade	Havana Parade (east approach)	0.552	0.552	20.2	20.2	16.4	16.4	0.580	0.580	23.9	23.9	12.2	12.2
	Thewlis Road (north approach)	0.410	0.410	0.0	0.0	0.6	0.6	0.475	0.475	0.0	0.0	0.7	0.7
	Centre Median (west approach)							0.378	0.378	10.9	10.9	7.4	7.4
	Thewlis Road (south approach)	0.661	0.661	50.3	50.3	7.2	7.2	0.374	0.374	0.0	0.0	1.4	1.4
	Centre Median (east approach)							0.216	0.216	5.0	5.0	5.6	5.6



SIDRA analysis reveals that both intersections are likely to operate below practical capacity during both the AM and PM peak periods as per the ultimate condition's configuration and indicative redistributed traffic volumes.

Conclusion

SIDRA analysis was undertaken to assess the proposed road network alterations for Mulcahy Road that have changed from the Cardinia Road PSP.

It is understood that limitations at the intersection of Mulcahy Road / Thewlis Road / Kenneth Road hinders the proposed unsignalised intersection treatment (i.e. roundabout) as shown in the PSP.

Based on the indicative traffic volumes within the PSP, the anticipated traffic volumes utilising the Mulcahy Road leg from the Mulcahy Road / Thewlis Road / Kenneth Road intersection have been redistributed along the surrounding road network.

SIDRA analysis reveals that the surrounding intersections will operate under practical capacity during both the AM and PM Peak period with the proposed Mulcahy Road closure between Thewlis Road and Moritz Street in the ultimate condition's layout configurations.

Please contact me on 0438 343 817 if you require additional information.

Yours sincerely,

A handwritten signature in purple ink, appearing to read "Ali Abdou".

Ali Abdou

Director BE (Civil) (Hons), MIEAust, CPEng, NER

Appendix 1 – SIDRA Results – Existing Layout Configurations

Appendix 2 – SIDRA Results – Ultimate Layout Configurations

USER REPORT FOR SITE

All Movement Classes

 **Project: 220269_Mulcahy Road SIDRA Analysis_221110** **Template: SIDRA Results (LS)**

Site: 4 [Havana Parade - Thewlis Road (Site Folder: Existing)]

Havana Parade - Thewlis Road
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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

Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Thewlis Road													
Lane 1	947	1.0	1432	0.661	100	7.2	LOS A	7.1	50.3	Full	235	0.0	0.0
Approach	947	1.0		0.661		7.2	NA	7.1	50.3				
East: Havana Parade													
Lane 1	263	1.0	477	0.552	100	16.4	LOS C	2.9	20.2	Full	370	0.0	0.0
Approach	263	1.0		0.552		16.4	LOS C	2.9	20.2				
North: Thewlis Road													
Lane 1	789	1.0	1928	0.410	100	0.6	LOS A	0.0	0.0	Full	125	0.0	0.0
Approach	789	1.0		0.410		0.6	NA	0.0	0.0				
Intersection	2000	1.0		0.661		5.8	NA	7.1	50.3				

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.

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

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

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

Queue Model: SIDRA Standard.

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

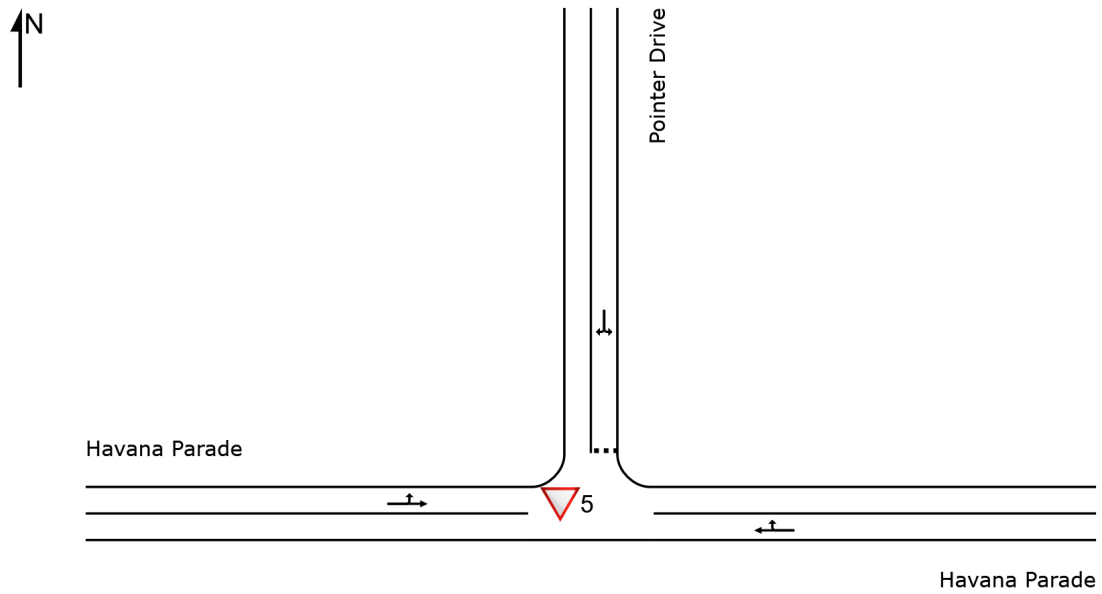
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

▽ Site: 5 [Havana Parade - Pointer Drive (Site Folder: Existing)]

Havana Parade - Pointer Drive
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Havana Parade													
Lane 1	263	1.0	1786	0.147	100	1.5	LOS A	0.4	2.9	Full	210	0.0	0.0
Approach	263	1.0		0.147		1.5	NA	0.4	2.9				
North: Pointer Drive													
Lane 1	105	1.0	1005	0.105	100	7.0	LOS A	0.4	2.7	Full	155	0.0	0.0
Approach	105	1.0		0.105		7.0	LOS A	0.4	2.7				
West: Havana Parade													
Lane 1	263	1.0	1918	0.137	100	1.1	LOS A	0.0	0.0	Full	370	0.0	0.0
Approach	263	1.0		0.137		1.1	NA	0.0	0.0				
Intersection	632	1.0		0.147		2.3	NA	0.4	2.9				

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.

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

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

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

Queue Model: SIDRA Standard.

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

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

USER REPORT FOR NETWORK SITE

All Movement Classes

 Project: 220269_Mulcahy Road SIDRA Analysis_221110 Template: SIDRA Results (LS)

 Site: 6E [Havana Parade - O'Brien Parade (East) (Site Folder: Existing)]  Network: 1 [Havana Parade - O'Brien Parade Staggered T - Existing (Network Folder: Existing)]

Havana Parade - O'Brien Parade (East)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist m]				
North: O'Brien Parade															
Lane 1	328	1.0	328	1.0	1937	0.169	100	0.0	LOS A	0.0	0.0	Full	180	0.0	0.0
Lane 2	328	1.0	328	1.0	1937	0.169	100	0.0	LOS A	0.0	0.0	Full	180	0.0	0.0
Lane 3	135	1.0	135	1.0	1830	0.074	100	5.7	LOS A	0.0	0.0	Short	60	-0.8 ^{N3}	NA
Approach	791	1.0	791	1.0		0.169		1.0	NA	0.0	0.0				
West: Centre Median															
Lane 1	132	1.0	132	1.0	623	0.211	100	6.5	LOS A	0.8	5.8	Full	5	0.0	9.7
Approach	132	1.0	132	1.0		0.211		6.5	LOS A	0.8	5.8				
Intersection	922	1.0	922	1.0		0.211		1.8	NA	0.8	5.8				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

N3 Capacity Adjustment due to downstream lane blockage determined by the program.

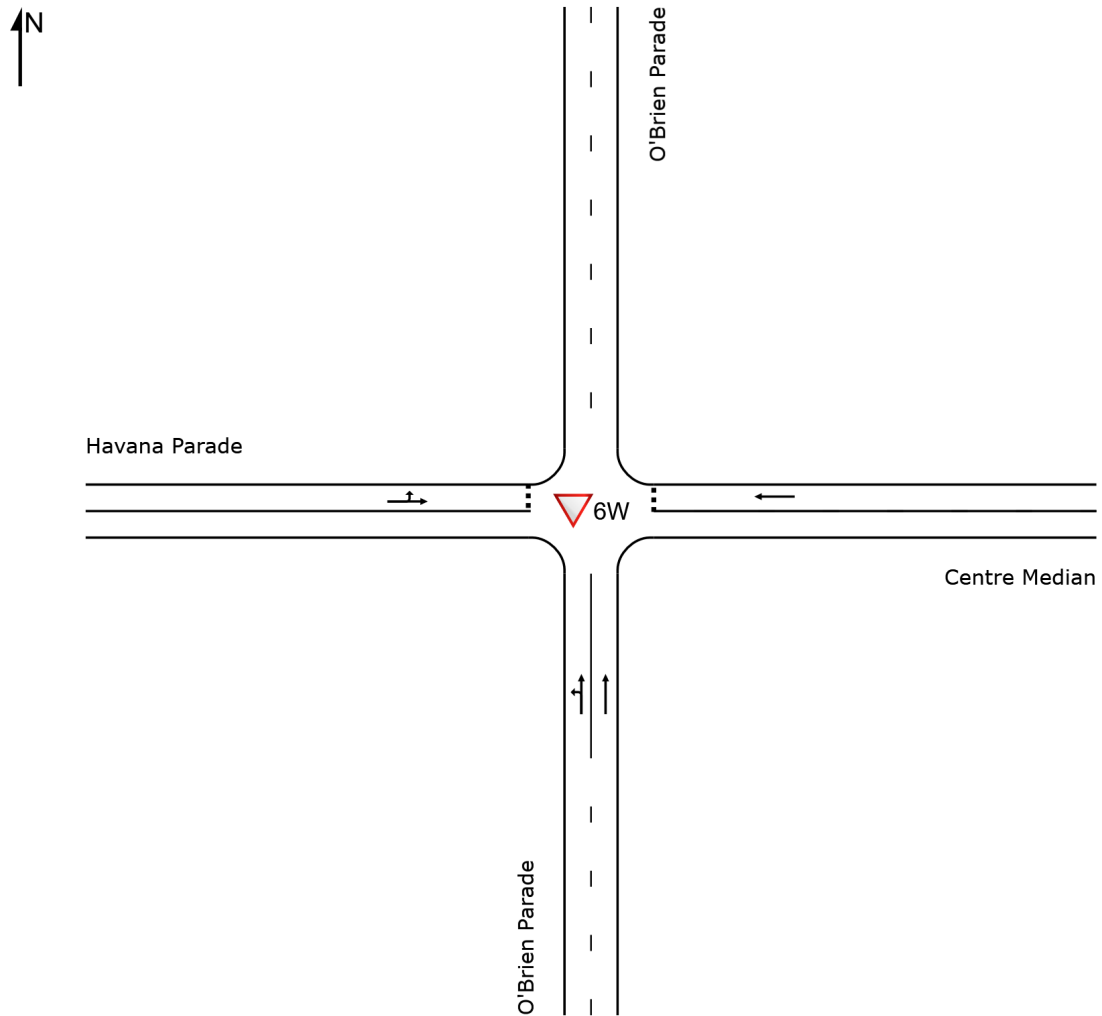
▼ Site: 6W [Havana Parade - O'Brien Parade (West) (Site Folder: Existing)]

■ Network: 1 [Havana Parade - O'Brien Parade Staggered T - Existing (Network Folder: Existing)]

Havana Parade - O'Brien Parade (West)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist]				
South: O'Brien Parade															
Lane 1	392	1.0	392	1.0	1904	0.206	100	1.9	LOS A	0.0	0.0	Full	95	0.0	0.0
Lane 2	399	1.0	399	1.0	1937	0.206	100	0.0	LOS A	0.0	0.0	Full	95	0.0	0.0
Approach	791	1.0	791	1.0		0.206		1.0	NA	0.0	0.0				
East: Centre Median															
Lane 1	135	1.0	135	1.0	792	0.170	100	4.3	LOS A	0.6	4.3	Full	5	0.0	0.8
Approach	135	1.0	135	1.0		0.170		4.3	LOS A	0.6	4.3				
West: Havana Parade															
Lane 1	263	1.0	263	1.0	976	0.270	100	6.9	LOS A	1.1	7.4	Full	210	-5.1 ^{N3}	0.0
Approach	263	1.0	263	1.0		0.270		6.9	LOS A	1.1	7.4				
Intersection	1188	1.0	1188	1.0		0.270		2.7	NA	1.1	7.4				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Site: 7 [Site No. 313 - Princes Highway - Lakeside Boulevard - O'Brien Parade - AM Peak (Site Folder: Existing)]

Princes Highway - Lakeside Boulevard - O'Brien Parade

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: OP Sheet

Reference Phase: Phase A

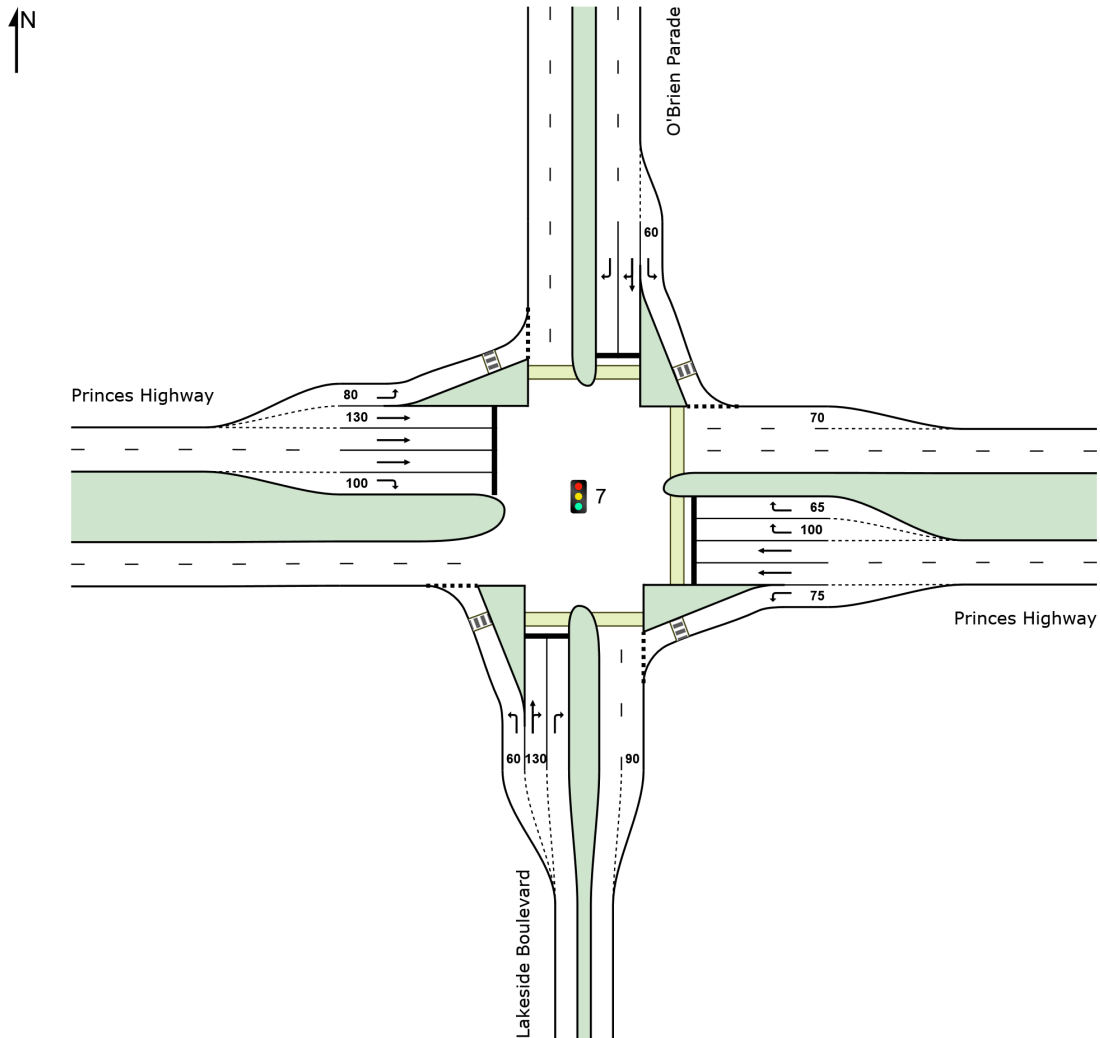
Input Phase Sequence: A, B, C, D1, D2*, D3*

Output Phase Sequence: A, B, C, D1, D3*

(* Variable Phase)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV %						[Veh Dist] m					
South: Lakeside Boulevard													
Lane 1	106	3.0	765	0.139	100	13.2	LOS B	2.3	16.8	Short	60	0.0	NA
Lane 2	159	3.0	218	0.729	100	60.9	LOS E	9.5	68.5	Short	130	0.0	NA
Lane 3	155	3.0	212	0.729	100	63.4	LOS E	9.3	66.8	Full	300	0.0	0.0
Approach	420	3.0		0.729		49.7	LOS D	9.5	68.5				
East: Princes Highway													
Lane 1	142	3.0	1444	0.098	100	9.5	LOS A	1.4	9.9	Short	75	0.0	NA
Lane 2	530	3.0	733 ¹	0.723	100	30.2	LOS C	24.8	178.4	Full	410	0.0	0.0
Lane 3	558	3.0	771 ¹	0.723	100	30.8	LOS C	26.7	191.6	Full	410	0.0	0.0
Lane 4	38	3.0	91	0.423	100	71.2	LOS E	2.3	16.8	Short	100	0.0	NA
Lane 5	38	3.0	91	0.423	100	71.2	LOS E	2.3	16.8	Short	65	0.0	NA
Approach	1306	3.0		0.723		30.6	LOS C	26.7	191.6				
North: O'Brien Parade													
Lane 1	100	3.0	599	0.167	100	15.6	LOS B	2.6	18.7	Short	60	0.0	NA
Lane 2	79	3.0	233	0.341	100	55.5	LOS E	4.4	31.3	Full	105	0.0	0.0
Lane 3	77	3.0	227	0.341	100	57.6	LOS E	4.3	30.6	Full	105	0.0	0.0
Approach	257	3.0		0.341		40.6	LOS D	4.4	31.3				
West: Princes Highway													
Lane 1	98	3.0	1363	0.072	100	8.6	LOS A	0.7	5.0	Short	80	0.0	NA
Lane 2	189	3.0	893	0.212	43 ⁶	21.4	LOS C	6.4	46.2	Short	130	0.0	NA
Lane 3	441	3.0	893	0.494	100	23.6	LOS C	17.7	126.9	Full	500	0.0	0.0
Lane 4	441	3.0	893	0.494	100	23.6	LOS C	17.7	126.9	Full	500	0.0	0.0
Lane 5	126	3.0	182	0.695	100	67.0	LOS E	7.6	54.6	Short	100	0.0	NA
Approach	1295	3.0		0.695		26.4	LOS C	17.7	126.9				
Intersection	3278	3.0		0.729		32.2	LOS C	26.7	191.6				

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.

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

Queue Model: SIDRA Standard.

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

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

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

⁶ Lane under-utilisation due to downstream effects

Phase Timing Summary

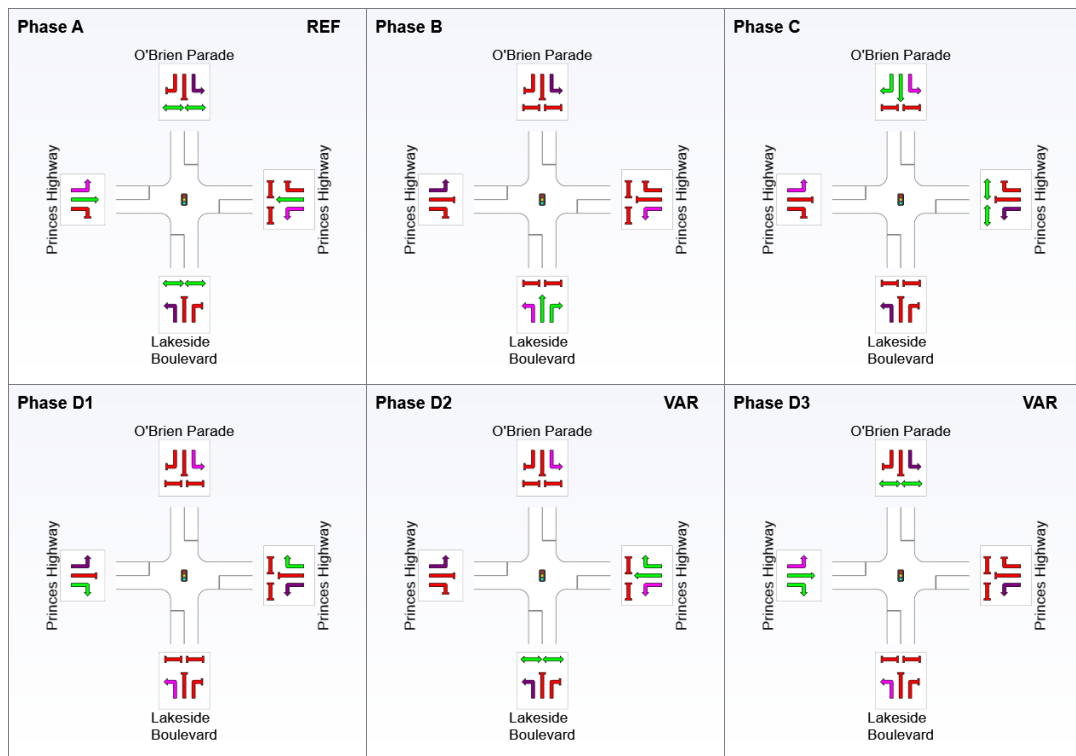
Phase	A	B	C	D1	D3
Phase Change Time (sec)	0	57	78	101	114
Green Time (sec)	50	14	15	6	***
Phase Time (sec)	57	22	22	13	6
Phase Split	48%	18%	18%	11%	5%

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

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Input Phase Sequence

Phase Sequence: OP Sheet
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D1, D2*, D3*



REF: Reference Phase
 VAR: Variable Phase



Site: 7 [Site No. 313 - Princes Highway - Lakeside Boulevard - O'Brien Parade - PM Peak (Site Folder: Existing)]

Princes Highway - Lakeside Boulevard - O'Brien Parade

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: OP Sheet

Reference Phase: Phase A

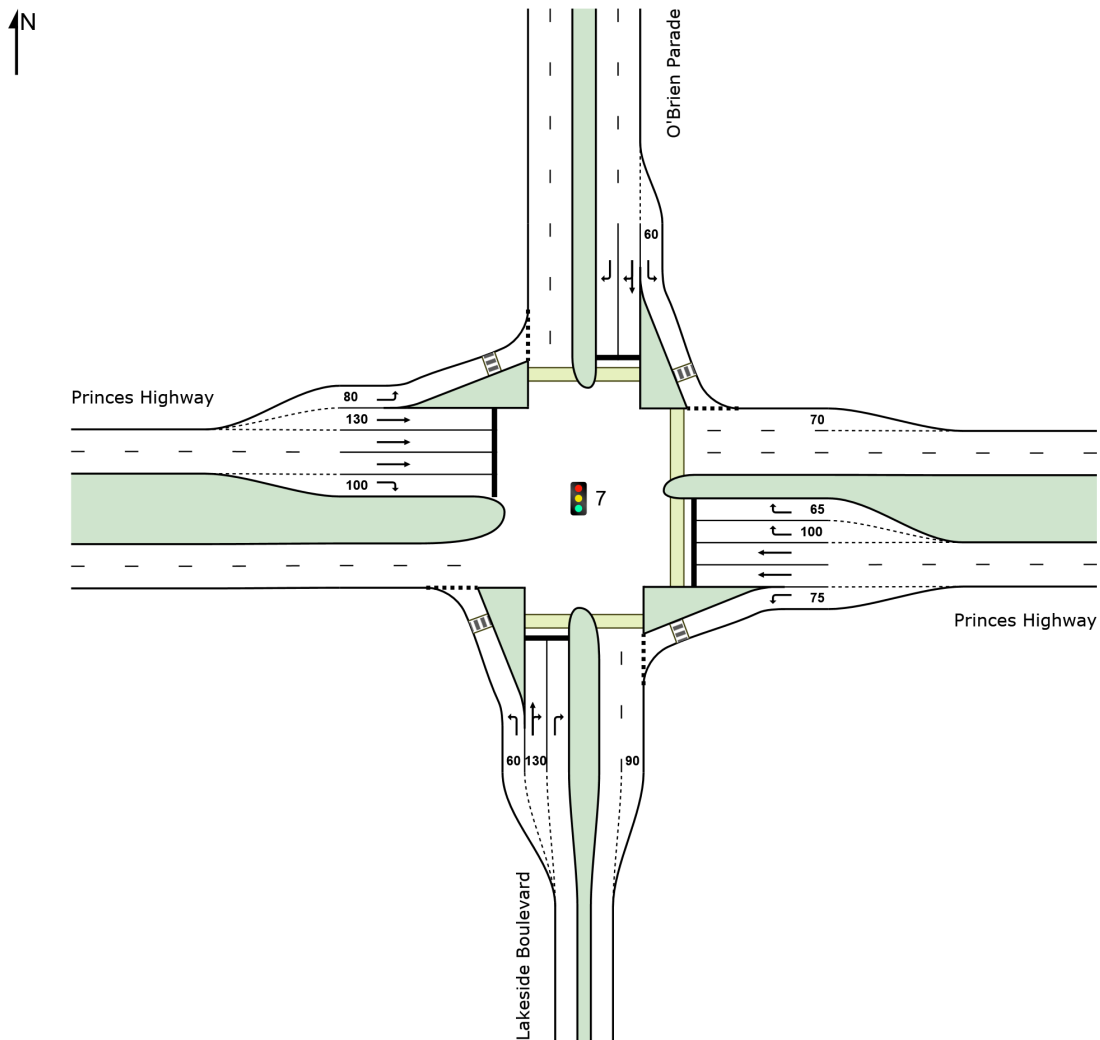
Input Phase Sequence: A, B, C, D1, D2*, D3*

Output Phase Sequence: A, B, C, D1, D3*

(* Variable Phase)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV] %						[Veh Dist]	m				
South: Lakeside Boulevard													
Lane 1	157	3.0	868	0.181	100	14.2	LOS B	3.7	26.4	Short	60	0.0	NA
Lane 2	160	3.0	215	0.745	100	62.8	LOS E	9.7	69.4	Short	130	0.0	NA
Lane 3	158	3.0	212	0.745	100	63.9	LOS E	9.6	68.7	Full	300	0.0	0.0
Approach	475	3.0		0.745		47.1	LOS D	9.7	69.4				
East: Princes Highway													
Lane 1	267	3.0	1312	0.204	100	11.8	LOS B	4.1	29.8	Short	75	0.0	NA
Lane 2	433	3.0	592 ¹	0.732	100	35.3	LOS D	21.3	153.1	Full	410	0.0	0.0
Lane 3	473	3.0	646 ¹	0.732	100	36.2	LOS D	23.8	171.2	Full	410	0.0	0.0
Lane 4	104	3.0	167	0.622	100	66.8	LOS E	6.2	44.2	Short	100	0.0	NA
Lane 5	104	3.0	167	0.622	100	66.8	LOS E	6.2	44.2	Short	65	0.0	NA
Approach	1381	3.0		0.732		35.8	LOS D	23.8	171.2				
North: O'Brien Parade													
Lane 1	228	3.0	597	0.383	100	24.6	LOS C	9.4	67.4	Short	60	0.0	NA
Lane 2	147	3.0	233	0.629	100	58.3	LOS E	8.4	60.6	Full	105	0.0	0.0
Lane 3	143	3.0	227	0.629	100	60.2	LOS E	8.3	59.2	Full	105	0.0	0.0
Approach	518	3.0		0.629		44.0	LOS D	9.4	67.4				
West: Princes Highway													
Lane 1	174	3.0	1343	0.129	100	8.8	LOS A	1.4	10.1	Short	80	0.0	NA
Lane 2	227	3.0	813	0.279	43 ⁶	26.2	LOS C	8.6	61.5	Short	130	0.0	NA
Lane 3	530	3.0	813	0.652	100	29.3	LOS C	24.5	176.0	Full	500	0.0	0.0
Lane 4	526	3.0	805	0.652	100	29.2	LOS C	24.2	173.7	Full	500	0.0	0.0
Lane 5	224	3.0	303	0.740	100	61.3	LOS E	13.1	94.3	Short	100	0.0	NA
Approach	1681	3.0		0.740		31.0	LOS C	24.5	176.0				
Intersection	4055	3.0		0.745		36.2	LOS D	24.5	176.0				

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.

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

Queue Model: SIDRA Standard.

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

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

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

⁶ Lane under-utilisation due to downstream effects

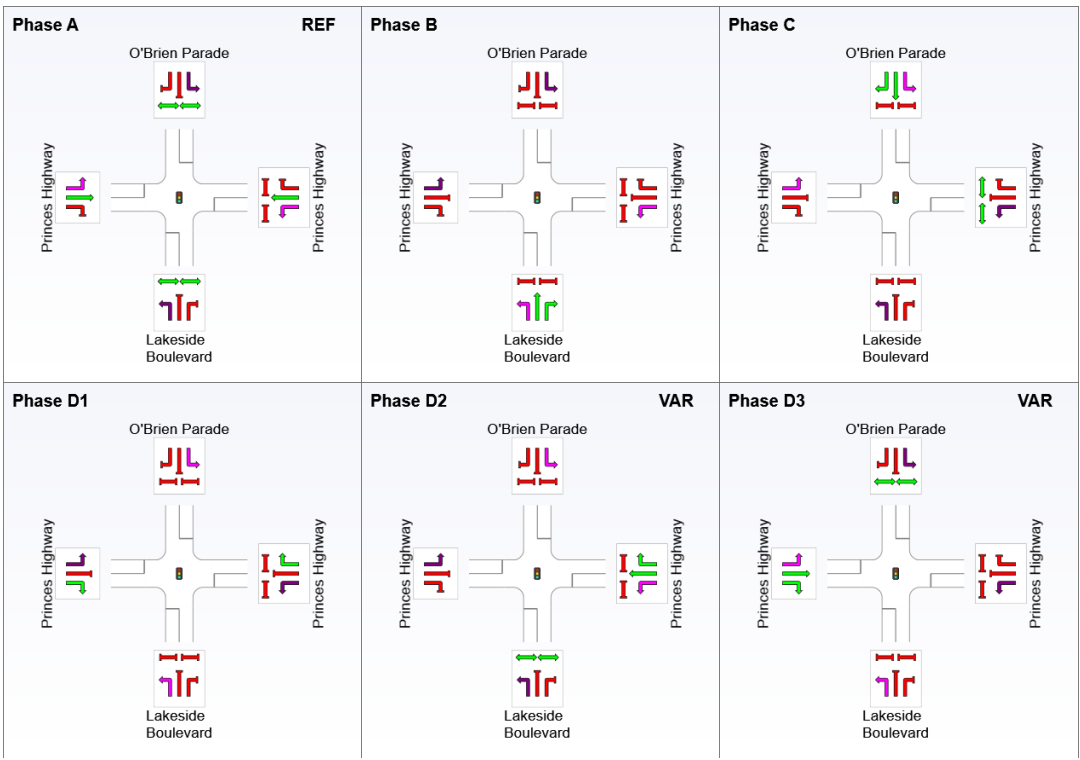
Phase Timing Summary

Phase	A	B	C	D1	D3
Phase Change Time (sec)	0	49	70	93	111
Green Time (sec)	42	14	15	11	2
Phase Time (sec)	49	22	22	18	9
Phase Split	41%	18%	18%	15%	8%

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

Input Phase Sequence

Phase Sequence: OP Sheet
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D1, D2*, D3*



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

USER REPORT FOR SITE

All Movement Classes

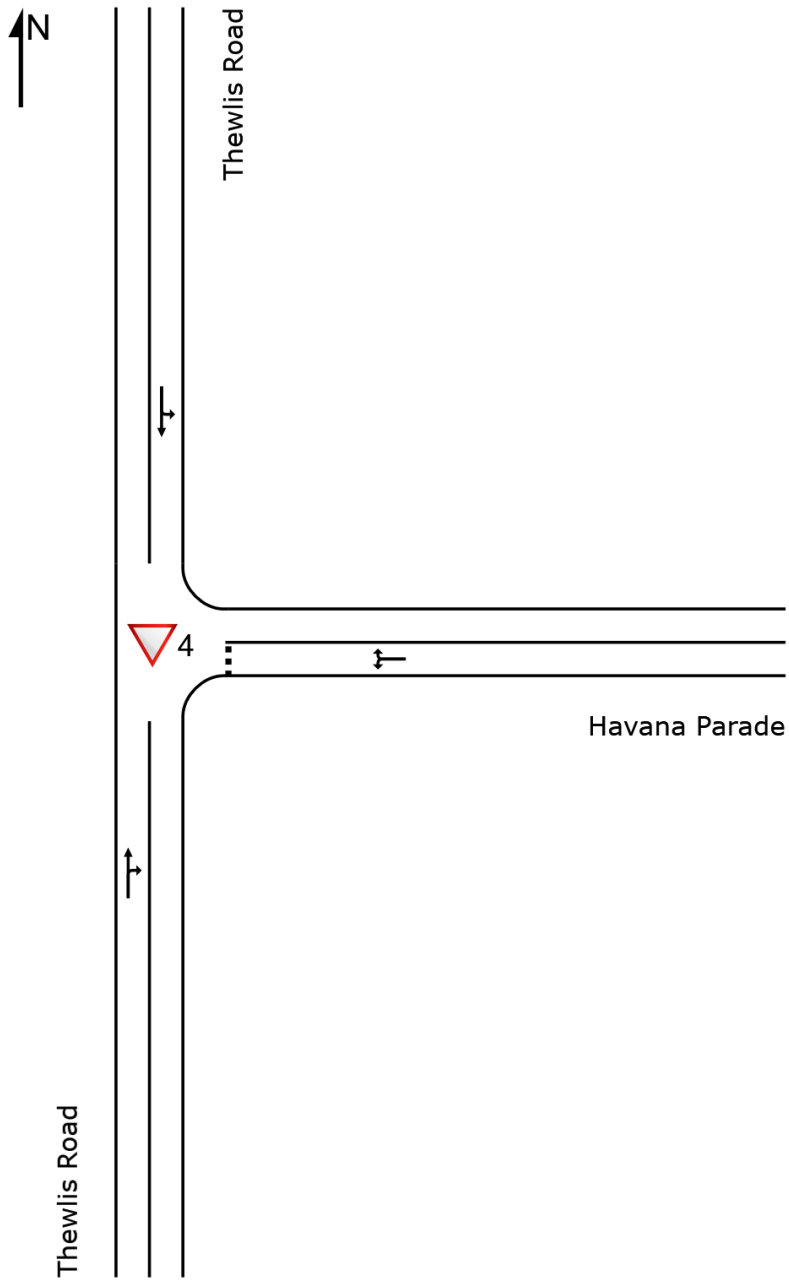
 **Project: 220269_Mulcahy Road SIDRA Analysis_230524** **Template: SIDRA Results (LS)**

 **Site: 4 [Havana Parade - Thewlis Road (Site Folder: Anticipated (Existing Layout))]**

Havana Parade - Thewlis Road
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Thewlis Road													
Lane 1	948	1.0	1212	0.782	100	13.1	LOS B	13.0	91.9	Full	235	0.0	0.0
Approach	948	1.0		0.782		13.1	NA	13.0	91.9				
East: Havana Parade													
Lane 1	406	1.0	201	2.023	100	946.9	LOS F	135.8	959.0	Full	370	0.0	55.5
Approach	406	1.0		2.023		946.9	LOS F	135.8	959.0				
North: Thewlis Road													
Lane 1	915	1.0	1926	0.475	100	0.7	LOS A	0.0	0.0	Full	125	0.0	0.0
Approach	915	1.0		0.475		0.7	NA	0.0	0.0				
Intersection	2269	1.0		2.023		175.3	NA	135.8	959.0				

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.

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

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

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

Queue Model: SIDRA Standard.

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

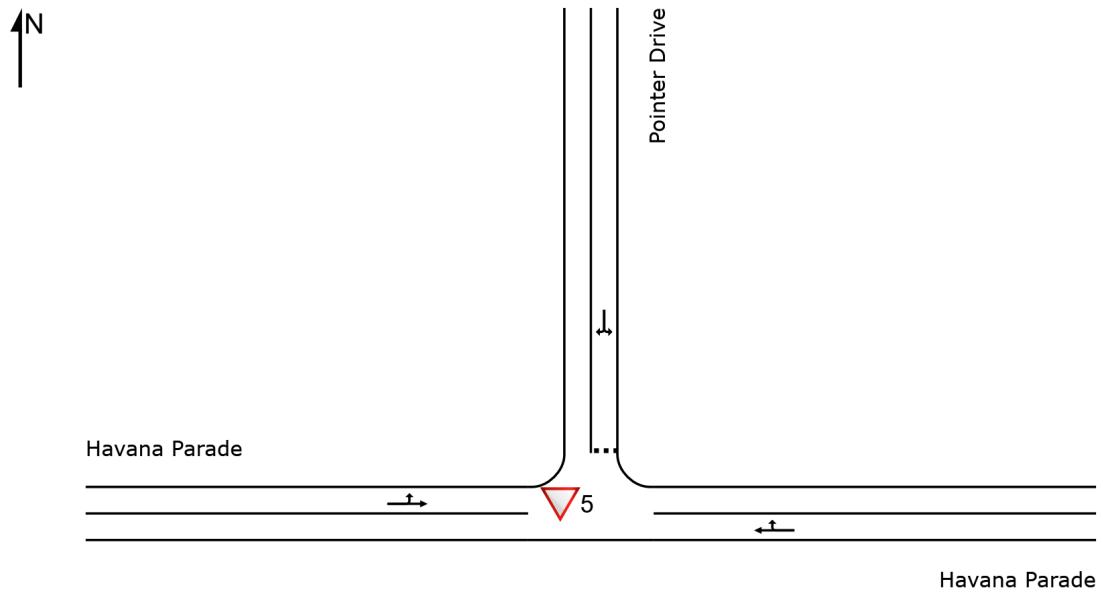
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

▽ Site: 5 [Havana Parade - Pointer Drive (Site Folder: Anticipated (Existing Layout))]

Havana Parade - Pointer Drive
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Havana Parade													
Lane 1	353	1.0	1794	0.197	100	1.3	LOS A	0.5	3.4	Full	210	0.0	0.0
Approach	353	1.0		0.197		1.3	NA	0.5	3.4				
North: Pointer Drive													
Lane 1	158	1.0	794	0.199	100	8.3	LOS A	0.7	5.0	Full	155	0.0	0.0
Approach	158	1.0		0.199		8.3	LOS A	0.7	5.0				
West: Havana Parade													
Lane 1	335	1.0	1920	0.174	100	1.0	LOS A	0.0	0.0	Full	370	0.0	0.0
Approach	335	1.0		0.174		1.0	NA	0.0	0.0				
Intersection	845	1.0		0.199		2.5	NA	0.7	5.0				

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.

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

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

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

Queue Model: SIDRA Standard.

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

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

USER REPORT FOR NETWORK SITE

All Movement Classes

 Project: 220269_Mulcahy Road SIDRA Analysis_230524 Template: SIDRA Results (LS)

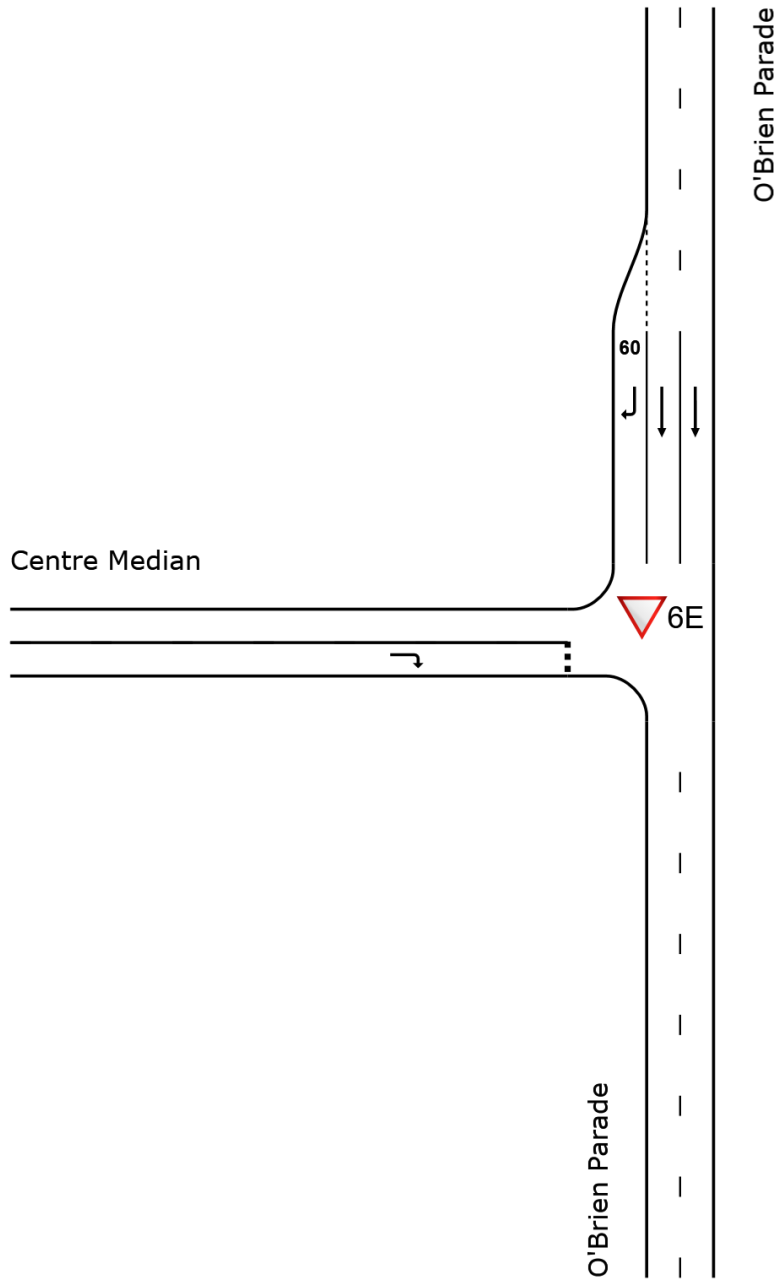
 Site: 6E [Havana Parade - O'Brien Parade (East) (Site Folder: Anticipated (Existing Layout))]

 Network: 2 [Havana Parade - O'Brien Parade Staged T - Anticipated (Network Folder: Anticipated)]

Havana Parade - O'Brien Parade (East)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h]	HV %	[Total veh/h]	HV %						[Veh]	[Dist] m				
North: O'Brien Parade															
Lane 1	335	1.0	335	1.0	1937	0.173	100	0.0	LOS A	0.0	0.0	Full	180	0.0	0.0
Lane 2	335	1.0	335	1.0	1937	0.173	100	0.0	LOS A	0.0	0.0	Full	180	0.0	0.0
Lane 3	145	1.0	145	1.0	1844	0.079	100	5.7	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	816	1.0	816	1.0		0.173		1.0	NA	0.0	0.0				
West: Centre Median															
Lane 1	132	1.0	132	1.0	611	0.216	100	6.7	LOS A	0.8	5.9	Full	6	0.0	4.6
Approach	132	1.0	132	1.0		0.216		6.7	LOS A	0.8	5.9				
Intersection	947	1.0	947	1.0		0.216		1.8	NA	0.8	5.9				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

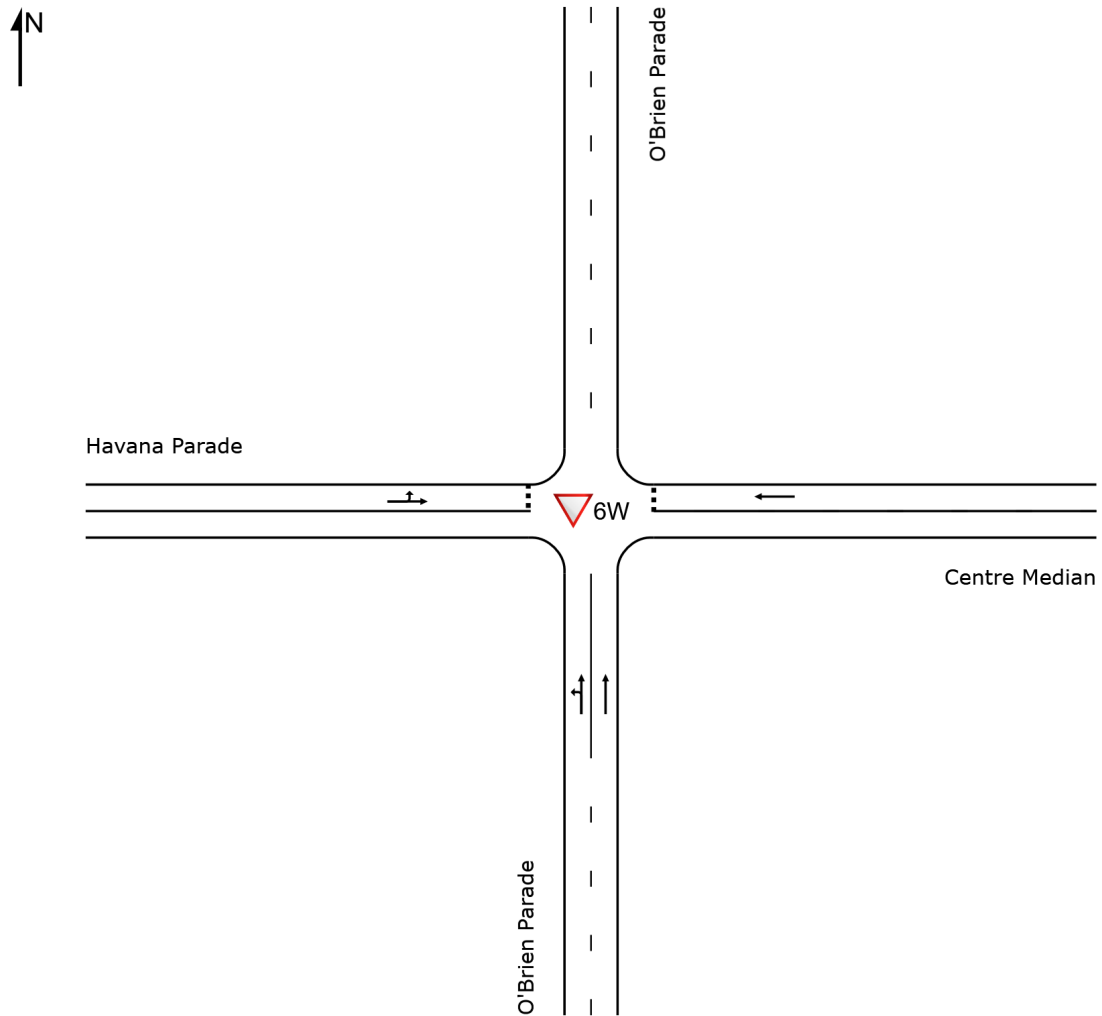
▽ Site: 6W [Havana Parade - O'Brien Parade (West) (Site Folder: Anticipated (Existing Layout))]

■ Network: 2 [Havana Parade - O'Brien Parade Staged T - Anticipated (Network Folder: Anticipated)]

Havana Parade - O'Brien Parade (West)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total HV]	%	[Total HV]	%						[Veh]	[Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m	m	%	%	
South: O'Brien Parade															
Lane 1	390	1.0	390	1.0	1885	0.207	100	3.0	LOS A	0.0	0.0	Full	95	0.0	0.0
Lane 2	401	1.0	401	1.0	1937	0.207	100	0.0	LOS A	0.0	0.0	Full	95	0.0	0.0
Approach	791	1.0	791	1.0		0.207		1.5	NA	0.0	0.0				
East: Centre Median															
Lane 1	145	1.0	145	1.0	792	0.183	100	4.3	LOS A	0.7	4.7	Full	6	0.0	0.0
Approach	145	1.0	145	1.0		0.183		4.3	LOS A	0.7	4.7				
West: Havana Parade															
Lane 1	328	1.0	328	1.0	1109	0.296	100	6.7	LOS A	1.3	8.9	Full	210	-1.9 ^{N3}	0.0
Approach	328	1.0	328	1.0		0.296		6.7	LOS A	1.3	8.9				
Intersection	1264	1.0	1264	1.0		0.296		3.2	NA	1.3	8.9				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

N3 Capacity Adjustment due to downstream lane blockage determined by the program.

Site: 7 [Site No. 313 - Princes Highway - Lakeside Boulevard - O'Brien Parade - AM Peak (Site Folder: Anticipated (Existing Layout))]

Princes Highway - Lakeside Boulevard - O'Brien Parade

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: OP Sheet

Reference Phase: Phase A

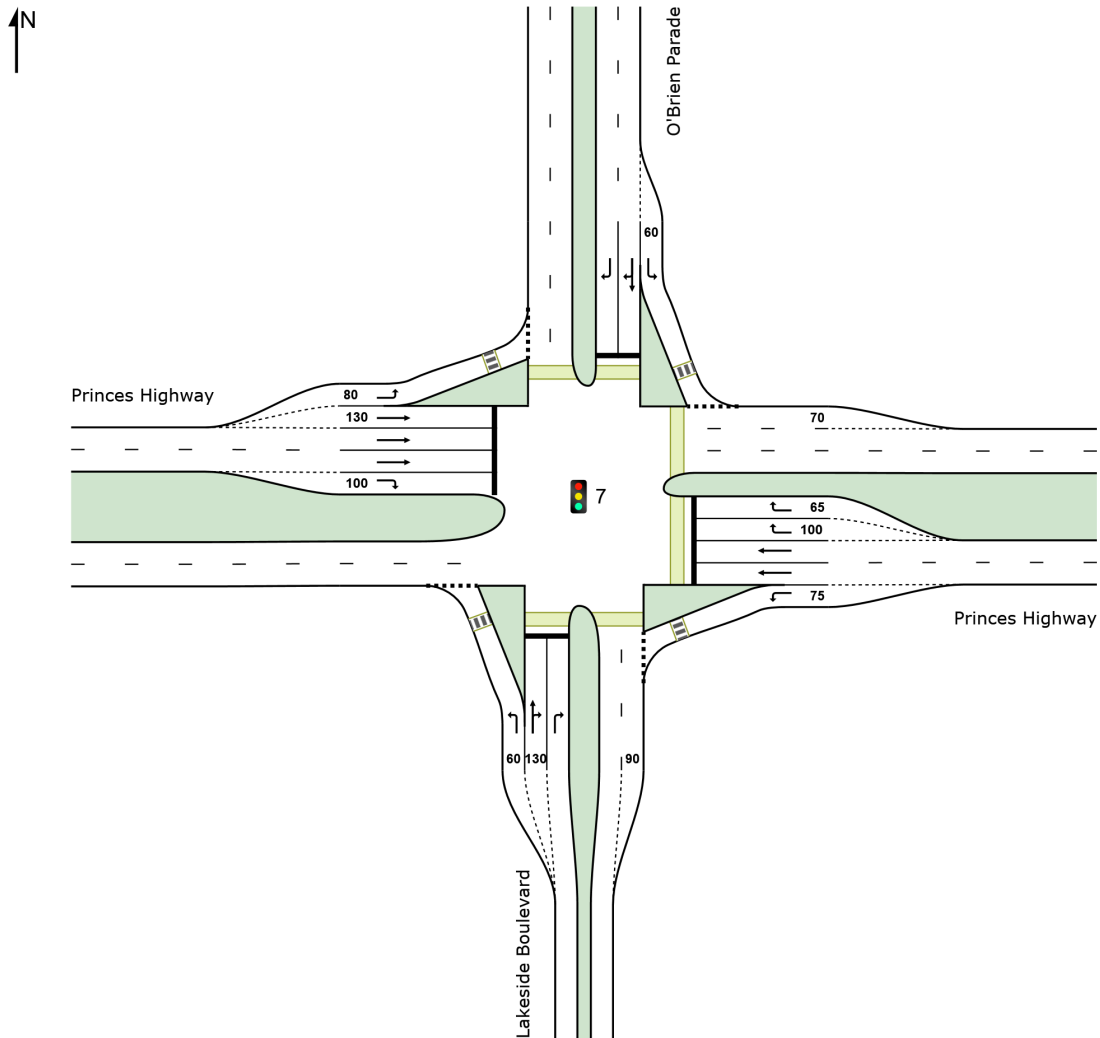
Input Phase Sequence: A, B, C, D1, D2*, D3*

Output Phase Sequence: A, B, C, D1, D3*

(* Variable Phase)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV] %						[Veh	Dist] m				
South: Lakeside Boulevard													
Lane 1	106	3.0	763	0.139	100	13.2	LOS B	2.3	16.8	Short	60	0.0	NA
Lane 2	159	3.0	218	0.729	100	60.9	LOS E	9.5	68.5	Short	130	0.0	NA
Lane 3	155	3.0	212	0.729	100	63.4	LOS E	9.3	66.8	Full	300	0.0	0.0
Approach	420	3.0		0.729		49.7	LOS D	9.5	68.5				
East: Princes Highway													
Lane 1	142	3.0	1444	0.098	100	9.5	LOS A	1.4	9.9	Short	75	0.0	NA
Lane 2	530	3.0	733 ¹	0.723	100	30.2	LOS C	24.8	178.4	Full	410	0.0	0.0
Lane 3	558	3.0	771 ¹	0.723	100	30.8	LOS C	26.7	191.6	Full	410	0.0	0.0
Lane 4	38	3.0	91	0.423	100	71.2	LOS E	2.3	16.8	Short	100	0.0	NA
Lane 5	38	3.0	91	0.423	100	71.2	LOS E	2.3	16.8	Short	65	0.0	NA
Approach	1306	3.0		0.723		30.6	LOS C	26.7	191.6				
North: O'Brien Parade													
Lane 1	100	3.0	599	0.167	100	15.6	LOS B	2.6	18.7	Short	60	0.0	NA
Lane 2	87	3.0	232	0.373	100	55.9	LOS E	4.8	34.4	Full	105	0.0	0.0
Lane 3	85	3.0	227	0.373	100	57.8	LOS E	4.7	33.7	Full	105	0.0	0.0
Approach	272	3.0		0.373		41.7	LOS D	4.8	34.4				
West: Princes Highway													
Lane 1	98	3.0	1363	0.072	100	8.6	LOS A	0.7	5.0	Short	80	0.0	NA
Lane 2	189	3.0	893	0.212	43 ⁶	21.4	LOS C	6.4	46.2	Short	130	0.0	NA
Lane 3	441	3.0	893	0.494	100	23.6	LOS C	17.7	126.9	Full	500	0.0	0.0
Lane 4	441	3.0	893	0.494	100	23.6	LOS C	17.7	126.9	Full	500	0.0	0.0
Lane 5	126	3.0	182	0.695	100	67.0	LOS E	7.6	54.6	Short	100	0.0	NA
Approach	1295	3.0		0.695		26.4	LOS C	17.7	126.9				
Intersection	3293	3.0		0.729		32.3	LOS C	26.7	191.6				

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.

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

Queue Model: SIDRA Standard.

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

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

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

⁶ Lane under-utilisation due to downstream effects

Phase Timing Summary

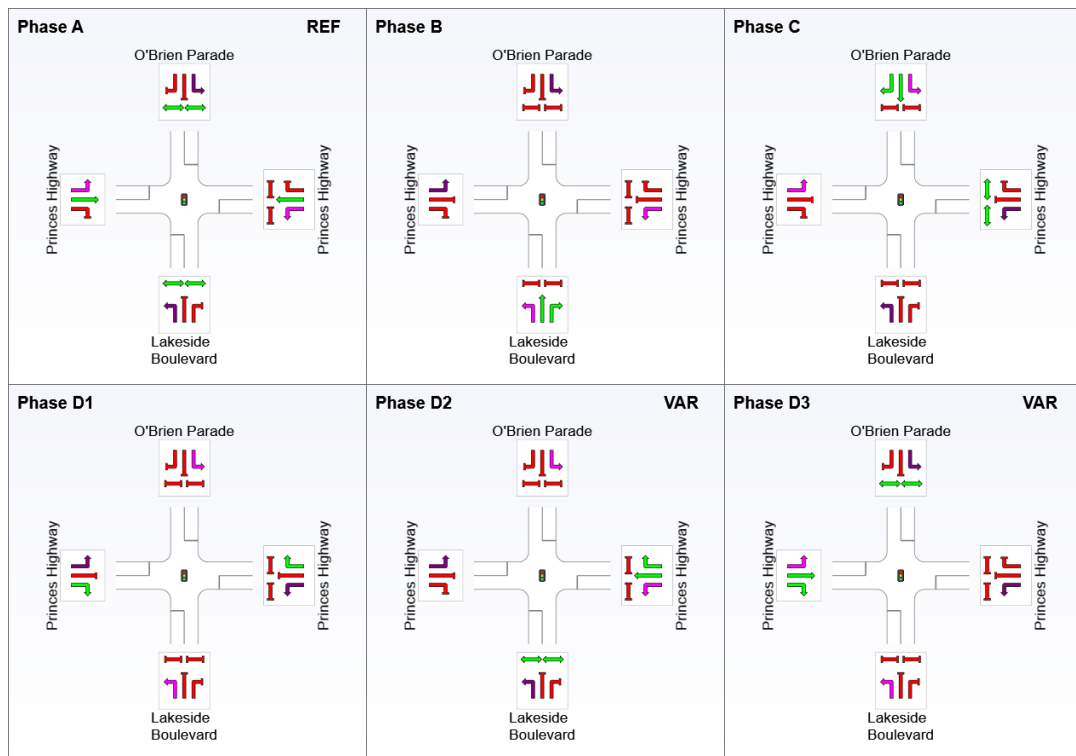
Phase	A	B	C	D1	D3
Phase Change Time (sec)	0	57	78	101	114
Green Time (sec)	50	14	15	6	***
Phase Time (sec)	57	22	22	13	6
Phase Split	48%	18%	18%	11%	5%

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

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Input Phase Sequence

Phase Sequence: OP Sheet
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D1, D2*, D3*



REF: Reference Phase
 VAR: Variable Phase



Site: 7 [Site No. 313 - Princes Highway - Lakeside Boulevard - O'Brien Parade - PM Peak (Site Folder: Anticipated (Existing Layout))]

Princes Highway - Lakeside Boulevard - O'Brien Parade

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: OP Sheet

Reference Phase: Phase A

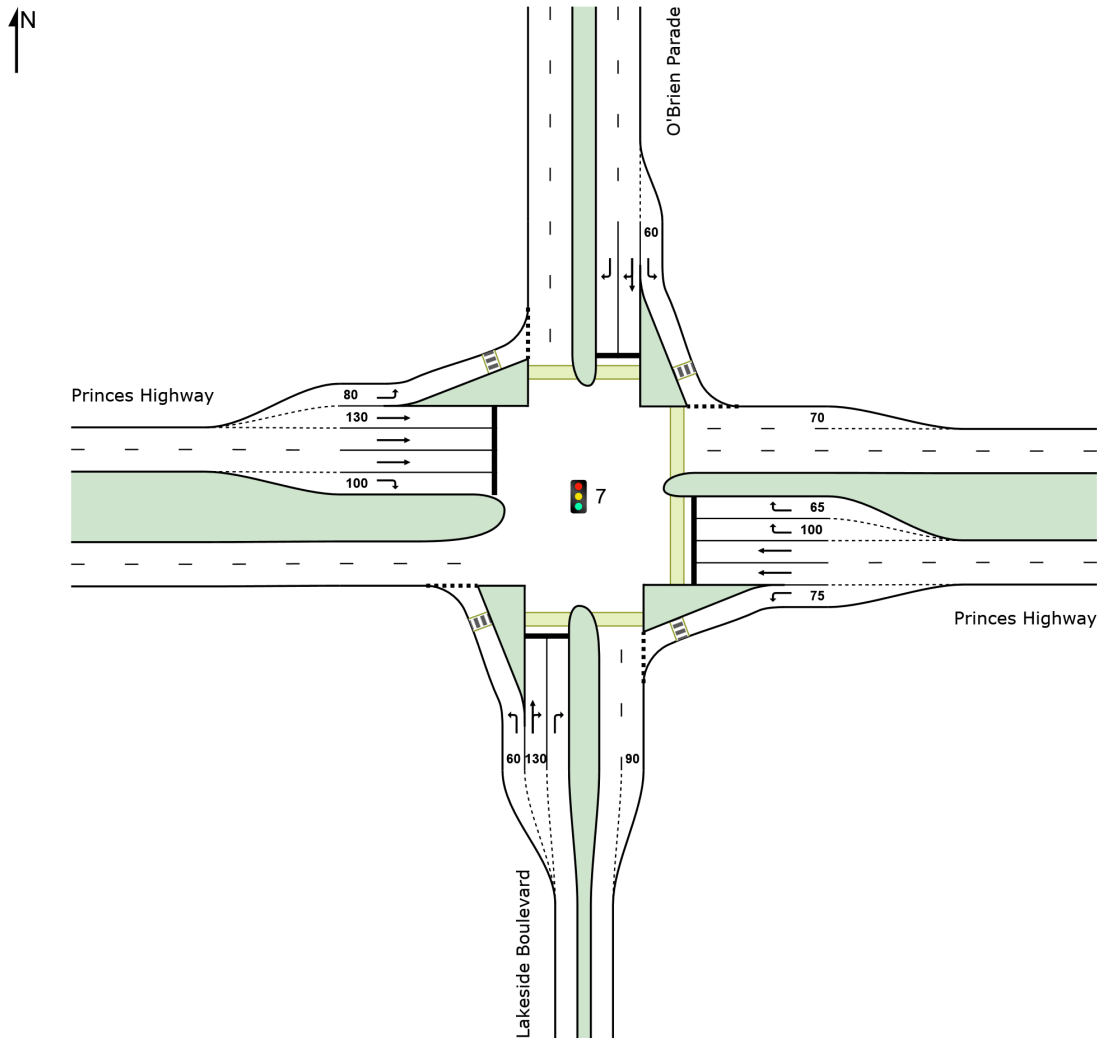
Input Phase Sequence: A, B, C, D1, D2*, D3*

Output Phase Sequence: A, B, C, D1, D3*

(* Variable Phase)

Site Layout

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



Lane Use and Performance													
	DEMAND FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV] %						[Veh Dist]					
South: Lakeside Boulevard													
Lane 1	157	3.0	866	0.181	100	14.6	LOS B	3.8	27.0	Short	60	0.0	NA
Lane 2	160	3.0	215	0.745	100	62.8	LOS E	9.7	69.4	Short	130	0.0	NA
Lane 3	158	3.0	212	0.745	100	63.9	LOS E	9.6	68.7	Full	300	0.0	0.0
Approach	475	3.0		0.745		47.2	LOS D	9.7	69.4				
East: Princes Highway													
Lane 1	267	3.0	1312	0.204	100	11.8	LOS B	4.1	29.8	Short	75	0.0	NA
Lane 2	433	3.0	592 ¹	0.732	100	35.3	LOS D	21.3	153.1	Full	410	0.0	0.0
Lane 3	473	3.0	646 ¹	0.732	100	36.2	LOS D	23.8	171.2	Full	410	0.0	0.0
Lane 4	104	3.0	167	0.622	100	66.8	LOS E	6.2	44.2	Short	100	0.0	NA
Lane 5	104	3.0	167	0.622	100	66.8	LOS E	6.2	44.2	Short	65	0.0	NA
Approach	1381	3.0		0.732		35.8	LOS D	23.8	171.2				
North: O'Brien Parade													
Lane 1	228	3.0	597	0.383	100	24.6	LOS C	9.4	67.4	Short	60	0.0	NA
Lane 2	154	3.0	233	0.661	100	59.0	LOS E	9.0	64.3	Full	105	0.0	0.0
Lane 3	150	3.0	227	0.661	100	60.9	LOS E	8.8	62.9	Full	105	0.0	0.0
Approach	533	3.0		0.661		44.8	LOS D	9.4	67.4				
West: Princes Highway													
Lane 1	174	3.0	1343	0.129	100	8.8	LOS A	1.4	10.1	Short	80	0.0	NA
Lane 2	227	3.0	813	0.279	43 ⁶	26.2	LOS C	8.6	61.5	Short	130	0.0	NA
Lane 3	530	3.0	813	0.652	100	29.3	LOS C	24.5	176.0	Full	500	0.0	0.0
Lane 4	526	3.0	805	0.652	100	29.2	LOS C	24.2	173.7	Full	500	0.0	0.0
Lane 5	224	3.0	303	0.740	100	61.3	LOS E	13.1	94.3	Short	100	0.0	NA
Approach	1681	3.0		0.740		31.0	LOS C	24.5	176.0				
Intersection	4069	3.0		0.745		36.3	LOS D	24.5	176.0				

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.

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

Queue Model: SIDRA Standard.

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

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

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

⁶ Lane under-utilisation due to downstream effects

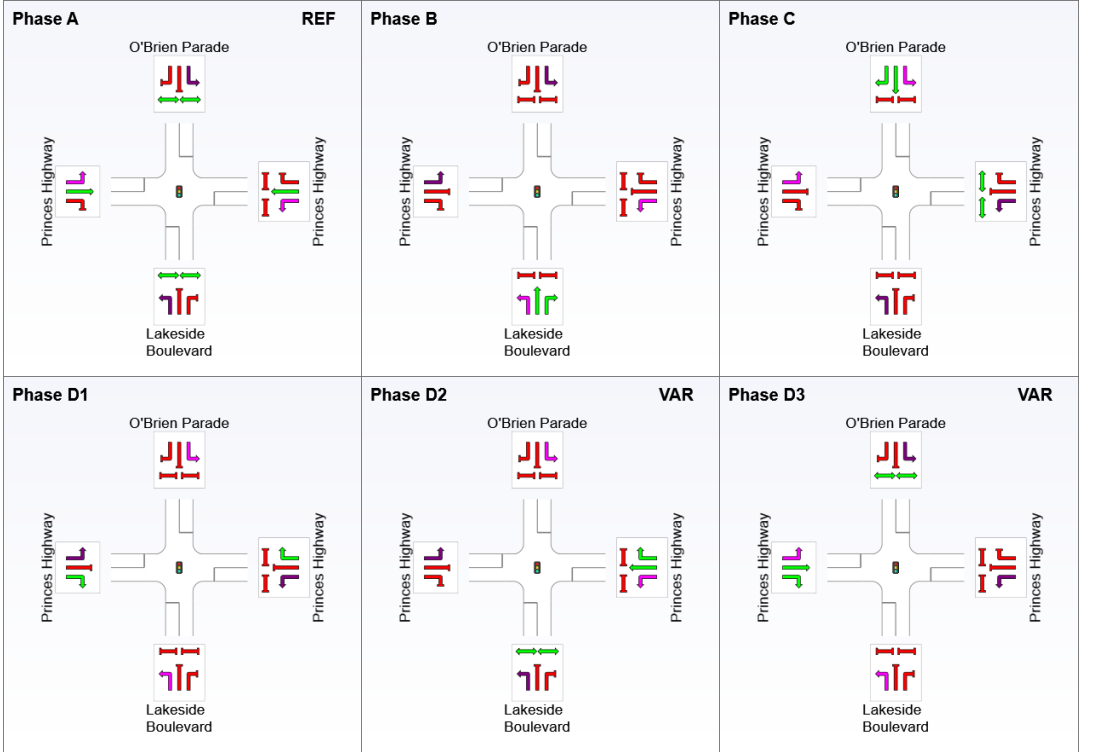
Phase Timing Summary

Phase	A	B	C	D1	D3
Phase Change Time (sec)	0	49	70	93	111
Green Time (sec)	42	14	15	11	2
Phase Time (sec)	49	22	22	18	9
Phase Split	41%	18%	18%	15%	8%

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

Input Phase Sequence

Phase Sequence: OP Sheet
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D1, D2*, D3*



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

USER REPORT FOR NETWORK SITE

All Movement Classes

 Project: 220269_Mulcahy Road SIDRA Analysis_230821 Template: SIDRA Results (LS)

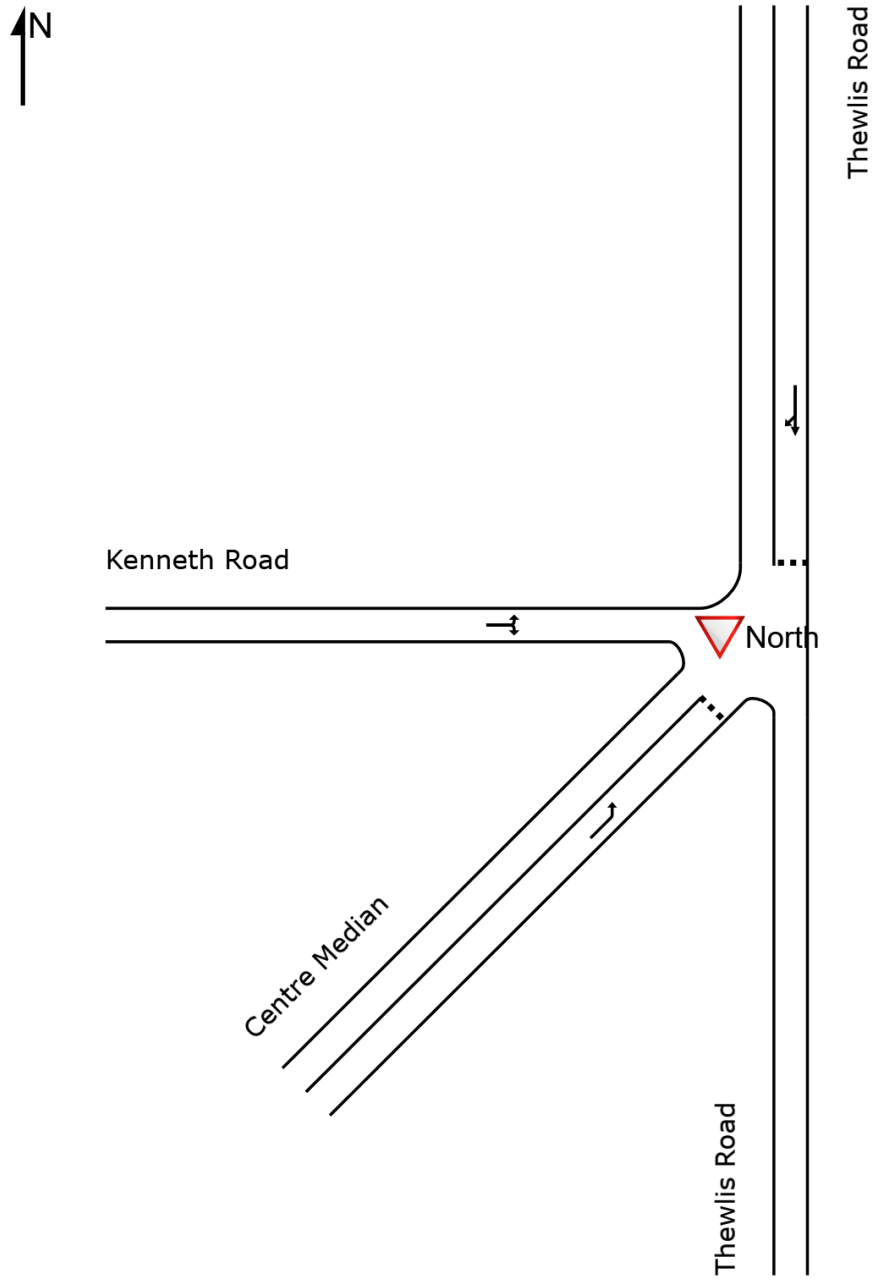
 Site: North [Thewlis Road / Kenneth Road (North) (Site Folder: Anticipated (Ultimate Conditions))]

 Network: 4 [Thewlis Road - Kenneth Road Staged T - Anticipated Interim (Network Folder: Anticipated)]

Thewlis Road / Kenneth Road
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
North: Thewlis Road															
Lane 1	299	1.0	299	1.0	620	0.482	100	11.0	LOS B	1.0	6.9	Full	500	0.0	0.0
Approach	299	1.0	299	1.0		0.482		11.0	LOS B	1.0	6.9				
West: Kenneth Road															
Lane 1	791	1.0	791	1.0	1844	0.429	100	5.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	791	1.0	791	1.0		0.429		5.8	NA	0.0	0.0				
SouthWest: Centre Median															
Lane 1	166	1.0	166	1.0	650	0.256	100	6.7	LOS A	0.4	2.9	Full	8	0.0	2.0
Approach	166	1.0	166	1.0		0.256		6.7	LOS A	0.4	2.9				
Intersection	1256	1.0	1256	1.0		0.482		7.2	NA	1.0	6.9				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

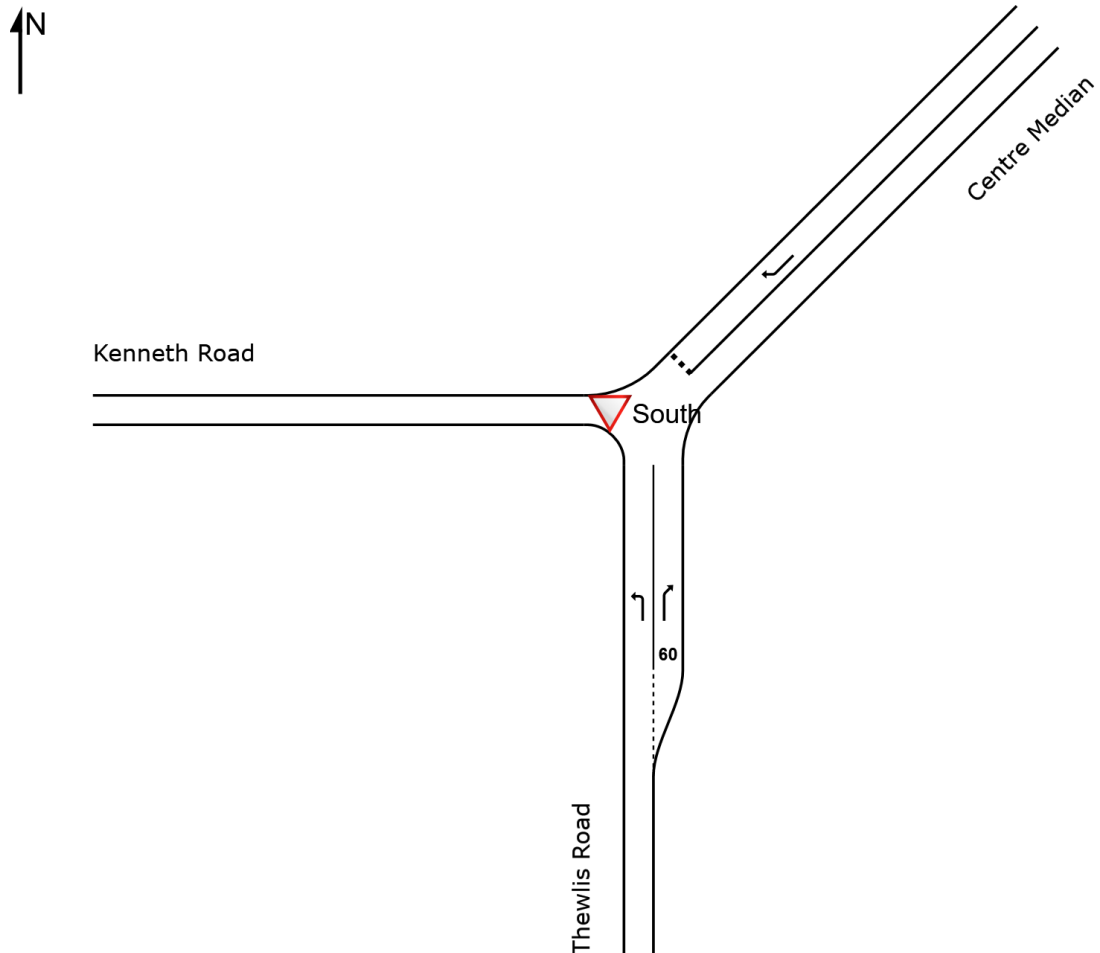
▼ Site: South [Thewlis Road / Kenneth Road (South) (Site Folder: Anticipated (Ultimate Conditions))]

■ Network: 4 [Thewlis Road - Kenneth Road Staged T - Anticipated Interim (Network Folder: Anticipated)]

Thewlis Road / Kenneth Road
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m	m	%	%	
South: Thewlis Road															
Lane 1	708	1.0	708	1.0	1844	0.384	100	5.6	LOS A	0.0	0.0	Full	125	0.0	0.0
Lane 2	166	1.0	166	1.0	1860	0.089	100	5.0	LOS A	0.0	0.0	Short	60	-2.0 ^{N3}	NA
Approach	875	1.0	875	1.0		0.384		5.5	NA	0.0	0.0				
NorthEast: Centre Median															
Lane 1	56	1.0	56	1.0	526	0.106	100	6.5	LOS A	0.1	0.9	Full	8	0.0	0.0
Approach	56	1.0	56	1.0		0.106		6.5	LOS A	0.1	0.9				
Intersection	931	1.0	931	1.0		0.384		5.5	NA	0.1	0.9				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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


^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

USER REPORT FOR NETWORK SITE

All Movement Classes

 Project: 220269_Mulcahy Road SIDRA Analysis_230821 Template: SIDRA Results (LS)

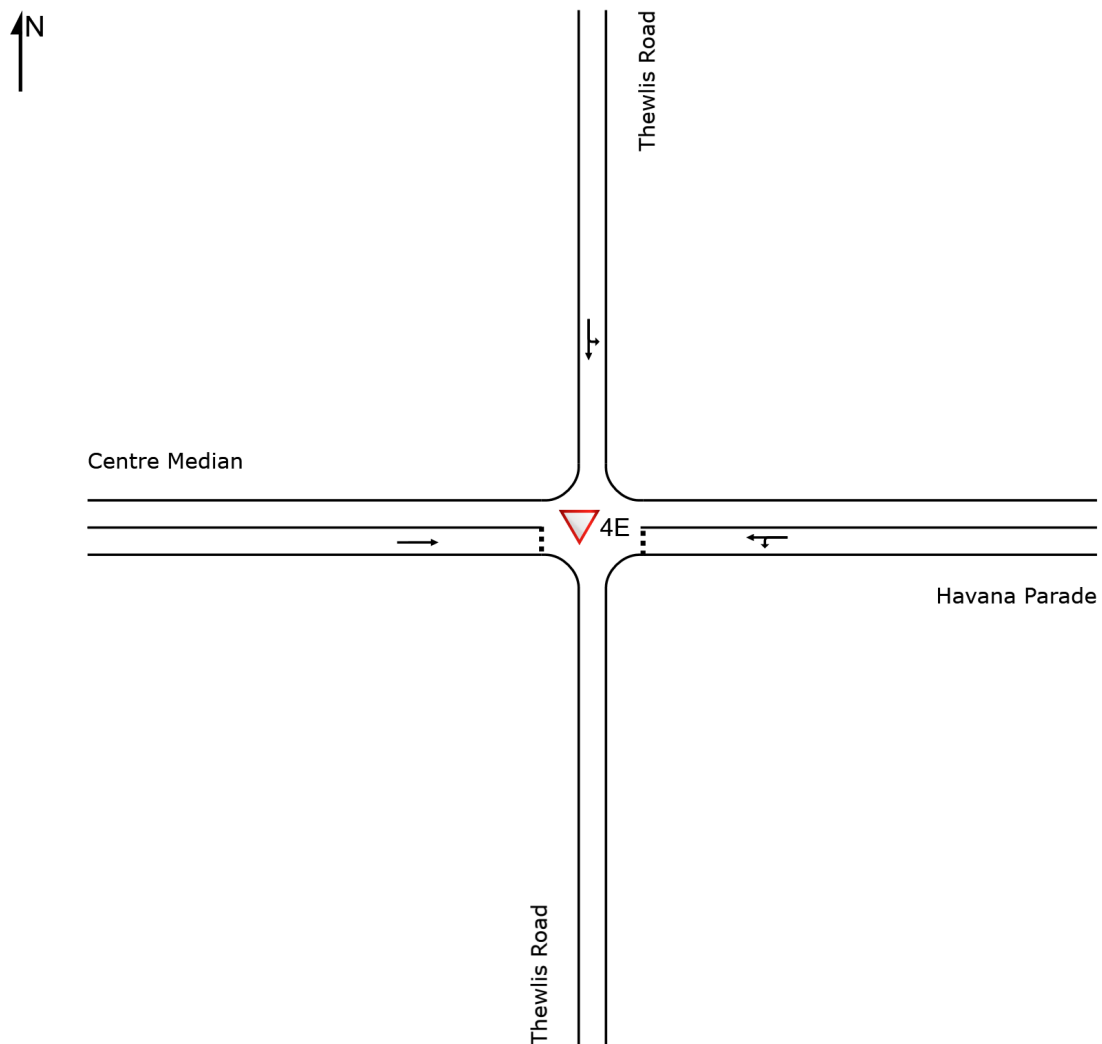
 Site: 4E [Havana Parade - Thewlis Road (East) (Site Folder: Anticipated (Ultimate Conditions))]

 Network: 3 [Havana Parade - Thewlis Road Staged T - Anticipated (Network Folder: Anticipated)]

Havana Parade - Thewlis Road (East)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total HV]	%	[Total HV]	%	veh/h	v/c	%	sec		[Veh	Dist]		m	%	%
East: Havana Parade															
Lane 1	406	1.0	406	1.0	701	0.580	100	12.2	LOS B	3.4	23.9	Full	370	0.0	0.0
Approach	406	1.0	406	1.0		0.580		12.2	LOS B	3.4	23.9				
North: Thewlis Road															
Lane 1	915	1.0	915	1.0	1926	0.475	100	0.7	LOS A	0.0	0.0	Full	125	0.0	0.0
Approach	915	1.0	915	1.0		0.475		0.7	NA	0.0	0.0				
West: Centre Median															
Lane 1	224	1.0	224	1.0	594	0.378	100	7.4	LOS A	1.5	10.9	Full	6	0.0	27.1
Approach	224	1.0	224	1.0		0.378		7.4	LOS A	1.5	10.9				
Intersection	1545	1.0	1545	1.0		0.580		4.7	NA	3.4	23.9				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

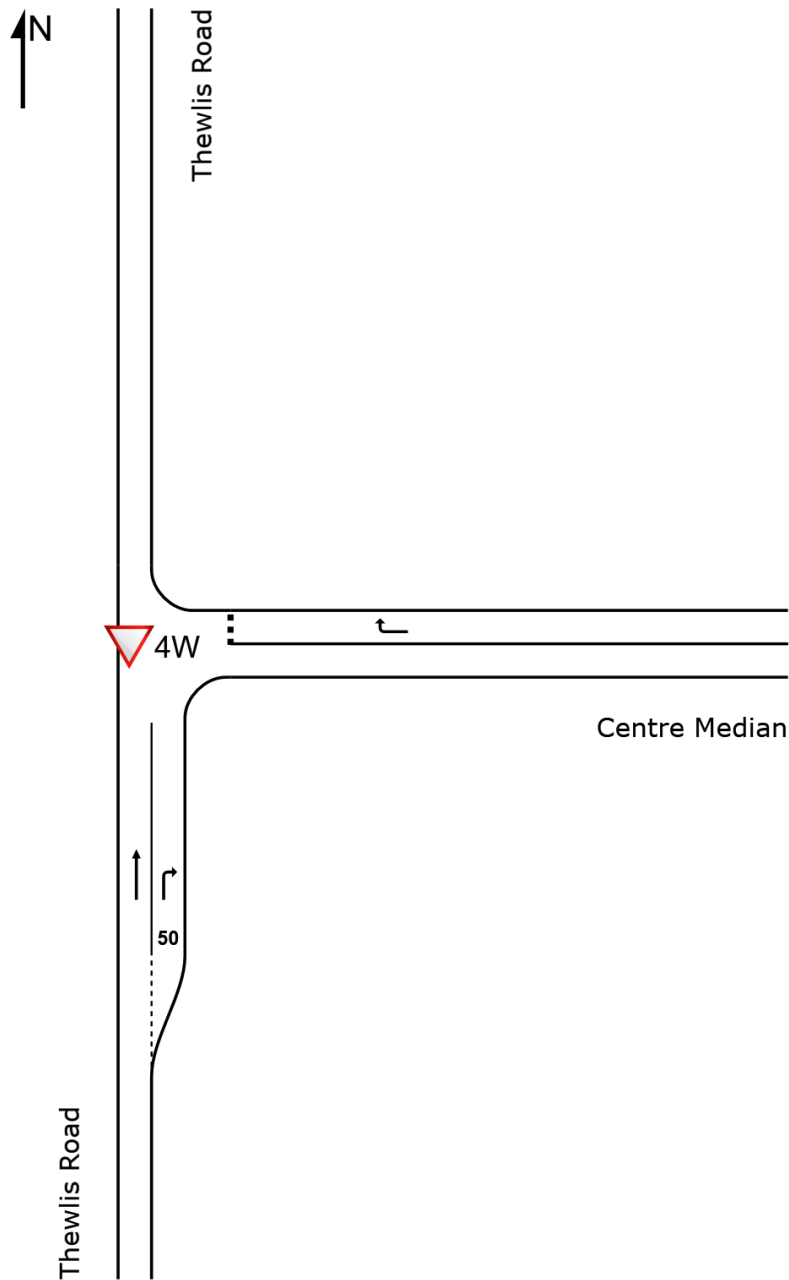
▼ Site: 4W [Havana Parade - Thewlis Road (West) (Site Folder: Anticipated (Ultimate Conditions))]

■ Network: 3 [Havana Parade - Thewlis Road Staged T - Anticipated (Network Folder: Anticipated)]

Havana Parade - Thewlis Road (West)
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m	m	%	%	
South: Thewlis Road															
Lane 1	724	1.0	724	1.0	1937	0.374	100	0.1	LOS A	0.0	0.0	Full	235	0.0	0.0
Lane 2	224	1.0	224	1.0	1344	0.167	100	5.8	LOS A	0.0	0.0	Short	50	-27.1 ^{N3}	NA
Approach	948	1.0	948	1.0		0.374		1.4	NA	0.0	0.0				
East: Centre Median															
Lane 1	151	1.0	151	1.0	696	0.216	100	5.6	LOS A	0.7	5.0	Full	6	0.0	0.0
Approach	151	1.0	151	1.0		0.216		5.6	LOS A	0.7	5.0				
Intersection	1099	1.0	1099	1.0		0.374		2.0	NA	0.7	5.0				

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

Lane LOS values are based on average delay per lane.

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

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

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.