Economic Development Queensland

Oonoonba
Urban Development Area
Infrastructure Plan Background Report

Effective August 2021

Queensland Government

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1 Preliminary

1.1 Oonoonba Urban Development Area

The Oonoonba Urban Development Area (UDA) was declared on 23 April 2010 under the *Urban Land Development Act 2007* (since repealed and replaced with the *Economic Development Act 2012*). The UDA comprises approximately 83 hectares of land and is bounded by the Ross River to the west and north, a rail line and Abbott Street road corridor to the east, and Riverwood Drive and Viewpoint Terrace to the south. A map of the UDA is Appendix A.

The Oonoonba UDA Development Scheme (development scheme) is applicable to all land within the boundaries of the UDA as well as to development outside the UDA if that development is declared to be UDA-associated development. The development scheme became effective on the 15 April 2011.

The Development Charges and Offset Plan (DCOP) provides guidance on infrastructure matters by stating the development charges applicable to development within the UDA, identifying any offsetable infrastructure within the water supply, sewerage, stormwater, transport, parks and community facilities networks made necessary by development of the UDA as well as matters relevant to calculating a credit, offset or refund for the provision of offsetable infrastructure.

Development of the Oonoonba UDA is partially complete with approximately 440 lots already developed. Many of these lots have dwellings constructed or under construction. Where infrastructure necessary to service the UDA has already been constructed, it will be identified as existing infrastructure.

1.2 Purpose of Infrastructure Planning Background Report (IPBR)

This IPBR will assist users of the development scheme and the DCOP by documenting information relevant to:

- the infrastructure planning undertaken for the Oonoonba UDA
- the determination of development charges for the Oonoonba UDA.

2 Growth projections

2.1 Introduction

The projections of future residential and non-residential growth in the Oonoonba UDA provide a consistent basis for the planning of infrastructure to service the UDA. The following section is a summary of the growth projections prepared for the UDA.

2.2 Growth projection years

The Oonoonba growth projections were prepared for:

- the base date 2019 and the following projection years:
    - 2021
    - 2026
    - 2031.

2.3 Potential development capacity

The development capacity proposed to be achieved within the UDA is in accordance with The Village Master Plan prepared for the UDA by Brazier Motti, dated 6 August 2018 (Appendix B).

The master plan was prepared having regard to the land use and built form requirements of the development scheme.

The master plan anticipates a mix of residential dwellings, commercial, retail, a childcare and a community facility.

Assumptions about the timing of development shown in the master plan have been prepared by the MEDQ based on an analysis of market trends.

2.4 Development constraints

The master plan for the UDA has been prepared taking into consideration known development constraints which may limit the potential yield of the site. The key constraint is flooding which impacts a portion of the UDA and has been addressed by the master plan. All other constraints are capable of being mitigated and did not impact the potential development yield of the UDA.

2.5 Growth rates

The rate of growth for residential and non-residential development in the UDA was determined by the MEDQ having regard to local market trends. It has been assumed that the UDA will be fully developed by 2031.

2.6 Growth projection summary

The growth projections for the UDA are summarised in Table 1 and Table 2.

Table 1 – Residential dwellings and non-residential floor space projections

Column 1 Description	Column 2 Projections by year			
	2019 (base date)	2021	2026	2031
Detached dwellings	162	192	468	678
Attached / semi-detached dwellings	158	158	158	158
Retail (GFA)	0	1750	1750	1750
Educational facility (GFA)	409	409	409	409
Community (GFA)	1522	1522	1522	1522

Table 2 – Population and employment projections

Column 1 Description	Column 2 Projections by year			
	2019 (base date)	2021	2026	2031
Population	738	822	1595	2183
Employment	24	54	54	54

3 Demand projections

Growth projections are converted into demand projections to enable infrastructure planning to be undertaken.

Networks express demand using different demand units. The demand units used by each local network in the UDA are as follows:

- for the water supply network, equivalent persons (EP)
- for the sewerage network, equivalent persons (EP)
- for the stormwater quantity network, impervious area expressed in hectares (Imp Ha)
- for the transport network, trips per day (trips per day)
- for the parks and community facilities network, equivalent persons (EP).

The demand generation rates used by each network to convert growth projections into demand are stated in Table 3.

The demand projections for each network are stated in Table 4.

Table 3 – Demand generation rates

Column 1 Development scheme zone / area	Column 2 Demand generation rate for an infrastructure network							
	Water supply network (EP)	Sewerage network (EP)	Stormwater quantity network (Imp Ha / Ha dev area)				Transport network (trips per day)	Parks and community facilities network (EP)
			2019	2021	2026	2031		
Detached dwellings	2.8	2.8	0.3	0.45	0.6	0.7	6.5	2.8
Attached dwellings	1.8	1.8					4.2	1.8
Retail (m^2 GFA)	0.021	0.0274					1	0
Educational facility (m^2 GFA)	0.0135	0.0186					0.2	0
Community (m^2 GFA)	0.0039	0.0039					0.1	0
Source	*Townsville City Plan* *Priority Infrastructure Plan*	*Townsville City Plan* *Priority Infrastructure Plan*	*Calculated impervious fraction for developable area of site based on existing development (2019) and proposed timing of development of the Plan of Development*				*Rates reflect typical industry averages*	*Rates calculated using an occupancy rate of 2.8 and 1.8 persons per dwelling*

Table 4 – Demand projection rates

Existing and projected demand for the water supply network

Column 1 Service catchment	Column 2 Existing and projected demand (EP)			
	2019 (base date)	2021	2026	2031
Oonoonba UDA	749	870	1643	2231

Existing and projected demand for the sewerage network

Column 1 Service catchment	Column 2 Existing and projected demand (EP)			
	2019 (base date)	2021	2026	2031
Oonoonba UDA	752	883	1656	2244

Existing and projected demand for the transport network

Column 1 Service catchment	Column 2 Existing and projected demand (Trips)			
	2019 (base date)	2021	2026	2031
Oonoonba UDA	1951	3896	5690	7055

Existing and projected demand for the parks and community facilities network

Column 1 Service catchment	Column 2 Existing and projected demand (EP)			
	2019 (base date)	2021	2026	2031
Oonoonba UDA	738	822	1595	2183

Existing and projected demand for the stormwater network

Column 1 Service catchment	Column 2 Existing and projected demand (Imp Ha)			
	2019 (base date)	2021	2026	2031
Oonoonba UDA	15.45	23.18	30.90	36.05

4 Desired standard of service

4.1 Water supply

Planning for the water network has been undertaken in accordance with the design standards for the water network stated in the report titled *The Village Oonoonba Townsville – Water Supply and Wastewater Master Planning,* dated 1 March 2016 (Appendix C).

4.2 Sewerage

Planning for the wastewater network has been undertaken in accordance with the design standards for the wastewater network stated in the report titled *The Village Oonoonba Townsville – Water Supply and Wastewater Master Planning,* dated 1 March 2016 (Appendix C).

4.3 Stormwater

Planning for the stormwater network is to be undertaken when the detailed design of the internal road network is undertaken. The design standards will be determined at that time.

4.4 Transport

Planning for the transport network has been undertaken in accordance with the design standards for the transport network stated in the report titled *The Village Oonoonba Townsville – Traffic Impact Assessment report*, dated 24 March 2017 (Appendix D).

4.5 Parks and community facilities

Planning for the parks and community facilities network has been undertaken consistent with the design objectives stated in the report titled *Oonoonba Priority Development Area - Open Space Master Plan Report,* dated August 2015 (Appendix E).

5 Infrastructure planning

5.1 Planning horizon

Infrastructure planning for the Oonoonba UDA was undertaken using a planning horizon of 2031. This horizon was chosen to align with the time period within which the UDA is expected to be fully developed.

5.2 Water supply

Planning of water supply infrastructure to service development within the UDA is documented in the following report:

- *The Village Oonoonba Townsville – Water Supply and Wastewater Master Planning report* prepared by Calibre Consulting, dated 1 March 2016 (Appendix C).

It has been determined that:

- Significant water supply infrastructure has already been constructed to service the UDA. This includes:
    - a major DN600 supply main from the Bottom City/Middle City reservoir, reducing to DN375 before entering the UDA from the north
    - DN200 and DN250 water mains in Darter Street and Riveredge Boulevard to service the initial stages of development
- The remaining northern portions of the UDA will be serviced via new connections to this existing infrastructure. This will include:
    - a DN300 water main approximately 287 metres long – heading west along a future road from Abbott Street to the Holyoak Avenue intersection
    - a DN200 water main approximately 130 metres long – heading north from the existing main at Intelligence Street along Riveredge Boulevard to future roundabout
    - a DN200 water main approximately 175 metres long – heading north along Darter Street from Lawrie Avenue to Memorial Square
    - a DN250 water main approximately 330 metres long – heading west along future road from Holyoak Avenue to Riveredge Boulevard
    - a DN250 water main approximately 115 metres long – from Abbott Street to Lakeside Drive
    - DN150, DN100 and OD63 water reticulation mains to service all lots.

A determination of whether the identified infrastructure is offsetable or non-offsetable infrastructure is provided in Table 5.

5.3 Sewerage

Planning of sewerage infrastructure to service development within the UDA is documented in the:

- *The Village Oonoonba Townsville – Water Supply and Wastewater Master Planning report* prepared by Calibre Consulting, dated 1 March 2016 (Appendix C)

It has been determined that:

- Significant sewerage infrastructure has already been constructed to service the completed stages of development within the UDA. This includes:
    - sewage pump station PS1 located on the northern side of Riveredge Boulevard
    - an existing lift station adjacent to Darter Street (PS2) which discharges wastewater into an existing DN225 gravity main in Darter Street and then to PS1
    - DN225 gravity mains within the existing stages of development.
- The remaining portions of the UDA will be serviced via new connections to this existing infrastructure. This includes:
    - an additional lift station (PS4) within Skinny Thomson Park
    - an extension of the DN225 gravity main to PS4 – approximately 115 metres long
    - an extension of the DN225 gravity main adjacent to Darter Street – approximately 255 metres long
    - an extension of the DN225 gravity main from Lakeside Drive to Darter Street – approximately 145 metres long
    - DN150 gravity mains to service all lots.
- The existing external network has sufficient capacity to service the development.

A determination of whether the identified infrastructure is offsetable or non-offsetable infrastructure is provided in Table 5.

5.4 Stormwater

Stormwater network infrastructure is to be planned and provided when the internal road network is designed and constructed. Some piped drainage, structures, culverts and water sensitive urban design (WSUD) features have already been provided as part of the construction of Riveredge Boulevard.

5.5 Transport

Planning of transport infrastructure (roads) to service development within the UDA is documented in the:

- *The Village Oonoonba Townsville – Traffic Impact Assessment report* prepared by Calibre Consulting, dated 24 March 2017 (Appendix D)

The report considered the impact of traffic from the proposed development on surrounding roads and intersections. The report concluded that:

- All roads (except for Abbott Street) are anticipated to accommodate the development traffic volumes.
- Abbott Street is forecast to exceed its design capacity by 2023 even without the proposed development. Improvements to Abbott Street are however constrained by the Ross River bridge structure that is one land in each southbound and northbound direction. Providing additional capacity within Abbott Street would require construction of another bridge. This is considered to be a Council responsibility.
- The intersection at Lakeside Drive and Riveredge Boulevard be signalised, with a single lane approach for all movements and the existing left slip lane at the Riveredge Boulevard approach extended to 20 metres.
- The intersection arrangement at the Abbott Street and Lakeside Drive intersection be upgraded to include a roundabout, with an additional approach lane at the southern approach of Abbott Street and an additional exit lane on the northern approach. Given the need for Council to upgrade Abbott Street to provide additional capacity, it is considered that the intersection works would be best undertaken by Council at that time.
- The intersection arrangement at the Railway Avenue, Boundary Street and Saunders Street intersection requires upgrading to service base traffic growth (excluding development from the UDA). The required works include an additional short lane for northbound traffic both on the approach and exit of Railway Avenue, an extra right turn short lane on the western approach of Boundary Street and various lengthening of existing short lanes, this is considered to be a Council responsibility. With the inclusion of traffic from the UDA, an additional straight through short lane on the northern approach of Railway Avenue and a short exit lane on the southern approach will be required.
- The intersection arrangement at the Railway Avenue, Queens Road and Putt Street intersection be upgraded to include an additional approach lane on the southern approach of Railway Avenue, a short exit lane on the northern approach and lengthening of existing short lanes on both the northern and western approaches. These works are required to accommodate growth from the wider Council area as well as the UDA at 2033. Having regard to the demand for these works and their timeframe, this is considered to be a Council responsibility.
- New internal local access streets are required to service the development.

Planning of transport infrastructure (off-road pathways) to service development within the UDA is documented in the *Oonoonba Priority Development Area Open Space Master Plan* prepared by Place Design Group, dated August 2015 (Appendix E). It was concluded that the following infrastructure is required:

- Approximately 1750 metres of 2.5 metre wide shared pathway (providing pedestrian and cyclist circulation) along River Esplanade.
- Approximately 700 metres of 2.0 metre wide shared pathway (providing pedestrian and cyclist circulation) along Holyoak Avenue.

EDQ has also determined that a pedestrian crossing over the railway line connecting the existing shared path on Abbott Street to the site is required.

A determination of whether the identified infrastructure is offsetable or non-offsetable infrastructure is provided in Table 5.

5.6 Parks and community facilities

Planning of parks and community infrastructure to service development within the UDA is documented in the:

- *Oonoonba Priority Development Area, Open Space Master Plan Report* – prepared by Place Design Group, dated August 2015 (Appendix E)

It has been determined that:

- a number of local recreation and neighbourhood parks are required to service the future development within the UDA. These parks are:
    - Village Green (Neighbourhood recreation park)
    - Memorial Square (Neighbourhood recreation park)
    - Skinny Thomas Park (Linear park)
    - The Glen (Neighbourhood recreation park)
    - Riverwalk Park (Linear park).

A determination of whether the identified infrastructure is offsetable or non-offsetable infrastructure is provided in Table 5.

Table 5 – Infrastructure funding determination

Infrastructure network	Infrastructure details	Offsetable / non-offsetable	Funding source
Water supply	Water main (DN300) approximately 287m - west along future road from Abbott Street to Holyoak Avenue intersection	Offsetable	Development charges
	Water main (DN200) approximately 130m - north along Riveredge Boulevarde from the Intelligence Street to future roundabout	Offsetable	Development charges
	Water main (DN200) approximately 175m - north along Darter Street from Lawrie Avenue to Memorial Square	Offsetable	Development charges
	Water main (DN250) approximately 330m - west along future road from Holyoak Avenue to Riveredge Boulevarde	Offsetable	Development charges
	Water main (DN250) approximately 115m - from Abbott Street to Lakeside Drive	Offsetable	Development charges
	Internal water reticulation network - DN150, DN100 and OD63 water mains	Non-offsetable	Developer
Sewerage	Lift station (PS4) - within Skinny Thomson Park	Offsetable	Development charges
	Gravity main (DN225) approximately 115m - extension along Riveredge Boulevarde to PS4	Offsetable	Development charges
	Gravity main (DN225) approximately 255m - north extension adjacent to Darter Street	Offsetable	Development charges
	Gravity main (DN225) approximately 145m - extension from Lakeside Drive to Darter Street	Offsetable	Development charges
	Internal sewerage reticulation network - DN150 gravity mains	Non-offsetable	Developer
Transport	Shared path - 2.5m wide along River Esplanade	Offsetable	Development charges
	Shared path - 2.0m wide along Holyoak Avenue	Offsetable	Development charges
	Pedestrian Crossing over the railway line to Abbott Street	Offsetable	Development charges
	Signalised Intersection - Lakeside Drive to Riveredge Boulevarde	Offsetable	Development charges
	Internal local access roads	Non-offsetable	Developer
Parks and open space	Neighbourhood recreational park - Village Green	Offsetable	Development charges
	Neighbourhood recreational park - Memorial Square	Offsetable	Development charges

	Linear park - Skinny Thomas Park	Offsetable	Development charges
	Neighbourhood recreational park - The Glen	Offsetable	Development charges
	Linear park - Riverwalk Park	Offsetable	Development charges
Electricity and gas		Other	Developer
Telecommunications		Other	Developer

6 Infrastructure costs

6.1 Cost of land

The cost of future infrastructure (land) was determined for each network as follows:

A land value of $329,562 per hectare has been determined by EDQ.[1]

6.2 Cost of works

The cost of future infrastructure (works) for each network is stated in Table 6.

Table 6 – Cost of future offsetable infrastructure (works)

<table>
<tr><th>Column 1
Network</th><th>Column 2
Report</th></tr>
<tr><td>Water supply</td><td>The following unit rates have been used by Economic Development Queensland to calculate the cost of the identified future water infrastructure:
DN300 water main - $555 per metre (July 2019).
DN250 water main - $360 per metre (July 2019).
DN200 water main - $269 per metre (July 2019).</td></tr>
<tr><td>Sewerage</td><td>The following unit rates have been used by Economic Development Queensland to calculate the cost of the identified future sewerage infrastructure:
DN225 gravity main - $520 per metre (July 2019).
The following future offsetable infrastructure has been costed by external consultants using unit rates based on previous construction projects:
Lift station - The following estimate was provided by Northern Consulting:
<table><tr><th>Item</th><th>Amount</th></tr><tr><td>Civil construction cost</td><td>$ 475,000</td></tr><tr><td>Electrical cost</td><td>$ 30,000</td></tr><tr><td>Total</td><td>$ 505,000</td></tr></table></td></tr>
<tr><td>Transport</td><td>The following unit rates have been used by Economic Development Queensland to calculate the cost of the identified future roads infrastructure:
2.5m wide shared path - $389 per metre (July 2019).
2.0m wide shared path - $312 per metre (July 2019).
The following future offsetable infrastructure has been costed by external consultants using unit rates based on previous construction projects:</td></tr>
</table>

[1] The Village Road Infrastructure Charges Final Offset Submission prepared by Continuum Group, dated November 2019.

<table>
<tr><th>Column 1
Network</th><th>Column 2
Report</th></tr>
<tr><td></td><td>
Pedestrian crossing - The following estimate was provided by Queensland Rail:
<table>
<tr><th>Item</th><th>Amount</th></tr>
<tr><td>Civil works</td><td>$ 1,200,000</td></tr>
<tr><td>Total</td><td>$ 1,200,000</td></tr>
</table>
Signalised intersection - The following estimate was provided by Northern Consulting:
<table>
<tr><th>Item</th><th>Amount</th></tr>
<tr><td>Civil works</td><td>$ 1,667,475</td></tr>
<tr><td>Signals</td><td>$ 900,000</td></tr>
<tr><td>Streetlights</td><td>$ 290,000</td></tr>
<tr><td>Total</td><td>$ 2,857,475</td></tr>
</table>
</td></tr>
<tr><td>Parks and land for community facilities</td><td>The following unit rates have been used by Economic Development Queensland to calculate the cost of the identified future parks infrastructure:
Neighbourhood recreation parks - $743,981 per hectare (July 2019).
Linear parks - $159,425 per hectare (July 2019).
</td></tr>
</table>

6.3 On-cost allowance

On-costs represent the owner's project costs and may include:

- survey for the work
- geotechnical investigations for the work
- strategic planning
- detailed design for the work
- project management, procurement and contract administration
- environmental investigations for the work; and
- portable long service leave payment for a construction contract for the work.

The on-costs allowances that have been applied to infrastructure costs in the UDA are stated in Table 7.

Table 7 – On-cost allowance

Network	On-costs allowance
Water supply	13%
Sewerage	13%
Stormwater	No future offsetable infrastructure has been identified.
Transport	13%
Parks and community facilities	10%

6.4 Contingency allowance

A contingency allowance is included in the cost of future infrastructure works to deal with known risks. The contingency allowance typically reduces in accordance with the level of planning undertaken for the infrastructure item. The level of contingency allowance applied for infrastructure works in each network are stated in Table 8.

Table 8 – Contingency allowance

Network	Contingency allowance
Water supply	25%
Sewerage	25%
Stormwater	No future offsetable infrastructure has been identified.
Transport	25%
Parks and land for community facilities	10%

7 Development charges

Development charges are imposed on development in the UDA to fund offsetable infrastructure and other services which have been provided or are planned to be provided to service the UDA. The following charges types make up a development charge and apply to development in the UDA.

- infrastructure charges.

The infrastructure charges for the Oonoonba UDA generally align with the charge rates stated in Townsville City Councils Infrastructure Charges Resolution

7.1 Funding offsetable infrastructure

Infrastructure charges imposed on development within the Oonoonba UDA will fund the provision of offsetable infrastructure made necessary by development of the Oonoonba UDA. Offsetable infrastructure is identified in Table 9 - Schedule of works.

Table 9 – Schedule of works

Schedule of future offsetable infrastructure works – Water

DCOP ID	Map number	Infrastructure type	Infrastructure description	Estimated timing	Land cost	Works base cost	Works on-costs	Works contingency	Total works cost[1]	Estimated cost[2]
WM002	2	Water main (DN300)	Water main DN300 (287 m) Abbott Street to Holyoak Avenue	2025	N/A	$159,227	$20,700	$44,982	$224,908	$224,908
WM003	2	Water main (DN200)	Water main DN200 (130 m) Intelligence Street to future roundabout	2027	N/A	$34,956	$4,544	$9,875	$49,376	$49,376
WM004	2	Water main (DN200)	Water main DN200 (175 m) Lawrie Avenue to Memorial Square	2024	N/A	$47,057	$6,117	$13,294	$66,468	$66,468
WM005	2	Water main (DN250)	Water main DN250 (330 m) Holyoak Avenue to Riveredge Boulevarde	2026	N/A	$118,899	$15,457	$33,589	$167,945	$167,945
WM006	2	Water main (DN250)	Water main DN250 (115 m) Abbott Street to Lakeside Drive	2021	N/A	$41,434	$5,386	$11,705	$58,526	$58,526

Notes:

1 – The total works cost is the sum of the following: construction cost, construction on costs and construction contingency.

2 – The estimated cost is the sum of the following: land cost and total works cost. This is expressed in current cost terms as at the base date (FY 2019/20).

Schedule of future offsetable infrastructure works – Sewer

DCOP ID	Map number	Infrastructure type	Infrastructure description	Estimated timing	Land cost	Works base cost	Works on- costs	Works contingency	Total works cost[1]	Estimated cost[2]
PS4	3	Lift station	Lift station	2027	N/A	$505,000	$65,650	$142,663	$713,313	$713,313
SG002	3	Gravity main (DN225)	Gravity main DN225 (115 m) Riveredge Boulevarde to PS4	2027	N/A	$59,768	$7,770	$16,885	$84,423	$84,423
SG003	3	Gravity main (DN225)	Gravity main DN225 (255 m) Lawrie Avenue to Memorial Square	2024	N/A	$132,530	$17,229	$37,440	$187,198	$187,198
SG004	3	Gravity main (DN225)	Gravity main DN225 (145 m) Lakeside Drive to Darter Street	2021	N/A	$75,360	$9,797	$21,289	$106,446	$106,446

Notes:

1 – The total works cost is the sum of the following: construction cost, construction on costs and construction contingency.

2 – The estimated cost is the sum of the following: land cost and total works cost. This is expressed in current cost terms as at the base date (FY 2019/20).

Schedule of future offsetable infrastructure works – Transport

DCOP ID	Map number	Infrastructure type	Infrastructure description	Estimated timing	Land cost	Works base cost	Works on- costs	Works contingency	Total works cost[1]	Estimated cost[2]
PC001	4	2.5 m wide shared path	2.5 m wide shared path along River Esplanade	2021	N/A	$681,514	$88,597	$192,528	$962,639	$962,639
PC002	4	2.0 m wide shared path	2.0 m wide shared path along Holyoak Avenue	2021	N/A	$218,084	$28,351	$61,609	$308,044	$308,044
PC003	4	Pedestrian crossing (over rail line)	Pedestrian crossing over rail line	2024	N/A	$1,200,000	$156,000	$339,000	$1,695,000	$1,695,000
RI001	4	Intersection (signalised)	Signalised Intersection Lakeside Drive to Riveredge Boulevard	2025	$71,218	$2,857,475	$371,472	$807,237	$4,036,183	$4,107,401

Notes:

1 – The total works cost is the sum of the following: construction cost, construction on costs and construction contingency.

2 – The estimated cost is the sum of the following: land cost and total works cost. This is expressed in current cost terms as at the base date (FY 2019/20).

Schedule of future offsetable infrastructure works – Parks and community facilities

DCOP ID	Map number	Infrastructure type	Infrastructure description	Estimated timing	Land cost	Works base cost	Works on-costs	Works contingency	Total works cost[1]	Estimated cost[2]
PO-001	5	Neighbourhood recreation park	Village Green	2022	$38,757	$624,944	$62,494	$68,744	$756,182	$794,939
PO-003	5	Neighbourhood recreation park	Memorial Square	2025	$22,424	$361,575	$36,158	$39,773	$437,506	$459,930
PO-004	5	Linear park	Skinny Thomas Park	2020	$37,701	$227,977	$22,798	$25,077	$275,852	$313,553
PO-005	5	Neighbourhood recreation parks	The Glen	2026	$59,584	$360,299	$36,030	$39,633	$435,962	$495,546
PO-006	5	Linear park	Riverwalk Park	2027	$52,228	$315,820	$31,582	$34,740	$382,142	$434,370

Notes:

1 – The total works cost is the sum of the following: construction cost, construction on costs and construction contingency.

2 – The estimated cost is the sum of the following: land cost and total works cost. This is expressed in current cost terms as at the base date (FY 2019/20).

7.2 Funding non-offsetable infrastructure and other infrastructure

Non-offsetable infrastructure and other infrastructure that is made necessary by development of the Oonoonba UDA will be delivered and/or funded by parties undertaking development. Non-offsetable infrastructure and other infrastructure is identified in Table 5 - Infrastructure funding determination.

Appendix A – Oonoonba UDA boundary map

Legend

Oonoonba Urban Development Area (UDA) boundary

Imagery: August 2020, 10cm resolution

0 25 50 100 150 200

Metres

Map created at: **A3**

Coordinate System: GCS GDA 1994

Datum: GDA 1994

Oonoonba
Urban Development Area

Map produced by the State Development, Infrastructure, Local Government and Planning Spatial Services Unit, 2/03/2021

Queensland Government

Path: S:\Projects\EDQ\Oonoonba\20200207\mxd\20200211_Oonoonba_PDA_A3P.mxd

Appendix B – The Village Master Plan

THE VILLAGE
Riverside. Cityside.

MASTER PLAN

0 25 50m

Lot Type - Front Loaded	W x D	Area (m2)	Stg 1	Stg 2	Stg 3	Stg 4	Stg 5	Stg 6	Stg 7a	Stg 7b	Stg 7c	Stg 7d	Stg 8	Stg 9	Stg10	Stg 11	Stg 12a	Stg 12b	Stg 13	Stg 14	Stg 15	Stg 16	Stg 17	Stg 18a	Stg 18b	Stg 19	Stg 20	Total	%
Premium Traditional 32	20 x 32	640	22		2	1												1						2				28	2.83%
Premium Traditional 25	20 x 25	500	2																									2	0.20%
Traditional 32	18 x 32	576	5								2						4				2							13	1.32%
Traditional 25	18 x 25	450		1	1	1					1						2											6	0.61%
Premium Courtyard 32	16 x 32	512							2	1								1		5	1	3	4			2		19	1.92%
Premium Courtyard 25	16 x 25	400							4	2			2	2		1			2		1	1				1		16	1.62%
Courtyard 32	15 x 32	480	7		4	4	1	12			3		1	1		2	4	6	1	5	8	11	7	10	10	2		99	10.02%
Courtyard 25	15 x 25	375	10	1	6	1	5	5	2	2	4	5		2	12		2	5	5	3	3	1		2	2	3		81	8.20%
Courtyard 32	13-14.5 x 32											2	1	1		1						2		2	1			10	1.01%
Courtyard 25	13-14.5 x 25																			1	1			1		3		6	0.61%
Premium Villa 32	12.5 x 32	400	1		11	5	2	6	4	4	2		3	4			6	2	2	7	5	15	11	5	8	8		111	11.23%
Premium Villa 25	12.5 x 25	312.5	6		7	4	4	7	7	10	4	1	5	4	8	5	4	4	6	5	14	4	3	4	6	5		127	12.85%
Villa 32	10 x 32	320	10		11	4	4	8	5		3		4	9		4			3		1		2					68	6.88%
Villa 25	10 x 25	250			6	8	5	8	10	8	3	7	4	9	17	6	1	2	7	9	6							116	11.74%
Urban (20)	7.5 x 20	150						7	5	2			3															17	1.72%
Urban (15)	10 x 15	150			3	3	6	3								3												18	1.82%
Loft	7 x 10	70		6																								6	0.61%
SoHo	10 x 10	100																									31	31	3.14%
Multi Res																												0	0.00%
Lot Type - Laneways																												0	0.00%
Premium Villa 32 (Laneway)	12.5 x 32	400																										0	0.00%
Premium Villa 25 (Laneway)	12.5 x 25	312.5												1					1		1							3	0.30%
Villa 32 (Laneway)	10 x 32	320		6																								6	0.61%
Villa 25 (Laneway)	10 x 25	250		8																								8	0.81%
Terrace 32 (Laneway)	7.5 x 32	240		9			4							6		8			1									28	2.83%
Terrace 25 (Laneway)	7.5 x 25	187.5		8			5			2			7	16	7		4	2	2								82	135	13.66%
5m Terrace 32 (Laneway)	5 x 32	160					10									3												13	1.32%
5m Terrace 25 (Laneway)	5 x 25	125					4								12	2		3										21	2.13%
Total			63	39	51	31	50	56	39	31	22	15	30	55	56	35	27	26	30	35	43	37	27	26	27	24	113	988	100.00%

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Appendix C – The Village Oonoonba Townsville, Water Supply and Wastewater Master Planning report

Appendix C The Village Oonoonba Townsville Water Supply and Wastewater Master Planning Report

The Village, Oonoonba, Townsville

Water Supply and Wastewater Master Planning

Prepared by Calibre Consulting
Prepared for Economic Development Queensland (EDQ)

1 March 2016

15-000745-02B
ORIGINAL
Water & Environment

COMMERCIAL IN CONFIDENCE

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DOCUMENT CONTROL

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Issue	Date	Issue Details	Author	Checked	Approved
A	19.01.16	Original	MAH	ABM (RPEQ 13639)	ABM (RPEQ 13639)
B	01.03.16	Modelling Amended	MAH	ABM (RPEQ 13639)	ABM (RPEQ 13639)

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APPENDICES

1 INTRODUCTION

Calibre Consulting (Qld) Pty Ltd has been engaged by Economic Development Queensland (EDQ) to undertake water supply and wastewater master planning in support of the proposed residential community 'The Village', located at Oonoonba, Townsville. Currently Stages 1 – 6 of the development north of Riveredge Boulevard have commenced, with the balance of the developable area (Stages 7-20) situated on Lot 9000 on SP264450, Lot 9001 on SP275839 and Lot 6000 on SP243806.

Refer to **Appendix A** for the proposed master plan layout.

This report identifies the water supply and wastewater infrastructure required to service the proposed master plan area. The objective of this report is to demonstrate that the proposed development can be supported by the existing and/or proposed infrastructure and that the development is compliant with the Townsville City Council guidelines.

2 SITE LOCALITY

The site is located approximately 3km south of the Townsville central business district. The site is located within the suburb of Oonoonba in the Townsville City Council local government area. The site is bound by Riveredge Boulevard to the south, Abbott Street to the east and Ross River to the west and north. The balance site has a total area of approximately 51.5ha and is comprised of the following real property titles:

- Lot 9000 on SP264450;
- Lot 9001 on SP275839; and
- Lot 6000 on SP243806.

Figure 2-1 outlines the approximate location of the site.

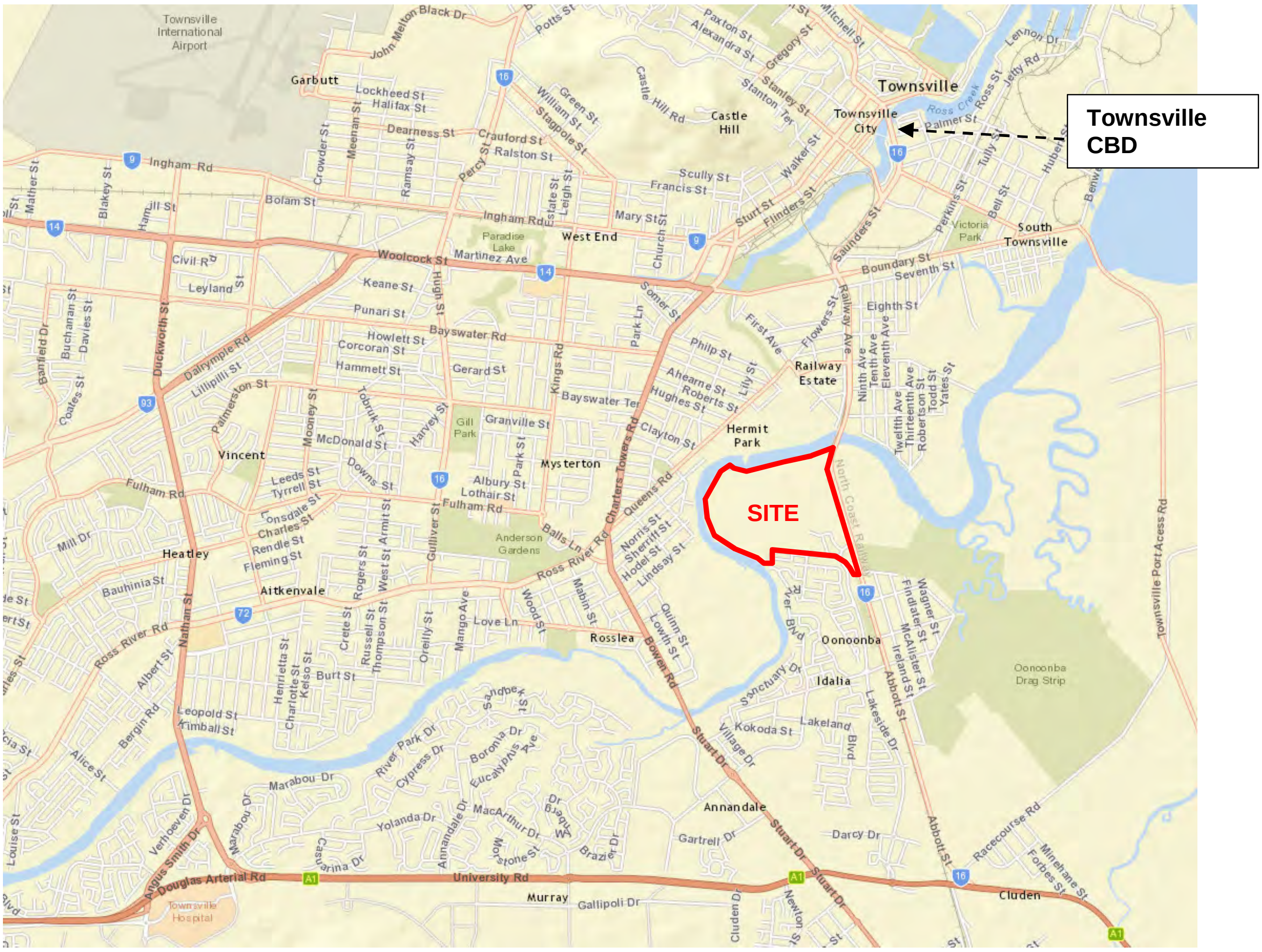


Figure 2-1: Site Locality (Source: Bing Maps)

3 ASSUMPTIONS

This section provides detail of the key assumptions made in developing the water and wastewater service strategies proposed to support The Village Master Plan area.

3.1 PREVIOUS INVESTIGATIONS

The following investigations have been previously completed for The Village Master Plan area and are relevant to the current application:

- DPM Water Pty Ltd (Apr. 2011), ULDA Oonoonba Residential Development – External Water Supply Planning Report; and
- UDP Consulting Engineers (Oct. 2012), Proposed Residential Development, The Village, Oonoonba – Water and Sewerage Master Planning, Report No. ULD100/R01.

3.2 DESIRED STANDARD OF SERVICE

Assessment was undertaken in accordance with *Section 6.4: Development Manual Planning Scheme Policy* of the *Townsville City Plan*. The key criteria from the adopted Desired Standards of Service (DSS) are as follows:

3.2.1 WATER SUPPLY

- Average Day Demand (AD): 1000 L/EP/Day;
- Mean Day Max Month Demand (MDMM): 1350 L/EP/Day;
- Peak Day Demand (PD): 1620 L/EP/Day;
- Peak Hour Demand (PH): 0.048 L/s/EP;
- Residential Fire Flow: 15L/s for 2 hours;
- Commercial Fire Flow: 30L/s for 2 hours;
- Minimum Residual Pressure (Peak Hour Conditions): 22m;
- Minimum Residual Pressure (Fire Flow Conditions): 12m; and
- Maximum Residual Pressure: 80m.

3.2.2 WASTEWATER

- Average Dry Weather Flow (ADWF): 230 L/EP/Day;
- Inflow / Infiltration (I/I): 163 L/EP/Day;
- Peak Wet Weather Flow (PWWF): 5 x ADWF + I/I; and
- Maximum depth of flow in new pipes: 70% depth at PWWF.

4 DEMAND ASSESSMENT

4.1 Equivalent Population Demand Projections

As discussed in **Section 1**, Stages 1 – 6 of The Village have already been developed. These stages consisted of 162 detached residential dwellings and 158 attached/terraced dwellings, with a yield of 738 EP.

The balance of The Village is proposed to occur across a further 14 stages (Stages 7-20) consisting of approximately 497 detached residential dwellings, 171 attached/terraced dwellings, a commercial area, a service station and open space land use. Further information regarding the site layout is presented in **Appendix A**.

For the purpose of this investigation, only the balance (or future Stages 7-20) of The Village will be incorporated within the water supply and wastewater master planning analyses. Stages 1-6 of The Village have been constructed and are considered to not be part of the updated master plan.

The design water supply and wastewater demands were determined generally in accordance with *Townsville City Plan Priority Infrastructure Plan, Part 4 Table 4.2.11.2.1* and *Table 4.2.11.2.2.* The design Equivalent Person (EP) demands for both water and wastewater infrastructure of the proposed development are outlined within **Table 4-1** below.

Table 4-1 – Equivalent Population Demand Projections

Development Use	Quantity	Unit	Water	Wastewater	Water	Wastewater
			EP/Unit	EP/Unit	EP Projection	EP Projection
Detached Residential[1]	543	Single Dwelling	2.8	2.8	1520.4	1520.4
Attached Residential	171	Multiple Dwelling	1.8	1.8	307.8	307.8
Service Station[2, 5]	1,400 m^2 GFA	Retail (100m^2 GFA)	2.10	2.74	29.4	38.4
Local Retail[3, 5]	2,253 m^2 GFA	Retail (100m^2 GFA)	2.10	2.74	47.3	61.7
Child Care Centre[3, 5]	1,129 m^2 GFA	Services (100m^2 GFA)	1.35	1.86	15.2	21.0
			TOTAL		1920.1 EP	1949.3 EP

Notes:
1) Contingency factors have been applied to the residential development;
2) EP demand projections for Service Station assumes GFA is 15% of total site area;
3) EP demand projections for Local Retail and Child Care Centre assumes GFA is 75% of total site area;
4) Dwelling and GFA rates adopted in accordance with Tables 4.2.11.2.1 and 4.2.11.2.2 of the Townsville City Plan; and
5) Non-residential EP's will be confirmed when final building configurations are received.

As outlined in **Table 4-1**, the water supply and wastewater demand allowances adopted for preliminary design purposes are 1920.1 EP and 1949.3 EP respectively. These figures include contingency factors associated with different portions of the residential development. It is understood that these figures will be further refined as part of detailed design and subject to subsequent assessment by Council through a future application for Operational Works. **Figure 4-1** outlines the contingency factors allowed for each portion of the residential development.

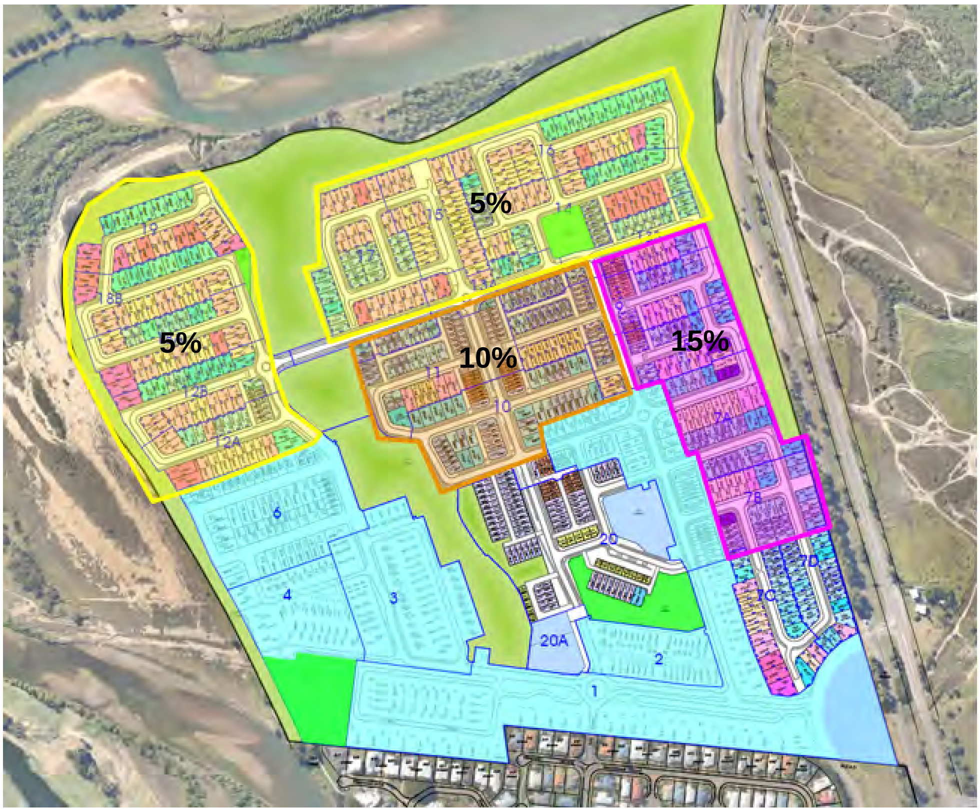


Figure 4-1: Site Contingency Allowances

5 WATER SUPPLY SERVICING

Assessment of proposed water supply master planning was undertaken to confirm that The Village can be serviced in accordance with *Section 6.4: Development Manual Planning Scheme Policy* of the *Townsville City Plan*. Assessment was undertaken for the ultimate population projection of 1920.1 EP. The following water service strategy is conceptual only and remains subject to detailed engineering design.

5.1.1 Methodology

The internal conceptual water network modelling was undertaken by Calibre Consulting with the use of WaterGEMS. Network infrastructure was assessed against the Townsville City Council desired standards of service outlined within the Townsville City Council Planning Scheme Policy SC6.4.3.21.2.

The initial modelling analyses were confirmed using Council's master model on 17 to 19 February 2016. The assumptions and projections, which were contained in Council's model, were adopted for the modelling analyses.

5.1.2 Existing Water Infrastructure

As previously outlined in **Section 3.1**, water supply master planning investigations were previously undertaken by DPM Water Pty Ltd (2011) for The Village along with the expected urban consolidation of the South Townsville, Railway Estate and Oonoonba suburbs. In order to service the greater structure plan area, it was proposed that a trunk main, approximately 3.14km in length, would be constructed from the Bottom City / Middle City Reservoir site south to within The Village development. This trunk water main has since been constructed generally in accordance with the proposed strategy outlined in the DPM Water Pty Ltd Master Planning Report. The DN600 main reduces in size as off takes are constructed to service other precincts in the structure plan area. The trunk water main is reduced to a DN375 water main before entering the site from the north. There is also an existing DN250 water main connection to service the initial stages of The Village.

Based on information obtained from a Dial Before You Dig (DBYD) search and available As-Constructed information, there is an existing water supply network connecting to the DN375 trunk main that has been constructed to service Stages 1-6 of The Village with provisions made for the ultimate development. The water supply network consists of existing DN200 and DN250 water mains in Darter Street and Riveredge Boulevard that supply internal OD63, DN100 and DN150 water reticulation mains.

5.1.3 Proposed Water Service Strategy

As outlined in Drawing No. **15-000745-GIS101** within **Appendix B**, it is proposed that the balance of The Village will be serviced via multiple connections to the aforementioned existing trunk main and water supply network that services Stages 1-6 of The Village. In addition to the existing DN250 water main that connects to the trunk main to service the initial stages, it is proposed that a second DN300 connection will be made to service the northern portions of The Village. Reticulation will be provided to the development in the form of DN250, DN200, DN150, DN100 and OD63 water mains.

It is proposed that the existing DN250 water main that traverses the proposed fuel site in the south-eastern corner of The Village, will be decommissioned and realigned south to within the existing drainage easement. It is considered that a shared easement is acceptable for the water main relocation. The water main is proposed to be offset 1m from the northern easement boundary and maintain standard offsets from the existing DN900 rising main and proposed stormwater drainage.

The following sections detail the water network analyses results achieved through the proposed service strategy.

5.1.4 Demand Assessment

Based on the design demand projections**,** a demand assessment was undertaken for Stages 7-20 of The Village in general accordance with the Townsville City Plan. **Table 5-1** outlines the projected water flow rates in accordance with the estimated ultimate EP.

Table 5-1 – Design Water Supply Demand Projections

Demand (EP)	Average Day Demand (L/s)	MDMM (L/s)	Peak Day (L/s)	Peak Hour (L/s)
1920.1	22.22	30.00	36.00	92.16

Notes: 1) Demand peaking factors adopted are in accordance with *Section 6.4* of the *Townsville City Plan*.

Fire flow demands of 15 L/s and 30L/s for two hours are required to service residential dwellings and commercial land uses respectively, as outlined in the *Townsville City Plan*.

5.1.5 Internal Water Network Assessment

The Townsville City Council WaterGEMS model was updated to include the proposed internal water supply network and the projected EP demands.

The following water supply network modelling results are in relation to the proposed service strategy outlined in **Section 5.1.3.**

To determine the impact of the proposed development, development demands were applied to the network model and assessed under PH and FF conditions during the 2018 and 2021 planning horizons. Fire flow conditions were assessed against DSS requirements with demands of 15 L/s for 2 hours applied to residential dwellings. **Table 5-2** outlines the minimum internal network pressures under PH and FF conditions during the 2018 and 2021 planning horizons.

Table 5-2 – Internal Network Modelling Results

Planning Horizon	Minimum Peak Hour Pressure (m)	Minimum Residual Fire Flow Pressure (m)
2018	35.1m	31.0m
2021	46.0m	44.2m

For the purpose of this assessment, concept bulk earthworks levels have been adopted. Water network modelling indicates that the minimum Peak Hour service pressure identified is 35m, which is above the Townsville City Plan minimum requirement of 22m. The minimum fire flow pressure was 31m, which is above the 12m minimum pressure requirement. Assessment of the proposed internal water network indicated that sufficient capacity is available to service Stages 7-20 of The Village as conceptualised in the development master plan.

The conceptual staging for water supply infrastructure, including corresponding peak hour and fire flow pressures are outlined in Drawings No. **15-000745-GIS101-102** within **Appendix B.**

6 WASTEWATER SERVICING

Assessment of the proposed wastewater network infrastructure was undertaken to confirm that The Village can be serviced in accordance *Section 6.4: Development Manual Planning Scheme Policy* of the *Townsville City Plan*. Assessment was undertaken for the ultimate population projection of 1949.3 EP. The following wastewater service strategy is conceptual only and remains subject to detailed engineering design.

6.1.1 Methodology

The internal conceptual wastewater network modelling was undertaken by Calibre Consulting with the use of SewerGEMS. Network infrastructure was assessed against the Townsville City Council desired standards of service outlined within the Townsville City Council Planning Scheme Policy SC6.4.3.21.3.

Master Planning has previously been undertaken by UDP for Stages 1-20 of The Village. It is proposed that wastewater from The Village will be conveyed to the existing sewage pump station (PS1), located on the northern side of Riveredge Boulevard. As outlined in **Section 3.3.2**, it is considered that PS1 and the downstream wastewater network have sufficient capacity to service the revised yields associated with Stages 7-20.

Assessment of the proposed wastewater infrastructure has been undertaken up to and including PS1 during PWWF conditions.

6.1.2 Existing Wastewater Infrastructure

As discussed in **Section 6.1.1**, there is an existing sewage pump station (PS1) located on the northern side of Riveredge Boulevard in which all loads from The Village will discharge to. PS1 then pumps wastewater approximately 4.7km east via a DN900 rising main to the Cleveland Bay Wastewater Treatment Plant (WWTP).

In accordance with the UDP Report (Oct. 2012) and As-Constructed information, there is an existing lift station adjacent to Darter Street that was constructed during Stage 5 works. This lift station discharges wastewater into an existing DN225 gravity main in Darter Street which conveys wastewater south-west to PS1. Existing DN150 and DN225 sewer gravity mains have also been identified within As-Constructed information from Stages 1-6 of The Village. Existing wastewater infrastructure is as outlined in Drawing No. **15-000745-GIS104** within **Appendix B.**

6.1.3 Proposed Wastewater Service Strategy

It is proposed that the development will be serviced via multiple connections to the wastewater infrastructure constructed during Stages 1-6 of The Village. The previous planning, prepared by UDP, indicated that Stages 7-20 of the Master Plan may require an additional two sewage lift stations, PS3 and PS4.

Calibre Consulting have optimised the earthworks to remove the need for the proposed PS3, which was to be located in the planned park reserve on the north-eastern portion of The Village. It is proposed that Stages 7-20 of The Village will be serviced via a new lift station, PS4, to be located in the large open drainage reserve traversing the site and servicing the north-western catchment. The remainder of Stages 7-20 will be serviced via approximately 370m of DN225 sewer main and approximately 5,765m of DN150 sewer main.

6.1.4 Demand Assessment

Based on the design demand projections**,** a demand assessment was undertaken for the proposed development in general accordance with the *Townsville City Plan* to evaluate the wastewater demands associated with the proposed development. The design wastewater loadings are outlined in **Table 6-1** below.

Table 6-1 – Design Wastewater Loading Projections

Demand (EP)	ADWF (L/s)	PWWF (L/s)
1949.3	5.19	29.62

Note: Wastewater flow projections calculated in accordance with Table SC6.4.3.21.5 of the Townsville City Plan.

An estimated ultimate PWWF of 29.62 L/s will be discharged to the existing wastewater network.

6.1.5 Internal Wastewater Network Assessment

Assessment of the internal wastewater network was undertaken to demonstrate that sufficient capacity is provided to service the ultimate development of 1949.3 EP. Preliminary concept design analyses have been undertaken to determine the indicative internal wastewater infrastructure requirement and remains subject to detailed engineering design during the operational works phase. The proposed internal wastewater network is as outlined on Drawing No. **15-000745-GIS104** within **Appendix B.**

6.1.5.1 Gravity Sewer Design

As detailed in **Section 6.1.3**, it is proposed that each of the sub-catchments will be serviced via an internal sewer reticulation network. **Table 6-2** and **Figure 6-1** outline the maximum depths of flows within the proposed internal wastewater network identified through network analyses.

Table 6-2 – Internal Gravity Network Capacity Summary

Nominal Pipe Diameter	Depth over Diameter (1:x)
150mm	0.49
225mm	0.57
300mm	0.41
375mm	0.20

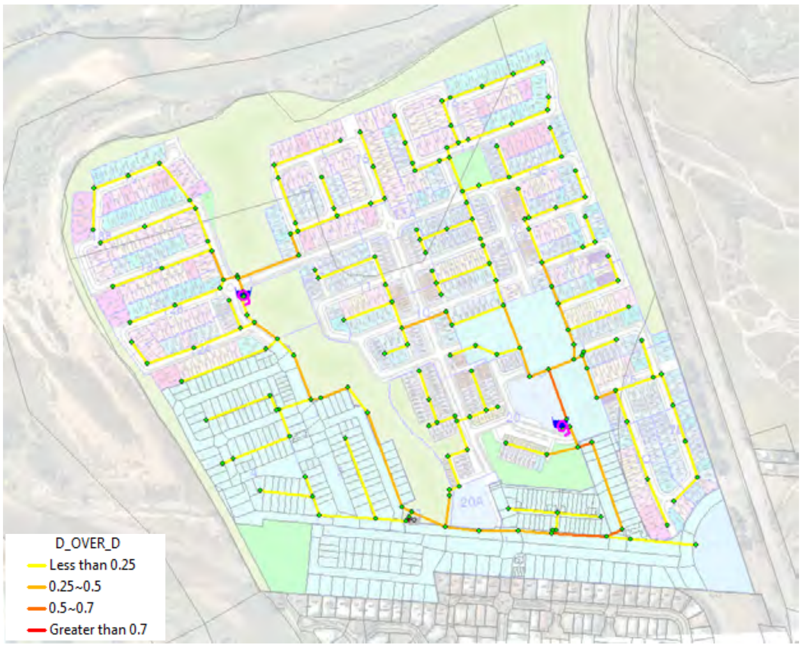


Figure 6-1: Internal Gravity Network Capacity (SewerGEMS Model)

The internal sewerage network has been planned with sufficient capacity to convey PWWF without exceeding 70% of pipe capacity. In support of a conservative internal network analysis the proposed reticulation mains have adopted minimum grade where achievable.

The proposed network configuration and alignment of the sewer network is indicative only and remains subject to detailed engineering design.

6.1.5.2 PS4 Lift Station Planning

Drawing No. **15-000745-GIS104** within **Appendix B** outlines the proposed location of the new PS4 lift station proposed to service the north-western catchment of The Village. **Table 6-3** outlines the design components for the proposed lift station which were included within the SewerGEMS network model.

Table 6-3 – Concept PS4 Operational Requirements

Catchment	Catchment PWWF	Incoming Sewer IL	Approx. Surface Level	Minimum Operational Storage Required	Wet Well Depth	Static Lift
403 EP	6.12 L/s	0.05mAHD	4.47mAHD	0.57m^3	6.2m	4.4m

Notes: 1) The wet-well invert was approximated as it is dependent upon the pumps nominated in detailed design.
2) Friction Losses have not been accounted for.

It is proposed that pumps will be provided to deliver a duty flow of 6.12L/s to service the ultimate catchment. It should be noted that the SPS design parameters are conceptual only and remain subject to detailed design.

6.1.5.3 PS2 Lift Station Planning

Drawing No. **15-000745-GIS104** within **Appendix B** outlines the location of the existing PS2 lift station. **Table 6-4**Table 6-3 outlines the design components for the existing lift station which were included within the SewerGEMS network model.

Table 6-4 – Concept PS2 Operational Requirements

Catchment	Catchment PWWF	Incoming Sewer IL	Approx. Surface Level	Minimum Operational Storage Required	Wet Well Depth	Static Lift
1,226 EP	18.63 L/s	-0.80mAHD	4.87mAHD	3.35m^3	7.5m	5.8m

Notes: 1) Friction Losses have not been accounted for.

It is assumed that the existing lift station has pumps capable of operating at a duty of 18.63L/s, or will be upgraded as necessary. It is recommended that this assumption be confirmed prior to detailed design. It should be noted that the SPS design parameters are conceptual only and remain subject to detailed design.

6.1.5.4 PS1 Pump Station Planning

Drawing No. **15-000745-GIS104** within **Appendix B** outlines the location of the existing PS1 pump station. **Table 6-5**Table 6-3 outlines the design components for the existing pump station which were included within the SewerGEMS network model.

Table 6-5 – Concept PS1 Operational Requirements

Catchment	Catchment PWWF	Incoming Sewer IL	Approx. Surface Level	Minimum Operational Storage Required	Wet Well Depth
1,949 EP	29.62 L/s	-0.09mAHD	4.34mAHD	5.33m^3	7.5m

Notes: 1) Friction Losses have not been accounted for.

It is assumed that the existing pump station has pumps capable of operating at a duty of flow rate of 29.62L/s, or will be upgraded as necessary. It should be noted that the SPS design parameters are conceptual only and remain subject to detailed design.

6.1.6 External Wastewater Network Assessment

The Townsville City Council SewerGEMS model was used to assess the development impacts. The range of pressures and flows in the common rising main system are outlined in Figures 6-2 to 6-7. Council's model included scenarios for the 2015 PWWF, 2031 PWWF and the 2031 ADWF.

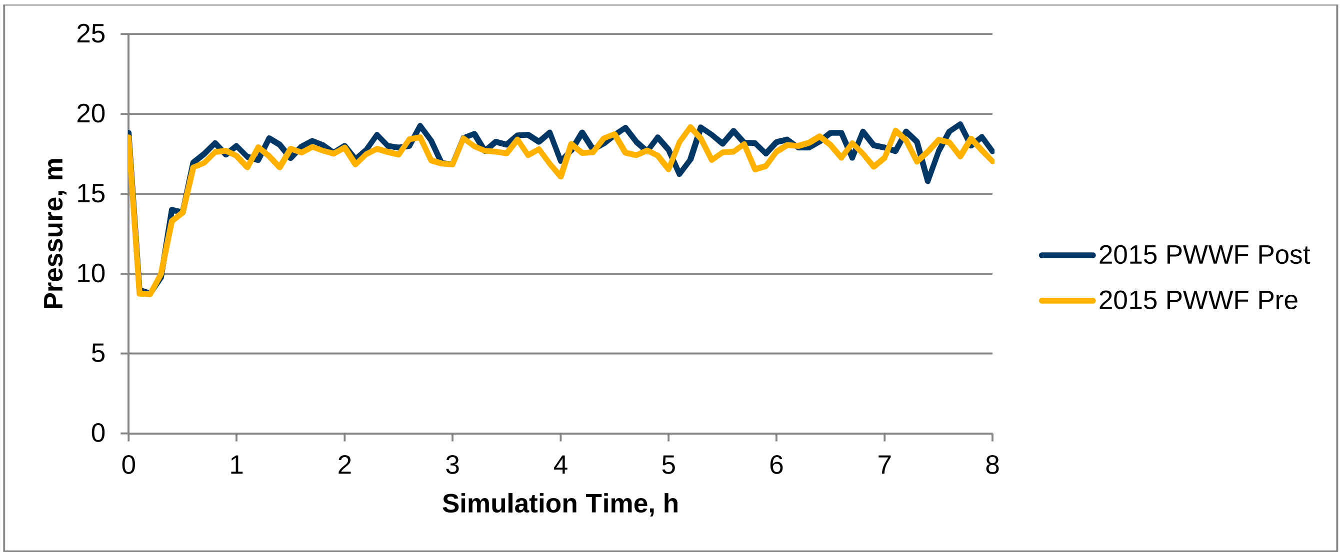


Figure 6-2: System Pressure in Common Rising Main at Proposed Connection Point, 2015 PWWF Scenario

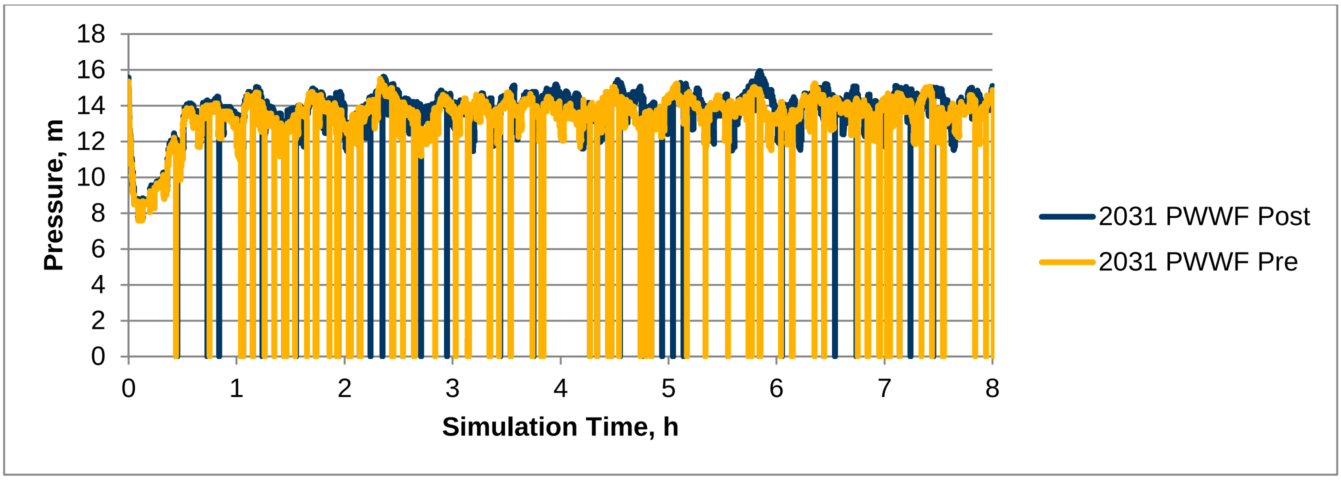


Figure 6-3: System Pressure in Common Rising Main at Proposed Connection Point, 2031 PWWF Scenario

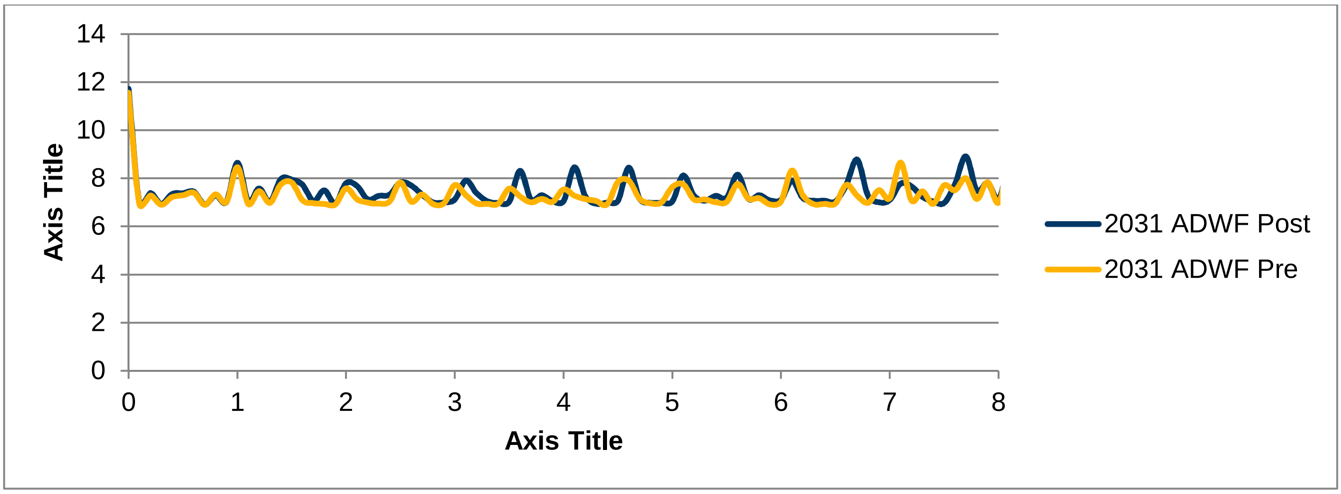


Figure 6-4: System Pressure in Common Rising Main at Proposed Connection Point, 2031 ADWF Scenario

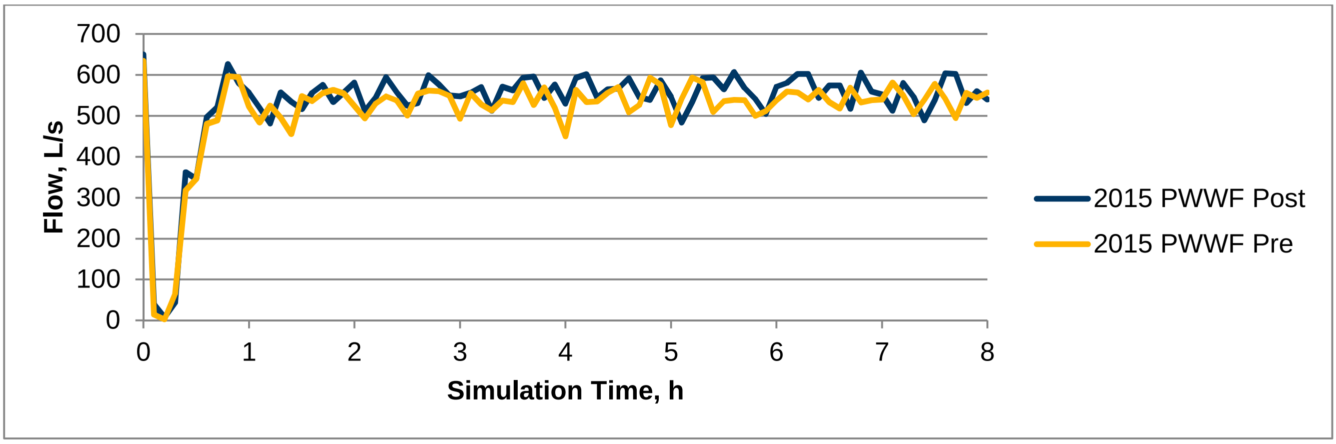


Figure 6-5: System Flow in Common Rising Main at Proposed Connection Point, 2015 PWWF Scenario

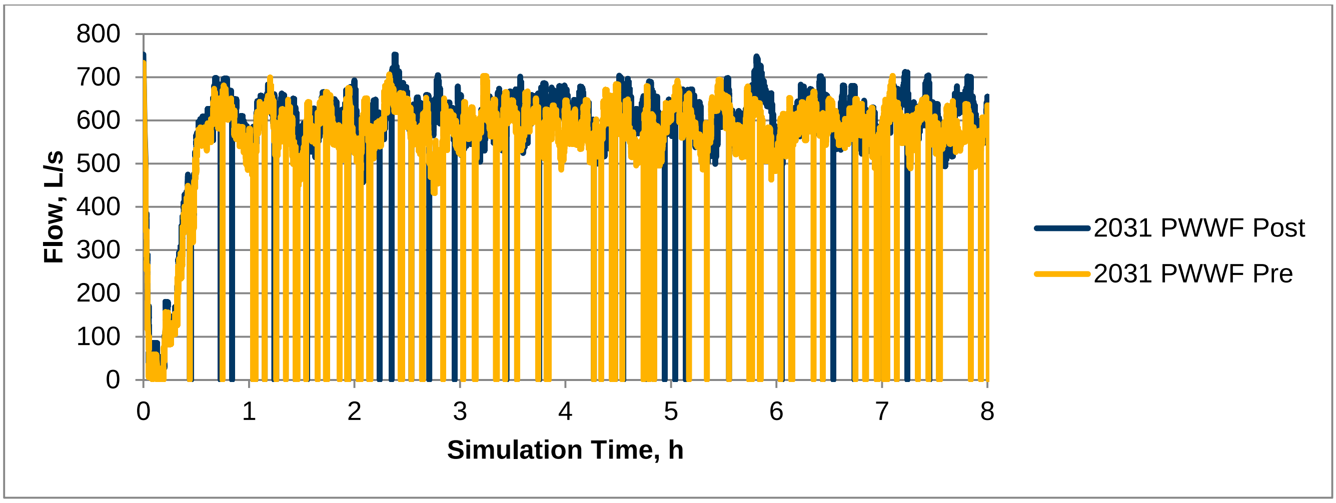


Figure 6-6: System Flow in Common Rising Main at Proposed Connection Point, 2031 PWWF Scenario

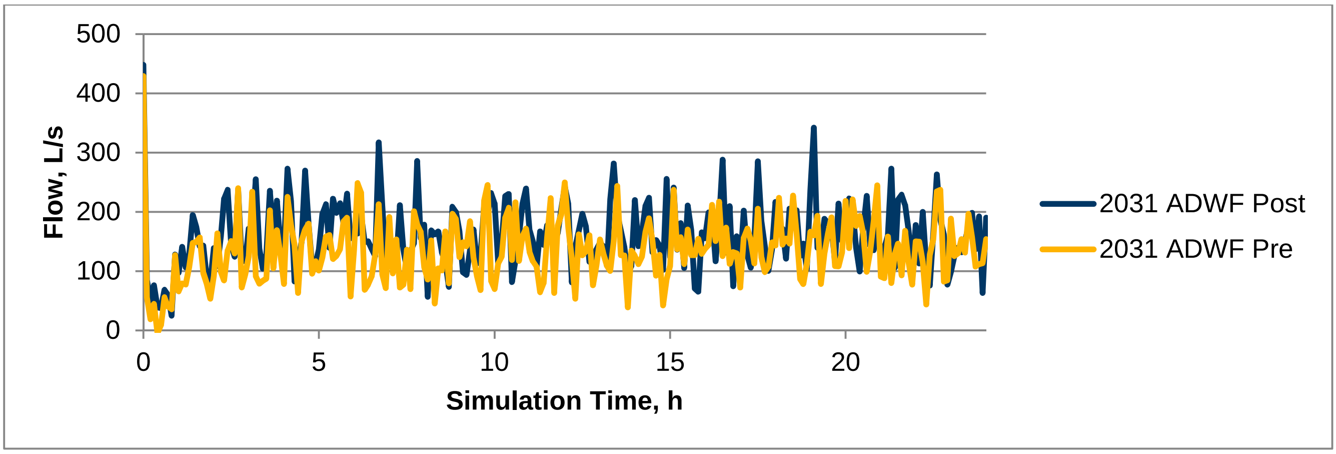


Figure 6-7: System Flow in Common Rising Main at Proposed Connection Point, 2031 ADWF Scenario

As outlined in Figures 6-2 to 6-4, the system pressures at the proposed connection point range from approximately 7 to 19m. It is recommended that the proposed PS1 pumps be capable of delivering the design PWWF, whilst injecting in to the common rising mains with a heads between less than 7m and greater than 19m. Some engineering judgement will be required to allow for safety factors outside of this range.

As outlined in Figure 6-5 to 6-7, the system flows just downstream of the proposed connection point range from approximately 50 to 700 L/s.

The impact of the addition of approximately 30 L/s from the proposed development is outlined as the differences between Pre and Post development scenarios on Figures 6-2 to 6-7. The hydraulic analyses did not consider the impact on external pump stations upstream of the proposed connection point.

Network modelling indicated that the loads associated with the proposed development have a negligible impact on the common rising main system. It is therefore considered that the existing network has sufficient capacity to service the development with negligible impact on the existing upstream pump stations.

7 CONCLUSION

Calibre Consulting (Qld) Pty Ltd has been engaged by Economic Development Queensland (EDQ) to undertake water supply and wastewater master planning in support of the proposed residential community 'The Village', located in Oonoonba, Townsville. For the purpose of this investigation, only the balance (or future Stages 7-20) of The Village were incorporated within the water supply and wastewater master planning analyses. Preliminary engineering analyses have confirmed the following outcomes:

- Stages 7-20 of The Village have a design demand of 1920.1 EP and 1949.3 EP for water and wastewater respectively. These figures include a contingency factor which has been applied to allow for minor changes in project planning;
- It is proposed that the development will be serviced via internal reticulation networks consisting of DN250, DN200, DN150, DN100 and OD63 water mains connecting to the existing water infrastructure that services Stages 1-6 of The Village;
- Water network modelling indicates that minimum pressure requirements can be satisfied under Peak Hour and Fire Flow conditions;
- It is proposed the development will be serviced via internal reticulation networks consisting of DN150 and DN225 gravity mains connecting to the existing trunk infrastructure that services Stages 1-6 of The Village;
- Network analyses have been undertaken up to and including the existing PS1 and common rising main system that is located on the northern side of Riveredge Boulevard. It is considered that the downstream infrastructure has sufficient capacity to service the revised development yields; and
- Internal wastewater infrastructure was conceptually designed in accordance with the Townsville City Plan requirements and input into the SewerGEMS network model.

Water and wastewater network analyses have indicated that the existing infrastructure has sufficient capacity to service The Village without negatively impacting existing network conditions. It is recommended that the development application be approved and the management strategies be incorporated into the future Operational Works detailed design. Detailed design may result in changes to the concept however the underlying design criteria will generally be followed.

8 DISCLAIMER

This report has been prepared on behalf of and for the exclusive use of Economic Development Queensland (EDQ) and is subject to and issued in accordance with the agreement between Calibre Consulting (QLD) Pty Ltd.

Our investigation and analysis has been specifically catered for the particular requirements of Economic Development Queensland (EDQ) and may not be applicable beyond this scope. For this reason, any other third parties are not authorised to utilise this report without further input and advice from Calibre Consulting (QLD) Pty Ltd.

Calibre Consulting (QLD) Pty Ltd accepts no liability or responsibility whatsoever for the report in respect of any use of or reliance upon this report by any third party.

The investigation and analysis has relied on information provided by others. We accept no responsibility for accuracy of material supplied by others. The accuracy of the investigation, analysis and report is dependent upon the accuracy of this information.

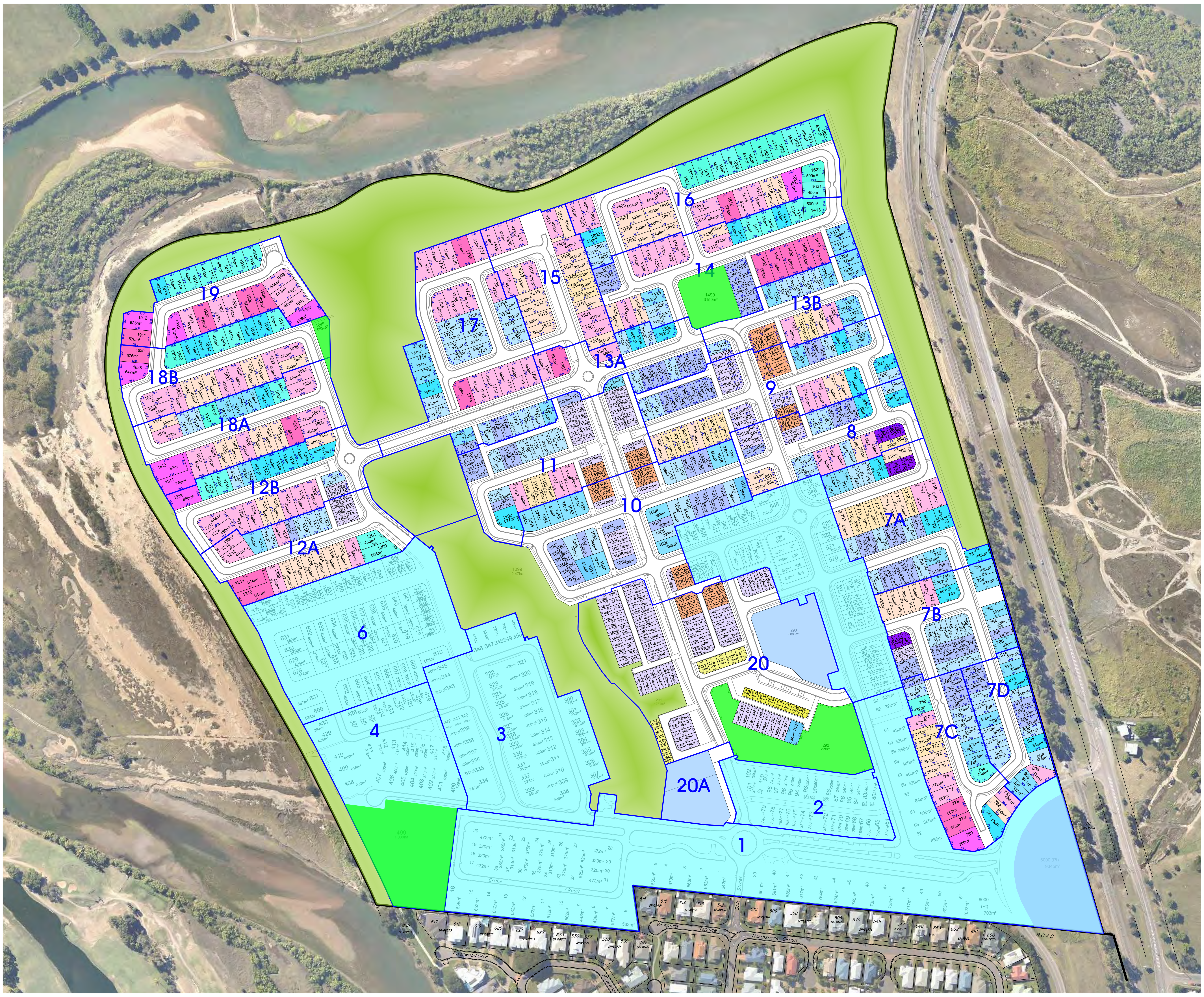
APPENDICES

APPENDIX A SITE LAYOUT

THE VILLAGE
Riverside. Cityside

MASTER PLAN

0 25 50m



Lot Type - Front Loaded	W x D	Area (m2)	Stg 7a	Stg 7b	Stg 7c	Stg 7d	Stg 8	Stg 9	Stg10	Stg 11	Stg 12a	Stg 12b	Stg 13a	Stg 13b	Stg 14	Stg 15	Stg 16	Stg 17	Stg 18a	Stg 18b	Stg 19	Stg 20a	Stg 20	Total
Premium Traditional 32	20 x 32	640			1							1	1				1		2	1	2			9
Premium Traditional 25	20 x 25	500													1		7		1	1				10
Traditional 32	18 x 32	576			2						2				5		1	2	1	1	5			19
Traditional 25	18 x 25	450			2	2					2	2			3		5		1	3	6			26
Premium Courtyard 32	16 x 32	512	2		1	1	1	1		1		1		1	5		3	6	2		5			30
Premium Courtyard 25	16 x 25	400	4	1		2	2	2				5			2		1	1	1	4	1			26
Courtyard 32	15 x 32	480		1	4		2	2		3	4	6	2	1	1	9	5	7	6	7	1			61
Courtyard 25	15 x 25	375	3	5	2	4		2	12	1	2	1	2	6	3			5	3				1	52
Premium Villa 32	12.5 x 32	400	4	4	3		3	4			6	3		1	3	10	8		6	6				61
Premium Villa 25	12.5 x 25	312.5	7	7	4	7	6	3	8	1	4	1	2	4	2		2	14	2					74
Villa 32	10 x 32	320	5		3		1	6		3				2		3								23
Villa 25	10 x 25	250	10	5	5	6	3	2	9	1	1				3									45
Urban (20)	7.5 x 20	150							6															6
Urban (15)	10 x 15	150	3	2			3																	8
Loft	7 x 10	70																						0
SoHo	10 x 10	100																					18	18
Multi Res																								0
Lot Type - Laneways																								0
Premium Villa 32 (Laneway)	12.5 x 32	400																						0
Premium Villa 25 (Laneway)	12.5 x 25	312.5						2		5		1	2					4						14
Villa 32 (Laneway)	10 x 32	320																						0
Villa 25 (Laneway)	10 x 25	250		2			1	6	2	6			6	1	6			3						33
Terrace 32 (Laneway)	7.5 x 32	240						3						1										4
Terrace 25 (Laneway)	7.5 x 25	187.5		2			5	10	7	14	4			1									63	106
5m Terrace 32 (Laneway)	5 x 32	160						2						3										5
5m Terrace 25 (Laneway)	5 x 25	125					3	2	12	8		3											10	38
Total			38	29	27	22	30	47	56	43	25	24	15	21	34	22	33	42	25	23	20	0	92	668

Site Type				Total Area
Park:	Lot 291 = 4271m²	Lot 293 = 7990m²	Lot 1499 = 3150m²	1.54 ha
Open Space:	1 = 10.03 ha	2 = 8875m²	3 = 2.50 ha	13.81 ha
Commercial Site:	Lot 289 = 1500m²	Lot 290 = 3004m²	Lot 6000 = 9345m²	1.35 ha

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Date: 30th July, 2015
Scale: 1:2000 @ A1
Drawn: AJL
Job No: 29060/212-1
Plan No: 29060/363D

APPENDIX B CALIBRE CONSULTING DRAWINGS

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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

calibre
CONSULTING

LEGEND

WATER SUPPPLY MAINS

- PROPOSED OD63 WATER MAIN
- EXISTING OD63 WATER MAIN
- PROPOSED DN100 WATER MAIN
- EXISTING DN100 WATER MAIN
- PROPOSED DN150 WATER MAIN
- EXISTING DN150 WATER MAIN
- PROPOSED DN200 WATER MAIN
- EXISTING DN200 WATER MAIN
- PROPOSED DN250 WATER MAIN
- EXISTING DN250 WATER MAIN
- EXISTING DN250 TO BE DECOMMISSIONED
- PROPOSED DN300 WATER MAIN
- EXISTING DN375 WATER MAIN
- EXISITNG LOTS
- 2021 PROJECTED LOTS

NOTES:

1. THIS DRAWING IS CONCEPTUAL ONLY AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.

0 25 50 100 m

1:3,500 (A3)

N

PROJECT:

THE VILLAGE, OONOONBA

CLIENT:

ECONOMIC DEVELOPMENT QUEENSLAND

DRAWING TITLE:

CONCEPTUAL WATER SUPPLY SERVICE STRATEGY - 2021 PLANNING HORIZON

DRAWING NO: **15-000745-GIS101**

ISSUE: **D**

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	02.10.15	ORIGINAL
B	MAH	ABM	16.11.15	AMENDED ALIGNMENT
C	MAH	ABM	19.01.16	AMENDED SERVICE STRATEGY
D	MAH	ABM	29.02.16	AMENDED MODEL RESULTS

LEGEND

WATER SUPPLY MAINS

- FUTURE WATER MAINS
- PROPOSED OD63 WATER MAIN
- EXISTING OD63 WATER MAIN
- PROPOSED DN100 WATER MAIN
- EXISTING DN100 WATER MAIN
- PROPOSED DN150 WATER MAIN
- EXISTING DN150 WATER MAIN
- PROPOSED DN200 WATER MAIN
- EXISTING DN200 WATER MAIN
- PROPOSED DN250 WATER MAIN
- EXISTING DN250 WATER MAIN
- EXISTING DN250 TO BE DECOMMISSIONED
- EXISTING DN375 WATER MAIN
- EXISITNG LOTS
- 2018 PROJECTED LOTS
- FUTURE LOTS

NOTES:

1. THIS DRAWING IS CONCEPTUAL ONLY AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.

0 25 50 100 m

1:3,500 (A3)

N

PROJECT:

THE VILLAGE, OONOONBA

CLIENT:

ECONOMIC DEVELOPMENT QUEENSLAND

DRAWING TITLE:

CONCEPTUAL WATER SUPPLY SERVICE STRATEGY - 2018 PLANNING HORIZON

DRAWING NO: **15-000745-GIS102**

ISSUE: **C**

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	16.11.15	ORIGINAL
B	MAH	ABM	19.01.16	AMENDED MODEL RESULTS
C	MAH	ABM	29.02.16	AMENDED MODEL RESULTS

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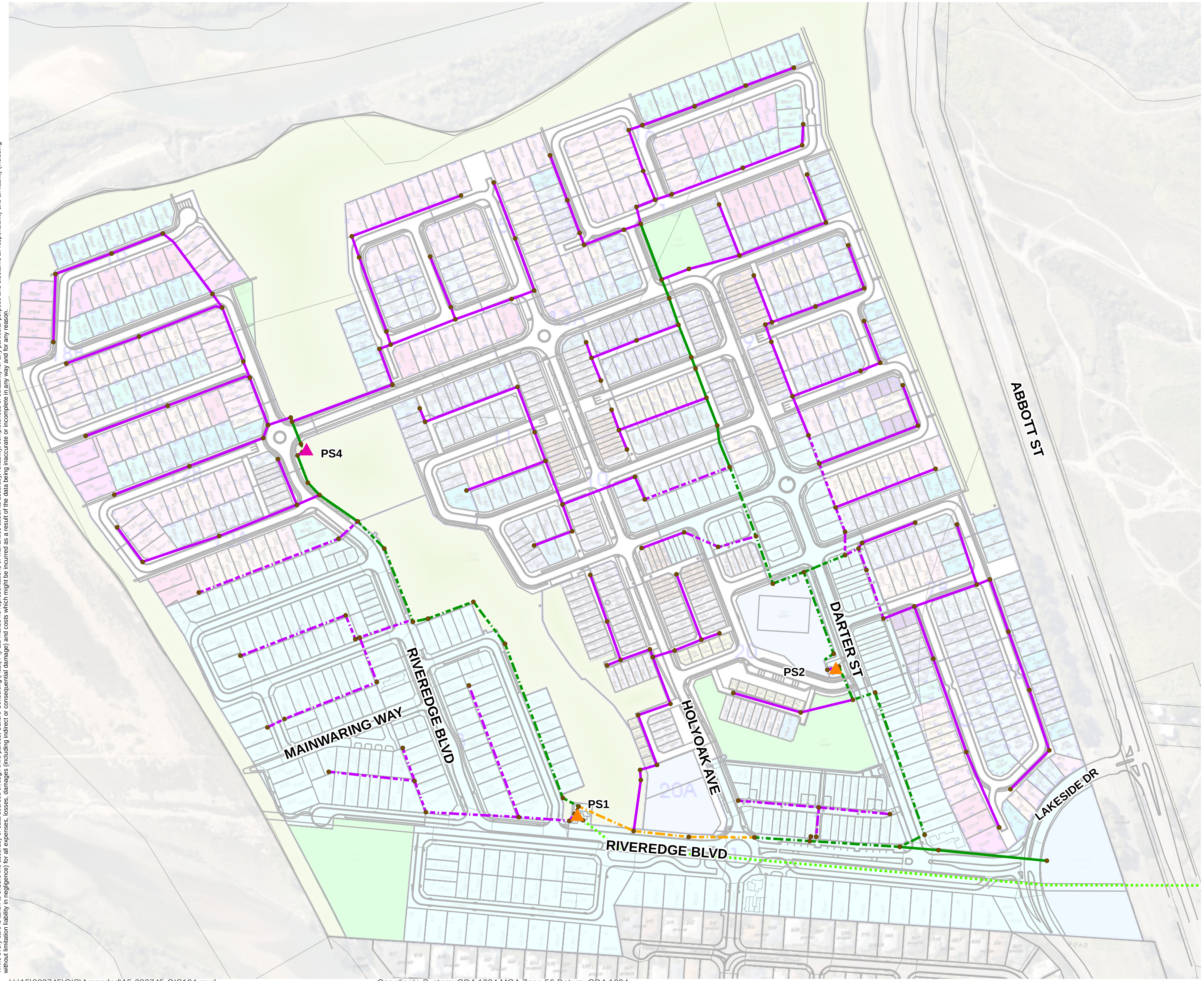
Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994



calibre CONSULTING

LEGEND

WASTEWATER INFRASTRUCTURE

- EXISTING LIFT/PUMP STATIONS
- PROPOSED LIFT/PUMP STATIONS
- PROPOSED DN150 GRAVITY MAIN
- EXISTING DN150 GRAVITY MAIN
- PROPOSED DN225 GRAVITY MAIN
- EXISTING DN225 GRAVITY MAIN
- EXISTING DN300 GRAVITY MAIN
- EXISTING DN375 GRAVITY MAIN
- EXISTING RISING MAIN

NOTES:

1. THIS DRAWING IS CONCEPTUAL ONLY AND HAS BEEN PRODUCED FOR DISCUSSION PURPOSES ONLY.

0 25 50 100 m

1:3,500 (A3)

N

PROJECT:

THE VILLAGE, OONOONBA

CLIENT:

ECONOMIC DEVELOPMENT QUEENSLAND

DRAWING TITLE:

CONCEPTUAL WASTEWATER SERVICE STRATEGY

DRAWING NO: 15-000745-GIS104

ISSUE: C

ISS	BY	CHK	DATE	DETAILS
A	MAH	ABM	19.01.16	ORIGINAL

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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

Appendix D – The Village Oonoonba Townsville, Traffic Impact Assessment report

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The Village, Oonoonba, Townsville
Traffic Impact Assessment

Prepared by Calibre Consulting
Prepared for Economic Development Queensland (EDQ)

24 March 2017

15-000745.ER01
Transportation

COMMERCIAL IN CONFIDENCE

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Issue	Date	Issue Details	Author	Checked	Approved
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2	20/03/2017	Final Issue Revised by TA	TA	SK	DA (RPEQ 7637)

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APPENDIX E	GROWTH RATE CALCULATIONS
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APPENDIX G	TRIP DISTRIBUTION
APPENDIX H	FORECAST TRAFFIC VOLUMES (BASE + DEVELOPMENT)
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1 INTRODUCTION AND CONTEXT

1.1 OVERVIEW

Calibre Consulting (Calibre) have been engaged to provide a traffic impact assessment report on behalf of Economic Development Queensland (EDQ) for the proposed residential community “The Village” located at Oonoonba within the city of Townsville, Queensland.

This report provides an assessment of the expected traffic generated by the development, its impact on existing infrastructure, and the proposed development access. These analyses are consistent with the Queensland Department of Transport and Main Roads’ Road Planning and Design Manual and the principles contained within the Guidelines for Assessment of Road Impacts of Development (GARID, 2006).

Throughout this report, the development area is referred to as ‘the site’ which is the declared Oonoonba Development Area. Currently Stages 1 – 6 of the development north of Riveredge Boulevard have been constructed, with the balance of the developable area situated on Lots 9000 & 9001 on SP275839 and Lot 6000 on SP243806.

1.2 SITE LOCATION

The site is located approximately 3km from the Townsville central business district. The location of the site area is shown in **Figure 1-1**.

The site is bounded to the north and west by the Ross River and to the south by Fairfield Waters which is an established residential development. The eastern boundary is framed by the North Coast railway line and the Abbott Street state-controlled road corridor.

The developable site area encompasses the area north of Riveredge Boulevard as well as the parcel of land to the south of the Lakeside Drive / Abbott Street intersection. **Figure 1-2** shows an aerial image of the site area captured in June 2016. The aerial image shows that residential development has commenced within the south of the site. **Figure 1-3** shows the local road network surrounding the site, and defines the study area for the purposes of the following traffic assessment.

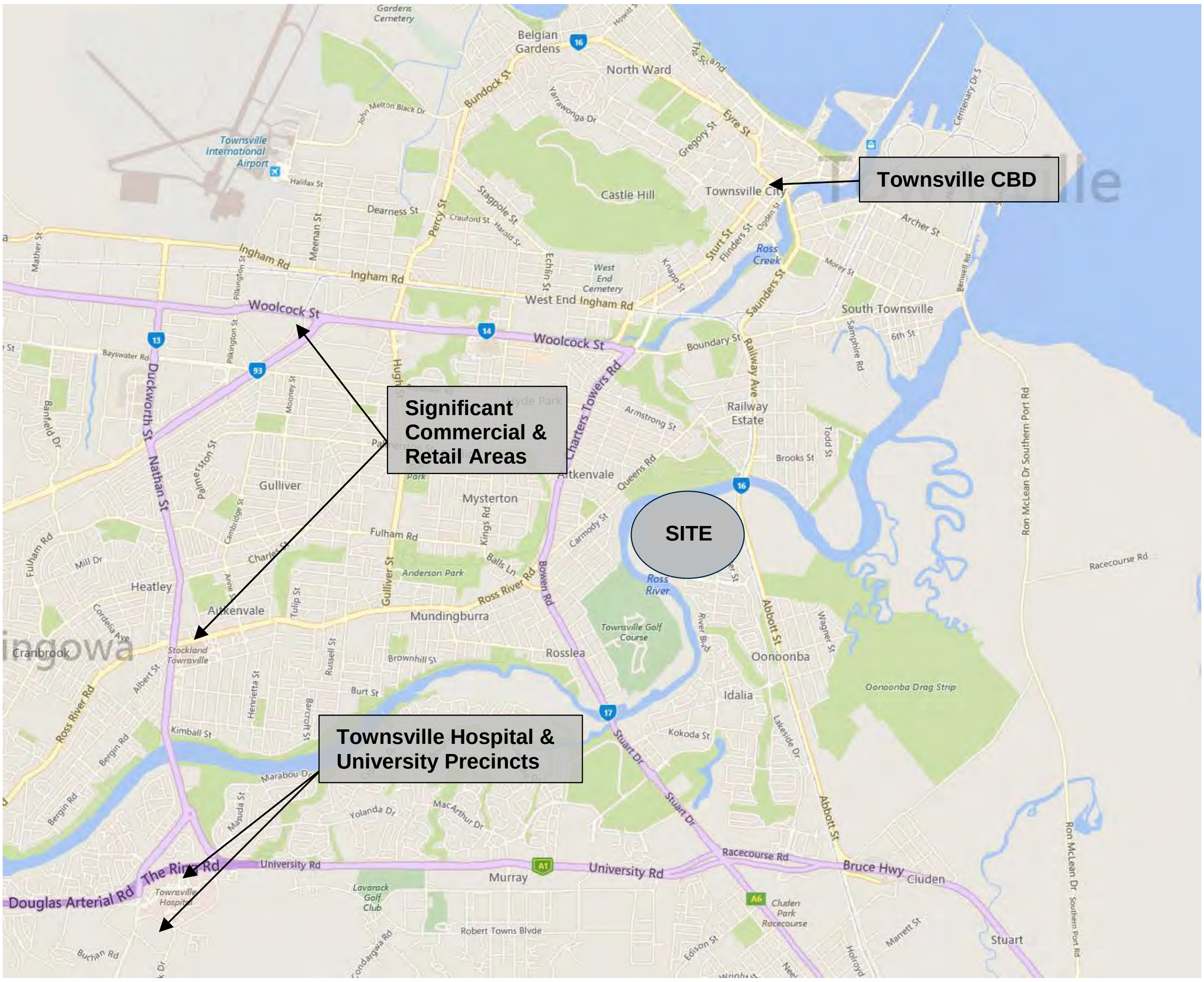


Figure 1-1: Site Location (Source: Bing Maps)

Site area shaded in blue

Figure 1-2: Current site development – aerial image of site in June 2016 (Source: Nearmap, 2017)

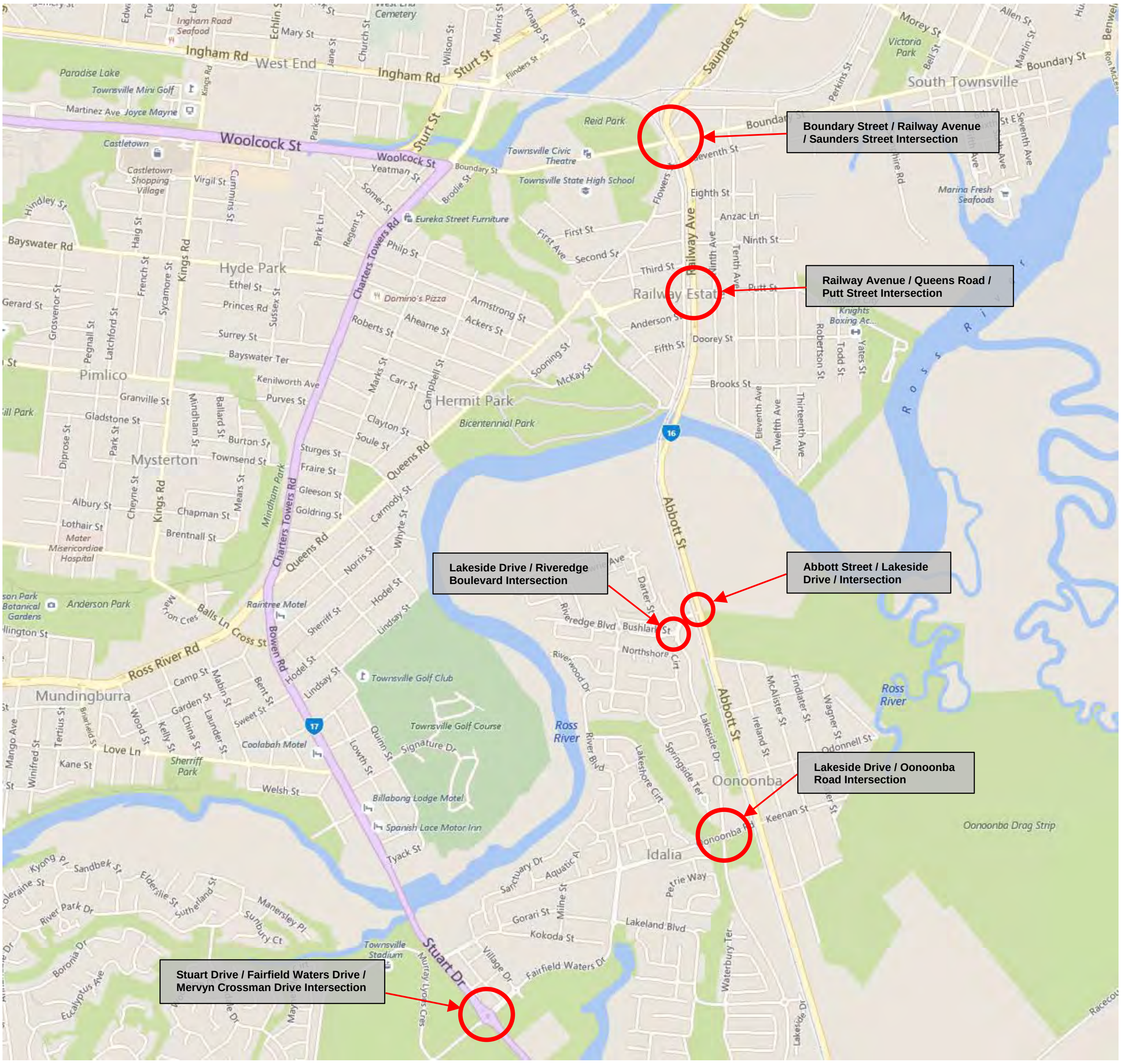


Figure 1-3: Local road network map showing key intersections and road links within the study area (Source: Bing Maps)

2 DEVELOPMENT PLAN

2.1 PROPOSED DEVELOPMENT PLAN

The development is proposed to consist of mixed uses. For the purpose of the traffic analysis the total site activity as agreed with EDQ is summarised in **Table 2-1**.

Table 2-1: Proposed Development Yield

Land Use	Quantum and Unit
Low Density Residential (Stages 1 to 20 inclusive)	626 Dwellings
Medium Density Residential (Lots that are less than 250 m^2)	330 Dwellings
Single Occupant Home Office (100 m^2)	31 Dwellings
Community Site (Church)	1,600 m^2 Total GFA
Child Care	75 children
Commercial (Retail)	1,500 m^2 Total GFA
Service Station	Allow for 6 bowsers and 250 m^2 convenience retail

The proposed land uses are shown in the site master plan, refer **Figure 2-1**.

2.2 KEY ASSUMPTIONS

Allotment delivery and sales information provided by EDQ suggests that the site will be fully developed and occupied by the year 2023. Consistent with relevant planning and assessment guidelines, the traffic impacts will be assessed at the base design year of 2023 and the 10 year post-construction future horizon year 2033.

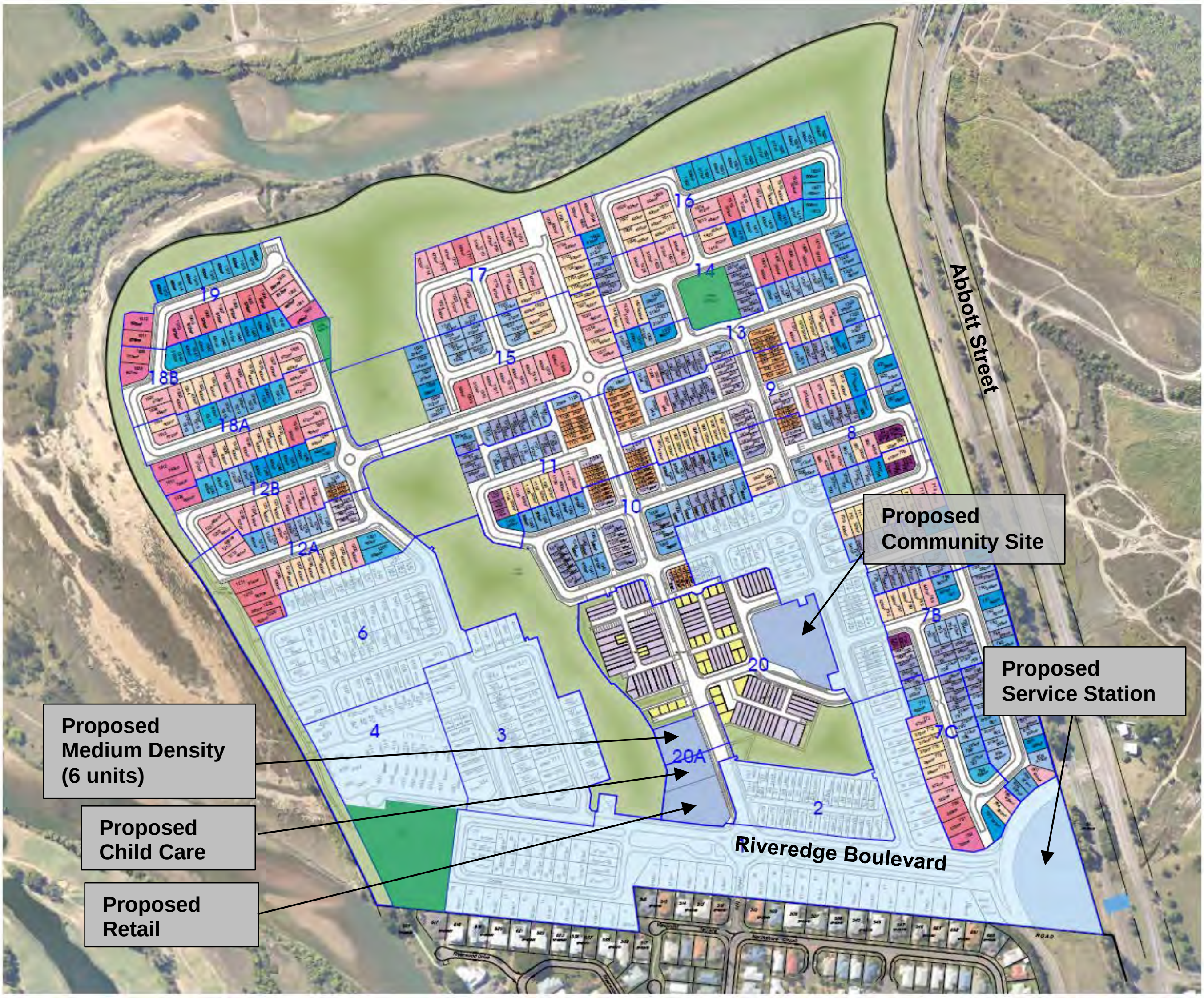


Figure 2-1: Site Master Plan (Source: Brazier Motti Plan No. 29060/3663F)

3 EXISTING TRANSPORT INFRASTRUCTURE

An outline of the features associated with the key routes within the site locality is presented in the following sections. The following assessment of the existing traffic conditions is based on observations during a site visit, aerial imagery as well as information from Townsville City Council (TCC) and the Department of Transport and Main Roads (DTMR).

3.1 EXISTING ROAD LINKS

The road link classifications and road characteristics are summarised in **Table 3-1** for those routes situated within the study area.

Table 3-1: Existing road links and road functions

Road Name	Classification	Posted Speed Limit	Route Configuration	Authority
Abbott Street[1]	Arterial Route	80 km/h	Two-way, 2 lanes	DTMR
Lakeside Drive	Sub-Arterial Route	60 km/h	Two-way, 2 lanes	Council
Riveredge Boulevard	Collector	60 km/h	Two-way, 2 lanes	Council
Oonoonba Road	Collector	60 km/h	Two-way, 2 lanes	Council
Stuart Drive	Sub-Arterial Route	60 km/h	Two-way, 2 lanes	DTMR
Fairfield Waters Drive	Collector	60 km/h	Two-way, 2 lanes	Council
Mervyn Crossman Drive	Collector	60 km/h	Two-way, 4 lanes	Council
Railway Avenue[1]	Arterial Route	60 km/h	Two-way, 4 lanes	DTMR
Queens Road	Collector	60 km/h	Two-way, 2 lanes	Council
Putt Street	Local Street	60 km/h	Two-way, 2 lanes	Council
Boundary Street	Arterial Route	60 km/h	Two-way, 2 lanes	DTMR
Saunders Street	Arterial Route	60 km/h	Two-way, 4 lanes	DTMR

3.2 NORTH COAST RAIL LINE

The North Coast Rail Line runs parallel along Abbott Street through to the Townsville Railway Station at Charters Towers Road, impacting a number of intersections. In 2012, GHD completed a preliminary evaluation for the Townsville Eastern Access Corridor Project (TEARC) titled *Townsville Eastern Access Corridor Project Economics and Market Sounding Summary Report*. As shown in **Figure 3-1,** the TEARC is an 8 km rail line running from Cluden (near Stuart) through the Townsville State Development Area to the Port of Townsville. This report lists service requirements for TEARC as follows:

- Improve urban amenity including increasing safety and reducing traffic delays by diverting bulk rail haulage away from suburban areas of Townsville.

The main findings of the market sounding analysis were that there was a sufficient case to warrant further consideration of PPP delivery. GHD concluded that:

- The decision criteria for the central case (2015 opening @ 7 % discount rate) show that TEARC is economically viable under high demand and medium demand scenarios and TEARC is marginal under low demand scenarios.

[1] Abbott Street becomes Railway Avenue at its northern extent after the Ross River Bridge.

On 18 May 2016, the Australian Government announced a $150 million investment for the TEARC to reduce bottlenecks and remove freight trains from the city's suburbs.

From reviewing this study and likely infrastructure improvement, it is foreseeable that the existing rail line and level crossings will be decommissioned prior to The Village, Oonoonba design horizon year 2033.

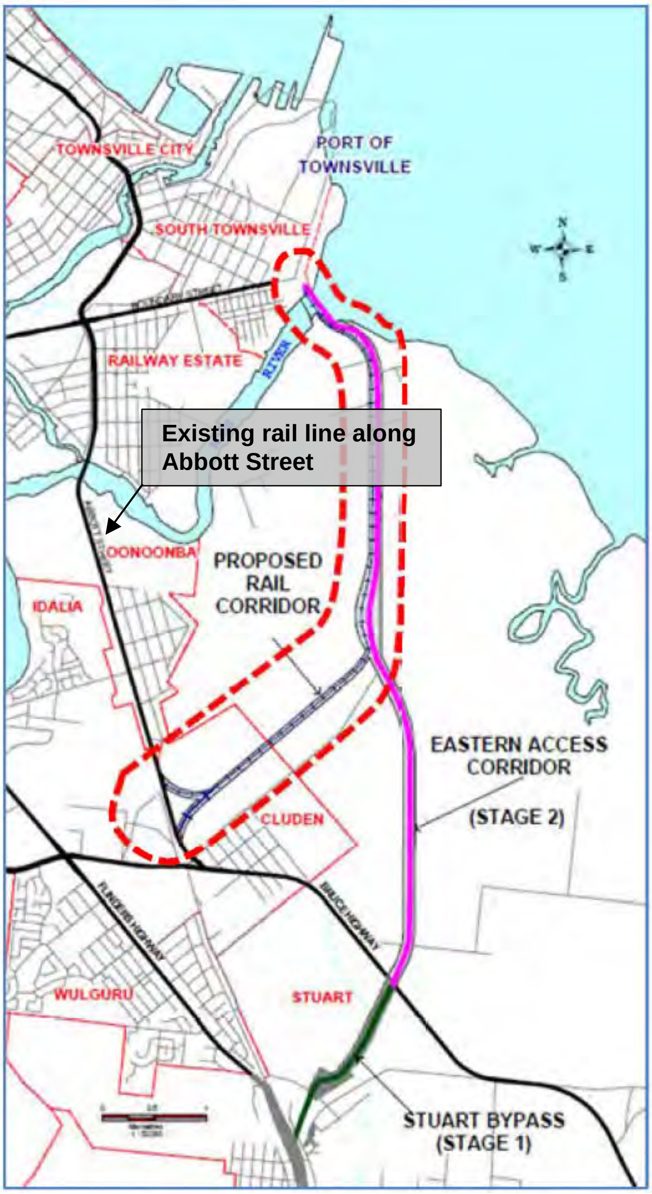


Figure 3-1: Proposed Eastern Access Rail Corridor (Source: Queensland Rail Townsville Eastern Access Rail Corridor Preliminary Evaluation: Economics and Market Sounding Summary Report by GHD (2012))

Further to the above, preliminary investigations were undertaken by Calibre to assess the need for inclusion of the level crossings in the traffic modelling of the future impacts of the site on the surrounding traffic network.

Train data received from EDQ indicated that the greatest frequency of 1434 trains falls in the month of August. This frequency was adopted as the conservative modelling scenario equating to an average of 47 trains each day of the month and two trains per hour over a 24-hour period. Without detailed timetable data and clarification on priority movements for freight transport, two trains per hour were modelled in the peak period to ensure the modelling allowed for the worst case scenario. Based on the available data, the following assumptions were made:

- Maximum train lengths of 980 m travelling at 80 km/h take approximately 44 secs to clear a level crossing;
- As per DTMR's *Manual of Uniform Traffic Control Devices Part 7 Railway Crossings (2003)*, the total delay is to include a minimum of 20 secs advanced warning before and after the train passes through the level crossing; and
- Level crossing closures produce a total delay of 84 secs (44 secs for train clearance and 20 secs warning before and after clearance) occurring twice per hour at 20 minutes and 40 minutes past the hour.

Using SIDRA Intersection Network, localised traffic analyses were undertaken to determine immediate impacts of the level crossing on the performance of Lakeside Drive / Abbot Street and Lakeside Drive / Riveredge Boulevard intersections at the 2033 design horizon year. The analysis utilised traffic survey data collected in July 2015 with the growth rates specified in Section 3.3.

The network was modelled at the horizon year under different scenarios, including:

1. Without the traffic impact of the level crossing (i.e. direct link from Lakeside Drive / Riveredge Boulevard intersection to Lakeview Drive / Abbott Street intersection); and
2. With the traffic impact of the level crossing.

The above scenarios were modelled using existing intersection arrangements with no mitigation measures adopted. The results of the network analyses are given as follows - refer to **Table 3-2** for detailed SIDRA outputs.

Table 3-2: SIDRA Network Analysis result comparison for network comprising the intersection of Lakeview Drive and Riveredge Boulevard and the intersection of Lakeview Drive and Abbott Street

Scenario	Peak	Network Level of Service	Control Delay (Worst Movement) (s)	Maximum 95th Percentile Queue Length (m)	Network Travel Speed (Average) (km/h)
2033 Design Horizon without Level Crossing	AM	E	654.5	263	16.8
	PM	E	679.6	2483	13.8
2033 Design Horizon with Level Crossing	AM	F	3821.4	3414	1.5
	PM	F	2918.1	5523	3.9

From the results in **Table 3-2** it can be seen that the impact of the level crossing on the road network at the design horizon year is significant and unavoidable even without the inclusion of development traffic. The results are well beyond what is deemed acceptable for priority controlled intersections.

Based on the above information relating to the TEARC and the preliminary network analyses undertaken, the inclusion of level crossings in Abbott Street / Railway Avenue intersection modelling is not considered appropriate for the assessment of the traffic impact of the site and is excluded from the proceeding analyses.

3.3 EXISTING TRAFFIC VOLUMES

Existing traffic count data has been sourced by independent traffic survey consultants Data Audit Systems for the purpose of informing the current traffic flows adjacent to the development. The traffic count was conducted in July 2015 and provides an indication of the morning and evening peak hour traffic volumes. Traffic count data was sourced for the following intersections:

- Abbott Street / Lakeside Drive;
- Riveredge Boulevard / Lakeside Drive;
- Oonoonba Road / Lakeside Drive; and
- Stuart Drive / Fairfield Waters Drive / Mervyn Crossman Drive.

The traffic counts were reported for 15 minute intervals over a total 24-hour survey period on a weekday. Due to the high number of AM and PM weekday trips required for non-discretionary purposes, i.e. travelling to work or education facilities, it is anticipated that the critical peak period will be during weekdays and not during the weekend. This applies to both the site traffic and the external traffic flows.

The AM peak period across all intersections was found on the day of the survey to be between the hours of 7:45 am and 8:45 am. The PM peak occurred at all intersections between the hours of 4:30 pm and 5:30 pm.

These traffic volumes were used to inform the base (i.e. background) traffic volumes and directional splits for traffic movements at both base year 2015 and the forecast design year 2023. The raw results from these traffic surveys are provided in **Appendix B**, with relevant peak hour volumes summarised in spreadsheet form to aid further analysis – refer **Appendix D**.

Additionally, forecast base traffic volumes at the macro level were sourced from TCC and DTMR's strategic traffic model (TSTM) – refer **Appendix C** for raw data and **Appendix D** for summary in spreadsheet form. The TSTM has been developed and calibrated with various Townsville traffic survey results, 2011 demographics and network conditions. Traffic volumes were sourced for the following intersections and associated road links:

- Abbott Street / Lakeside Drive;
- Riveredge Boulevard / Lakeside Drive;
- Oonoonba Road / Lakeside Drive;
- Stuart Drive / Fairfield Waters Drive / Mervyn Crossman Drive;
- Railway Avenue / Boundary Street / Saunders Street; and
- Railway Avenue / Queens Road / Putt Street.

In the absence of defined peak hour periods, the peak hour periods for the given TSTM data were assumed to match those of the existing background traffic peak hours, i.e. 7:45 am to 8:45 am and 4:30 pm to 5:30 pm.

TSTM traffic volumes were used to inform the base traffic volumes and directional splits for both the forecast design year, 2023 and the forecast design horizon year, 2033.

3.4 GROWTH RATES

Through consultation with TCC, EDQ and DTMR in Townsville, background growth rates have been established to represent the traffic growth in the vicinity of The Village, Oonoonba. These rates have been calculated by determining the growth required to reach predicted traffic volumes at 2031 in the TSTM. Where actual growth rates were calculated to be less than 0.5 %, a 0.5 % growth rate has been adopted to ensure the traffic analysis is conservative and misrepresentative negative growth rates are not adopted in the wider model. Refer **Table 3-3** for growth rate calculations.

Table 3-3: Adopted background traffic growth rates

Route	Calculated Growth Rate (%)	Adopted Growth Rate (%)
Abbott Street	4.2	4.2
Lakeside Drive	-0.1	0.5
Riveredge Boulevard	2.3	2.3

Route	Calculated Growth Rate (%)	Adopted Growth Rate (%)
Oonoonba Road	2.5	2.5
Keenan Street	8.3	8.3
Fairfield Waters Drive	-3.3	0.5
Mervyn Crossman Drive	-2.9	0.5
Stuart Drive	2.2	2.2
Railway Avenue	4.2	4.2
Saunders Street	2.7	2.7
Boundary Street	1.5	1.5
Queens Road	0.3	0.5
Putt Street	Unknown	0.5

4 DEVELOPMENT TRAFFIC

The following section outlines the anticipated traffic generation potential of the development.

4.1 ANTICIPATED DEVELOPMENT TRAFFIC

The traffic generation rates have been sourced from the RTA *Guide to Traffic Generating Developments* (RTA) and the *8th Edition ITE Trip Generation Report* (ITE). The trip generation rates proposed are considered appropriate estimates of the average level of demand for the proposed land uses within the site. Refer to **Table 4-1** summarising the anticipated site traffic generated by the proposed development.

Table 4-1: Summary of Total Anticipated Development Traffic

Land Use	Quantum	Peak AM Period Trip Generation Rate	AM Peak Hour Volume (vph)	Peak PM Period Trip Generation Rate	PM Peak Hour Volume (vph)	Source
Low Density Residential	626 Dwellings	0.85 vph/house	391	0.85 vph/house	391	RTA
Medium Density Residential	330 Dwellings	0.55 vph/unit	151	0.55 vph/unit	151	RTA
Single Occupant Home Office (100m^2)	31	0.55 vph/home office	17	0.55 vph/home office	17	RTA
Community Site (Church)	1,600m^2 GFA	0.55 vph/100sqm	9	0.55 vph/100sqm	9	ITE
Child Care	75 children	0.8 vph/child	60	0.8 vph/child	60	RTA
Commercial Site (Retail)	1,500m^2 GFA	12.5 vph/100sqm GFA	188	12.5 vph/100sqm GFA	188	RTA
Service Station	6 bowsers and 250m^2 convenience retail	13.38 vph/bowser	80	13.38 vph/bowser	80	ITE
		Total vph	**895**		**895**	

For the land use, 'Single Occupant Home Office' (SOHO), a trip generation rate equivalent to that of a medium density residential dwelling was adopted. This is considered appropriate since the occupant / business owner does not need to travel to work, nor is it considered typical of a SOHO style business to attract many customers during the peak hour.

Note that since the traffic assessment uses background traffic volumes that were counted in July 2015, it is reasonable to assume that the peak hour trips generated by the residential dwellings onsite in July 2015 were captured in the traffic count data. Based on the assumption that the residential dwellings comprising Stages 1-6 were only 75% occupied at the time of the traffic count, 25% of the trips generated by Stage 1-6 were included in the ultimate 2023 development traffic volume – refer **Table 4-2** for trip generation calculations.

4.2 DIRECTIONAL ASSIGNMENT

For the purpose of determining the macro distribution of trips associated with different land uses, the following assumptions were made:

- Due to the high number of AM weekday trips required for non-discretionary purposes, i.e. travelling to work or education facilities, it is assumed that in the morning peak hour 80 % of the residential generated traffic travels out of the site, and 20 % of the traffic generated travels into the site. Similarly, the reverse is true in the evening peak hour.
- During the morning peak hour it is assumed that 80 % of the commercial (retail) and community (church) generated traffic travels into the site, i.e. for work or shopping purposes, and 20 % travels out of the site. Similarly, the reverse is true in the evening peak hour.
- During the morning peak hour it is assumed that 50 % of the Child Care and Service Station generated traffic travels into the site and 50 % travels out of the site. This is consistent with land uses where short stays are typical. Similarly, the reverse is true in the evening peak hour.

The macro distribution of trips per land use is summarised in **Table 4-2.**

Table 4-2: Development traffic distribution into and out of the site

Land Use Type	AM In (%)	AM Out (%)	PM In (%)	PM Out (%)
Low Density Residential	20	80	80	20
Medium Density Residential	20	80	80	20
Single Occupant Home Office	20	80	80	20
Community Site	80	20	20	80
Child Care	50	50	50	50
Commercial Site	80	20	20	80
Service Station	50	50	50	50

It is noted that there are significant trip attractors located to the west and to the north of the site. As the site is bounded by the Ross River immediately to the west and north, westbound traffic is required to travel either north along Abbott Street or south along Lakeside Drive. It is anticipated that negligible development traffic volumes will travel east, as there are no significant trip attractors situated east of the site. It is anticipated that the volume of development traffic travelling to/from the existing residential area to the south of the site will be negligible as there are no trip attractors within the adjoining residential area. There are also existing traffic calming devices at Twinview Place and local threshold treatments within the adjacent residential estate, which are anticipated to deter through-traffic movements.

Where possible, TSTM data was used to determine the macro distribution of trips north and south out of the development and micro distribution of trips across the wider road network. From the TSTM data it can be established that the future preferred travel route for the morning peak is via Lakeside Drive (between Bruce Highway and Oonoonba Road), right onto Oonoonba Road (between Lakeside Drive and Abbott Street), left onto Abbott Street (north of Oonoonba Road) and then along Railway Avenue into the city. For the evening peak it is the reverse of this.

For instances where TSTM data was incomplete, the existing (2015) traffic counts were used to inform the distribution. This approach was adopted for all scenarios discussed in the following section. For trip distribution across the wider network, refer distribution diagrams in **Appendix G**.

For the purpose of the following traffic assessment, the level of self-containment within the proposed development is assumed to be 80 % for the child care centre and community site and 20 % for the retail site. This implies that 80 % of the peak hour child care centre and church trips will be internal to the site and the remaining 20 % will be external to the site, likewise 20 % of the retail trips will be internal to the site and 80 % will be external. For a development with 956 residential dwellings, this is considered a reasonable assumption.

Of the trips generated by the service station, 90 % are considered 'linked' trips, where motorists stop at the service station on their way to/from their ultimate destination, while the remaining 10 % are considered 'unlinked' trips, where the service station is the ultimate destination. At the Lakeside Drive / Riveredge Boulevard intersection it is assumed that both 'linked' and 'unlinked' trips add traffic volume to the intersection. However, it is assumed that only the 'unlinked' trips, i.e. 10% of the generated trips, add traffic volume to those intersections in the outer road network.

5 TRAFFIC NETWORK ASSESSMENT

The following assessment has been based on a combination of an intersection performance based assessment and link based assessment process as consistent with Austroads guidelines.

For the purpose of assessing future background traffic demands, base traffic volumes discussed in **Section 3.3** have been adopted with the growth rates specified in **Table 3-3** from TCC's strategy model – refer **Appendix E** and **Appendix C** respectively. These growth rates were applied to the 2015 traffic count data[2] and the 2031 TSTM data for the purpose of informing the 2023 and 2033 background traffic volumes respectively.

Comparing background forecast traffic demands without the development against that of forecast traffic demands with the development, the following assessment periods applicable to the scope of this assessment apply:

- **2015 (Base) Traffic Scenario**: this scenario includes the 2015 traffic volumes modelled over the existing road network. This analysis was performed for both the AM and PM peaks.

- **2023 (Base without Development) Forecast Traffic Scenario**: this scenario includes the 2015 traffic volumes forecast to 2023 modelled over the existing road network. This analysis was performed for both the AM and PM peaks.

- **2023 (Base + Development) Forecast Traffic Scenario**: this scenario uses the 2015 traffic volumes forecast to 2023, plus forecast development traffic in 2023 modelled over the existing road network and where required modification and/or upgrade works have been identified. These analyses were performed for both the AM and PM peaks.

- **2033 (Base + Development) Forecast Traffic Scenario**: this scenario extends the 2023 (Base + Development) Forecast Traffic Scenario over a 10-year design horizon to confirm intersection performance can be maintained over this period. This analysis uses the 2031 TSTM traffic volumes for base traffic and was performed for both the AM and PM peaks. Where required modification and/or upgrade works have been identified.

For the proceeding assessment it is assumed that the peak hour vehicle movements of all mixed uses within the proposed development coincide with the peak hour of the external traffic network. It should also be noted that where possible the percentage of heavy vehicles for each of the above modelling scenarios was adopted from the 2015 traffic count data. Where this data was unavailable, i.e. at the Railway Avenue intersections, a 2008 Traffic Analysis and Reporting System (TARS) report for the intersection of Railway Avenue, Boundary Street and Saunders Street was used to inform the decision.

5.1 EXTERNAL INTERSECTION ASSESSMENTS

The following traffic assessment considers these intersections:

- Lakeside Drive / Riveredge Boulevard
- Abbott Street / Lakeside Drive
- Oonoonba Road / Lakeside Drive

[2] 2021 TSTM data was used to inform background traffic growth at 2023 where 2015 traffic counts were unavailable.

- Stuart Drive / Fairfield Waters / Mervyn Crossman Drive
- Boundary Street / Railway Avenue / Saunders Street
- Railway Avenue / Queens Road / Putt Street

The desirable service standards for intersection operation are described within the TCC Planning Scheme (2014). A summary of the service standards is given in **Table 5-1**.

Table 5-1: Desirable service standards for intersection operation

Criteria	Acceptable Levels
Signalised intersection	Control delay less than 55 secs per vehicle (LOS D) or Degree of Saturation less than 0.9
Roundabout	Control delay less than 35 secs per vehicle (LOS D) or Degree of Saturation less than 0.85
Priority intersection or give-way stop controlled intersection	Control delay less than 35 secs per vehicle (LOS D) or Degree of Saturation less than 0.8
Left or right turning lanes	Less than available storage length within 95 percentile queue

All of the above intersections were analysed using computer software SIDRA Intersection Version 7 (SIDRA) under the development scenarios discussed above. The results and associated conclusions discussed hereafter. Refer to **Appendix I** for detailed SIDRA outputs.

5.1.1 LAKESIDE DRIVE / RIVEREDGE BOULEVARD

The intersection between Lakeside Drive and Riveredge Boulevard is currently a three-leg priority controlled intersection with a channelised right turn (CHR) lane - refer **Figure 5-1**. The western approach of the intersection is the main site access for the residential, commercial and community uses within the proposed site. The ultimate intersection configuration will include an eastern approach to allow access to the proposed petrol station and convenience store site so that the intersection will become a four-leg signalised arrangement.

The proposed development is anticipated to increase the traffic volume at the intersection by 803 vph (total two-way) during the AM and PM peak hour. The anticipated total volume of site movements for the year 2023 (including the development traffic) is 1,805 vph and 1,602 vph during the AM and PM peak hours, which equates to a proportional development increase of 80 % and 101 % respectively. The increase in traffic volumes as a result of the proposed development is significant at this location, as the intersection is the major access node to the service station site (eastern intersection approach) and the residential / mixed-use sites (via western intersection approach) within the developable area.

Figure 5-1: Existing Intersection at Lakeside Drive and Riveredge Boulevard – Aerial Image from June 2016 (Source: Nearmap, 2017)

The proposed ultimate four-leg approach signalised intersection as modelled in SIDRA is shown in **Figure 5-2**. Traffic signal control is recommended to minimise the risk of potential conflict between traffic movements, and also to mitigate the risk of the limited visibility along the north and south intersection approaches arising as a result of the horizontal road curvature in Lakeside Drive. It is also required to improve performance for right turn and straight through movements from Riveredge Boulevard and the service station.

Due to the high volume of left turn traffic anticipated at the western Riveredge Boulevard approach during the morning peak, the current arrangement of the left turn continuous slip lane will remain, with an addition of 10 m to the existing lane length to allow for adequate queueing storage. The Riveredge Boulevard intersection approach currently allows for this left turn slip lane, with pavement, kerb and channel already in place. The length of the left turn slip lane is constrained by the adjoining local intersection of Riveredge Boulevard / Darter Street that is located approximately 100 m prior to Lakeside Drive. Results from the analysis of this layout and the existing priority controlled intersection are provided in **Table 5-2**, with SIDRA outputs available in **Appendix I**.

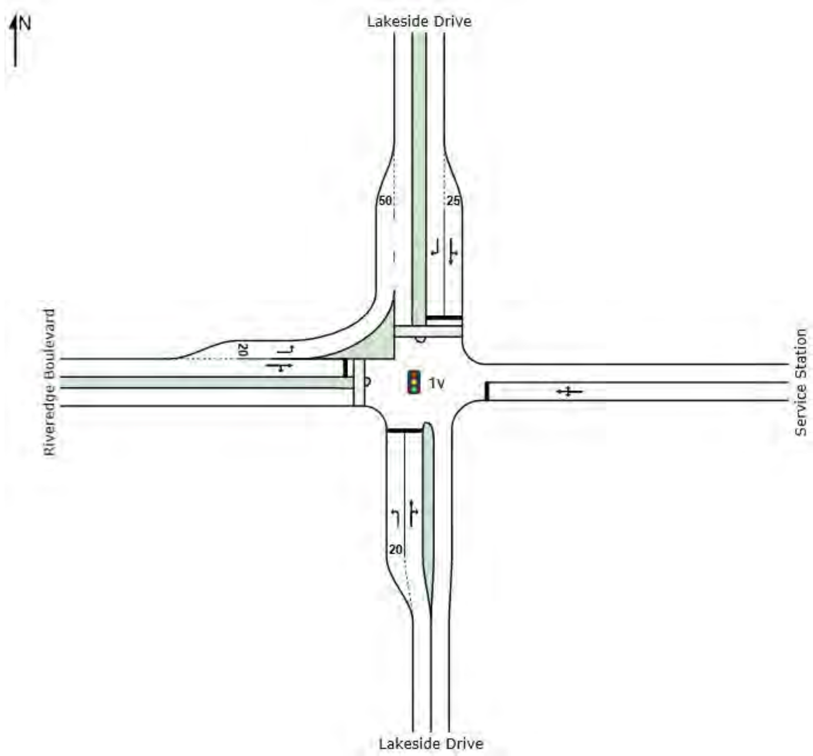


Figure 5-2: Proposed Lakeside Drive and Riveredge Boulevard layout as modelled

Table 5-2: Summary of SIDRA Assessment – Lakeside Drive and Riveredge Boulevard Intersection

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time (s)
AM Peak					
Existing – Priority Control (2015)	0.34	N/A	11	2.7	N/A
Without Development traffic (2023) – Priority Control	0.43	N/A	15	3.2	N/A
With Development traffic (2023) – Traffic Signal	0.61	A	74	9.9	60
Without Development traffic (2033) – Priority Control	0.38	N/A	13	3.2	N/A
With Development traffic (2033) – Traffic Signal	0.57	A	67	9.1	60
PM Peak					
Existing – Priority Control (2015)	0.19	N/A	3	2.1	N/A
Without Development traffic (2023) – Priority Control	0.19	N/A	4	2.2	N/A
With Development traffic (2023) – Traffic Signal	0.89	C	110	23.5	70
Without Development traffic (2033) – Priority Control	0.23	N/A	6	3	N/A
With development traffic (2033) – Traffic Signal	0.80	C	86	20.3	60

[1]These values are the 'worst values' for any approach at each intersection.

The SIDRA results in **Table 5-2** indicate that the intersection performs at LOS C or better, with worst degree of saturation of up to 0.89 during the evening peak in the year 2023. The worst maximum 95th percentile queue length is 110 m on the Lakeside Drive southern approach during the 2023 PM peak hour. The longest cycle time is 70 secs in the design horizon year 2023. These results suggest that the intersection performance is fair and operates well with the development traffic in both years 2023 and 2033.

It can be observed that the intersection generally performs better during both peak periods in year 2023 compared to year 2033. This is due to the year 2031 TSTM traffic volumes being used to derive traffic volumes for year 2033 whilst the year 2015 traffic volumes obtained during the traffic surveys were used to derive the 2023 traffic volumes.

Note that for the scenarios without development, the intersection has been analysed as per the existing priority controlled intersection. Traffic volumes are anticipated to be low without the development and will not require upgrades to the intersection.

The key findings of the Lakeside Drive and Riveredge Boulevard intersection assessment are:

- It is recommended for consideration that at this intersection location the service station site access be constructed as a signalised eastern intersection approach, with a single lane approach for all movements (i.e.: no left turn slip lane is required);
- It is recommended for consideration that the existing left turn slip lane at the Riveredge Boulevard approach be extended to 20 m;
- That over the 10 year assessment period the intersection is anticipated to operate well with minimal queues or delays; and
- That all works undertaken are in accordance with relevant design standards and guidelines.

5.1.2 ABBOTT STREET / LAKESIDE DRIVE

The existing intersection configuration is a three-leg approach priority controlled intersection. The intersection has a designated right turn and left turn lane from the major road - refer **Figure 5-3**. Currently all movements are allowed with the exception of the right turn from Lakeside Drive. The left turn from Lakeside Drive is currently operating as a continuous movement, since there is an uninterrupted exit lane along Abbott Street north of the intersection. The exit lane for the left turn from Lakeside Drive into Abbott Street is approximately 170 m in length, at which point the entering Lakeside Drive traffic is required to merge with the northbound through traffic to form one lane along Abbott Street prior to the Ross River Bridge crossing which is a single-lane carriageway.

The development traffic as a proportion of the total background traffic at the intersection represents 25 % and 29 % of the AM and PM peak hours respectively in the base design year 2023. The proportion of development traffic at the intersection is greater than 5 %, hence triggering a detailed analysis of the intersection.

For the purpose of the following traffic assessment, the traffic operations at this intersection will be modelled without the existing rail crossing that is located to the west of the intersection. The anticipated effect of the North Coast Rail services could consist of additional queuing within the right and left turn lanes along the major road and at the minor road approach. The additional queuing is considered to be unavoidable with the arrival of a train at the crossing. As discussed in **Section 3.2**, the extent of queuing on the intersection with the arrival of a train during peak periods is beyond the scope of this assessment.

Figure 5-3: Abbott Street and Lakeside Drive intersection, aerial view at June 2016 (Source: Nearmap, 2017)

A review of the existing base year 2015 traffic volumes indicate that the intersection currently satisfies the warrants for signalisation during the AM and PM peak hours, in accordance with *Austroads Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings* and TMR's *Road Planning and Design Manual* (RPDM), refer **Table 5-3.**

Table 5-3: Analysis of Austroads Warrants for Signalised Intersections – Existing Base Year 2015

Traffic Scenario	Major Leg (Abbott Street – Two-Way volume, all approaches) (vph)	Minor Leg (Lakeside Drive – One-way approach volume) (vph)	Comment
Traffic volumes triggering warrants for traffic signal control at the intersection	600	200	-
Traffic volumes AM peak hour 2015	979	735	Volumes exceed traffic signal warrants
Traffic volumes PM peak hour 2015	1,122	374	Volumes exceed traffic signal warrants

The existing layout of the Abbott Street and Lakeside Drive intersection as modelled in SIDRA is shown in **Figure 5-4**. Results from the analysis of this layout are provided in **Table 5-4**, with SIDRA outputs available in **Appendix I**.

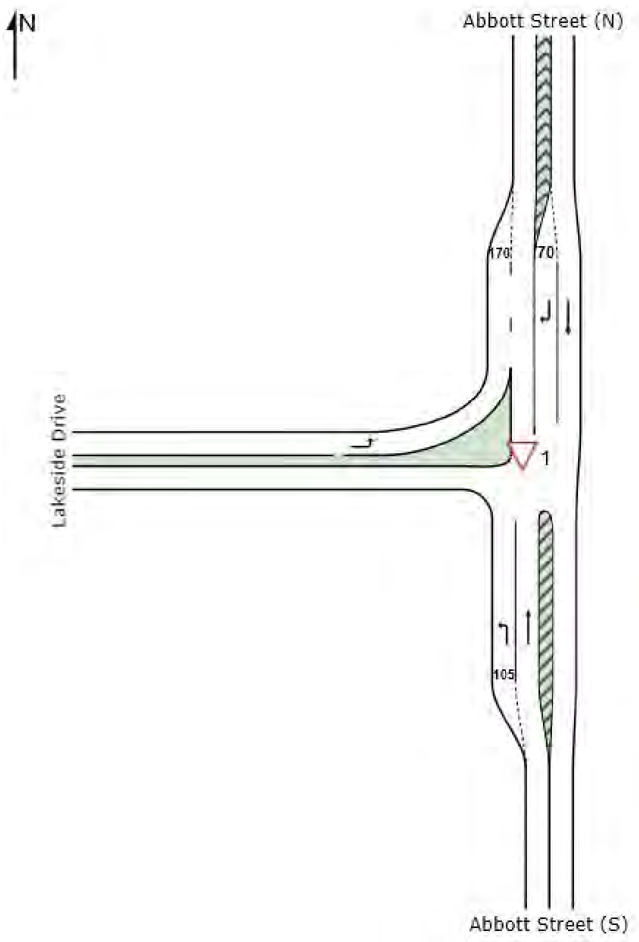


Figure 5-4: Abbott Street and Lakeside Drive existing layout as modelled

With the development traffic, the combination of increasing straight through traffic volumes from the southern approach of Abbott Street with the right turn volumes from the northern approach into Lakeside Drive, particularly during the evening peak hour, requires an upgrade of the intersection to maintain acceptable LOS for all traffic at the intersection. In view of the high right turn volumes from Abbott Street into Lakeside Drive, it is deemed that an upgrade to a roundabout is most suitable. **Figure 5-5** shows the proposed roundabout layout to accommodate traffic in year 2023. A continuous left turn lane is provided on Lakeside Drive due to the high left turn volumes onto Abbott Street. Results for the intersection are provided in **Table 5-4**.

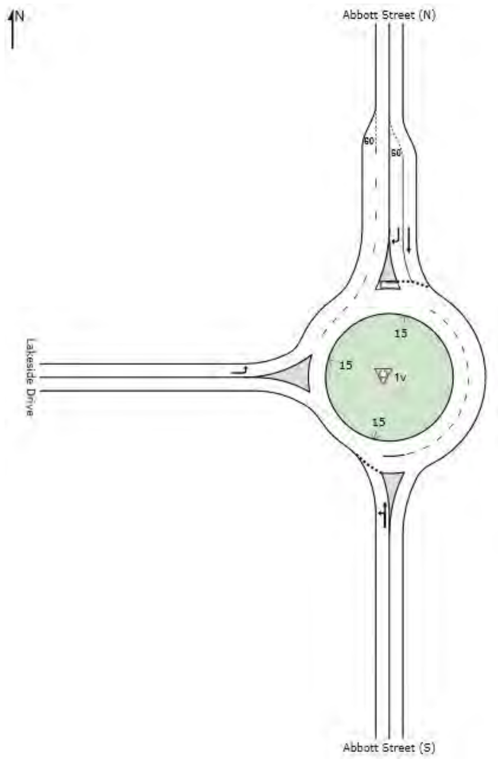


Figure 5-5: Abbott Street and Lakeside Drive proposed ultimate roundabout arrangement

With the increase in background traffic, an additional approach lane will be required at the southern approach of Abbott Street and an additional exit lane on the northern approach will be required in year 2033; refer **Figure 5-6**. This is due to the high straight through volumes from the southern approach, which more than doubled during the 10 years between 2023 and 2033. Results of the intersection performance are summarised in **Table 5-4**.

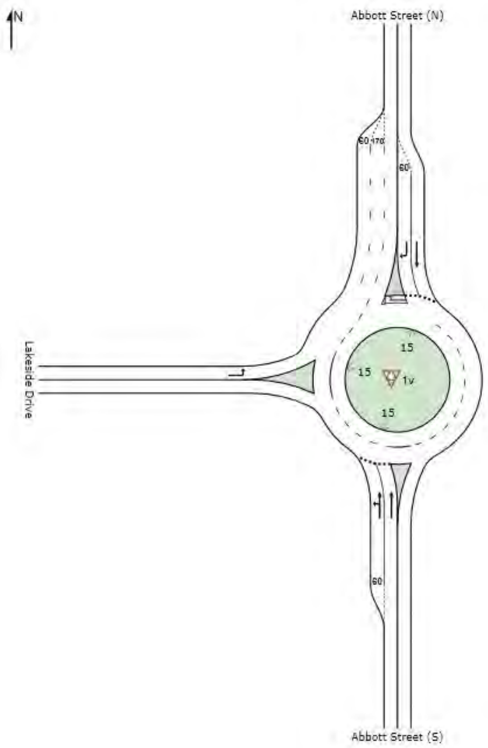


Figure 5-6: Abbott Street and Lakeside Drive proposed ultimate roundabout arrangement

Table 5-4: Summary of SIDRA assessment for Abbott Street and Lakeside Drive Intersection

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)
AM Peak				
Existing traffic scenario (2015) – Priority Control	0.42	N/A	6	3.3
Without Development traffic (2023) – Priority Control	0.44	N/A	12	3.3
With Development traffic (2023) – Roundabout	0.70	A	57	7.2
Without Development traffic (2033) – Priority Control	0.70	N/A	6	2.3
With Development traffic (2033) – Roundabout	0.78	A	73	6.3
PM Peak				
Existing traffic scenario (2015) – Priority Control	0.30	N/A	10	3.2
Without Development traffic (2023) – Priority Control	0.47	N/A	23	3.4
With Development traffic (2023) – Roundabout	0.69	A	54	9.9
Without Development traffic (2033) – Priority Control	0.85	N/A	25	2.8
With development traffic (2033) – Roundabout	0.90	B	91	10.1

[1]These values are the 'worst values' for any approach at each intersection

With the upgrade to a roundabout, the intersection will perform well in year 2023 with LOS A in all peak hours, with minimum delays and queue lengths. The longest 95th percentile queue during both peak hours occurs on the southern approach to the intersection.

In year 2033, the intersection performs well with the additional lane provided, with the worst LOS of B occurring during the PM peak. Average control delays are maintained at very low levels, with the longest queue of 91 m on the southern approach of Abbott Street during the PM peak hour. It can be observed that even without the development traffic, the intersection will be operating at a high degree of saturation of 0.85 during the PM peak of year 2033.

5.1.3 LAKESIDE DRIVE / OONOONBA ROAD

The Oonoonba Road and Lakeside Drive intersection is a signalised four-leg intersection, with left turn slip lane treatments located on each approach. The development traffic as a proportion of the total background traffic at the intersection represents 13 % and 10 % of the AM and PM peak hours in the base design year 2023. This is greater than the 5 % value, triggering further detailed analysis of the intersection. The Oonoonba Road and Lakeside Drive intersection was signalised in 2014 to accommodate increased traffic volumes as a part of the Abbott Street Deviation Project undertaken by DTMR - refer **Figure 5-7** showing the intersection configuration.

Figure 5-7: Existing Intersection at Lakeside Drive / Oonoonba Road – Aerial Image from June 2016 (Source: Nearmap, 2017)

It should be noted that the phase and cycle times for this intersection were unavailable at the time of writing this report. For the adopted phase and cycle times refer to the Phasing Summary in **Appendix I**.

The existing layout of the Lakeside Drive and Oonoonba Road intersection as modelled in SIDRA is shown in **Figure 5-8**. Results from the analysis of this layout are provided in **Table 5-5**, with SIDRA outputs available in **Appendix I**.

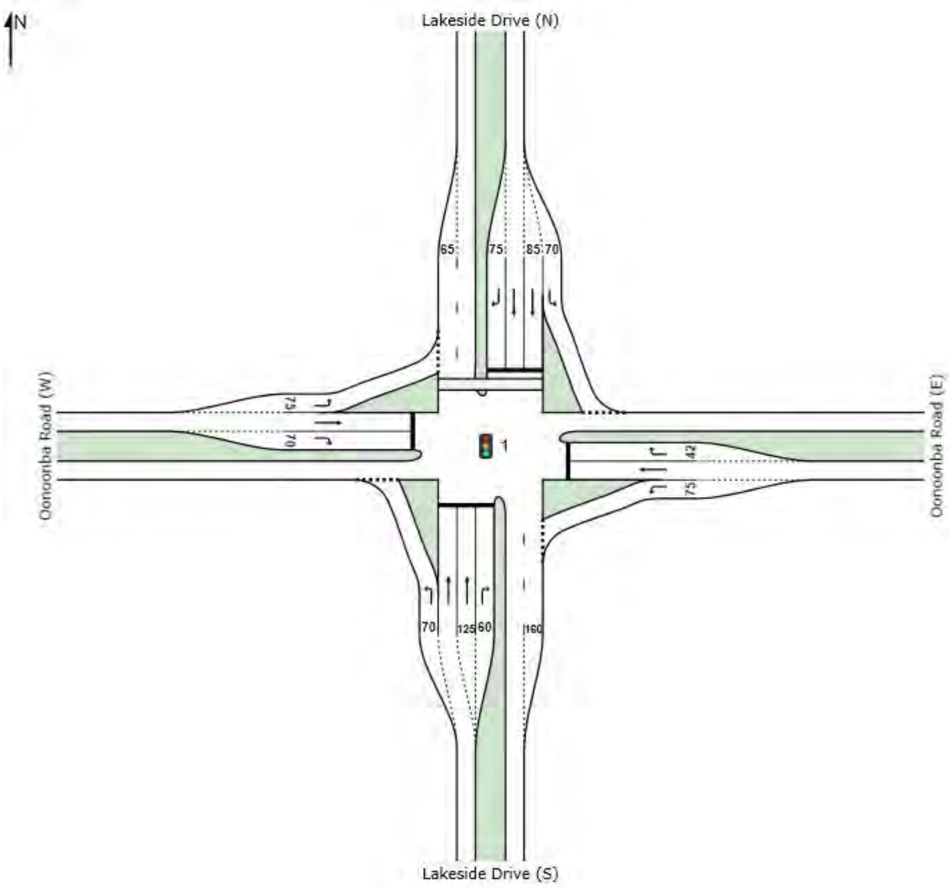


Figure 5-8: Lakeside Drive and Oonoonba Road existing layout as modelled

Table 5-5: Summary of SIDRA assessment for Lakeside Drive and Oonoonba Road Intersection

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time[2] (s)
AM Peak					
Existing traffic scenario (2015)	0.36	B	54	16.4	80
Without Development traffic (2023)	0.41	B	66	16.2	80
With Development traffic (2023)	0.49	B	74	16.8	80
With Development traffic (2033)	0.55	B	71	17.2	80
PM Peak					
Existing traffic scenario (2015)	0.42	B	65	17.7	80
Without Development traffic (2023)	0.49	B	78	17.6	80
With Development traffic (2023)	0.55	B	84	18.3	80
With development traffic (2033)	0.49	B	82	16.2	80

[1]These values are the ‘worst values’ for any approach at each intersection

The SIDRA analysis results summarised in **Table 5-5** indicate that the intersection continues to operate within acceptable performance measures up to the 2033 design horizon. The maximum 95th percentile queue length in the design horizon year 2033 is 84 m which occurs on the eastern approach from Oonoonba Road. This additional queuing is not anticipated to impinge on the operation of the Abbott Street and Oonoonba Road intersection. Based on the analysis above it is anticipated that the development will not significantly impact on the performance of this intersection. As such there are no mitigation measures required at the intersection.

5.1.4 STUART DRIVE / FAIRFIELD WATERS DRIVE / MERVYN CROSSMAN DRIVE

The Stuart Drive, Fairfield Waters Drive and Mervyn Crossman Drive intersection is a four-leg approach roundabout with two circulating lanes. The development traffic anticipated at the intersection is 104 vph during the AM peak hour and 69 vph during the PM peak hour total two-way all-movements. The total volume of traffic movements at year 2023 are 4,884 vph and 3,938 vph during the AM and PM peak hours respectively. The resulting proportion of development traffic at the intersection is 2.13 % in the AM peak hour and 1.75 % during the PM peak hour, which is below the 5 % trigger therefore not requiring a more detailed assessment. The traffic impact arising from the development traffic at this intersection is negligible.

Figure 5-9: Stuart Drive, Fairfield Waters Drive and Mervyn Crossman Drive aerial view at June 2016 (Source: Nearmap, 2017)

5.1.5 RAILWAY AVENUE / BOUNDARY STREET / SAUNDERS STREET

Further to the north of the site, Abbott Street becomes Railway Avenue. The Boundary Street, Railway Avenue and Saunders Street intersection site provides access to the Townsville CBD area in the north and the commercial / retail / industrial districts situated further west, refer **Figure 1-1** and **Figure 1-3**. The intersection of Boundary Street, Railway Avenue and Saunders Street is a signalised four-way intersection, with an unsignalised left turn slip lane treatment at the eastern and western intersection approaches - refer **Figure 5-10**. The development traffic as a proportion of the total background traffic at the intersection represents 10 % in the AM peak hour and 11 % in the PM peak hour. This is greater than the 5 % trigger, therefore requiring further detailed analysis of the intersection.

For the purpose of the following traffic assessment, the traffic operations at this intersection will be modelled without the existing rail crossing that is located at the western intersection approach. The anticipated effect of the North Coast Rail services could consist of additional queuing at the western approach, and additional queues within the right and left turn lanes along the north and south approaches respectively, as well as additional queues and delays at the eastern approach through-movement. The additional queuing is considered to be unavoidable with the arrival of a train at the crossing. The extent of queuing on the intersection with the arrival of a train during peak periods is beyond the scope of this assessment.

Figure 5-10: Railway Avenue, Boundary Street and Saunders Street aerial view at June 2016 (Source: Nearmap, 2017)

For the projected 2023 traffic volumes, traffic volume data for the intersection was obtained from the TSTM for the year 2021 and factored by the agreed growth rates.

STREAMS traffic signal data for Thursday 10 May 2016 was obtained from DTMR for the purpose of informing the traffic signal phase and cycle times for this intersection in SIDRA. The phase and cycle time data was extracted for the relevant AM and PM peak hours and the average phase and cycle times were calculated based on the available data. **Table 5-6** shows the details of the average phase times calculated for the intersection. It is noted that not all phases were called during every cycle, and this is allowed for by multiplying the average phase times with the phase frequency. The calculated average phase times shown in the tables may therefore be lower than the minimum allocated phase times on site.

Table 5-6: Intersection of Railway Avenue, Boundary Street and Saunders Street - average phases times calculated

		Phase						Average Cycle Time (s)
		A	B	C	D	E	F	
AM	Average Phase Time (s)	39.7	22.5	23.2	21.0	14.5	19.0	140.0
	Phase Frequency (%)	100	100	96.2	100	88.5	100	
PM	Average Phase Time (s)	23.3	33.8	27.6	18.2	16.1	22.2	160.7
	Phase Frequency (%)	100	100	100	100	89.7	100	

The existing layout of the Railway Avenue, Boundary Street and Saunders Street intersection as modelled in SIDRA is shown in **Figure 5-11**. The average phase times calculated above were entered into SIDRA to obtain results for existing intersection performances. Results from the analysis of this layout are provided in **Table 5-7**, with SIDRA outputs available in **Appendix I**.

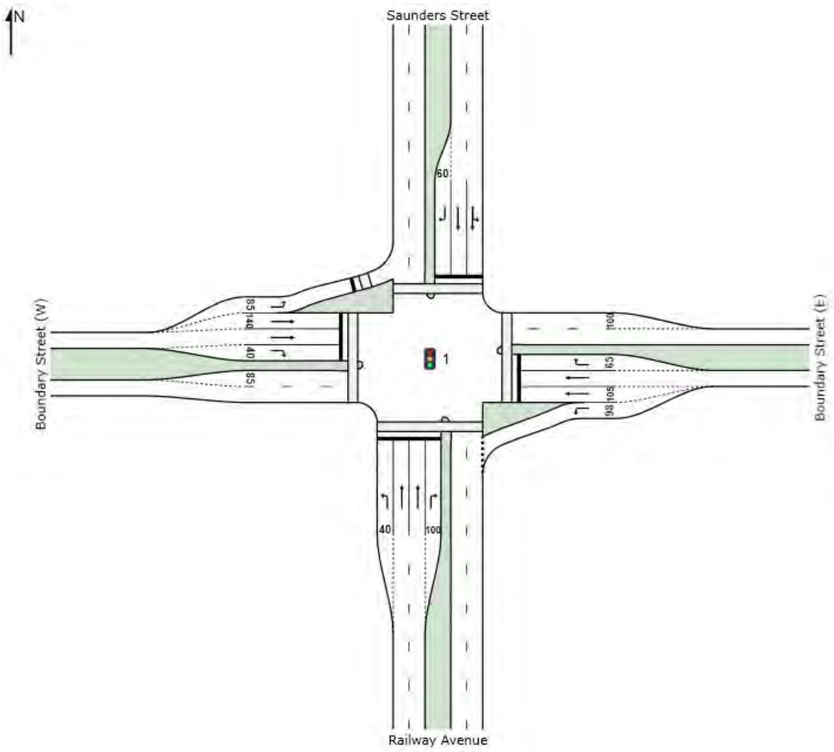


Figure 5-11: Railway Avenue, Boundary Street and Saunders Street existing layout as modelled

It can be observed from **Table 5-7** that with the TSTM projected 2016 traffic volumes, the existing intersection is oversaturated with a degree of saturation of more than one. Road users are also experiencing high delays during the PM peak period, with the longest queue length of 79 5m occurring on the Saunders Street approach. Results for the year 2023 peak hours are also showing oversaturated conditions, although the intersection appears to perform better with different phase times. These results suggest that upgrades of the intersection are required to improve driving experience at this intersection.

Figure 5-12 shows the upgrades required to improve performance at the intersection for year 2023 without development traffic. An additional short lane is proposed for northbound traffic both on the approach and exit of Railway Avenue. An extra right turn short lane is also required on the western approach of Boundary Street. Various lengthening of existing short lanes are proposed to provide better intersection performance. Results of the proposed layout are tabulated in **Table 5-7**.

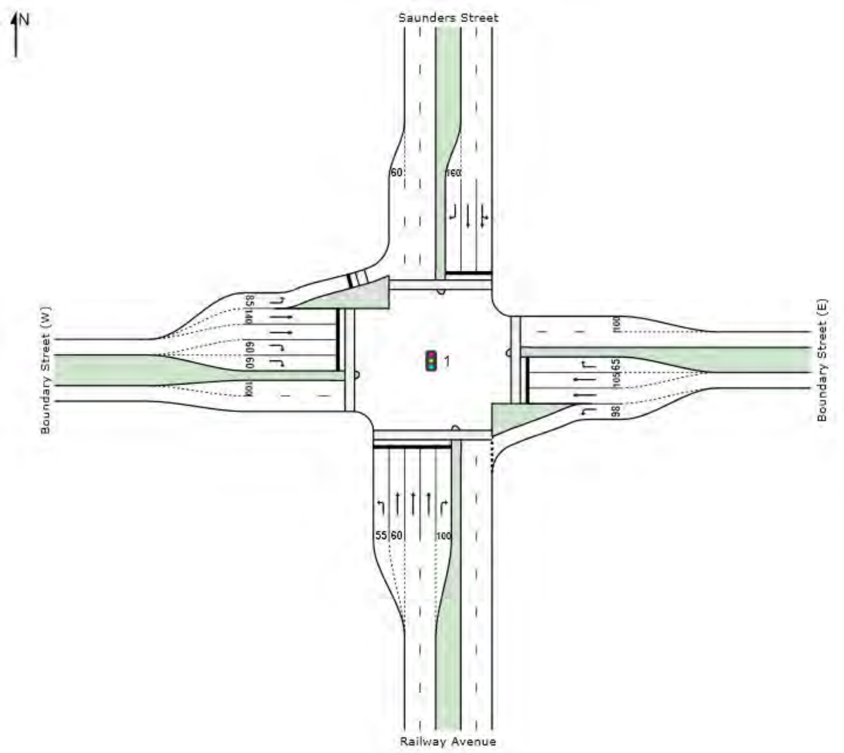


Figure 5-12: Proposed layout for Railway Avenue, Boundary Street and Saunders Street to improve performance for year 2023 base traffic

With the inclusion of development traffic, an addition of a straight through short lane on the northern approach of Railway Avenue will be required, accompanied with a short exit lane on the southern approach as shown in **Figure 5-13**. Minor lengthening of other short lanes are also necessary to maintain acceptable LOS and degree of saturation at the intersection.

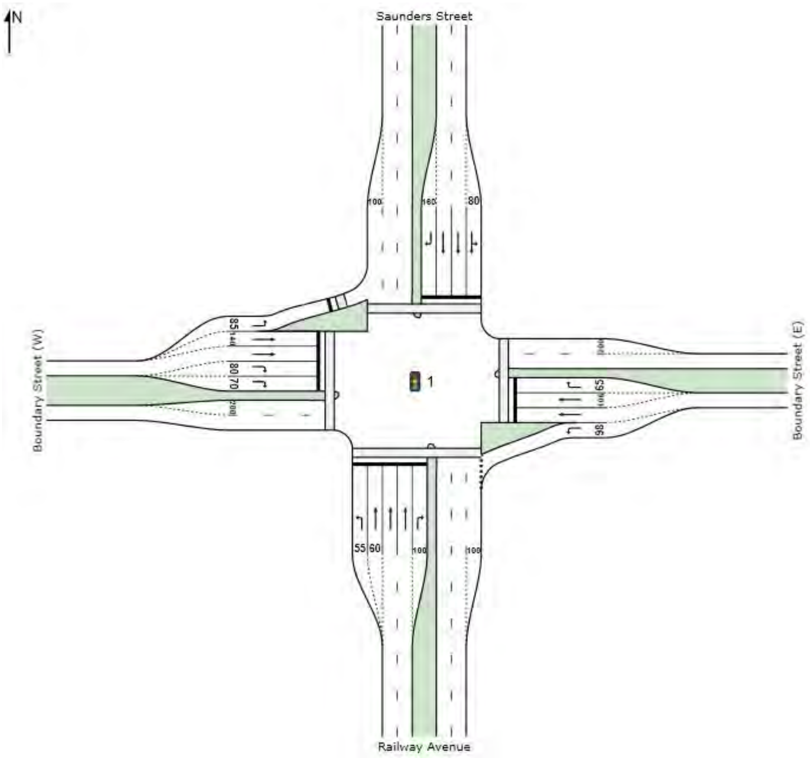


Figure 5-13: Proposed layout for the intersection of Railway Avenue, Boundary Street and Saunders Street with development traffic in year 2023

With the projection of traffic volumes to the design horizon year of 2033, further improvements are required to accommodate traffic volumes on Railway Avenue as shown in **Figure 5-14**. With background traffic growth rate of around 4 % per annum on Railway Avenue, the amount of traffic traversing the intersection increases significantly, resulting in the addition of two approach lanes on the northern approach of Railway Avenue, accompanied by various lengthening of short lanes. It can be observed from **Table 5-7** that intersection performance does not worsen significantly with the addition of development traffic in year 2033.

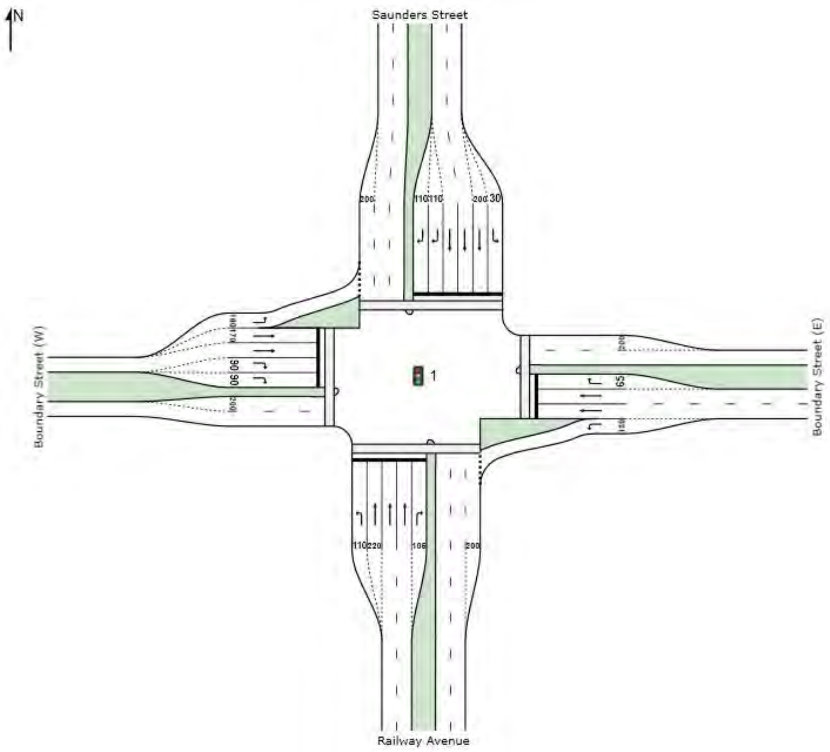


Figure 5-14: Proposed year 2033 layout for the intersection of Railway Avenue, Boundary Street and Saunders Street

Table 5-7: Summary of SIDRA assessment of Railway Avenue, Boundary Street and Saunders Street Intersection

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time (s)
AM Peak					
TSTM projected traffic scenario (2016)	1.04	D	286	49.5	141
Without Development traffic (2023)	1.01	E	499	76.6	141
Without Development traffic (2023) – With upgrades	0.86	D	181	35.8	95
With Development traffic (2023) – With upgrades	0.90	D	212	36.3	95
Without Development traffic (2033) – With upgrades	0.85	C	142	29.5	75
With Development traffic (2033) – With upgrades	0.84	C	219	33.6	95
PM Peak					
TSTM projected traffic scenario (2016)	1.25	F	795	140.5	142
Without Development traffic (2023)	1.14	F	526	116.1	142
Without Development traffic (2023) – With upgrades	0.88	D	263	39.1	95

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time (s)
With Development traffic (2023) – With upgrades	0.90	D	231	36.4	85
Without Development traffic (2033) – With upgrades	0.85	C	205	33.5	85
With development traffic (2033) – With upgrades	0.90	D	319	40.1	105

[1]These values are the 'worst values' for any approach at each intersection.

The SIDRA analysis results in **Table 5-7** indicate that the intersection is anticipated to be currently operating at LOS F during the PM peak, with degree of saturation up to 1.25. For signalised intersections, the practical degree of saturation threshold of 0.90 indicates that the traffic operations are constrained and that the intersection is nearing its operational capacity. At degree of saturation greater than 0.90, the performance of the intersection begins to decline rapidly with substantial queuing and delays. The SIDRA results indicate that the intersection performance is poor, and is anticipated to function beyond degree of saturation of 1.0 throughout the assessment period, without development traffic, with significant 95th percentile queue lengths and delays by future year 2033.

The various upgrades discussed above will help improve intersection performance and reduce the degree of saturation to 0.90 at the maximum. It is noted that background traffic growth contributes significantly to the deterioration of intersection performance, as observed in the year 2033 scenarios, which were analysed with the same intersection layouts for both the with and without development traffic scenarios. The above results show that the intersection performances do not vary significantly with the addition of development traffic.

It is noted that the suggested improvements to accommodate year 2033 traffic increase the size of the intersection significantly, and it may be worth considering upgrading the intersection to an interchange in the future.

5.1.6 RAILWAY AVENUE / QUEENS ROAD / PUTT STREET

The intersection of Railway Avenue, Queens Road and Putt Street is a signalised four-way intersection, with unsignalised left turn slip lane treatments at the western and southern approaches – refer **Figure 5-15**. The development traffic as a proportion of the total background traffic at the intersection represents 16 % in both the AM and PM peak. This is greater than the 5% trigger, therefore requiring further detailed analysis of the intersection.

For the purpose of the following traffic assessment, the traffic operations at this intersection will be modelled without the existing rail crossing that is located at the western intersection approach. The anticipated effect of the North Coast Rail services could consist of additional queuing at the western approach, and additional queues within the right and left turn lanes along the north and south approaches respectively, as well as additional queues and delays at the eastern approach through-movement. The additional queuing is considered to be unavoidable with the arrival of a train at the crossing. The extent of queuing on the intersection with the arrival of a train during peak periods is beyond the scope of this assessment. However, the unsignalised left turn slip lanes have been modelled as signalised slip lanes in the attempt to allow for some additional delays and queueing at the intersection.

Figure 5-15: Railway Avenue, Queens Road and Putt Street aerial view at June 2016 (Source: Nearmap, 2017)

STREAMS traffic signal data for Thursday 10 May 2016 was obtained from DTMR for the purpose of informing the traffic signal phase and cycle times for this intersection in SIDRA. The phase and cycle time data was extracted for the relevant AM and PM peak hours and the average phase and cycle times were calculated based on the available data. **Table 5-8** shows the details of the average phase times calculated for the intersection. It is noted that not all phases were called during every cycle, and this is allowed for by multiplying the average phase times with the phase frequency. The calculated average phase times shown in the tables may therefore be lower than the minimum allocated phase times on site.

Table 5-8: Intersection of Railway Avenue / Queens Road / Putt Street - average phases times calculated

		Phase				Average Cycle Time (s)
		A	B	C	D	
AM	Average Phase Time (s)	95.2	20.6	24.5	-	140.3
	Phase Frequency (%)	100	95.2	100	-	
PM	Average Phase Time (s)	90.6	19.0	26.8	6.0	144.2
	Phase Frequency (%)	100	92.0	100	4.0	

The existing layout of the Railway Avenue, Queens Road and Putt Street intersection as modelled in SIDRA is shown in **Figure 5-16**. Results from the analysis of this layout are provided in **Table 5-9**, with SIDRA outputs available in **Appendix I**.

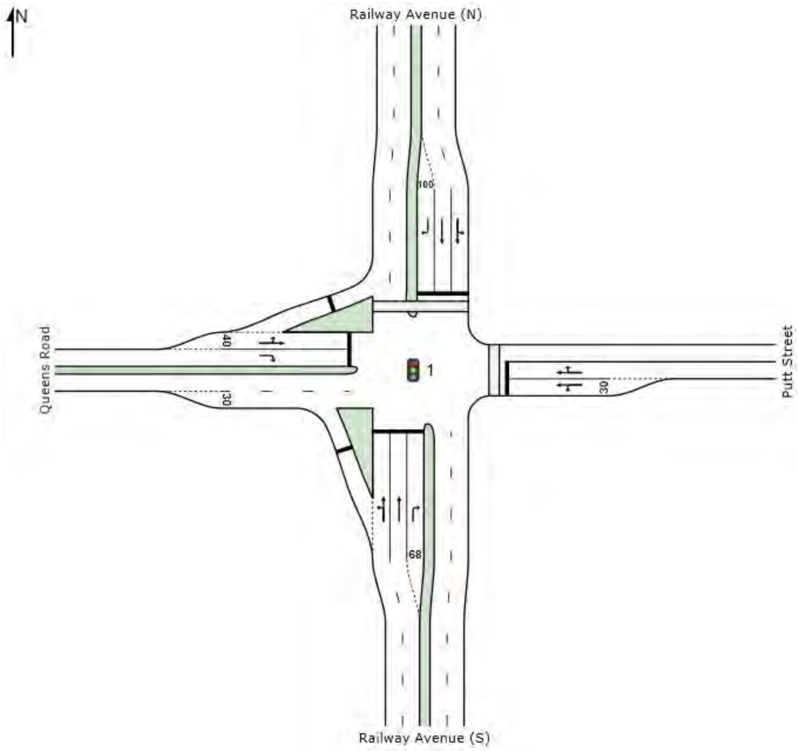


Figure 5-16: Railway Avenue, Queens Road and Putt Street existing layout as modelled

It is noted that the existing intersection is performing at a degree of saturation of more than 1. However, the intersection performance can be improved with some refinement to the phase times. This can be observed in the scenario without development traffic for year 2023 in **Table 5-9**. The intersection will be performing at a satisfactory LOS in year 2023 with changes to the phase times.

For year 2033, with background traffic growth, the intersection will require upgrades to maintain acceptable LOS and degree of saturation. The proposed layout is shown in **Figure 5-17**. An addition of one approach lane on Railway Avenue south is required, with a short exit lane on the northern approach. Existing short lanes on both the northern and western approach will be lengthened slightly to provide additional storage for queues.

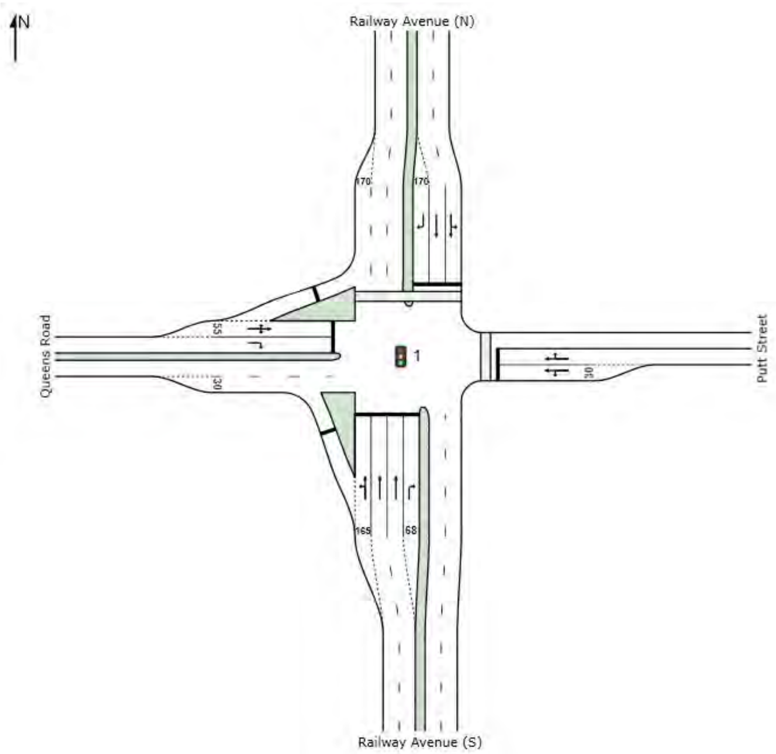


Figure 5-17: Proposed improvements at Railway Avenue, Queens Road and Putt Street for year 2033 base traffic

For scenarios with development traffic, in year 2023, improvements required to maintain satisfactory LOS are similar to those proposed in **Figure 5-17**. **Figure 5-18** shows the additional improvements required to accommodate development traffic in year 2033. These include an additional of a short approach lane on Railway Avenue north, with a short exit lane on Railway Avenue south. A short right turn lane on Queens Road is also required to maintain satisfactory LOS at the intersection.

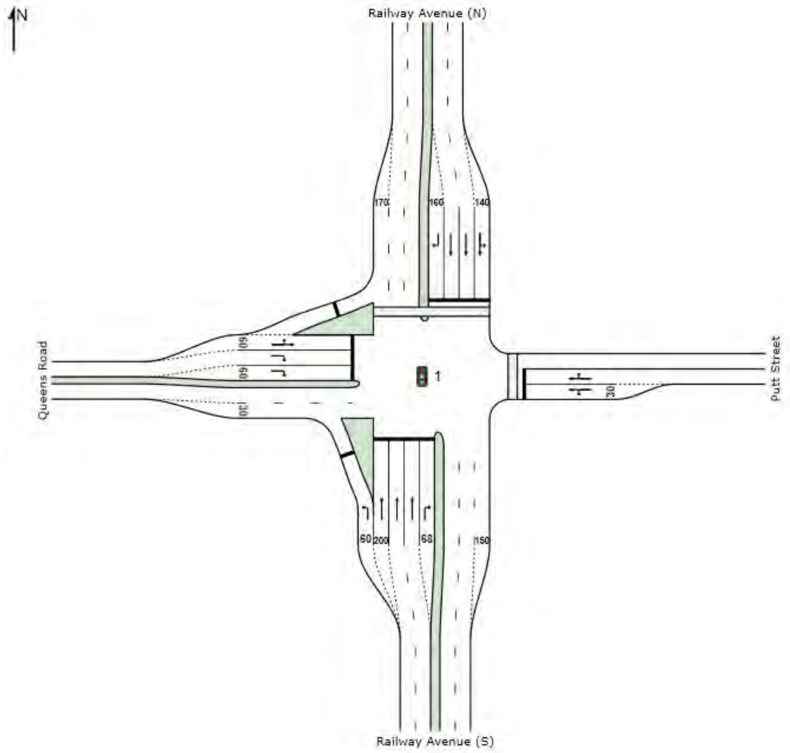


Figure 5-18: Proposed improvements at Railway Avenue, Queens Road and Putt Street for year 2033 with development traffic

Table 5-9: Summary of SIDRA assessment of Railway Avenue, Queens Road and Putt Street Intersection

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time (s)
AM Peak					
Projected traffic scenario (2016) – Existing layout	1.56	D	200	42.8	141
Without Development traffic (2023) – Existing layout, phase time change	0.72	C	278	25.4	141
With Development traffic (2023) – With upgrades	0.84	C	198	24.9	80
Without Development traffic (2033) – Existing layout	0.95	D	539	38.7	141
Without Development traffic (2033) – With upgrades	0.82	C	236	28.8	110
With Development traffic (2033) – With upgrades	0.88	C	344	33.0	120
PM Peak					
Projected traffic scenario (2016) – Existing layout	1.79	F	439	84.4	138

Scenario	Degree of Saturation[1] (DOS)	Level of Service (LOS)	95th Percentile Queue[1] (m)	Control Delay (Average) (s)	Cycle Time (s)
Without Development traffic (2023) – Existing layout, phase time change	0.85	C	303	31.7	138
With Development traffic (2023) – With upgrades	0.84	C	260	27.8	105
Without Development traffic (2033) – Existing layout	1.01	E	545	55.2	138
Without Development traffic (2033) – With upgrades	0.89	C	289	31.4	105
With development traffic (2033) – With upgrades	0.88	C	218	27.3	110

[1]These values are the 'worst values' for any approach at each intersection.

As mentioned above, the performances at the existing intersection with projected 2016 traffic are not acceptable with a degree of saturation above 1.0, accompanied by high intersection delays and long queue lengths. However, with adjustments to phase times, the intersection performances can be improved with no physical change required to the layout. This situation can be maintained to year 2023 with base traffic, but will require upgrades with year 2033 base traffic. As observed in **Table 5-9**, the degree of saturation in year 2033 will increase above 1.0 without physical improvements.

The intersection will perform satisfactorily with development traffic by implementing the proposed changes to the intersection configuration described above.

5.2 INTERNAL ROAD NETWORK

Previous planning for the site has dictated the internal road layout. A review of the ultimate road hierarchy for the site is shown in **Figure 5-19.** Provision has been made for a bus service route to loop through the site. In accordance with *Queensland Development Design Specifications* the potential bus route is located within 400 m of 95 % of the residential dwellings within the development. The TCC guidelines indicate that the bus route is to have a minimum 9 m carriageway. The road classifications and widths are shown in **Figure 5-19** and are based on TCC requirements which are considered to be consistent with *Queensland Streets* and national frameworks such as Austroads. It is noted that the access roadway to the child care and commercial/retail precinct is required to have a minimum road reserve width of 22 m and carriageway width of 13 m.

Access Place:
-5.5m Carriageway
-6.5m Road reserve

Access Street:
-5m Carriageway
-14m Road reserve

Major Collector Street:
-9m Carriageway
-20m Road reserve

Major Collector Street:
-13m Carriageway
-22m Road reserve

Sub Arterial Main Street:
-11m Carriageway (5m centre median)
-30m Road reserve

*Note: All Carriageway and Road Reserve widths are the minimum required width

Figure 5-19: Internal road layout plan

5.3 ROAD LINK ASSESSMENT

Table 5-10 shows the road link assessment for Riveredge Boulevard, Lakeside Drive, Abbott Street and Oonoonba Road. Road link capacities have been calculated in accordance with the guidelines given in Austroads' *Guide to Traffic Management Part 3: Traffic Studies and Analysis (2013)*, in particular Equation 5:

$$C = 1800 f_W f_{HV}$$

where

C_{pce} = capacity in passenger car equivalents per hour per lane (pc/h/l) under prevailing roadway and traffic conditions

f_W = adjustment factor for narrow lanes and lateral clearances (obtained from Table 4.1, Austroads' Guide)

f_{HV} = adjustment factor for heavy vehicles

$= 1/[1 + P_{HV} (E_{HV} - 1)]$

P_{HV} = the proportion of heavy vehicles in the traffic stream, expressed as a decimal

E_{HV} = the average passenger car equivalents for heavy vehicles (obtained from Table 4.2, Austroads' Guide)

Road link capacities in terms of pc/h/l were converted to vehicles per hour per lane (v/h/l) using the following equation from the *California Department of Transportation Life-Cycle Cost Analysis Manual Appendix 5* (2013):

$$C = \frac{C_{pce} \times 100}{[100 + P_{HV} \times (E_{HV} - 1)]}$$

Table 5-10: Road link analysis for year 2023

Road Link	Peak Hour	Calculated Capacity (vph)	2023 Peak Hour Volume (vph)	2023 Volume to Capacity Ratio	2023 Peak Hour Volume – With Development (vph)	2023 Volume to Capacity Ratio- With Development	Change in Volume to Capacity Ratio
Riveredge Boulevard (Eastbound)	AM	1147	205	0.18	592	0.52	189%
	PM	1147	83	0.07	335	0.29	305%
Riveredge Boulevard (Westbound)	AM	1147	56	0.05	306	0.27	445%
	PM	1147	144	0.13	640	0.56	346%
Abbott Street - Between Lakeside Drive and Queens Road (Northbound)	AM	939	1,504	1.60	1,893	2.02	26%
	PM	939	1133	1.21	1284	1.37	13%
Abbott Street - Between Lakeside Drive and Queens Road (Southbound)	AM	939	896	0.95	959	1.02	7%
	PM	939	1,583	1.69	1,978	2.11	25%
Abbott Street - Between Oonoonba Road and Lakeside Drive (Northbound)	AM	1095	1195	1.09	1267	1.16	6%
	PM	1095	1023	0.93	1045	0.95	2%
Abbott Street - Between Oonoonba Road and Lakeside Drive (Southbound)	AM	1095	832	0.76	832	0.76	0%
	PM	1095	1200	1.10	1200	1.10	0%
Lakeside Drive - Between Riveredge Boulevard and Abbott Street (Eastbound)	AM	1557	180	0.12	569	0.37	217%
	PM	1557	61	0.04	212	0.14	247%
Lakeside Drive - Between Riveredge Boulevard and Abbott Street (Westbound)	AM	1557	44	0.03	179	0.11	307%
	PM	1557	230	0.15	647	0.42	182%
Lakeside Drive - Between Oonoonba Road and Riveredge Boulevard (Northbound)	AM	1542	60	0.04	186	0.12	213%
	PM	1542	73	0.05	149	0.10	103%
Lakeside Drive - Between Oonoonba Road and Riveredge Boulevard (Southbound)	AM	1542	85	0.06	182	0.12	114%
	PM	1542	100	0.07	208	0.13	107%
Lakeside Drive - South of Oonoonba Road (Northbound)	AM	1512	349	0.23	395	0.26	13%
	PM	1512	266	0.18	296	0.20	11%
Lakeside Drive - South of Oonoonba Road (Southbound)	AM	1512	232	0.15	276	0.18	19%
	PM	1512	432	0.29	485	0.32	12%

Table 5-11: Road link analysis for design horizon year 2033

Road Link	Peak Hour	Calculated Capacity (vehicles per hour)	2033 Peak Hour Volume (vph)	2033 Volume to Capacity Ratio	2033 Peak Hour Volume – With Development (vph)	2033 Volume to Capacity Ratio- With Development	Change in Volume to Capacity Ratio
Riveredge Boulevard (Eastbound)	AM	1147	204	0.18	701	0.61	243%
	PM	1147	132	0.11	384	0.34	192%
Riveredge Boulevard (Westbound)	AM	1147	47	0.04	298	0.26	527%
	PM	1147	159	0.14	655	0.57	313%
Abbott Street - Between Lakeside Drive and Queens Road (Northbound)	AM	939	1877	2.00	2,301	2.45	23%
	PM	939	1371	1.46	1522	1.62	11%
Abbott Street - Between Lakeside Drive and Queens Road (Southbound)	AM	939	1078	1.15	1141	1.22	6%
	PM	939	2058	2.19	2,453	2.61	19%
Abbott Street - Between Oonoonba Road and Lakeside Drive (Northbound)	AM	1095	1201	1.10	1273	1.16	6%
	PM	1095	1167	1.07	1189	1.09	2%
Abbott Street - Between Oonoonba Road and Lakeside Drive (Southbound)	AM	1095	999	0.91	999	0.91	0%
	PM	1095	1214	1.11	1214	1.11	0%
Lakeside Drive - Between Riveredge Boulevard and Abbott Street (Eastbound)	AM	1557	523	0.34	947	0.61	81%
	PM	1557	152	0.10	302	0.19	100%
Lakeside Drive - Between Riveredge Boulevard and Abbott Street (Westbound)	AM	1557	59	0.04	193	0.12	230%
	PM	1557	662	0.42	1079	0.69	63%
Lakeside Drive - Between Oonoonba Road and Riveredge Boulevard (Northbound)	AM	1542	362	0.23	488	0.32	35%
	PM	1542	152	0.10	227	0.15	50%
Lakeside Drive - Between Oonoonba Road and Riveredge Boulevard (Southbound)	AM	1542	94	0.06	156	0.10	66%
	PM	1542	486	0.32	593	0.38	22%
Lakeside Drive - South of Oonoonba Road (Northbound)	AM	1512	412	0.27	457	0.30	11%
	PM	1512	332	0.22	363	0.24	9%
Lakeside Drive - South of Oonoonba Road (Southbound)	AM	1512	286	0.19	314	0.21	10%
	PM	1512	521	0.34	574	0.38	10%

With the exception of Abbott Street, the road link analysis shows that all road links are anticipated to accommodate the development traffic volumes. The key findings of the road link assessment are as follows:

- Riveredge Boulevard experiences a considerable rise in volume to capacity ratio (up to 527 %) yet continues to accommodate the expected base and development volumes to the design horizon year 2033;
- Abbott Street exceeds the maximum capacity at 2023 without the inclusion of development traffic, i.e. base traffic alone. The volume to capacity ratio increases through to 2033 and with the inclusion of development traffic; and
- Lakeside Drive experiences a considerable rise in volume to capacity ratio (up to 307 %) yet continues to accommodate the expected base and development volumes to the design horizon year 2033.

As shown by the results, the Abbott Street road link is anticipated to function beyond a volume-to-capacity ratio of 1.0 throughout the assessment period to future design horizon year 2033 without the inclusion of development traffic. The background traffic growth alone contributes significantly to the deterioration of link performance. This can be observed in the year 2033 AM peak scenario between Lakeside Drive and Queens Road, where the projected volume to capacity ratio reaches twice the maximum capacity. On average across AM and PM peak periods, the development traffic is only expected to form 16 % of the total traffic volume.

The Abbott Street road link is constrained by the Ross River Bridge structure that is one-lane in each southbound and northbound direction. Increasing the capacity of Abbott Street to improve mid-block performance through this section of road is anticipated to require the construction of an extra northbound and southbound lane, i.e. the construction of another bridge over the Ross River. If in the future the North Coast Railway Bridge is decommissioned, the railway bridge could be used to accommodate northbound traffic and the existing Abbott Street bridge could be used for two lanes of southbound traffic.

5.4 PUBLIC TRANSPORT AND ACTIVE TRANSPORT FACILITIES

The intent of “The Village” is to create an ecologically sustainable residential community that incorporates established trees, embraces the river and includes a network of open parks that will link the existing river front access from Fairfield Waters to the Abbott Street pedestrian and cycle bridge.

5.4.1 PUBLIC TRANSPORT SERVICES

The public transport opportunities consist mainly of local public bus services between Townsville (North East) and Thuringowa Central (South West).

The study area is located in Zone Fare 3 within the Townsville region. Sunbus operates two public bus services Route 207 and Route 208 within Oonoonba, providing connectivity between Townsville and Thuringowa Central, refer **Figure 5-20**. The closest bus service is Route 208, which services the bus stop located approximately 400m south of the development site on Shannon Street. This service operates with a frequency of approximately one bus every hour. The second bus route is Route 207, with the nearest bus stop located approximately 1.5 km from the development site at Oonoonba State School. The bus service operates with a frequency of approximately one bus every 3 hours.

There is no suburban commuter rail service in the Townsville Region, however Queensland Rail provides a train service which connects Brisbane and Cairns. This service stops at the only public train station in Townsville, located approximately 2km from the site at Charters Towers Road.

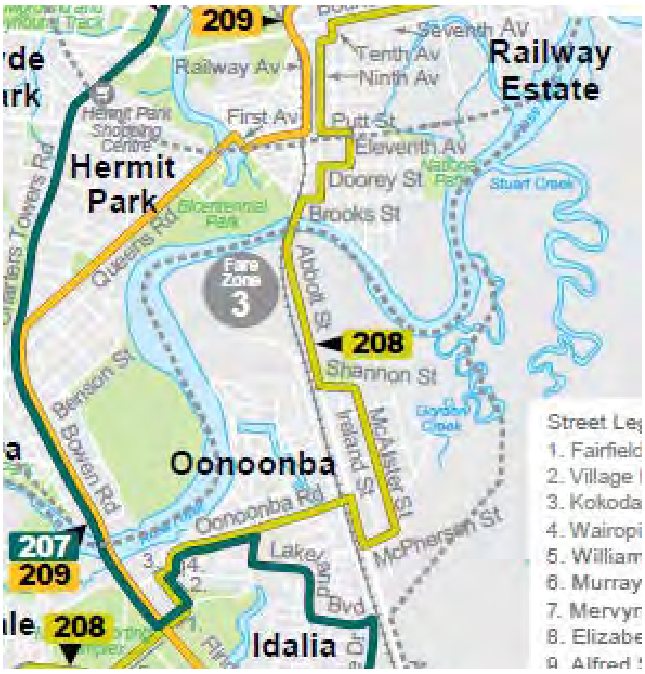


Figure 5-20: Map showing Sunbus Public Bus Route 207 and 208 (Source: Sunbus)

5.4.2 TAXI SERVICES

Taxi services are provided by Townsville Taxis throughout the Townsville Region. Taxis are available 24 hours 7 days a week via phone or online bookings. There are designated taxi ranks located in Townsville, for example the Flinders Mall taxi rank is located approximately 2.5 km from the site.

5.4.3 PEDESTRIAN AND CYCLIST NETWORK

There are several pedestrian pathways located adjacent to the development area. Along the north eastern boundary of the site (Abbott Street) there is an existing pedestrian footpath which extends further north along Railway Avenue. Further south of the site within the neighbouring residential area there are shared pedestrian and cyclist recreational pathways along the banks of the Ross River as well as surrounding Northview Lake and Freshwater Lake. These pathways connect to the existing pedestrian/cyclist pathways along Stuart Drive. There are good walking and cycling networks surrounding the site.

6 CONCLUSIONS AND RECOMMENDATIONS

The key finding of this report is that the traffic network arrangements proposed will be able to accommodate the anticipated traffic volumes to at least the future design horizon year of 2033. The forecast demand estimates are based on the ultimate development scenario.

Consistent with the assessment undertaken, the following are recommended for consideration:

- The intersection arrangement at the Lakeside Drive and Riveredge Boulevard intersection be developed to include traffic signal control, with a single lane approach for all movements (i.e. no left turn slip lane is required) and with the existing left turn slip lane at the Riveredge Boulevard approach extended to 20 m;
- The intersection arrangement at the Abbott Street and Lakeside Drive intersection be developed to include a roundabout, with an additional approach lane at the southern approach of Abbott Street and an additional exit lane on the northern approach;
- To accommodate base traffic growth alone, the intersection arrangement at the Railway Avenue, Boundary Street and Saunders Street intersection be upgraded to include an additional short lane for northbound traffic both on the approach and exit of Railway Avenue, an extra right turn short lane on the western approach of Boundary Street and various lengthening of existing short lanes;
- With the inclusion of development traffic at the intersection of Railway Avenue, Boundary Street and Saunders Street, an additional straight through short lane on the northern approach of Railway Avenue and a short exit lane on the southern approach will be required;
- The signal phasing at the intersection of Railway Avenue, Queens Road and Putt street be refined to accommodate background traffic growth and development traffic at the year 2023; and
- To accommodate background traffic growth and development traffic at 2033, the intersection arrangement at the Railway Avenue, Queens Road and Putt Street intersection be upgraded to include an additional approach lane on the southern approach of Railway Avenue, a short exit lane on the northern approach and lengthening of existing short lanes on both the northern and western approaches.

The road corridors surrounding the site are generally operating with reserve capacity at the link level, with the exception of the Abbott Street road link north of Lakeside Drive. However, it should be noted that this road link is already operating beyond capacity, and that additional through lanes are limited by the single two lane two way carriageway of the existing Ross River bridge crossing. The other road corridors surrounding the site are anticipated to be able to accommodate the development traffic.

The proposed internal road network and layout satisfies TCC requirements.

The detailed design of all proposed works, including the intersection arrangements as well as all internal traffic network elements are to be undertaken in accordance with the relevant TMR and Council design standards and guidelines.

Based on the assessment contained within this report, Calibre see no traffic engineering reason why the relevant approvals should not be granted.

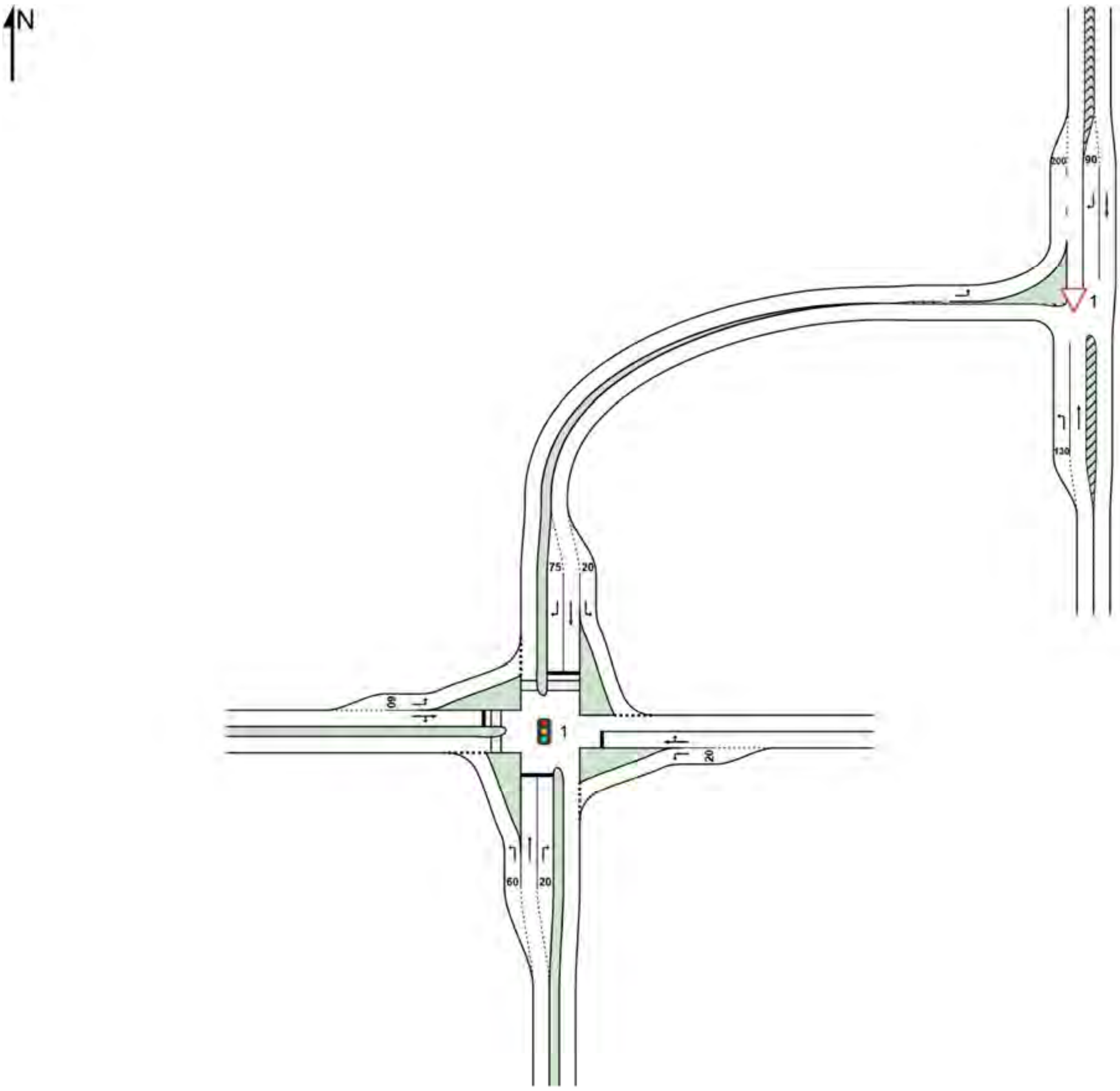
APPENDICES

APPENDIX A LEVEL CROSSING SIDRA OUTPUTS

NETWORK LAYOUT

Network: N101 [Without LC AM]

New Network



SITES IN NETWORK	
Site ID	**Site Name**
▽1	LD/AR AM 2033 Without LC
1	LD/RE/SS AM 2033 Without LC

NETWORK SUMMARY

Network: N101 [Without LC AM]

New Network

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS E			
Travel Time Index	4.32			
Speed Efficiency	0.49			
Congestion Coefficient	2.05			
Travel Speed (Average)	29.3 km/h		2.7 km/h	29.2 km/h
Travel Distance (Total)	4130.5 veh-km/h		2.0 ped-km/h	4958.6 pers-kn
Travel Time (Total)	140.9 veh-h/h		0.8 ped-h/h	169.8 pers-h/l
Desired Speed	60.0 km/h			
Demand Flows (Total for all Sites)	5485 veh/h		80 ped/h	6582 pers/h
Arrival Flows (Total for all Sites)	5485 veh/h		80 ped/h	6582 pers/h
Percent Heavy Vehicles (Demand)	5.3 %			
Percent Heavy Vehicles (Arrival)	5.3 %			
Degree of Saturation	1.342			
Control Delay (Total)	71.21 veh-h/h		0.32 ped-h/h	85.78 pers-h/l
Control Delay (Average)	46.7 sec		14.6 sec	46.9 sec
Control Delay (Worst Lane)	654.5 sec			
Control Delay (Worst Movement)	654.5 sec		19.4 sec	654.5 sec
Geometric Delay (Average)	3.0 sec			
Stop-Line Delay (Average)	43.7 sec			
Queue Storage Ratio (Worst Lane)	0.10			
Total Effective Stops	4582 veh/h		60 ped/h	5558 pers/h
Effective Stop Rate	0.84 per veh	1.1 per km	0.75 per ped	0.84 per per
Proportion Queued	0.53		0.75	0.54
Performance Index	314.8		1.1	315.9
Cost (Total)	4317.21 $/h	1.05 $/km	17.17 $/h	4334.38 $/h
Fuel Consumption (Total)	533.7 L/h	129.2 mL/km		
Fuel Economy	12.9 L/100km			
Carbon Dioxide (Total)	1270.9 kg/h	307.7 g/km		
Hydrocarbons (Total)	0.114 kg/h	0.028 g/km		
Carbon Monoxide (Total)	1.271 kg/h	0.308 g/km		
NOx (Total)	2.700 kg/h	0.654 g/km		

Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Setup used: Standard Left.

Network Performance - Annual Values

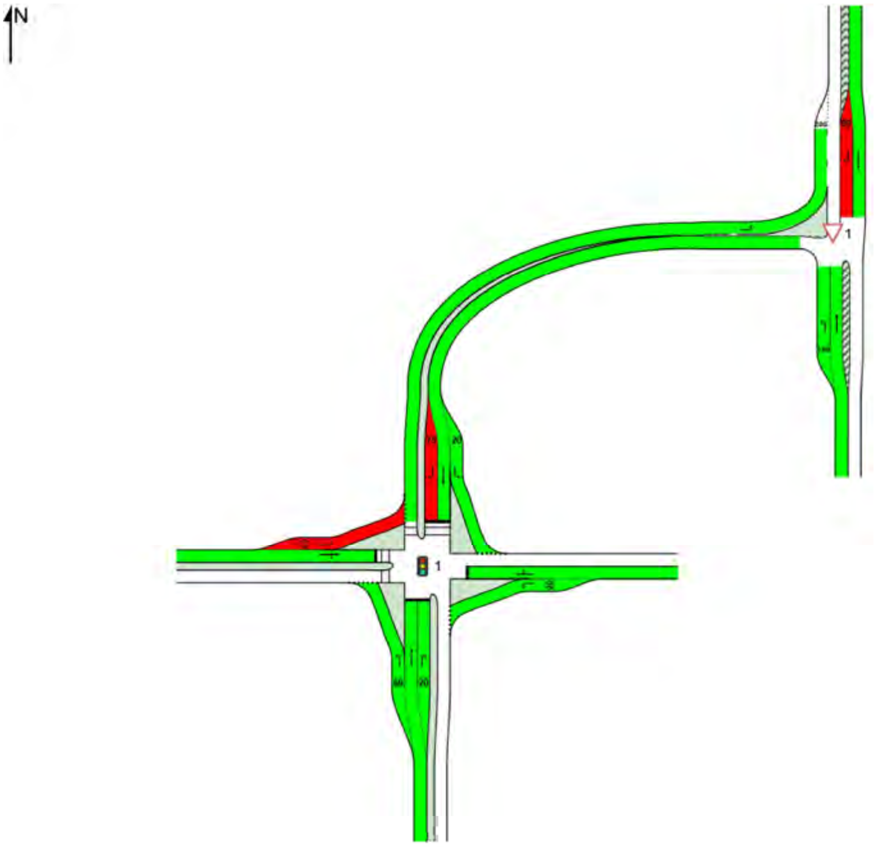
Performance Measure	Vehicles	Pedestrians	Persons
Demand Flows (Total for all Sites)	2,632,800 veh/y	38,400 ped/y	3,159,360 pers/y
Delay	34,182 veh-h/y	155 ped-h/y	41,173 pers-h/y
Effective Stops	2,199,336 veh/y	28,824 ped/y	2,668,027 pers/y
Travel Distance	1,982,624 veh-km/y	965 ped-km/y	2,380,114 pers-km/y
Travel Time	67,611 veh-h/y	361 ped-h/y	81,495 pers-h/y
Cost	2,072,260 $/y	8,242 $/y	2,080,502 $/y
Fuel Consumption	256,163 L/y		
Carbon Dioxide	610,037 kg/y		
Hydrocarbons	55 kg/y		
Carbon Monoxide	610 kg/y		
NOx	1,296 kg/y		

QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (metres)

Network: N101 [Without LC AM]

New Network



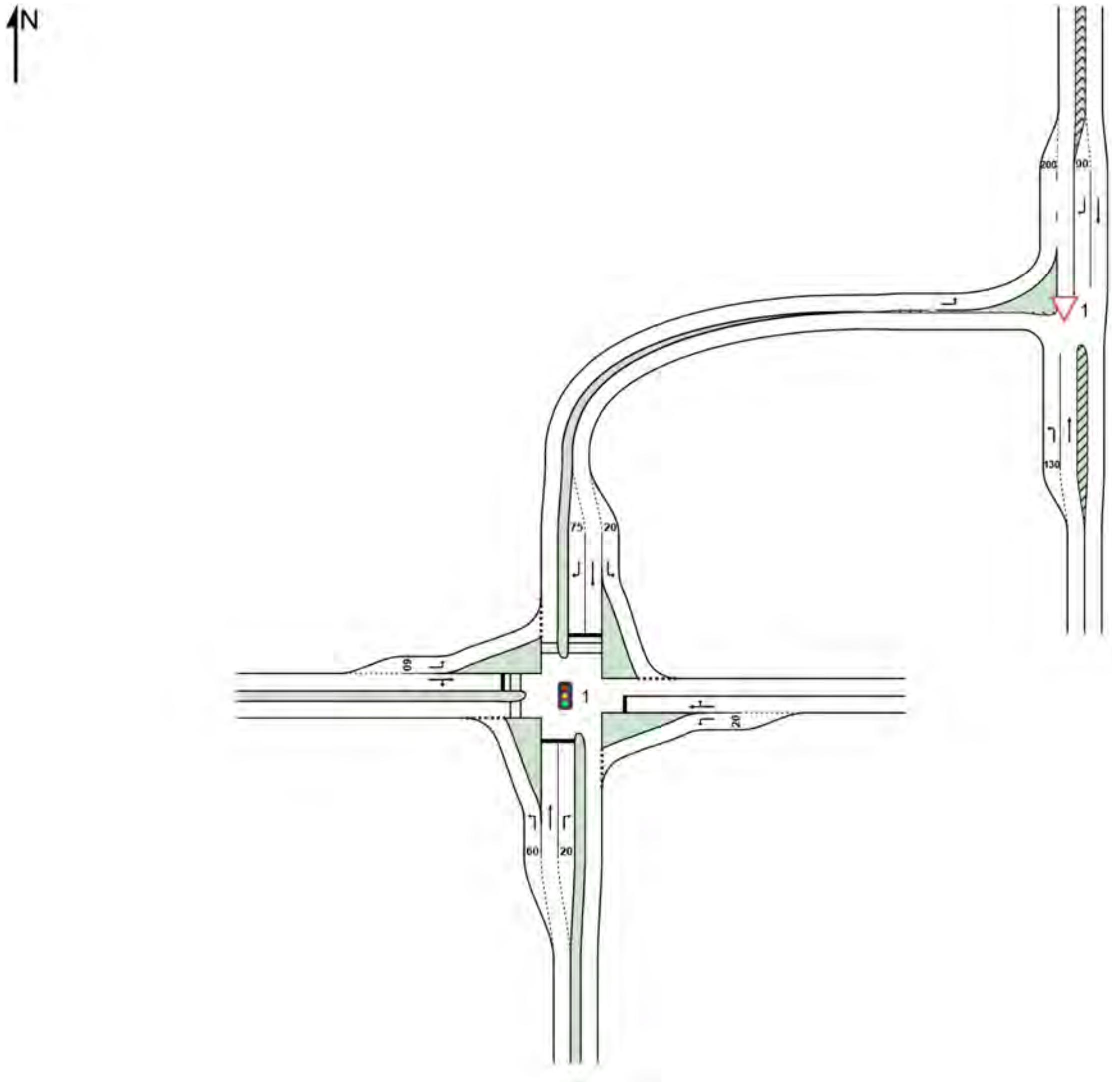
Colour code based on Queue Storage Ratio

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

NETWORK LAYOUT

Network: N101 [Without LC PM]

New Network



SITES IN NETWORK	
Site ID	**Site Name**
▽1	LD/AR PM 2033 Without LC
1	LD/RE/SS PM 2033 Without LC

NETWORK SUMMARY

Network: N101 [Without LC PM]

New Network

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS F			
Travel Time Index	1.45			
Speed Efficiency	0.23			
Congestion Coefficient	4.33			
Travel Speed (Average)	13.8 km/h		2.3 km/h	13.8 km/h
Travel Distance (Total)	3560.8 veh-km/h		2.0 ped-km/h	4275.0 pers-kn
Travel Time (Total)	257.2 veh-h/h		0.9 ped-h/h	309.5 pers-h/l
Desired Speed	60.0 km/h			
Demand Flows (Total for all Sites)	5010 veh/h		80 ped/h	6012 pers/h
Arrival Flows (Total for all Sites)	4704 veh/h		80 ped/h	5645 pers/h
Percent Heavy Vehicles (Demand)	6.1 %			
Percent Heavy Vehicles (Arrival)	6.5 %			
Degree of Saturation	1.368			
Control Delay (Total)	197.47 veh-h/h		0.43 ped-h/h	237.39 pers-h/l
Control Delay (Average)	151.1 sec		19.4 sec	151.4 sec
Control Delay (Worst Lane)	679.6 sec			
Control Delay (Worst Movement)	679.6 sec		34.3 sec	679.6 sec
Geometric Delay (Average)	2.9 sec			
Stop-Line Delay (Average)	148.2 sec			
Queue Storage Ratio (Worst Lane)	0.06			
Total Effective Stops	16111 veh/h		50 ped/h	19383 pers/h
Effective Stop Rate	3.42 per veh	4.5 per km	0.63 per ped	3.43 per per
Proportion Queued	0.63		0.63	0.68
Performance Index	683.9		1.1	685.1
Cost (Total)	8188.74 $/h	2.30 $/km	19.60 $/h	8208.34 $/h
Fuel Consumption (Total)	712.1 L/h	200.0 mL/km		
Fuel Economy	20.0 L/100km			
Carbon Dioxide (Total)	1692.8 kg/h	475.4 g/km		
Hydrocarbons (Total)	0.177 kg/h	0.050 g/km		
Carbon Monoxide (Total)	1.549 kg/h	0.435 g/km		
NOx (Total)	3.414 kg/h	0.959 g/km		

Network Model Accuracy Level (largest change in degree of saturation for any lane): 1.9 %
Number of Iterations: 10 (maximum specified: 10)
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Setup used: Standard Left.

Network Performance - Annual Values

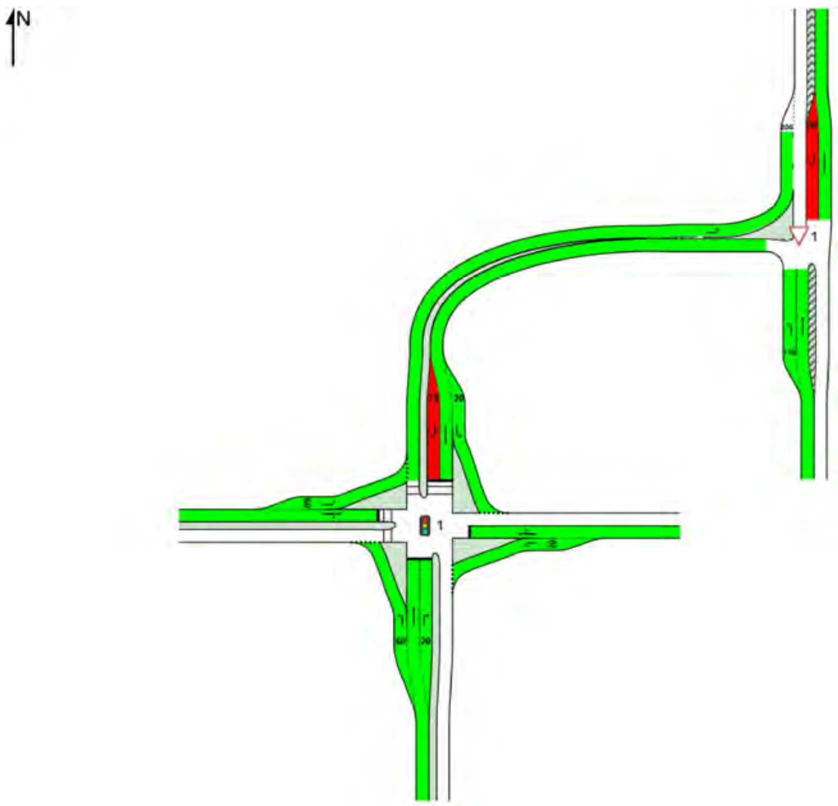
Performance Measure	Vehicles	Pedestrians	Persons
Demand Flows (Total for all Sites)	2,404,800 veh/y	38,400 ped/y	2,885,760 pers/y
Delay	94,784 veh-h/y	206 ped-h/y	113,947 pers-h/y
Effective Stops	7,733,351 veh/y	24,020 ped/y	9,304,042 pers/y
Travel Distance	1,709,181 veh-km/y	965 ped-km/y	2,051,982 pers-km/y
Travel Time	123,469 veh-h/y	413 ped-h/y	148,576 pers-h/y
Cost	3,930,597 $/y	9,407 $/y	3,940,004 $/y
Fuel Consumption	341,789 L/y		
Carbon Dioxide	812,561 kg/y		
Hydrocarbons	85 kg/y		
Carbon Monoxide	744 kg/y		
NOx	1,639 kg/y		

QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (metres)

Network: N101 [Without LC PM]

New Network



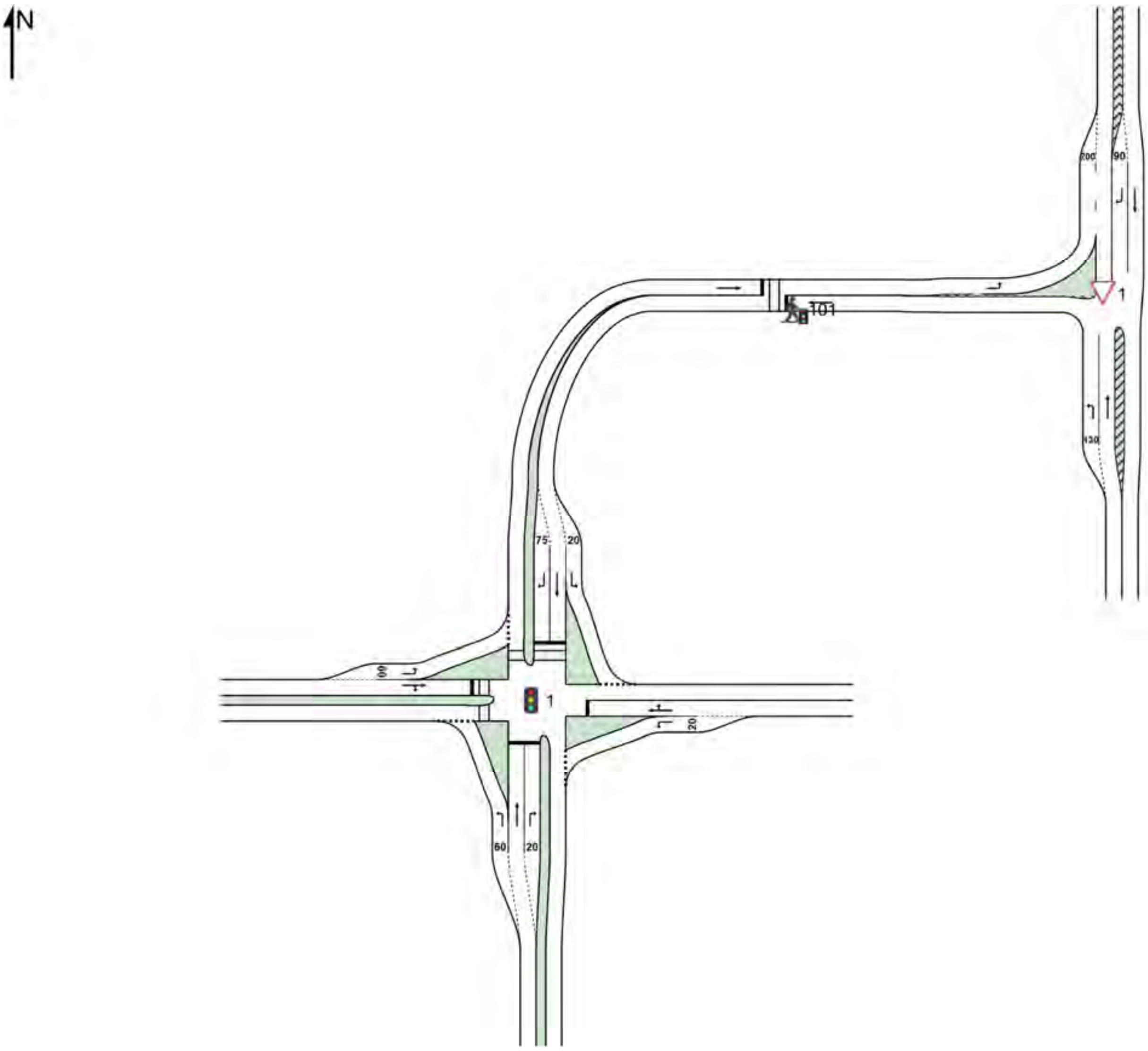
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

NETWORK LAYOUT

Network: N101 [With LC AM]

New Network



SITES IN NETWORK	
Site ID	**Site Name**
▽1	LD/AR AM 2033 With LC
1	LD/RE/SS AM 2033 WIth LC
101	LC AM 2033

NETWORK SUMMARY

Network: N101 [With LC AM]

New Network

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS F			
Travel Time Index	0.00			
Speed Efficiency	0.07			
Congestion Coefficient	14.41			
Travel Speed (Average)	4.2 km/h		1.5 km/h	4.2 km/h
Travel Distance (Total)	3834.6 veh-km/h		2.0 ped-km/h	4603.5 pers-kn
Travel Time (Total)	921.0 veh-h/h		1.4 ped-h/h	1106.6 pers-h/l
Desired Speed	60.0 km/h			
Demand Flows (Total for all Sites)	7164 veh/h		81 ped/h	8597 pers/h
Arrival Flows (Total for all Sites)	6264 veh/h		81 ped/h	7517 pers/h
Percent Heavy Vehicles (Demand)	4.1 %			
Percent Heavy Vehicles (Arrival)	4.6 %			
Degree of Saturation	3.067			
Control Delay (Total)	856.40 veh-h/h		0.96 ped-h/h	1028.65 pers-h/l
Control Delay (Average)	492.2 sec		42.9 sec	492.7 sec
Control Delay (Worst Lane)	3821.4 sec			
Control Delay (Worst Movement)	3821.4 sec		997.0 sec	3821.4 sec
Geometric Delay (Average)	2.0 sec			
Stop-Line Delay (Average)	490.2 sec			
Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	6801 veh/h		49 ped/h	8211 pers/h
Effective Stop Rate	1.09 per veh	1.8 per km	0.61 per ped	1.09 per per
Proportion Queued	0.46		0.61	0.50
Performance Index	1745.6		1.7	1747.3
Cost (Total)	28016.75 $/h	7.31 $/km	32.61 $/h	28049.36 $/h
Fuel Consumption (Total)	1499.5 L/h	391.1 mL/km		
Fuel Economy	39.1 L/100km			
Carbon Dioxide (Total)	3549.7 kg/h	925.7 g/km		
Hydrocarbons (Total)	0.449 kg/h	0.117 g/km		
Carbon Monoxide (Total)	3.093 kg/h	0.807 g/km		
NOx (Total)	4.109 kg/h	1.072 g/km		

Network Model Accuracy Level (largest change in degree of saturation for any lane): 9.7 %
Number of Iterations: 10 (maximum specified: 10)
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Setup used: Standard Left.

Network Performance - Annual Values

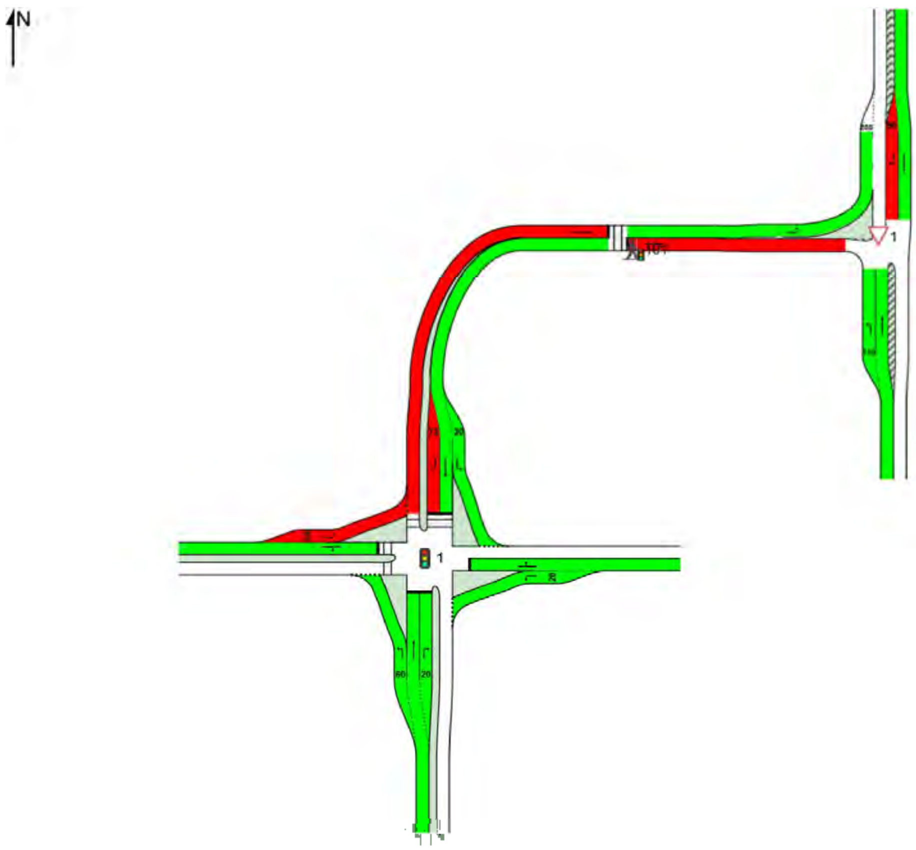
Performance Measure	Vehicles	Pedestrians	Persons
Demand Flows (Total for all Sites)	3,438,720 veh/y	38,880 ped/y	4,126,465 pers/y
Delay	411,074 veh-h/y	463 ped-h/y	493,752 pers-h/y
Effective Stops	3,264,627 veh/y	23,538 ped/y	3,941,090 pers/y
Travel Distance	1,840,587 veh-km/y	979 ped-km/y	2,209,683 pers-km/y
Travel Time	442,095 veh-h/y	672 ped-h/y	531,187 pers-h/y
Cost	13,448,040 $/y	15,651 $/y	13,463,690 $/y
Fuel Consumption	719,783 L/y		
Carbon Dioxide	1,703,857 kg/y		
Hydrocarbons	216 kg/y		
Carbon Monoxide	1,485 kg/y		
NOx	1,972 kg/y		

QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (metres)

Network: N101 [With LC AM]

New Network



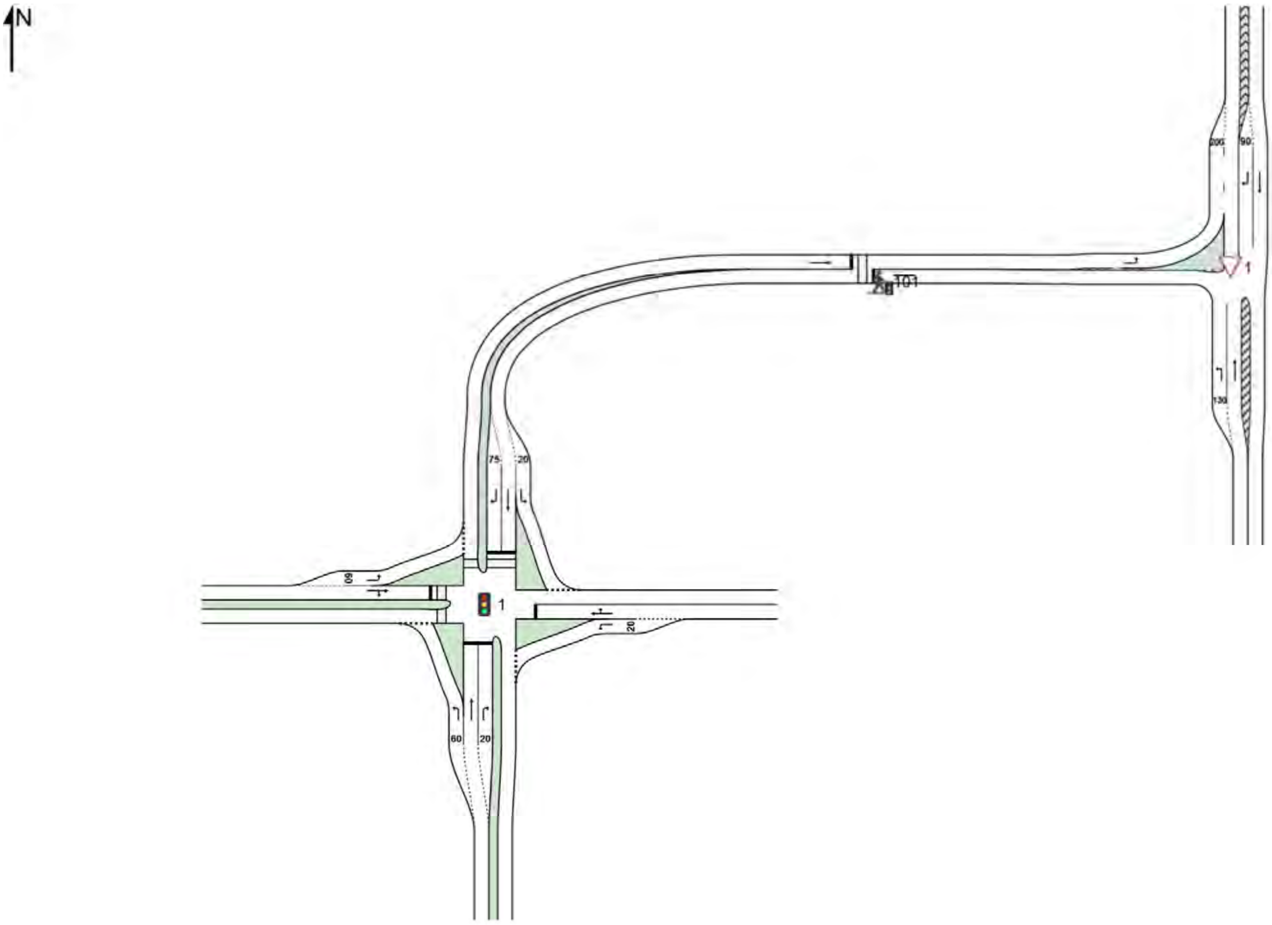
Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

NETWORK LAYOUT

Network: N101 [With LC PM]

New Network



SITES IN NETWORK	
Site ID	**Site Name**
▽1	LD/AR PM 2033 WIth LC
1	LD/RE/SS PM 2033 With LC
101	LC PM 2033

NETWORK SUMMARY

Network: N101 [With LC PM]

New Network

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS F			
Travel Time Index	0.00			
Speed Efficiency	0.07			
Congestion Coefficient	15.27			
Travel Speed (Average)	3.9 km/h		1.9 km/h	3.9 km/h
Travel Distance (Total)	3403.5 veh-km/h		2.0 ped-km/h	4086.2 pers-kn
Travel Time (Total)	866.3 veh-h/h		1.0 ped-h/h	1040.6 pers-h/l
Desired Speed	60.0 km/h			
Demand Flows (Total for all Sites)	6568 veh/h		81 ped/h	7882 pers/h
Arrival Flows (Total for all Sites)	5431 veh/h		81 ped/h	6518 pers/h
Percent Heavy Vehicles (Demand)	4.6 %			
Percent Heavy Vehicles (Arrival)	5.6 %			
Degree of Saturation	2.609			
Control Delay (Total)	809.25 veh-h/h		0.61 ped-h/h	971.71 pers-h/l
Control Delay (Average)	536.4 sec		27.3 sec	536.7 sec
Control Delay (Worst Lane)	2918.1 sec			
Control Delay (Worst Movement)	2918.1 sec		997.0 sec	2918.1 sec
Geometric Delay (Average)	2.1 sec			
Stop-Line Delay (Average)	534.3 sec			
Queue Storage Ratio (Worst Lane)	1.00			
Total Effective Stops	33260 veh/h		54 ped/h	39966 pers/h
Effective Stop Rate	6.12 per veh	9.8 per km	0.67 per ped	6.13 per per
Proportion Queued	0.54		0.67	0.62
Performance Index	1727.1		1.4	1728.4
Cost (Total)	26905.07 $/h	7.91 $/km	24.59 $/h	26929.66 $/h
Fuel Consumption (Total)	1530.7 L/h	449.7 mL/km		
Fuel Economy	45.0 L/100km			
Carbon Dioxide (Total)	3624.1 kg/h	1064.8 g/km		
Hydrocarbons (Total)	0.453 kg/h	0.133 g/km		
Carbon Monoxide (Total)	3.027 kg/h	0.889 g/km		
NOx (Total)	4.952 kg/h	1.455 g/km		

Network Model Accuracy Level (largest change in degree of saturation for any lane): 0.9 %
Number of Iterations: 18 (maximum specified: 20)
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Setup used: Standard Left.

Network Performance - Annual Values

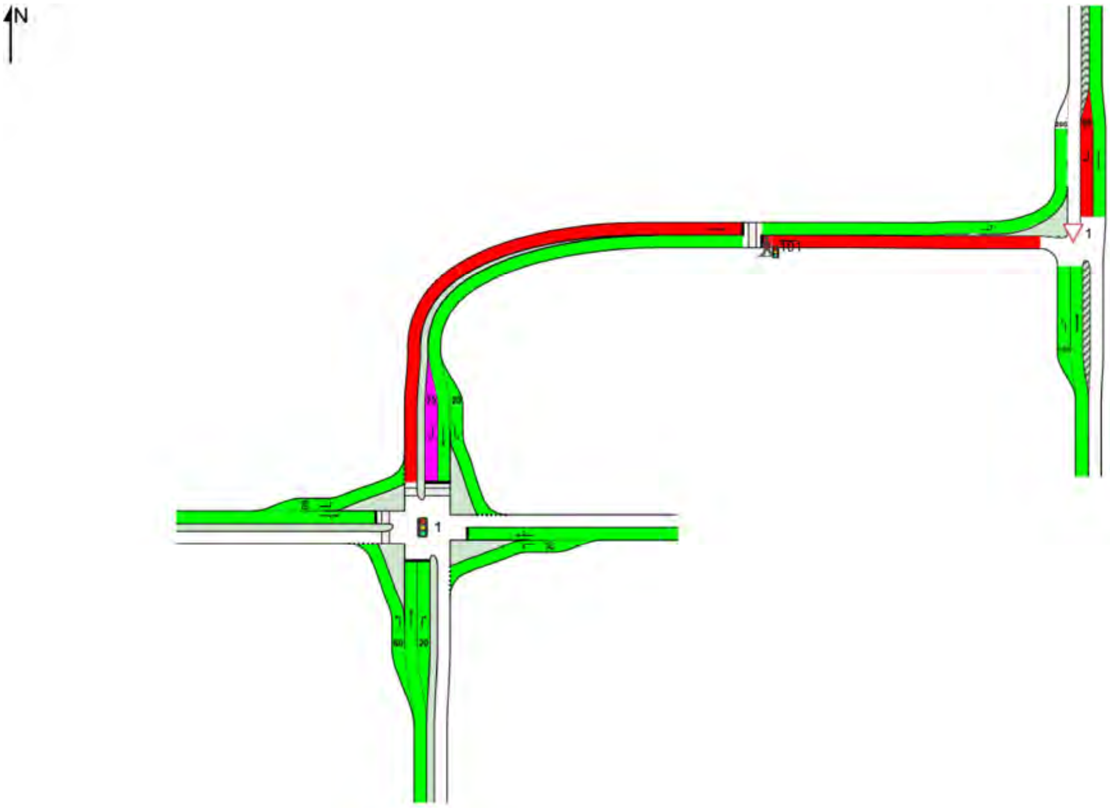
Performance Measure	Vehicles	Pedestrians	Persons
Demand Flows (Total for all Sites)	3,152,640 veh/y	38,880 ped/y	3,783,168 pers/y
Delay	388,440 veh-h/y	294 ped-h/y	466,422 pers-h/y
Effective Stops	15,964,640 veh/y	26,101 ped/y	19,183,660 pers/y
Travel Distance	1,633,680 veh-km/y	979 ped-km/y	1,961,395 pers-km/y
Travel Time	415,819 veh-h/y	503 ped-h/y	499,487 pers-h/y
Cost	12,914,440 $/y	11,804 $/y	12,926,240 $/y
Fuel Consumption	734,715 L/y		
Carbon Dioxide	1,739,564 kg/y		
Hydrocarbons	217 kg/y		
Carbon Monoxide	1,453 kg/y		
NOx	2,377 kg/y		

QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (metres)

Network: N101 [With LC PM]

New Network



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

APPENDIX B TRAFFIC COUNT DATA

Traffic Census

Site No: 0

Survey Day/Date: Wednesday, 29 July 2015

Location: Lakeside Dr & Riveredge Blvd

Intersection Type: Priority Controlled (Give-Way)

Suburb: Oonoonba

Weather: Fine

AM Peak	Hour Ending	8:45	AM
PM Peak	Hour Ending	17:30	PM

N

North Approach (Lakeside Dr)

Pedestrians: AM Peak 0, PM Peak 0

	Total Northbd		9a	9	8	Total Southbd
AADT	4900 / 3%	(Vol) (%C)	7500 / 3%			2600 / 3%
AM Peak	728 / 2%	(Vol) (%C)	0 / 0%	35 / 11%	127 / 2%	162 / 4%
PM Peak	383 / 2%	(Vol) (%C)	0 / 0%	100 / 1%	210 / 0%	310 / 0%

West Approach (Riveredge Blvd)

Pedestrians: AM Peak 0, PM Peak 0

	AADT	AM Peak (Vol) (%C)	PM Peak (Vol) (%C)
Total Eastbd	1300 / 6%	171 / 4%	69 / 6%
10		143 / 3%	42 / 5%
12		28 / 11%	26 / 8%
12a	2400 / 6%	0 / 0%	1 / 0%
Total Westbd	1100 / 6%	54 / 15%	139 / 1%

South Approach (Lakeside Dr)

	Total Northbd	1	2		3a		Total Southbd
AM Peak	604 / 3%	19 / 21%	585 / 2%		0 / 0%	(Vol) (%C)	155 / 3%
PM Peak	379 / 1%	38 / 0%	341 / 1%		0 / 0%	(Vol) (%C)	236 / 1%
AADT	4500 / 2%			6700 / 3%		(Vol) (%C)	2200 / 3%

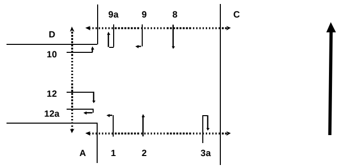
Pedestrians: AM Pk 0, PM Pk 0

Count3WU

Data Audit Systems
TRAFFIC SURVEYS

Calibre Consulting Intersection Count

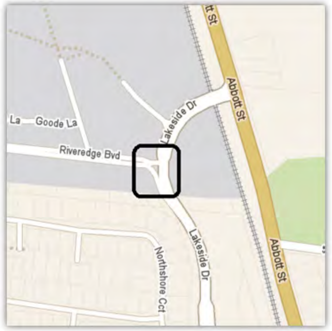
Site No.:
Weather: Fine
Location: Lakeside Dr & Riveredge Blvd
Suburb: Oonoonba
Day/Date: Wednesday, 29 July 2015
8:45 AM AM Peak (hour ending)
5:30 PM PM Peak (hour ending)
Traffic Control: Priority Controlled (Give-Way)

North Approach (Lakeside Dr)
West Approach (Riveredge Blvd)


South Approach (Lakeside Dr)

Run Macro

Enter Data in Header Cells, Copy Data into Cells D25:BC72
Then run macro to determine peaks and fill cells in Diagram



	TIME	South Approach (Lakeside Dr)									North Approach (Lakeside Dr)									West Approach (Riveredge Blvd)									PEDESTRIAN MOVEMENTS			
		Movement 1 (Left Turn)			Movement 2 (Through)			Movement 3a (U Turn)			Movement 8 (Through)			Movement 9 (Right Turn)			Movement 9a (U Turn)			Movement 10 (Left Turn)			Movement 12 (Right Turn)			Movement 12a (U Turn)						
15 MINUTE PERIOD ENDING		Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	South		North	West
1	6:15 AM	2	0	1	28	1	1	0	0	0	11	1	1	7	1	0	0	0	0	4	0	3	0	1	0	0	0	0	0		0	0
2	6:30 AM	2	0	0	28	0	3	0	0	0	14	0	0	5	0	0	0	0	0	8	0	0	7	0	0	0	0	0	0		0	0
3	6:45 AM	0	1	0	53	3	1	0	0	0	34	0	0	5	1	0	0	0	0	11	0	0	10	0	0	0	0	0	0		0	0
4	7:00 AM	2	0	0	77	0	0	0	0	0	32	1	1	7	4	0	0	0	0	8	0	0	15	1	1	0	0	0	0		0	0
5	7:15 AM	3	2	0	76	0	1	0	0	0	21	0	0	5	1	1	0	0	0	25	2	0	11	0	0	0	0	0	0		0	0
6	7:30 AM	4	0	0	93	1	3	0	0	0	26	0	2	7	2	0	0	0	0	14	1	1	3	1	0	0	0	0	0		0	0
7	7:45 AM	3	0	0	117	1	0	0	0	0	21	0	0	7	2	0	0	0	0	26	1	1	9	1	0	0	0	0	0		0	0
8	8:00 AM	4	1	0	153	1	0	0	0	0	35	1	0	6	0	1	0	0	0	36	1	0	5	0	0	0	0	0	0		0	0
9	8:15 AM	2	0	0	161	2	0	0	0	0	29	0	0	4	1	0	0	0	0	38	1	1	10	2	0	0	0	0	0		0	0
10	8:30 AM	3	1	0	137	3	1	0	0	0	38	1	4	7	1	0	0	0	0	34	1	1	4	0	0	0	0	0	0		0	0
11	8:45 AM	6	2	0	122	6	0	0	0	0	23	0	1	14	2	0	0	0	0	31	1	0	6	1	0	0	0	0	0		0	0
12	9:00 AM	6	1	0	99	2	2	0	0	0	21	0	0	9	2	0	0	0	0	13	2	0	7	0	0	0	0	0	0		0	0
13	9:15 AM	3	0	0	66	0	0	0	0	0	25	0	0	8	0	0	0	0	0	8	1	0	4	0	0	1	0	0	0		0	0
14	9:30 AM	2	0	0	42	1	0	0	0	0	13	1	0	5	1	0	0	0	0	16	0	0	8	2	0	1	0	0	0		0	0
15	9:45 AM	2	0	0	63	2	1	0	0	0	19	1	0	8	0	0	0	0	0	10	0	0	3	0	0	0	0	0	0		0	0
16	10:00 AM	2	0	0	39	0	0	0	0	0	12	1	0	2	0	0	0	0	0	5	0	0	3	1	0	0	0	0	0		0	0
17	10:15 AM	7	1	0	32	0	0	0	0	0	13	0	0	6	0	0	0	0	0	11	2	0	8	0	0	0	0	0	0		0	0
18	10:30 AM	8	2	0	49	0	0	0	0	0	14	0	0	3	0	0	0	0	0	8	1	0	1	1	0	0	0	0	0		0	0
19	10:45 AM	6	0	0	38	2	0	0	0	0	21	2	0	6	1	0	0	0	0	13	4	0	2	0	0	1	0	0	0		0	0
20	11:00 AM	2	0	0	32	0	0	0	0	0	18	0	0	5	0	0	0	0	0	12	0	0	4	0	0	0	0	0	0		0	0
21	11:15 AM	1	0	0	42	5	0	0	0	0	16	0	0	7	1	0	0	0	0	5	0	0	4	0	0	0	0	0	0		0	0
22	11:30 AM	3	0	0	34	1	0	0	0	0	22	1	0	10	2	0	0	0	0	12	1	0	8	0	0	1	0	0	0		0	0
23	11:45 AM	3	0	1	41	3	0	0	0	0	28	1	2	9	1	0	0	0	0	8	1	0	4	0	0	0	0	0	0		0	0
24	12:00 PM	6	0	0	42	1	0	0	0	0	13	0	0	8	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0		0	0
25	12:15 PM	7	0	0	43	2	0	0	0	0	17	1	0	11	1	0	0	0	0	6	0	1	3	1	0	0	0	0	0		0	0
26	12:30 PM	7	0	0	43	1	0	0	0	0	25	1	0	5	1	0	0	0	0	13	1	0	4	1	0	1	0	0	0		0	0
27	12:45 PM	6	1	0	39	3	0	0	0	0	20	0	0	4	2	0	0	0	0	9	0	0	4	0	0	0	2	0	0		0	0
28	1:00 PM	4	0	0	44	0	0	0	0	0	14	0	0	11	0	0	0	0	0	5	1	0	1	0	0	0	1	0	0		0	0
29	1:15 PM	5	0	0	38	2	0	0	0	0	26	2	0	9	2	0	0	0	0	7	0	0	10	0	0	0	0	0	0		0	0
30	1:30 PM	3	0	0	37	2	0	0	0	0	23	1	0	12	1	0	0	0	0	10	1	0	3	0	0	0	0	0	0		0	0
31	1:45 PM	2	0	0	34	1	0	0	0	0	27	0	0	14	2	0	0	0	0	7	1	0	5	1	0	1	0	0	0		0	0
32	2:00 PM	9	0	0	41	1	1	0	0	0	20	0	0	8	0	0	0	0	0	4	1	0	6	0	0	1	0	0	0		0	0
33	2:15 PM	4	0	0	37	1	0	0	0	0	41	1	0	14	0	0	0	0	0	10	2	0	7	1	0	0	0	0	0		0	0
34	2:30 PM	5	0	0	41	4	0	0	0	0	36	1	0	12	0	0	0	0	0	13	1	0	2	0	0	0	0	0	0		0	0
35	2:45 PM	3	0	0	53	2	0	0	0	0	33	0	0	7	1	0	0	0	0	11	0	0	5	0	0	0	0	0	0		0	0
36	3:00 PM	3	1	0	54	1	0	0	0	0	40	0	0	3	0	0	0	0	0	7	2	1	3	0	0	0	0	0	0		0	0
37	3:15 PM	8	1	0	65	2	0	0	0	0	35	1	0	14	0	0	0	0	0	12	0	0	8	0	0	0	0	0	0		0	0
38	3:30 PM	10	0	0	81	4	0	0	0	0	29	2	0	17	0	0	0	0	0	11	0	0	7	0	0	0	0	0	0		0	0
39	3:45 PM	9	0	0	50	1	0	0	0	0	28	2	0	17	0	0	0	0	0	8	0	0	7	0	0	1	0	0	0		0	0
40	4:00 PM	8	0	0	48	2	0	0	0	0	37	2	0	18	0	0	0	0	0	6	1	1	4	0	0	3	0	0	0		0	0
41	4:15 PM	13	0	0	69	1	0	1	0	0	60	0	0	17	0	0	0	0	0	12	0	1	7	0	0	0	0	0	0		0	0
42	4:30 PM	10	0	0	75	0	0	0	0	0	52	1	1	18	0	0	0	0	0	16	0	0	6	0	0	0	0	0	0		0	0
43	4:45 PM	9	0	0	92	3	1	0	0	0	46	0	0	22	0	3	0	0	0	8	0	0	4	1	0	1	0	0	0		0	0
44	5:00 PM	8	0	0	87	0	0	0	0	0	51	0	0	18	1	1	0	0	0	18	1	1	5	1	0	0	0	0	0		0	0
45	5:15 PM	8	0	0	72	0	0	0	0	0	58	0	0	27	0	0	0	0	0	8	1	1	7	0	0	0	0	0	0		0	0
46	5:30 PM	13	0	0	85	2	0	0	0	0	55	0	2	32	0	0	0	0	0	6	0	0	8	0	0	0	0	0	0		0	0
47	5:45 PM	15	0	0	75	0	0	0	0	0	46	0	0	26	0	1	0	0	0	7	0	2	7	0	0	0	0	0	0		0	0
48	6:00 PM	9	0	0	74	0	0	0	0	0	37	1	0	25	0	0	0	0	0	21	0	0	6	0	0	0	0	0	0		0	0
12 hr Total		260	14	2	3041	70	15	1	0	0	1375	27	14	521	34	7	0	0	0	597	33	15	265	17	1	12	3	0	0	0	0	0
AM Peak		15	4	0	573	12	1	0	0	0	125	2	5	31	4	1	0	0	0	139	4	2	25	3	0	0	0	0	0	0	0	0
PM Peak		38	0	0	336	5	1	0	0	0	210	0	2	99	1	4	0	0	0	40	2	2	24	2	0	1	0	0	0	0	0	0

Movements 3, 4, 5, 6, 6a, 7 and 11: 12 hr Total 0 0 0; AM Peak 0 0 0; PM Peak 0 0 0.

	AM Peak		PM Peak	
1	19	21%	38	0%
2	585	2%	341	1%
3	0	0%	0	0%
3a	0	0%	0	0%
4	0	0%	0	0%
5	0	0%	0	0%
6	0	0%	0	0%
6a	0	0%	0	0%
7	0	0%	0	0%
8	127	2%	210	0%
9	35	11%	100	1%
9a	0	0%	0	0%
10	143	3%	42	5%
11	0	0%	0	0%
12	28	11%	26	8%
12a	0	0%	1	0%

	Total	
1	62	
2	67	
3	119	
4	149	397
5	148	483
6	158	574
7	189	644
8	244	739
9	251	842
10	236	920
11	215	946
12	164	866
13	116	731
14	92	587
15	109	481
16	65	382
17	80	346
18	87	341
19	96	328
20	73	336
21	81	337
22	95	345
23	102	351
24	76	354
25	93	366
26	103	374
27	90	362
28	81	367
29	101	375
30	93	365
31	95	370
32	92	381
33	118	398
34	115	420
35	115	440
36	115	463
37	146	491
38	161	537
39	123	545
40	130	560
41	181	595
42	179	613
43	190	680
44	192	742
45	182	743
46	203	767
47	179	756
48	173	737

32

67

Traffic Census

Site No: 0 | **Location:** Abbott St & Lakeside Dr | **Suburb:** Oonoonba

Survey Day/Date: Wednesday, 29 July 2015 | **Intersection Type:** Priority Controlled (Give-Way) | **Weather:** Fine

AM Peak Hour Ending 8:45 AM

PM Peak Hour Ending 17:30 PM

N

North Approach (Abbott St)

	Total Northbd			9a	9	8	Total Southbd
Pedestrians AM Peak				0			
Pedestrians PM Peak				0			
AADT	9000	(Vol)		17100			8100
	7%	(%C)		7%			7%
AM Peak	1132	(Vol)		0	158	421	579
	4%	(%C)		0%	3%	14%	11%
PM Peak	625	(Vol)		0	309	556	865
	4%	(%C)		0%	0%	2%	1%

West Approach (Lakeside Dr)

	Total	AADT	AM Peak	PM Peak
Total Eastbd (Vol)		4900	735	374
Total Eastbd (%C)		3%	2%	3%
10 (Vol)			735	374
10 (%C)			2%	3%
12 (Vol)			0	0
12 (%C)			0%	0%
12a (Vol)		7500	0	0
12a (%C)		3%	0%	0%
Total Westbd (Vol)		2600	161	315
Total Westbd (%C)		3%	3%	0%

Pedestrians: AM Peak 0, PM Peak 0

South Approach (Abbott St)

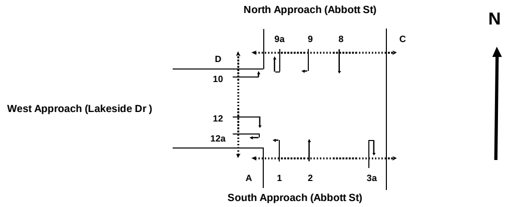
	Total Northbd	1	2	3a		Total Southbd
AM Peak (Vol)	400	3	397	0		421
AM Peak (%C)	8%	0%	8%	0%		14%
PM Peak (Vol)	257	6	251	0		556
PM Peak (%C)	5%	0%	5%	0%		2%
AADT (Vol)	4200		9800			5600
AADT (%C)	12%		11%			10%

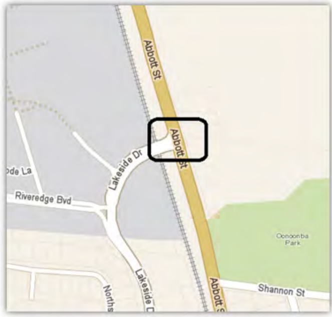
Pedestrians: AM Pk 1, PM Pk 1

Count3WU

Data Audit Systems
TRAFFIC SURVEYS

Calibre Consulting Intersection Count





Site No.:
Weather: Fine
Location: Abbott St & Lakeside Dr
Suburb: Oonoonba
Day/Date: Wednesday, 29 July 2015
8:45 AM AM Peak (hour ending)
5:30 PM PM Peak (hour ending)
Traffic Control: Priority Controlled (Give-Way)

Run Macro

Enter Data in Header Cells, Copy Data into Cells D25:BC72
Then run macro to determine peaks and fill cells in Diagram

TIME		South Approach (Abbott St)									North Approach (Abbott St)									West Approach (Lakeside Dr)									PEDESTRIAN MOVEMENTS					
		Movement 1 (Left Turn)			Movement 2 (Through)			Movement 3a (U Turn)			Movement 8 (Through)			Movement 9 (Right Turn)			Movement 9a (U Turn)			Movement 10 (Left Turn)			Movement 12 (Right Turn)			Movement 12a (U Turn)							Total	
	15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	South		North	West		
1	6:15 AM	0	0	0	31	2	0	0	0	0	23	3	0	19	1	0	0	0	0	38	1	0	0	0	0	0	0	0	0		0	0	118	
2	6:30 AM	3	0	0	21	10	0	0	0	0	55	7	1	19	0	0	0	0	0	32	0	0	0	0	1	0	0	0	0		0	0	149	
3	6:45 AM	1	0	0	61	5	0	0	0	0	62	10	0	38	0	0	0	0	0	68	3	0	0	0	0	0	0	0	0		0	0	248	
4	7:00 AM	2	0	0	56	4	0	0	0	0	85	7	1	39	4	0	0	0	0	90	0	1	0	0	0	0	0	0	0		0	0	289	804
5	7:15 AM	0	1	0	71	8	0	0	0	0	77	10	0	26	1	0	0	0	0	93	2	1	0	0	0	0	0	0	0		0	0	290	976
6	7:30 AM	2	0	0	62	12	0	0	0	0	78	13	0	36	2	0	0	0	0	110	2	2	0	0	0	0	0	0	0		0	0	319	1146
7	7:45 AM	1	0	0	100	16	0	0	0	0	65	7	0	28	2	0	0	0	0	152	1	1	0	0	0	0	0	0	0		0	0	373	1271
8	8:00 AM	0	0	0	93	13	0	0	0	0	87	11	0	39	1	0	0	0	0	186	2	0	0	0	0	0	0	0	1		0	0	432	1414
9	8:15 AM	2	0	2	91	8	0	0	0	0	87	11	0	35	1	0	0	0	0	208	2	0	0	0	0	0	0	0	0		0	0	447	1571
10	8:30 AM	1	0	0	94	6	0	0	0	0	97	19	0	43	1	0	0	0	0	165	3	0	0	0	0	0	0	0	0		0	0	429	1681
11	8:45 AM	0	0	0	86	6	0	0	0	0	93	16	0	36	2	0	0	0	0	164	5	0	0	0	0	0	0	0	0		0	0	408	1716
12	9:00 AM	2	0	0	73	22	0	0	0	0	79	16	0	26	2	0	0	0	0	111	3	1	0	0	0	0	0	0	0		0	0	335	1619
13	9:15 AM	0	0	1	60	8	0	0	0	0	68	14	0	33	0	0	0	0	0	73	1	0	0	0	0	0	0	0	0		0	0	258	1430
14	9:30 AM	2	0	0	68	11	0	0	0	0	63	18	0	17	2	0	0	0	0	50	1	0	0	0	0	0	0	0	0		0	0	232	1233
15	9:45 AM	3	0	0	43	12	0	0	0	0	50	9	0	24	1	0	0	0	0	79	2	0	0	0	0	0	0	0	0		0	0	223	1048
16	10:00 AM	0	0	0	52	9	0	0	0	0	47	7	0	11	1	0	0	0	0	43	0	0	1	0	1	0	0	0	0		0	0	172	885
17	10:15 AM	1	0	0	51	7	0	0	0	0	77	9	0	17	1	0	1	0	0	41	1	0	1	0	0	0	0	0	0		0	0	207	834
18	10:30 AM	0	0	0	59	11	0	0	0	0	58	8	0	16	0	0	0	0	0	57	1	0	0	0	0	0	0	0	0		0	0	210	812
19	10:45 AM	1	0	0	46	12	0	0	0	0	56	11	0	26	2	0	0	0	0	48	7	0	0	0	0	0	0	0	0		0	0	209	798
20	11:00 AM	1	1	0	39	10	0	0	0	0	55	9	0	23	0	0	0	0	0	44	0	0	0	0	0	0	0	0	0		0	0	182	808
21	11:15 AM	1	0	0	48	10	0	0	0	0	49	12	0	20	2	0	0	0	0	48	5	0	0	0	0	0	0	0	0		0	0	195	796
22	11:30 AM	2	2	0	44	11	0	0	0	0	56	10	0	33	0	0	0	0	0	46	1	0	0	0	0	0	0	0	0		0	0	205	791
23	11:45 AM	4	0	0	34	8	0	0	0	0	72	10	0	33	1	0	0	0	0	53	3	0	0	0	0	0	0	0	0		0	0	218	800
24	12:00 PM	1	0	0	41	7	0	0	0	0	65	7	0	20	0	0	0	0	0	47	1	0	0	0	0	0	0	0	0		0	0	189	807
25	12:15 PM	1	0	1	58	9	0	0	0	0	55	9	0	27	2	0	0	0	0	46	2	1	0	0	0	0	0	0	0		0	0	211	823
26	12:30 PM	1	0	0	49	4	0	0	0	0	63	13	0	30	0	0	0	0	0	55	1	1	0	0	0	0	0	0	0		0	0	217	835
27	12:45 PM	0	0	1	51	7	0	0	0	0	65	10	0	24	2	0	0	0	0	49	3	0	0	0	0	0	2	0	0		0	0	214	831
28	1:00 PM	3	0	0	46	7	0	0	0	0	69	6	0	21	0	0	0	0	0	48	2	0	0	0	0	0	1	0	0		0	0	203	845
29	1:15 PM	1	0	0	40	8	0	0	0	0	64	12	0	35	3	0	0	0	0	45	2	0	0	0	0	0	0	0	0		0	0	210	844
30	1:30 PM	2	0	0	39	9	0	0	0	0	77	7	0	35	2	0	0	0	0	46	3	0	0	0	0	0	0	0	0		0	0	220	847
31	1:45 PM	1	0	0	50	16	0	0	0	0	73	11	0	41	1	0	0	0	0	41	3	0	0	0	0	0	0	0	0		0	0	237	870
32	2:00 PM	1	0	0	46	10	0	0	0	0	81	5	0	27	0	0	0	0	0	41	4	0	0	0	0	0	0	0	0		0	0	215	882
33	2:15 PM	3	0	0	48	12	0	0	0	0	99	12	0	52	2	0	0	0	0	45	5	0	0	0	0	0	0	0	0		0	0	278	950
34	2:30 PM	2	0	0	51	10	0	0	0	0	62	5	0	44	1	0	0	0	0	54	5	0	0	0	0	0	0	0	0		0	0	234	964
35	2:45 PM	1	1	0	49	7	0	0	0	0	109	8	0	39	0	0	0	0	0	62	5	0	0	0	0	0	0	0	0		0	0	281	1008
36	3:00 PM	1	0	0	73	8	1	0	0	0	88	6	0	40	0	0	0	0	0	57	5	1	0	0	1	0	0	0	0		0	0	281	1074
37	3:15 PM	1	0	0	66	5	0	0	0	0	94	7	2	49	0	0	0	0	0	74	3	1	0	0	1	0	0	0	0		0	0	303	1099
38	3:30 PM	1	0	0	56	12	0	0	0	0	98	8	0	45	2	0	0	0	0	89	5	0	0	0	2	0	0	0	0		0	0	318	1183
39	3:45 PM	0	0	0	86	8	0	0	0	0	88	7	0	45	2	0	0	0	0	59	2	1	0	0	0	0	0	0	0		0	0	298	1200
40	4:00 PM	1	0	0	55	5	0	0	0	0	106	5	0	58	1	0	0	0	0	50	6	1	0	0	0	0	0	0	0		0	0	288	1207
41	4:15 PM	2	0	0	50	3	0	0	0	0	115	7	0	73	0	0	0	0	0	78	2	2	1	0	1	0	0	0	0		0	0	334	1238
42	4:30 PM	2	0	0	60	2	1	0	0	0	123	3	0	69	1	0	0	0	0	87	1	3	0	0	0	0	0	0	0		0	0	352	1272
43	4:45 PM	1	0	2	55	4	0	0	0	0	140	7	0	68	0	0	0	0	0	99	3	0	0	0	1	0	0	0	0		0	0	380	1354
44	5:00 PM	1	0	0	80	3	0	0	0	0	100	0	0	70	0	0	0	0	0	98	5	1	0	0	0	0	0	0	1		0	0	358	1424
45	5:15 PM	4	0	0	61	2	0	0	0	0	131	2	0	81	0	0	0	0	0	76	1	0	0	0	0	0	0	0	0		0	0	358	1448
46	5:30 PM	0	0	0	42	4	0	0	0	0	174	2	0	90	0	0	0	0	0	91	1	1	0	0	0	0	0	0	0		0	0	405	1501
47	5:45 PM	2	0	0	54	1	0	0	0	0	136	0	0	73	0	0	0	0	0	86	0	0	0	0	0	0	0	0	0		0	0	352	1473
48	6:00 PM	0	0	0	59	4	0	0	0	0	78	3	0	59	0	0	0	0	0	103	2	0	0	0	0	0	0	0	0		0	0	308	1423

Movement	12 hr Total: Cars, Utilities & Motorcycles	12 hr Total: Trucks & Buses	12 hr Total: Cyclists	AM Peak: Cars, Utilities & Motorcycles	AM Peak: Trucks & Buses	AM Peak: Cyclists	AM Peak: Total	AM Peak: %	PM Peak: Cars, Utilities & Motorcycles	PM Peak: Trucks & Buses	PM Peak: Cyclists	PM Peak: Total	PM Peak: %
1	62	5	7	3	0	2	3	0%	6	0	2	6	0%
2	2748	388	2	364	33	0	397	8%	238	13	0	251	5%
3	0	0	0	0	0	0	0	0%	0	0	0	0	0%
3a	0	0	0	0	0	0	0	0%	0	0	0	0	0%
4	0	0	0	0	0	0	0	0%	0	0	0	0	0%
5	0	0	0	0	0	0	0	0%	0	0	0	0	0%
6	0	0	0	0	0	0	0	0%	0	0	0	0	0%
6a	0	0	0	0	0	0	0	0%	0	0	0	0	0%
7	0	0	0	0	0	0	0	0%	0	0	0	0	0%
8	3892	409	4	364	57	0	421	14%	545	11	0	556	2%
9	1852	46	0	153	5	0	158	3%	309	0	0	309	0%
9a	1	0	0	0	0	0	0	0%	0	0	0	0	0%
10	3625	118	19	723	12	0	735	2%	364	10	2	374	3%
11	0	0	0	0	0	0	0	0%	0	0	0	0	0%
12	3	0	8	0	0	0	0	0%	0	0	1	0	0%
12a	0	3	0	0	0	0	0	0%	0	0	0	0	0%

Pedestrian Movements	12 hr Total	AM Peak	PM Peak
South	2	1	1
	0	0	0
North	0	0	0
West	0	0	0

AM Peak: 32
PM Peak: 67

Traffic Census

Site No: 0
Survey Day/Date: Wednesday, 29 July 2015
Location: Lakeside Dr & Oonoonba Rd
Intersection Type: Signalised
Suburb: Oonoonba
Weather: Fine

AM Peak Hour Ending 8:45 AM
PM Peak Hour Ending 17:30 PM

N

North Approach (Lakeside Dr)

Pedestrians: 2 AM Peak, 9 PM Peak

		Total Northbd	9a	9	8	7	Total Southbd
Total	(Vol)	3497	5280				1783
	(%C)	2%	2%				2%
AM Peak	(Vol)	595	0	112	54	6	172
	(%C)	3%	0%	1%	6%	17%	3%
PM Peak	(Vol)	407	0	152	74	9	235
	(%C)	1%	0%	0%	1%	0%	0%

West Approach (Oonoonba Rd)

Pedestrians: AM Peak 0, PM Peak 0

	Total	AM Peak	PM Peak
Total Eastbd	3779 / 3%	595 / 2%	430 / 0%
10		407 / 1%	255 / 0%
11		180 / 5%	161 / 1%
12		8 / 0%	14 / 0%
12a	7192 / 3%	0 / 0%	0 / 0%
Total Westbd	3413 / 3%	386 / 3%	486 / 1%

(Vol) (%C)

East Approach (Oonoonba Rd)

Pedestrians: 0 AM Peak, 0 PM Peak

	AM Peak (Vol) (%C)	PM Peak (Vol) (%C)	Total (Vol) (%C)
Total Eastbd	238 / 5%	238 / 2%	2123 / 5%
6a	0 / 0%	0 / 0%	5293 / 4%
6	2 / 0%	5 / 0%	
5	263 / 3%	302 / 1%	
4	82 / 4%	122 / 2%	
Total Westbd	347 / 3%	429 / 1%	3170 / 4%

South Approach (Lakeside Dr)

Pedestrians: 0 AM Pk, 0 PM Pk

		Total Northbd	1	2	3	3a	Total Southbd
AM Peak	(Vol)	249	11	186	52	0	144
	(%C)	5%	9%	5%	4%	0%	4%
PM Peak	(Vol)	247	32	147	68	0	210
	(%C)	3%	0%	2%	6%	0%	1%
Total	(Vol)	2085	3869				1784
	(%C)	5%	4%				4%

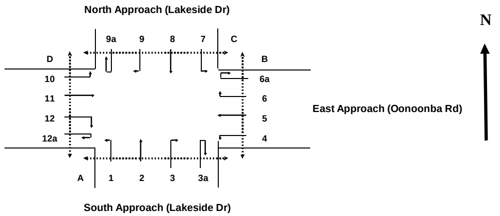
Count4U

Data Audit Systems
TRAFFIC SURVEYS

Calibre Consulting Intersection Count

Site No.:
Weather: Fine
Location: Lakeside Dr & Oonoonba Rd
Suburb: Oonoonba
Day/Date: Wednesday, 29 July 2015

8:45 AM AM Peak (hour ending)
5:30 PM PM Peak (hour ending)
Traffic Control: Signalised



Run Macro

Enter Data in Header Cells, Copy Data into Cells D25:BC72
Then run macro to determine peaks and fill cells in Diagram

	TIME	South Approach (Lakeside Dr)												East Approach (Oonoonba Rd)											
		Movement 1 (Left Turn)			Movement 2 (Through)			Movement 3 (Right Turn)			Movement 3a (U Turn)			Movement 4 (Left Turn)			Movement 5 (Through)			Movement 6 (Right Turn)			Movement 6a (U Turn)		
	15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists
1	6:15 AM	0	0	0	6	1	1	3	0	0	0	0	0	12	0	0	16	0	0	0	0	1	0	0	0
2	6:30 AM	1	0	0	9	0	1	1	2	0	0	0	0	12	0	0	25	3	2	1	0	0	0	0	0
3	6:45 AM	0	0	0	20	1	0	6	0	0	0	0	0	19	1	0	29	1	0	0	0	0	0	0	0
4	7:00 AM	1	0	0	14	0	0	4	2	0	0	0	0	28	0	1	35	2	0	1	0	0	0	0	0
5	7:15 AM	1	0	0	26	1	0	6	0	0	0	0	0	27	1	0	51	4	0	0	0	0	0	0	0
6	7:30 AM	0	0	0	29	2	0	6	0	0	0	0	0	20	0	0	43	3	0	0	0	0	0	0	0
7	7:45 AM	1	0	0	30	0	0	9	1	0	0	0	0	15	0	0	44	1	1	0	0	0	0	0	0
8	8:00 AM	0	1	0	47	1	0	12	1	0	0	0	0	18	1	0	62	2	5	0	0	0	0	0	0
9	8:15 AM	3	0	0	46	2	0	11	1	0	0	0	0	19	0	0	63	2	0	1	0	0	0	0	0
10	8:30 AM	6	0	0	46	2	0	14	0	0	0	0	0	17	2	0	69	2	3	1	0	0	0	0	0
11	8:45 AM	1	0	0	37	5	0	13	0	0	0	0	0	25	0	0	60	3	3	0	0	0	0	0	0
12	9:00 AM	3	0	0	34	0	1	11	2	0	0	0	0	16	1	0	44	2	0	1	0	0	0	0	0
13	9:15 AM	3	0	0	28	0	0	11	0	0	1	0	0	14	2	0	43	3	0	0	0	0	0	0	0
14	9:30 AM	6	0	0	14	1	0	16	1	0	0	0	0	26	2	0	30	1	0	1	0	0	0	0	0
15	9:45 AM	5	1	0	29	2	1	15	4	0	0	0	0	18	1	0	17	3	0	0	0	0	0	0	0
16	10:00 AM	2	0	0	20	0	0	16	1	0	0	0	0	10	0	0	21	1	0	2	0	0	0	0	0
17	10:15 AM	3	0	0	23	0	0	11	2	0	0	0	0	21	1	0	29	2	1	3	0	0	0	0	0
18	10:30 AM	1	0	0	29	1	0	15	0	0	0	0	0	15	0	0	29	4	1	0	0	0	0	0	0
19	10:45 AM	5	0	0	19	2	0	9	0	0	0	0	0	17	1	0	28	2	0	0	0	0	0	0	0
20	11:00 AM	2	0	0	16	0	0	5	0	0	0	0	0	14	0	0	24	1	0	0	0	0	0	0	0
21	11:15 AM	4	1	0	20	3	0	8	3	0	0	0	0	17	2	0	15	1	0	0	0	0	0	0	0
22	11:30 AM	7	0	0	13	0	0	12	1	0	0	0	0	21	0	0	21	3	0	2	0	0	0	0	0
23	11:45 AM	5	0	1	19	1	0	8	0	0	0	0	0	18	2	1	28	1	0	1	0	0	0	0	0
24	12:00 PM	4	0	0	18	1	0	9	0	0	0	0	0	14	0	0	21	1	0	1	0	0	0	0	0
25	12:15 PM	2	1	0	18	1	0	14	1	0	0	0	0	18	1	0	28	0	1	1	0	0	0	0	0
26	12:30 PM	4	0	0	23	1	0	11	1	0	0	0	0	18	0	0	33	1	0	0	0	0	0	0	0
27	12:45 PM	5	0	0	19	2	0	11	0	0	0	0	0	14	0	0	19	2	0	3	1	0	0	0	0
28	1:00 PM	4	0	0	19	1	0	9	1	0	0	0	0	12	0	0	25	3	0	2	0	0	0	0	0
29	1:15 PM	5	1	0	22	2	0	6	0	0	0	0	0	14	0	0	35	2	0	0	0	0	0	0	0
30	1:30 PM	7	0	0	11	1	0	10	0	0	0	0	0	20	0	0	35	1	0	1	0	0	0	0	0
31	1:45 PM	6	0	0	12	1	0	5	1	0	0	0	0	16	1	0	38	3	1	0	0	0	0	0	0
32	2:00 PM	4	1	0	12	1	0	8	1	0	0	0	0	18	1	1	30	0	0	1	0	0	0	0	0
33	2:15 PM	5	1	0	14	2	0	16	0	0	0	0	0	26	2	0	42	5	0	1	0	0	0	0	0
34	2:30 PM	3	0	0	27	3	0	10	1	0	0	0	0	16	1	0	52	2	0	0	0	0	0	0	0
35	2:45 PM	7	0	0	29	2	0	8	0	1	0	0	0	32	0	1	58	3	0	0	0	0	0	0	0
36	3:00 PM	8	0	0	26	2	0	9	0	0	0	0	0	16	0	0	68	2	1	1	0	0	0	0	0
37	3:15 PM	7	1	0	28	2	0	13	0	0	0	0	0	27	0	0	40	2	1	2	0	0	0	0	0
38	3:30 PM	10	0	0	32	2	0	11	2	0	0	0	0	19	1	0	47	3	2	1	0	0	0	0	0
39	3:45 PM	7	1	0	26	1	0	21	0	0	0	0	0	16	3	0	49	2	2	0	0	0	0	0	0
40	4:00 PM	5	1	0	32	2	0	21	0	0	0	0	0	18	0	0	54	1	1	2	0	0	0	0	0
41	4:15 PM	3	1	0	34	1	0	15	1	0	0	0	0	26	0	0	74	2	0	0	0	0	0	0	0
42	4:30 PM	8	0	0	34	0	0	22	0	0	0	0	0	21	0	0	66	0	0	1	0	0	0	0	0
43	4:45 PM	7	0	0	38	2	0	12	0	0	0	0	0	25	1	0	64	1	2	2	0	0	0	0	0
44	5:00 PM	4	0	0	34	0	0	20	2	0	0	0	0	28	0	0	69	1	0	1	0	0	0	0	0
45	5:15 PM	9	0	0	36	0	0	16	0	0	0	0	0	20	0	0	72	1	0	2	0	0	0	0	0
46	5:30 PM	12	0	0	36	1	0	16	2	0	0	0	0	47	1	0	94	0	0	0	0	0	0	0	0
47	5:45 PM	8	0	0	40	0	0	17	1	0	0	0	0	35	0	0	57	1	0	0	0	0	0	0	0
48	6:00 PM	6	0	0	34	0	0	12	1	0	0	0	0	21	0	0	62	0	0	4	0	0	0	0	0
	12 hr Total	210	11	1	1228	56	4	544	36	0	0	0	0	956	29	4	2058	86	27	40	1	1	0	0	0
	AM Peak	10	1	0	176	10	0	50	2	0	0	0	0	79	3	0	254	9	11	2	0	0	0	0	0
		1	11	9%	2	186	5%	3	52	4%	3a	0	0%	4	82	4%	5	263	3%	6	2	0%	6a	0	0%
	PM Peak	32	0	0	144	3	0	64	4	0	0	0	0	120	2	0	299	3	2	5	0	0	0	0	0
		1	32	0%	2	147	2%	3	68	6%	3a	0	0%	4	122	2%	5	302	1%	6	5	0%	6a	0	0%

	TIME	North Approach (Lakeside Dr)												West Approach (Oonoonba Rd)												PEDESTRIAN MOVEMENTS			
		Movement 7 (Left Turn)			Movement 8 (Through)			Movement 9 (Right Turn)			Movement 9a (U Turn)			Movement 10 (Left Turn)			Movement 11 (Through)			Movement 12 (Right Turn)			Movement 12a (U Turn)						
	15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	South	East	North	West
1	6:15 AM	1	0	0	5	2	0	8	0	0	0	0	0	22	0	0	11	1	0	0	0	0	0	0	0	1	0	1	0
2	6:30 AM	2	0	0	8	0	0	12	0	0	0	0	0	20	0	1	12	1	0	0	0	0	0	0	0	0	0	2	0
3	6:45 AM	2	0	0	12	0	0	32	0	0	0	0	0	33	2	0	15	1	0	3	0	0	0	0	0	0	0	2	0
4	7:00 AM	6	0	0	18	1	0	26	0	1	0	0	0	57	0	1	26	2	0	1	0	0	0	0	0	0	0	4	0
5	7:15 AM	1	0	0	15	1	0	24	0	0	0	0	0	54	1	1	25	0	0	2	0	0	0	0	0	0	0	0	0
6	7:30 AM	3	0	0	7	0	0	29	1	0	0	0	0	67	0	0	27	0	0	3	2	0	0	0	0	0	0	3	0
7	7:45 AM	2	0	0	10	0	0	25	0	0	0	0	0	89	1	0	29	2	0	2	0	0	0	0	0	0	0	1	0
8	8:00 AM	0	0	0	8	1	0	26	0	0	0	0	0	105	1	0	35	3	0	2	0	0	0	0	0	0	0	1	0
9	8:15 AM	2	0	0	14	1	0	27	1	0	0	0	0	112	0	0	44	1	1	1	0	0	0	0	0	0	0	1	0
10	8:30 AM	0	0	0	19	1	0	28	0	3	0	0	0	93	3	0	46	2	0	2	0	0	0	0	0	0	0	0	0
11	8:45 AM	3	1	0	10	0	1	30	0	0	0	0	0	92	1	2	46	3	0	3	0	0	0	0	0	0	0	0	0
12	9:00 AM	2	1	0	9	0	0	23	0	0	0	0	0	69	2	0	46	3	2	4	0	0	0	0	0	0	0	2	0
13	9:15 AM	2	0	0	10	0	0	12	0	0	0	0	0	44	1	0	22	2	1	7	0	0	0	0	0	0	0	1	0
14	9:30 AM	1	0	1	13	2	0	13	0	0	0	0	0	24	0	0	27	3	0	3	1	0	0	0	0	0	0	0	0
15	9:45 AM	0	0	0	10	0	0	13	1	0	0	0	0	39	0	0	20	1	0	2	0	0	0	0	0	0	0	0	0
16	10:00 AM	2	0	0	15	0	0	7	2	0	0	0	0	20	0	0	25	0	0	3	1	0	0	0	0	0	0	0	0
17	10:15 AM	2	0	0	7	0	0	12	0	0	0	0	0	27	0	0	25	0	0	3	2	0	0	0	0	0	0	0	0
18	10:30 AM	2	1	0	3	0	0	10	0	0	0	0	0	28	1	0	22	2	0	6	0	0	0	0	0	0	0	0	0
19	10:45 AM	0	0	0	7	2	0	10	0	0	0	0	0	23	0	0	16	3	0	1	0	0	0	0	0	0	0	0	0
20	11:00 AM	2	0	0	10	0	0	13	0	0	0	0	0	17	1	0	20	3	0	5	0	0	0	0	0	0	0	0	0
21	11:15 AM	1	0	0	11	0	0	11	0	0	0	0	0	18	1	0	21	0	0	5	0	0	0	0	0	0	0	0	0
22	11:30 AM	6	0	0	13	0	1	16	0	0	0	0	0	26	1	1	19	0	0	3	0	0	0	0	0	0	0	0	0
23	11:45 AM	2	0	0	13	1	0	12	0	1	0	0	0	30	2	0	26	2	1	2	0	0	0	0	0	0	0	0	0
24	12:00 PM	1	0	0	10	2	0	8	0	0	0	0	0	26	0	0	21	0	3	1	0	0	0	0	0	0	0	1	0
25	12:15 PM	1	0	0	13	1	0	9	0	0	0	0	0	26	1	0	21	1	0	5	0	0	0	0	0	0	0	0	0
26	12:30 PM	2	1	0	14	0	0	13	1	0	0	0	0	25	2	0	23	0	0	2	0	0	0	0	0	0	0	0	0
27	12:45 PM	1	0	0	6	0	0	16	0	0	0	0	0	28	0	0	25	3	0	3	0	0	0	0	0	0	0	0	0
28	1:00 PM	0	0	0	5	0	0	11	0	0	0	0	0	29	0	0	21	3	0	3	0	0	0	0	0	0	0	0	0
29	1:15 PM	2	1	0	15	1	0	16	0	0	0	0	0	20	0	0	20	1	0	4	0	0	0	0	0	0	0	0	0
30	1:30 PM	4	0	0	20	1	0	15	1	0	0	0	0	29	1	0	23	2	0	3	0	0	1	0	0	0	0	1	0
31	1:45 PM	0	0	0	13	0	0	20	1	0	0	0	0	29	0	0	25	2	0	5	0	0	0	0	0	0	0	0	0
32	2:00 PM	3	0	0	11	0	0	17	0	0	0	0	0	34	0	0	25	1	0	1	0	0	0	0	0	0	0	0	0
33	2:15 PM	1	1	0	12	1	0	22	0	0	0	0	0	28	0	0	22	1	0	3	0	0	0	0	0	0	0	0	0
34	2:30 PM	1	0	0	15	1	0	31	1	0	0	0	0	20	1	0	31	0	0	2	0	0	1	0	0	0	0	1	0
35	2:45 PM	1	0	0	14	0	0	25	0	0	0	0	0	27	0	0	29	1	0	4	0	0	0	0	0	0	0	0	0
36	3:00 PM	1	0	0	9	0	0	32	0	0	0	0	0	32	0	0	31	2	2	5	1	0	0	0	0	0	0	0	0
37	3:15 PM	4	0	0	11	0	0	25	1	0	0	0	0	57	1	0	49	0	5	6	0	0	0	0	0	0	0	8	0
38	3:30 PM	4	0	0	13	1	0	19	1	0	0	0	0	62	2	1	47	0	4	3	0	0	0	0	0	0	0	1	0
39	3:45 PM	4	0	0	15	2	0	24	0	0	0	0	0	43	0	1	32	1	0	2	0	0	0	0	0	0	0	1	0
40	4:00 PM	1	0	0	22	2	0	26	0	0	0	0	0	32	0	0	43	3	0	4	0	0	0	0	0	0	0	1	0
41	4:15 PM	2	0	0	18	1	0	36	0	0	0	0	0	56	0	0	27	1	5	1	0	0	0	0	0	0	0	1	0
42	4:30 PM	2	0	0	21	0	0	41	1	0	0	0	0	62	0	0	37	1	0	9	1	0	0	0	0	0	0	0	0
43	4:45 PM	4	0	0	14	0	0	33	0	0	0	0	0	73	1	0	44	1	0	3	0	0	0	0	0	0	0	0	0
44	5:00 PM	0	0	0	18	1	0	33	0	0	0	0	0	65	0	0	41	0	1	1	0	0	0	0	0	0	0	2	0
45	5:15 PM	3	0	0	19	0	0	45	0	0	0	0	0	53	0	0	36	0	1	4	0	0	0	0	0	0	0	5	0
46	5:30 PM	2	0	0	22	0	0	41	0	1	0	0	0	63	0	0	39	0	0	6	0	0	0	0	0	0	0	2	0
47	5:45 PM	0	0	0	20	0	0	31	0	0	0	0	0	58	0	0	30	1	0	6	0	0	0	0	0	0	0	1	0
48	6:00 PM	2	0	0	16	0	0	28	0	0	0	0	0	59	0	0	40	0	1	3	0	0	0	0	0	0	0	6	0
	12 hr Total	90	6	1	613	26	2	1036	12	6	0	0	0	2145	27	8	1387	60	27	152	8	0	0	0	0	1	0	49	0
	AM Peak	5	1	0	51	3	1	111	1	3	0	0	0	402	5	2	171	9	1	8	0	0	0	0	0	0	0	2	0
		7	6	17%	8	54	6%	9	112	1%	9a	0	0%	10	407	1%	11	180	5%	12	8	0%	12a	0	0%				
	PM Peak	9	0	0	73	1	0	152	0	1	0	0	0	254	1	0	160	1	2	14	0	0	0	0	0	0	0	9	0
		7	9	0%	8	74	1%	9	152	0%	9a	0	0%	10	255	0%	11	161	1%	12	14	0%	12a	0	0%				

32

67

	Total	
1	90	
2	113	
3	177	
4	227	607
5	241	758
6	242	887
7	262	972
8	331	1076
9	352	1187
10	359	1304
11	339	1381
12	276	1326
13	206	1180
14	186	1007
15	182	850
16	148	722
17	174	690
18	170	674
19	145	637
20	133	622
21	142	590
22	166	586
23	177	618
24	141	626
25	164	648
26	175	657
27	158	638
28	148	645
29	167	648
30	186	659
31	179	680
32	170	702
33	205	740
34	219	773
35	242	836
36	248	914
37	282	991
38	287	1059
39	252	1069
40	270	1091
41	304	1113
42	327	1153
43	327	1228
44	319	1277
45	317	1290
46	383	1346
47	305	1324
48	289	1294

Traffic Census

Site No:	0	Location:	Stuart Dr / Fairfield Waters Dr / Mervyn Crossman Dr
Suburb:	Annandale		
Survey Day/Date:	Wednesday, 29 July 2015	Intersection Type:	Roundabout
Weather:	Fine		

AM Peak	Hour Ending	8:45	AM
PM Peak	Hour Ending	17:30	PM

N

North Approach (Stuart Dr)

Pedestrians: 13 AM Peak, 1 PM Peak

	Total Northbd	9a	9	8	7	Total Southbd
Total (Vol)	9752	19927				10175
Total (%C)	4%	4%				4%
AM Peak (Vol)	1498	0	471	357	90	918
AM Peak (%C)	2%	0%	1%	8%	1%	4%
PM Peak (Vol)	899	0	697	508	171	1376
PM Peak (%C)	2%	0%	0%	2%	0%	1%

West Approach (Mervyn Crossman Dr)

Pedestrians: AM Peak 0, PM Peak 0

	Total	AM Peak	PM Peak
Total Eastbd (Vol)	7058	1174	834
Total Eastbd (%C)	1%	1%	1%
10		601 (1%)	344 (1%)
11		398 (2%)	368 (1%)
12		175 (1%)	122 (0%)
12a		0 (0%)	0 (0%)
Total (Vol)	15908		
Total (%C)	2%		
Total Westbd (Vol)	8850	1333	1159
Total Westbd (%C)	2%	2%	0%

East Approach (Fairfield Waters Dr)

Pedestrians: AM Peak 0, PM Peak 0

	AM Peak	PM Peak	Total
Total Eastbd (Vol)	618	714	5103
Total Eastbd (%C)	2%	1%	3%
Total (Vol)			13519
Total (%C)			3%
6a	0 (0%)	0 (0%)	
6	476 (2%)	222 (1%)	
5	776 (2%)	416 (1%)	
4	488 (6%)	105 (2%)	
Total Westbd (Vol)	1740	743	8416
Total Westbd (%C)	3%	1%	3%

South Approach (Stuart Dr)

Pedestrians: 0 AM Pk, 0 PM Pk

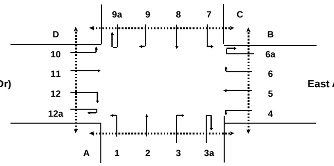
	Total Northbd	1	2	3	3a	Total Southbd
AM Peak (Vol)	637	86	421	130	0	1020
AM Peak (%C)	5%	9%	5%	2%	0%	6%
PM Peak (Vol)	554	46	333	175	0	735
PM Peak (%C)	2%	0%	4%	1%	0%	2%
Total (Vol)	5825	13594				7769
Total (%C)	5%	5%				5%

Data Audit Systems
TRAFFIC SURVEYS

Calibre Consulting Intersection Count

North Approach (Stuart Dr)

West Approach (Mervyn Crossman Dr)



East Approach (Fairfield Waters Dr)

South Approach (Stuart Dr)

N

Site No.:

Weather: Fine

Location: Stuart Dr / Fairfield Waters Dr / Mervyn Crossman Dr

Suburb: Annandale

Day/Date: Wednesday, 29 July 2015

8:45 AM AM Peak (hour ending)

5:30 PM PM Peak (hour ending)

Traffic Control: Roundabout

Run Macro

Enter Data in Header Cells, Copy Data into Cells D25:BC72
Then run macro to determine peaks and fill cells in Diagram

	TIME	South Approach (Stuart Dr)												East Approach (Fairfield Waters Dr)											
		Movement 1 (Left Turn)			Movement 2 (Through)			Movement 3 (Right Turn)			Movement 3a (U Turn)			Movement 4 (Left Turn)			Movement 5 (Through)			Movement 6 (Right Turn)			Movement 6a (U Turn)		
	15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists
1	6:15 AM	5	0	0	48	1	0	7	2	0	0	0	0	64	3	1	43	0	0	19	2	0	0	0	0
2	6:30 AM	1	0	0	23	3	1	19	1	0	0	0	0	91	7	0	46	0	0	25	0	0	0	0	0
3	6:45 AM	8	0	0	48	3	0	13	2	0	0	0	0	40	4	0	84	1	0	26	3	0	0	0	0
4	7:00 AM	5	0	0	66	6	0	13	0	0	0	0	0	94	5	0	100	3	1	45	0	0	0	0	0
5	7:15 AM	6	0	0	66	2	0	26	0	0	0	0	0	70	7	0	124	1	0	58	2	0	0	0	0
6	7:30 AM	9	0	0	79	5	0	20	1	0	0	0	0	71	1	0	111	3	0	65	2	0	0	0	0
7	7:45 AM	13	0	0	92	6	0	26	1	0	0	0	0	107	4	0	160	4	0	85	3	0	0	0	0
8	8:00 AM	15	1	0	98	2	0	32	0	0	0	0	0	113	6	1	183	1	1	118	1	0	0	0	0
9	8:15 AM	23	2	0	99	6	0	30	0	0	0	0	0	87	9	0	208	6	0	132	1	0	0	0	0
10	8:30 AM	23	5	0	106	10	0	34	2	0	0	0	0	122	7	1	194	2	0	125	2	0	0	0	0
11	8:45 AM	17	0	0	96	4	0	31	1	0	0	0	0	135	9	0	179	3	0	93	4	0	0	0	0
12	9:00 AM	10	0	0	94	4	0	36	1	0	0	0	0	106	2	1	139	1	0	72	1	0	0	0	0
13	9:15 AM	1	0	0	95	8	0	31	1	0	0	0	0	65	4	0	86	1	0	55	1	0	0	0	0
14	9:30 AM	5	0	0	87	6	0	18	3	0	0	0	0	42	0	0	71	0	0	53	3	0	0	0	0
15	9:45 AM	7	0	0	80	5	0	29	1	0	0	0	0	21	2	0	54	1	0	41	1	0	0	0	0
16	10:00 AM	3	0	0	87	1	0	20	1	1	0	0	0	11	1	0	35	2	0	35	3	0	0	0	0
17	10:15 AM	6	0	0	100	8	0	19	1	0	0	0	0	18	2	1	38	0	0	46	0	0	0	0	0
18	10:30 AM	0	0	0	79	9	0	10	2	0	0	0	0	12	2	0	31	1	0	32	1	0	0	0	0
19	10:45 AM	6	0	0	97	6	0	14	3	0	0	0	0	20	1	0	47	0	0	31	2	0	0	0	0
20	11:00 AM	5	0	0	72	6	0	14	2	0	0	0	0	15	0	0	39	1	0	27	3	0	0	0	0
21	11:15 AM	6	0	0	79	8	0	17	0	0	0	0	0	14	0	0	33	0	0	40	5	0	0	0	0
22	11:30 AM	3	1	0	77	4	0	21	0	0	0	0	0	18	0	0	30	0	0	28	0	0	0	0	0
23	11:45 AM	3	1	0	66	5	0	24	1	0	0	0	0	16	1	0	32	3	0	39	2	0	0	0	0
24	12:00 PM	2	1	0	69	4	0	21	3	0	0	0	0	20	0	0	23	1	0	49	2	0	0	0	0
25	12:15 PM	2	0	0	89	2	0	25	1	0	0	0	0	17	1	0	33	0	0	39	2	0	0	0	0
26	12:30 PM	3	0	0	75	11	0	31	0	0	0	0	0	19	1	0	35	0	0	42	0	0	0	0	0
27	12:45 PM	6	0	0	79	5	0	38	4	0	0	0	0	17	1	0	36	1	0	37	2	0	0	0	0
28	1:00 PM	11	1	0	92	5	0	34	2	0	0	0	0	15	3	0	47	1	0	28	1	0	0	0	0
29	1:15 PM	3	0	0	61	6	0	23	1	0	0	0	0	19	0	0	48	0	0	40	2	0	0	0	0
30	1:30 PM	10	1	0	84	5	0	9	0	0	0	0	0	25	0	0	31	0	0	36	1	0	0	0	0
31	1:45 PM	7	0	0	67	8	0	25	0	0	0	0	0	23	2	1	40	1	0	40	0	0	0	0	0
32	2:00 PM	7	2	0	82	8	0	21	1	0	0	0	0	14	0	0	44	1	0	37	0	0	0	0	0
33	2:15 PM	6	0	0	62	3	0	31	0	0	0	0	0	13	1	0	49	2	0	38	2	0	0	0	0
34	2:30 PM	7	1	0	74	3	0	28	0	0	0	0	0	19	1	0	44	1	0	42	2	0	0	0	0
35	2:45 PM	6	0	0	77	7	0	35	0	0	0	0	0	24	1	0	95	3	0	61	6	0	0	0	0
36	3:00 PM	18	0	0	89	4	1	21	2	0	0	0	0	26	0	0	91	3	0	66	0	0	0	0	0
37	3:15 PM	14	0	0	95	5	0	41	3	0	0	0	0	31	2	0	108	1	0	98	4	0	0	0	0
38	3:30 PM	11	0	0	78	2	0	32	1	0	0	0	0	34	2	0	64	5	0	60	4	0	0	0	0
39	3:45 PM	8	1	0	75	4	0	24	0	0	0	0	0	38	0	0	50	2	0	60	4	0	0	0	0
40	4:00 PM	14	0	0	78	9	0	32	1	0	0	0	0	27	0	0	75	2	0	45	2	0	0	0	0
41	4:15 PM	18	0	0	92	3	0	27	0	0	0	0	0	27	1	0	75	1	0	44	0	0	0	0	0
42	4:30 PM	10	0	0	94	2	0	42	2	0	0	0	0	29	0	0	115	3	0	41	3	0	0	0	0
43	4:45 PM	8	0	0	76	3	0	45	0	0	0	0	0	27	0	0	106	1	0	67	2	0	0	0	0
44	5:00 PM	13	0	0	97	4	0	51	1	0	0	0	0	16	0	0	104	1	0	50	0	0	0	0	0
45	5:15 PM	12	0	0	68	3	0	34	0	0	0	0	0	35	2	0	95	1	0	53	1	0	0	0	0
46	5:30 PM	13	0	0	80	2	0	44	0	1	0	0	0	25	0	0	108	0	0	49	0	0	0	0	0
47	5:45 PM	14	0	0	69	1	0	35	0	0	0	0	0	29	0	0	91	1	0	28	1	0	0	0	0
48	6:00 PM	20	0	0	79	3	0	37	2	0	0	0	0	9	0	0	92	0	0	36	0	0	0	0	0
	12 hr Total	423	17	0	3815	230	2	1290	50	0	0	0	0	1930	95	6	3766	66	2	2476	83	0	0	0	0
	AM Peak	78	8	0	399	22	0	127	3	0	0	0	0	457	31	2	764	12	1	468	8	0	0	0	0
		1	86	9%	2	421	5%	3	130	2%	3a	0	0%	4	488	6%	5	776	2%	6	476	2%	6a	0	0%
	PM Peak	46	0	0	321	12	0	174	1	1	0	0	0	103	2	0	413	3	0	219	3	0	0	0	0
		1	46	0%	2	333	4%	3	175	1%	3a	0	0%	4	105	2%	5	416	1%	6	222	1%	6a	0	0%

	TIME	North Approach (Stuart Dr)												West Approach (Mervyn Crossman Dr)												PEDESTRIAN MOVEMENTS			
		Movement 7 (Left Turn)			Movement 8 (Through)			Movement 9 (Right Turn)			Movement 9a (U Turn)			Movement 10 (Left Turn)			Movement 11 (Through)			Movement 12 (Right Turn)			Movement 12a (U Turn)						
	15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Cyclists	South	East	North	West
1	6:15 AM	5	0	0	41	0	0	23	0	0	0	0	0	14	0	0	18	0	0	8	0	0	0	0	0	0	0	0	0
2	6:30 AM	6	1	0	71	6	0	35	0	0	0	0	0	24	1	0	39	0	1	10	0	0	0	0	0	0	0	2	0
3	6:45 AM	11	1	0	67	10	1	42	0	0	0	0	0	46	0	0	35	2	0	18	1	0	0	0	0	0	0	0	0
4	7:00 AM	7	2	0	74	9	1	47	2	0	0	0	0	41	0	0	58	0	0	24	0	0	0	0	0	0	0	0	0
5	7:15 AM	9	1	0	84	8	0	76	2	2	0	0	0	65	0	0	42	0	0	28	0	0	0	0	0	0	0	0	0
6	7:30 AM	14	2	0	68	5	0	63	1	0	0	0	0	67	0	0	49	0	0	39	0	0	0	0	0	0	0	1	0
7	7:45 AM	16	0	0	83	6	0	83	3	0	0	0	0	102	1	0	69	3	0	49	0	0	0	0	0	0	0	0	0
8	8:00 AM	20	1	0	84	3	0	98	1	0	0	0	0	141	0	0	79	3	0	45	0	0	0	0	0	0	0	4	0
9	8:15 AM	17	0	0	65	9	0	128	1	1	0	0	0	162	1	0	104	0	0	41	0	0	0	0	0	0	0	9	0
10	8:30 AM	17	0	0	84	7	0	127	3	0	0	0	0	157	3	0	95	2	2	39	0	0	0	0	0	0	0	0	0
11	8:45 AM	35	0	0	96	9	0	111	2	0	0	0	0	134	3	0	112	3	0	48	2	0	0	0	0	0	0	0	0
12	9:00 AM	16	1	0	80	3	0	92	0	0	0	0	0	117	2	0	104	1	0	13	0	0	0	0	0	0	0	0	0
13	9:15 AM	17	1	0	77	6	1	72	3	0	0	0	0	54	1	0	35	1	0	37	0	0	0	0	0	0	0	0	0
14	9:30 AM	7	3	0	67	3	0	80	1	0	0	0	0	40	1	0	31	0	0	19	0	0	0	0	0	0	0	0	0
15	9:45 AM	12	1	0	80	7	0	69	2	0	0	0	0	42	1	0	32	2	0	22	1	0	0	0	0	0	0	0	0
16	10:00 AM	20	0	0	63	6	0	57	2	0	0	0	0	50	1	0	29	0	0	12	0	0	0	0	0	0	0	2	0
17	10:15 AM	22	0	0	68	9	0	60	1	0	0	0	0	45	2	0	27	0	0	19	0	0	0	0	0	0	0	0	0
18	10:30 AM	15	0	0	78	10	0	62	4	0	0	0	0	44	0	0	27	1	0	18	0	0	0	0	0	0	0	0	0
19	10:45 AM	22	1	0	66	6	0	59	3	0	0	0	0	45	0	0	31	2	0	13	0	0	0	0	0	0	0	3	0
20	11:00 AM	22	0	0	73	10	0	60	2	0	0	0	0	45	0	0	24	2	0	10	0	0	0	0	0	0	0	0	0
21	11:15 AM	10	0	0	73	11	0	74	2	0	0	0	0	44	3	0	23	2	0	7	0	0	0	0	0	0	0	1	0
22	11:30 AM	20	0	0	97	10	0	65	1	0	0	0	0	34	1	0	30	0	0	15	0	0	0	0	0	0	0	0	0
23	11:45 AM	21	2	0	84	3	0	70	3	0	0	0	0	56	1	0	34	1	0	20	0	0	0	0	0	0	0	1	0
24	12:00 PM	21	0	0	85	7	0	63	0	0	0	0	0	48	0	0	33	1	0	18	0	0	0	0	0	0	0	0	0
25	12:15 PM	19	0	0	88	6	0	63	0	0	0	0	0	37	1	0	31	1	0	24	0	0	0	0	0	0	0	1	0
26	12:30 PM	28	1	0	88	3	0	69	1	0	0	0	0	42	2	0	29	1	0	26	0	0	0	0	0	0	0	1	0
27	12:45 PM	20	3	0	76	4	0	68	1	0	0	0	0	49	1	0	54	4	0	41	1	0	0	0	0	0	0	0	0
28	1:00 PM	19	0	0	93	3	0	80	3	0	0	0	0	41	0	0	30	0	0	30	0	0	0	0	0	0	0	0	0
29	1:15 PM	27	0	0	99	5	1	84	0	0	0	0	0	45	0	0	37	1	0	11	0	0	0	0	0	0	0	1	0
30	1:30 PM	19	0	0	78	6	0	89	2	0	0	0	0	40	0	0	29	1	0	15	0	0	0	0	0	0	0	0	0
31	1:45 PM	20	0	0	80	5	1	78	4	0	0	0	0	41	0	0	34	0	0	8	1	0	0	0	0	0	0	0	0
32	2:00 PM	10	0	0	69	6	0	63	5	0	0	0	0	42	1	0	24	1	0	29	0	0	0	0	0	0	0	0	0
33	2:15 PM	11	0	0	75	7	0	69	2	0	0	0	0	40	1	0	30	1	0	34	0	0	0	0	0	0	0	1	0
34	2:30 PM	32	2	0	82	7	0	86	2	0	0	0	0	50	1	0	29	0	0	27	0	0	0	0	0	0	0	0	0
35	2:45 PM	26	0	0	98	2	0	101	1	0	0	0	0	49	2	0	38	0	0	24	1	0	0	0	0	0	0	0	0
36	3:00 PM	46	1	0	96	9	0	135	1	0	0	0	0	58	1	1	41	0	0	21	0	0	0	0	0	0	0	0	0
37	3:15 PM	25	0	0	89	3	0	138	0	0	0	0	0	87	1	0	73	3	0	45	0	0	0	0	0	0	0	9	0
38	3:30 PM	38	0	0	115	6	0	152	1	0	0	0	0	99	3	0	122	1	1	51	0	0	0	0	0	0	0	27	0
39	3:45 PM	36	2	0	131	15	0	138	0	0	0	0	0	74	3	0	74	4	0	15	1	0	0	0	0	0	0	4	0
40	4:00 PM	18	1	0	75	4	0	114	0	0	0	0	0	79	0	0	87	2	2	16	0	0	0	0	0	0	0	2	0
41	4:15 PM	22	1	1	126	9	0	122	1	0	0	0	0	68	0	1	64	0	0	24	0	0	0	0	0	0	0	1	0
42	4:30 PM	34	0	0	123	2	0	148	1	0	0	0	0	68	1	0	93	1	3	24	0	0	0	0	0	0	0	1	0
43	4:45 PM	42	0	0	113	4	0	162	0	0	0	0	0	90	0	1	101	2	1	21	0	0	0	0	0	0	0	1	0
44	5:00 PM	46	0	0	116	2	0	165	0	0	0	0	0	82	2	0	88	0	0	27	0	0	0	0	0	0	0	0	0
45	5:15 PM	41	0	0	136	5	0	181	1	0	0	0	0	99	0	0	87	0	0	36	0	0	0	0	0	0	0	0	0
46	5:30 PM	42	0	0	131	1	1	187	1	0	0	0	0	69	2	0	89	1	0	38	0	0	0	0	0	0	0	0	0
47	5:45 PM	40	1	0	128	0	1	161	1	0	0	0	0	63	1	0	76	1	0	48	0	0	0	0	0	0	0	0	0
48	6:00 PM	36	0	0	98	1	0	141	1	0	0	0	0	74	0	0	84	0	0	40	0	0	0	0	0	0	0	0	0
	12 hr Total	1079	29	1	4211	278	7	4510	68	3	0	0	0	3103	45	3	2604	51	10	1247	8	0	0	0	0	0	0	72	0
	AM Peak	89	1	0	329	28	0	464	7	1	0	0	0	594	7	0	390	8	2	173	2	0	0	0	0	0	0	13	0
		7	90	1%	8	357	8%	9	471	1%	9a	0	0%	10	601	1%	11	398	2%	12	175	1%	12a	0	0%				
	PM Peak	171	0	0	496	12	1	695	2	0	0	0	0	340	4	1	365	3	1	122	0	0	0	0	0	0	0	1	0
		7	171	0%	8	508	2%	9	697	0%	9a	0	0%	10	344	1%	11	368	1%	12	122	0%	12a	0	0%				

	Total	
1	304	
2	411	
3	466	
4	603	1784
5	679	2159
6	675	2423
7	916	2873
8	1047	3317
9	1132	3770
10	1169	4264
11	1127	4475
12	896	4324
13	653	3845
14	540	3216
15	513	2602
16	440	2146
17	492	1985
18	438	1883
19	475	1845
20	432	1837
21	451	1796
22	455	1813
23	488	1826
24	471	1865
25	481	1895
26	507	1947
27	548	2007
28	539	2075
29	513	2107
30	481	2081
31	486	2019
32	467	1947
33	477	1911
34	540	1970
35	657	2141
36	731	2405
37	866	2794
38	882	3136
39	759	3238
40	683	3190
41	727	3051
42	839	3008
43	872	3121
44	865	3303
45	890	3466
46	884	3511
47	790	3429
48	753	3317

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Queensland Government

15-Jul-2015 09:30

Traffic Analysis and Reporting System

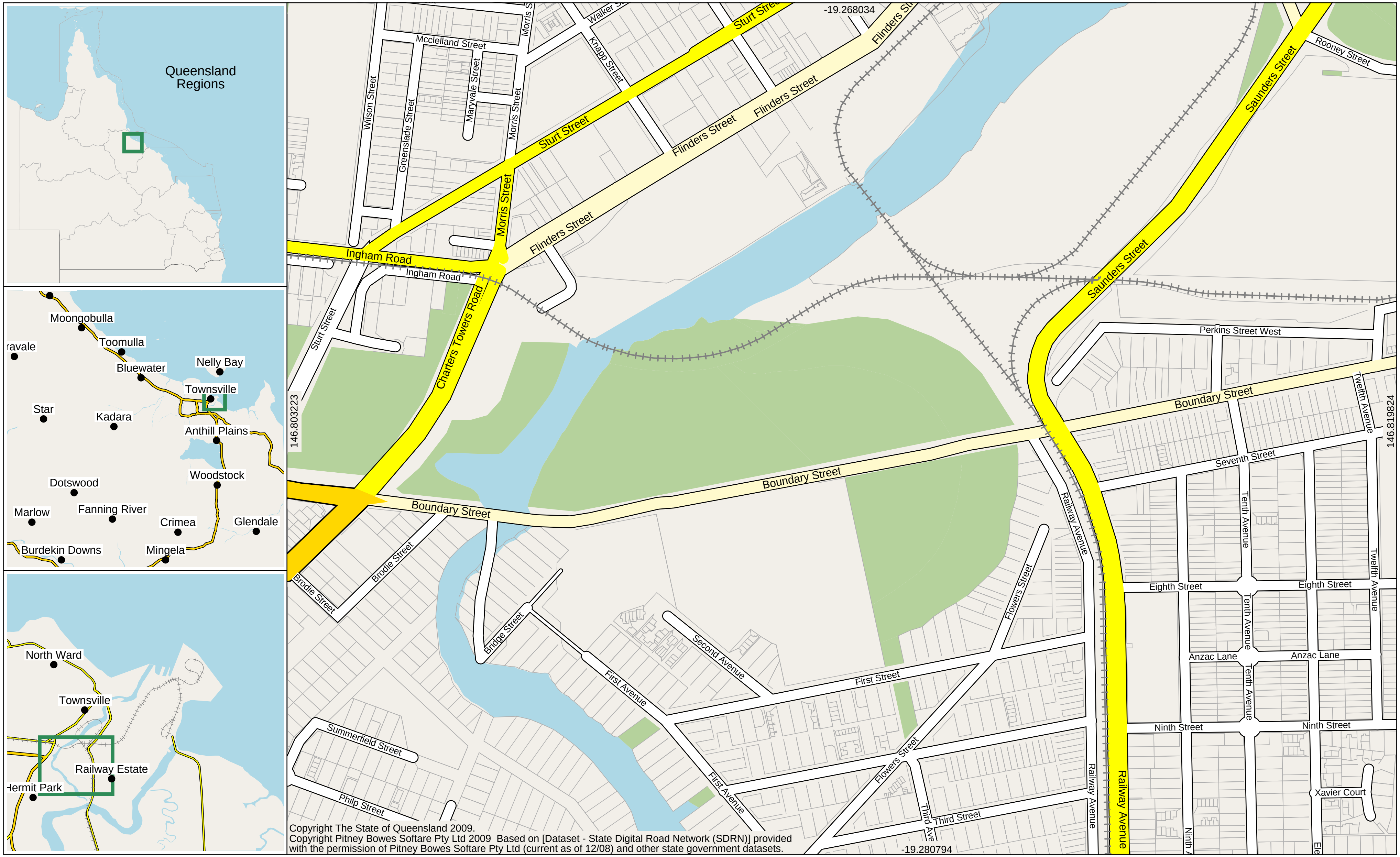
Intersection Analysis Report

Region 408 - Northern District   Road Section 831 - South Townsville Road

Intersection 85 - 831 & 832 & 833(R'way/Boundary/Saunders)

Thursday 15-May-2008   07:15 - 19:15

TARS



Queensland Government

15-Jul-2015 09:30

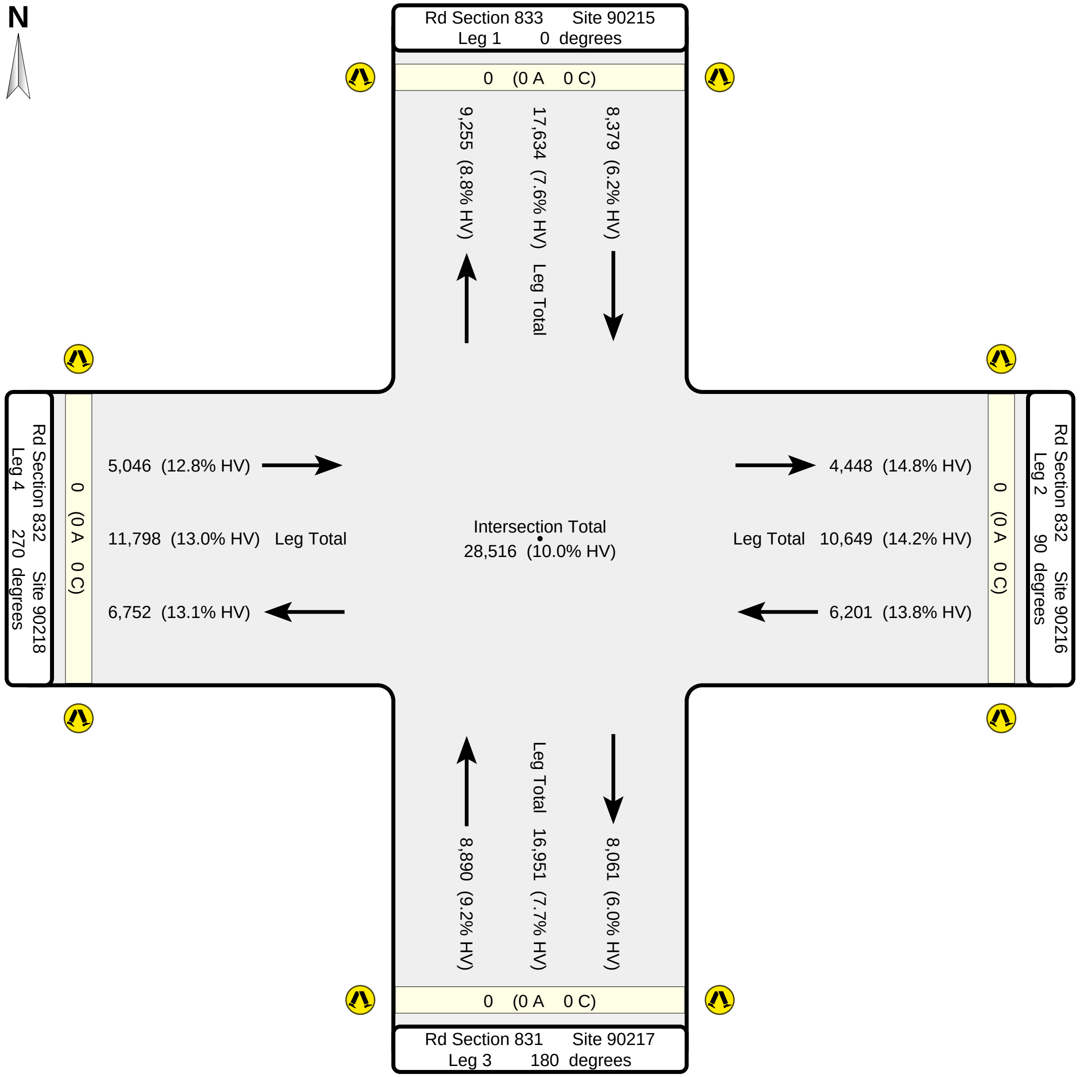
Traffic Analysis and Reporting System

Intersection Analysis Report

Region 408 - Northern District Road Section 831 - South Townsville Road
Intersection 85 - 831 & 832 & 833(R'way/Boundary/Saunders)
Thursday 15-May-2008 07:15 - 19:15

TARS

Summary



Leg	Angle	Road Section	Site	TDist	Site Description
1	0	833	90215	0.000	Saunders St to City @ Boundary St
2	90	832	90216	11.891	Boundary St to Port @ Saunders / Railway
3	180	831	90217	5.470	Railway Ave to Cluden @ Boundary St
4	270	832	90218	11.891	Boundary St to West End @ Railway Ave

APPENDIX C TOWNSVILLE STRATEGIC TRAFFIC MODEL DATA

Assumption - Rocky Springs development commences in 2026

Daily Traffic

Year	Oonoonba Road				Lakeside Drive							
	West of Lakeside Drive		Between Lakeside Drive and Abbott Street		South of Oonoonba Road*		Between Oonoonba Road and River Boulevard		Between River Boulevard and Riveredge Boulevard		Between Riveredge Boulevard and Abbott Street	
	Eastbound	Westbound	Eastbound	Westbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound
2011 (Base)	7083	6794	6733	6392	NA	NA	426	478	611	699	713	804
2016	5647	5426	8617	8402	3470	3519	562	604	719	800	981	1080
2021	5999	5802	9214	9007	3792	3891	657	766	830	981	1234	1416
2026	6404	6278	9807	9647	4252	4374	942	1098	1152	1352	1706	1950
2031	6697	6575	9730	9810	4612	4751	1690	1628	1911	1896	2566	2607

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Year	Abbott Street				Abbott Street / Railway Avenue		Railway Avenue		Saunders Street		Boundary Street			
	South of Oonoonba Road		Between Oonoonba Road and Lakeside Drive		Between Lakeside Drive and Queens Road		Between Queens Road and Boundary Street		North of Boundary Street		West of Railway Avenue		East of Railway Avenue	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
2011 (Base)	4171	4175	10745	10405	12474	12277	12085	13248	10621	10902	8631	7625	6306	6293
2016	3152	2041	11584	10262	13560	12404	13371	13930	13856	13449	9314	8173	6217	6210
2021	3768	2468	12776	11277	15017	13772	14796	15322	16588	15832	10667	9178	6506	6494
2026	4372	2937	14122	12561	16719	15458	16598	17387	19431	18665	11965	10181	6758	6748
2031	5992	4322	15606	14053	19036	17574	18962	19636	22104	21148	12823	10970	6916	6917

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Morning 2 hour peak (7am to 9am)

Year	Oonoonba Road				Lakeside Drive							
	West of Lakeside Drive		Between Lakeside Drive and Abbott Street		South of Oonoonba Road*		Between Oonoonba Road and River Boulevard		Between River Boulevard and Riveredge Boulevard		Between Riveredge Boulevard and Abbott Street	
	Eastbound	Westbound	Eastbound	Westbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound
2011 (Base)	1317	1063	1283	949	NA	NA	48	128	161	50	188	54
2016	961	940	1561	1207	663	403	77	151	189	72	268	70
2021	1001	1011	1595	1322	692	459	118	168	232	91	356	87
2026	1090	1061	1555	1418	768	511	327	177	450	108	618	104
2031	1126	1094	1250	1499	815	566	716	186	839	118	1036	116

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Year	Abbott Street				Abbott Street / Railway Avenue		Railway Avenue		Saunders Street		Boundary Street			
	South of Oonoonba Road		Between Oonoonba Road		Between Lakeside Drive and		Between Queens Road and		North of Boundary Street		West of Railway Avenue		East of Railway Avenue	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
2011 (Base)	707	494	1985	1376	2452	1435	2381	1517	1995	1313	1485	1207	1072	896
2016	519	255	2078	1385	2618	1448	2573	1555	2505	1602	1679	1235	1051	879
2021	547	334	2201	1533	2770	1650	2753	2790	2902	2977	1949	1351	1103	903
2026	579	394	2136	1723	3039	1826	3047	2004	3347	2289	2178	1466	1141	924
2031	906	471	2213	1841	3458	1986	3465	2199	3777	2546	2275	1601	1159	946

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Evening 2 hour peak (3:30pm to 5:30pm)

Year	Oonoonba Road				Lakeside Drive							
	West of Lakeside Drive		Between Lakeside Drive and Abbott Street		South of Oonoonba Road*		Between Oonoonba Road and River Boulevard		Between River Boulevard and Riveredge Boulevard		Between Riveredge Boulevard and Abbott Street	
	Eastbound	Westbound	Eastbound	Westbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound
2011 (Base)	1080	1293	991	1240	NA	NA	100	64	61	189	72	216
2016	900	947	1260	1655	479	800	129	102	81	221	98	306
2021	942	1006	1338	1675	527	855	145	199	98	321	121	455
2026	1000	1096	1450	1583	598	959	163	486	122	615	154	798
2031	1053	1144	1428	1231	658	1032	300	962	261	1094	300	1310

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Year	Abbott Street				Abbott Street / Railway Avenue		Railway Avenue		Saunders Street		Boundary Street			
	South of Oonoonba Road		Between Oonoonba Road		Between Lakeside Drive and		Between Queens Road and		North of Boundary Street		West of Railway Avenue		East of Railway Avenue	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
2011 (Base)	632	824	1575	2060	1729	2601	1618	2993	1467	2411	1411	1366	938	1228
2016	510	446	1708	2097	1872	2722	1806	3386	1967	3161	1533	1556	924	1223
2021	637	469	1884	2210	2087	2916	2007	3330	2400	3282	1678	1683	956	1284
2026	725	560	1085	2219	2317	3267	2248	3771	2781	3881	1842	1894	986	1336
2031	822	941	2149	2237	2525	3790	2471	4324	3072	4464	2009	2033	1014	1368

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Morning 1 hour peak

Year	Oonoonba Road				Lakeside Drive							
	West of Lakeside Drive		Between Lakeside Drive		South of Oonoonba Road*		Between Oonoonba Road and		Between River Boulevard		Between Riveredge Boulevard and	
	Eastbound	Westbound	Eastbound	Westbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound
2011 (Base)	659	532	642	475	NA	NA	24	64	81	25	94	27
2016	481	470	781	604	332	202	39	76	95	36	134	35
2021	501	506	798	661	346	230	59	84	116	46	178	44
2026	545	531	778	709	384	256	164	89	225	54	309	52
2031	563	547	625	750	408	283	358	93	420	59	518	58

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Year	Abbott Street				Abbott Street / Railway Avenue		Railway Avenue		Saunders Street		Boundary Street			
	South of Oonoonba Road		Between Oonoonba Road		Between Lakeside Drive and		Between Queens Road and		North of Boundary Street		West of Railway Avenue		East of Railway Avenue	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
2011 (Base)	354	247	993	688	1226	718	1191	759	998	657	743	604	536	448
2016	260	128	1039	693	1309	724	1287	778	1253	801	840	618	526	440
2021	274	167	1101	767	1385	825	1377	1395	1451	1489	975	676	552	452
2026	290	197	1068	862	1520	913	1524	1002	1674	1145	1089	733	571	462
2031	453	236	1107	921	1729	993	1733	1100	1889	1273	1138	801	580	473

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

Evening 1 hour peak

Year	Oonoonba Road				Lakeside Drive							
	West of Lakeside Drive		Between Lakeside Drive		South of Oonoonba Road*		Between Oonoonba Road and		Between River Boulevard		Between Riveredge Boulevard and	
	Eastbound	Westbound	Eastbound	Westbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound
2011 (Base)	540	647	496	620	NA	NA	50	32	31	95	36	108
2016	450	474	630	828	240	400	65	51	41	111	49	153
2021	471	503	669	838	264	428	73	100	49	161	61	228
2026	500	548	725	792	299	480	82	243	61	308	77	399
2031	527	572	714	616	329	516	150	481	131	547	150	655

Year	Abbott Street				Abbott Street / Railway Avenue		Railway Avenue		Saunders Street		Boundary Street			
	South of Oonoonba Road		Between Oonoonba Road		Between Lakeside Drive and		Between Queens Road and		North of Boundary Street		West of Railway Avenue		East of Railway Avenue	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
2011 (Base)	316	412	788	1030	865	1301	809	1497	734	1206	706	683	469	614
2016	255	223	854	1049	936	1361	903	1693	984	1581	767	778	462	612
2021	319	235	942	1105	1044	1458	1004	1665	1200	1641	839	842	478	642
2026	363	280	543	1110	1159	1634	1124	1886	1391	1941	921	947	493	668
2031	411	471	1075	1119	1263	1895	1236	2162	1536	2232	1005	1017	507	684

** This is the "missing link" section of Lakeside Drive which was only constructed in 2015 so no data for 2011 base model*

All Traffic Data is for 2031 base

From Aimun Microsimulation Model

Nomenclature for Turn Movements

L = Left
T = Through
R = Right
LT = Left & Through
LR = Left & Right
TR = Through & Right
LTR = Left, Through & Right

Intersection of Lakeside Drive and Abbott Street

Peak Period	Abbott St (South)		Abbott St (North)		Lakeside Dr
	L	T	T	R	L
AM Peak Hour	32	1131	495	28	736
PM Peak Hour	15	681	1423	270	424

Intersection of Lakeside Drive and Riveredge Boulevard

Peak Period	Lakeside Dr (South)		Lakeside Dr (North)		Riveredge Blvd
	L	T	T	R	LR
AM Peak Hour	21	590	34	26	195
PM Peak Hour	21	346	145	136	126

Intersection of Abbott Street, Oonoonba Road and Keenan Street

Peak Period	Abbott St (South)			Keenan Street	Abbott St (North)		Oonoonba Rd	
	LT	T	R	LTR	LT	R	L	TR
AM Peak Hour	345	269	7	152	98	395	460	36
PM Peak Hour	278	194	46	83	452	878	234	83

Intersection of Oonoonba Road and Lakeside Drive

Peak Period	Lakeside Dr (South)			Oonoonba Rd (East)			Lakeside Dr (North)			Oonoonba Rd (West)		
	L	T	R	L	T	R	L	T	R	L	T	R
AM Peak Hour	136	162	281	230	267	0	15	67	60	232	199	12
PM Peak Hour	9	161	153	539	381	9	5	48	32	178	170	15

Intersection of Fairfield Waters Drive, Mervyn Crossman Drive and Stuart Drive

Peak Period	Stuart Dr (South)		Fairfield Waters Dr (East)		Stuart Dr (North)		Mervyn Crossman Dr (West)	
	K	M	K	M	K	M	K	M
AM Peak Hour	486	422	386	423	560	486	576	212
PM Peak Hour	501	428	288	248	854	817	379	155

** There is no turn designation within Aimsun for roundabouts. Nomenclature as follows:*

K = Kerbside Lane

M = Median Lane

Assumption - Rocky Springs development commences in 2026

Daily Traffic

Year	Railway Avenue (South)			Boundary Street (East)			Saunders Street (North)			Boundary Street (West)		
	L	T	R	L	T	R	L	T	R	L	T	R
2011	2745	8020	1320	2128	3498	667	672	8708	1521	1934	4313	2412
2016	2195	10000	1176	1857	3589	764	777	10066	2606	3092	4264	2007
2021	2186	11425	1184	1889	3738	867	899	11419	3514	4296	4423	2014
2026	2308	13133	1157	1915	3862	970	1007	13340	4319	5327	4594	2132
2031	2636	15149	1177	1956	3920	1041	1079	15268	4801	5914	4660	2413

Morning 2 hour peak (7am to 9am)

Year	Railway Avenue (South)			Boundary Street (East)			Saunders Street (North)			Boundary Street (West)		
	L	T	R	L	T	R	L	T	R	L	T	R
2011	586	1559	235	279	513	105	103	967	243	331	734	271
2016	517	1856	200	241	517	120	114	1096	391	530	737	218
2021	514	2040	199	242	526	135	131	1313	532	726	772	235
2026	546	2302	199	240	531	153	142	1507	640	893	800	257
2031	632	2630	203	243	543	161	155	1683	708	986	801	274

Evening 2 hour peak (3:30pm to 5:30pm)

Year	Railway Avenue (South)			Boundary Street (East)			Saunders Street (North)			Boundary Street (West)		
	L	T	R	L	T	R	L	T	R	L	T	R
2011	381	1057	179	456	663	109	118	1999	295	300	641	538
2016	283	1368	154	409	690	124	140	2466	555	474	630	511
2021	266	1593	148	415	728	141	163	2459	660	667	645	456
2026	286	1816	146	420	760	156	184	2877	819	809	656	474
2031	321	2000	149	430	770	169	194	3351	919	903	670	543

Assumption - Rocky Springs development commences in 2026

Daily Traffic

Year	Railway Avenue (South)			~~Putt Street (East)~~			Railway Avenue (North)			Queens Road (West)		
	L	T	R	~~L~~	~~T~~	~~R~~	L	T	R	L	T	R
2011	1477	10997						10570	2679	1088		1707
2016	1418	12142						10665	3265	1228		1739
2021	1418	13599						12110	3212	1197		1662
2026	1418	15301						13800	3587	1298		1658
2031	1488	17548						15811	3826	1414		1763

** No Putt Street data available within strategic level model*

Morning 2 hour peak (7am to 9am)

Year	Railway Avenue (South)			~~Putt Street (East)~~			Railway Avenue (North)			Queens Road (West)		
	L	T	R	~~L~~	~~T~~	~~R~~	L	T	R	L	T	R
2011	301	2150						1232	285	230		203
2016	302	2316						1247	308	257		201
2021	280	2490						1452	339	263		199
2026	280	2759						1627	377	288		199
2031	294	3164						1781	418	301		205

** No Putt Street data available within strategic level model*

Evening 2 hour peak (3:30pm to 5:30pm)

Year	Railway Avenue (South)			~~Putt Street (East)~~			Railway Avenue (North)			Queens Road (West)		
	L	T	R	~~L~~	~~T~~	~~R~~	L	T	R	L	T	R
2011	244	1485						2248	744	132		353
2016	220	1652						2336	1050	154		386
2021	224	1863						2581	749	143		335
2026	223	2095						2934	837	154		333
2031	231	2294						3431	893	177		359

** No Putt Street data available within strategic level model*

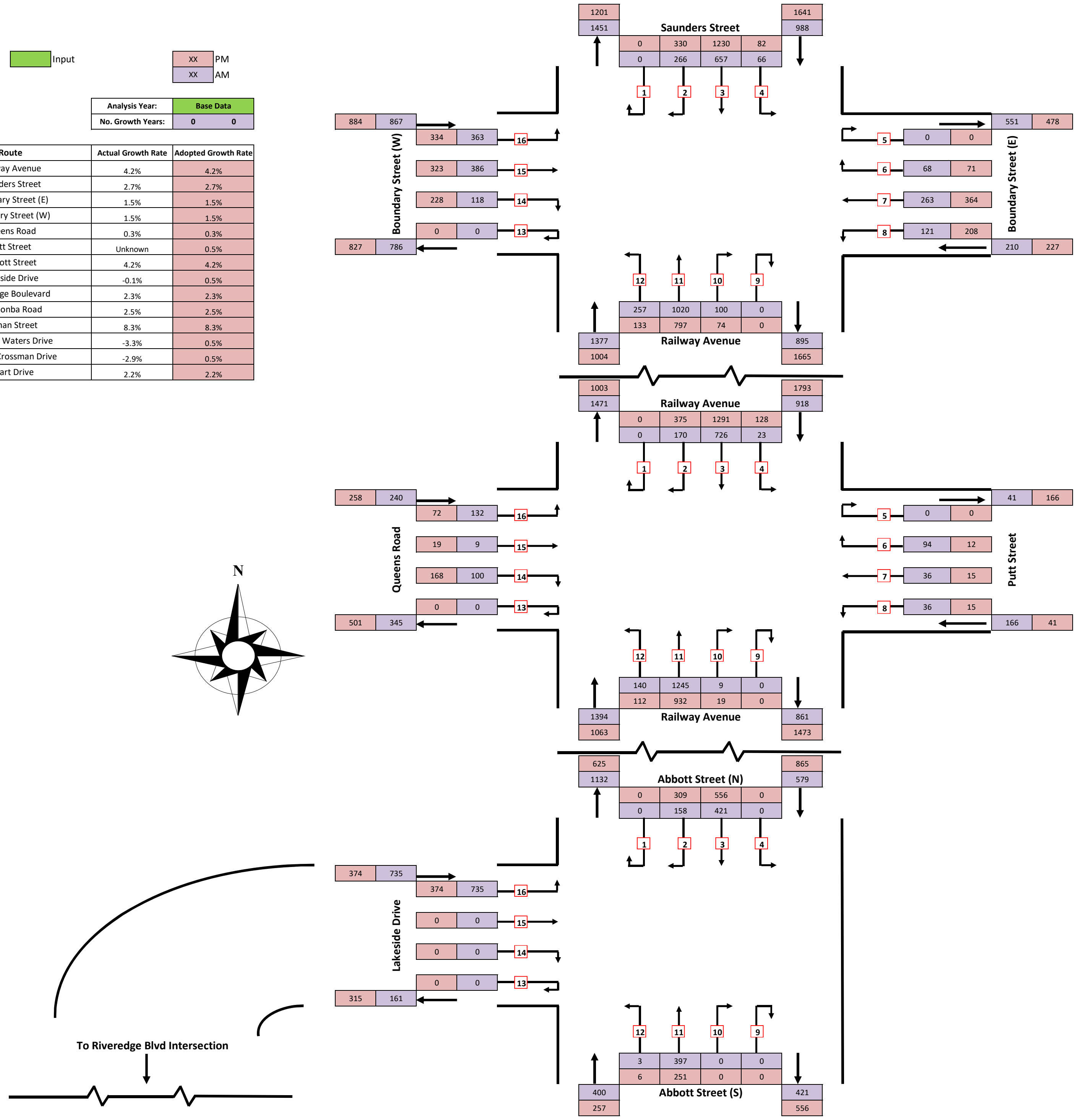
APPENDIX D BASE PEAK HOUR TRAFFIC VOLUMES

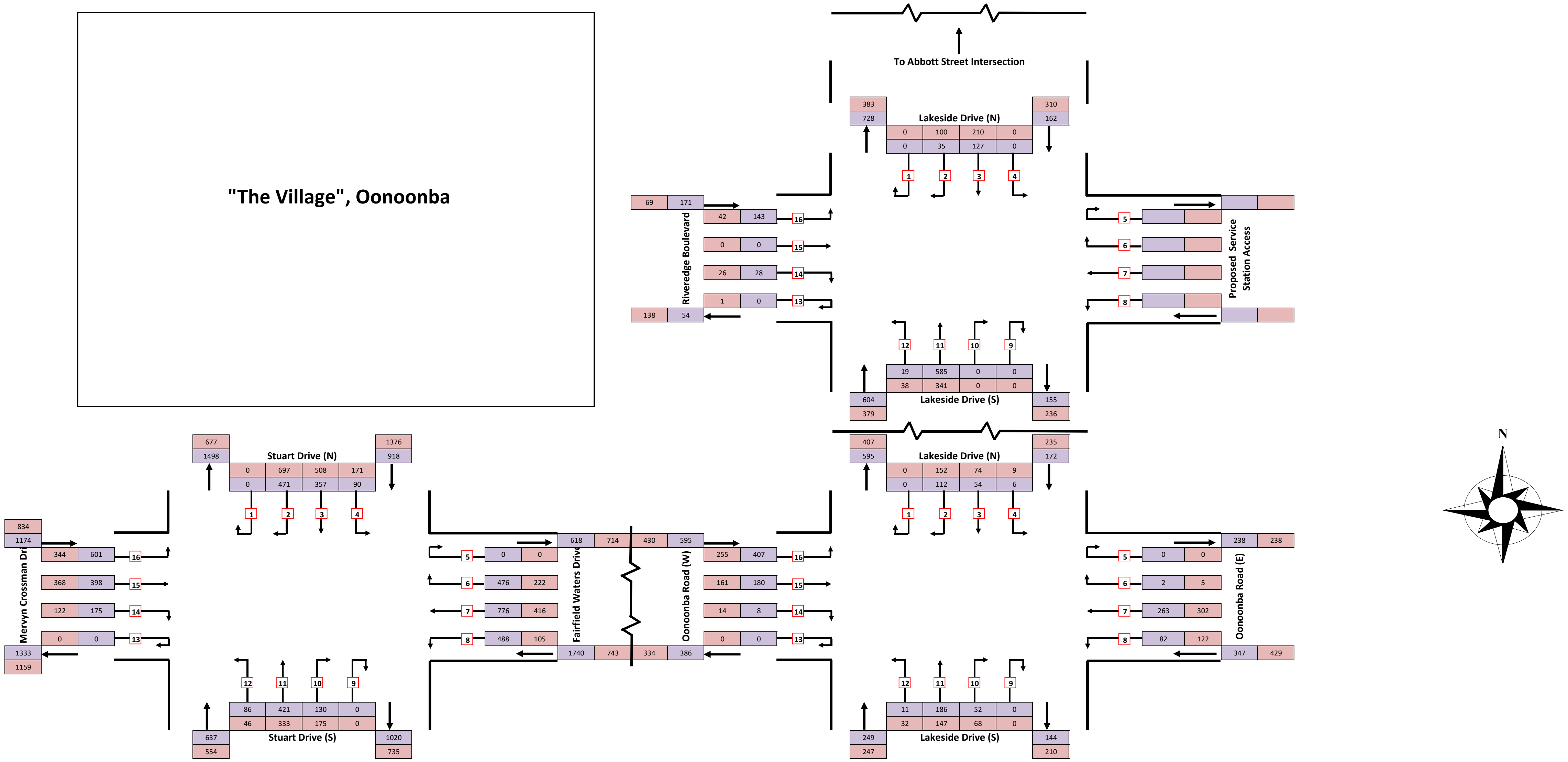
2015 Base Volumes

Input		XX	PM
		XX	AM

Analysis Year:	Base Data	
No. Growth Years:	0	0

Route	Actual Growth Rate	Adopted Growth Rate
Railway Avenue	4.2%	4.2%
Saunders Street	2.7%	2.7%
Boundary Street (E)	1.5%	1.5%
Boundary Street (W)	1.5%	1.5%
Queens Road	0.3%	0.3%
Putt Street	Unknown	0.5%
Abbott Street	4.2%	4.2%
Lakeside Drive	-0.1%	0.5%
Riveredge Boulevard	2.3%	2.3%
Oonoonba Road	2.5%	2.5%
Keenan Street	8.3%	8.3%
Fairfield Waters Drive	-3.3%	0.5%
Mervyn Crossman Drive	-2.9%	0.5%
Stuart Drive	2.2%	2.2%



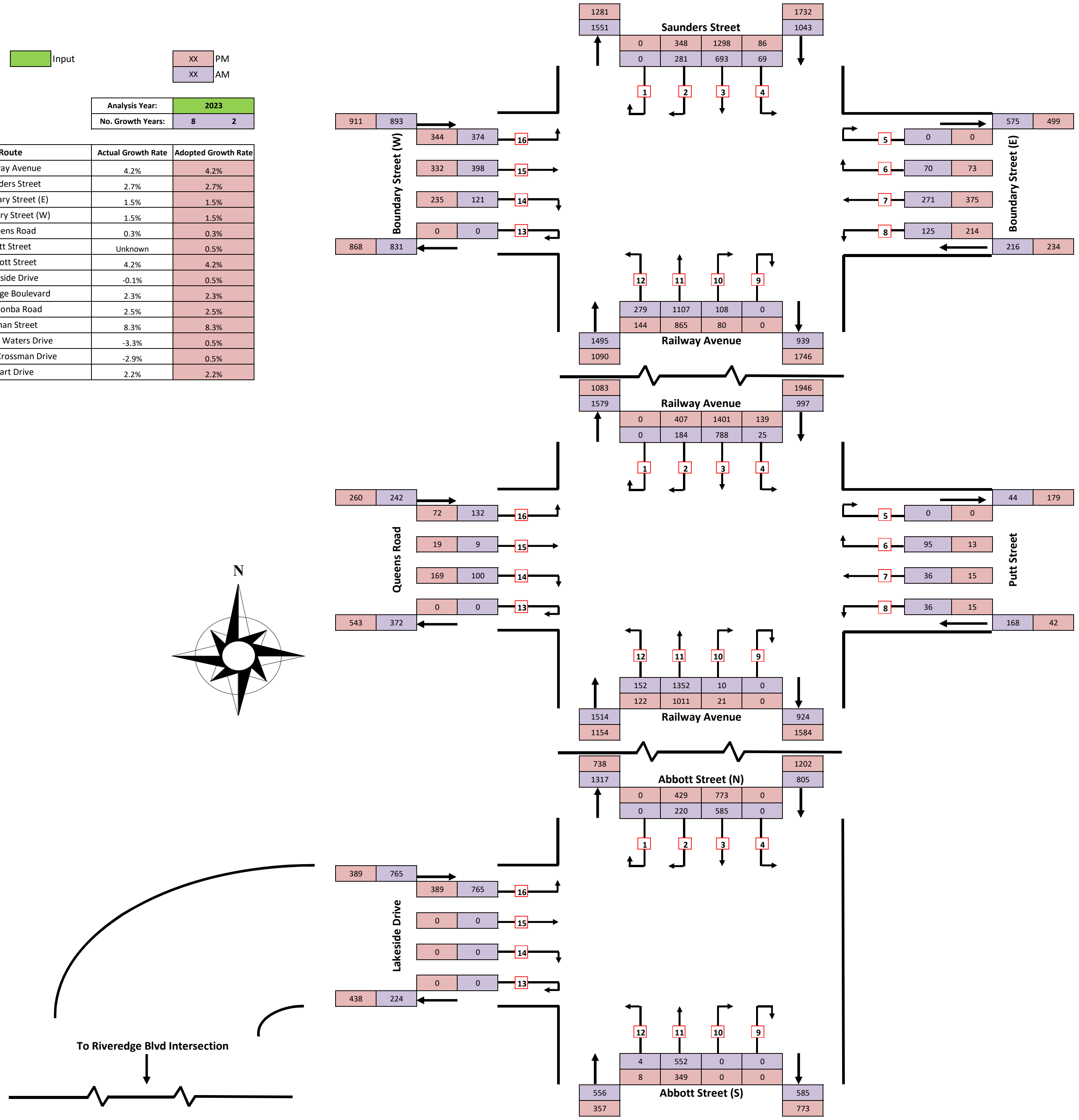

"The Village", Oonoonba
To Abbott Street Intersection
Lakeside Drive (N)
Lakeside Drive (S)
Riveredge Boulevard
Proposed Service Station Access
Stuart Drive (N)
Stuart Drive (S)
Mervyn Crossman Dr
Fairfield Waters Drive
Oonoonba Road (W)
Oonoonba Road (E)
N

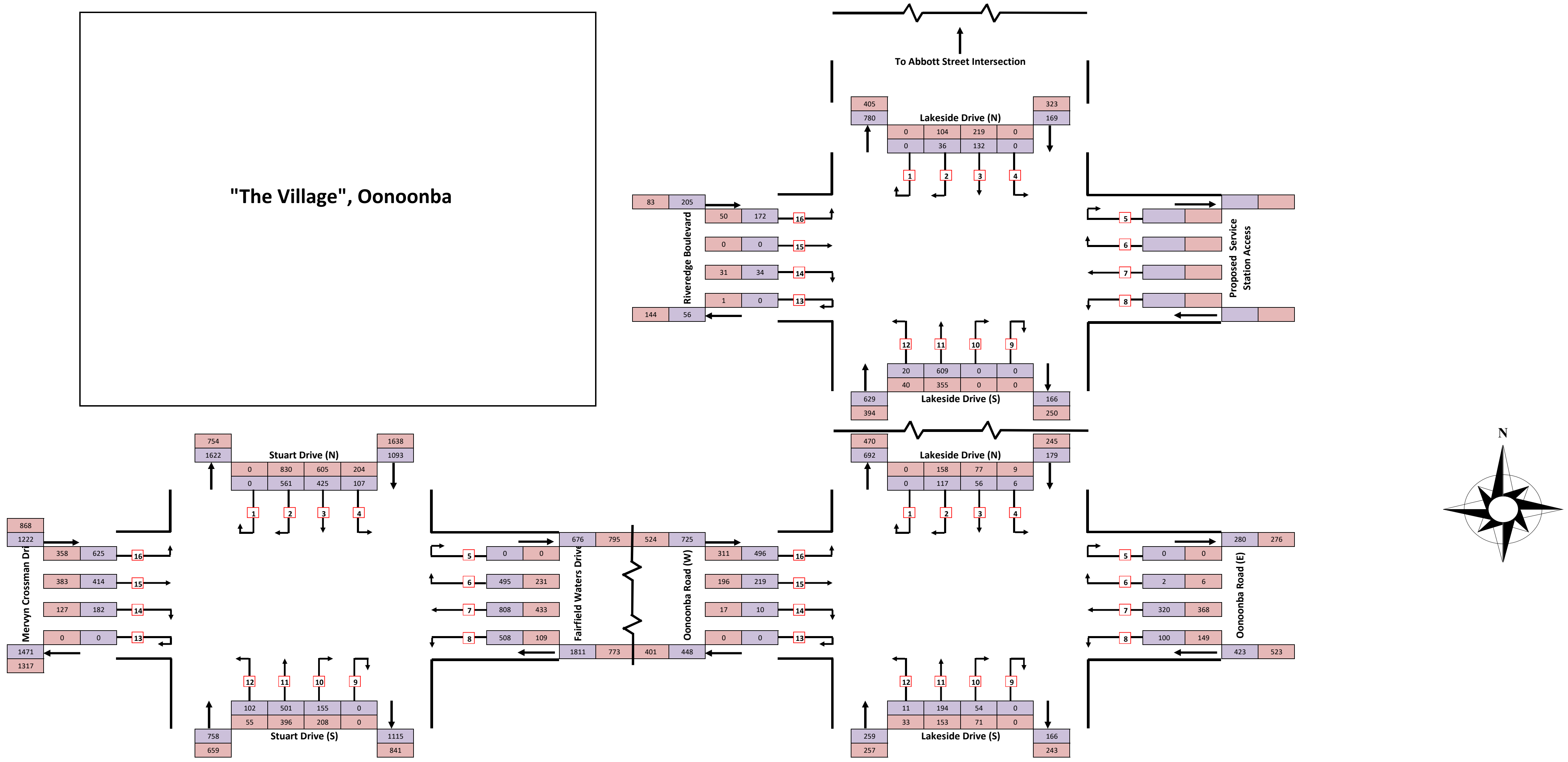
2023 Base Volumes

Input		xx	PM
		xx	AM

Analysis Year:	2023	
No. Growth Years:	8	2

Route	Actual Growth Rate	Adopted Growth Rate
Railway Avenue	4.2%	4.2%
Saunders Street	2.7%	2.7%
Boundary Street (E)	1.5%	1.5%
Boundary Street (W)	1.5%	1.5%
Queens Road	0.3%	0.3%
Putt Street	Unknown	0.5%
Abbott Street	4.2%	4.2%
Lakeside Drive	-0.1%	0.5%
Riveredge Boulevard	2.3%	2.3%
Oonoonba Road	2.5%	2.5%
Keenan Street	8.3%	8.3%
Fairfield Waters Drive	-3.3%	0.5%
Mervyn Crossman Drive	-2.9%	0.5%
Stuart Drive	2.2%	2.2%



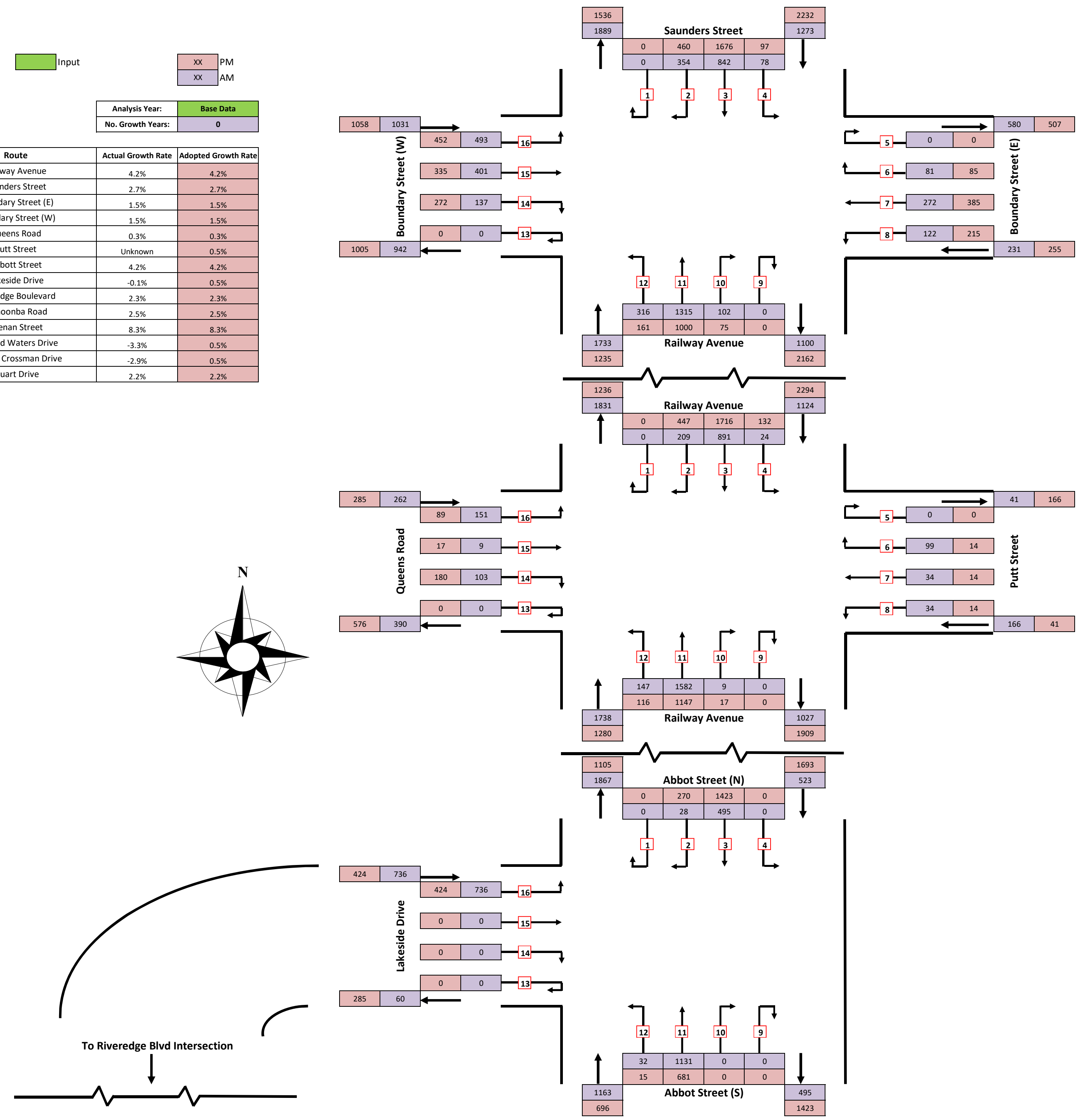

"The Village", Oonoonba
To Abbott Street Intersection
Lakeside Drive (N)
Lakeside Drive (S)
Riveredge Boulevard
Proposed Service Station Access
Stuart Drive (N)
Stuart Drive (S)
Mervyn Crossman Dr
Fairfield Waters Drive
Oonoonba Road (W)
Oonoonba Road (E)
N

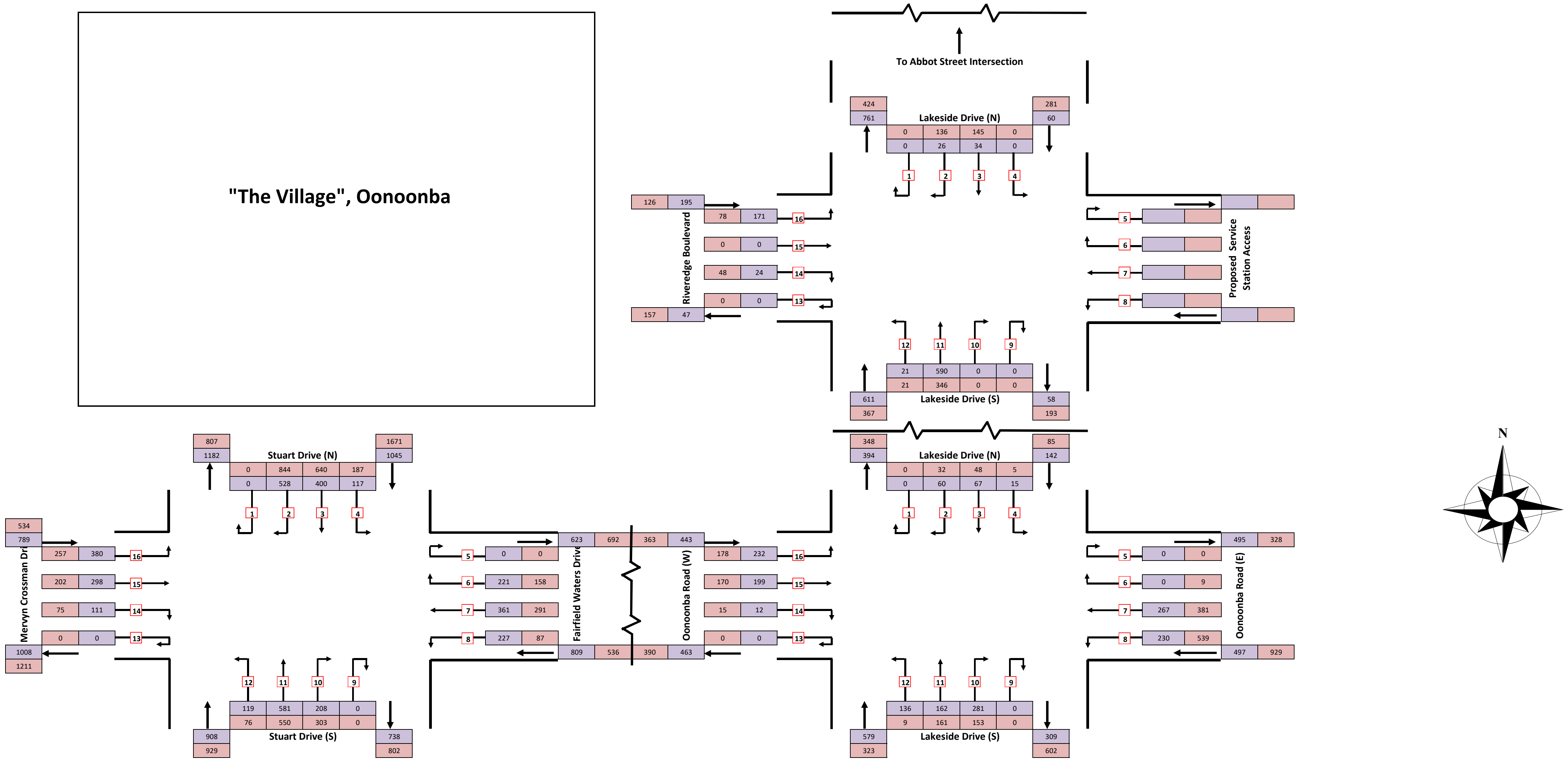
2031 Base Volumes

Input	
XX	PM
XX	AM

Analysis Year:	Base Data
No. Growth Years:	0

Route	Actual Growth Rate	Adopted Growth Rate
Railway Avenue	4.2%	4.2%
Saunders Street	2.7%	2.7%
Boundary Street (E)	1.5%	1.5%
Boundary Street (W)	1.5%	1.5%
Queens Road	0.3%	0.3%
Putt Street	Unknown	0.5%
Abbott Street	4.2%	4.2%
Lakeside Drive	-0.1%	0.5%
Riveredge Boulevard	2.3%	2.3%
Oonoonba Road	2.5%	2.5%
Keenan Street	8.3%	8.3%
Fairfield Waters Drive	-3.3%	0.5%
Mervyn Crossman Drive	-2.9%	0.5%
Stuart Drive	2.2%	2.2%




"The Village", Oonoonba
To Abbot Street Intersection
Lakeside Drive (N)
Lakeside Drive (S)
Riveredge Boulevard
Proposed Service Station Access
Stuart Drive (N)
Stuart Drive (S)
Mervyn Crossman Dr
Fairfield Waters Drive
Oonoonba Road (W)
Oonoonba Road (E)
N
424
761
281
60
0
136
145
0
0
26
34
0
126
195
78
171
0
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48
24
0
0
157
47
21
590
0
0
21
346
0
0
611
367
58
193
348
394
85
142
0
32
48
5
0
60
67
15
807
1182
1671
1045
0
844
640
187
0
528
400
117
534
789
257
380
202
298
75
111
0
0
1008
1211
623
692
363
443
0
0
221
158
361
291
227
87
809
536
390
463
178
232
170
199
15
12
0
0
495
328
0
0
0
9
267
381
230
539
497
929
119
581
208
0
76
550
303
0
908
929
738
802
136
162
281
0
9
161
153
0
579
323
309
602

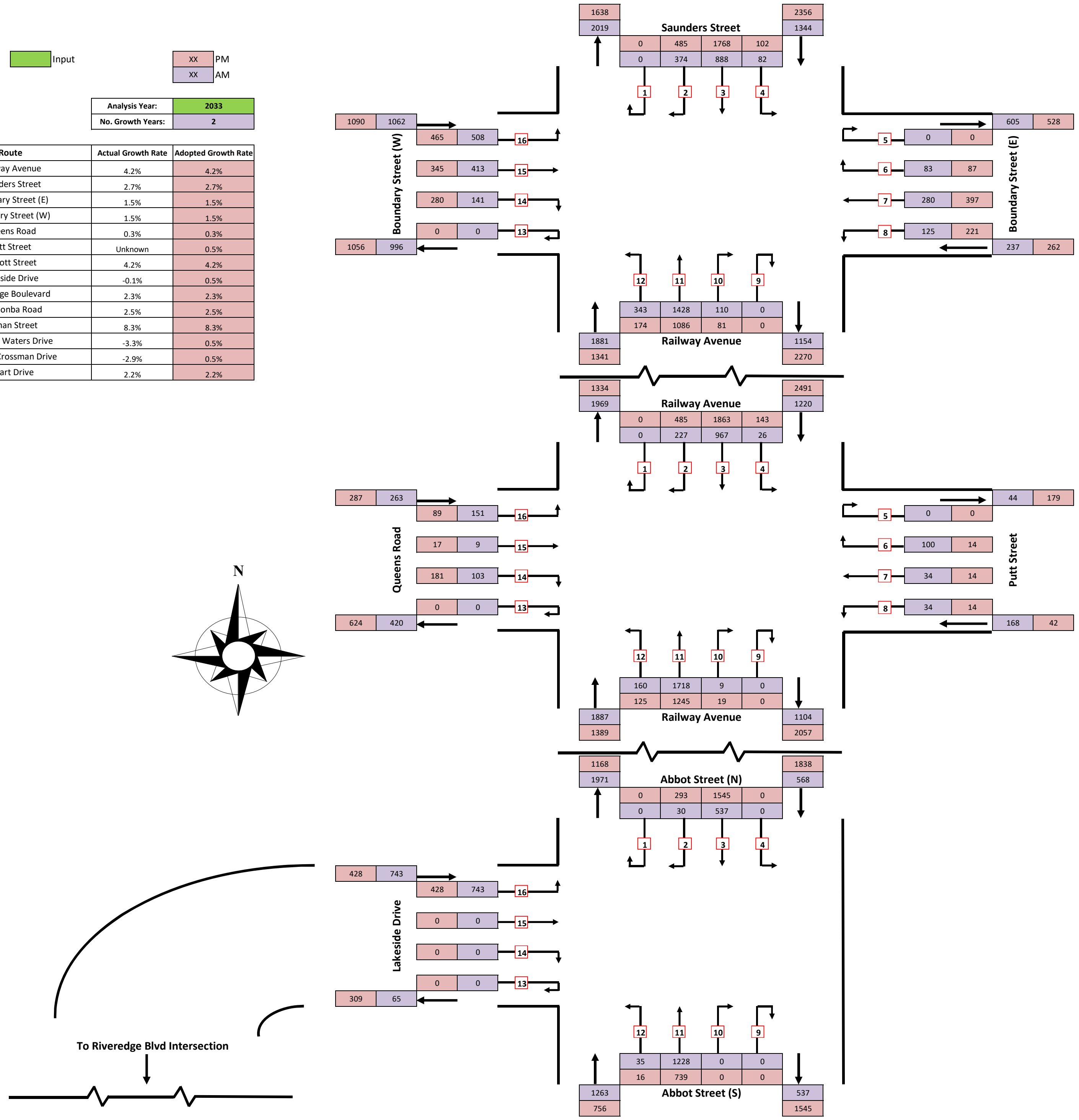
2033 Base Volumes

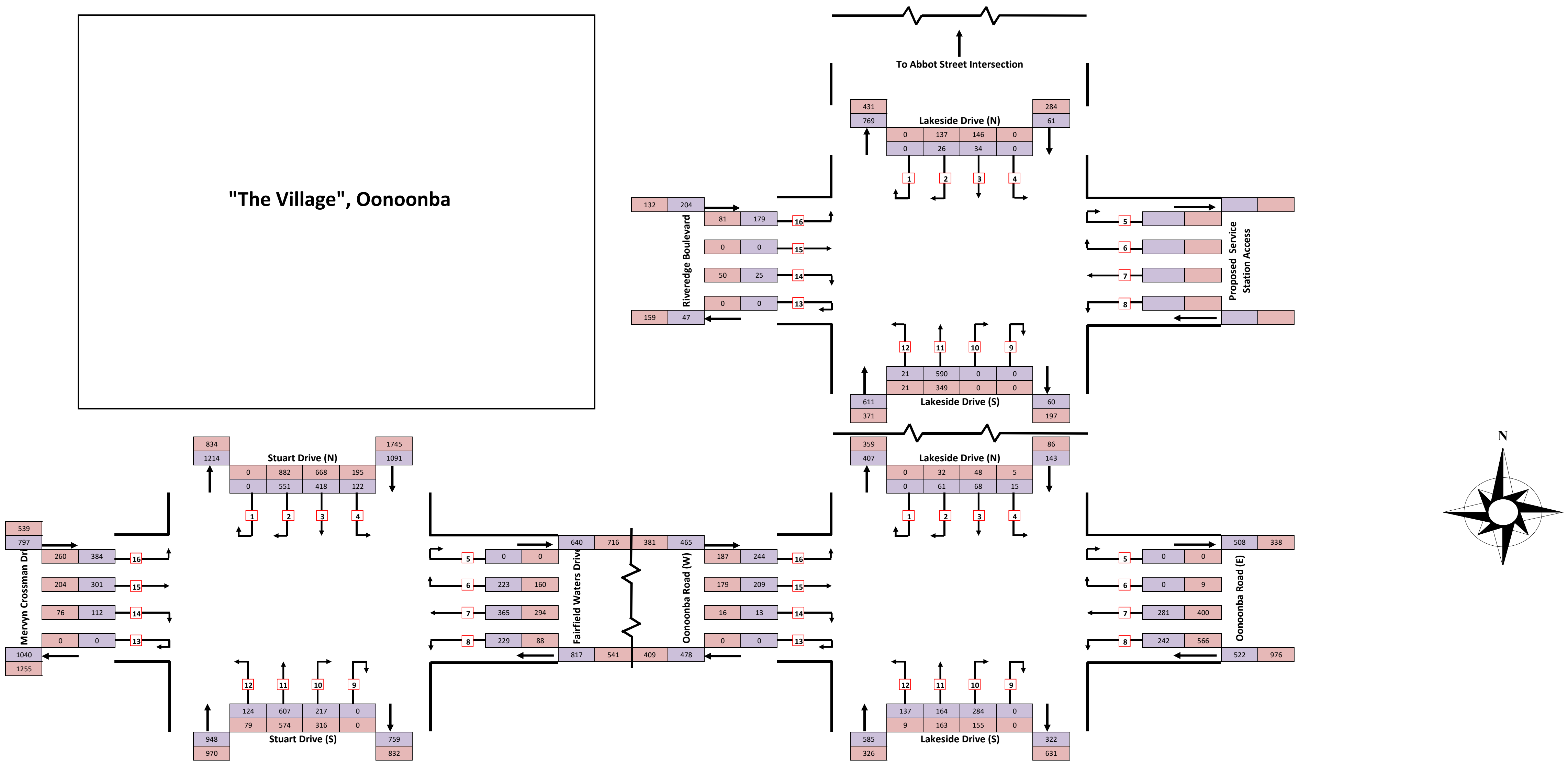
Input

XX PM
XX AM

Analysis Year:	2033
No. Growth Years:	2

Route	Actual Growth Rate	Adopted Growth Rate
Railway Avenue	4.2%	4.2%
Saunders Street	2.7%	2.7%
Boundary Street (E)	1.5%	1.5%
Boundary Street (W)	1.5%	1.5%
Queens Road	0.3%	0.3%
Putt Street	Unknown	0.5%
Abbott Street	4.2%	4.2%
Lakeside Drive	-0.1%	0.5%
Riveredge Boulevard	2.3%	2.3%
Oonoonba Road	2.5%	2.5%
Keenan Street	8.3%	8.3%
Fairfield Waters Drive	-3.3%	0.5%
Mervyn Crossman Drive	-2.9%	0.5%
Stuart Drive	2.2%	2.2%




"The Village", Oonoonba
To Abbot Street Intersection
Lakeside Drive (N)
Riveredge Boulevard
Proposed Service Station Access
Lakeside Drive (S)
Stuart Drive (N)
Mervyn Crossman Dr
Fairfield Waters Drive
Oonoonba Road (W)
Lakeside Drive (N)
Oonoonba Road (E)
Stuart Drive (S)
Lakeside Drive (S)
N

APPENDIX E GROWTH RATE CALCULATIONS

All Traffic Data is for 2031 base

From Aimun Microsimulation Model

Nomenclature for Turn Movements

L = Left
T = Through
R = Right
LT = Left & Through
LR = Left & Right
TR = Through & Right
LTR = Left, Through & Right

Intersection of Lakeside Drive and Abbott Street

Peak Period	Abbott St (South)		Abbott St (North)		Lakeside Dr
2031					
	L	**T**	**T**	**R**	**L**
AM Peak Hour	32	1131	495	28	736
PM Peak Hour	15	681	1423	270	424
2015					
Peak Period	**Abbott St (South)**		**Abbott St (North)**		**Lakeside Dr**
	L	**T**	**T**	**R**	**L**
AM Peak Hour	3	397	421	158	735
PM Peak Hour	6	251	556	309	374
Growth Rates					
AM Peak Hour	16%	7%	1%	-10%	0%
PM Peak Hour	6%	6%	6%	-1%	1%

Intersection of Lakeside Drive and Riveredge Boulevard

Peak Period	Lakeside Dr (South)		Lakeside Dr (North)		Riveredge Blvd
2031					
	L	**T**	**T**	**R**	**LR**
AM Peak Hour	21	590	34	26	195
PM Peak Hour	21	346	145	136	126
2015					
Peak Period	**Lakeside Dr (South)**		**Lakeside Dr (North)**		**Riveredge Blvd**
	L	**T**	**T**	**R**	**LR**
AM Peak Hour	19	585	127	35	171
PM Peak Hour	38	341	210	100	69
Growth Rates					
AM Peak Hour	1%	0%	-8%	-2%	1%
PM Peak Hour	-4%	0%	-2%	2%	4%

Intersection of Abbott Street, Oonoonba Road and Keenan Street

Peak Period	Abbott St (South)			Keenan Street	Abbott St (North)		Oonoonba Rd	
2031								
	LT	**T**	**R**	**LTR**	**LT**	**R**	**L**	**TR**
AM Peak Hour	345	269	7	152	98	395	460	36
PM Peak Hour	278	194	46	83	452	878	234	83
2015								
Peak Period	**Abbott St (South)**			**Keenan Street**	**Abbott St (North)**		**Oonoonba Rd**	
	LT	**T**	**R**	**LTR**	**LT**	**R**	**L**	**TR**
AM Peak Hour	59	183	2	23	277	279	200	40
PM Peak Hour	40	122	8	44	363	363	169	65
Growth Rates								
AM Peak Hour	12%	2%	8%	13%	-6%	2%	5%	-1%
PM Peak Hour	13%	3%	12%	4%	1%	6%	2%	2%
	Left Only				Left Only			

Intersection of Oonoonba Road and Lakeside Drive

Peak Period	Lakeside Dr (South)			Oonoonba Rd (East)			Lakeside Dr (North)			Oonoonba Rd (West)		
2031												
	L	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
AM Peak Hour	136	162	281	230	267	0	15	67	60	232	199	12
PM Peak Hour	9	161	153	539	381	9	5	48	32	178	170	15
2015												
Peak Period	**Lakeside Dr (South)**			**Oonoonba Rd (East)**			**Lakeside Dr (North)**			**Oonoonba Rd (West)**		
	L	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
AM Peak Hour	11	186	52	82	263	2	6	54	112	407	180	8
PM Peak Hour	32	147	68	122	302	5	9	74	152	255	161	14
Growth Rates												
AM Peak Hour	17%	-1%	11%	7%	0%	-100%	6%	1%	-4%	-3%	1%	3%
PM Peak Hour	-8%	1%	5%	10%	1%	4%	-4%	-3%	-9%	-2%	0%	0%

Intersection of Fairfield Waters Drive, Mervyn Crossman Drive and Stuart Drive

Peak Period	Stuart Dr (South)		Fairfield Waters Dr (East)		Stuart Dr (North)		Mervyn Crossman Dr (West)	
2031								
	K	**M**	**K**	**M**	**K**	**M**	**K**	**M**
AM Peak Hour	486	422	386	423	560	486	576	212
PM Peak Hour	501	428	288	248	854	817	379	155
2015								
Peak Period	**Stuart Dr (South)**		**Fairfield Waters Dr (East)**		**Stuart Dr (North)**		**Mervyn Crossman Dr (West)**	
	K	**M**	**K**	**M**	**K**	**M**	**K**	**M**
AM Peak Hour	297	341	876	864	269	650	800	374
PM Peak Hour	213	342	313	430	425	951	528	306
Growth Rates								
AM Peak Hour	3%	1%	-5%	-4%	5%	-2%	-2%	-3%
PM Peak Hour	5%	1%	-1%	-3%	4%	-1%	-2%	-4%

Intersection	Route	Approach	Growth Rates* AM Peak	PM Peak	Average
Abott Street/Lakeside Drive	Abbott Street	Northern	-5%	3%	
	Abbott Street	Southern	11%	6%	
	Lakeside Drive	Western	0%	1%	
Lakeside Drive/Riveredge Boulevard	Lakeside Drive	Northern	-5%	0%	
	Lakeside Drive	Southern	0%	-2%	
	Riveredge Boulevard	Western	1%	4%	
Oonoonba Road/Lakeside Drive	Lakeside Drive	Northern	1%	-5%	
	Lakeside Drive	Southern	9%	-1%	
	Oonoonba Road	Eastern**	3%	6%	
	Oonoonba Road	Western	2%	0%	
Abott Street/Oonoonba Road/Keenan Street	Abbott Street	Northern	-2%	4%	
	Abbott Street	Southern	7%	9%	
	Keenan Street	Eastern	13%	4%	
	Oonoonba Road	Western	2%	2%	
Fairfield Waters Drive/Mervyn Crossman Drive/Stuart Drive	Stuart Drive	Northern	1%	2%	
	Stuart Drive	Southern	2%	3%	
	Fairfield Waters Drive	Eastern	-5%	-2%	
	Mervyn Crossman Drive	Western	-3%	-3%	

Abbott	4.2%	4.2
Lakeside	-0.1%	0.5
Riveredge	2.3%	2.3
Oonoonba	2.5%	2.5
Keenan	8.3%	8.3
Stuart	2.2%	2.2
Fairfield Waters	-3.3%	0.5
Mervyn Crossman	-2.9%	0.5

*

**Right turn traffic not included in average growth rates as volume <2 vph and is not representative of the growth of the traffic

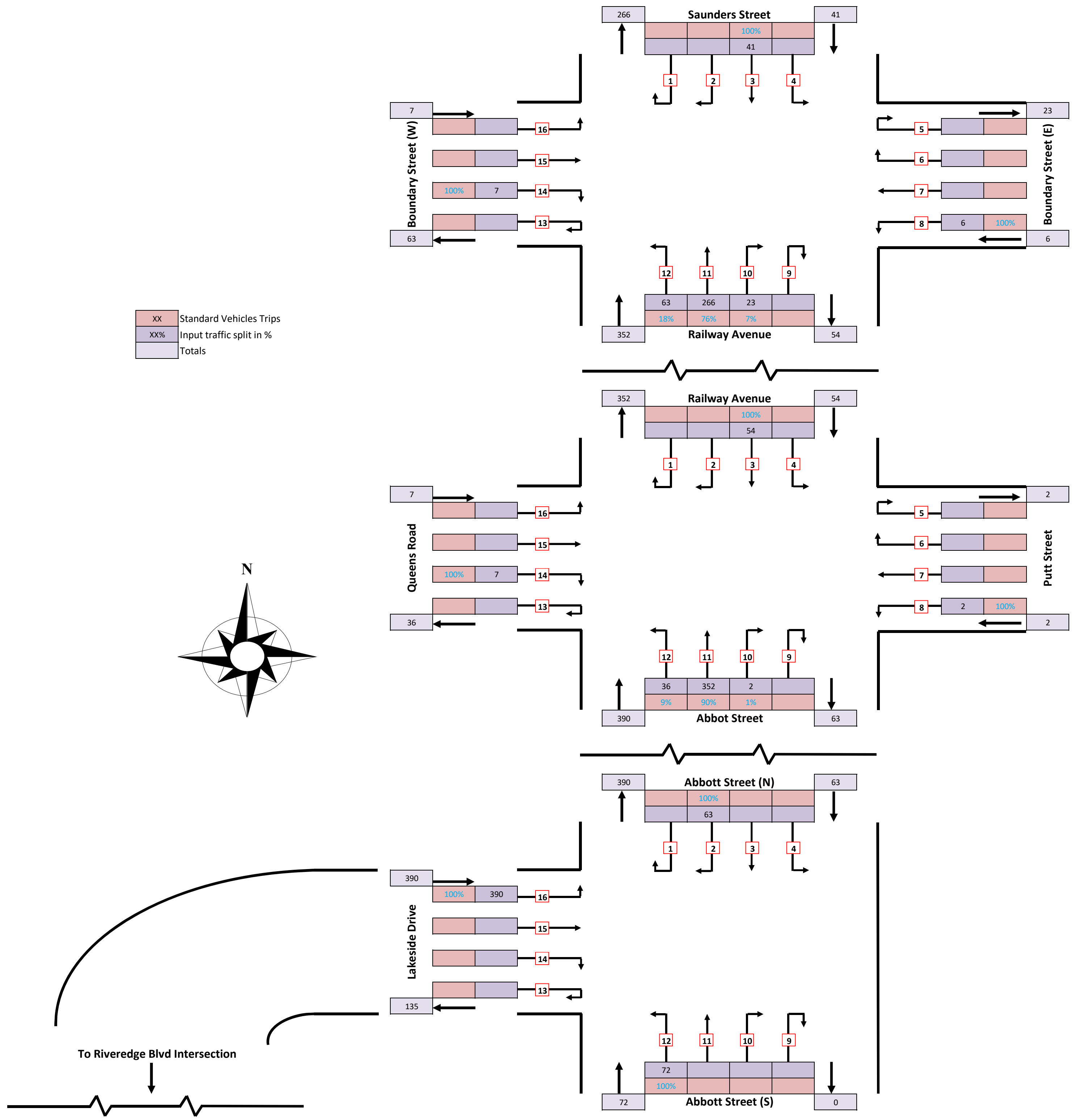
APPENDIX F DEVELOPMENT TRIP GENERATION

					Expected Completed Trip Generation Staged								
Stage	**Land Use**	**Quantum**	**Peak Hour Trip Generation Rate**		**Completed prior to 2015 Counts**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	
1 to 6	Low Density Res (25% Unoccupied)	222	0.85	vph/dwelling	142	47							
	Med Density Res (25% Unoccupied)	74	0.55	vph/dwelling	31	10							
7a	Low Density Res	25	0.85	vph/dwelling		21							
	Med Density Res	13	0.55	vph/dwelling		7							
7b	Low Density Res	19	0.85	vph/dwelling		16							
	Med Density Res	12	0.55	vph/dwelling		7							
7c	Low Density Res	21	0.85	vph/dwelling					18				
	Med Density Res	5	0.55	vph/dwelling					3				
7d	Low Density Res	16	0.85	vph/dwelling						14			
	Med Density Res	6	0.55	vph/dwelling						3			
8	Low Density Res	15	0.85	vph/dwelling				13					
	Med Density Res	15	0.55	vph/dwelling				8					
9	Low Density Res	23	0.85	vph/dwelling					20				
	Med Density Res	30	0.55	vph/dwelling					17				
10	Low Density Res	18	0.85	vph/dwelling		15							
	Med Density Res	38	0.55	vph/dwelling		21							
11	Low Density Res	11	0.85	vph/dwelling			9						
	Med Density Res	28	0.55	vph/dwelling			15						
12a	Low Density Res	20	0.85	vph/dwelling		17							
	Med Density Res	5	0.55	vph/dwelling		3							
12b	Low Density Res	21	0.85	vph/dwelling					18				
	Med Density Res	3	0.55	vph/dwelling					2				
13	Low Density Res	22	0.85	vph/dwelling							19		
	Med Density Res	10	0.55	vph/dwelling							6		
14	Low Density Res	25	0.85	vph/dwelling							21		
	Med Density Res	9	0.55	vph/dwelling							5		
15	Low Density Res	41	0.85	vph/dwelling				35					
	Med Density Res	0	0.55	vph/dwelling				0					
16	Low Density Res	33	0.85	vph/dwelling								28	
	Med Density Res	0	0.55	vph/dwelling								0	
17	Low Density Res	26	0.85	vph/dwelling							22		
	Med Density Res	0	0.55	vph/dwelling							0		
18a	Low Density Res	25	0.85	vph/dwelling						21			
	Med Density Res	0	0.55	vph/dwelling						0			
18b	Low Density Res	23	0.85	vph/dwelling							20		
	Med Density Res	0	0.55	vph/dwelling							0		
19	Low Density Res	20	0.85	vph/dwelling								17	
	Med Density Res	0	0.55	vph/dwelling								0	
20	Single Occupant Home Office (100m2)	31	0.55	vph/100m2							17		
	Med Density Res	82	0.55	vph/dwelling							45		
					Total	164	25	56	76	38	154	45	
					Cumulative Total	164	189	245	321	359	514	559	With Self Containment
Other	Church	1600	0.55	vph/100m2								9	2
Other	Child Care (Lot 290)	75	0.8	vph/child								60	12
Other	Retail (Lot 289 being 3,000 sqm total lot area)	1500	12.5	vph/100m2								188	150
					Total	0	0	0	0	0	0	256	
					Cumulative Total	0	0	0	0	0	0	256	
Other	Service Station (Lot 6,000)	6	13.38	vph/bowser								80	
					Total	0	0	0	0	0	0	80	
					Cumulative Total	0	0	0	0	0	0	80	

APPENDIX G TRIP DISTRIBUTION

Traffic Distribution (Oonoonba) 2023 v2.xlsx

TRIP DISTRIBUTION AM 2023



*Departure North / South splits calculated from 2026 TSTM midblock volumes along Lakeside Drive - commuter pattern.
*Arrival North / South splits calculated from 2031 TSTM intersection volumes Lakeside Drive / Riveredge Boulevard intersection.
*Service Station In / Out traffic splits calculated from 2031 TSTM volumes and development traffic splits
*Splits at intersection of Mervyn Crossman Drive / Stuart Drive / Fairfield Waters Drive calculated from 2015 traffic count due to incomplete TSTM data.
*Splits at Railway Avenue / Queens Road / Putt Street intersection calculated from 2026 TSTM intersection volumes
*Splits at Railway Avenue / Saunders Street / Boundary Street intersection calculated from 2026 TSTM intersection volumes
*All other splits in network calculated from 2031 TSTM data intersection volumes.

"The Village", Oonoonba - Traffic Generation by Land Use

Residential Land Uses

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	62	55%	Departure (North)	360	81%
Approach (South)	50	45%	Departure (South)	86	19%
Total	112	100%	*Total*	447	100%

Commercial Land Uses - Church

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	1	55%	Departure (North)	0	81%
Approach (South)	1	45%	Departure (South)	0	19%
Total	1	100%	*Total*	0	100%

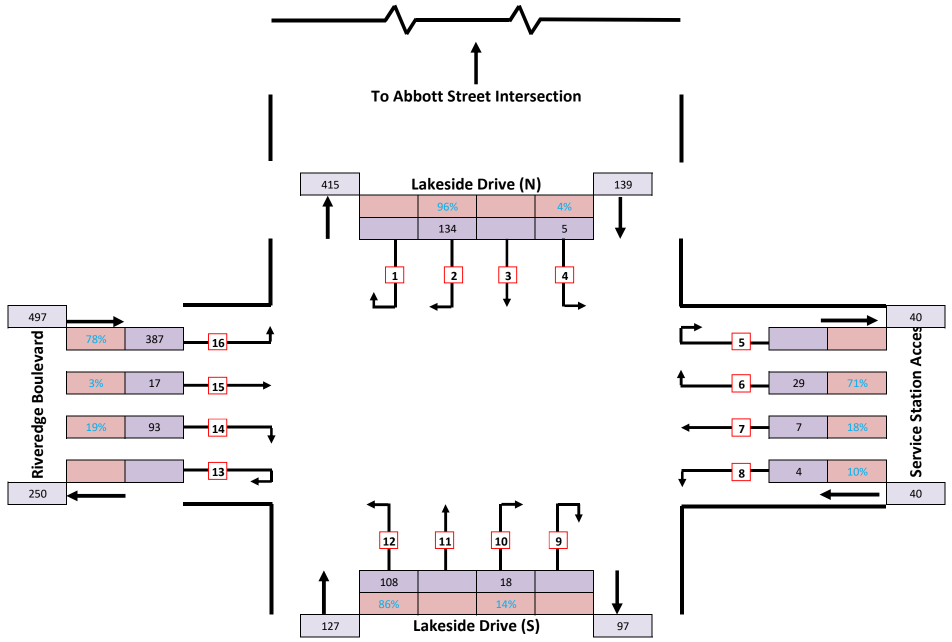
Commercial Land Uses - Childcare

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	5	55%	Departure (North)	2	81%
Approach (South)	4	45%	Departure (South)	0	19%
Total	10	100%	*Total*	2	100%

Commercial Land Uses - Retail

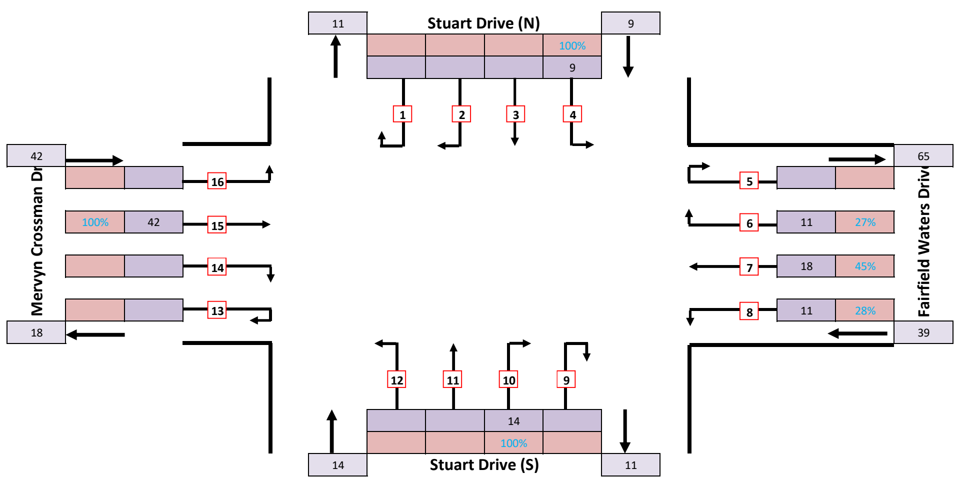
In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	66	55%	Departure (North)	24	81%
Approach (South)	54	45%	Departure (South)	6	19%
Total	120	100%	*Total*	30	100%

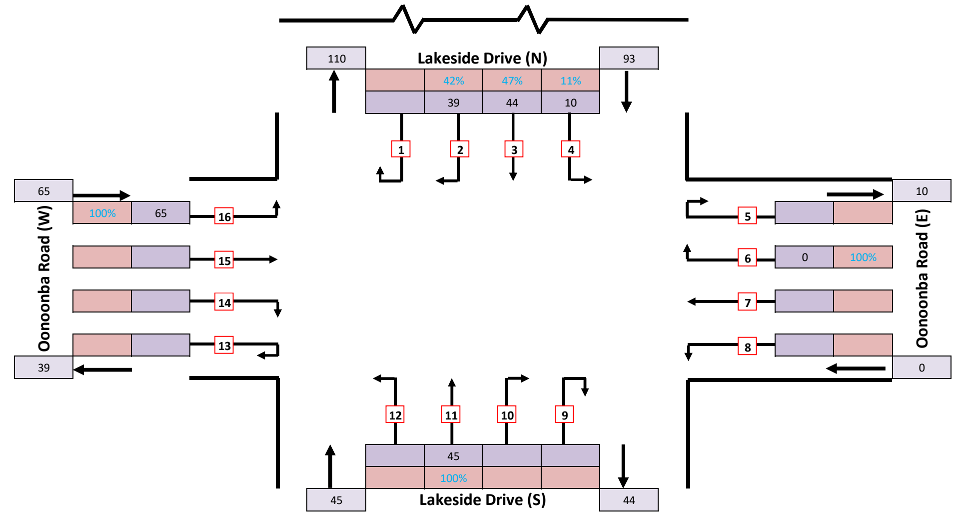
Total In	243	*Total Out*	480

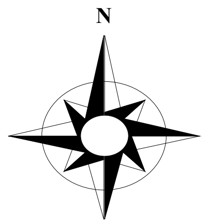


Service Station Traffic Generation

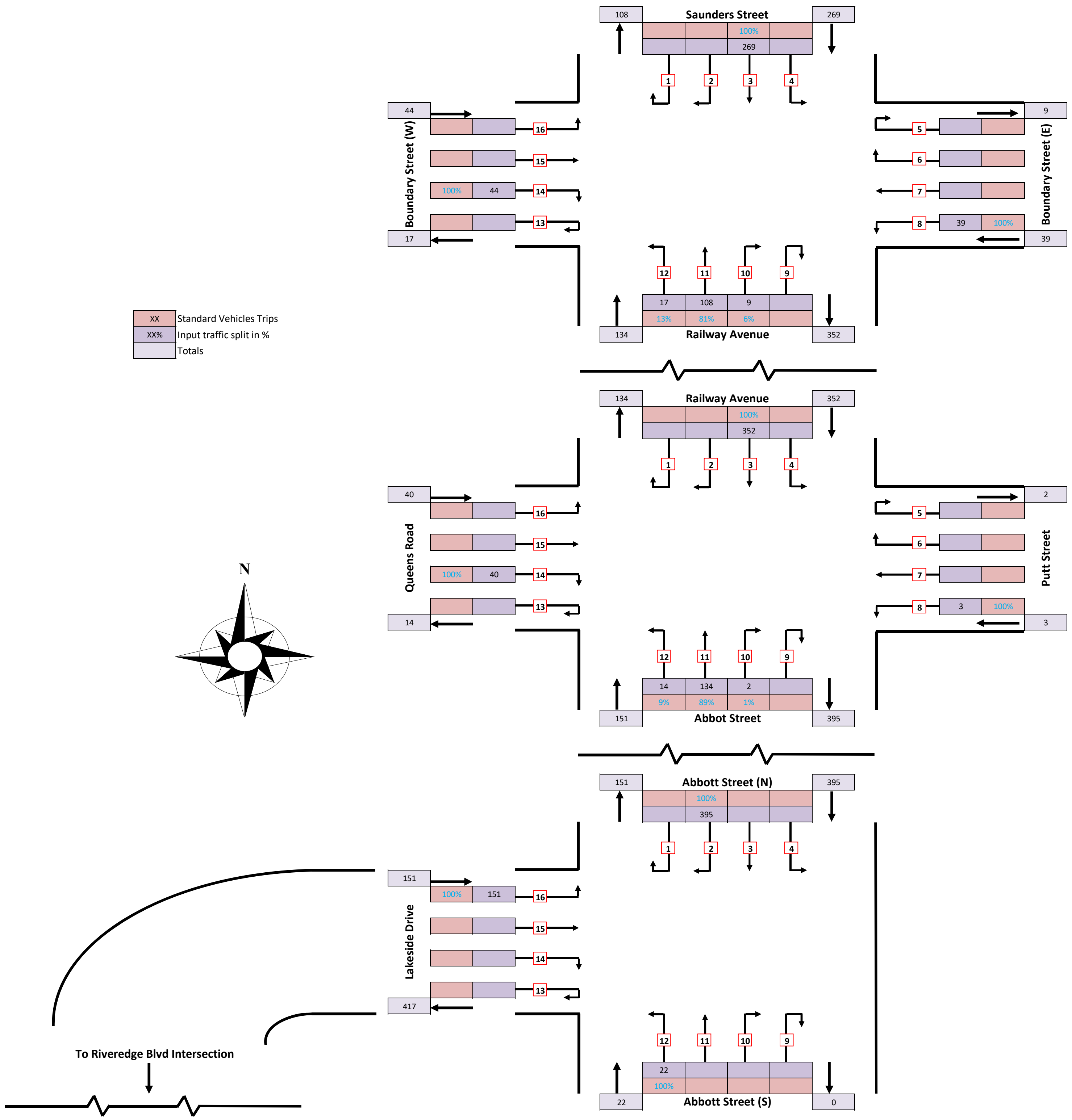
In		50%	Out		50%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (West)	17	42%	Departure (West)	7	18%
Approach (North)	5	12%	Departure(North)	29	71%
Approach (South)	18	45%	Departure (South)	4	10%
Total	40	100%	*Total*	40	100%







TRIP DISTRIBUTION PM 2023



"The Village", Oonoonba - Traffic Generation by Land Use

Residential Land Uses

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	387	87%	Departure (North)	69	62%
Approach (South)	60	13%	Departure (South)	43	38%
Total	447	100%	*Total*	112	100%

Commercial Land Uses - Church

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	0	87%	Departure (North)	1	62%
Approach (South)	0	13%	Departure (South)	1	38%
Total	0	100%	*Total*	1	100%

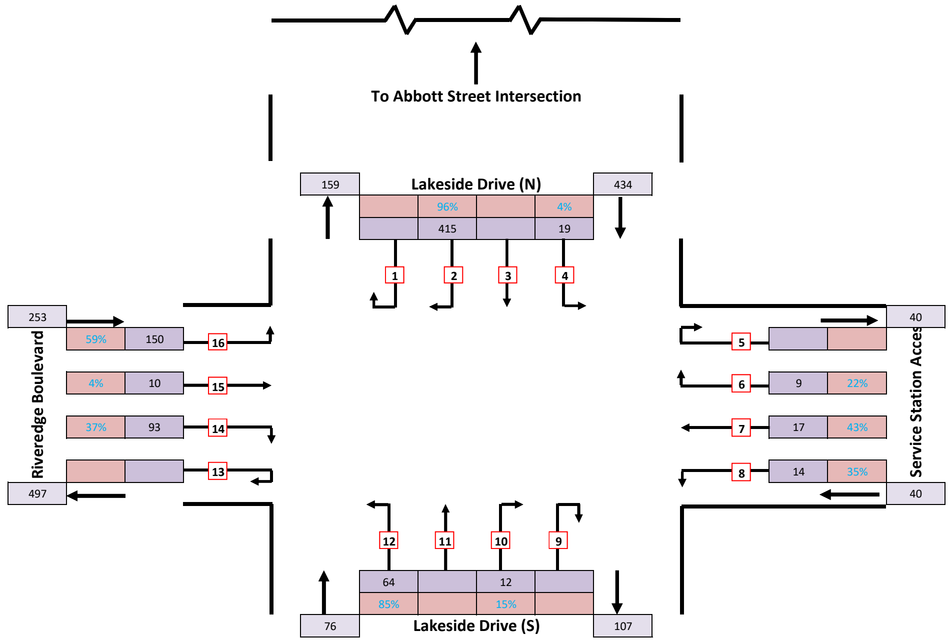
Commercial Land Uses - Childcare

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	2	87%	Departure (North)	6	62%
Approach (South)	0	13%	Departure (South)	4	38%
Total	2	100%	*Total*	10	100%

Commercial Land Uses - Retail

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	26	87%	Departure (North)	74	62%
Approach (South)	4	13%	Departure (South)	46	38%
Total	30	100%	*Total*	120	100%

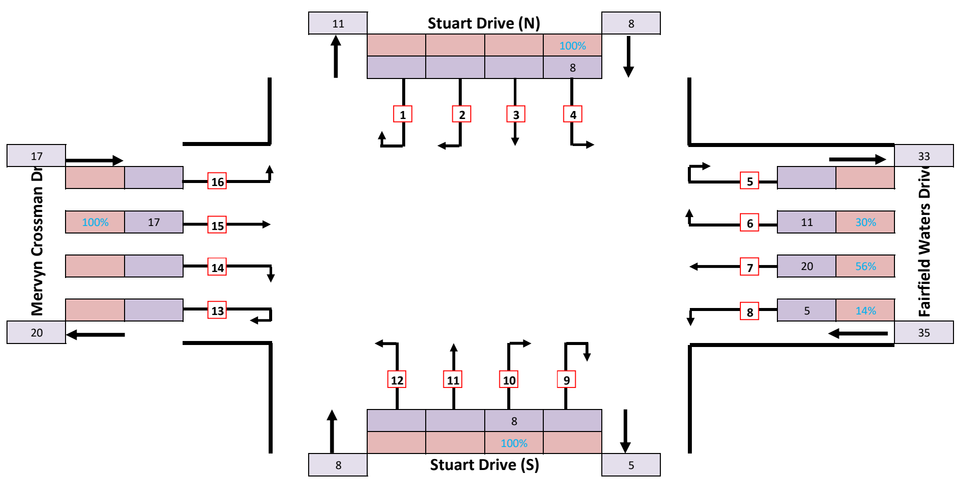
Total In	480	*Total Out*	243

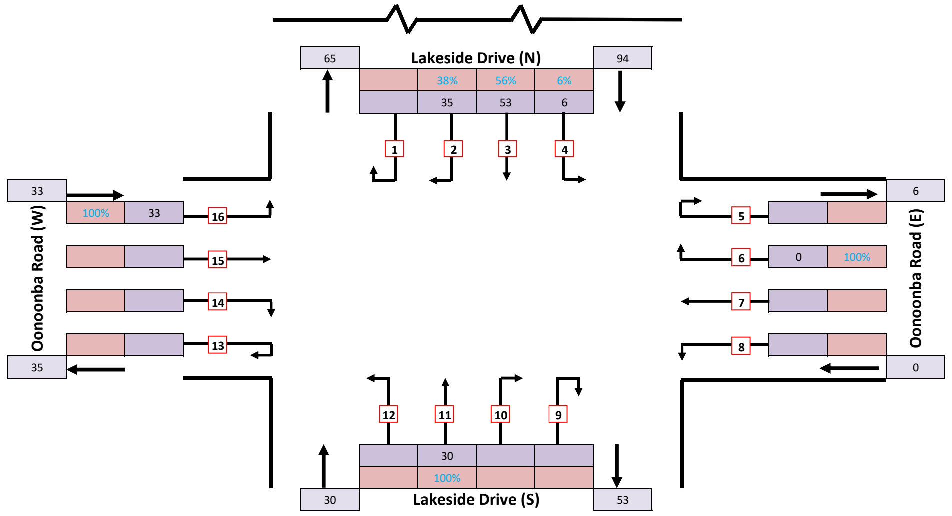


*Departure North / South splits calculated from 2026 TSTM midblock volumes along Lakeside Drive - commuter pattern.
*Arrival North / South splits calculated from 2031 TSTM intersection volumes Lakeside Drive / Riveredge Boulevard intersection.
*Service Station In / Out traffic splits calculated from 2031 TSTM volumes and development traffic splits
*Splits at intersection of Mervyn Crossman Drive / Stuart Drive / Fairfield Waters Drive calculated from 2015 traffic count due to incomplete TSTM data.
*Splits at Railway Avenue / Queens Road / Putt Street intersection calculated from 2026 TSTM intersection volumes
*Splits at Railway Avenue / Saunders Street / Boundary Street intersection calculated from 2026 TSTM intersection volumes
*All other splits in network calculated from 2031 TSTM data intersection volumes.

Service Station Traffic Generation

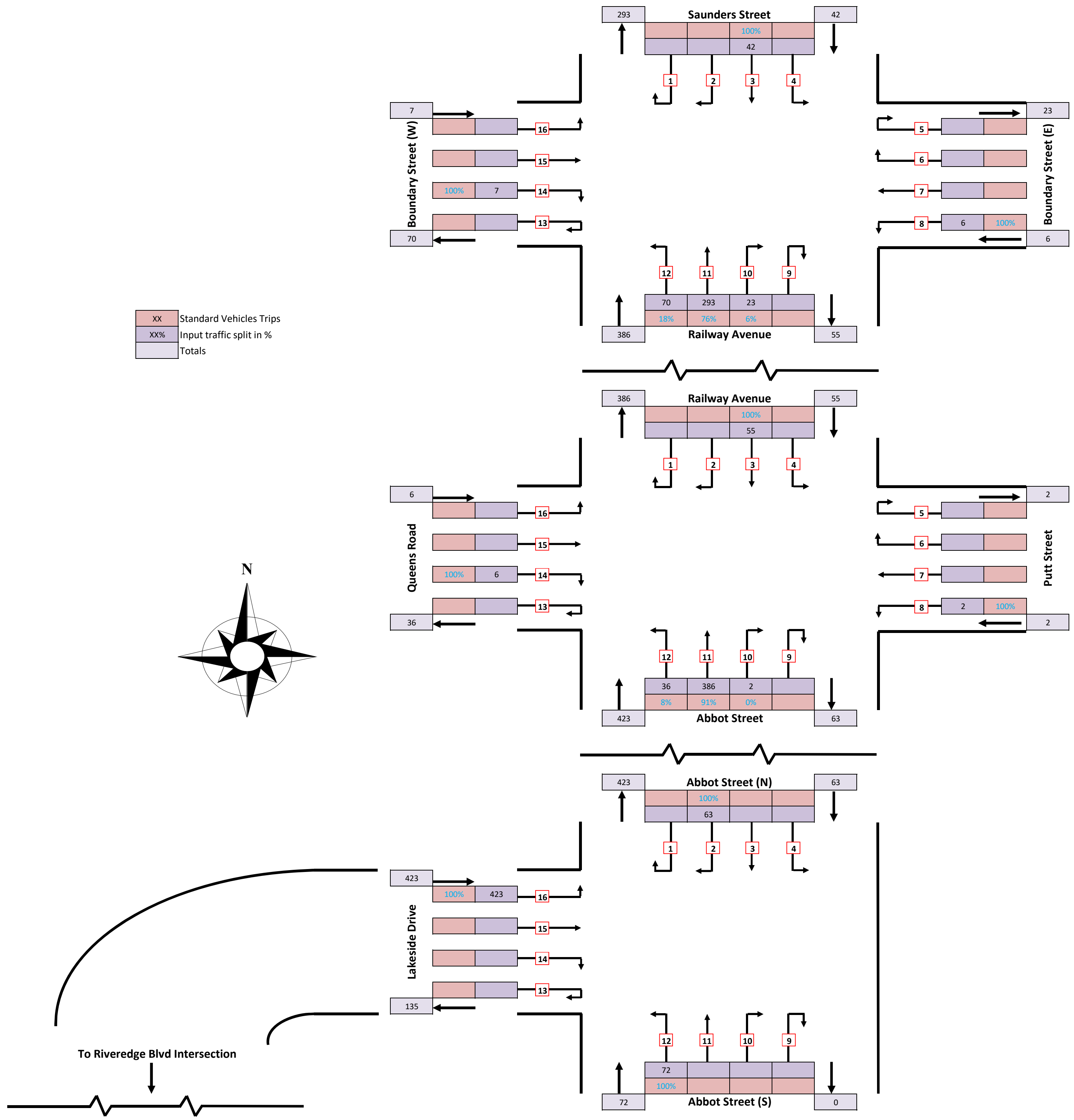
In		50%	Out		50%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (West)	10	25%	Departure (West)	17	43%
Approach (North)	19	47%	Departure(North)	9	22%
Approach (South)	12	29%	Departure (South)	14	35%
Total	40	100%	*Total*	40	100%





N

TRIP DISTRIBUTION AM 2033



"The Village", Oonoonba - Traffic Generation by Land Use

Residential Land Uses

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	62	55%	Departure (North)	392	88%
Approach (South)	50	45%	Departure (South)	55	12%
Total	112	100%	*Total*	447	100%

Commercial Land Uses - Church

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	1	55%	Departure (North)	0	88%
Approach (South)	1	45%	Departure (South)	0	12%
Total	1	100%	*Total*	0	100%

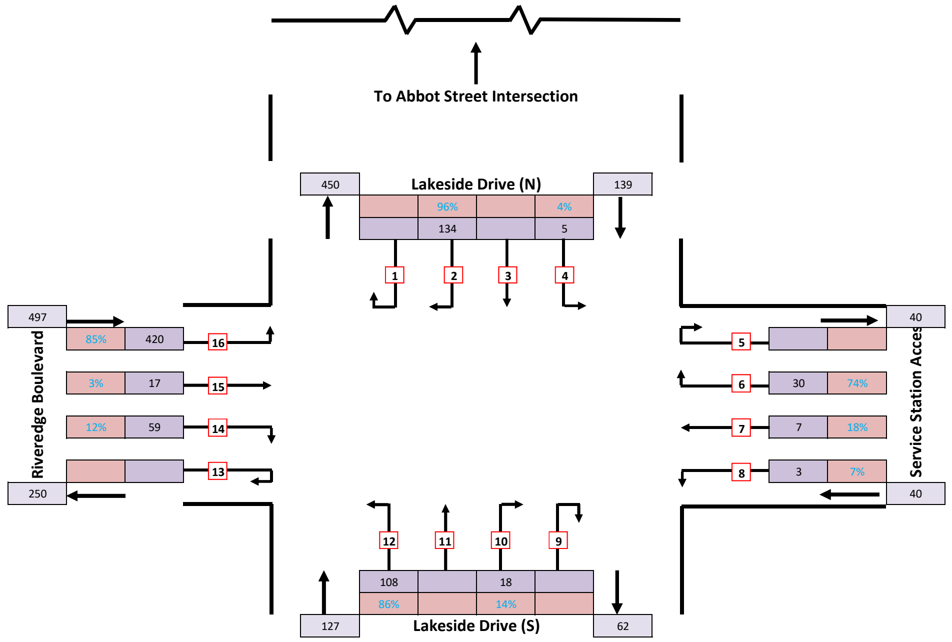
Commercial Land Uses - Childcare

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	5	55%	Departure (North)	2	88%
Approach (South)	4	45%	Departure (South)	0	12%
Total	10	100%	*Total*	2	100%

Commercial Land Uses - Retail

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	66	55%	Departure (North)	26	88%
Approach (South)	54	45%	Departure (South)	4	12%
Total	120	100%	*Total*	30	100%

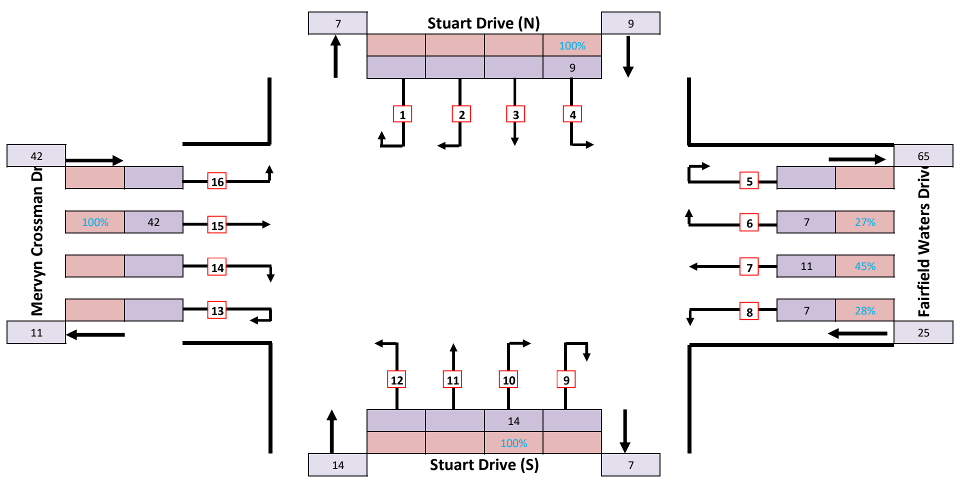
Total In	243	*Total Out*	480

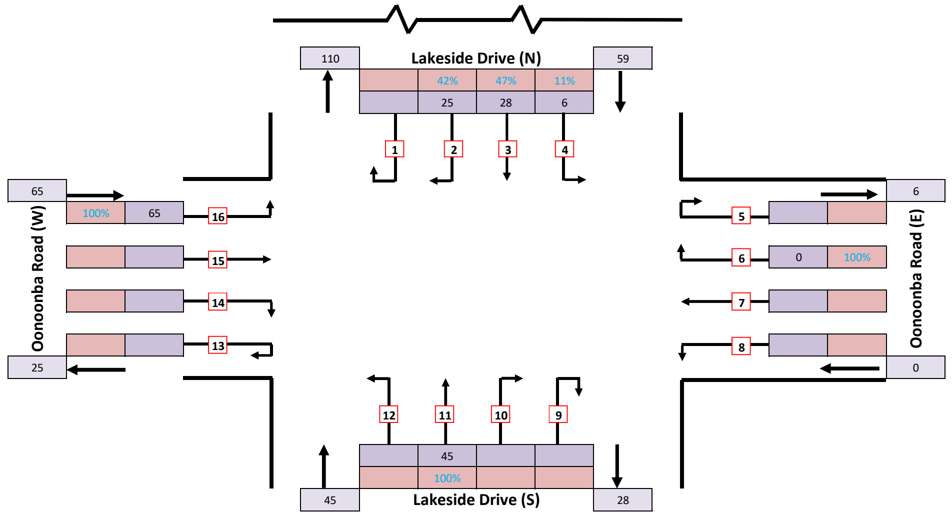


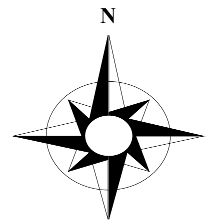
*Departure North / South splits calculated from 2031 TSTM midblock volumes along Lakeside Drive.
*Arrival North / South splits calculated from 2031 TSTM intersection volumes Lakeside Drive / Riveredge Boulevard intersection.
*Service Station In / Out traffic splits calculated from 2031 TSTM volumes and development traffic splits
*Splits at intersection of Mervyn Crossman Drive / Stuart Drive / Fairfield Waters Drive calculated from 2015 traffic count due to incomplete TSTM data.
*Splits at Railway Avenue / Queens Road / Putt Street intersection calculated from 2026 TSTM intersection volumes
*Splits at Railway Avenue / Saunders Street / Boundary Street intersection calculated from 2026 TSTM intersection volumes
*All other splits in network calculated from 2031 TSTM data intersection volumes.

Service Station Traffic Generation

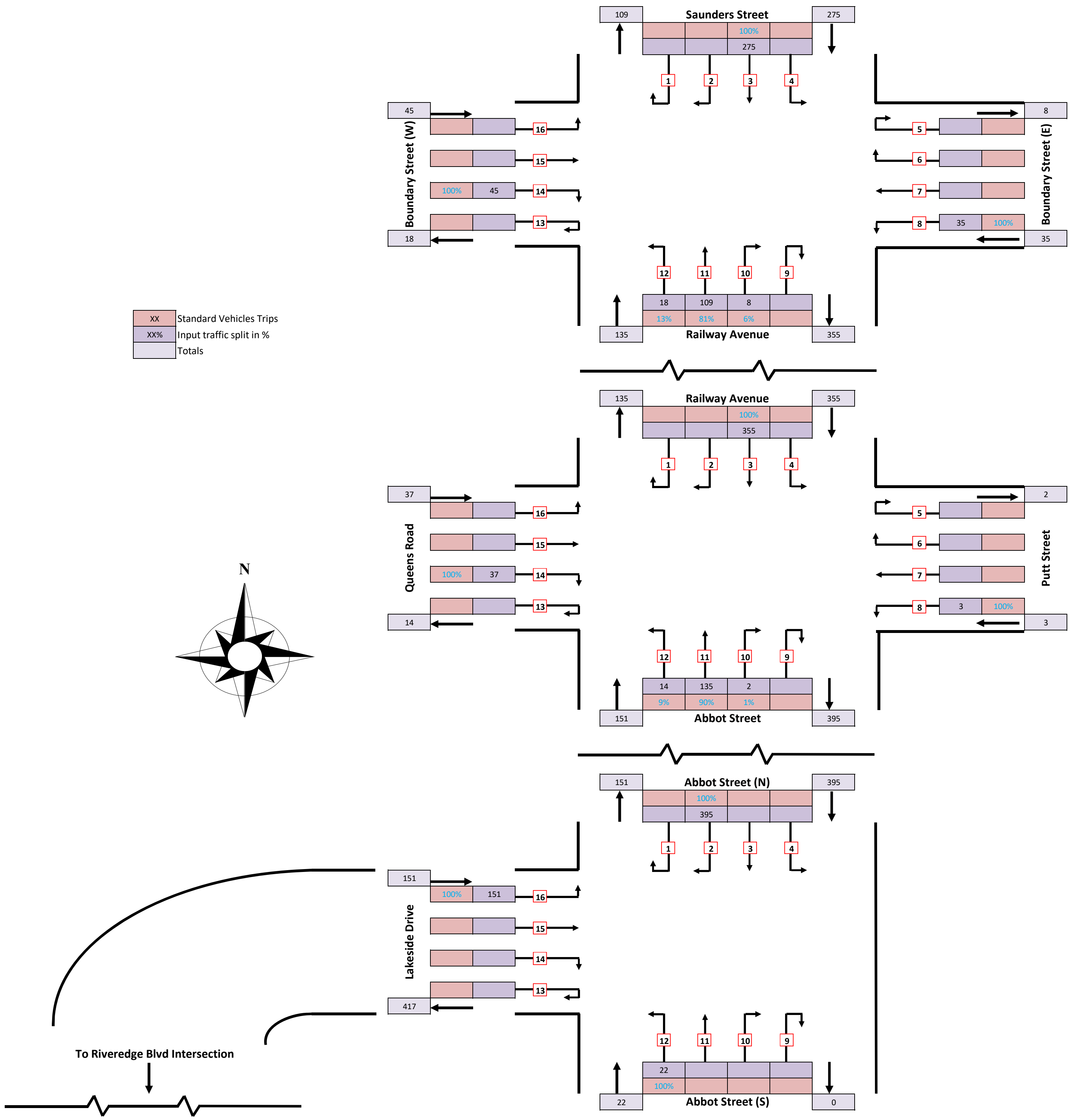
In		50%	Out		50%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (West)	17	42%	Departure (West)	7	18%
Approach (North)	5	12%	Departure(North)	30	74%
Approach (South)	18	45%	Departure (South)	3	7%
Total	40	100%	*Total*	40	100%







TRIP DISTRIBUTION PM 2033



"The Village", Oonoonba - Traffic Generation by Land Use

Residential Land Uses

In		80%	Out		20%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	387	87%	Departure (North)	69	62%
Approach (South)	60	13%	Departure (South)	43	38%
Total	447	100%	*Total*	112	100%

Commercial Land Uses - Church

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	0	87%	Departure (North)	1	62%
Approach (South)	0	13%	Departure (South)	1	38%
Total	0	100%	*Total*	1	100%

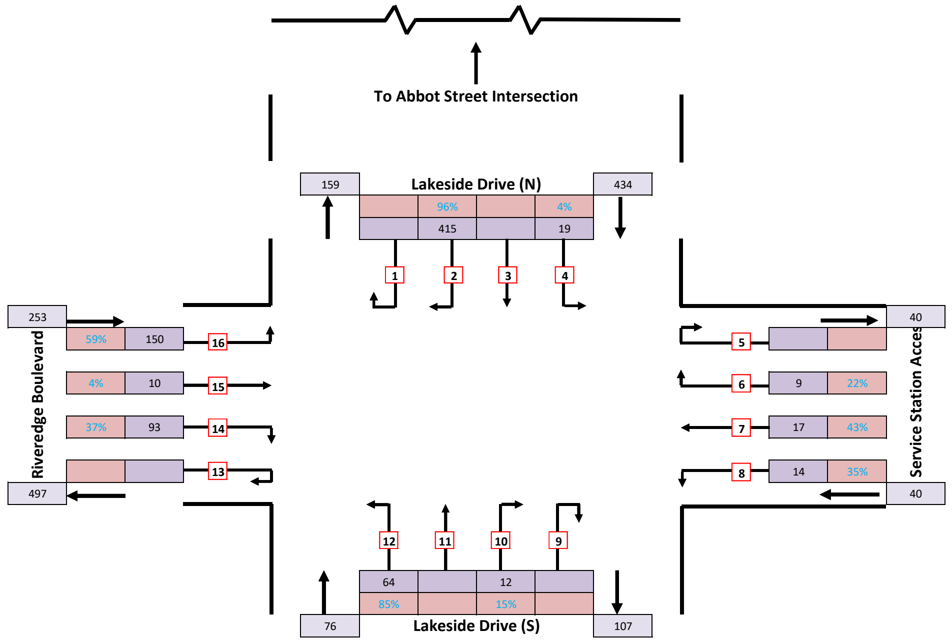
Commercial Land Uses - Childcare

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	2	87%	Departure (North)	6	62%
Approach (South)	0	13%	Departure (South)	4	38%
Total	2	100%	*Total*	10	100%

Commercial Land Uses - Retail

In		20%	Out		80%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (North)	26	87%	Departure (North)	74	62%
Approach (South)	4	13%	Departure (South)	46	38%
Total	30	100%	*Total*	120	100%

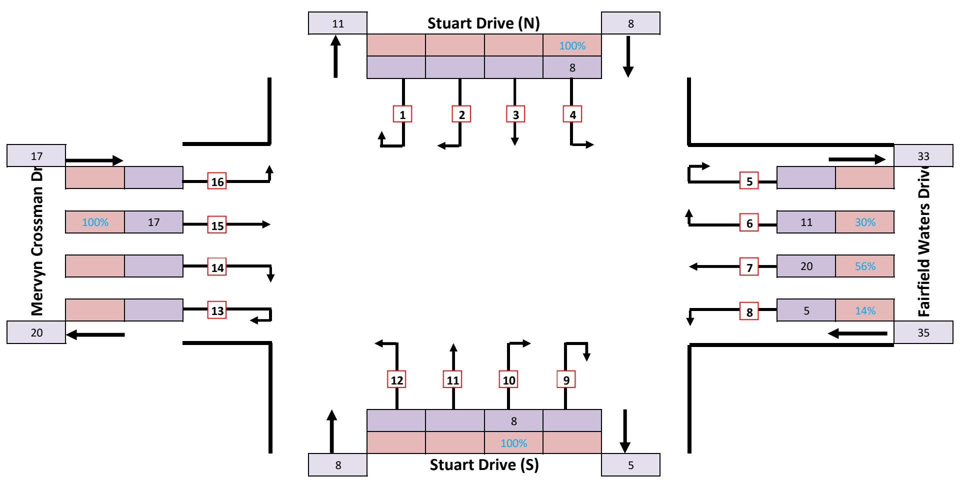
Total In	480	*Total Out*	243

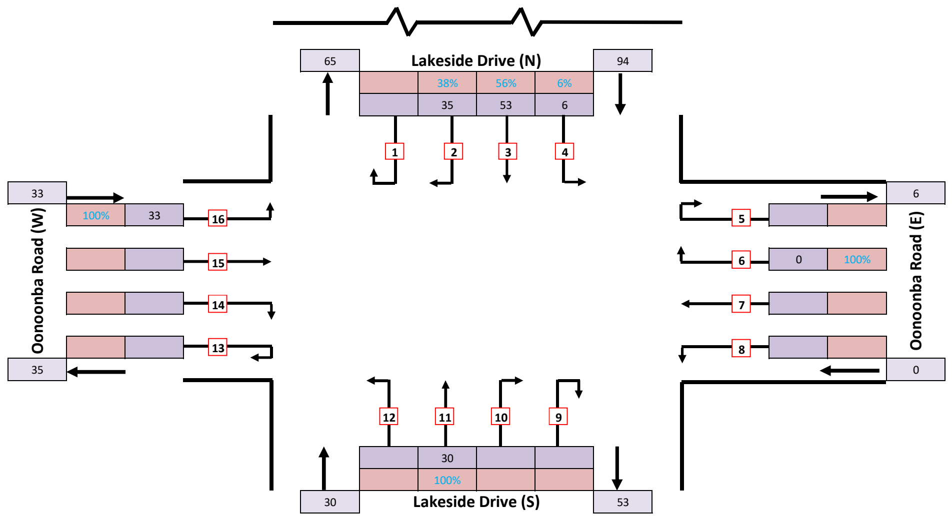


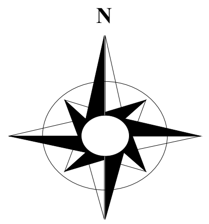
*Departure "Out" North / South splits calculated from 2015 Lakeside / Riveredge counts - midblock flows along Lakeside not a good indication of departure traffic as it is predominately commuter traffic.
*Arrival "In" North / South splits calculated from 2031 TSTM intersection volumes from Lakeside Drive / Riveredge Boulevard intersection.
*Service Station In / Out traffic splits calculated from 2031 TSTM volumes and development traffic splits
*Splits at intersection of Mervyn Crossman Drive / Stuart Drive / Fairfield Waters Drive calculated from 2015 traffic count due to incomplete TSTM data.
*Splits at Railway Avenue / Queens Road / Putt Street intersection calculated from 2026 TSTM intersection volumes
*Splits at Railway Avenue / Saunders Street / Boundary Street intersection calculated from 2026 TSTM intersection volumes
*All other splits in network calculated from 2031 TSTM data intersection volumes.

Service Station Traffic Generation

In		50%	Out		50%
Traffic Split		**Percentage**	**Traffic Split**		**Percentage**
Approach (West)	10	25%	Departure (West)	17	43%
Approach (North)	19	47%	Departure(North)	9	22%
Approach (South)	12	29%	Departure (South)	14	35%
Total	40	100%	*Total*	40	100%

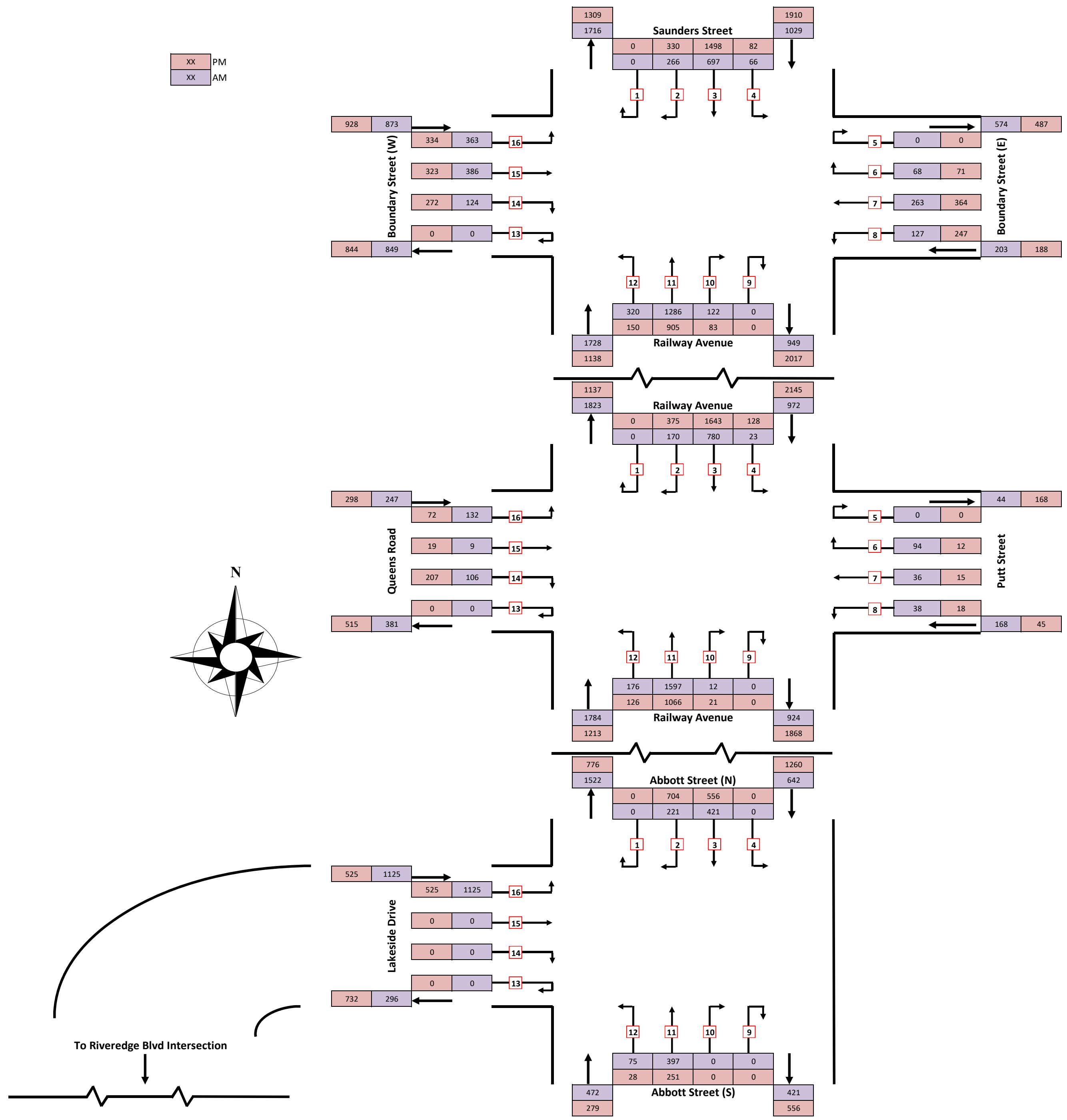


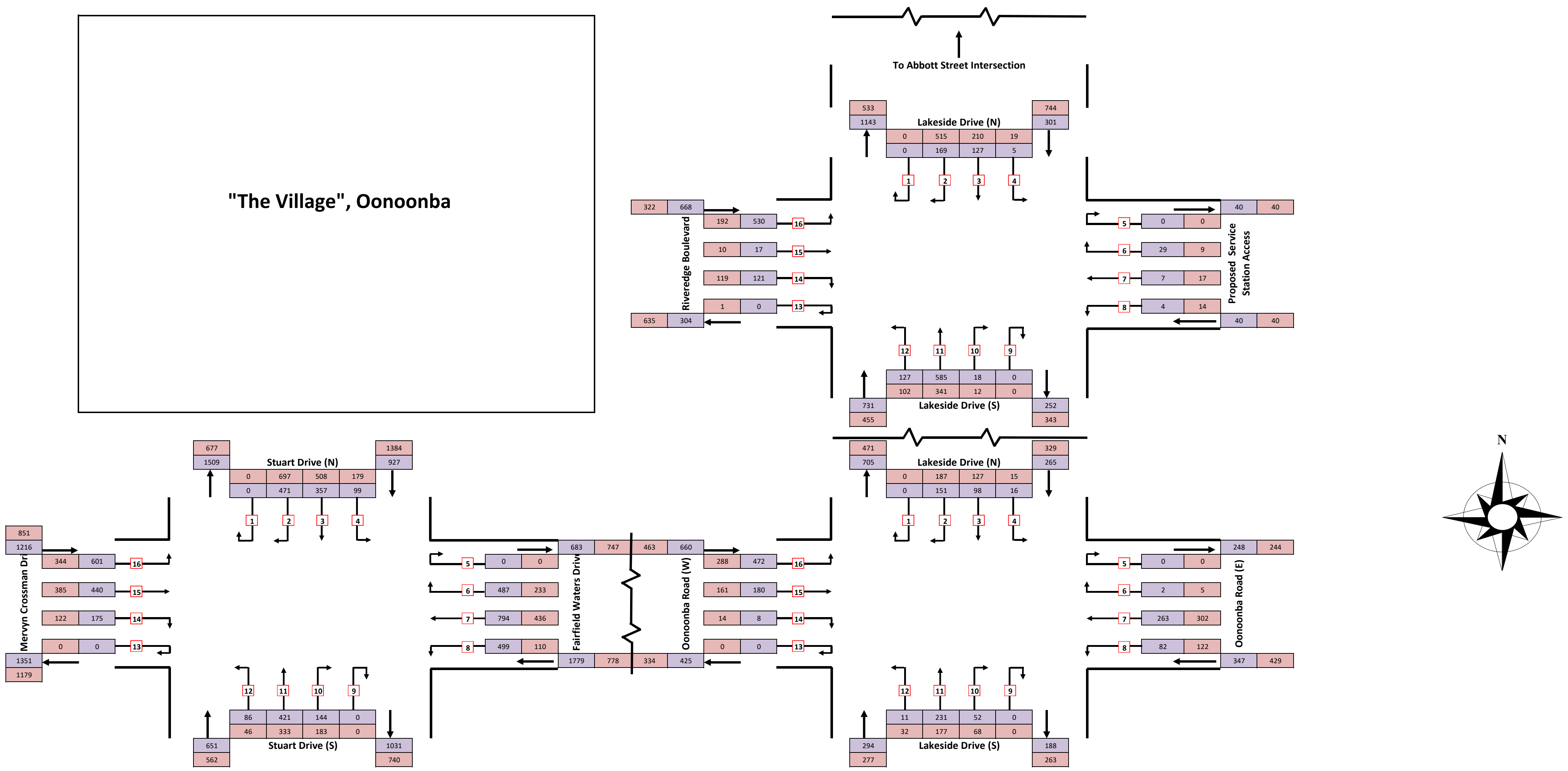




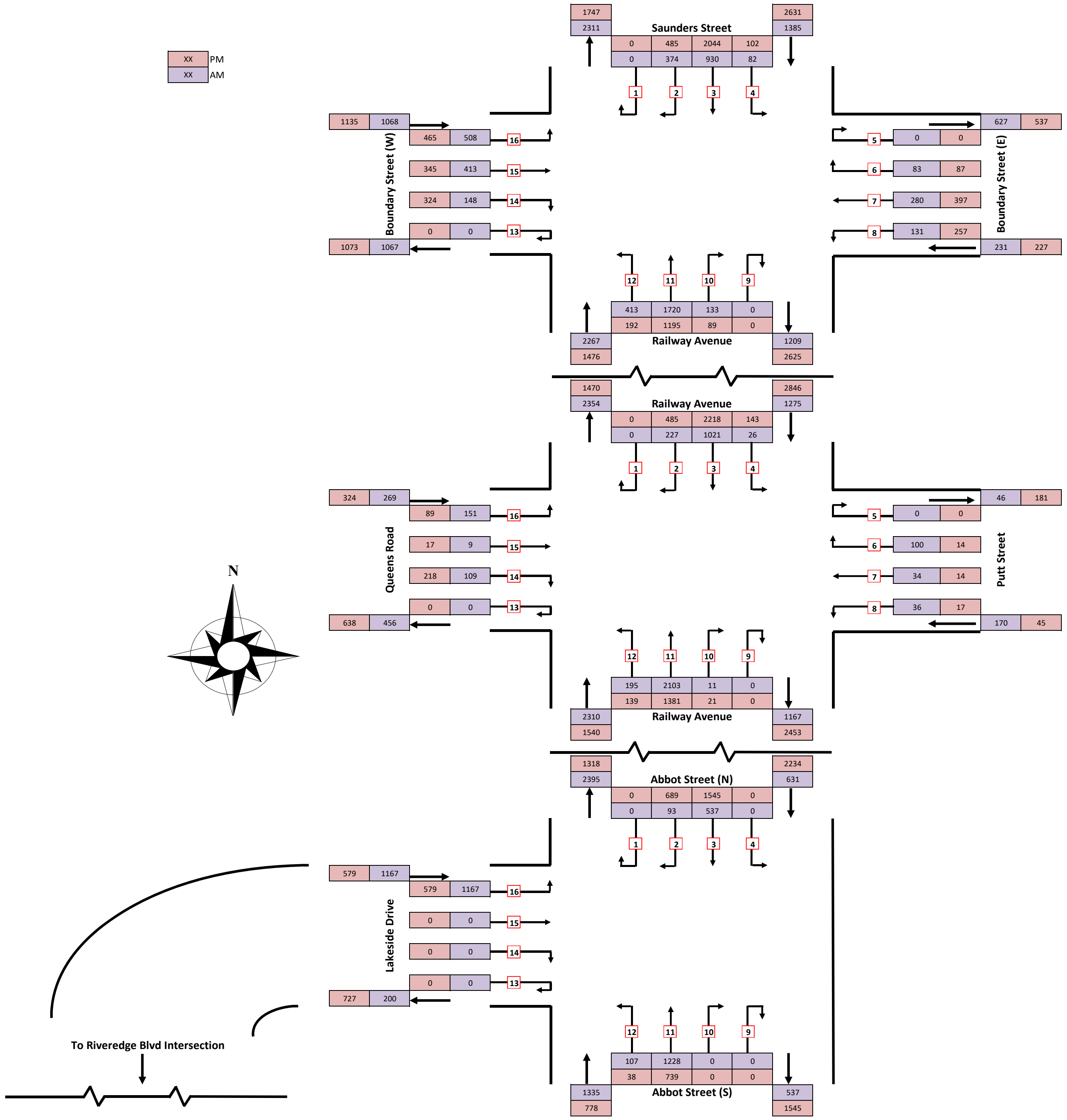
APPENDIX H FORECAST TRAFFIC VOLUMES (BASE + DEVELOPMENT)

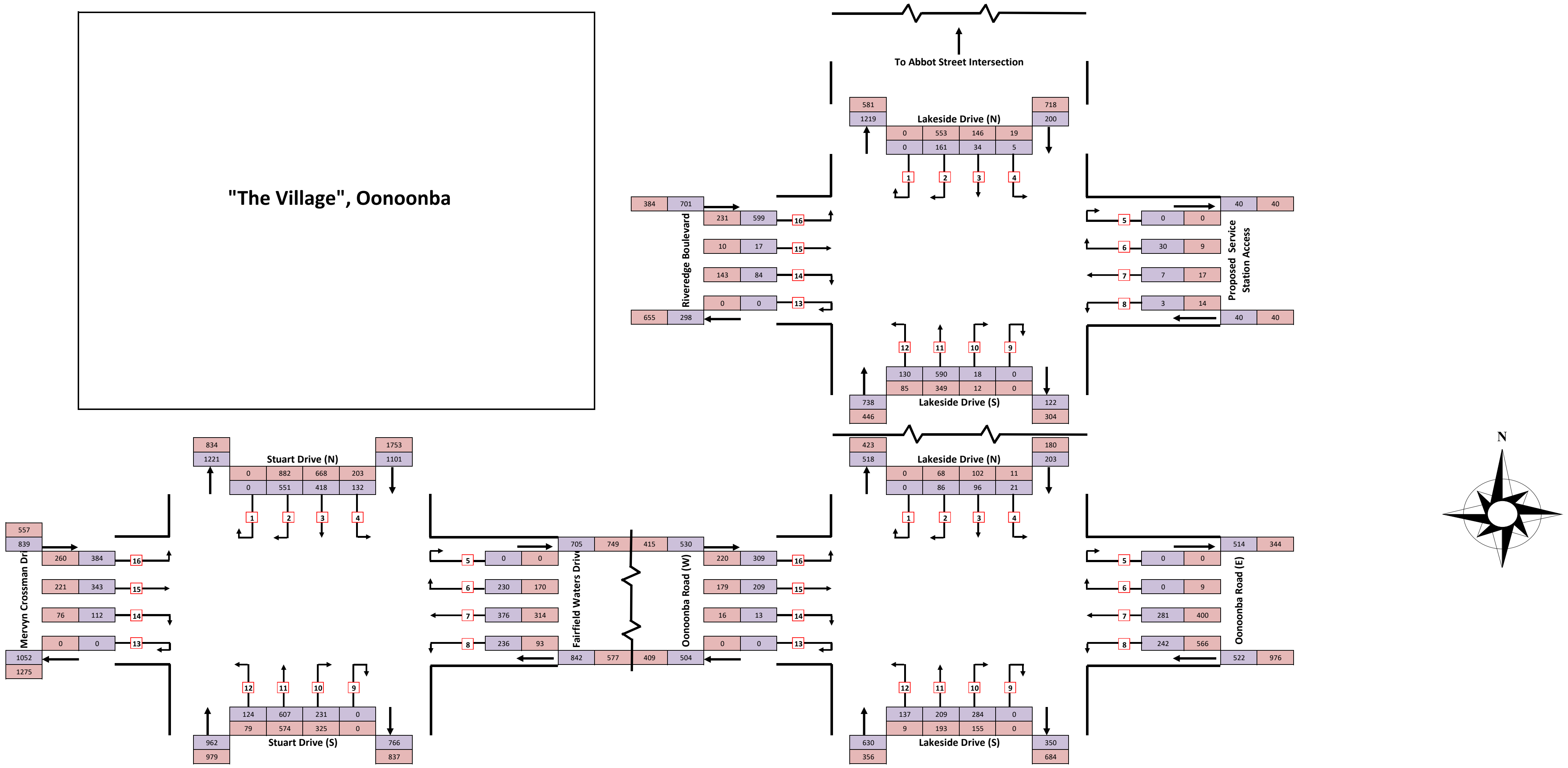
2023 Forecast Base + Development Volumes




"The Village", Oonoonba
To Abbott Street Intersection
Lakeside Drive (N)
533
1143
744
301
0 515 210 19
0 169 127 5
1 2 3 4
Riveredge Boulevard
322 668
192 530 16
10 17 15
119 121 14
1 0 13
635 304
Proposed Service Station Access
40 40
0 0 5
29 9 6
7 17 7
4 14 8
40 40
12 11 10 9
127 585 18 0
102 341 12 0
Lakeside Drive (S)
731
455
252
343
Stuart Drive (N)
677
1509
1384
927
0 697 508 179
0 471 357 99
Mervyn Crossman Dr
851
1216
344 601 16
385 440 15
122 175 14
0 0 13
1351
1179
Fairfield Waters Drive
683 747 463 660
0 0 5
487 233 6
794 436 7
499 110 8
1779 778 334 425
86 421 144 0
46 333 183 0
Stuart Drive (S)
651
562
1031
740
Oonoonba Road (W)
288 472 16
161 180 15
14 8 14
0 0 13
Lakeside Drive (N)
471
705
329
265
0 187 127 15
0 151 98 16
Oonoonba Road (E)
248 244
0 0 5
2 5 6
263 302 7
82 122 8
347 429
11 231 52 0
32 177 68 0
Lakeside Drive (S)
294
277
188
263
N

2033 Forecast Base + Development Volumes



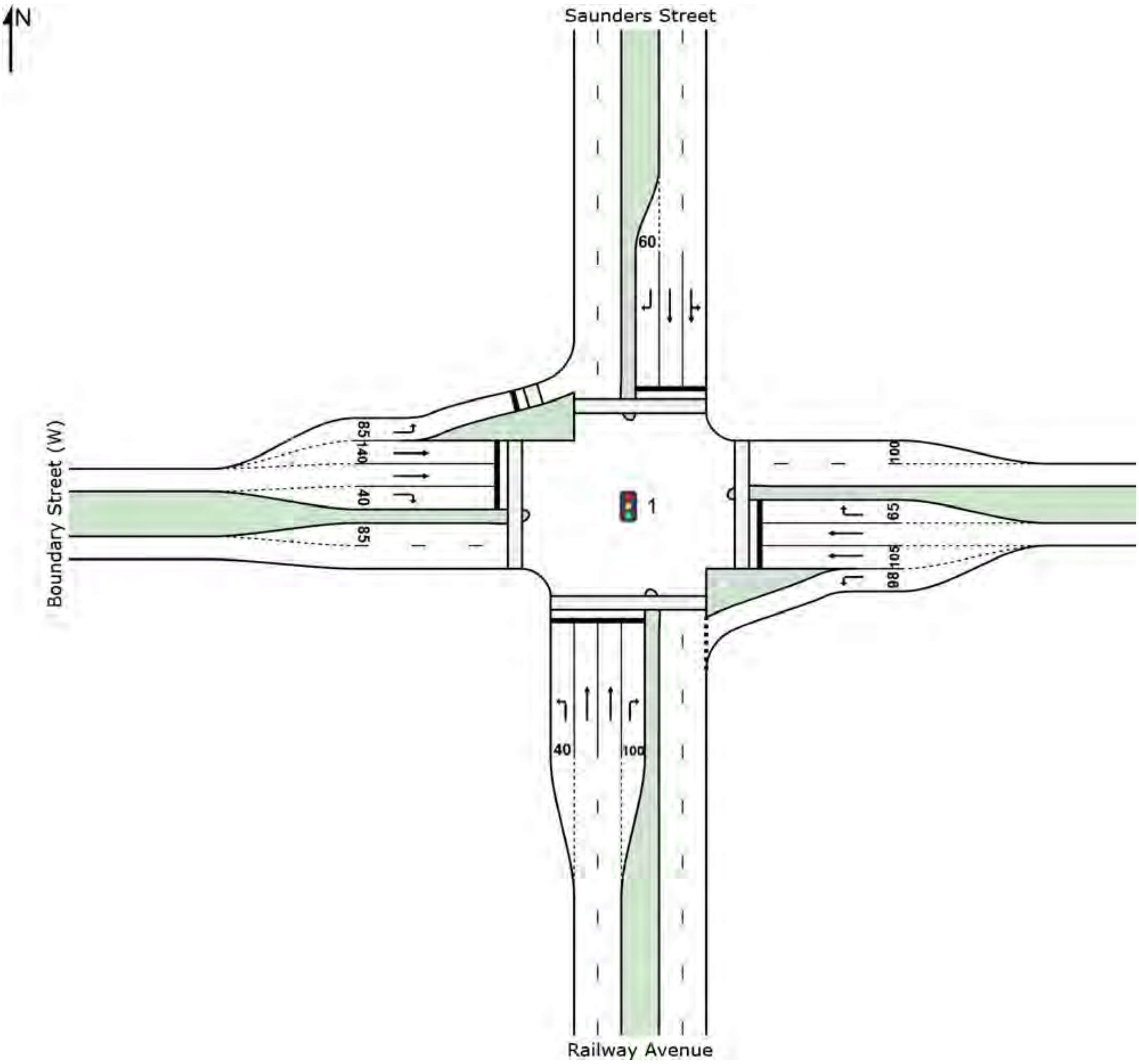

"The Village", Oonoonba
To Abbot Street Intersection
Lakeside Drive (N)
Lakeside Drive (S)
Riveredge Boulevard
Proposed Service Station Access
Stuart Drive (N)
Stuart Drive (S)
Mervyn Crossman Dri
Fairfield Waters Drive
Oonoonba Road (W)
Oonoonba Road (E)
N

APPENDIX I   SIDRA OUTPUTS

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2016]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 141 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	273	16.1	0.325	17.4	LOS B	6.6	52.8	0.63	0.75	47.1
2	T1	977	5.0	0.879	52.1	LOS D	39.2	286.2	0.92	0.93	32.5
3	R2	105	18.8	0.697	77.0	LOS E	7.5	60.7	1.00	0.84	16.8
Approach		1355	8.3	0.879	47.0	LOS D	39.2	286.2	0.87	0.89	33.7
East: Boundary Street (E)											
4	L2	127	9.5	0.115	9.9	LOS A	2.1	16.1	0.31	0.63	43.3
5	T1	273	14.7	0.475	51.6	LOS D	10.9	86.0	0.91	0.74	35.1
6	R2	63	17.3	0.598	79.5	LOS E	4.5	36.2	1.00	0.78	25.7
Approach		463	13.6	0.598	43.9	LOS D	10.9	86.0	0.76	0.72	34.3
North: Saunders Street											
7	L2	60	11.8	0.427	38.4	LOS D	15.6	114.3	0.78	0.70	37.3
8	T1	577	4.4	0.427	32.8	LOS C	15.8	114.9	0.78	0.68	38.9
9	R2	206	9.3	1.044	146.0	LOS F	21.7	163.9	1.00	1.19	24.6
Approach		843	6.1	1.044	60.9	LOS E	21.7	163.9	0.83	0.81	32.3
West: Boundary Street (W)											
10	L2	279	13.1	0.380	34.6	LOS C	12.9	100.1	0.73	0.78	44.5
11	T1	388	13.4	0.554	44.6	LOS D	12.9	100.6	0.86	0.72	37.2
12	R2	115	9.5	0.517	69.1	LOS E	7.6	57.2	0.98	0.79	30.3
Approach		782	12.7	0.554	44.6	LOS D	12.9	100.6	0.83	0.75	38.9
All Vehicles		3443	9.5	1.044	49.5	LOS D	39.2	286.2	0.83	0.81	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	58.1	LOS E	0.0	0.0	0.91	0.91
P2	East Full Crossing	1	35.5	LOS D	0.0	0.0	0.71	0.71
P3	North Full Crossing	1	48.5	LOS E	0.0	0.0	0.83	0.83
P4	West Full Crossing	1	37.6	LOS D	0.0	0.0	0.73	0.73
P4S	West Slip/Bypass Lane Crossing	1	28.7	LOS C	0.0	0.0	0.64	0.64
All Pedestrians		5	41.7	LOS E			0.76	0.76

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Phase Times)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	273	16.1	839	0.325	100	17.4	LOS B	6.6	52.8	Short	40	0.0	NA
Lane 2	408	5.0	464 [1]	0.879	100	52.2	LOS D	26.7	195.1	Full	250	0.0	0.0
Lane 3	569	5.0	647 [1]	0.879	100	52.0	LOS D	39.2	286.2	Full	250	0.0	17.2
Lane 4	105	18.8	151	0.697	100	77.0	LOS E	7.5	60.7	Short	100	0.0	NA
Approach	1355	8.3		0.879		47.0	LOS D	39.2	286.2				
East: Boundary Street (E)													
Lane 1	127	9.5	1104	0.115	100	9.9	LOS A	2.1	16.1	Short	98	0.0	NA
Lane 2	180	14.7	379	0.475	100	52.6	LOS D	10.9	86.0	Short	105	0.0	NA
Lane 3	93	14.7	379	0.245	51 [6]	49.7	LOS D	5.3	41.7	Full	250	0.0	0.0
Lane 4	63	17.3	106	0.598	100	79.5	LOS E	4.5	36.2	Short	65	0.0	NA
Approach	463	13.6		0.598		43.9	LOS D	10.9	86.0				
North: Saunders Street													
Lane 1	316	5.8	740	0.427	100	33.8	LOS C	15.6	114.3	Full	750	0.0	0.0
Lane 2	321	4.4	753	0.427	100	32.8	LOS C	15.8	114.9	Full	750	0.0	0.0
Lane 3	206	9.3	198	1.044	100	146.0	LOS F	21.7	163.9	Short	60	0.0	NA
Approach	843	6.1		1.044		60.9	LOS E	21.7	163.9				
West: Boundary Street (W)													
Lane 1	279	13.1	735	0.380	100	34.6	LOS C	12.9	100.1	Short	85	0.0	NA
Lane 2	162	13.4	496	0.326	59 [6]	43.4	LOS D	8.8	68.7	Short	140	0.0	NA
Lane 3	227	13.4	410 [1]	0.554	100	45.3	LOS D	12.9	100.6	Full	940	0.0	0.0
Lane 4	115	9.5	222	0.517	100	69.1	LOS E	7.6	57.2	Short	40	0.0	NA
Approach	782	12.7		0.554		44.6	LOS D	12.9	100.6				
Intersection	3443	9.5		1.044		49.5	LOS D	39.2	286.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

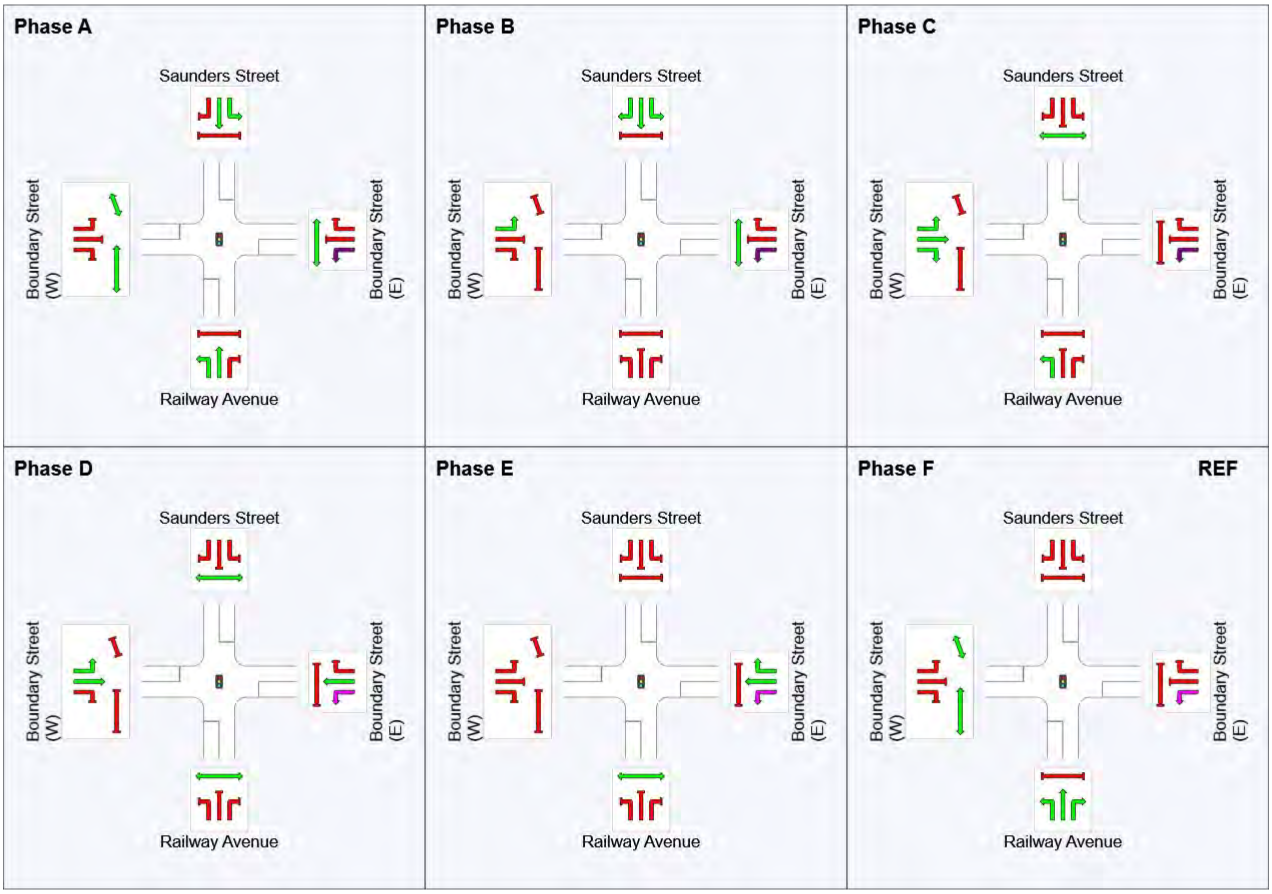
Site: 1 [Boundary / Saunders / Railway AM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Phase Times)

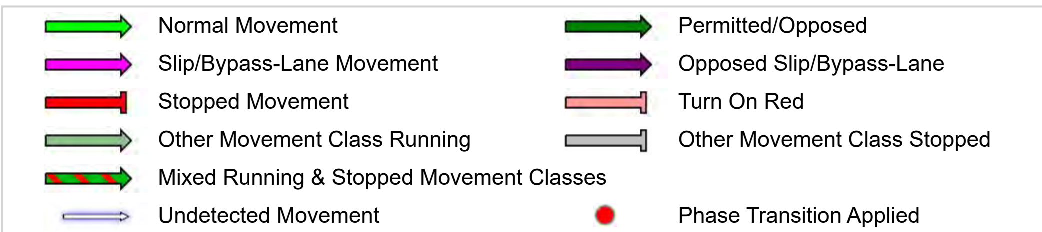
Phase Times specified by the user
Sequence: 4-phase PM - Copy
Reference Phase: Phase F
Input Sequence: A, B, C, D, E, F
Output Sequence: A, B, C, D, E, F

Phase Timing Results

Phase	A	B	C	D	E	F
Phase Change Time (sec)	19	59	81	105	126	0
Green Time (sec)	34	16	18	15	9	13
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	40	22	24	21	15	19
Phase Split	28%	16%	17%	15%	11%	13%



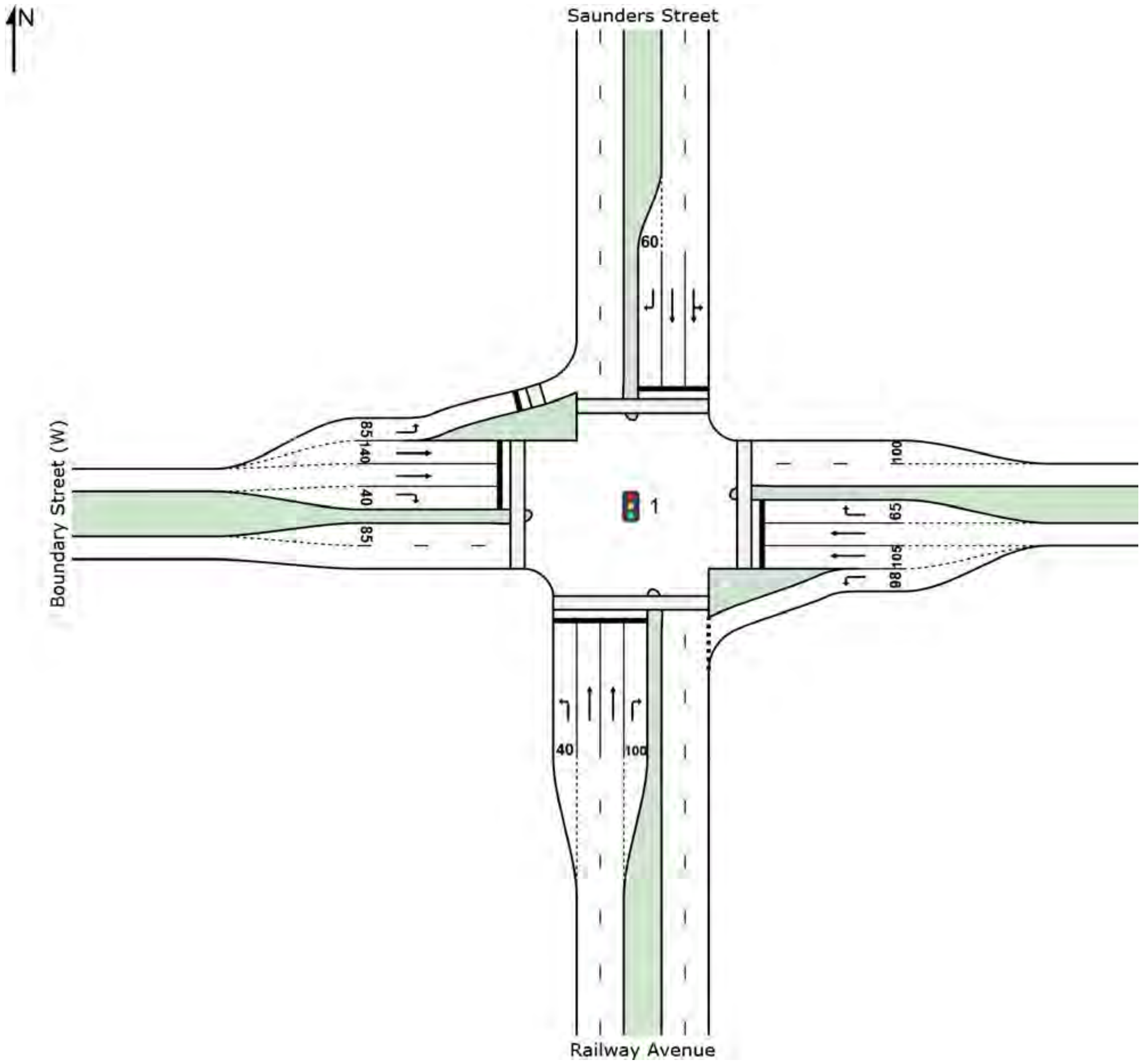
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2016]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 142 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	149	16.1	0.209	19.5	LOS B	3.3	26.1	0.66	0.74	46.1
2	T1	720	5.0	0.808	54.0	LOS D	26.7	195.2	0.96	0.89	31.9
3	R2	81	18.8	0.439	71.1	LOS E	5.4	43.9	0.98	0.78	17.7
Approach		951	7.9	0.808	50.0	LOS D	26.7	195.2	0.92	0.86	32.6
East: Boundary Street (E)											
4	L2	216	9.5	0.298	35.0	LOS D	9.6	73.0	0.70	0.80	27.5
5	T1	363	14.7	0.660	55.0	LOS E	15.4	121.6	0.95	0.79	34.2
6	R2	65	17.3	0.510	76.8	LOS E	4.6	36.6	1.00	0.77	26.2
Approach		644	13.2	0.660	50.5	LOS D	15.4	121.6	0.87	0.79	31.7
North: Saunders Street											
7	L2	74	11.8	1.152	220.6	LOS F	108.8	794.8	1.00	1.72	13.1
8	T1	1298	4.4	1.152	224.0	LOS F	108.8	794.8	1.00	1.75	12.9
9	R2	293	9.3	1.167	268.2	LOS F	41.8	315.6	1.00	1.41	16.5
Approach		1664	5.6	1.167	231.6	LOS F	108.8	794.8	1.00	1.69	13.7
West: Boundary Street (W)											
10	L2	249	13.1	0.282	25.9	LOS C	9.5	74.1	0.60	0.73	47.4
11	T1	332	13.4	0.486	43.3	LOS D	10.4	80.8	0.84	0.69	37.6
12	R2	269	9.5	1.254	337.6	LOS F	44.0	333.3	1.00	1.55	10.6
Approach		851	12.1	1.254	131.4	LOS F	44.0	333.3	0.82	0.98	22.9
All Vehicles		4109	8.7	1.254	140.5	LOS F	108.8	794.8	0.92	1.21	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	59.5	LOS E	0.0	0.0	0.92	0.92
P2	East Full Crossing	1	39.6	LOS D	0.0	0.0	0.75	0.75
P3	North Full Crossing	1	48.2	LOS E	0.0	0.0	0.82	0.82
P4	West Full Crossing	1	49.0	LOS E	0.0	0.0	0.83	0.83
P4S	West Slip/Bypass Lane Crossing	1	38.8	LOS D	0.0	0.0	0.74	0.74
All Pedestrians		5	47.0	LOS E			0.81	0.81

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 142 seconds (User-Given Phase Times)

Lane Use and Performance	Demand Flows Total (veh/h)	Demand Flows HV (%)	Cap. (veh/h)	Deg. Satn (v/c)	Lane Util. (%)	Average Delay (sec)	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist (m)	Lane Config	Lane Length (m)	Cap. Adj. (%)	Prob. Block. (%)
South: Railway Avenue													
Lane 1	149	16.1	716	0.209	100	19.5	LOS B	3.3	26.1	Short	40	0.0	NA
Lane 2	320	5.0	395[1]	0.808	100	53.4	LOS D	20.6	150.7	Full	250	0.0	0.0
Lane 3	400	5.0	496[1]	0.808	100	54.5	LOS D	26.7	195.2	Full	250	0.0	0.0
Lane 4	81	18.8	185	0.439	100	71.1	LOS E	5.4	43.9	Short	100	0.0	NA
Approach	951	7.9		0.808		50.0	LOS D	26.7	195.2				
East: Boundary Street (E)													
Lane 1	216	9.5	723	0.298	100	35.0	LOS D	9.6	73.0	Short	98	0.0	NA
Lane 2	240	14.7	364	0.660	100	56.5	LOS E	15.4	121.6	Short	105	0.0	NA
Lane 3	123	14.7	364	0.339	51[6]	52.2	LOS D	7.3	57.9	Full	250	0.0	0.0
Lane 4	65	17.3	128	0.510	100	76.8	LOS E	4.6	36.6	Short	65	0.0	NA
Approach	644	13.2		0.660		50.5	LOS D	15.4	121.6				
North: Saunders Street													
Lane 1	777	5.1	674	1.152	100	215.4	LOS F	108.8	794.8	Full	750	0.0	10.2
Lane 2	595	4.4	516[1]	1.152	100	234.7	LOS F	84.4	612.8	Full	750	0.0	0.0
Lane 3	293	9.3	251[1]	1.167	100	268.2	LOS F	41.8	315.6	Short	60	0.0	NA
Approach	1664	5.6		1.167		231.6	LOS F	108.8	794.8				
West: Boundary Street (W)													
Lane 1	249	13.1	885	0.282	100	25.9	LOS C	9.5	74.1	Short	85	0.0	NA
Lane 2	144	13.4	505	0.286	59[6]	42.6	LOS D	7.8	60.6	Short	140	0.0	NA
Lane 3	187	13.4	385[1]	0.486	100	43.8	LOS D	10.4	80.8	Full	940	0.0	0.0
Lane 4	269	9.5	215[1]	1.254	100	337.6	LOS F	44.0	333.3	Short	40	0.0	NA
Approach	851	12.1		1.254		131.4	LOS F	44.0	333.3				
Intersection	4109	8.7		1.254		140.5	LOS F	108.8	794.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

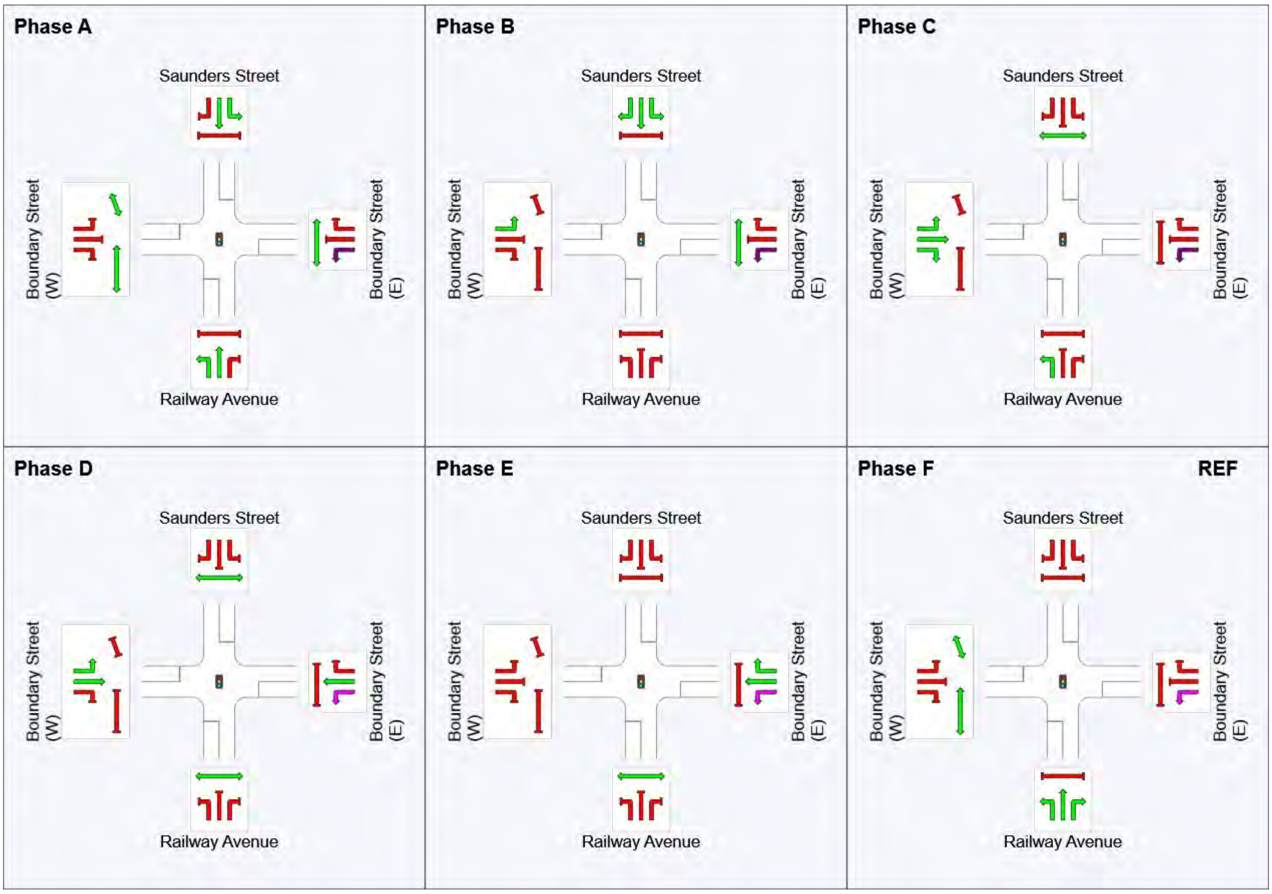
Site: 1 [Boundary / Saunders / Railway PM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 142 seconds (User-Given Phase Times)

Phase Times specified by the user
Sequence: 4-phase PM - Copy
Reference Phase: Phase F
Input Sequence: A, B, C, D, E, F
Output Sequence: A, B, C, D, E, F

Phase Timing Results

Phase	A	B	C	D	E	F
Phase Change Time (sec)	22	45	79	107	125	0
Green Time (sec)	17	28	22	12	11	16
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	23	34	28	18	17	22
Phase Split	16%	24%	20%	13%	12%	15%



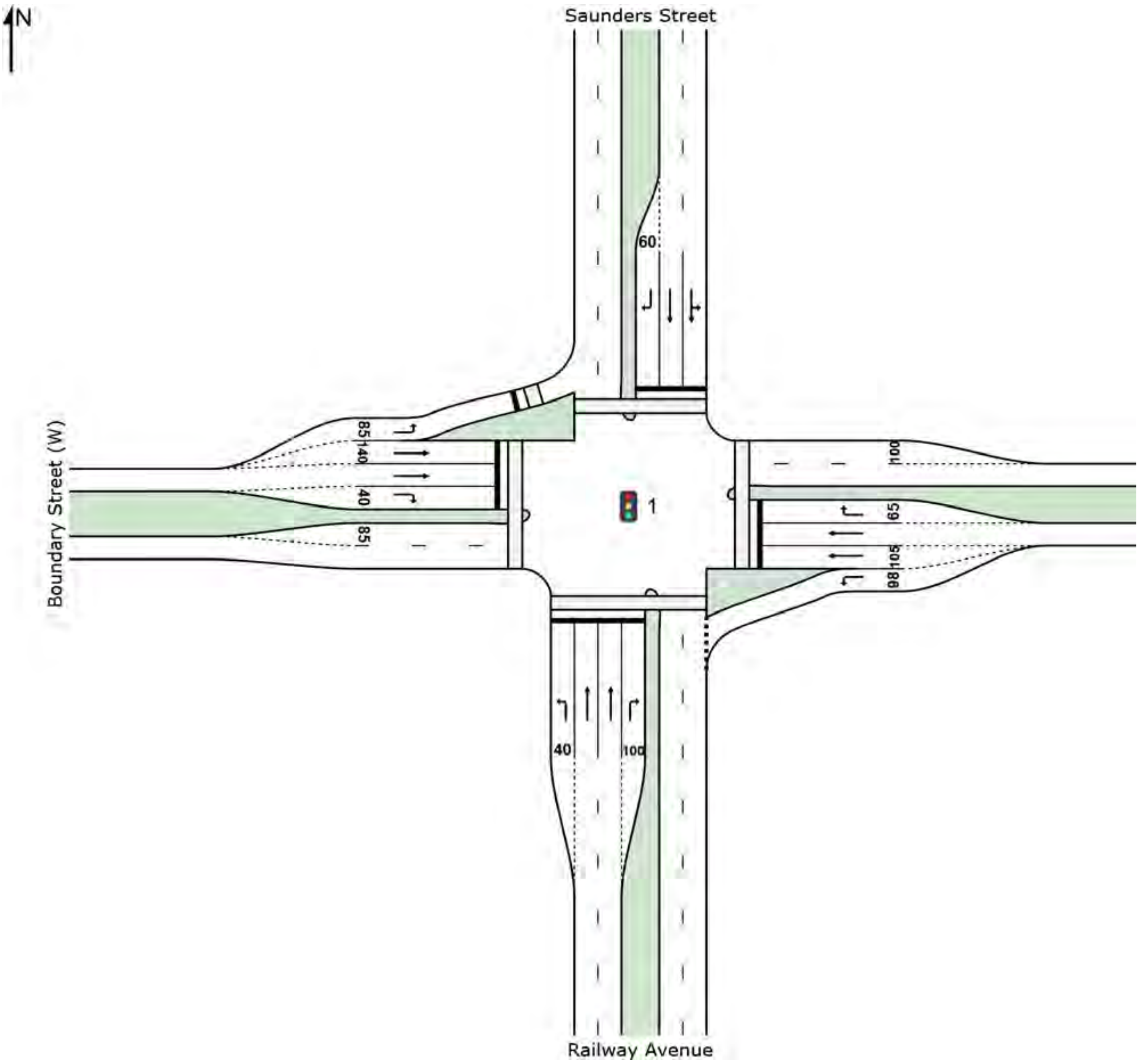
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	294	16.1	0.355	18.4	LOS B	8.0	63.7	0.65	0.75	46.6
2	T1	1165	5.0	1.013	121.5	LOS F	68.3	498.7	1.00	1.31	20.1
3	R2	114	18.8	0.489	67.3	LOS E	7.4	60.0	0.97	0.79	18.4
Approach		1573	8.1	1.013	98.3	LOS F	68.3	498.7	0.93	1.17	22.9
East: Boundary Street (E)											
4	L2	132	9.5	0.131	11.1	LOS B	2.5	19.0	0.34	0.64	42.1
5	T1	285	14.7	0.995	95.2	LOS F	17.4	137.5	1.00	1.05	26.0
6	R2	74	17.3	0.898	92.3	LOS F	5.8	47.0	1.00	0.97	23.6
Approach		491	13.7	0.995	72.2	LOS E	17.4	137.5	0.82	0.93	27.0
North: Saunders Street											
7	L2	73	11.8	0.504	33.3	LOS C	20.7	151.9	0.75	0.69	39.4
8	T1	729	4.4	0.504	26.9	LOS C	20.7	151.9	0.73	0.65	41.5
9	R2	296	9.3	1.007	144.0	LOS F	29.8	225.3	1.00	1.14	24.8
Approach		1098	6.2	1.007	58.8	LOS E	29.8	225.3	0.80	0.78	33.0
West: Boundary Street (W)											
10	L2	394	13.1	0.558	36.4	LOS D	19.5	152.0	0.78	0.81	43.9
11	T1	419	13.4	0.989	86.0	LOS F	22.1	172.5	0.99	1.04	27.5
12	R2	127	9.5	0.645	72.5	LOS E	8.7	65.9	1.00	0.81	29.5
Approach		940	12.7	0.989	63.4	LOS E	22.1	172.5	0.90	0.91	34.2
All Vehicles		4101	9.3	1.013	76.6	LOS E	68.3	498.7	0.88	0.98	28.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	64.6	LOS F	0.0	0.0	0.96	0.96
P2	East Full Crossing	1	28.7	LOS C	0.0	0.0	0.64	0.64
P3	North Full Crossing	1	61.8	LOS F	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	36.9	LOS D	0.0	0.0	0.72	0.72
P4S	West Slip/Bypass Lane Crossing	1	28.1	LOS C	0.0	0.0	0.63	0.63
All Pedestrians		5	44.0	LOS E			0.78	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	294	16.1	827	0.355	100	18.4	LOS B	8.0	63.7	Short	40	0.0	NA
Lane 2	495	5.0	489 [1]	1.013	100	135.9	LOS F	51.9	379.2	Full	250	0.0	43.2
Lane 3	671	5.0	662 [1]	1.013	100	110.9	LOS F	68.3	498.7	Full	250	0.0	69.1
Lane 4	114	18.8	232	0.489	100	67.3	LOS E	7.4	60.0	Short	100	0.0	NA
Approach	1573	8.1		1.013		98.3	LOS F	68.3	498.7				
East: Boundary Street (E)													
Lane 1	132	9.5	1006	0.131	100	11.1	LOS B	2.5	19.0	Short	98	0.0	NA
Lane 2	188	14.7	189	0.995	100	110.2	LOS F	17.4	137.5	Short	105	0.0	NA
Lane 3	97	14.7	189	0.512	51 [6]	66.1	LOS E	6.5	51.2	Full	250	0.0	0.0
Lane 4	74	17.3	82	0.898	100	92.3	LOS F	5.8	47.0	Short	65	0.0	NA
Approach	491	13.7		0.995		72.2	LOS E	17.4	137.5				
North: Saunders Street													
Lane 1	439	5.6	872	0.504	100	28.6	LOS C	20.7	151.9	Full	750	0.0	0.0
Lane 2	363	4.4	720 [1]	0.504	100	26.1	LOS C	16.1	117.2	Full	750	0.0	0.0
Lane 3	296	9.3	294 [1]	1.007	100	144.0	LOS F	29.8	225.3	Short	60	0.0	NA
Approach	1098	6.2		1.007		58.8	LOS E	29.8	225.3				
West: Boundary Street (W)													
Lane 1	394	13.1	706 [1]	0.558	100	36.4	LOS D	19.5	152.0	Short	85	0.0	NA
Lane 2	178	13.4	305	0.582	59 [6]	58.8	LOS E	11.4	89.2	Short	140	0.0	NA
Lane 3	241	13.4	244 [1]	0.989	100	106.0	LOS F	22.1	172.5	Full	940	0.0	0.0
Lane 4	127	9.5	197	0.645	100	72.5	LOS E	8.7	65.9	Short	40	0.0	NA
Approach	940	12.7		0.989		63.4	LOS E	22.1	172.5				
Intersection	4101	9.3		1.013		76.6	LOS E	68.3	498.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

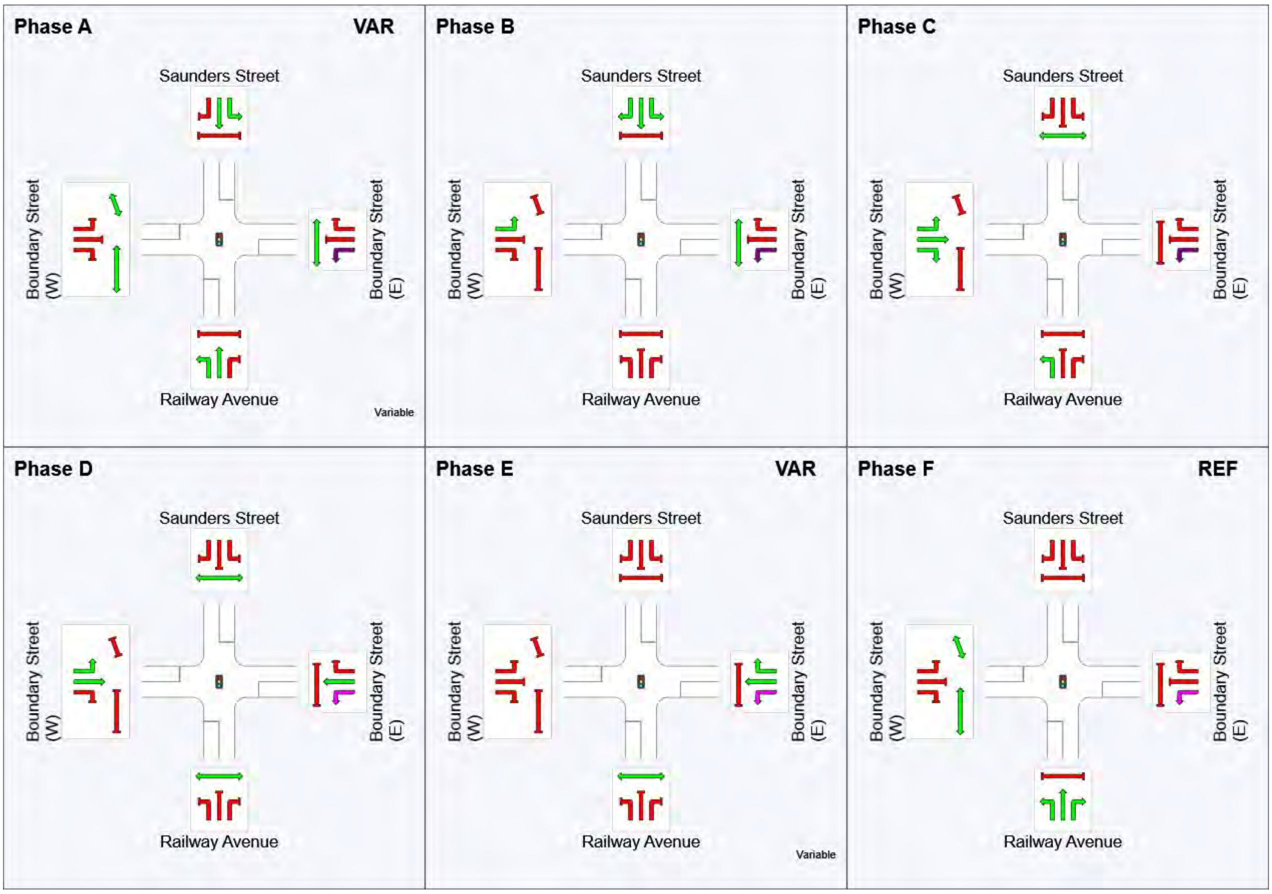
Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: 4-phase PM - Copy
Reference Phase: Phase F
Input Sequence: A*, B, C, D, E*, F
Output Sequence: A*, B, C, D, E*, F
(* Variable Phase)

Phase Timing Results

Phase	**A**	**B**	**C**	**D**	**E**	**F**
Phase Change Time (sec)	26	60	98	120	128	0
Green Time (sec)	28	32	16	2	7	20
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	34	38	22	8	13	26
Phase Split	24%	27%	16%	6%	9%	18%



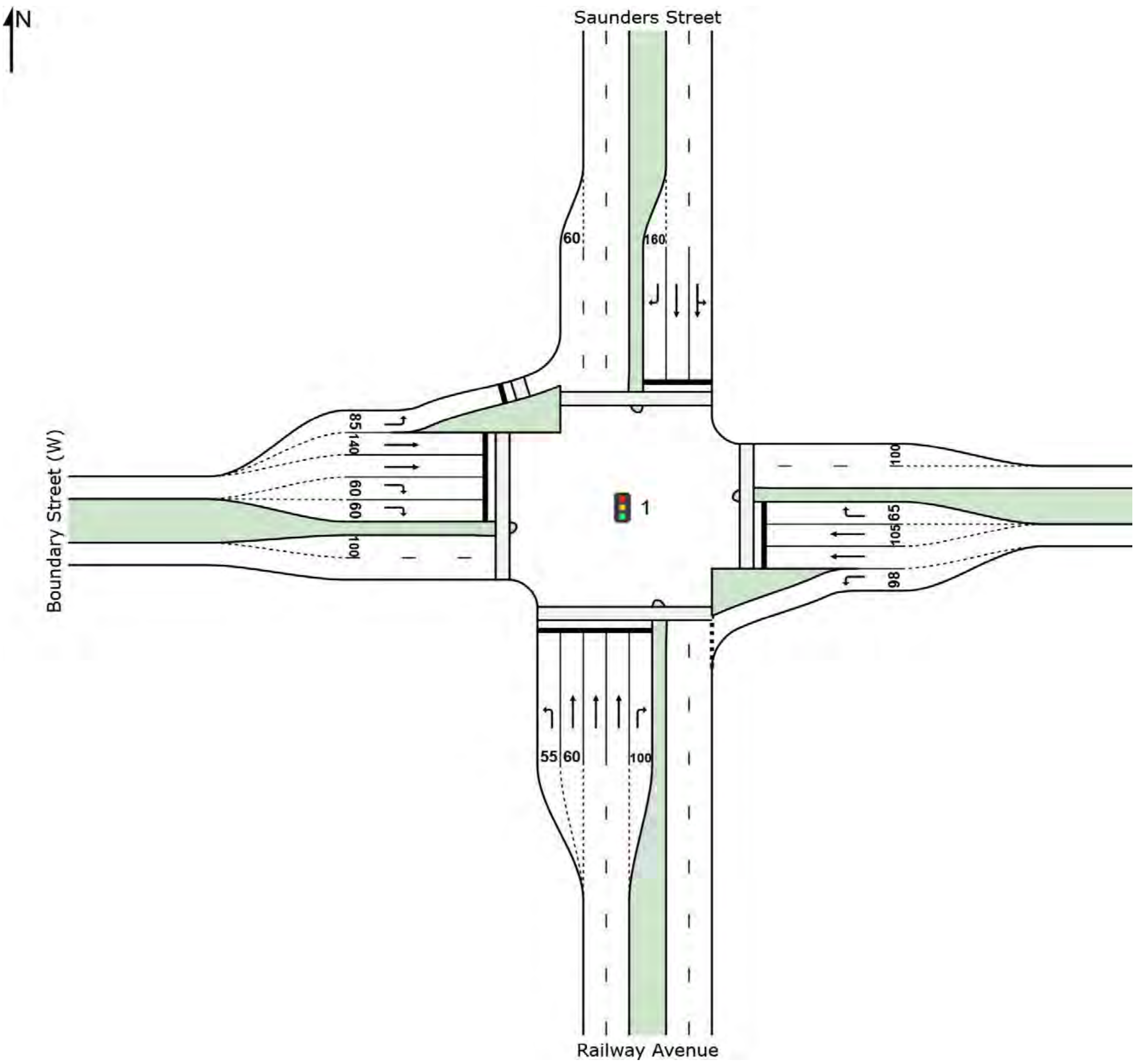
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	294	16.1	0.399	25.0	LOS C	9.2	73.4	0.72	0.78	43.5
2	T1	1165	5.0	0.848	37.3	LOS D	24.8	181.3	0.95	0.93	37.4
3	R2	114	18.8	0.550	49.9	LOS D	5.2	42.3	0.98	0.79	22.1
Approach		1573	8.1	0.848	35.9	LOS D	24.8	181.3	0.91	0.89	37.6
East: Boundary Street (E)											
4	L2	132	9.5	0.146	9.9	LOS A	1.8	13.7	0.38	0.65	43.2
5	T1	285	14.7	0.593	39.9	LOS D	7.9	62.0	0.96	0.77	38.8
6	R2	74	17.3	0.706	58.4	LOS E	3.7	30.0	1.00	0.84	30.1
Approach		491	13.7	0.706	34.6	LOS C	7.9	62.0	0.81	0.75	37.7
North: Saunders Street											
7	L2	73	11.8	0.548	30.0	LOS C	14.3	105.2	0.83	0.74	40.9
8	T1	729	4.4	0.548	24.3	LOS C	14.6	106.0	0.83	0.73	42.8
9	R2	296	9.3	0.849	53.6	LOS D	15.2	114.9	1.00	0.97	39.2
Approach		1098	6.2	0.849	32.6	LOS C	15.2	114.9	0.88	0.80	41.3
West: Boundary Street (W)											
10	L2	394	13.1	0.537	27.3	LOS C	13.5	105.3	0.79	0.81	46.9
11	T1	419	13.4	0.864	46.9	LOS D	13.7	106.9	0.98	0.93	36.5
12	R2	127	9.5	0.580	56.6	LOS E	3.1	23.7	1.00	0.78	33.3
Approach		940	12.7	0.864	40.0	LOS D	13.7	106.9	0.91	0.86	40.6
All Vehicles		4101	9.3	0.864	35.8	LOS D	24.8	181.3	0.89	0.84	39.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P2	East Full Crossing	1	28.0	LOS C	0.0	0.0	0.77	0.77
P3	North Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	35.4	LOS D	0.0	0.0	0.86	0.86
P4S	West Slip/Bypass Lane Crossing	1	23.6	LOS C	0.0	0.0	0.71	0.71
All Pedestrians		5	34.1	LOS D			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	294	16.1	737	0.399	100	25.0	LOS C	9.2	73.4	Short	55	0.0	NA
Lane 2	209	5.0	596	0.350	41 [6]	27.0	LOS C	7.5	54.6	Short	60	0.0	NA
Lane 3	451	5.0	532 [1]	0.848	100	39.4	LOS D	21.6	158.0	Full	250	0.0	0.0
Lane 4	505	5.0	596	0.848	100	39.8	LOS D	24.8	181.3	Full	250	0.0	0.0
Lane 5	114	18.8	207	0.550	100	49.9	LOS D	5.2	42.3	Short	100	0.0	NA
Approach	1573	8.1		0.848		35.9	LOS D	24.8	181.3				
East: Boundary Street (E)													
Lane 1	132	9.5	901	0.146	100	9.9	LOS A	1.8	13.7	Short	98	0.0	NA
Lane 2	178	14.7	300	0.593	100	40.6	LOS D	7.9	62.0	Full	250	0.0	0.0
Lane 3	108	14.7	300	0.359	60 [6]	38.7	LOS D	4.5	35.8	Short	105	0.0	NA
Lane 4	74	17.3	104	0.706	100	58.4	LOS E	3.7	30.0	Short	65	0.0	NA
Approach	491	13.7		0.706		34.6	LOS C	7.9	62.0				
North: Saunders Street													
Lane 1	397	5.8	724	0.548	100	25.3	LOS C	14.3	105.2	Full	750	0.0	0.0
Lane 2	405	4.4	738	0.548	100	24.3	LOS C	14.6	106.0	Full	750	0.0	0.0
Lane 3	296	9.3	348	0.849	100	53.6	LOS D	15.2	114.9	Short	160	0.0	NA
Approach	1098	6.2		0.849		32.6	LOS C	15.2	114.9				
West: Boundary Street (W)													
Lane 1	394	13.1	733	0.537	100	27.3	LOS C	13.5	105.3	Short	85	0.0	NA
Lane 2	158	13.4	302	0.523	60 [6]	40.0	LOS D	6.9	53.8	Short	140	0.0	NA
Lane 3	261	13.4	302	0.864	100	51.0	LOS D	13.7	106.9	Full	940	0.0	0.0
Lane 4	64	9.5	110	0.580	100	56.6	LOS E	3.1	23.7	Short	60	0.0	NA
Lane 5	64	9.5	110	0.580	100	56.6	LOS E	3.1	23.7	Short	60	0.0	NA
Approach	940	12.7		0.864		40.0	LOS D	13.7	106.9				
Intersection	4101	9.3		0.864		35.8	LOS D	24.8	181.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

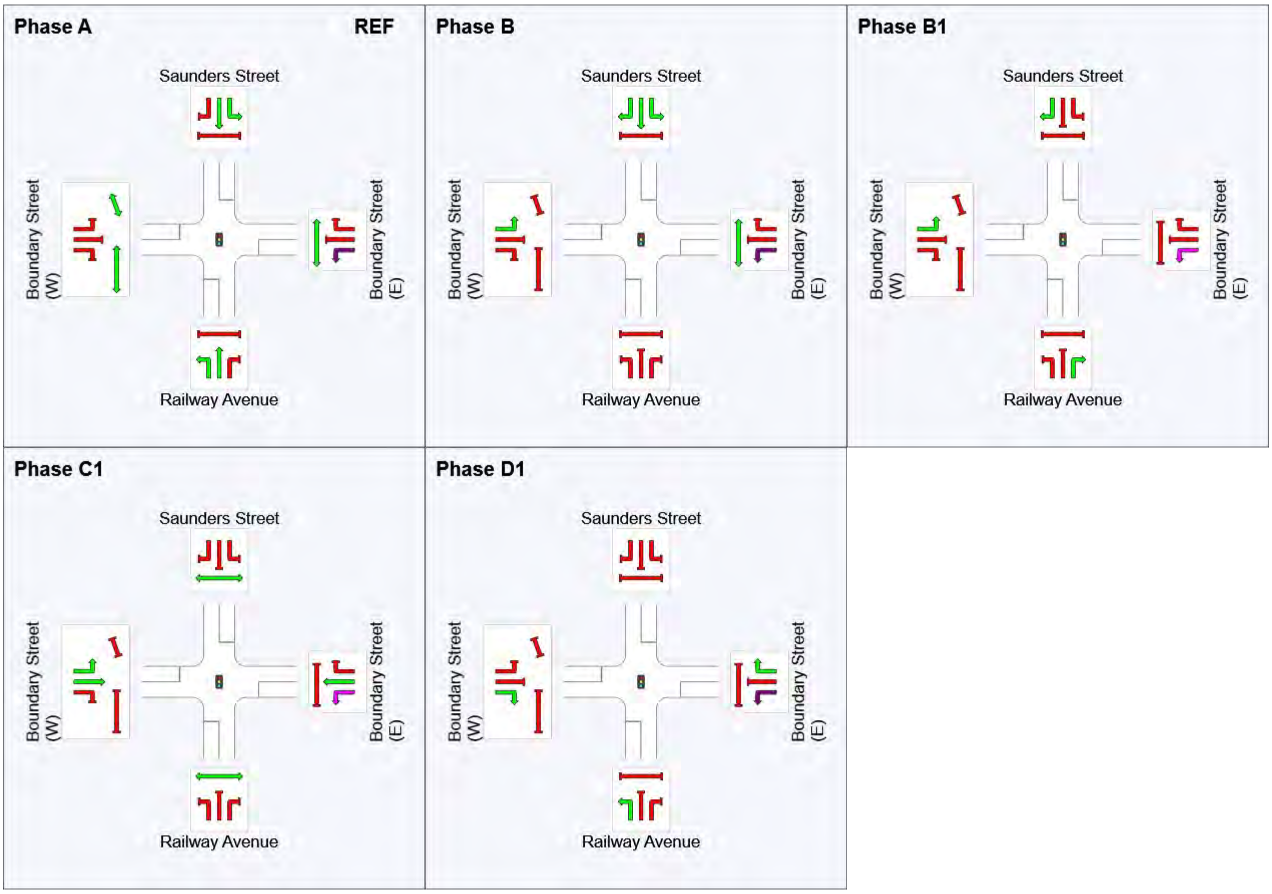
Site: 1 [Boundary / Saunders / Railway AM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C1, D1
Output Sequence: A, B, B1, C1, D1

Phase Timing Results

Phase	A	B	B1	C1	D1
Phase Change Time (sec)	0	36	43	61	83
Green Time (sec)	30	1	12	16	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	36	7	18	22	12
Phase Split	38%	7%	19%	23%	13%



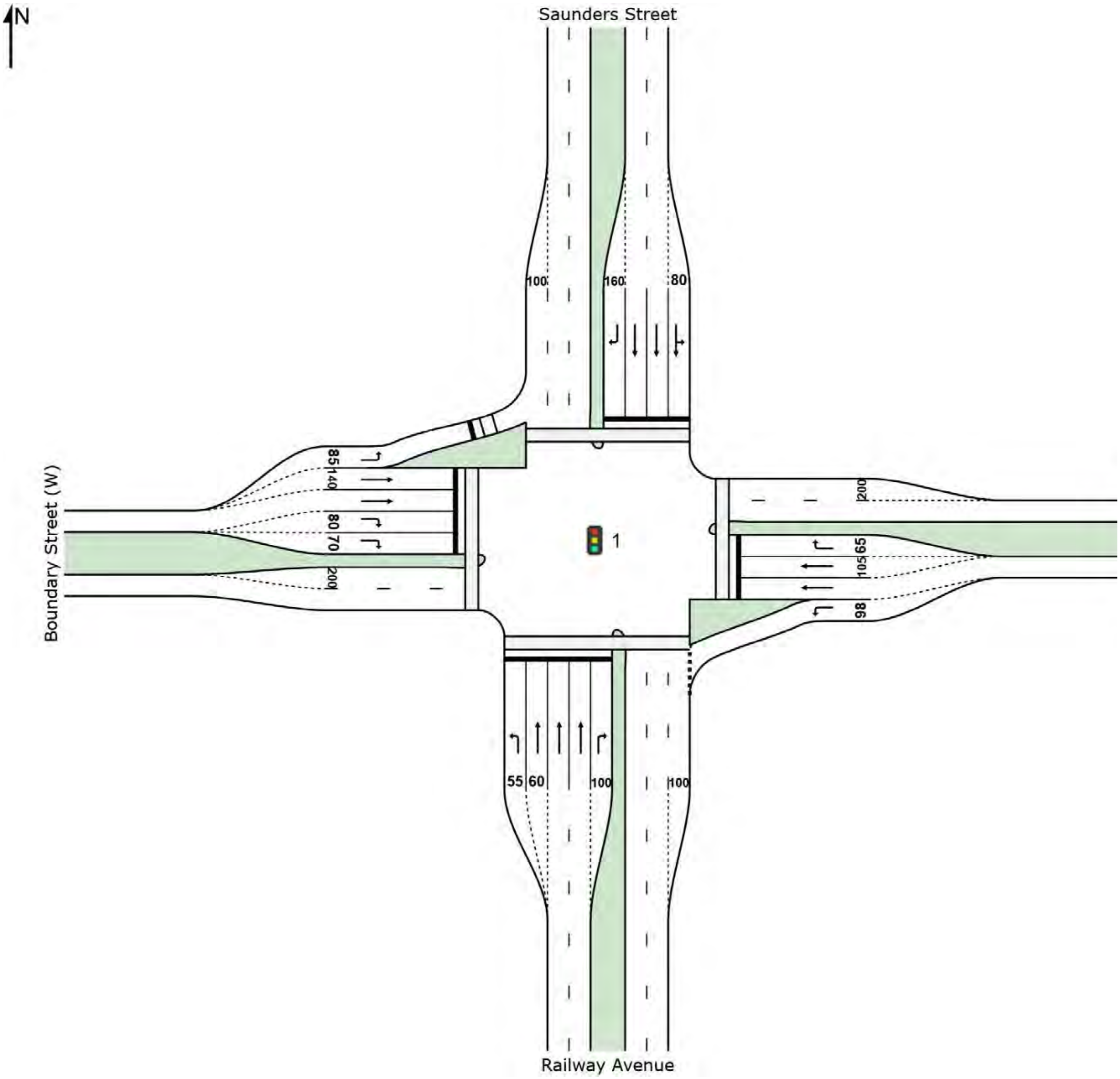
REF: Reference Phase
VAR: Variable Phase

Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	360	16.1	0.428	21.6	LOS C	10.5	83.6	0.68	0.78	45.0
2	T1	1445	5.0	0.877	36.2	LOS D	29.1	212.4	0.92	0.93	37.8
3	R2	138	18.8	0.444	43.6	LOS D	5.8	47.4	0.93	0.79	24.0
Approach		1943	8.0	0.877	34.0	LOS C	29.1	212.4	0.88	0.90	38.3
East: Boundary Street (E)											
4	L2	138	9.5	0.145	8.9	LOS A	1.7	12.6	0.33	0.64	44.3
5	T1	285	14.7	0.586	43.2	LOS D	6.5	51.0	0.99	0.79	37.7
6	R2	74	17.3	0.605	55.9	LOS E	3.6	29.0	1.00	0.80	30.9
Approach		497	13.6	0.605	35.6	LOS D	6.5	51.0	0.80	0.75	37.3
North: Saunders Street											
7	L2	73	11.8	0.284	28.4	LOS C	6.2	46.2	0.75	0.68	41.1
8	T1	773	4.4	0.469	24.4	LOS C	11.6	84.3	0.80	0.70	42.8
9	R2	296	9.3	0.896	59.9	LOS E	16.3	123.2	1.00	1.03	37.7
Approach		1141	6.1	0.896	33.9	LOS C	16.3	123.2	0.85	0.78	40.7
West: Boundary Street (W)											
10	L2	394	13.1	0.629	32.5	LOS C	15.1	117.8	0.88	0.83	45.1
11	T1	419	13.4	0.853	51.9	LOS D	10.9	85.2	1.00	1.00	35.1
12	R2	135	9.5	0.526	54.8	LOS D	3.2	24.5	1.00	0.76	33.7
Approach		947	12.7	0.853	44.3	LOS D	15.1	117.8	0.95	0.90	39.3
All Vehicles		4528	9.2	0.896	36.3	LOS D	29.1	212.4	0.88	0.85	39.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P2	East Full Crossing	1	29.6	LOS C	0.0	0.0	0.79	0.79
P3	North Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	31.2	LOS D	0.0	0.0	0.81	0.81
P4S	West Slip/Bypass Lane Crossing	1	20.2	LOS C	0.0	0.0	0.65	0.65
All Pedestrians		5	32.9	LOS D			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	360	16.1	842	0.428	100	21.6	LOS C	10.5	83.6	Short	55	0.0	NA
Lane 2	369	5.0	696	0.531	60[6]	25.4	LOS C	13.5	98.3	Short	60	0.0	NA
Lane 3	498	5.0	568[1]	0.877	100	39.8	LOS D	24.3	177.7	Full	250	0.0	0.0
Lane 4	578	5.0	659[1]	0.877	100	39.9	LOS D	29.1	212.4	Full	250	0.0	0.0
Lane 5	138	18.8	310	0.444	100	43.6	LOS D	5.8	47.4	Short	100	0.0	NA
Approach	1943	8.0		0.877		34.0	LOS C	29.1	212.4				
East: Boundary Street (E)													
Lane 1	138	9.5	950	0.145	100	8.9	LOS A	1.7	12.6	Short	98	0.0	NA
Lane 2	143	14.7	244	0.586	100	43.2	LOS D	6.5	51.0	Full	250	0.0	0.0
Lane 3	143	14.7	244	0.586	100	43.2	LOS D	6.5	51.0	Short	105	0.0	NA
Lane 4	74	17.3	122	0.605	100	55.9	LOS E	3.6	29.0	Short	65	0.0	NA
Approach	497	13.6		0.605		35.6	LOS D	6.5	51.0				
North: Saunders Street													
Lane 1	190	7.2	671	0.284	60[6]	24.9	LOS C	6.2	46.2	Short	80	0.0	NA
Lane 2	327	4.4	698	0.469	100	24.7	LOS C	11.6	84.3	Full	750	0.0	0.0
Lane 3	327	4.4	698	0.469	100	24.7	LOS C	11.6	84.3	Full	750	0.0	0.0
Lane 4	296	9.3	330	0.896	100	59.9	LOS E	16.3	123.2	Short	160	0.0	NA
Approach	1141	6.1		0.896		33.9	LOS C	16.3	123.2				
West: Boundary Street (W)													
Lane 1	394	13.1	626	0.629	100	32.5	LOS C	15.1	117.8	Short	85	0.0	NA
Lane 2	209	13.4	245	0.853	100	51.9	LOS D	10.9	85.2	Short	140	0.0	NA
Lane 3	209	13.4	245	0.853	100	51.9	LOS D	10.9	85.2	Full	940	0.0	0.0
Lane 4	67	9.5	128	0.526	100	54.8	LOS D	3.2	24.5	Short	80	0.0	NA
Lane 5	67	9.5	128	0.526	100	54.8	LOS D	3.2	24.5	Short	70	0.0	NA
Approach	947	12.7		0.853		44.3	LOS D	15.1	117.8				
Intersection	4528	9.2		0.896		36.3	LOS D	29.1	212.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

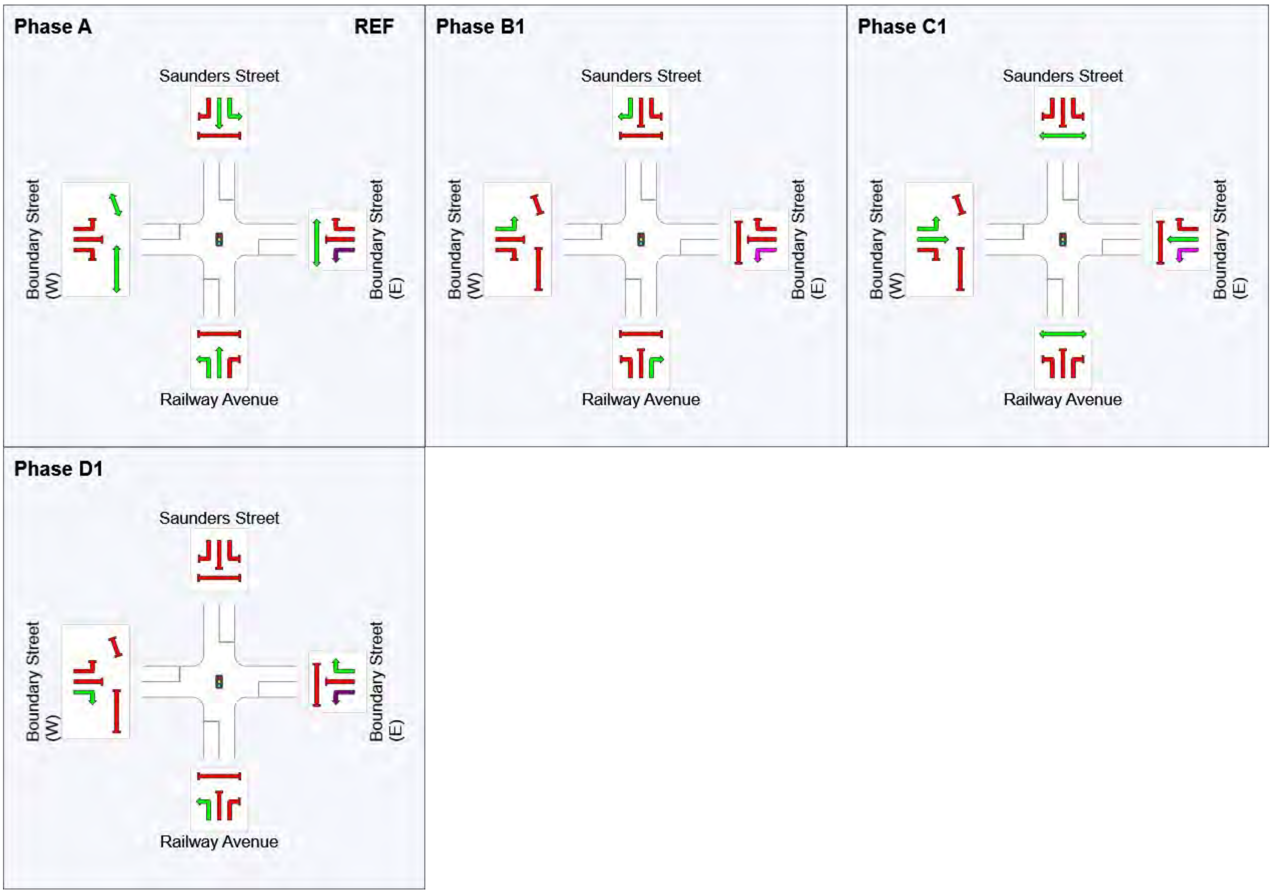
Site: 1 [Boundary / Saunders / Railway AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times specified by the user
Sequence: 5-phase AM
Reference Phase: Phase A
Input Sequence: A, B2*, B1, C1, D1
Output Sequence: A, B1, C1, D1
(* Variable Phase)

Phase Timing Results

Phase	**A**	**B1**	**C1**	**D1**
Phase Change Time (sec)	0	41	65	82
Green Time (sec)	35	18	13	7
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	41	24	17	13
Phase Split	43%	25%	18%	14%



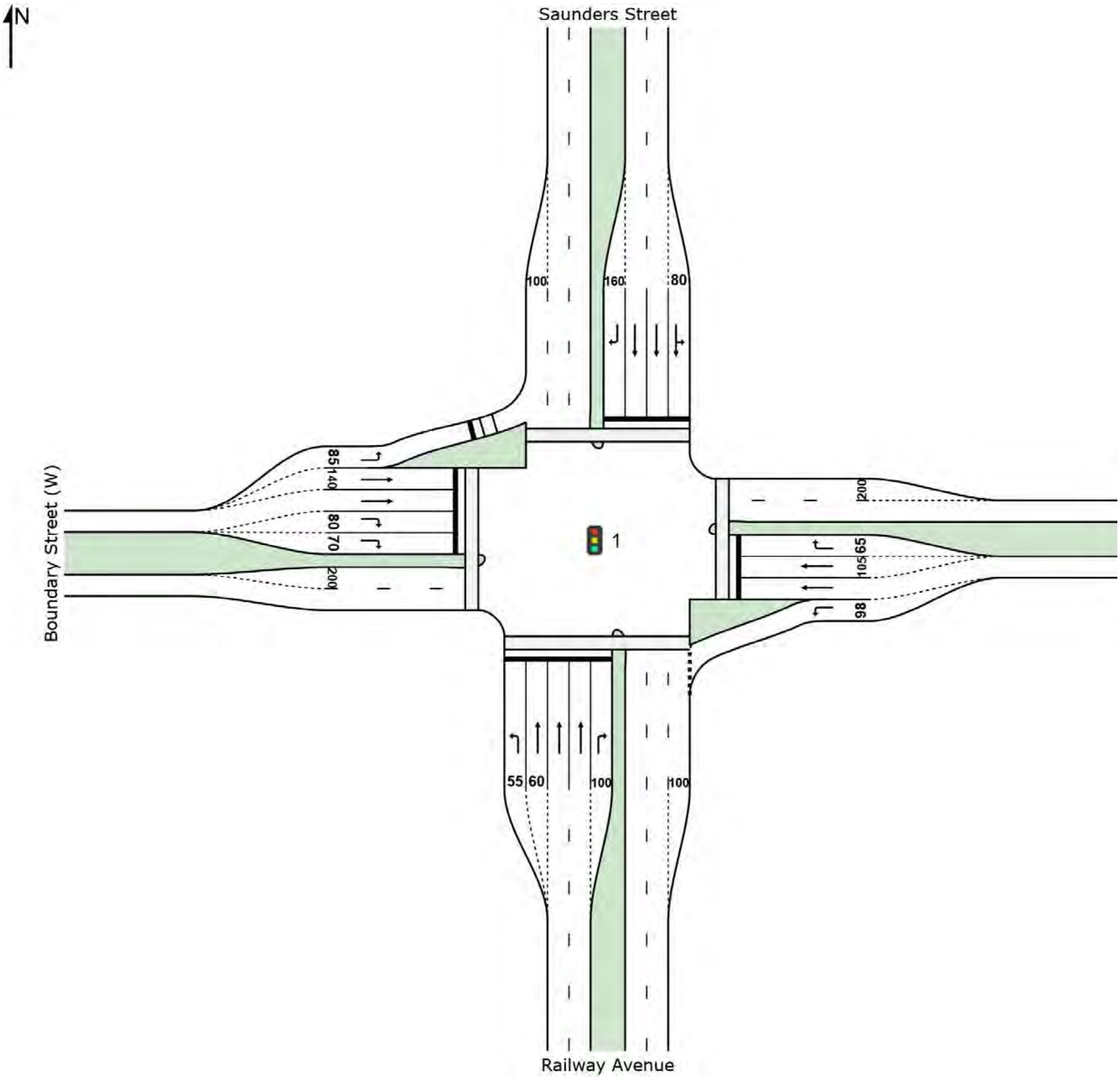
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	169	16.1	0.247	23.4	LOS C	4.6	36.8	0.69	0.75	44.2
2	T1	1024	5.0	0.853	38.4	LOS D	18.3	133.6	0.98	0.96	37.0
3	R2	94	18.8	0.810	55.3	LOS E	4.4	35.9	1.00	0.93	20.9
Approach		1287	7.5	0.853	37.6	LOS D	18.3	133.6	0.94	0.93	36.8
East: Boundary Street (E)											
4	L2	266	9.5	0.420	19.8	LOS B	6.9	52.5	0.74	0.77	35.2
5	T1	395	14.7	0.857	47.9	LOS D	9.4	73.8	1.00	1.01	36.3
6	R2	77	17.3	0.494	48.0	LOS D	3.2	26.1	0.99	0.77	33.1
Approach		738	13.1	0.857	37.8	LOS D	9.4	73.8	0.90	0.90	35.7
North: Saunders Street											
7	L2	91	11.8	0.528	25.3	LOS C	12.8	94.2	0.79	0.72	43.0
8	T1	1648	4.4	0.873	30.6	LOS C	31.7	230.6	0.92	0.95	40.0
9	R2	366	9.3	0.851	47.0	LOS D	16.9	128.1	1.00	0.98	40.9
Approach		2105	5.6	0.873	33.2	LOS C	31.7	230.6	0.93	0.95	40.3
West: Boundary Street (W)											
10	L2	362	13.1	0.477	23.6	LOS C	10.6	82.5	0.75	0.79	48.3
11	T1	349	13.4	0.753	42.8	LOS D	7.7	59.9	1.00	0.90	37.9
12	R2	294	9.5	0.897	59.1	LOS E	7.3	55.4	1.00	1.04	32.6
Approach		1005	12.2	0.897	40.6	LOS D	10.6	82.5	0.91	0.90	40.0
All Vehicles		5136	8.4	0.897	36.4	LOS D	31.7	230.6	0.93	0.93	38.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	1	24.1	LOS C	0.0	0.0	0.75	0.75
P3	North Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
P4S	West Slip/Bypass Lane Crossing	1	25.6	LOS C	0.0	0.0	0.78	0.78
All Pedestrians		5	32.0	LOS D			0.86	0.86

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	169	16.1	686	0.247	100	23.4	LOS C	4.6	36.8	Short	55	0.0	NA
Lane 2	241	5.0	467	0.516	60 [6]	30.3	LOS C	8.8	64.2	Short	60	0.0	NA
Lane 3	385	5.0	451 [1]	0.853	100	40.8	LOS D	17.6	128.5	Full	250	0.0	0.0
Lane 4	398	5.0	467	0.853	100	40.9	LOS D	18.3	133.6	Full	250	0.0	0.0
Lane 5	94	18.8	116	0.810	100	55.3	LOS E	4.4	35.9	Short	100	0.0	NA
Approach	1287	7.5		0.853		37.6	LOS D	18.3	133.6				
East: Boundary Street (E)													
Lane 1	266	9.5	633	0.420	100	19.8	LOS B	6.9	52.5	Short	98	0.0	NA
Lane 2	197	14.7	230	0.857	100	47.9	LOS D	9.4	73.8	Full	250	0.0	0.0
Lane 3	197	14.7	230	0.857	100	47.9	LOS D	9.4	73.8	Short	105	0.0	NA
Lane 4	77	17.3	156	0.494	100	48.0	LOS D	3.2	26.1	Short	65	0.0	NA
Approach	738	13.1		0.857		37.8	LOS D	9.4	73.8				
North: Saunders Street													
Lane 1	414	6.0	785	0.528	60 [6]	20.9	LOS C	12.8	94.2	Short	80	0.0	NA
Lane 2	624	4.4	715 [1]	0.873	100	33.1	LOS C	27.3	198.3	Full	750	0.0	0.0
Lane 3	701	4.4	803	0.873	100	33.4	LOS C	31.7	230.6	Full	750	0.0	0.0
Lane 4	366	9.3	430	0.851	100	47.0	LOS D	16.9	128.1	Short	160	0.0	NA
Approach	2105	5.6		0.873		33.2	LOS C	31.7	230.6				
West: Boundary Street (W)													
Lane 1	362	13.1	759	0.477	100	23.6	LOS C	10.6	82.5	Short	85	0.0	NA
Lane 2	175	13.4	232	0.753	100	42.8	LOS D	7.7	59.9	Short	140	0.0	NA
Lane 3	175	13.4	232	0.753	100	42.8	LOS D	7.7	59.9	Full	940	0.0	0.0
Lane 4	147	9.5	164	0.897	100	59.1	LOS E	7.3	55.4	Short	80	0.0	NA
Lane 5	147	9.5	164	0.897	100	59.1	LOS E	7.3	55.4	Short	70	0.0	NA
Approach	1005	12.2		0.897		40.6	LOS D	10.6	82.5				
Intersection	5136	8.4		0.897		36.4	LOS D	31.7	230.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

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Project: C:\Users\Meng Kong\Desktop\Boundary_Saunders_Railway.sip7

PHASING SUMMARY

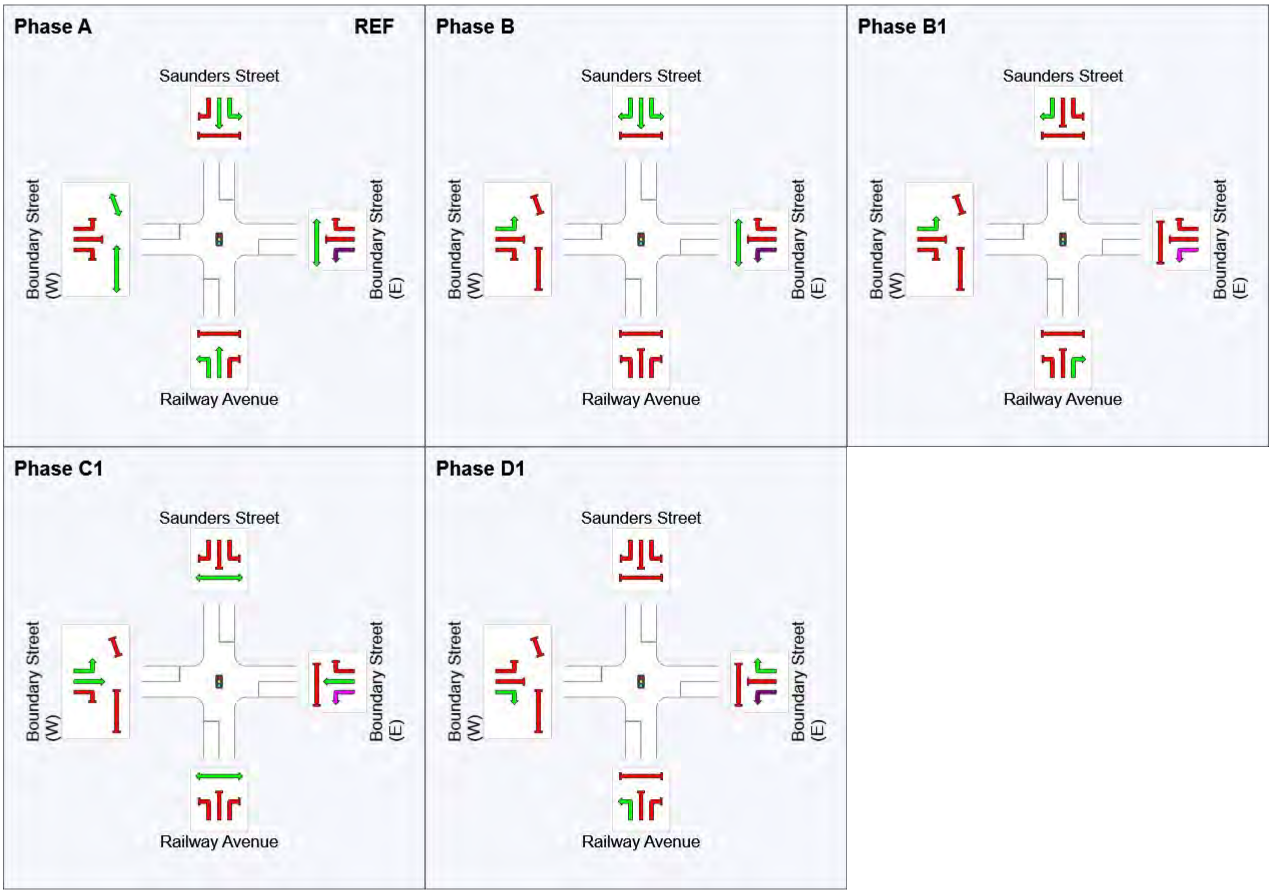
Site: 1 [Boundary / Saunders / Railway PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C1, D1
Output Sequence: A, B, B1, C1, D1

Phase Timing Results

Phase	A	B	B1	C1	D1
Phase Change Time (sec)	0	27	42	54	71
Green Time (sec)	21	9	6	11	8
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	27	15	12	17	14
Phase Split	32%	18%	14%	20%	16%



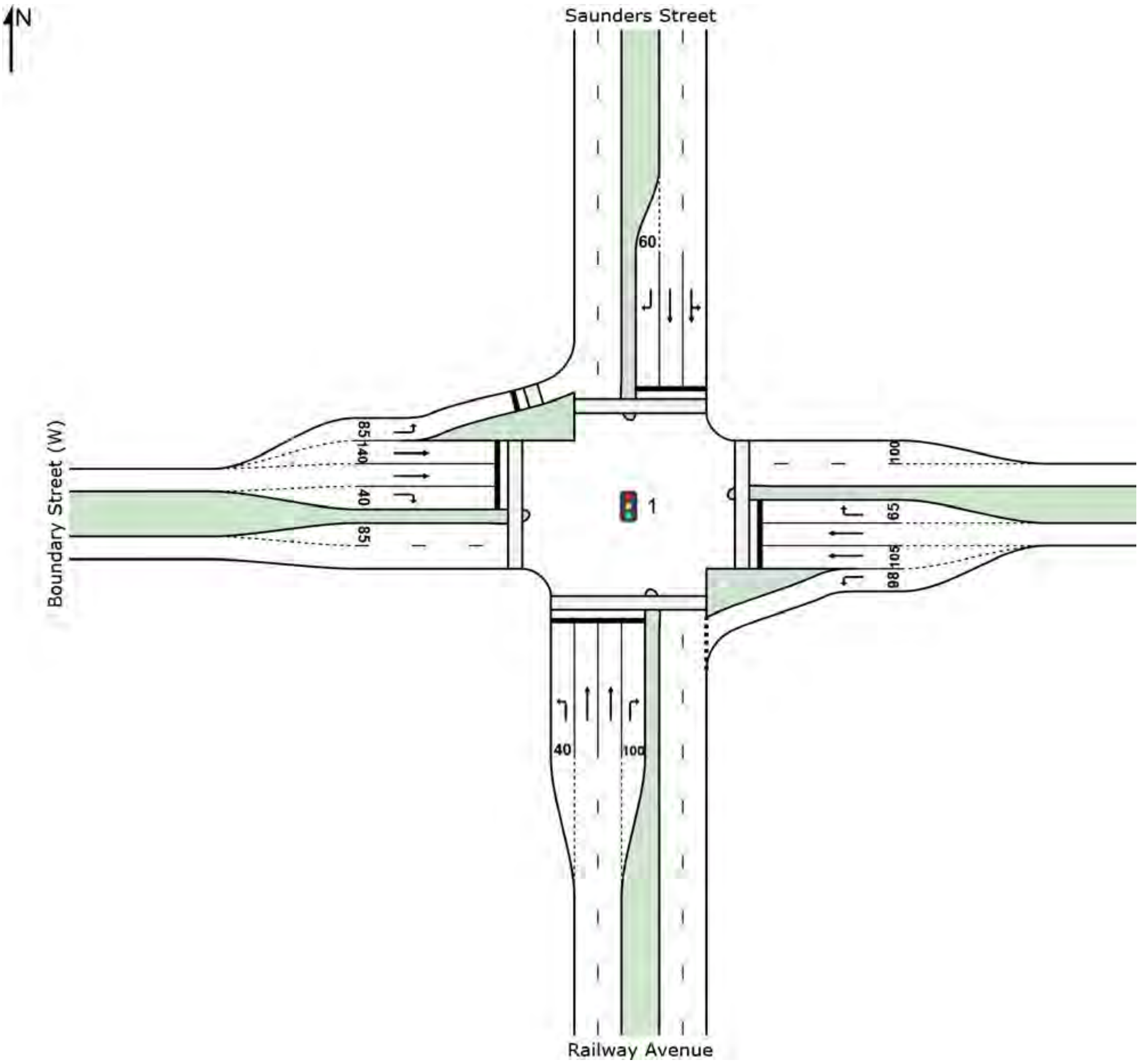
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 142 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	152	16.1	0.223	21.7	LOS C	4.4	35.0	0.69	0.74	45.0
2	T1	911	5.0	1.116	200.6	LOS F	64.0	467.5	1.00	1.62	14.1
3	R2	84	18.8	0.913	94.3	LOS F	6.8	55.3	1.00	1.00	14.5
Approach		1146	7.5	1.116	169.1	LOS F	64.0	467.5	0.96	1.46	15.8
East: Boundary Street (E)											
4	L2	225	9.5	0.394	40.1	LOS D	11.8	89.5	0.82	0.79	25.6
5	T1	395	14.7	1.094	139.1	LOS F	31.3	246.5	1.00	1.22	20.6
6	R2	77	17.3	0.660	79.8	LOS E	5.5	44.5	1.00	0.81	25.6
Approach		697	13.3	1.094	100.5	LOS F	31.3	246.5	0.94	1.04	21.8
North: Saunders Street											
7	L2	91	11.8	0.954	70.1	LOS E	72.0	526.1	1.00	1.09	28.4
8	T1	1366	4.4	0.954	65.1	LOS E	72.0	526.1	0.92	1.04	29.0
9	R2	366	9.3	1.139	251.7	LOS F	50.7	383.4	1.00	1.37	17.3
Approach		1823	5.8	1.139	102.8	LOS F	72.0	526.1	0.94	1.11	24.2
West: Boundary Street (W)											
10	L2	362	13.1	0.383	24.5	LOS C	13.9	108.1	0.61	0.75	47.9
11	T1	349	13.4	0.655	51.0	LOS D	11.7	91.3	0.91	0.75	35.3
12	R2	247	9.5	1.135	237.8	LOS F	32.9	248.9	1.00	1.36	13.9
Approach		959	12.3	1.135	89.2	LOS F	32.9	248.9	0.82	0.91	28.9
All Vehicles		4625	8.7	1.139	116.1	LOS F	72.0	526.1	0.92	1.14	22.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	65.1	LOS F	0.0	0.0	0.96	0.96
P2	East Full Crossing	1	27.9	LOS C	0.0	0.0	0.63	0.63
P3	North Full Crossing	1	55.0	LOS E	0.0	0.0	0.88	0.88
P4	West Full Crossing	1	52.4	LOS E	0.0	0.0	0.86	0.86
P4S	West Slip/Bypass Lane Crossing	1	41.8	LOS E	0.0	0.0	0.77	0.77
All Pedestrians		5	48.5	LOS E			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 142 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	152	16.1	680	0.223	100	21.7	LOS C	4.4	35.0	Short	40	0.0	NA
Lane 2	412	5.0	369[1]	1.116	100	208.9	LOS F	53.4	390.0	Full	250	0.0	45.8
Lane 3	498	5.0	446[1]	1.116	100	193.8	LOS F	64.0	467.5	Full	250	0.0	62.9
Lane 4	84	18.8	92	0.913	100	94.3	LOS F	6.8	55.3	Short	100	0.0	NA
Approach	1146	7.5		1.116		169.1	LOS F	64.0	467.5				
East: Boundary Street (E)													
Lane 1	225	9.5	572	0.394	100	40.1	LOS D	11.8	89.5	Short	98	0.0	NA
Lane 2	261	14.7	238	1.094	100	178.0	LOS F	31.3	246.5	Short	105	0.0	NA
Lane 3	134	14.7	238	0.563	51[6]	63.4	LOS E	8.9	70.2	Full	250	0.0	3.7[8]
Lane 4	77	17.3	116	0.660	100	79.8	LOS E	5.5	44.5	Short	65	0.0	NA
Approach	697	13.3		1.094		100.5	LOS F	31.3	246.5				
North: Saunders Street													
Lane 1	857	5.2	898	0.954	100	65.0	LOS E	72.0	526.1	Full	750	0.0	0.0
Lane 2	600	4.4	629[1]	0.954	100	66.0	LOS E	45.4	329.7	Full	750	0.0	0.0
Lane 3	366	9.3	322[1]	1.139	100	251.7	LOS F	50.7	383.4	Short	60	0.0	NA
Approach	1823	5.8		1.139		102.8	LOS F	72.0	526.1				
West: Boundary Street (W)													
Lane 1	362	13.1	945	0.383	100	24.5	LOS C	13.9	108.1	Short	85	0.0	NA
Lane 2	156	13.4	404	0.386	59[6]	50.3	LOS D	9.2	71.6	Short	140	0.0	NA
Lane 3	194	13.4	295[1]	0.655	100	51.6	LOS D	11.7	91.3	Full	940	0.0	0.0
Lane 4	247	9.5	218[1]	1.135	100	237.8	LOS F	32.9	248.9	Short	40	0.0	NA
Approach	959	12.3		1.135		89.2	LOS F	32.9	248.9				
Intersection	4625	8.7		1.139		116.1	LOS F	72.0	526.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

PHASING SUMMARY

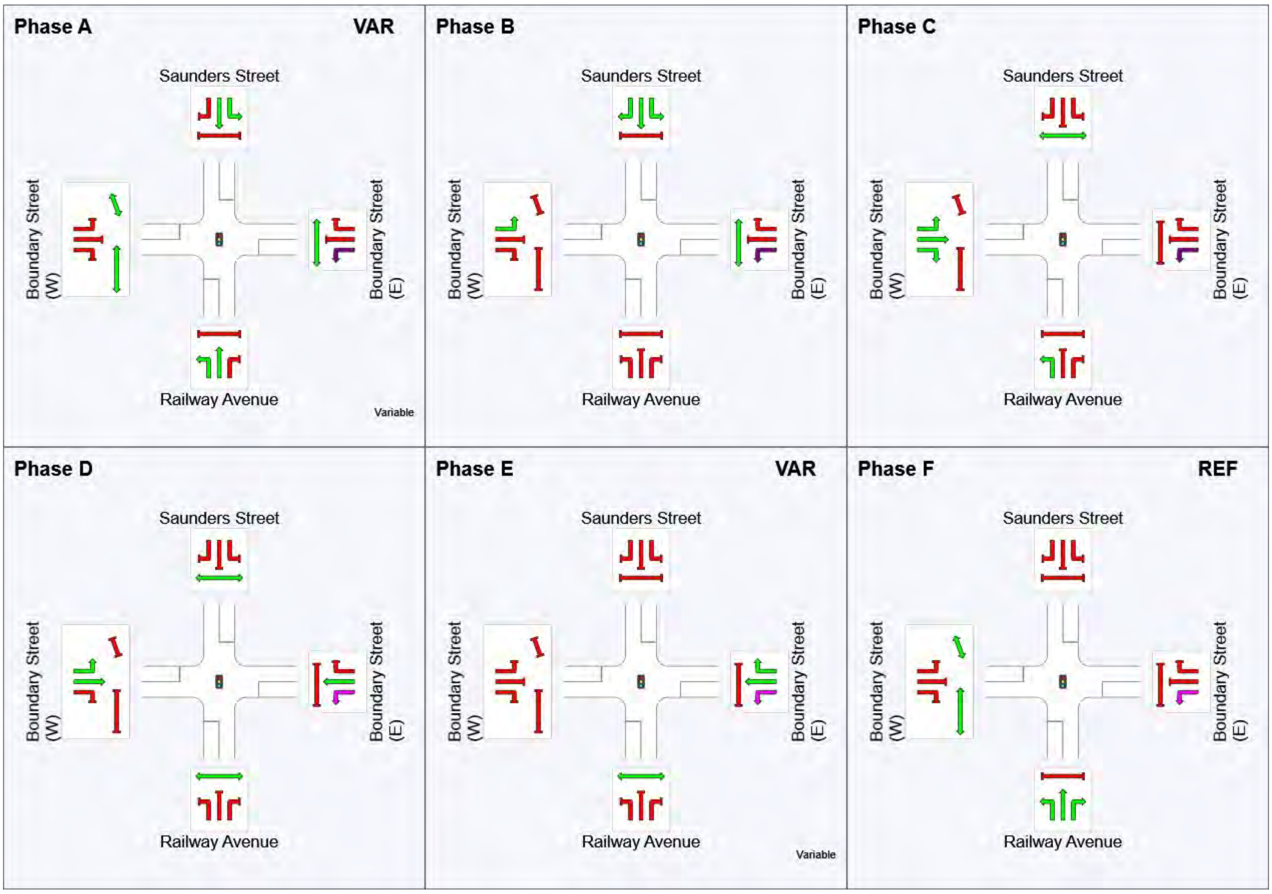
Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 142 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: 4-phase PM - Copy
Reference Phase: Phase F
Input Sequence: A*, B, C, D, E*, F
Output Sequence: A*, B, C, D, E*, F
(* Variable Phase)

Phase Timing Results

Phase	A	B	C	D	E	F
Phase Change Time (sec)	14	41	88	117	126	0
Green Time (sec)	21	41	23	3	10	8
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	27	47	29	9	16	14
Phase Split	19%	33%	20%	6%	11%	10%

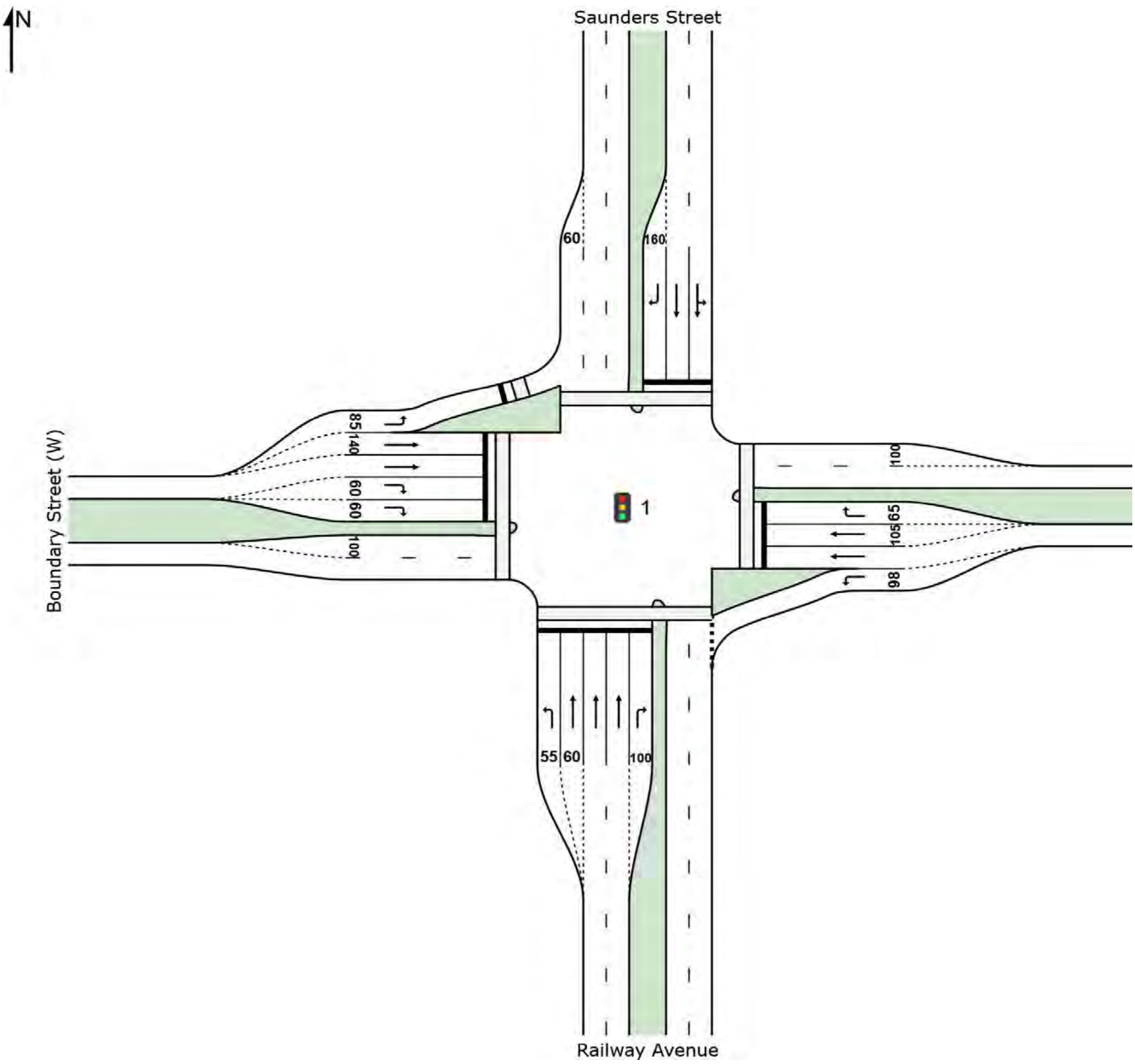


REF: Reference Phase
VAR: Variable Phase

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	152	16.1	0.227	26.0	LOS C	4.6	36.9	0.70	0.75	43.1
2	T1	911	5.0	0.804	38.8	LOS D	18.2	133.1	0.97	0.90	36.8
3	R2	84	18.8	0.814	61.2	LOS E	4.4	35.9	1.00	0.92	19.5
Approach		1146	7.5	0.814	38.8	LOS D	18.2	133.1	0.94	0.88	36.4
East: Boundary Street (E)											
4	L2	225	9.5	0.346	20.9	LOS C	6.3	47.8	0.70	0.76	34.5
5	T1	395	14.7	0.875	48.3	LOS D	13.1	103.3	0.99	0.94	36.1
6	R2	77	17.3	0.552	54.1	LOS D	3.7	29.5	1.00	0.78	31.2
Approach		697	13.3	0.875	40.1	LOS D	13.1	103.3	0.90	0.86	35.2
North: Saunders Street											
7	L2	91	11.8	0.875	40.9	LOS D	35.8	262.4	0.98	1.01	36.6
8	T1	1366	4.4	0.875	35.1	LOS D	36.2	263.2	0.98	1.01	38.1
9	R2	366	9.3	0.833	48.8	LOS D	18.2	137.3	1.00	0.95	40.5
Approach		1823	5.8	0.875	38.2	LOS D	36.2	263.2	0.99	1.00	38.7
West: Boundary Street (W)											
10	L2	362	13.1	0.450	23.7	LOS C	11.2	87.3	0.72	0.78	48.2
11	T1	349	13.4	0.769	43.7	LOS D	10.5	82.2	0.98	0.86	37.5
12	R2	247	9.5	0.844	60.6	LOS E	6.5	49.2	1.00	0.96	32.3
Approach		959	12.3	0.844	40.5	LOS D	11.2	87.3	0.89	0.85	40.2
All Vehicles		4625	8.7	0.875	39.1	LOS D	36.2	263.2	0.94	0.92	38.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P2	East Full Crossing	1	24.3	LOS C	0.0	0.0	0.72	0.72
P3	North Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	40.8	LOS E	0.0	0.0	0.93	0.93
P4S	West Slip/Bypass Lane Crossing	1	28.0	LOS C	0.0	0.0	0.77	0.77
All Pedestrians		5	35.3	LOS D			0.86	0.86

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	152	16.1	666	0.227	100	26.0	LOS C	4.6	36.9	Short	55	0.0	NA
Lane 2	158	5.0	477	0.332	41 [6]	31.5	LOS C	6.1	44.2	Short	60	0.0	NA
Lane 3	368	5.0	458 [1]	0.804	100	40.3	LOS D	17.4	126.8	Full	250	0.0	0.0
Lane 4	384	5.0	477	0.804	100	40.5	LOS D	18.2	133.1	Full	250	0.0	0.0
Lane 5	84	18.8	103	0.814	100	61.2	LOS E	4.4	35.9	Short	100	0.0	NA
Approach	1146	7.5		0.814		38.8	LOS D	18.2	133.1				
East: Boundary Street (E)													
Lane 1	225	9.5	650	0.346	100	20.9	LOS C	6.3	47.8	Short	98	0.0	NA
Lane 2	246	14.7	281	0.875	100	52.8	LOS D	13.1	103.3	Full	250	0.0	0.0
Lane 3	149	14.7	281	0.529	60 [6]	41.0	LOS D	6.6	51.7	Short	105	0.0	NA
Lane 4	77	17.3	139	0.552	100	54.1	LOS D	3.7	29.5	Short	65	0.0	NA
Approach	697	13.3		0.875		40.1	LOS D	13.1	103.3				
North: Saunders Street													
Lane 1	724	5.3	827	0.875	100	35.9	LOS D	35.8	262.4	Full	750	0.0	0.0
Lane 2	733	4.4	838	0.875	100	35.1	LOS D	36.2	263.2	Full	750	0.0	0.0
Lane 3	366	9.3	440	0.833	100	48.8	LOS D	18.2	137.3	Short	160	0.0	NA
Approach	1823	5.8		0.875		38.2	LOS D	36.2	263.2				
West: Boundary Street (W)													
Lane 1	362	13.1	805	0.450	100	23.7	LOS C	11.2	87.3	Short	85	0.0	NA
Lane 2	132	13.4	283	0.465	60 [6]	40.5	LOS D	5.7	44.8	Short	140	0.0	NA
Lane 3	218	13.4	283	0.769	100	45.7	LOS D	10.5	82.2	Full	940	0.0	0.0
Lane 4	124	9.5	146	0.844	100	60.6	LOS E	6.5	49.2	Short	60	0.0	NA
Lane 5	124	9.5	146	0.844	100	60.6	LOS E	6.5	49.2	Short	60	0.0	NA
Approach	959	12.3		0.844		40.5	LOS D	11.2	87.3				
Intersection	4625	8.7		0.875		39.1	LOS D	36.2	263.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

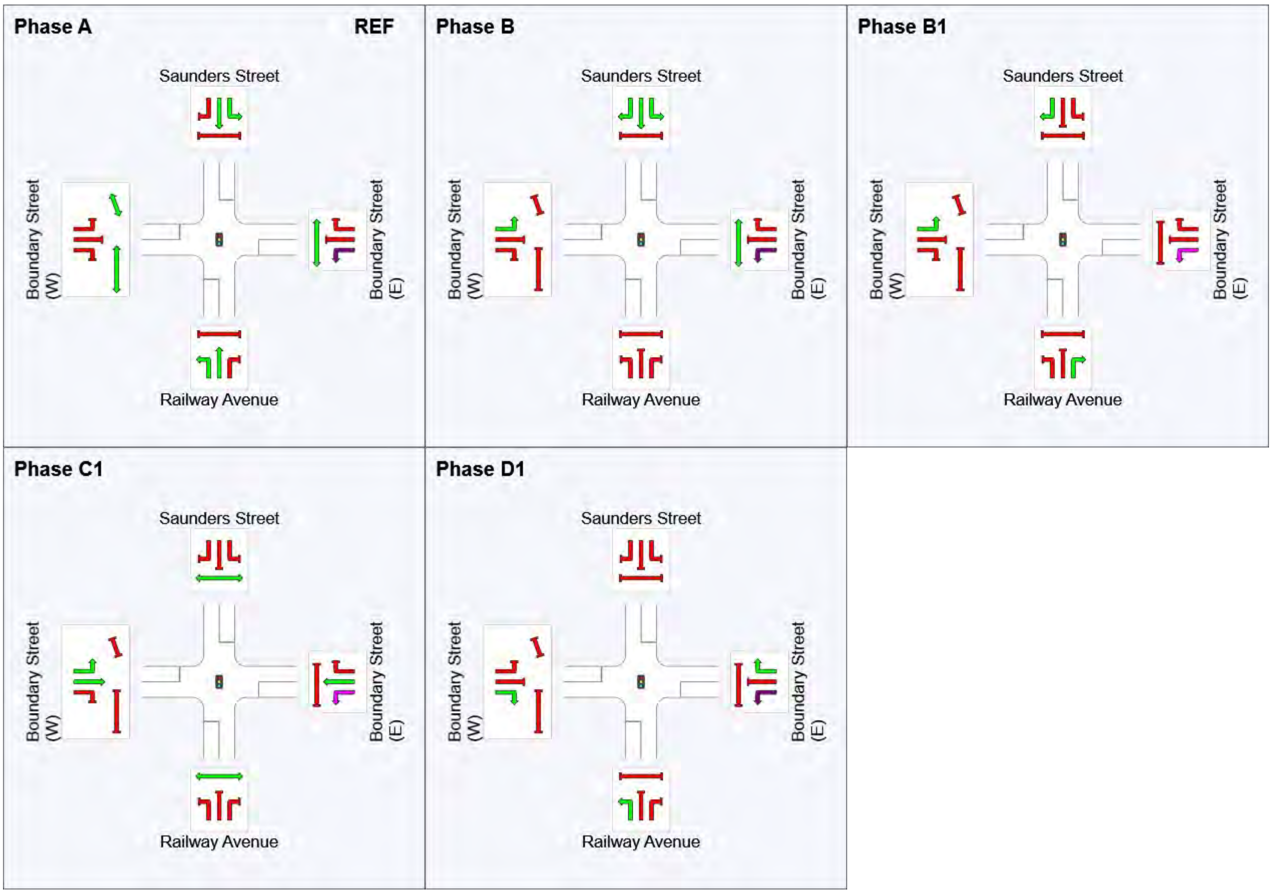
Site: 1 [Boundary / Saunders / Railway PM 2023 W/O D S2-Final]

Without Dev Traffic
Improved Layout
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C1, D1
Output Sequence: A, B, B1, C1, D1

Phase Timing Results

Phase	A	B	B1	C1	D1
Phase Change Time (sec)	0	30	48	60	81
Green Time (sec)	24	12	6	15	8
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	30	18	12	21	14
Phase Split	32%	19%	13%	22%	15%



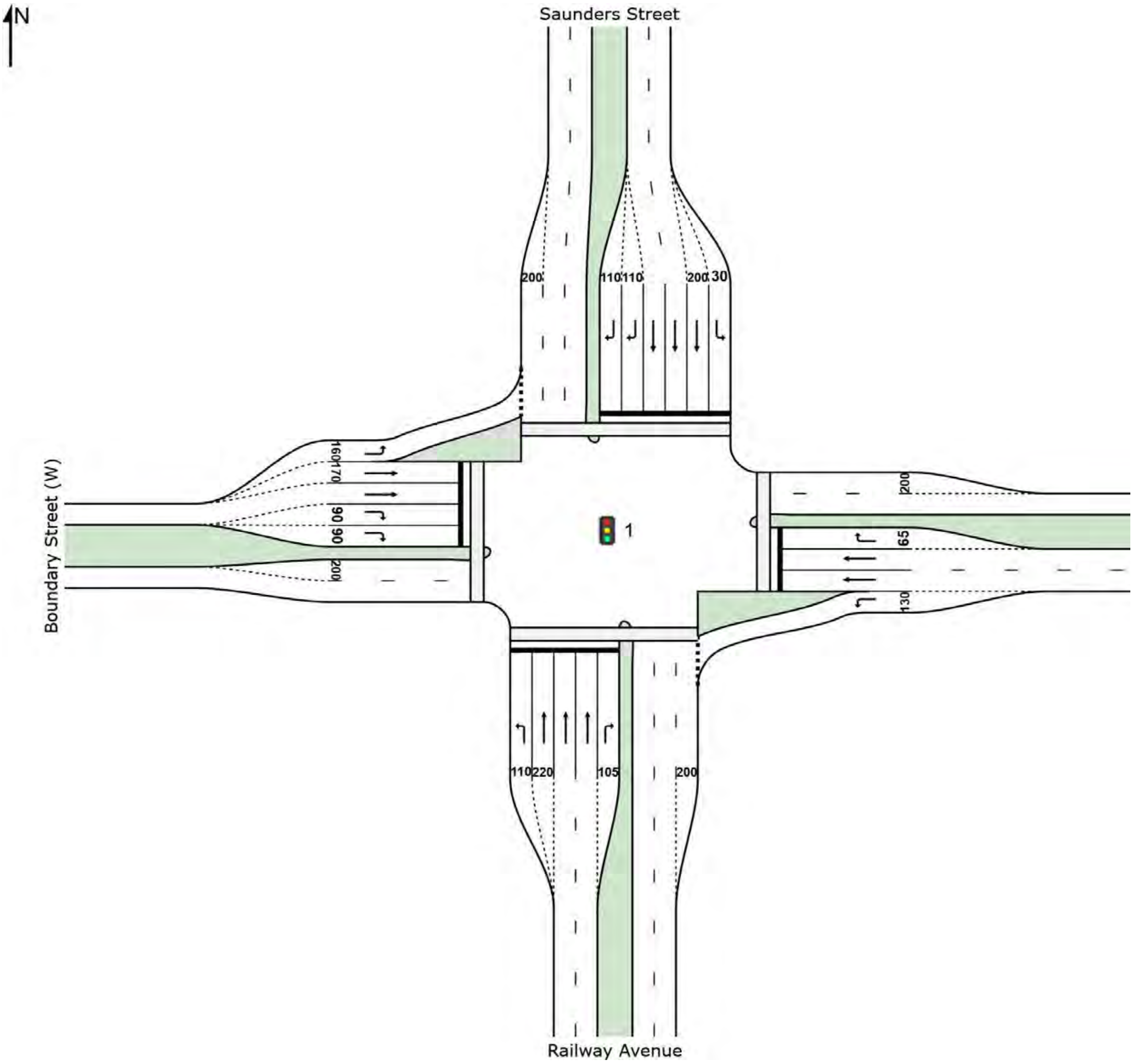
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	454	16.1	0.517	21.4	LOS C	13.6	108.7	0.70	0.79	45.1
2	T1	1888	5.0	0.844	33.8	LOS C	30.0	219.1	0.97	0.96	38.7
3	R2	146	18.8	0.653	50.4	LOS D	6.8	55.6	1.00	0.84	22.1
Approach		2488	7.8	0.844	32.5	LOS C	30.0	219.1	0.92	0.93	39.0
East: Boundary Street (E)											
4	L2	142	9.5	0.165	9.1	LOS A	1.8	13.3	0.36	0.65	44.1
5	T1	295	14.7	0.562	42.1	LOS D	6.6	52.0	0.98	0.79	38.1
6	R2	87	17.3	0.837	62.1	LOS E	4.6	37.2	1.00	0.94	29.6
Approach		524	13.7	0.837	36.5	LOS D	6.6	52.0	0.81	0.78	37.0
North: Saunders Street											
7	L2	86	11.8	0.096	17.6	LOS B	2.0	15.2	0.53	0.69	44.6
8	T1	1005	4.4	0.456	22.3	LOS C	11.7	85.3	0.78	0.67	44.0
9	R2	394	9.3	0.826	55.9	LOS E	10.0	75.8	1.00	0.95	38.7
Approach		1485	6.1	0.826	31.0	LOS C	11.7	85.3	0.82	0.75	41.9
West: Boundary Street (W)											
10	L2	535	13.1	0.747	23.2	LOS C	19.1	148.4	0.88	0.86	48.4
11	T1	435	13.4	0.822	49.1	LOS D	11.0	85.7	1.00	0.96	36.0
12	R2	160	9.5	0.728	58.5	LOS E	4.1	30.7	1.00	0.85	32.8
Approach		1129	12.7	0.822	38.1	LOS D	19.1	148.4	0.94	0.90	41.4
All Vehicles		5627	8.9	0.844	33.6	LOS C	30.0	219.1	0.89	0.86	40.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P2	East Full Crossing	1	27.3	LOS C	0.0	0.0	0.76	0.76
P3	North Full Crossing	1	41.7	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	28.8	LOS C	0.0	0.0	0.78	0.78
All Pedestrians		4	34.9	LOS D			0.85	0.85

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	454	16.1	877	0.517	100	21.4	LOS C	13.6	108.7	Short	110	0.0	NA
Lane 2	613	5.0	726[1]	0.844	100	33.7	LOS C	28.5	208.0	Short	220	0.0	NA
Lane 3	638	5.0	755	0.844	100	33.9	LOS C	30.0	219.1	Full	250	0.0	0.0
Lane 4	638	5.0	755	0.844	100	33.9	LOS C	30.0	219.1	Full	250	0.0	0.0
Lane 5	146	18.8	224	0.653	100	50.4	LOS D	6.8	55.6	Short	105	0.0	NA
Approach	2488	7.8		0.844		32.5	LOS C	30.0	219.1				
East: Boundary Street (E)													
Lane 1	142	9.5	864	0.165	100	9.1	LOS A	1.8	13.3	Short	130	0.0	NA
Lane 2	147	14.7	262	0.562	100	42.1	LOS D	6.6	52.0	Full	250	0.0	0.0
Lane 3	147	14.7	262	0.562	100	42.1	LOS D	6.6	52.0	Full	250	0.0	0.0
Lane 4	87	17.3	104	0.837	100	62.1	LOS E	4.6	37.2	Short	65	0.0	NA
Approach	524	13.7		0.837		36.5	LOS D	6.6	52.0				
North: Saunders Street													
Lane 1	86	11.8	902	0.096	100	17.6	LOS B	2.0	15.2	Short	30	0.0	NA
Lane 2	314	4.4	690[1]	0.456	100	22.0	LOS C	10.5	76.0	Short	200	0.0	NA
Lane 3	345	4.4	758	0.456	100	22.5	LOS C	11.7	85.3	Full	750	0.0	0.0
Lane 4	345	4.4	758	0.456	100	22.5	LOS C	11.7	85.3	Full	750	0.0	0.0
Lane 5	197	9.3	238	0.826	100	55.9	LOS E	10.0	75.8	Short	110	0.0	NA
Lane 6	197	9.3	238	0.826	100	55.9	LOS E	10.0	75.8	Short	110	0.0	NA
Approach	1485	6.1		0.826		31.0	LOS C	11.7	85.3				
West: Boundary Street (W)													
Lane 1	535	13.1	716	0.747	100	23.2	LOS C	19.1	148.4	Short	160	0.0	NA
Lane 2	217	13.4	264	0.822	100	49.1	LOS D	11.0	85.7	Short	170	0.0	NA
Lane 3	217	13.4	264	0.822	100	49.1	LOS D	11.0	85.7	Full	940	0.0	0.0
Lane 4	80	9.5	110	0.728	100	58.5	LOS E	4.1	30.7	Short	90	0.0	NA
Lane 5	80	9.5	110	0.728	100	58.5	LOS E	4.1	30.7	Short	90	0.0	NA
Approach	1129	12.7		0.822		38.1	LOS D	19.1	148.4				
Intersection	5627	8.9		0.844		33.6	LOS C	30.0	219.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

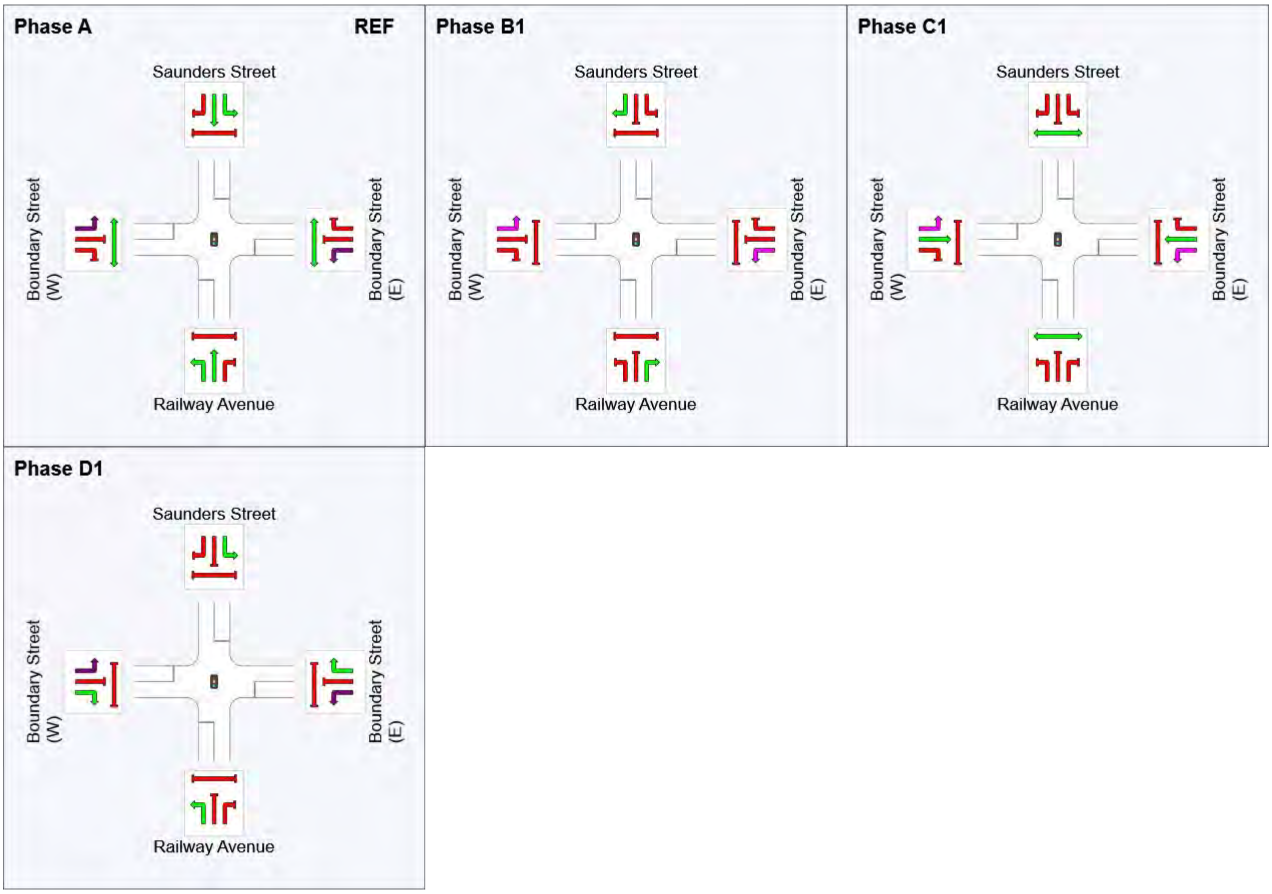
Site: 1 [Boundary / Saunders / Railway AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B1, C1, D1
Output Sequence: A, B1, C1, D1

Phase Timing Results

Phase	A	B1	C1	D1
Phase Change Time (sec)	0	44	63	83
Green Time (sec)	38	13	14	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	44	19	20	12
Phase Split	46%	20%	21%	13%



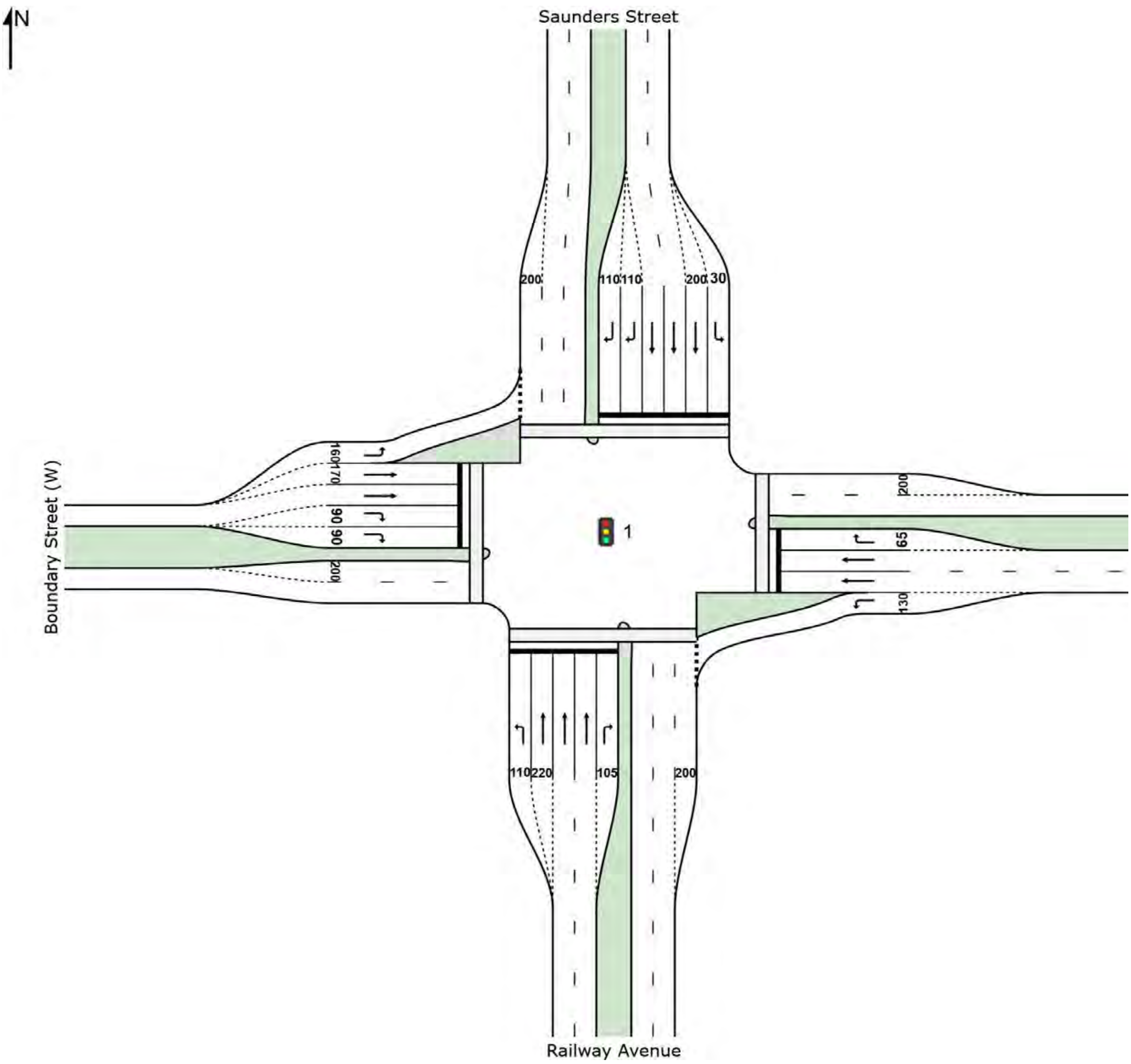
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway AM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	361	16.1	0.452	19.8	LOS B	8.8	70.4	0.71	0.78	45.9
2	T1	1503	5.0	0.829	31.4	LOS C	19.5	142.1	0.99	0.99	39.8
3	R2	116	18.8	0.530	40.5	LOS D	4.2	34.1	0.98	0.79	25.0
Approach		1980	7.8	0.829	29.8	LOS C	19.5	142.1	0.94	0.94	40.2
East: Boundary Street (E)											
4	L2	132	9.5	0.146	8.9	LOS A	1.4	10.4	0.39	0.65	44.2
5	T1	295	14.7	0.565	33.8	LOS C	5.3	41.7	0.98	0.78	41.1
6	R2	87	17.3	0.661	46.2	LOS D	3.5	27.8	1.00	0.83	34.0
Approach		514	13.8	0.661	29.5	LOS C	5.3	41.7	0.83	0.76	40.0
North: Saunders Street											
7	L2	86	11.8	0.105	17.1	LOS B	1.7	13.3	0.58	0.70	44.9
8	T1	935	4.4	0.524	22.7	LOS C	9.7	70.2	0.87	0.73	43.8
9	R2	394	9.3	0.848	48.0	LOS D	8.3	62.6	1.00	1.00	40.7
Approach		1415	6.2	0.848	29.4	LOS C	9.7	70.2	0.88	0.81	42.6
West: Boundary Street (W)											
10	L2	535	13.1	0.673	15.7	LOS B	12.4	96.3	0.78	0.81	51.4
11	T1	435	13.4	0.826	40.2	LOS D	8.9	69.5	1.00	0.98	38.8
12	R2	148	9.5	0.533	44.7	LOS D	2.8	21.6	1.00	0.77	36.6
Approach		1118	12.7	0.826	29.1	LOS C	12.4	96.3	0.90	0.87	44.6
All Vehicles		5026	9.1	0.848	29.5	LOS C	19.5	142.1	0.90	0.87	42.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	31.7	LOS D	0.0	0.0	0.92	0.92
P2	East Full Crossing	1	29.0	LOS C	0.0	0.0	0.88	0.88
P3	North Full Crossing	1	31.7	LOS D	0.0	0.0	0.92	0.92
P4	West Full Crossing	1	30.8	LOS D	0.0	0.0	0.91	0.91
All Pedestrians		4	30.8	LOS D			0.91	0.91

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway AM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated   Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	361	16.1	800	0.452	100	19.8	LOS B	8.8	70.4	Short	110	0.0	NA
Lane 2	501	5.0	604	0.829	100	31.4	LOS C	19.5	142.1	Short	220	0.0	NA
Lane 3	501	5.0	604	0.829	100	31.4	LOS C	19.5	142.1	Full	250	0.0	0.0
Lane 4	501	5.0	604	0.829	100	31.4	LOS C	19.5	142.1	Full	250	0.0	0.0
Lane 5	116	18.8	218	0.530	100	40.5	LOS D	4.2	34.1	Short	105	0.0	NA
Approach	1980	7.8		0.829		29.8	LOS C	19.5	142.1				
East: Boundary Street (E)													
Lane 1	132	9.5	902	0.146	100	8.9	LOS A	1.4	10.4	Short	130	0.0	NA
Lane 2	147	14.7	261	0.565	100	33.8	LOS C	5.3	41.7	Full	250	0.0	0.0
Lane 3	147	14.7	261	0.565	100	33.8	LOS C	5.3	41.7	Full	250	0.0	0.0
Lane 4	87	17.3	132	0.661	100	46.2	LOS D	3.5	27.8	Short	65	0.0	NA
Approach	514	13.8		0.661		29.5	LOS C	5.3	41.7				
North: Saunders Street													
Lane 1	86	11.8	822	0.105	100	17.1	LOS B	1.7	13.3	Short	30	0.0	NA
Lane 2	299	4.4	569 [1]	0.524	100	22.5	LOS C	9.0	65.1	Short	200	0.0	NA
Lane 3	318	4.4	607	0.524	100	22.8	LOS C	9.7	70.2	Full	750	0.0	0.0
Lane 4	318	4.4	607	0.524	100	22.8	LOS C	9.7	70.2	Full	750	0.0	0.0
Lane 5	197	9.3	232	0.848	100	48.0	LOS D	8.3	62.6	Short	110	0.0	NA
Lane 6	197	9.3	232	0.848	100	48.0	LOS D	8.3	62.6	Short	110	0.0	NA
Approach	1415	6.2		0.848		29.4	LOS C	9.7	70.2				
West: Boundary Street (W)													
Lane 1	535	13.1	795	0.673	100	15.7	LOS B	12.4	96.3	Short	160	0.0	NA
Lane 2	217	13.4	263	0.826	100	40.2	LOS D	8.9	69.5	Short	170	0.0	NA
Lane 3	217	13.4	263	0.826	100	40.2	LOS D	8.9	69.5	Full	940	0.0	0.0
Lane 4	74	9.5	139	0.533	100	44.7	LOS D	2.8	21.6	Short	90	0.0	NA
Lane 5	74	9.5	139	0.533	100	44.7	LOS D	2.8	21.6	Short	90	0.0	NA
Approach	1118	12.7		0.826		29.1	LOS C	12.4	96.3				
Intersection	5026	9.1		0.848		29.5	LOS C	19.5	142.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

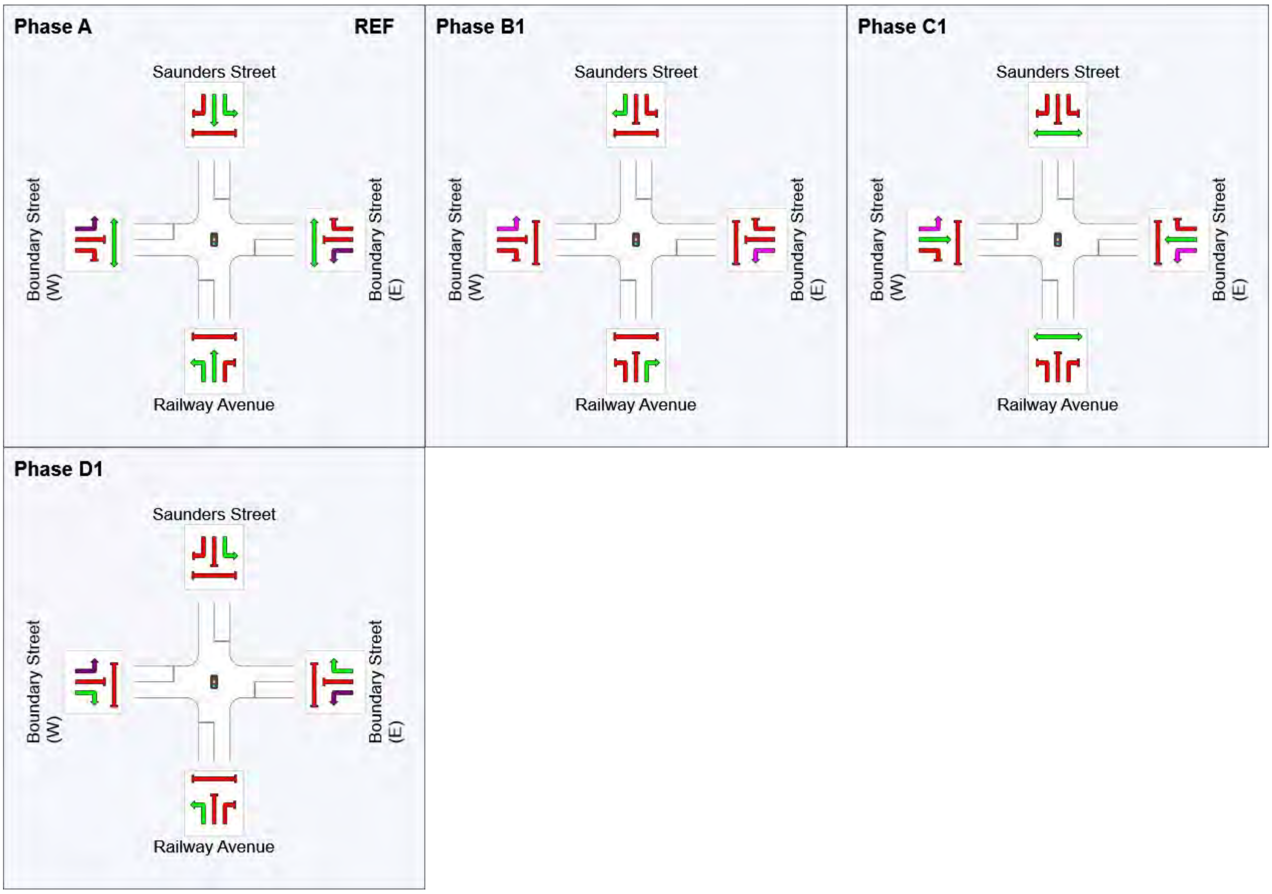
Site: 1 [Boundary / Saunders / Railway AM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated   Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B1, C1, D1
Output Sequence: A, B1, C1, D1

Phase Timing Results

Phase	A	B1	C1	D1
Phase Change Time (sec)	0	30	46	63
Green Time (sec)	24	10	11	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	30	16	17	12
Phase Split	40%	21%	23%	16%



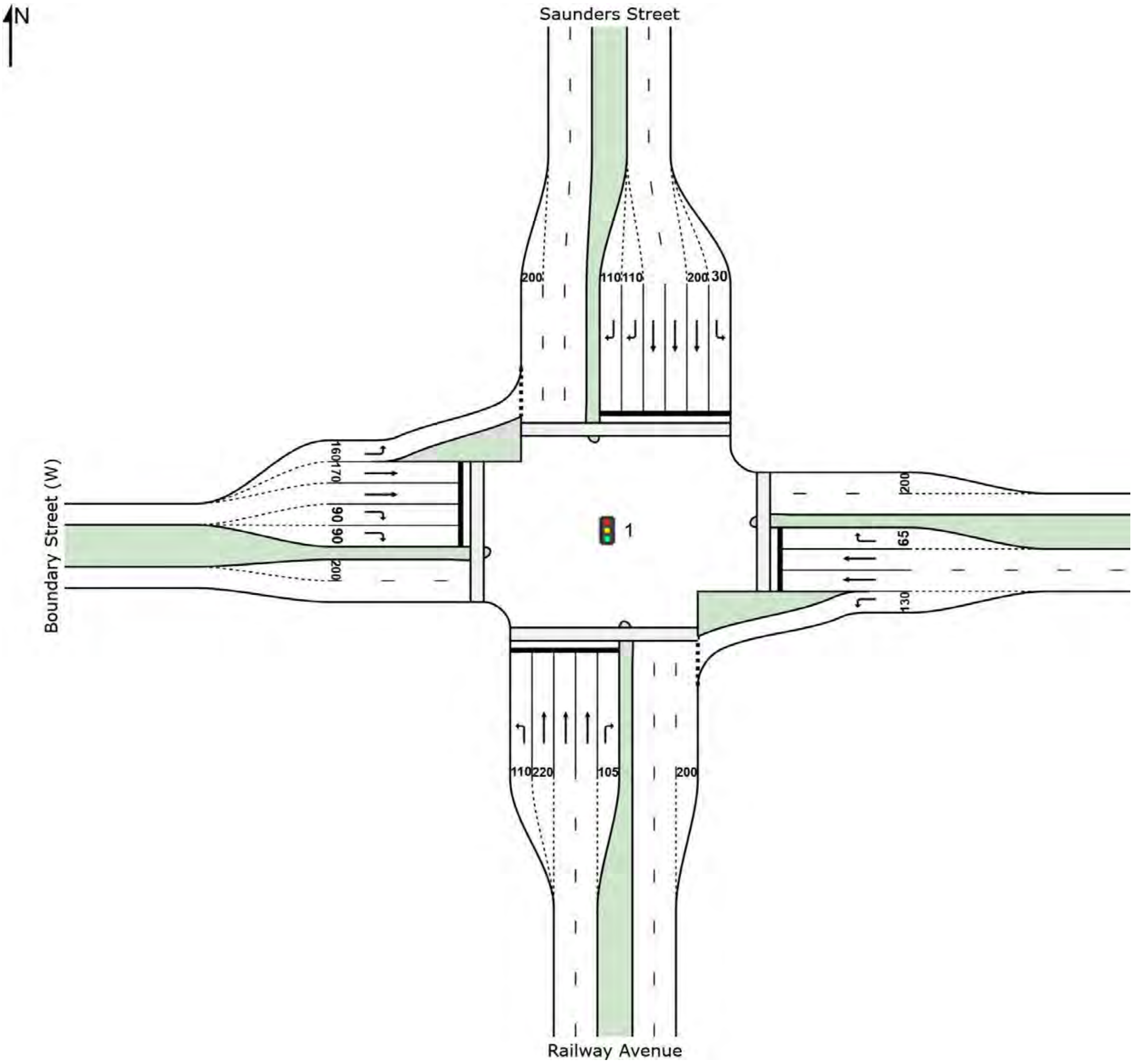
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	202	16.1	0.250	22.6	LOS C	6.0	47.8	0.62	0.74	44.6
2	T1	1258	5.0	0.706	34.4	LOS C	19.0	139.0	0.94	0.82	38.5
3	R2	94	18.8	0.858	68.4	LOS E	5.5	44.7	1.00	0.96	18.3
Approach		1554	7.3	0.858	34.9	LOS C	19.0	139.0	0.90	0.82	38.0
East: Boundary Street (E)											
4	L2	271	9.5	0.472	26.6	LOS C	9.7	73.2	0.79	0.79	31.3
5	T1	418	14.7	0.880	59.5	LOS E	12.3	96.8	1.00	1.03	33.1
6	R2	92	17.3	0.485	55.0	LOS D	4.6	37.0	0.98	0.78	31.4
Approach		780	13.2	0.880	47.6	LOS D	12.3	96.8	0.93	0.92	32.5
North: Saunders Street											
7	L2	107	11.8	0.100	13.8	LOS B	2.1	16.5	0.42	0.68	46.8
8	T1	2152	4.4	0.898	40.2	LOS D	43.9	319.1	0.95	1.01	36.3
9	R2	511	9.3	0.699	48.9	LOS D	12.6	95.3	0.98	0.86	40.4
Approach		2769	5.6	0.898	40.8	LOS D	43.9	319.1	0.93	0.97	37.6
West: Boundary Street (W)											
10	L2	489	13.1	0.579	14.8	LOS B	12.8	100.0	0.63	0.77	51.8
11	T1	363	13.4	0.759	51.7	LOS D	9.7	75.7	1.00	0.90	35.2
12	R2	341	9.5	0.858	64.4	LOS E	9.8	74.4	1.00	0.98	31.4
Approach		1194	12.2	0.858	40.2	LOS D	12.8	100.0	0.85	0.87	40.4
All Vehicles		6297	8.2	0.898	40.1	LOS D	43.9	319.1	0.91	0.91	37.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	46.7	LOS E	0.0	0.0	0.94	0.94
P2	East Full Crossing	1	24.7	LOS C	0.0	0.0	0.69	0.69
P3	North Full Crossing	1	46.7	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	37.7	LOS D	0.0	0.0	0.85	0.85
All Pedestrians		4	38.9	LOS D			0.85	0.85

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	202	16.1	809	0.250	100	22.6	LOS C	6.0	47.8	Short	110	0.0	NA
Lane 2	419	5.0	594	0.706	100	34.4	LOS C	19.0	139.0	Short	220	0.0	NA
Lane 3	419	5.0	594	0.706	100	34.4	LOS C	19.0	139.0	Full	250	0.0	0.0
Lane 4	419	5.0	594	0.706	100	34.4	LOS C	19.0	139.0	Full	250	0.0	0.0
Lane 5	94	18.8	109	0.858	100	68.4	LOS E	5.5	44.7	Short	105	0.0	NA
Approach	1554	7.3		0.858		34.9	LOS C	19.0	139.0				
East: Boundary Street (E)													
Lane 1	271	9.5	573	0.472	100	26.6	LOS C	9.7	73.2	Short	130	0.0	NA
Lane 2	209	14.7	237	0.880	100	59.5	LOS E	12.3	96.8	Full	250	0.0	0.0
Lane 3	209	14.7	237	0.880	100	59.5	LOS E	12.3	96.8	Full	250	0.0	0.0
Lane 4	92	17.3	189	0.485	100	55.0	LOS D	4.6	37.0	Short	65	0.0	NA
Approach	780	13.2		0.880		47.6	LOS D	12.3	96.8				
North: Saunders Street													
Lane 1	107	11.8	1077	0.100	100	13.8	LOS B	2.1	16.5	Short	30	0.0	NA
Lane 2	685	4.4	764 [1]	0.898	100	40.1	LOS D	37.1	269.3	Short	200	0.0	NA
Lane 3	778	4.4	867	0.898	100	40.4	LOS D	43.9	319.1	Full	750	0.0	0.0
Lane 4	688	4.4	767 [1]	0.898	100	40.1	LOS D	37.3	270.6	Full	750	0.0	0.0
Lane 5	255	9.3	365	0.699	100	48.9	LOS D	12.6	95.3	Short	110	0.0	NA
Lane 6	255	9.3	365	0.699	100	48.9	LOS D	12.6	95.3	Short	110	0.0	NA
Approach	2769	5.6		0.898		40.8	LOS D	43.9	319.1				
West: Boundary Street (W)													
Lane 1	489	13.1	845	0.579	100	14.8	LOS B	12.8	100.0	Short	160	0.0	NA
Lane 2	182	13.4	239	0.759	100	51.7	LOS D	9.7	75.7	Short	170	0.0	NA
Lane 3	182	13.4	239	0.759	100	51.7	LOS D	9.7	75.7	Full	940	0.0	0.0
Lane 4	171	9.5	199	0.858	100	64.4	LOS E	9.8	74.4	Short	90	0.0	NA
Lane 5	171	9.5	199	0.858	100	64.4	LOS E	9.8	74.4	Short	90	0.0	NA
Approach	1194	12.2		0.858		40.2	LOS D	12.8	100.0				
Intersection	6297	8.2		0.898		40.1	LOS D	43.9	319.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

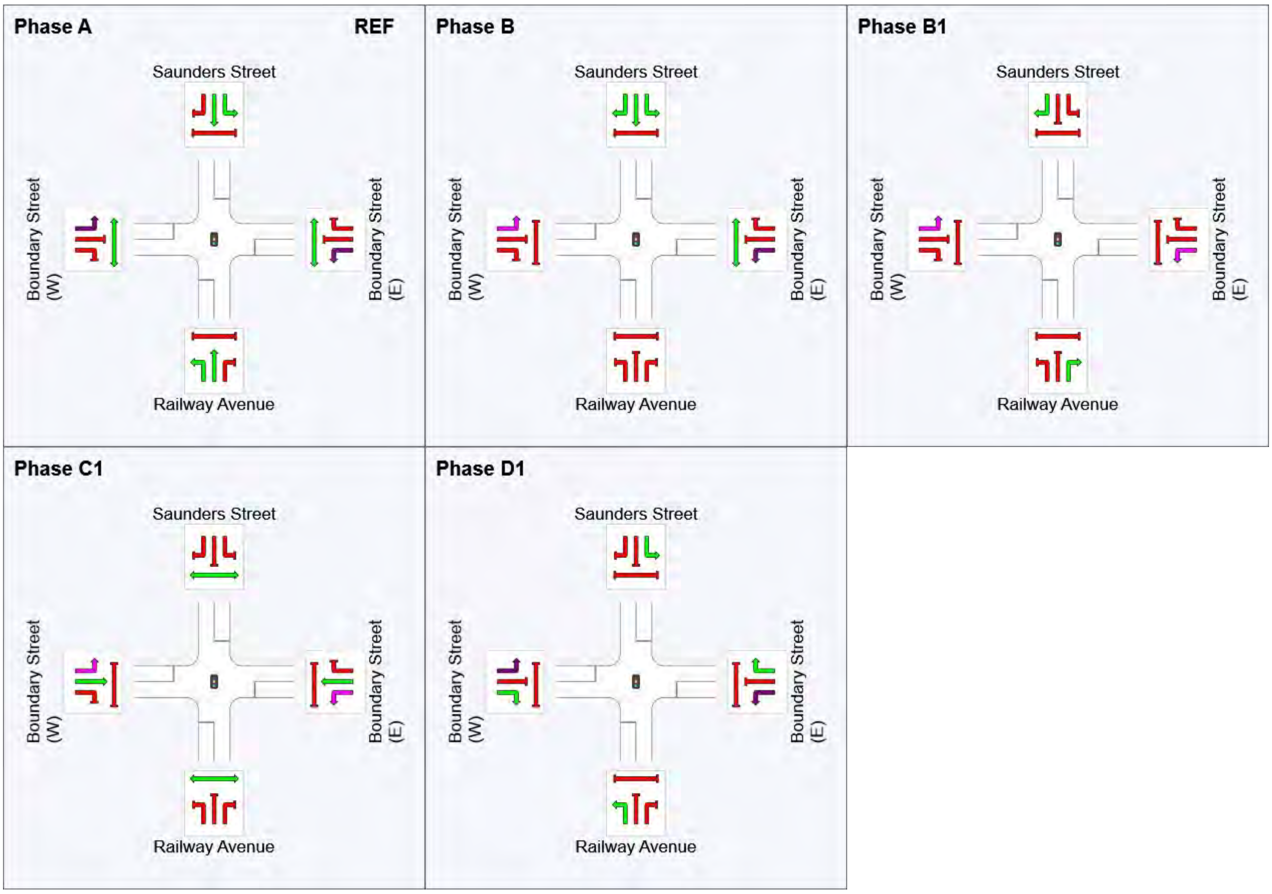
Site: 1 [Boundary / Saunders / Railway PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C1, D1
Output Sequence: A, B, B1, C1, D1

Phase Timing Results

Phase	A	B	B1	C1	D1
Phase Change Time (sec)	0	39	54	67	87
Green Time (sec)	33	9	7	14	12
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	39	15	13	20	18
Phase Split	37%	14%	12%	19%	17%



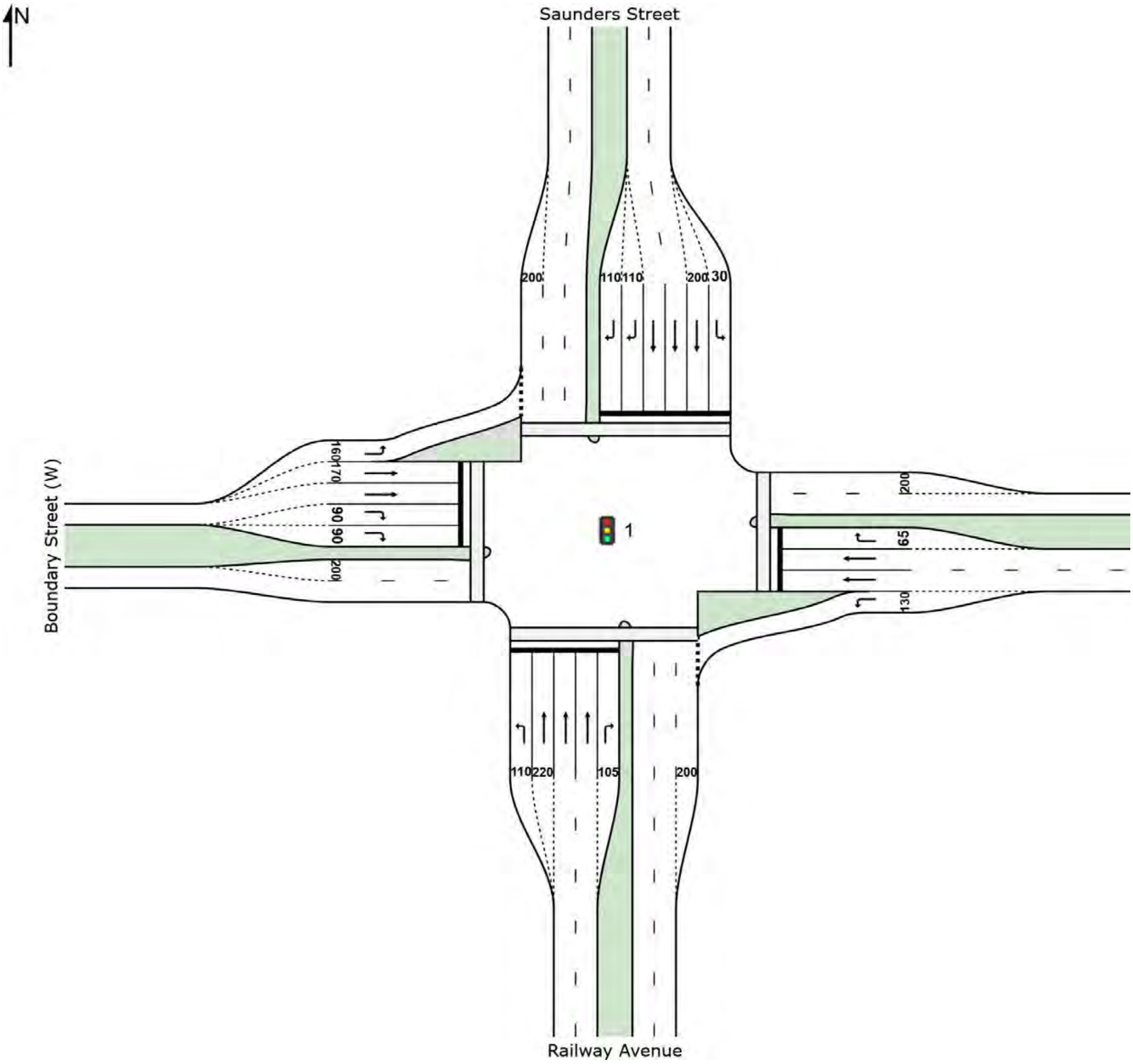
REF: Reference Phase
VAR: Variable Phase

Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class Running
Mixed Running & Stopped Movement Classes
Undetected Movement
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Other Movement Class Stopped
Phase Transition Applied

SITE LAYOUT

Site: 1 [Boundary / Saunders / Railway PM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated   Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue											
1	L2	183	16.1	0.246	21.4	LOS C	4.7	37.6	0.66	0.75	45.1
2	T1	1143	5.0	0.746	32.8	LOS C	15.3	111.8	0.97	0.89	39.1
3	R2	85	18.8	0.738	53.3	LOS D	3.9	31.8	1.00	0.87	21.4
Approach		1412	7.3	0.746	32.6	LOS C	15.3	111.8	0.93	0.87	38.9
East: Boundary Street (E)											
4	L2	233	9.5	0.355	18.2	LOS B	5.6	42.5	0.69	0.75	36.3
5	T1	418	14.7	0.832	45.5	LOS D	9.6	76.0	1.00	0.98	37.0
6	R2	92	17.3	0.523	47.1	LOS D	3.8	30.8	0.99	0.78	33.7
Approach		742	13.4	0.832	37.1	LOS D	9.6	76.0	0.90	0.88	36.5
North: Saunders Street											
7	L2	107	11.8	0.109	14.3	LOS B	2.0	15.3	0.48	0.69	46.5
8	T1	1861	4.4	0.853	32.1	LOS C	28.3	205.3	0.96	0.98	39.4
9	R2	511	9.3	0.733	43.1	LOS D	10.7	80.7	0.99	0.89	42.0
Approach		2479	5.7	0.853	33.6	LOS C	28.3	205.3	0.95	0.95	40.4
West: Boundary Street (W)											
10	L2	489	13.1	0.554	12.9	LOS B	10.0	77.5	0.62	0.76	52.6
11	T1	363	13.4	0.717	41.0	LOS D	7.8	60.8	1.00	0.88	38.5
12	R2	295	9.5	0.800	51.9	LOS D	6.7	51.1	1.00	0.93	34.5
Approach		1147	12.3	0.800	31.8	LOS C	10.0	77.5	0.84	0.84	43.3
All Vehicles		5780	8.4	0.853	33.5	LOS C	28.3	205.3	0.92	0.90	40.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	1	25.6	LOS C	0.0	0.0	0.78	0.78
P3	North Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
P4	West Full Crossing	1	36.7	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		4	33.9	LOS D			0.89	0.89

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

LANE SUMMARY

Site: 1 [Boundary / Saunders / Railway PM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue													
Lane 1	183	16.1	745	0.246	100	21.4	LOS C	4.7	37.6	Short	110	0.0	NA
Lane 2	381	5.0	511	0.746	100	32.8	LOS C	15.3	111.8	Short	220	0.0	NA
Lane 3	381	5.0	511	0.746	100	32.8	LOS C	15.3	111.8	Full	250	0.0	0.0
Lane 4	381	5.0	511	0.746	100	32.8	LOS C	15.3	111.8	Full	250	0.0	0.0
Lane 5	85	18.8	116	0.738	100	53.3	LOS D	3.9	31.8	Short	105	0.0	NA
Approach	1412	7.3		0.746		32.6	LOS C	15.3	111.8				
East: Boundary Street (E)													
Lane 1	233	9.5	655	0.355	100	18.2	LOS B	5.6	42.5	Short	130	0.0	NA
Lane 2	209	14.7	251	0.832	100	45.5	LOS D	9.6	76.0	Full	250	0.0	0.0
Lane 3	209	14.7	251	0.832	100	45.5	LOS D	9.6	76.0	Full	250	0.0	0.0
Lane 4	92	17.3	175	0.523	100	47.1	LOS D	3.8	30.8	Short	65	0.0	NA
Approach	742	13.4		0.832		37.1	LOS D	9.6	76.0				
North: Saunders Street													
Lane 1	107	11.8	988	0.109	100	14.3	LOS B	2.0	15.3	Short	30	0.0	NA
Lane 2	568	4.4	665 [1]	0.853	100	31.8	LOS C	23.9	173.7	Short	200	0.0	NA
Lane 3	647	4.4	758	0.853	100	32.2	LOS C	28.3	205.3	Full	750	0.0	0.0
Lane 4	647	4.4	758	0.853	100	32.2	LOS C	28.3	205.3	Full	750	0.0	0.0
Lane 5	255	9.3	348	0.733	100	43.1	LOS D	10.7	80.7	Short	110	0.0	NA
Lane 6	255	9.3	348	0.733	100	43.1	LOS D	10.7	80.7	Short	110	0.0	NA
Approach	2479	5.7		0.853		33.6	LOS C	28.3	205.3				
West: Boundary Street (W)													
Lane 1	489	13.1	884	0.554	100	12.9	LOS B	10.0	77.5	Short	160	0.0	NA
Lane 2	182	13.4	253	0.717	100	41.0	LOS D	7.8	60.8	Short	170	0.0	NA
Lane 3	182	13.4	253	0.717	100	41.0	LOS D	7.8	60.8	Full	940	0.0	0.0
Lane 4	147	9.5	184	0.800	100	51.9	LOS D	6.7	51.1	Short	90	0.0	NA
Lane 5	147	9.5	184	0.800	100	51.9	LOS D	6.7	51.1	Short	90	0.0	NA
Approach	1147	12.3		0.800		31.8	LOS C	10.0	77.5				
Intersection	5780	8.4		0.853		33.5	LOS C	28.3	205.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

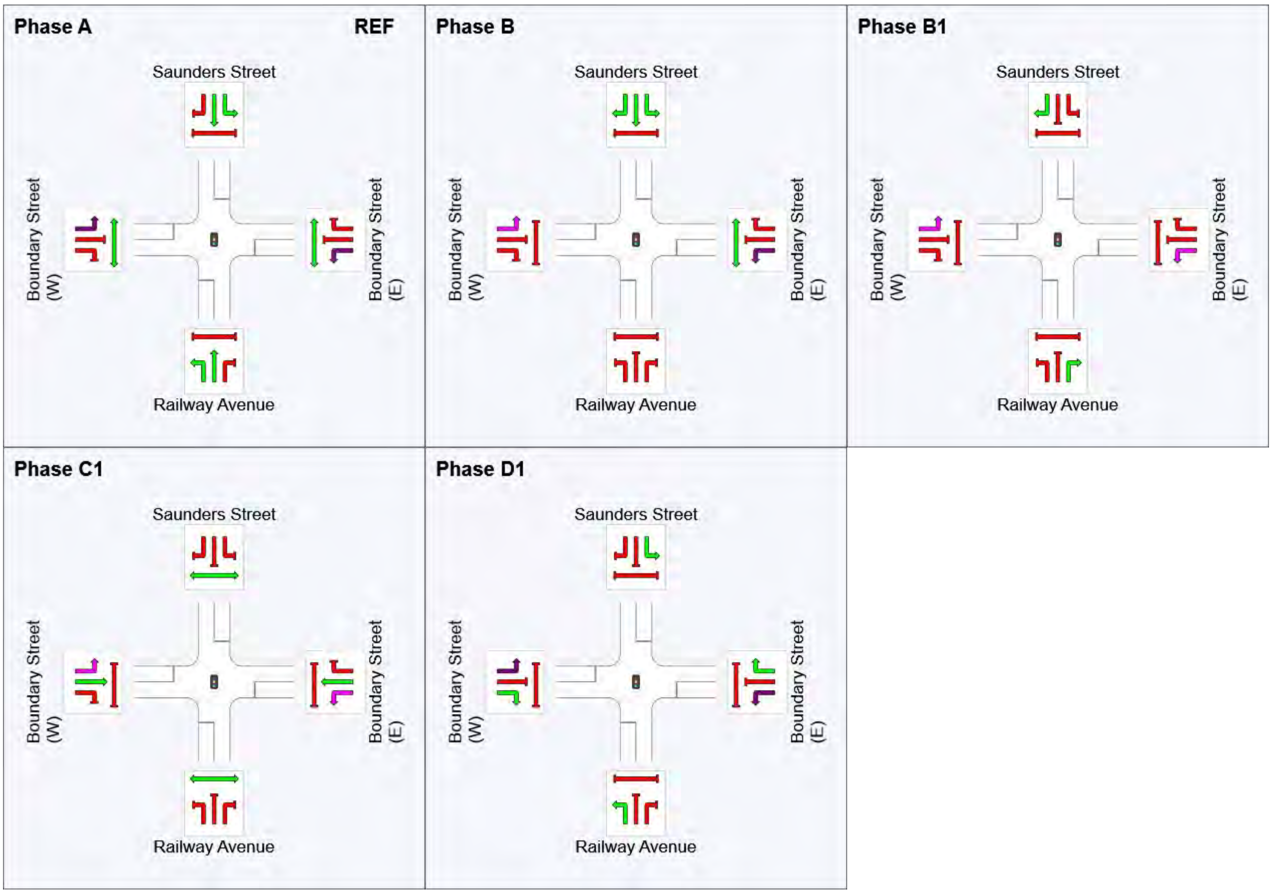
Site: 1 [Boundary / Saunders / Railway PM 2033 W/O D S5-Final]

Without Dev Traffic
Additional Improvements
Signals - Fixed Time Isolated   Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: 4-phase PM - 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C1, D1
Output Sequence: A, B, B1, C1, D1

Phase Timing Results

Phase	A	B	B1	C1	D1
Phase Change Time (sec)	0	29	40	52	70
Green Time (sec)	23	5	6	12	9
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	29	11	12	18	15
Phase Split	34%	13%	14%	21%	18%



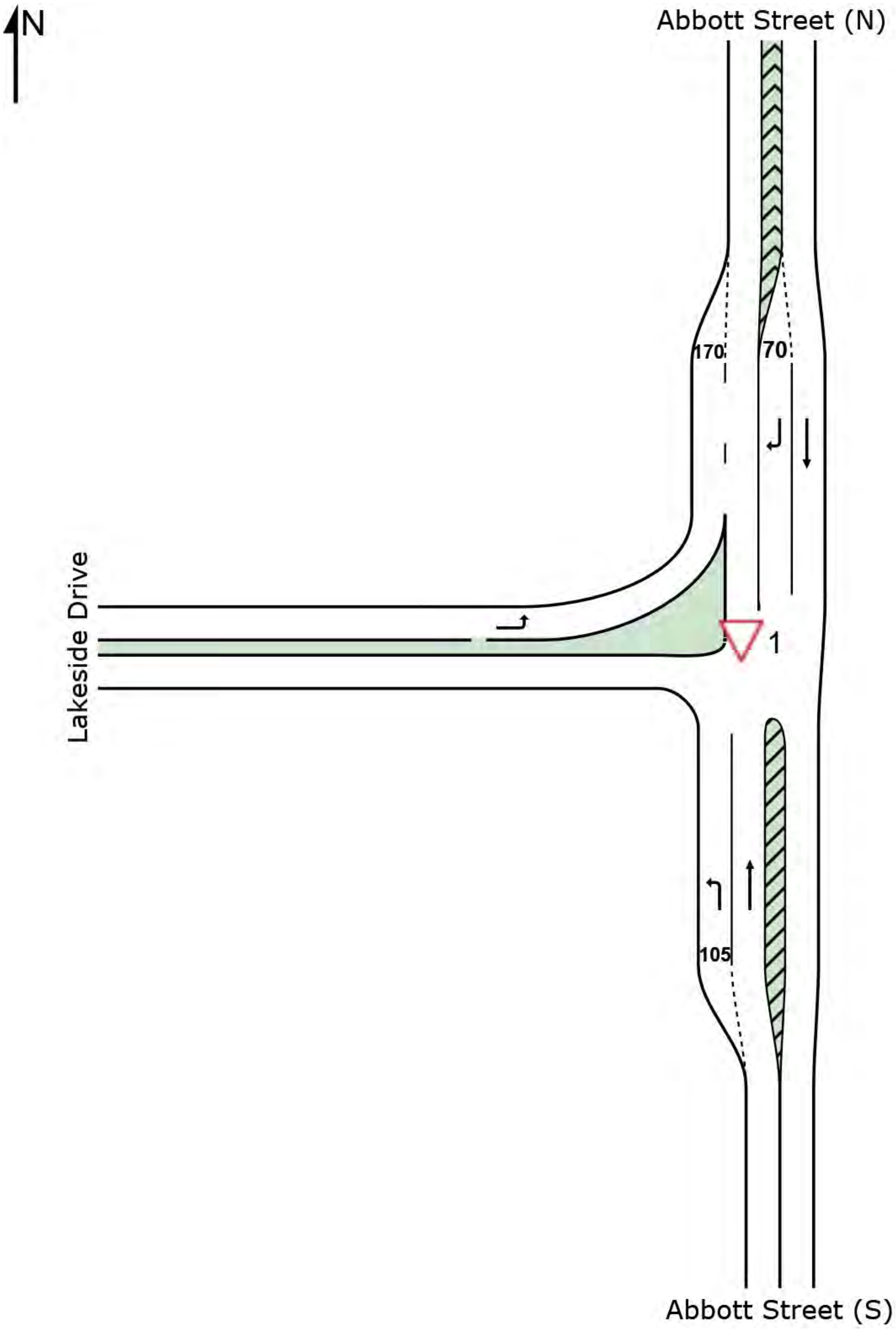
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott AM 2015]

New Site
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Abbott AM 2015]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	3	0.0	0.002	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	418	8.0	0.225	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		421	7.9	0.225	0.1	NA	0.0	0.0	0.00	0.00	79.7
North: Abbott Street (N)											
8	T1	443	14.0	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
9	R2	166	3.0	0.189	9.3	LOS A	0.8	5.5	0.51	0.76	54.8
Approach		609	11.0	0.248	2.6	NA	0.8	5.5	0.14	0.21	71.4
West: Lakeside Drive											
10	L2	774	2.0	0.423	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		774	2.0	0.423	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		1804	6.4	0.423	3.3	NA	0.8	5.5	0.05	0.30	63.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Abbott AM 2015]

New Site
Giveway / Yield (Two-Way)

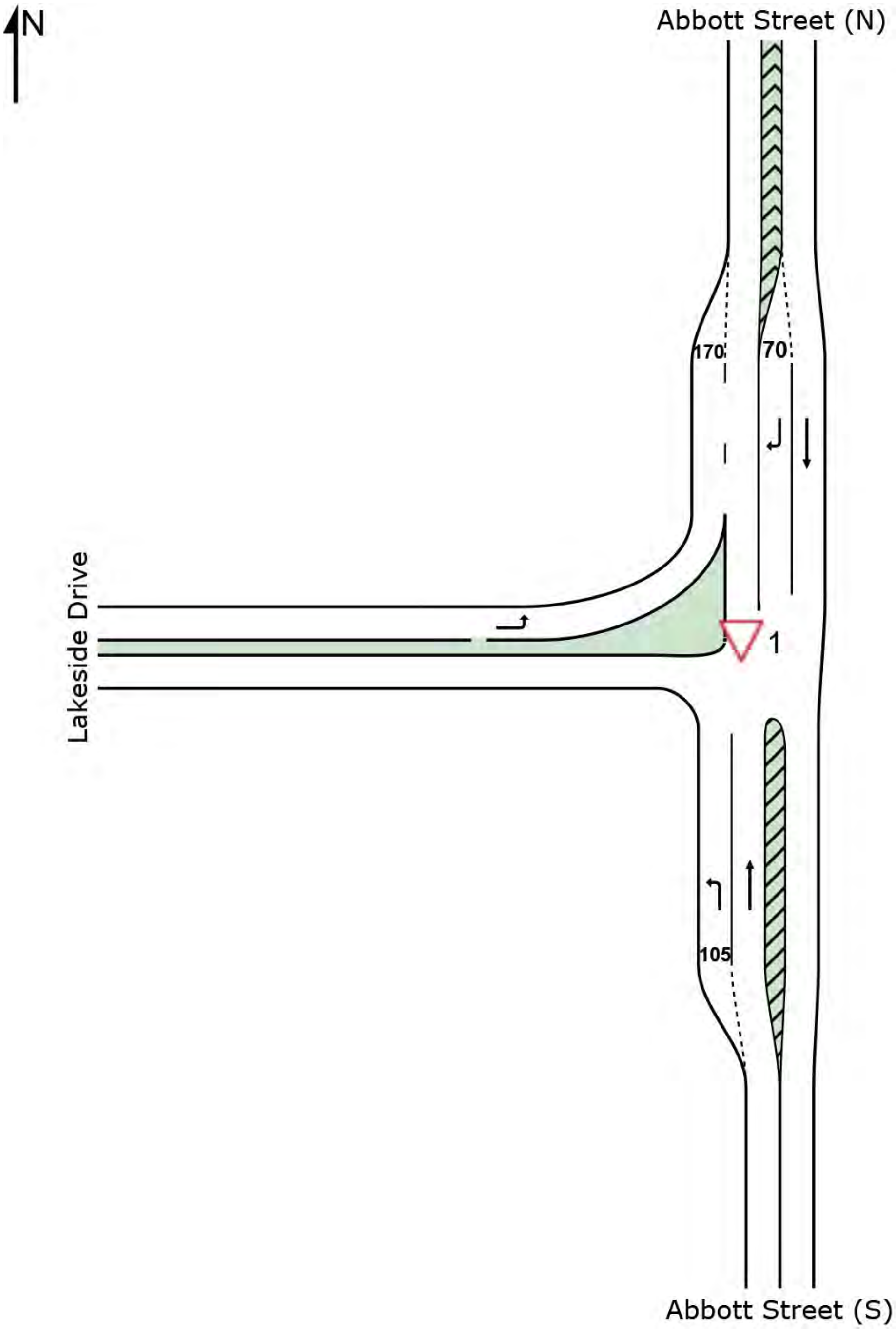
Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Abbott Street (S)													
Lane 1	3	0.0	1857	0.002	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	418	8.0	1854	0.225	100	0.0	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	421	7.9		0.225		0.1	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	443	14.0	1787	0.248	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	166	3.0	879	0.189	100	9.3	LOS A	0.8	5.5	Short	70	0.0	NA
Approach	609	11.0		0.248		2.6	NA	0.8	5.5				
West: Lakeside Drive													
Lane 1	774	2.0	1831	0.423	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	774	2.0		0.423		5.6	NA	0.0	0.0				
Intersection	1804	6.4		0.423		3.3	NA	0.8	5.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott PM 2015]

New Site
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Lakeside / Abbott PM 2015]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	6	0.0	0.003	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	264	5.0	0.140	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		271	4.9	0.140	0.2	NA	0.0	0.0	0.00	0.01	79.3
North: Abbott Street (N)											
8	T1	585	2.0	0.304	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
9	R2	325	0.0	0.298	8.3	LOS A	1.4	9.8	0.44	0.69	56.1
Approach		911	1.3	0.304	3.0	NA	1.4	9.8	0.16	0.25	69.8
West: Lakeside Drive											
10	L2	394	3.0	0.217	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		394	3.0	0.217	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		1575	2.3	0.304	3.2	NA	1.4	9.8	0.09	0.28	65.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

Site: 1 [Lakeside / Abbott PM 2015]

New Site
Giveway / Yield (Two-Way)

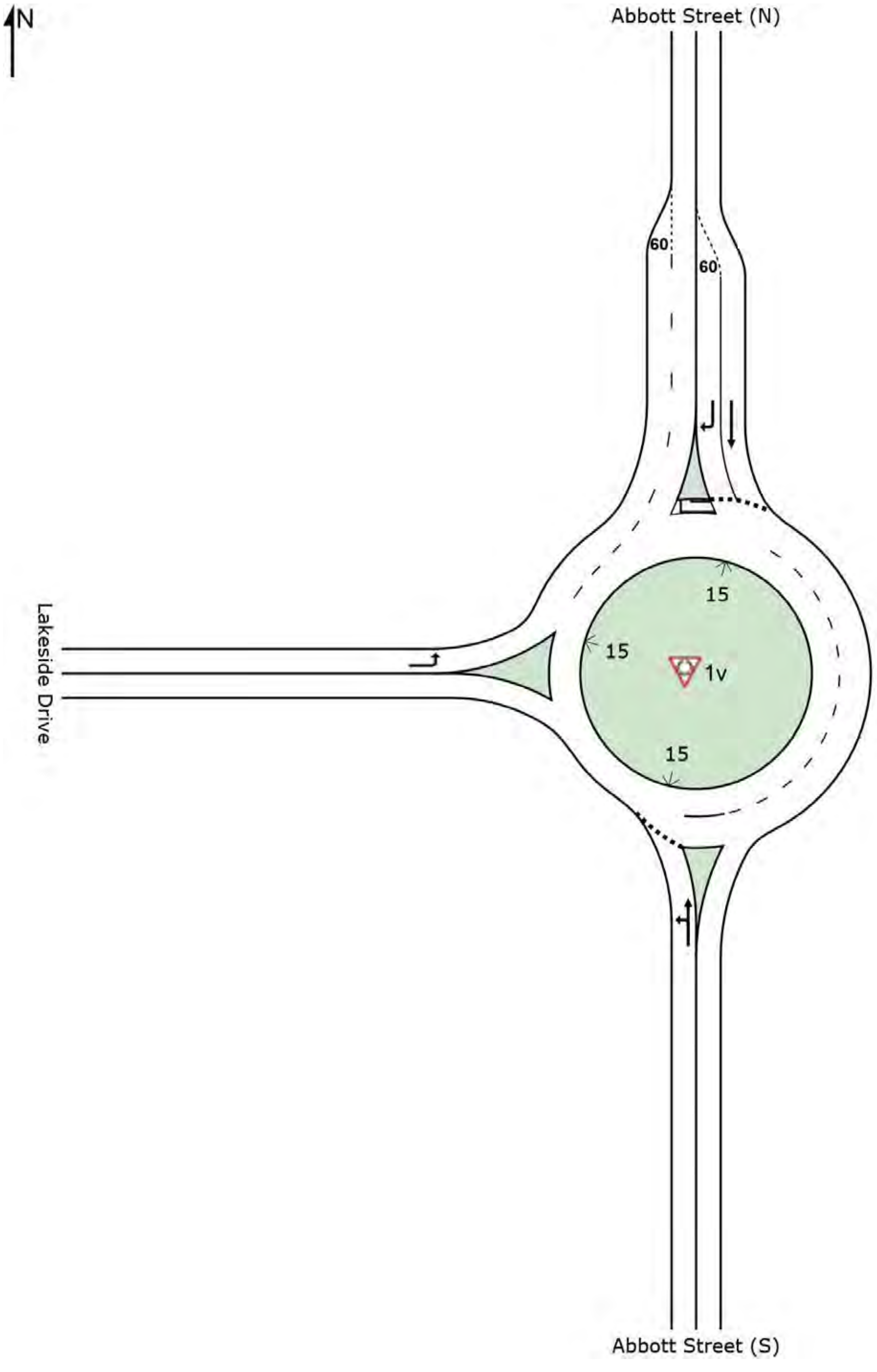
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Abbott Street (S)													
Lane 1	6	0.0	1857	0.003	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	264	5.0	1889	0.140	100	0.0	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	271	4.9		0.140		0.2	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	585	2.0	1925	0.304	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	325	0.0	1091	0.298	100	8.3	LOS A	1.4	9.8	Short	70	0.0	NA
Approach	911	1.3		0.304		3.0	NA	1.4	9.8				
West: Lakeside Drive													
Lane 1	394	3.0	1818	0.217	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	394	3.0		0.217		5.6	NA	0.0	0.0				
Intersection	1575	2.3		0.304		3.2	NA	1.4	9.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Abbott AM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, 24 March 2017 4:26:44 PM
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MOVEMENT SUMMARY

Site: 1v [Lakeside / Abbott AM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	80	0.0	0.699	11.1	LOS B	7.6	56.7	0.77	0.82	43.7
2	T1	581	8.0	0.699	12.1	LOS B	7.6	56.7	0.77	0.82	54.7
Approach		661	7.0	0.699	12.0	LOS B	7.6	56.7	0.77	0.82	53.7
North: Abbott Street (N)											
8	T1	616	14.0	0.360	6.6	LOS A	0.0	0.0	0.00	0.54	62.4
9	R2	297	3.0	0.204	10.4	LOS B	0.0	0.0	0.00	0.71	56.7
Approach		913	10.4	0.360	7.8	LOS A	0.0	0.0	0.00	0.59	60.5
West: Lakeside Drive											
10	L2	1216	2.0	0.664	4.1	LOS A	0.0	0.0	0.00	0.51	52.7
Approach		1216	2.0	0.664	4.1	LOS A	0.0	0.0	0.00	0.51	52.7
All Vehicles		2789	5.9	0.699	7.2	LOS A	7.6	56.7	0.18	0.61	55.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

LANE SUMMARY

Site: 1v [Lakeside / Abbott AM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Abbott Street (S)													
Lane 1[d]	661	7.0	946	0.699	100	12.0	LOS B	7.6	56.7	Full	220	0.0	0.0
Approach	661	7.0		0.699		12.0	LOS B	7.6	56.7				
North: Abbott Street (N)													
Lane 1[d]	616	14.0	1710	0.360	100	6.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	297	3.0	1458	0.204	100	10.4	LOS B	0.0	0.0	Short	60	0.0	NA
Approach	913	10.4		0.360		7.8	LOS A	0.0	0.0				
West: Lakeside Drive													
Lane 1[d]	1216	2.0	1831	0.664	100	4.1	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	1216	2.0		0.664		4.1	LOS A	0.0	0.0				
Intersection	2789	5.9		0.699		7.2	LOS A	7.6	56.7				

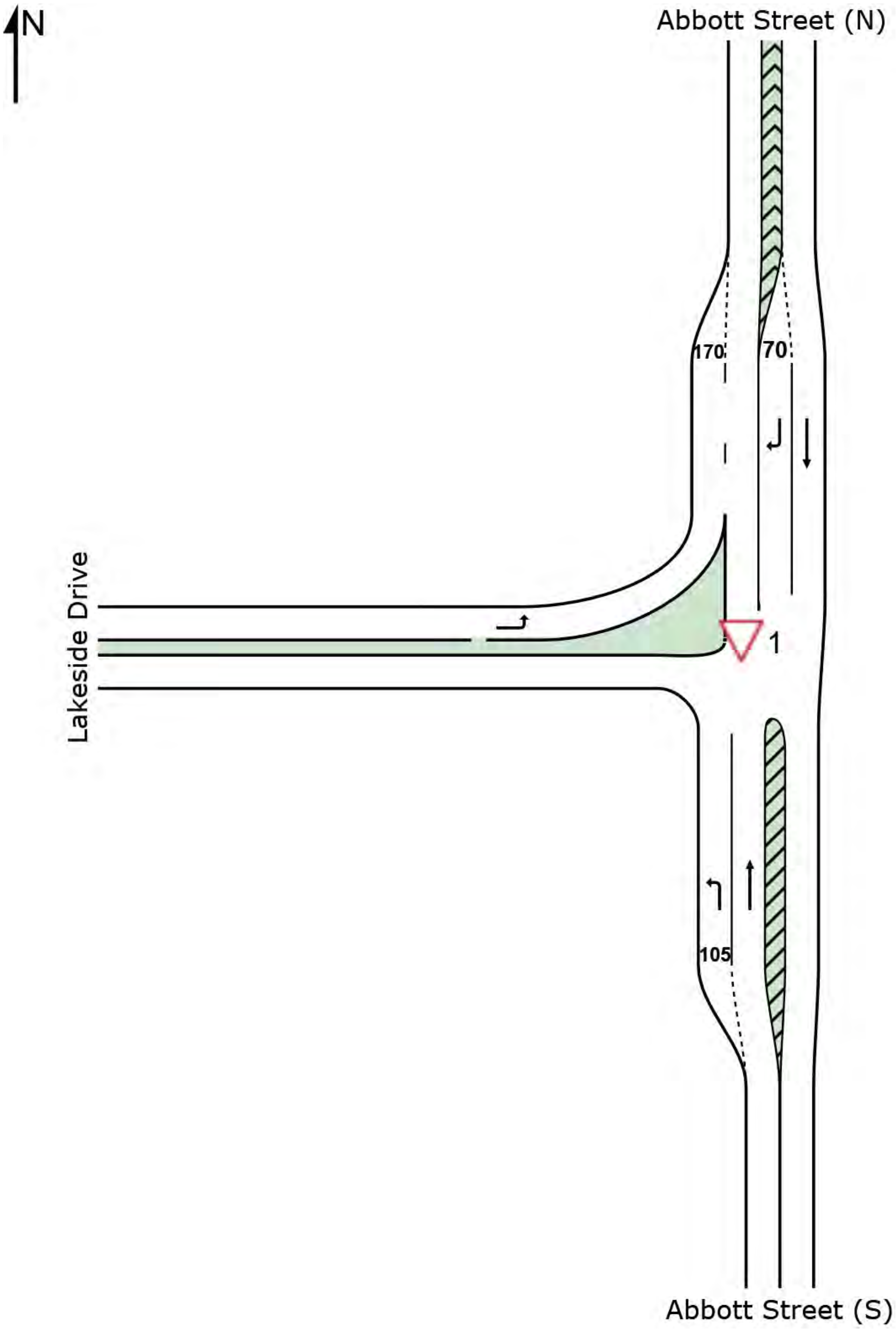
Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Abbott AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	4	0.0	0.002	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	581	8.0	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		585	7.9	0.313	0.1	NA	0.0	0.0	0.00	0.00	79.7
North: Abbott Street (N)											
8	T1	616	14.0	0.345	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
9	R2	232	3.0	0.335	11.8	LOS B	1.6	11.5	0.63	0.90	51.9
Approach		847	11.0	0.345	3.3	NA	1.6	11.5	0.17	0.25	70.1
West: Lakeside Drive											
10	L2	805	2.0	0.440	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		805	2.0	0.440	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		2238	7.0	0.440	3.3	NA	1.6	11.5	0.06	0.28	64.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

Site: 1 [Lakeside / Abbott AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Lane Use and Performance

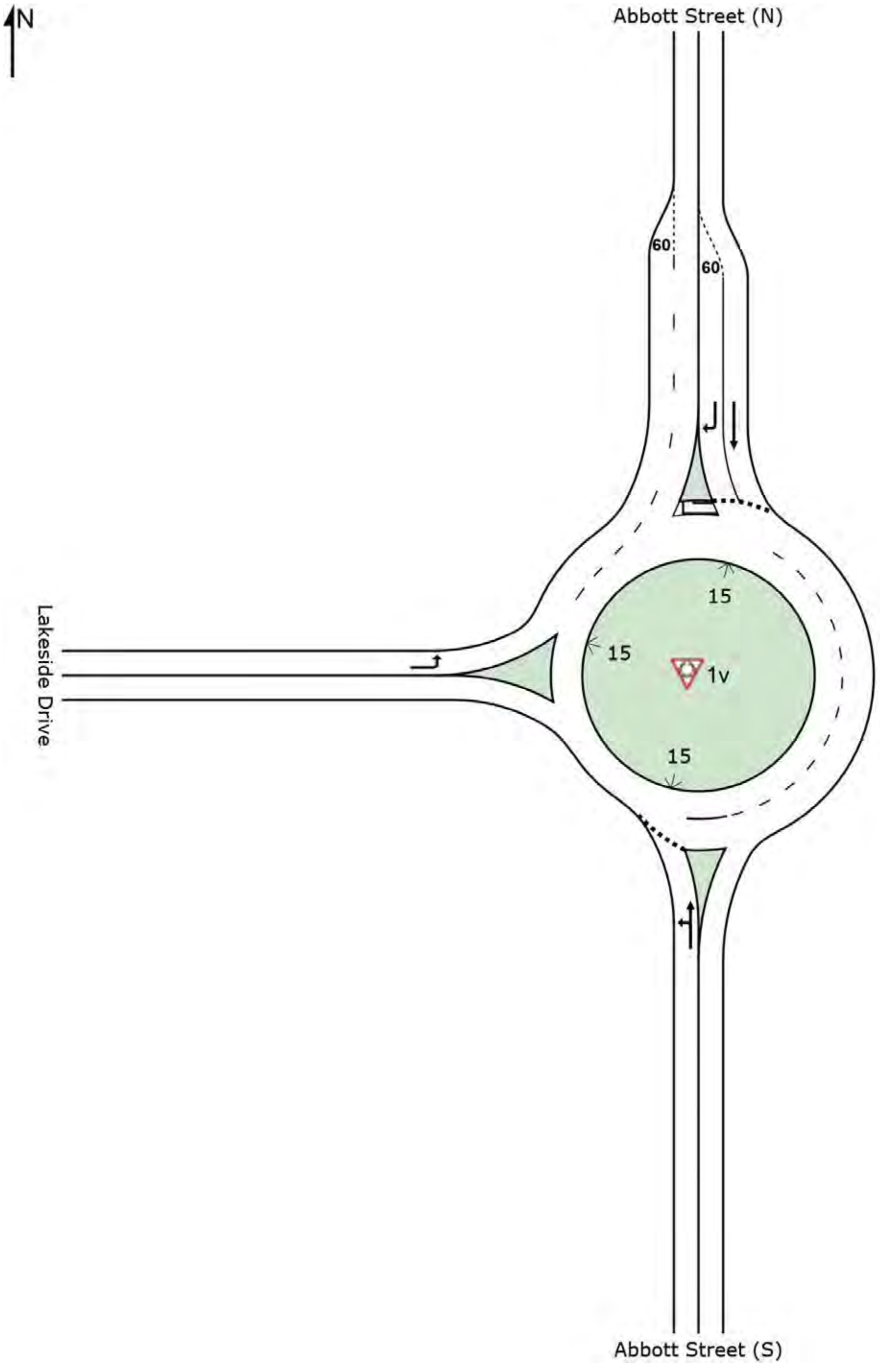
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Abbott Street (S)													
Lane 1	4	0.0	1857	0.002	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	581	8.0	1854	0.313	100	0.0	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	585	7.9		0.313		0.1	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	616	14.0	1787	0.345	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	232	3.0	690	0.335	100	11.8	LOS B	1.6	11.5	Short	70	0.0	NA
Approach	847	11.0		0.345		3.3	NA	1.6	11.5				
West: Lakeside Drive													
Lane 1	805	2.0	1831	0.440	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	805	2.0		0.440		5.6	NA	0.0	0.0				
Intersection	2238	7.0		0.440		3.3	NA	1.6	11.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Abbott PM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout



MOVEMENT SUMMARY

Site: 1v [Lakeside / Abbott PM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	32	0.0	0.689	23.4	LOS C	7.4	53.6	0.93	1.16	32.0
2	T1	367	5.0	0.689	24.4	LOS C	7.4	53.6	0.93	1.16	44.2
Approach		399	4.6	0.689	24.3	LOS C	7.4	53.6	0.93	1.16	43.5
North: Abbott Street (N)											
8	T1	814	2.0	0.524	6.4	LOS A	0.0	0.0	0.00	0.53	64.1
9	R2	868	0.0	0.475	10.3	LOS B	0.0	0.0	0.00	0.71	57.1
Approach		1682	1.0	0.524	8.4	LOS A	0.0	0.0	0.00	0.63	60.4
West: Lakeside Drive											
10	L2	568	3.0	0.313	4.1	LOS A	0.0	0.0	0.00	0.51	52.8
Approach		568	3.0	0.313	4.1	LOS A	0.0	0.0	0.00	0.51	52.8
All Vehicles		2649	2.0	0.689	9.9	LOS A	7.4	53.6	0.14	0.68	55.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

LANE SUMMARY

Site: 1v [Lakeside / Abbott PM 2023 WD Rbt S1-Final]

With Dev Traffic
Roundabout

Lane Use and Performance														
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Abbott Street (S)													
Lane 1[d]	399	4.6	579	0.689	100	24.3	LOS C	7.4	53.6	Full	220	0.0	0.0
Approach	399	4.6		0.689		24.3	LOS C	7.4	53.6				
North: Abbott Street (N)													
Lane 1	814	2.0	1553	0.524	100	6.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2[d]	868	0.0	1830	0.475	100	10.3	LOS B	0.0	0.0	Short	60	0.0	NA
Approach	1682	1.0		0.524		8.4	LOS A	0.0	0.0				
West: Lakeside Drive													
Lane 1[d]	568	3.0	1818	0.313	100	4.1	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	568	3.0		0.313		4.1	LOS A	0.0	0.0				
Intersection	2649	2.0		0.689		9.9	LOS A	7.4	53.6				

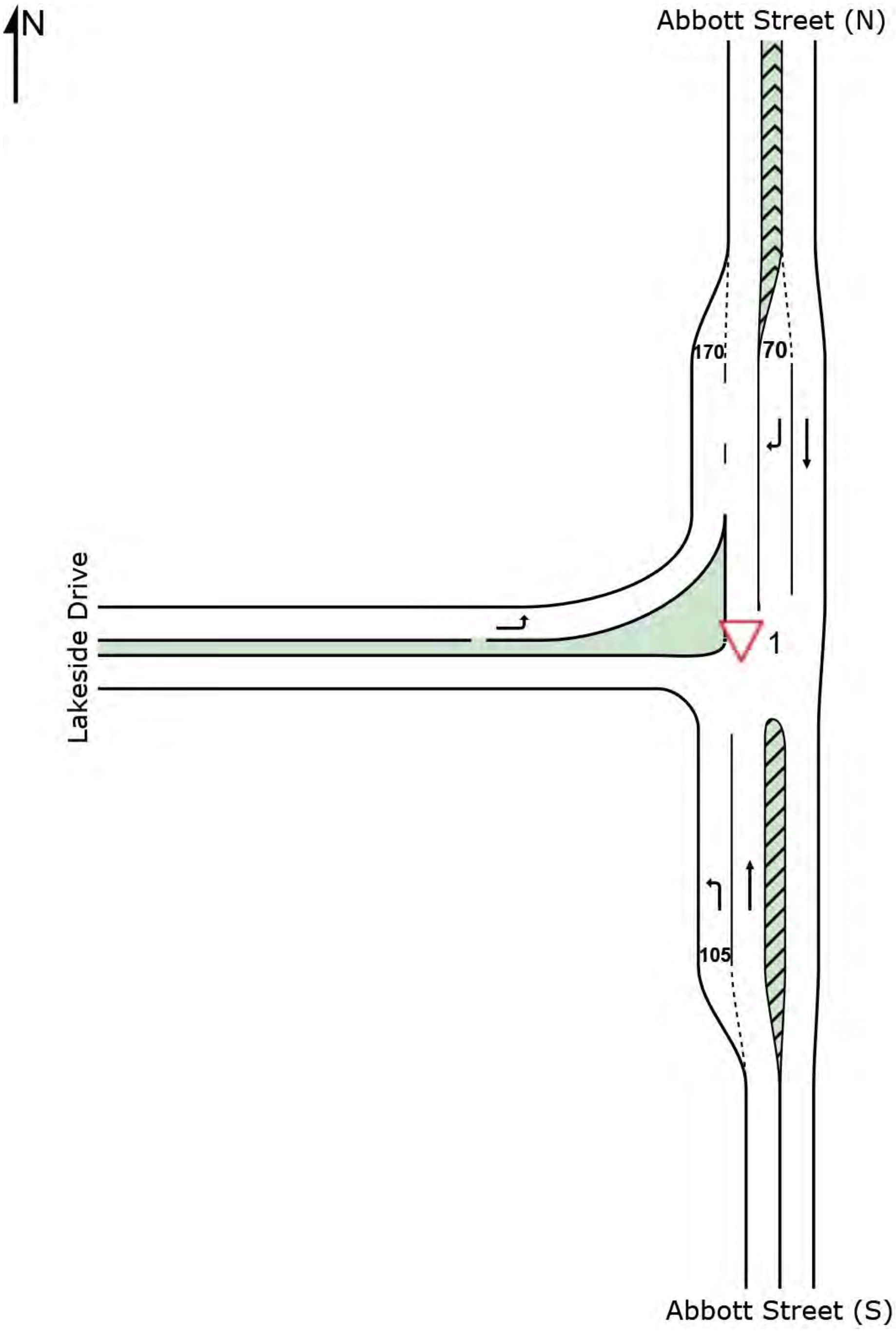
Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, 24 March 2017 4:24:03 PM
Project: C:\Users\Meng Kong\Desktop\Lakeside_Abbott.sip7

MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Abbott PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	8	0.0	0.005	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	367	5.0	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		376	4.9	0.195	0.2	NA	0.0	0.0	0.00	0.01	79.3
North: Abbott Street (N)											
8	T1	814	2.0	0.423	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
9	R2	452	0.0	0.469	10.2	LOS B	3.2	22.6	0.58	0.85	54.0
Approach		1265	1.3	0.469	3.7	NA	3.2	22.6	0.21	0.30	68.6
West: Lakeside Drive											
10	L2	409	3.0	0.225	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		409	3.0	0.225	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		2051	2.3	0.469	3.4	NA	3.2	22.6	0.13	0.29	66.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Abbott PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

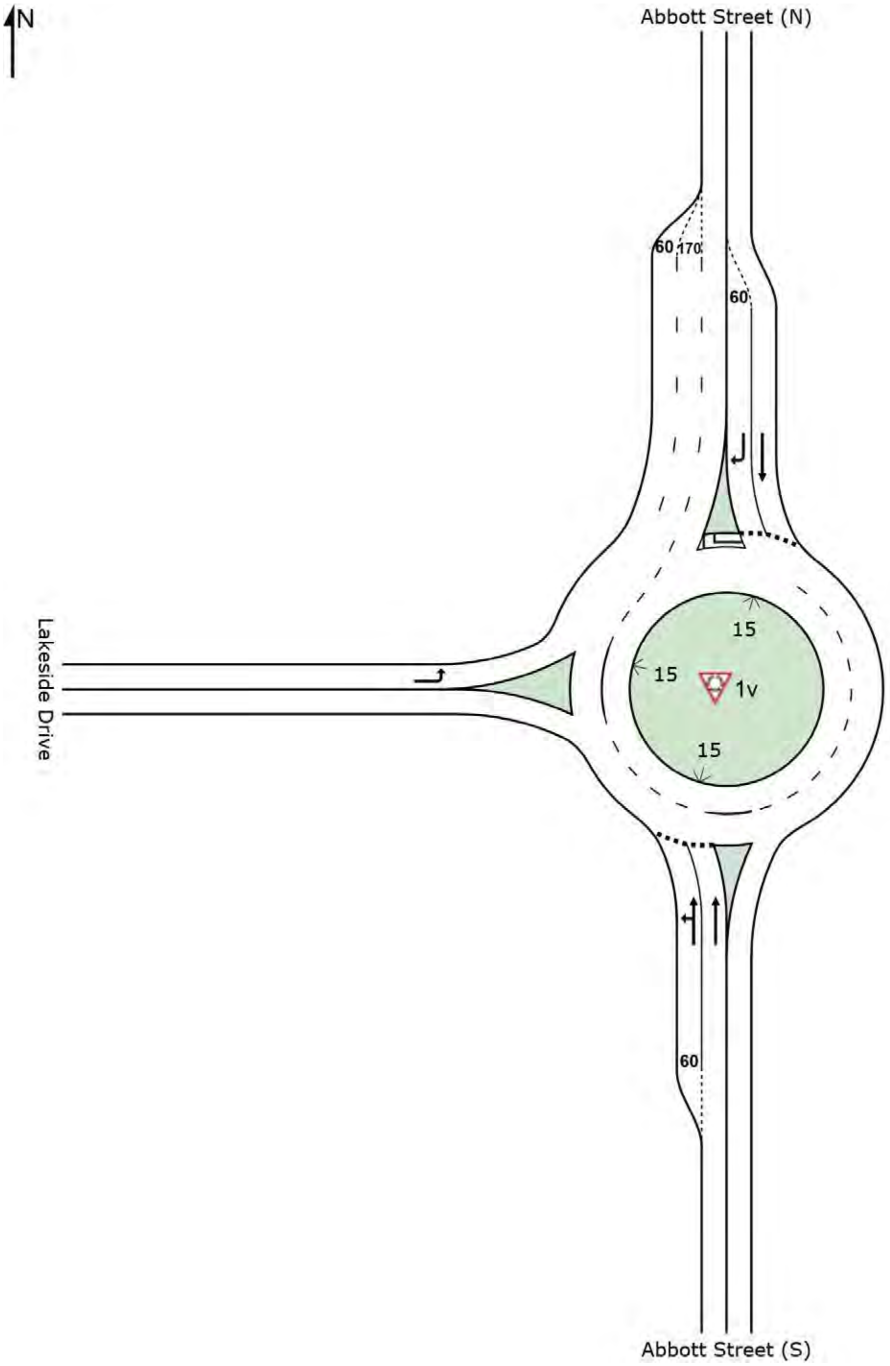
Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Abbott Street (S)													
Lane 1	8	0.0	1857	0.005	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	367	5.0	1889	0.195	100	0.0	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	376	4.9		0.195		0.2	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	814	2.0	1925	0.423	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	452	0.0	962	0.469	100	10.2	LOS B	3.2	22.6	Short	70	0.0	NA
Approach	1265	1.3		0.469		3.7	NA	3.2	22.6				
West: Lakeside Drive													
Lane 1	409	3.0	1818	0.225	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	409	3.0		0.225		5.6	NA	0.0	0.0				
Intersection	2051	2.3		0.469		3.4	NA	3.2	22.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Abbott AM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout



MOVEMENT SUMMARY

Site: 1v [Lakeside / Abbott AM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	113	0.0	0.341	7.1	LOS A	2.1	15.1	0.35	0.56	48.7
2	T1	1293	8.0	0.778	7.9	LOS A	9.8	73.4	0.54	0.54	57.7
Approach		1405	7.4	0.778	7.9	LOS A	9.8	73.4	0.53	0.54	57.2
North: Abbott Street (N)											
8	T1	565	14.0	0.330	6.6	LOS A	0.0	0.0	0.00	0.54	62.4
9	R2	98	3.0	0.074	10.4	LOS B	0.0	0.0	0.00	0.71	56.7
Approach		663	12.4	0.330	7.1	LOS A	0.0	0.0	0.00	0.56	61.5
West: Lakeside Drive											
10	L2	1228	2.0	0.671	4.2	LOS A	0.0	0.0	0.00	0.50	52.9
Approach		1228	2.0	0.671	4.2	LOS A	0.0	0.0	0.00	0.50	52.9
All Vehicles		3297	6.4	0.778	6.3	LOS A	9.8	73.4	0.23	0.53	56.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

LANE SUMMARY

Site: 1v [Lakeside / Abbott AM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Abbott Street (S)													
Lane 1	317	5.2	927	0.341	44[6]	7.6	LOS A	2.1	15.1	Short	60	0.0	NA
Lane 2[d]	1089	8.0	1399	0.778	100	8.0	LOS A	9.8	73.4	Full	220	0.0	0.0
Approach	1405	7.4		0.778		7.9	LOS A	9.8	73.4				
North: Abbott Street (N)													
Lane 1[d]	565	14.0	1710	0.330	100	6.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	98	3.0	1316	0.074	100	10.4	LOS B	0.0	0.0	Short	60	0.0	NA
Approach	663	12.4		0.330		7.1	LOS A	0.0	0.0				
West: Lakeside Drive													
Lane 1[d]	1228	2.0	1831	0.671	100	4.2	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	1228	2.0		0.671		4.2	LOS A	0.0	0.0				
Intersection	3297	6.4		0.778		6.3	LOS A	9.8	73.4				

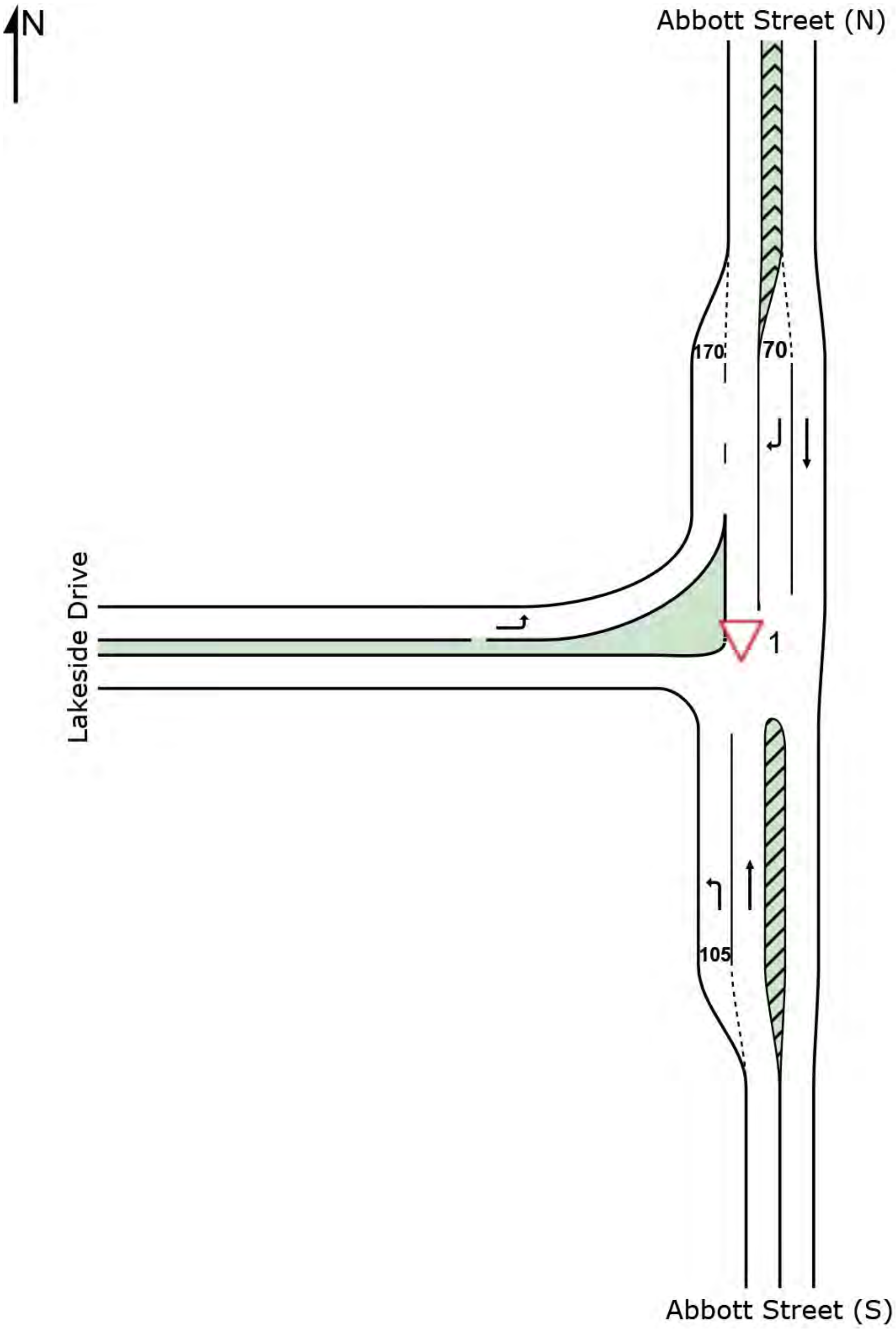
Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Abbott AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	37	0.0	0.020	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	1293	8.0	0.697	0.1	LOS A	0.0	0.0	0.00	0.00	79.3
Approach		1329	7.8	0.697	0.3	NA	0.0	0.0	0.00	0.02	78.6
North: Abbott Street (N)											
8	T1	565	14.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
9	R2	32	3.0	0.271	41.1	LOS E	0.8	5.9	0.94	0.99	32.0
Approach		597	13.4	0.316	2.2	NA	0.8	5.9	0.05	0.05	74.4
West: Lakeside Drive											
10	L2	782	2.0	0.427	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		782	2.0	0.427	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		2708	7.4	0.697	2.3	NA	0.8	5.9	0.01	0.17	68.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Abbott AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

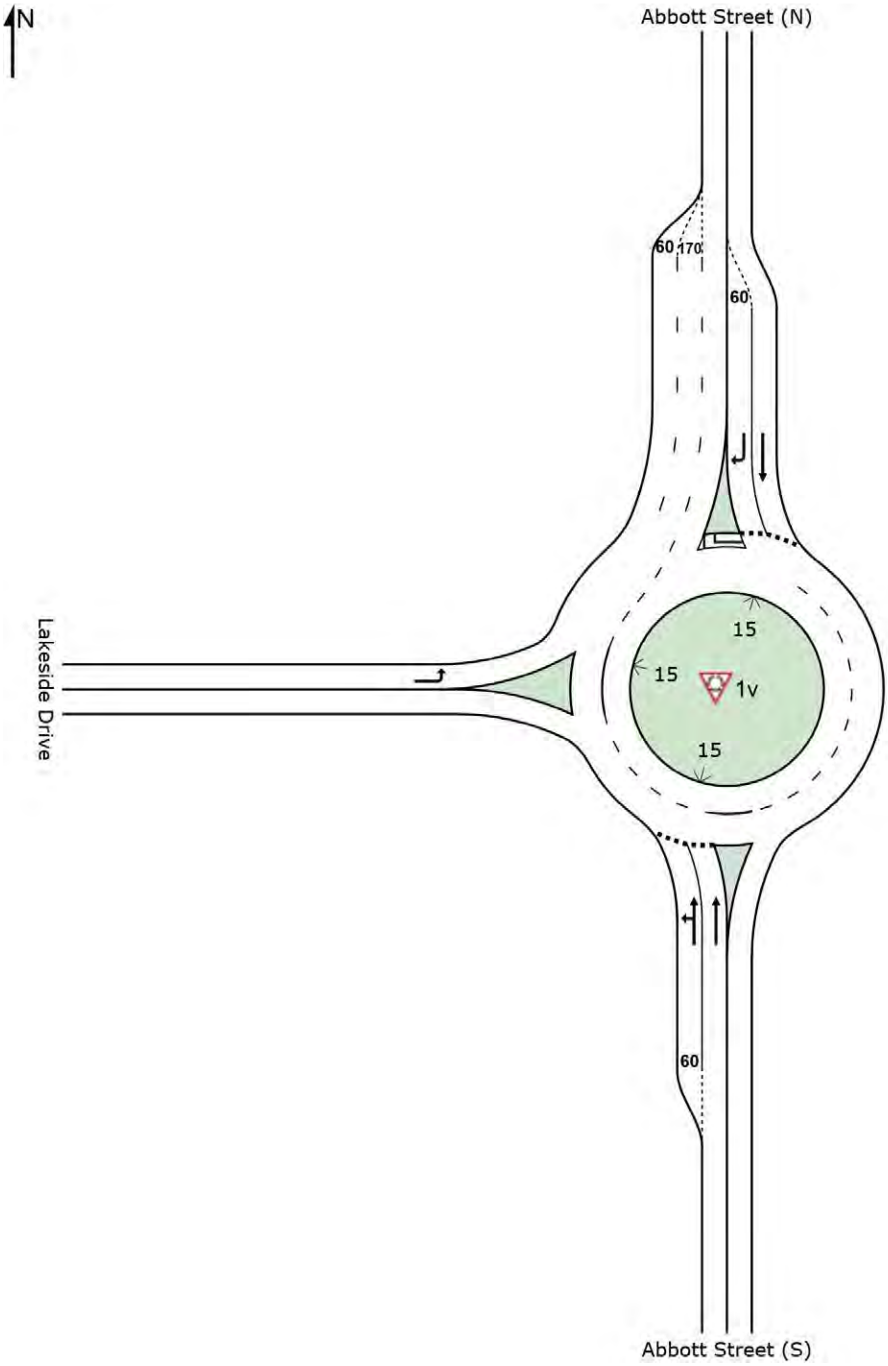
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Abbott Street (S)													
Lane 1	37	0.0	1857	0.020	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	1293	8.0	1854	0.697	100	0.1	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	1329	7.8		0.697		0.3	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	565	14.0	1787	0.316	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	32	3.0	116	0.271	100	41.1	LOS E	0.8	5.9	Short	70	0.0	NA
Approach	597	13.4		0.316		2.2	NA	0.8	5.9				
West: Lakeside Drive													
Lane 1	782	2.0	1831	0.427	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	782	2.0		0.427		5.6	NA	0.0	0.0				
Intersection	2708	7.4		0.697		2.3	NA	0.8	5.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Abbott PM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout



MOVEMENT SUMMARY

Site: 1v [Lakeside / Abbott PM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	40	0.0	0.351	14.7	LOS B	1.9	13.9	0.75	0.90	39.4
2	T1	778	5.0	0.801	22.1	LOS C	12.5	91.2	0.94	1.20	46.2
Approach		818	4.8	0.801	21.7	LOS C	12.5	91.2	0.93	1.18	46.0
North: Abbott Street (N)											
8	T1	1626	2.0	0.898	6.4	LOS A	0.0	0.0	0.00	0.53	64.1
9	R2	725	0.0	0.495	10.3	LOS B	0.0	0.0	0.00	0.71	57.1
Approach		2352	1.4	0.898	7.6	LOS A	0.0	0.0	0.00	0.59	61.8
West: Lakeside Drive											
10	L2	609	3.0	0.335	4.2	LOS A	0.0	0.0	0.00	0.50	53.0
Approach		609	3.0	0.335	4.2	LOS A	0.0	0.0	0.00	0.50	53.0
All Vehicles		3779	2.4	0.898	10.1	LOS B	12.5	91.2	0.20	0.70	56.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

LANE SUMMARY

Site: 1v [Lakeside / Abbott PM 2033 WD Rbt S2-Final]

With Dev Traffic
Roundabout

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Abbott Street (S)													
Lane 1	168	3.8	479	0.351	44[6]	15.5	LOS B	1.9	13.9	Short	60	0.0	NA
Lane 2[d]	649	5.0	811	0.801	100	23.3	LOS C	12.5	91.2	Full	220	0.0	0.0
Approach	818	4.8		0.801		21.7	LOS C	12.5	91.2				
North: Abbott Street (N)													
Lane 1[d]	1626	2.0	1812	0.898	100	6.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	725	0.0	1466	0.495	100	10.3	LOS B	0.0	0.0	Short	60	0.0	NA
Approach	2352	1.4		0.898		7.6	LOS A	0.0	0.0				
West: Lakeside Drive													
Lane 1[d]	609	3.0	1818	0.335	100	4.2	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	609	3.0		0.335		4.2	LOS A	0.0	0.0				
Intersection	3779	2.4		0.898		10.1	LOS B	12.5	91.2				

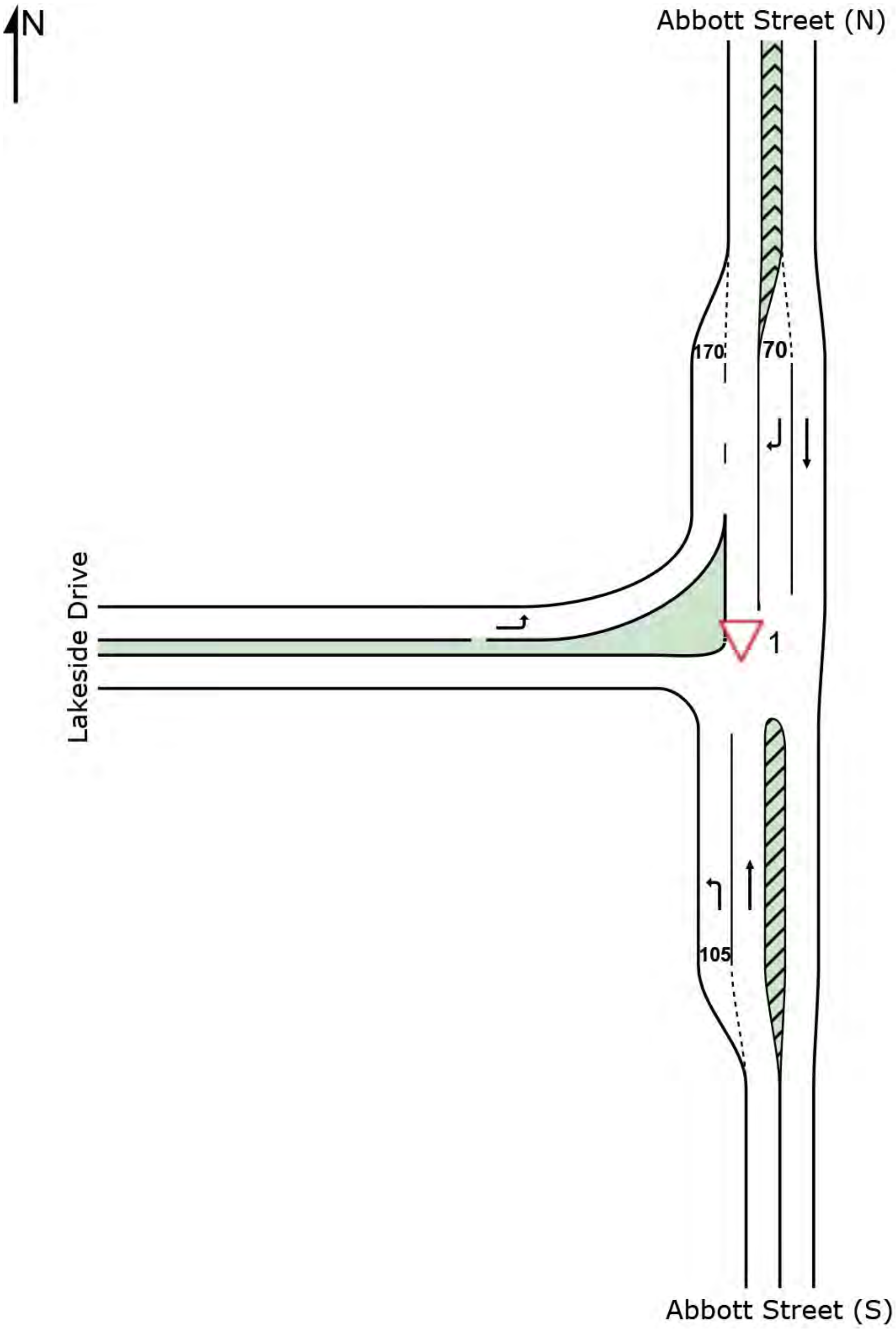
Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

SITE LAYOUT

▽ Site: 1 [Lakeside / Abbott PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Abbott PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbott Street (S)											
1	L2	17	0.0	0.009	6.9	LOS A	0.0	0.0	0.00	0.63	49.5
2	T1	778	5.0	0.412	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		795	4.9	0.412	0.2	NA	0.0	0.0	0.00	0.01	79.2
North: Abbott Street (N)											
8	T1	1626	2.0	0.845	0.5	LOS A	0.0	0.0	0.00	0.00	78.5
9	R2	308	0.0	0.605	17.9	LOS C	3.6	25.4	0.82	1.08	46.2
Approach		1935	1.7	0.845	3.2	NA	3.6	25.4	0.13	0.17	71.0
West: Lakeside Drive											
10	L2	451	3.0	0.248	5.6	LOS A	0.0	0.0	0.00	0.53	52.6
Approach		451	3.0	0.248	5.6	NA	0.0	0.0	0.00	0.53	52.6
All Vehicles		3180	2.7	0.845	2.8	NA	3.6	25.4	0.08	0.18	69.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

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

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.

LANE SUMMARY

Site: 1 [Lakeside / Abbott PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Lane Use and Performance

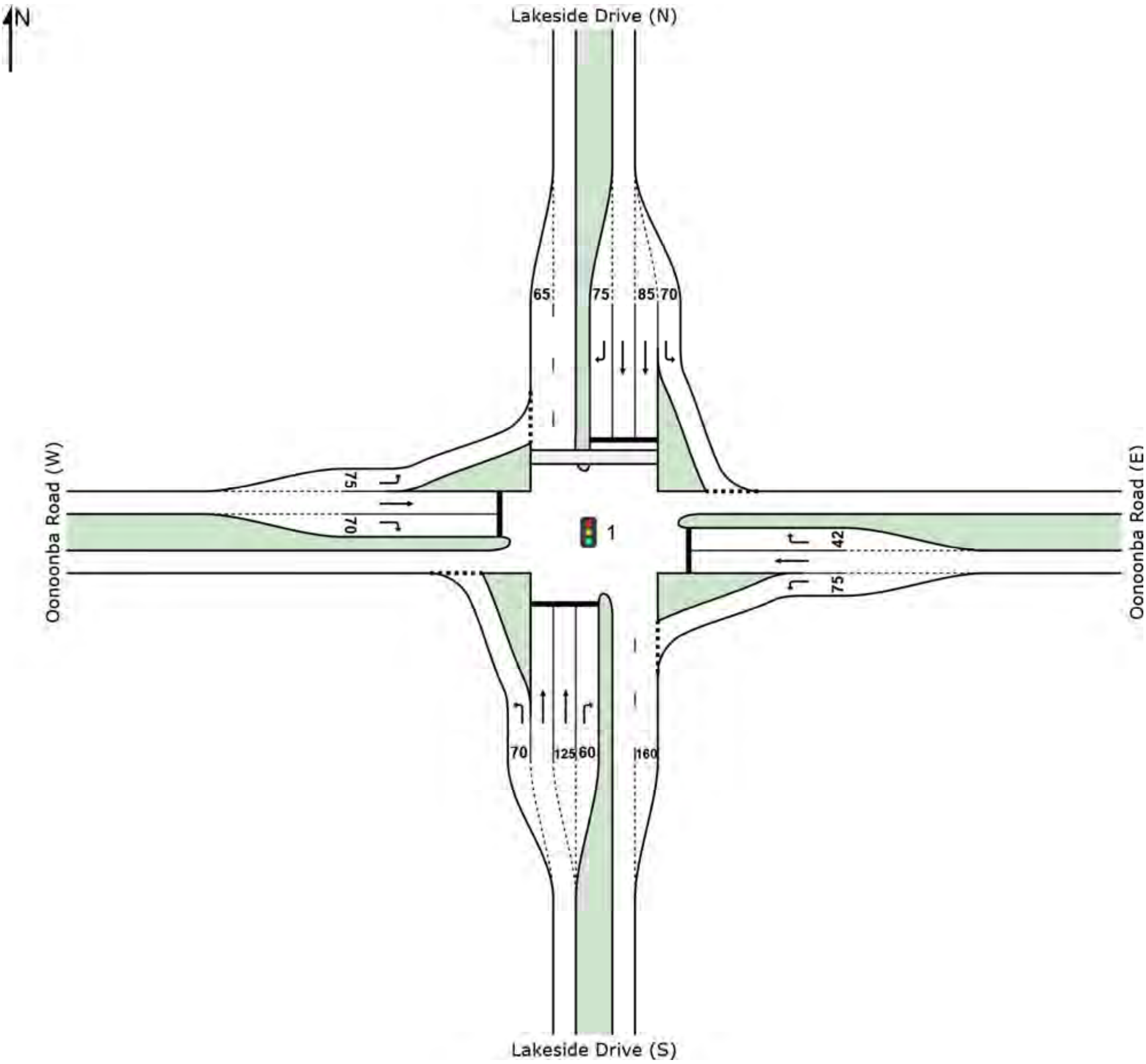
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Abbott Street (S)													
Lane 1	17	0.0	1857	0.009	100	6.9	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	778	5.0	1889	0.412	100	0.0	LOS A	0.0	0.0	Full	220	0.0	0.0
Approach	795	4.9		0.412		0.2	NA	0.0	0.0				
North: Abbott Street (N)													
Lane 1	1626	2.0	1925	0.845	100	0.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	308	0.0	510	0.605	100	17.9	LOS C	3.6	25.4	Short	70	0.0	NA
Approach	1935	1.7		0.845		3.2	NA	3.6	25.4				
West: Lakeside Drive													
Lane 1	451	3.0	1818	0.248	100	5.6	LOS A	0.0	0.0	Full	165	0.0	0.0
Approach	451	3.0		0.248		5.6	NA	0.0	0.0				
Intersection	3180	2.7		0.845		2.8	NA	3.6	25.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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.
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.

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba AM 2015]

New Site
Signals - Fixed Time Isolated



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, March 24, 2017 5:10:50 PM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2015]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	12	9.0	0.012	7.9	LOS A	0.1	0.6	0.33	0.60	54.0
2	T1	196	5.0	0.248	22.7	LOS C	4.2	30.6	0.78	0.63	47.4
3	R2	55	4.0	0.130	27.9	LOS C	1.6	11.5	0.76	0.72	40.0
Approach		262	5.0	0.248	23.1	LOS C	4.2	30.6	0.76	0.65	46.3
East: Oonoonba Road (E)											
4	L2	86	4.0	0.060	6.3	LOS A	0.3	2.3	0.18	0.59	53.3
5	T1	277	3.0	0.362	18.2	LOS B	7.6	54.6	0.75	0.63	41.2
6	R2	2	0.0	0.015	43.8	LOS D	0.1	0.6	0.94	0.61	29.7
Approach		365	3.2	0.362	15.5	LOS B	7.6	54.6	0.61	0.62	44.3
North: Lakeside Drive (N)											
7	L2	6	17.0	0.006	7.0	LOS A	0.0	0.3	0.25	0.58	49.9
8	T1	57	6.0	0.054	21.4	LOS C	0.8	6.2	0.74	0.54	48.0
9	R2	118	1.0	0.354	33.1	LOS C	3.9	27.7	0.87	0.78	39.3
Approach		181	3.1	0.354	28.5	LOS C	3.9	27.7	0.80	0.70	42.4
West: Oonoonba Road (W)											
10	L2	428	1.0	0.308	6.9	LOS A	2.9	20.3	0.29	0.64	53.6
11	T1	189	5.0	0.251	17.2	LOS B	4.9	36.0	0.71	0.59	41.9
12	R2	8	0.0	0.060	44.5	LOS D	0.3	2.2	0.95	0.66	38.3
Approach		626	2.2	0.308	10.5	LOS B	4.9	36.0	0.42	0.62	50.3
All Vehicles		1435	3.1	0.362	16.4	LOS B	7.6	54.6	0.58	0.64	46.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	2	24.8	LOS C	0.0	0.0	0.79	0.79
All Pedestrians		2	24.8	LOS C			0.79	0.79

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2015]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive (S)													
Lane 1	12	9.0	989	0.012	100	7.9	LOS A	0.1	0.6	Short	70	0.0	NA
Lane 2	55	5.0	567	0.097	39[6]	21.8	LOS C	1.6	11.3	Full	830	0.0	0.0
Lane 3	141	5.0	567	0.248	100	23.0	LOS C	4.2	30.6	Short	125	0.0	NA
Lane 4	55	4.0	422	0.130	100	27.9	LOS C	1.6	11.5	Short	60	0.0	NA
Approach	262	5.0		0.248		23.1	LOS C	4.2	30.6				
East: Oonoonba Road (E)													
Lane 1	86	4.0	1434	0.060	100	6.3	LOS A	0.3	2.3	Short	75	0.0	NA
Lane 2	277	3.0	765	0.362	100	18.2	LOS B	7.6	54.6	Full	140	0.0	0.0
Lane 3	2	0.0	139	0.015	100	43.8	LOS D	0.1	0.6	Short	42	0.0	NA
Approach	365	3.2		0.362		15.5	LOS B	7.6	54.6				
North: Lakeside Drive (N)													
Lane 1	6	17.0	1069	0.006	100	7.0	LOS A	0.0	0.3	Short	70	0.0	NA
Lane 2	26	6.0	563	0.047	87[6]	21.3	LOS C	0.7	5.4	Short	85	0.0	NA
Lane 3	30	6.0	563	0.054	100	21.4	LOS C	0.8	6.2	Full	575	0.0	0.0
Lane 4	118	1.0	333	0.354	100	33.1	LOS C	3.9	27.7	Short	75	0.0	NA
Approach	181	3.1		0.354		28.5	LOS C	3.9	27.7				
West: Oonoonba Road (W)													
Lane 1	428	1.0	1389	0.308	100	6.9	LOS A	2.9	20.3	Short	75	0.0	NA
Lane 2	189	5.0	755	0.251	100	17.2	LOS B	4.9	36.0	Full	500	0.0	0.0
Lane 3	8	0.0	139	0.060	100	44.5	LOS D	0.3	2.2	Short	70	0.0	NA
Approach	626	2.2		0.308		10.5	LOS B	4.9	36.0				
Intersection	1435	3.1		0.362		16.4	LOS B	7.6	54.6				

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.

6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

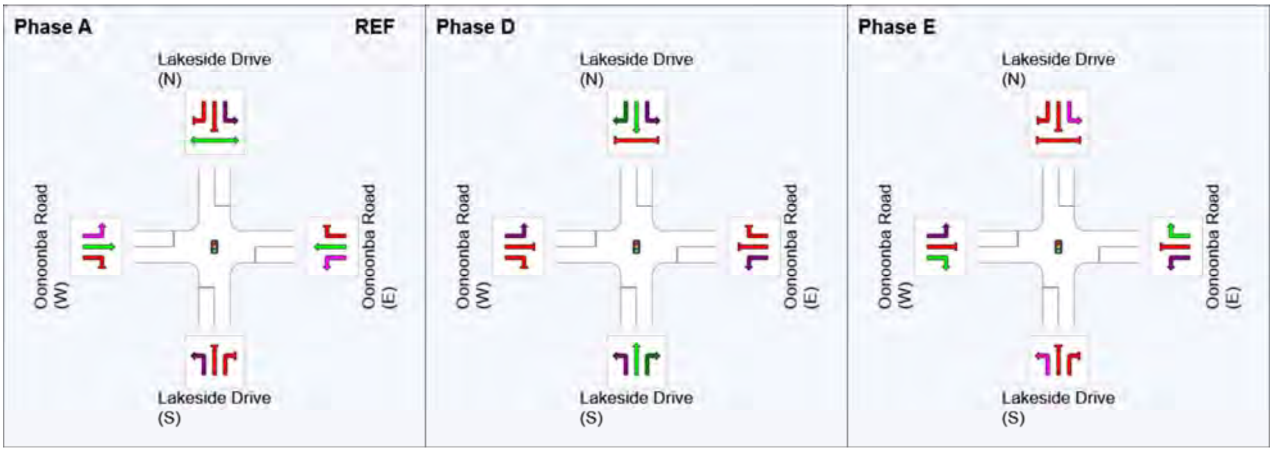
Site: 1 [Lakeside / Oonoonba AM 2015]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	38	68
Green Time (sec)	32	24	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	38	30	12
Phase Split	48 %	38 %	15 %



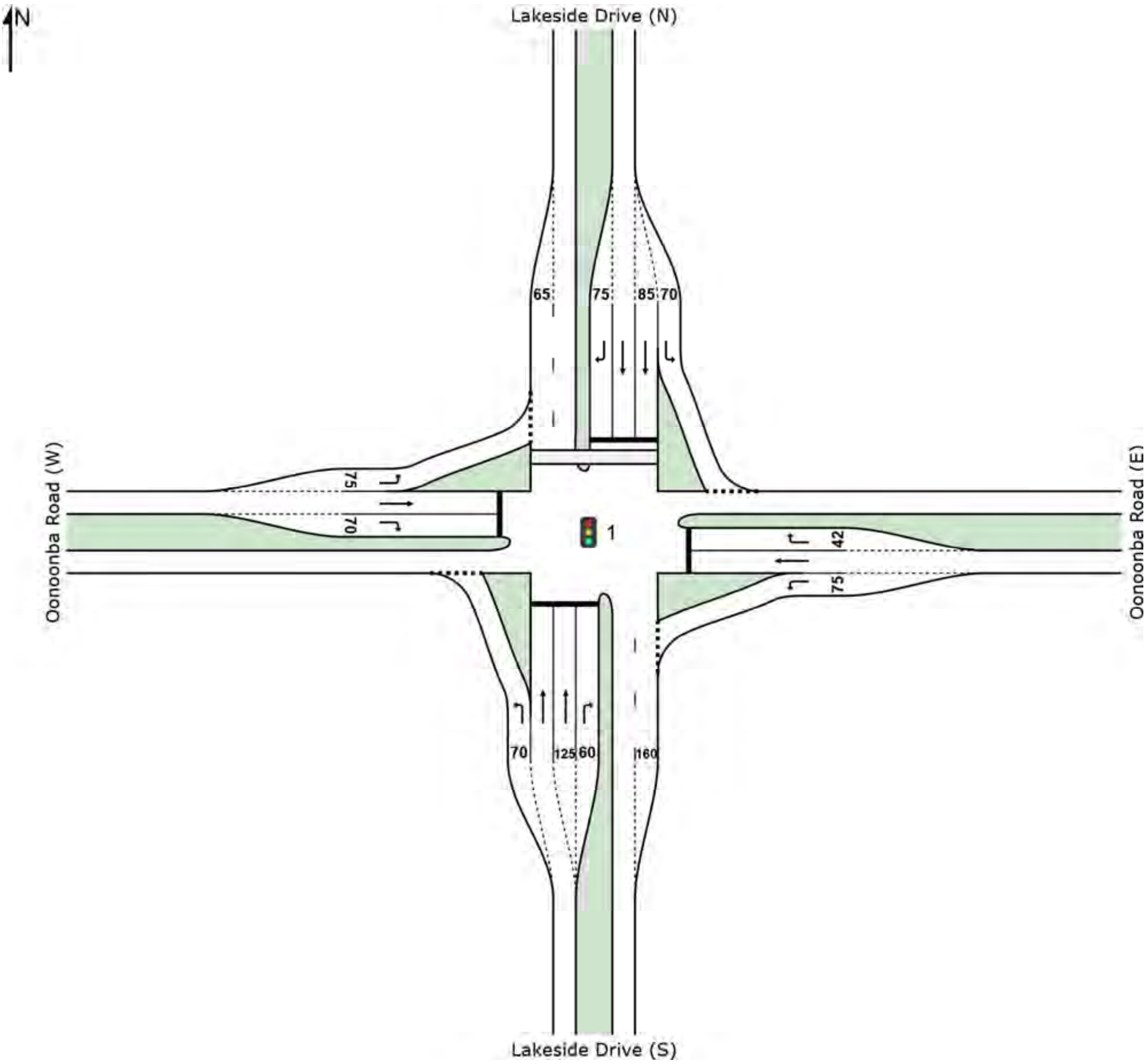
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba PM 2015]

New Site
Signals - Fixed Time Isolated



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, March 24, 2017 5:11:23 PM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2015]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	34	0.0	0.035	8.3	LOS A	0.3	1.8	0.37	0.63	53.9
2	T1	155	2.0	0.185	21.5	LOS C	3.2	22.7	0.76	0.60	47.9
3	R2	72	6.0	0.169	28.3	LOS C	2.1	15.4	0.77	0.74	39.8
Approach		260	2.8	0.185	21.6	LOS C	3.2	22.7	0.71	0.64	46.6
East: Oonoonba Road (E)											
4	L2	128	2.0	0.090	6.2	LOS A	0.5	3.4	0.19	0.60	53.4
5	T1	318	1.0	0.423	19.4	LOS B	9.1	64.5	0.78	0.67	40.3
6	R2	5	0.0	0.038	44.2	LOS D	0.2	1.4	0.95	0.64	29.5
Approach		452	1.3	0.423	16.0	LOS B	9.1	64.5	0.61	0.65	44.2
North: Lakeside Drive (N)											
7	L2	9	0.0	0.008	6.7	LOS A	0.0	0.3	0.23	0.58	51.2
8	T1	78	1.0	0.069	20.7	LOS C	1.1	8.1	0.73	0.55	48.3
9	R2	160	0.0	0.424	32.0	LOS C	5.3	37.0	0.87	0.79	39.7
Approach		247	0.3	0.424	27.5	LOS C	5.3	37.0	0.80	0.71	42.8
West: Oonoonba Road (W)											
10	L2	268	0.0	0.190	6.5	LOS A	1.4	10.0	0.24	0.62	53.8
11	T1	169	1.0	0.226	17.7	LOS B	4.4	31.4	0.71	0.58	41.5
12	R2	15	0.0	0.106	44.9	LOS D	0.6	4.0	0.96	0.68	38.2
Approach		453	0.4	0.226	12.0	LOS B	4.4	31.4	0.44	0.61	49.1
All Vehicles		1412	1.1	0.424	17.7	LOS B	9.1	64.5	0.61	0.64	45.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	9	25.6	LOS C	0.0	0.0	0.80	0.80
All Pedestrians		9	25.6	LOS C			0.80	0.80

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2015]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive (S)													
Lane 1	34	0.0	961	0.035	100	8.3	LOS A	0.3	1.8	Short	70	0.0	NA
Lane 2	43	2.0	602	0.072	39[6]	20.8	LOS C	1.2	8.5	Full	830	0.0	0.0
Lane 3	111	2.0	602	0.185	100	21.7	LOS C	3.2	22.7	Short	125	0.0	NA
Lane 4	72	6.0	424	0.169	100	28.3	LOS C	2.1	15.4	Short	60	0.0	NA
Approach	260	2.8		0.185		21.6	LOS C	3.2	22.7				
East: Oonoonba Road (E)													
Lane 1	128	2.0	1434	0.090	100	6.2	LOS A	0.5	3.4	Short	75	0.0	NA
Lane 2	318	1.0	751	0.423	100	19.4	LOS B	9.1	64.5	Full	140	0.0	0.0
Lane 3	5	0.0	139	0.038	100	44.2	LOS D	0.2	1.4	Short	42	0.0	NA
Approach	452	1.3		0.423		16.0	LOS B	9.1	64.5				
North: Lakeside Drive (N)													
Lane 1	9	0.0	1169	0.008	100	6.7	LOS A	0.0	0.3	Short	70	0.0	NA
Lane 2	36	1.0	605	0.060	87[6]	20.7	LOS C	1.0	7.0	Short	85	0.0	NA
Lane 3	42	1.0	605	0.069	100	20.8	LOS C	1.1	8.1	Full	575	0.0	0.0
Lane 4	160	0.0	378	0.424	100	32.0	LOS C	5.3	37.0	Short	75	0.0	NA
Approach	247	0.3		0.424		27.5	LOS C	5.3	37.0				
West: Oonoonba Road (W)													
Lane 1	268	0.0	1414	0.190	100	6.5	LOS A	1.4	10.0	Short	75	0.0	NA
Lane 2	169	1.0	751	0.226	100	17.7	LOS B	4.4	31.4	Full	500	0.0	0.0
Lane 3	15	0.0	139	0.106	100	44.9	LOS D	0.6	4.0	Short	70	0.0	NA
Approach	453	0.4		0.226		12.0	LOS B	4.4	31.4				
Intersection	1412	1.1		0.424		17.7	LOS B	9.1	64.5				

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.

6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

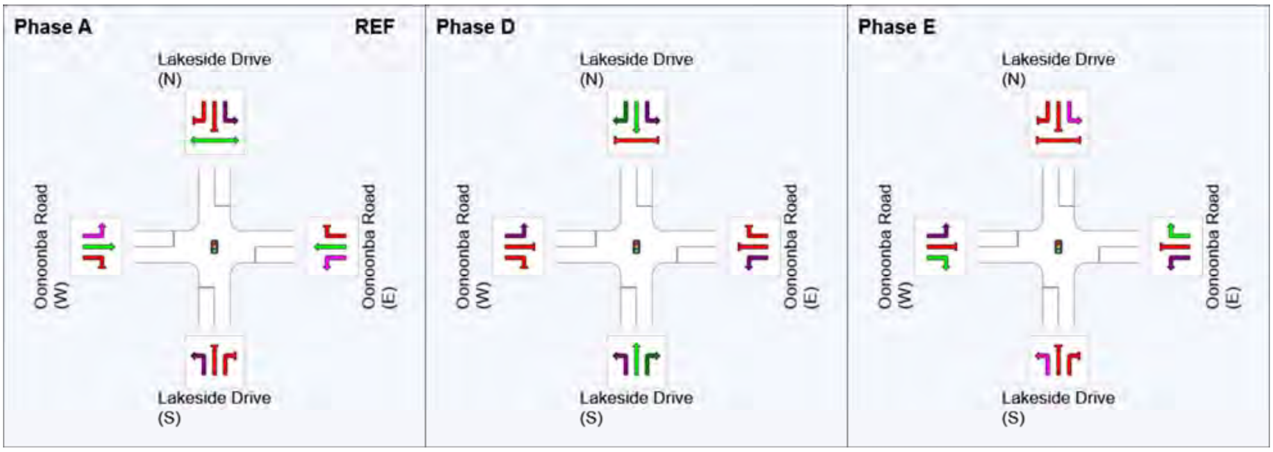
Site: 1 [Lakeside / Oonoonba PM 2015]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	37	68
Green Time (sec)	31	25	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	37	31	12
Phase Split	46 %	39 %	15 %



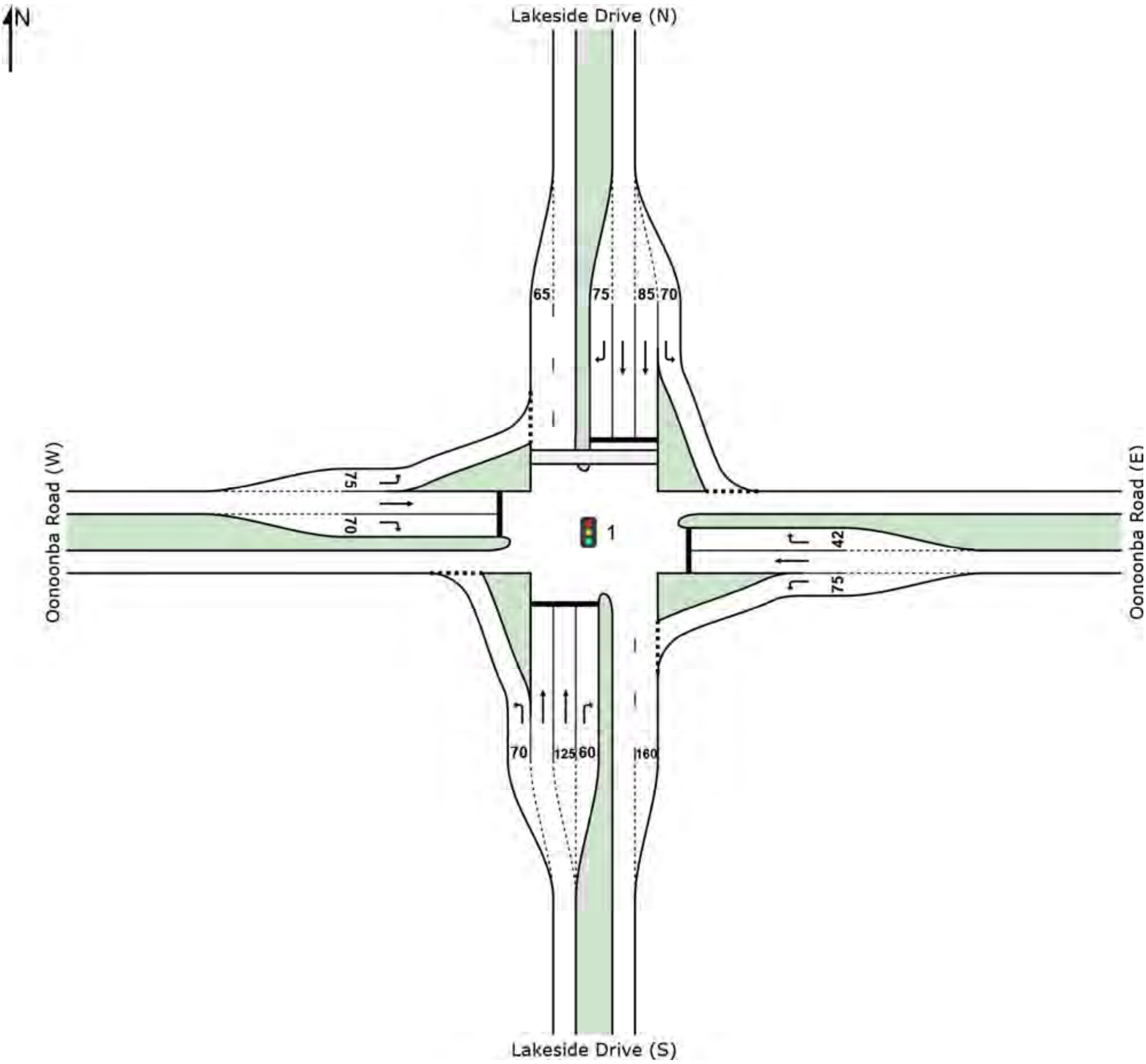
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba AM 2023 W/O D]

New Site
Signals - Fixed Time Isolated



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, March 24, 2017 5:11:54 PM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2023 W/O D]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	12	9.0	0.012	8.2	LOS A	0.1	0.7	0.35	0.60	53.8
2	T1	204	5.0	0.283	24.5	LOS C	4.6	33.3	0.81	0.65	46.6
3	R2	57	4.0	0.146	29.7	LOS C	1.7	12.4	0.79	0.73	39.3
Approach		273	5.0	0.283	24.9	LOS C	4.6	33.3	0.79	0.67	45.6
East: Oonoonba Road (E)											
4	L2	105	4.0	0.073	6.3	LOS A	0.4	2.8	0.18	0.59	53.3
5	T1	337	3.0	0.414	17.3	LOS B	9.2	66.1	0.74	0.64	41.8
6	R2	2	0.0	0.015	43.8	LOS D	0.1	0.6	0.94	0.61	29.7
Approach		444	3.2	0.414	14.8	LOS B	9.2	66.1	0.61	0.63	44.8
North: Lakeside Drive (N)											
7	L2	6	17.0	0.006	7.2	LOS A	0.0	0.3	0.26	0.58	49.8
8	T1	59	6.0	0.061	23.0	LOS C	0.9	6.7	0.77	0.56	47.2
9	R2	123	1.0	0.414	35.3	LOS D	4.3	30.3	0.90	0.79	38.5
Approach		188	3.1	0.414	30.5	LOS C	4.3	30.3	0.84	0.71	41.6
West: Oonoonba Road (W)											
10	L2	522	1.0	0.375	7.0	LOS A	3.8	27.0	0.31	0.65	53.5
11	T1	231	5.0	0.287	16.2	LOS B	5.9	43.0	0.70	0.58	42.6
12	R2	11	0.0	0.076	44.7	LOS D	0.4	2.8	0.96	0.67	38.3
Approach		763	2.2	0.375	10.3	LOS B	5.9	43.0	0.44	0.63	50.4
All Vehicles		1668	3.0	0.414	16.2	LOS B	9.2	66.1	0.59	0.64	46.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	2	23.3	LOS C	0.0	0.0	0.76	0.76
All Pedestrians		2	23.3	LOS C			0.76	0.76

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2023 W/O D]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive (S)													
Lane 1	12	9.0	932	0.012	100	8.2	LOS A	0.1	0.7	Short	70	0.0	NA
Lane 2	57	5.0	519	0.110	39[6]	23.5	LOS C	1.7	12.3	Full	830	0.0	0.0
Lane 3	147	5.0	519	0.283	100	24.9	LOS C	4.6	33.3	Short	125	0.0	NA
Lane 4	57	4.0	389	0.146	100	29.7	LOS C	1.7	12.4	Short	60	0.0	NA
Approach	273	5.0		0.283		24.9	LOS C	4.6	33.3				
East: Oonoonba Road (E)													
Lane 1	105	4.0	1440	0.073	100	6.3	LOS A	0.4	2.8	Short	75	0.0	NA
Lane 2	337	3.0	813	0.414	100	17.3	LOS B	9.2	66.1	Full	140	0.0	0.0
Lane 3	2	0.0	139	0.015	100	43.8	LOS D	0.1	0.6	Short	42	0.0	NA
Approach	444	3.2		0.414		14.8	LOS B	9.2	66.1				
North: Lakeside Drive (N)													
Lane 1	6	17.0	1032	0.006	100	7.2	LOS A	0.0	0.3	Short	70	0.0	NA
Lane 2	27	6.0	516	0.053	87[6]	23.0	LOS C	0.8	5.8	Short	85	0.0	NA
Lane 3	32	6.0	516	0.061	100	23.1	LOS C	0.9	6.7	Full	575	0.0	0.0
Lane 4	123	1.0	298	0.414	100	35.3	LOS D	4.3	30.3	Short	75	0.0	NA
Approach	188	3.1		0.414		30.5	LOS C	4.3	30.3				
West: Oonoonba Road (W)													
Lane 1	522	1.0	1392	0.375	100	7.0	LOS A	3.8	27.0	Short	75	0.0	NA
Lane 2	231	5.0	803	0.287	100	16.2	LOS B	5.9	43.0	Full	500	0.0	0.0
Lane 3	11	0.0	139	0.076	100	44.7	LOS D	0.4	2.8	Short	70	0.0	NA
Approach	763	2.2		0.375		10.3	LOS B	5.9	43.0				
Intersection	1668	3.0		0.414		16.2	LOS B	9.2	66.1				

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.

6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

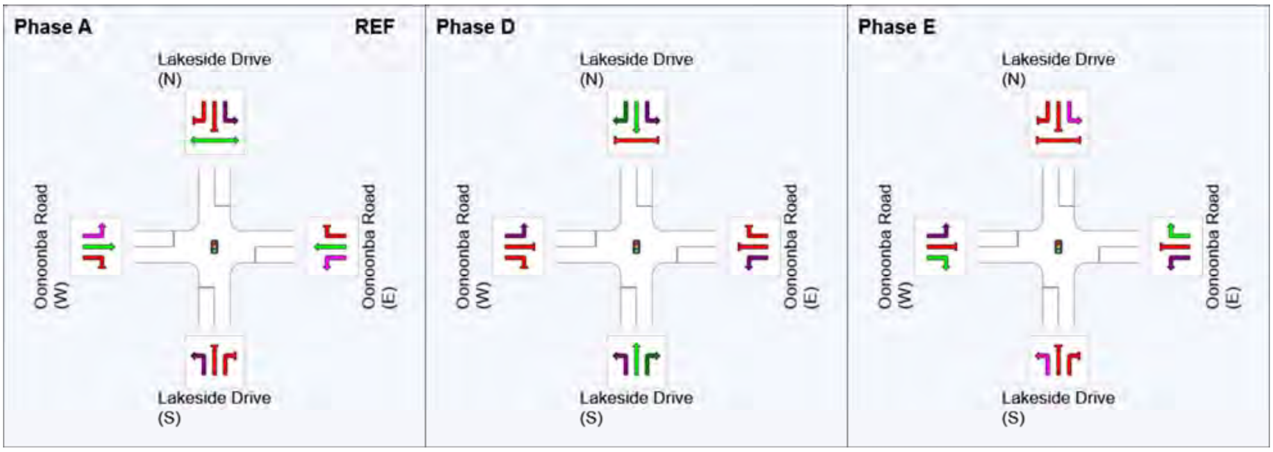
Site: 1 [Lakeside / Oonoonba AM 2023 W/O D]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	40	68
Green Time (sec)	34	22	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	40	28	12
Phase Split	50 %	35 %	15 %

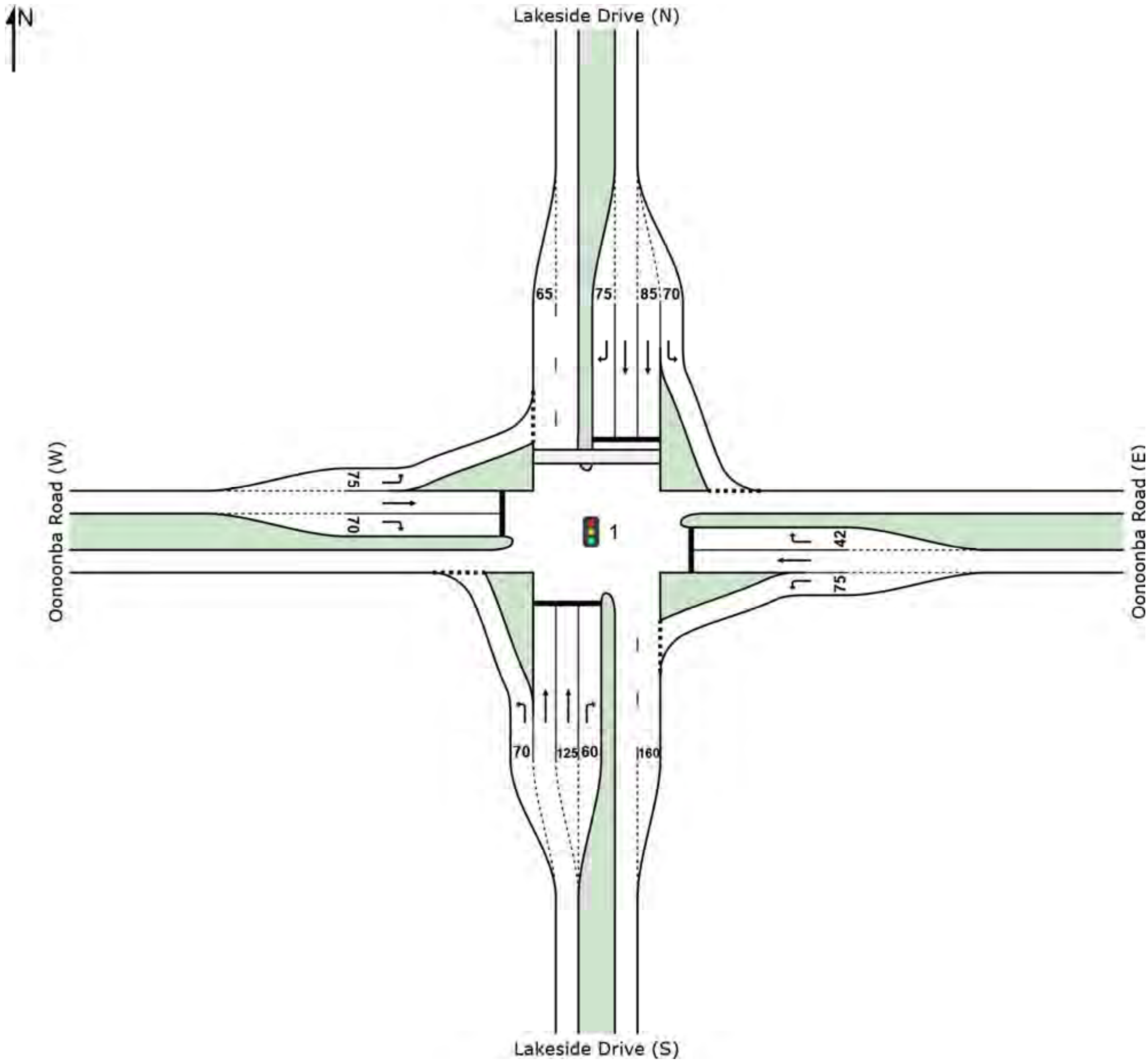


REF: Reference Phase
VAR: Variable Phase

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba AM 2023 WD]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2023 WD]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	12	9.0	0.013	8.8	LOS A	0.1	0.7	0.39	0.61	53.4
2	T1	252	5.0	0.284	20.7	LOS C	5.2	38.0	0.76	0.62	48.3
3	R2	57	4.0	0.128	26.4	LOS C	1.6	11.5	0.74	0.72	40.7
Approach		320	5.0	0.284	21.2	LOS C	5.2	38.0	0.74	0.64	47.3
East: Oonoonba Road (E)											
4	L2	105	4.0	0.075	6.3	LOS A	0.4	2.8	0.18	0.59	53.3
5	T1	337	3.0	0.486	21.4	LOS C	10.3	73.7	0.82	0.71	39.0
6	R2	2	0.0	0.015	43.8	LOS D	0.1	0.6	0.94	0.61	29.7
Approach		444	3.2	0.486	17.9	LOS B	10.3	73.7	0.67	0.68	42.6
North: Lakeside Drive (N)											
7	L2	17	17.0	0.016	7.4	LOS A	0.1	0.9	0.28	0.59	49.6
8	T1	105	6.0	0.089	19.4	LOS B	1.5	11.0	0.71	0.55	48.9
9	R2	164	1.0	0.475	32.6	LOS C	5.6	39.2	0.88	0.80	39.5
Approach		286	3.8	0.475	26.3	LOS C	5.6	39.2	0.78	0.69	43.5
West: Oonoonba Road (W)											
10	L2	591	1.0	0.438	7.3	LOS A	5.1	36.0	0.35	0.67	53.3
11	T1	231	5.0	0.337	20.1	LOS C	6.6	48.0	0.77	0.64	39.9
12	R2	11	0.0	0.076	44.7	LOS D	0.4	2.8	0.96	0.67	38.3
Approach		832	2.1	0.438	11.3	LOS B	6.6	48.0	0.48	0.66	49.8
All Vehicles		1882	3.1	0.486	16.8	LOS B	10.3	73.7	0.61	0.67	46.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	2	27.2	LOS C	0.0	0.0	0.83	0.83
All Pedestrians		2	27.2	LOS C			0.83	0.83

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2023 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive (S)													
Lane 1	12	9.0	895	0.013	100	8.8	LOS A	0.1	0.7	Short	70	0.0	NA
Lane 2	71	5.0	637	0.111	39 [6]	19.6	LOS B	1.9	13.9	Full	830	0.0	0.0
Lane 3	181	5.0	637	0.284	100	21.0	LOS C	5.2	38.0	Short	125	0.0	NA
Lane 4	57	4.0	444	0.128	100	26.4	LOS C	1.6	11.5	Short	60	0.0	NA
Approach	320	5.0		0.284		21.2	LOS C	5.2	38.0				
East: Oonoonba Road (E)													
Lane 1	105	4.0	1400	0.075	100	6.3	LOS A	0.4	2.8	Short	75	0.0	NA
Lane 2	337	3.0	693	0.486	100	21.4	LOS C	10.3	73.7	Full	140	0.0	0.0
Lane 3	2	0.0	139	0.015	100	43.8	LOS D	0.1	0.6	Short	42	0.0	NA
Approach	444	3.2		0.486		17.9	LOS B	10.3	73.7				
North: Lakeside Drive (N)													
Lane 1	17	17.0	1041	0.016	100	7.4	LOS A	0.1	0.9	Short	70	0.0	NA
Lane 2	49	6.0	633	0.077	87 [6]	19.4	LOS B	1.3	9.5	Short	85	0.0	NA
Lane 3	56	6.0	633	0.089	100	19.5	LOS B	1.5	11.0	Full	575	0.0	0.0
Lane 4	164	1.0	345	0.475	100	32.6	LOS C	5.6	39.2	Short	75	0.0	NA
Approach	286	3.8		0.475		26.3	LOS C	5.6	39.2				
West: Oonoonba Road (W)													
Lane 1	591	1.0	1349	0.438	100	7.3	LOS A	5.1	36.0	Short	75	0.0	NA
Lane 2	231	5.0	685	0.337	100	20.1	LOS C	6.6	48.0	Full	500	0.0	0.0
Lane 3	11	0.0	139	0.076	100	44.7	LOS D	0.4	2.8	Short	70	0.0	NA
Approach	832	2.1		0.438		11.3	LOS B	6.6	48.0				
Intersection	1882	3.1		0.486		16.8	LOS B	10.3	73.7				

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.

6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

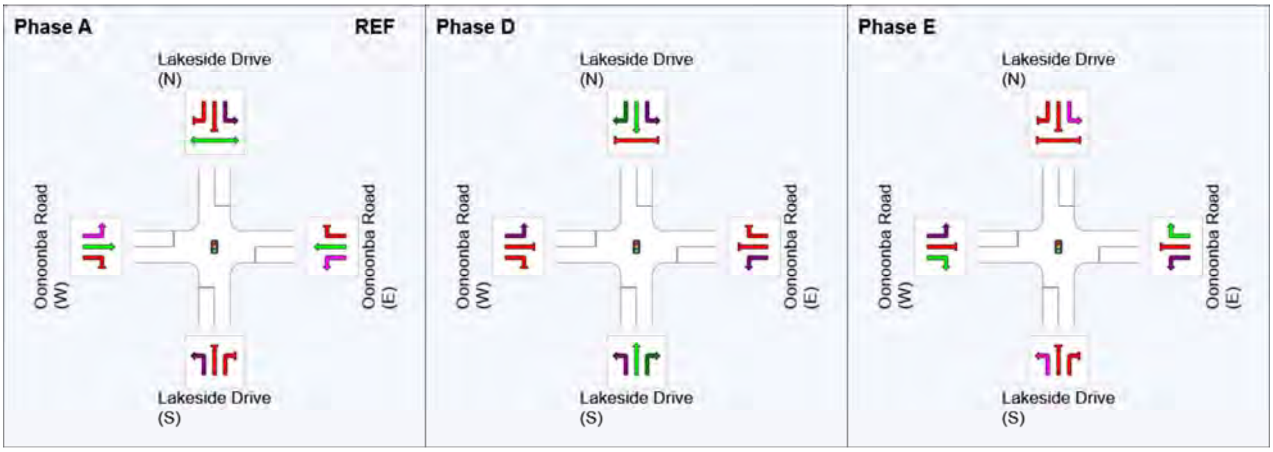
Site: 1 [Lakeside / Oonoonba AM 2023 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	35	68
Green Time (sec)	29	27	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	35	33	12
Phase Split	44 %	41 %	15 %

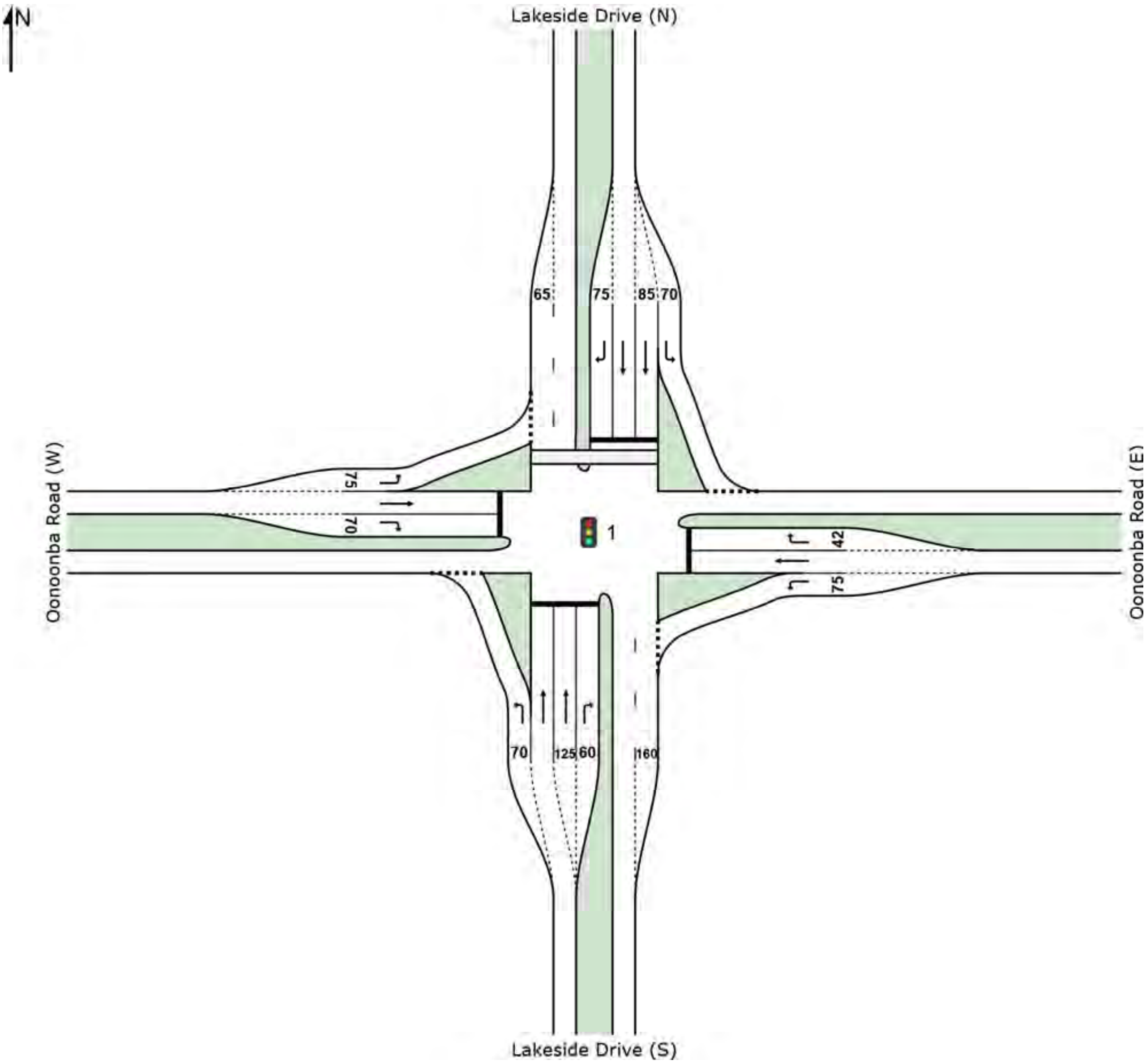


REF: Reference Phase
VAR: Variable Phase

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba PM 2023 W/O D]

New Site
Signals - Fixed Time Isolated



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, March 24, 2017 5:13:00 PM
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MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2023 W/O D]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	35	0.0	0.039	9.0	LOS A	0.3	2.1	0.41	0.63	53.5
2	T1	161	2.0	0.209	23.2	LOS C	3.5	24.6	0.79	0.62	47.2
3	R2	75	6.0	0.191	30.1	LOS C	2.3	16.8	0.80	0.74	39.0
Approach		271	2.8	0.209	23.3	LOS C	3.5	24.6	0.74	0.66	45.9
East: Oonoonba Road (E)											
4	L2	157	2.0	0.109	6.3	LOS A	0.6	4.2	0.19	0.60	53.4
5	T1	387	1.0	0.490	18.7	LOS B	11.1	78.7	0.78	0.68	40.9
6	R2	6	0.0	0.045	44.3	LOS D	0.2	1.7	0.95	0.65	29.5
Approach		551	1.3	0.490	15.4	LOS B	11.1	78.7	0.62	0.66	44.6
North: Lakeside Drive (N)											
7	L2	9	0.0	0.008	7.0	LOS A	0.1	0.4	0.26	0.59	51.0
8	T1	81	1.0	0.078	22.3	LOS C	1.2	8.7	0.76	0.57	47.5
9	R2	166	0.0	0.486	34.2	LOS C	5.8	40.3	0.90	0.80	38.9
Approach		257	0.3	0.486	29.5	LOS C	5.8	40.3	0.83	0.72	42.0
West: Oonoonba Road (W)											
10	L2	327	0.0	0.231	6.6	LOS A	1.8	12.7	0.25	0.63	53.8
11	T1	206	1.0	0.258	16.6	LOS B	5.3	37.4	0.70	0.58	42.3
12	R2	18	0.0	0.128	45.1	LOS D	0.7	4.8	0.96	0.69	38.2
Approach		552	0.4	0.258	11.6	LOS B	5.3	37.4	0.44	0.61	49.3
All Vehicles		1629	1.1	0.490	17.6	LOS B	11.1	78.7	0.61	0.65	45.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	9	24.0	LOS C	0.0	0.0	0.78	0.78
All Pedestrians		9	24.0	LOS C			0.78	0.78

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2023 W/O D]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive (S)													
Lane 1	35	0.0	896	0.039	100	9.0	LOS A	0.3	2.1	Short	70	0.0	NA
Lane 2	45	2.0	553	0.082	39 [6]	22.4	LOS C	1.3	9.2	Full	830	0.0	0.0
Lane 3	116	2.0	553	0.209	100	23.5	LOS C	3.5	24.6	Short	125	0.0	NA
Lane 4	75	6.0	391	0.191	100	30.1	LOS C	2.3	16.8	Short	60	0.0	NA
Approach	271	2.8		0.209		23.3	LOS C	3.5	24.6				
East: Oonoonba Road (E)													
Lane 1	157	2.0	1439	0.109	100	6.3	LOS A	0.6	4.2	Short	75	0.0	NA
Lane 2	387	1.0	790 [1]	0.490	100	18.7	LOS B	11.1	78.7	Full	140	0.0	0.0
Lane 3	6	0.0	139	0.045	100	44.3	LOS D	0.2	1.7	Short	42	0.0	NA
Approach	551	1.3		0.490		15.4	LOS B	11.1	78.7				
North: Lakeside Drive (N)													
Lane 1	9	0.0	1134	0.008	100	7.0	LOS A	0.1	0.4	Short	70	0.0	NA
Lane 2	38	1.0	557	0.068	87 [6]	22.3	LOS C	1.1	7.5	Short	85	0.0	NA
Lane 3	43	1.0	557	0.078	100	22.4	LOS C	1.2	8.7	Full	575	0.0	0.0
Lane 4	166	0.0	342	0.486	100	34.2	LOS C	5.8	40.3	Short	75	0.0	NA
Approach	257	0.3		0.486		29.5	LOS C	5.8	40.3				
West: Oonoonba Road (W)													
Lane 1	327	0.0	1418	0.231	100	6.6	LOS A	1.8	12.7	Short	75	0.0	NA
Lane 2	206	1.0	799	0.258	100	16.6	LOS B	5.3	37.4	Full	500	0.0	0.0
Lane 3	18	0.0	139	0.128	100	45.1	LOS D	0.7	4.8	Short	70	0.0	NA
Approach	552	0.4		0.258		11.6	LOS B	5.3	37.4				
Intersection	1629	1.1		0.490		17.6	LOS B	11.1	78.7				

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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

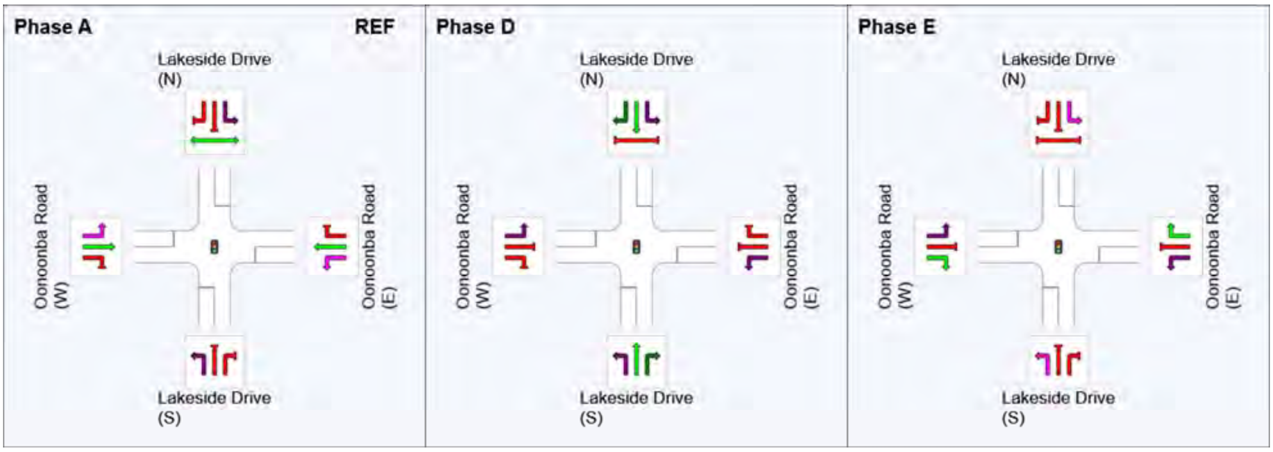
Site: 1 [Lakeside / Oonoonba PM 2023 W/O D]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	39	68
Green Time (sec)	33	23	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	39	29	12
Phase Split	49 %	36 %	15 %



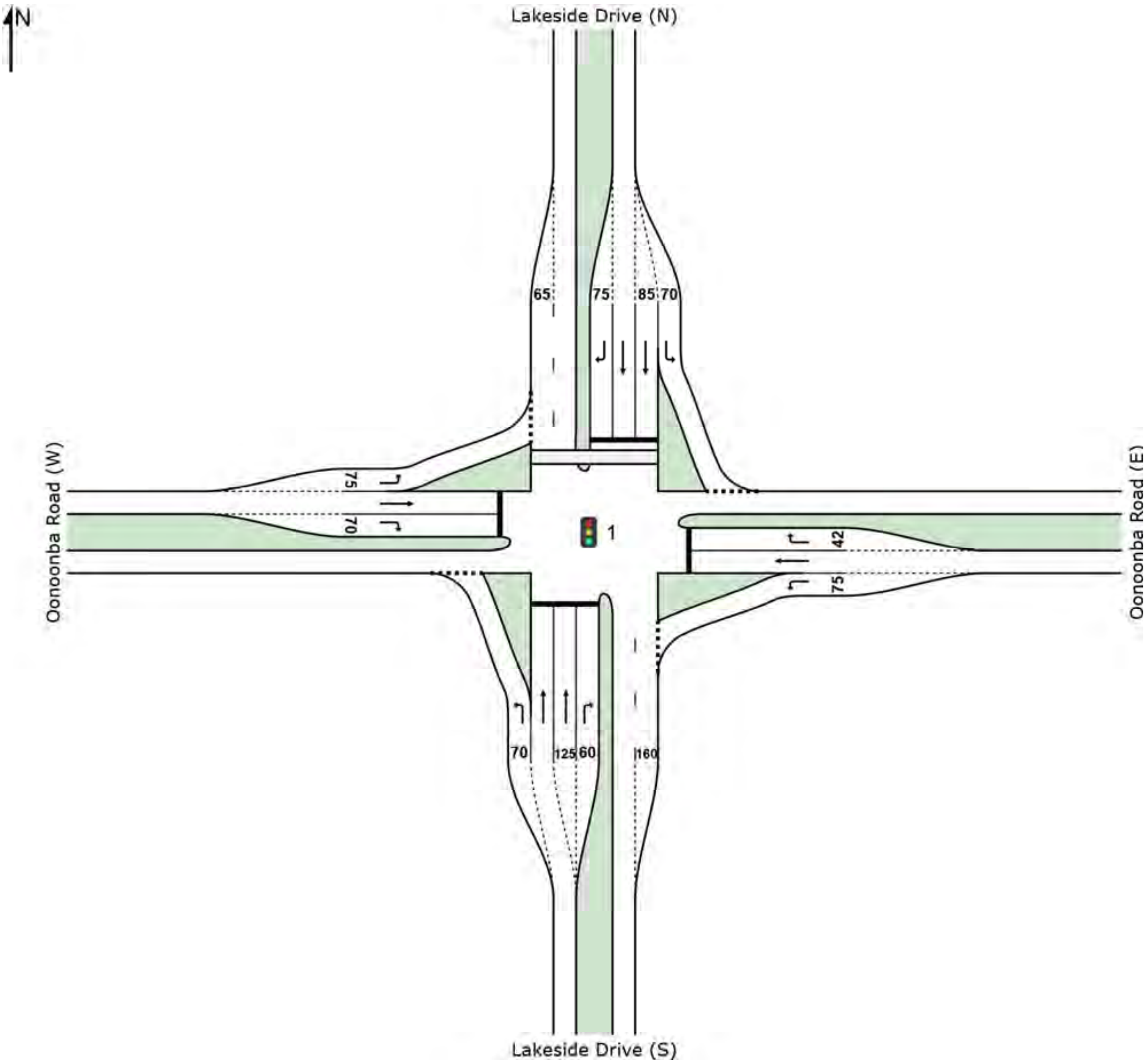
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba PM 2023 WD]

New Site
Signals - Fixed Time Isolated



Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Created: Friday, March 24, 2017 5:13:20 PM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2023 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	35	0.0	0.040	9.7	LOS A	0.3	2.3	0.45	0.64	53.1
2	T1	193	2.0	0.221	20.9	LOS C	4.0	28.2	0.75	0.60	48.2
3	R2	75	6.0	0.185	28.5	LOS C	2.2	16.3	0.78	0.74	39.7
Approach		302	2.8	0.221	21.5	LOS C	4.0	28.2	0.73	0.64	46.8
East: Oonoonba Road (E)											
4	L2	157	2.0	0.112	6.4	LOS A	0.7	4.9	0.20	0.61	53.3
5	T1	387	1.0	0.539	21.2	LOS C	11.9	84.0	0.83	0.72	39.2
6	R2	6	0.0	0.045	44.3	LOS D	0.2	1.7	0.95	0.65	29.5
Approach		551	1.3	0.539	17.2	LOS B	11.9	84.0	0.66	0.69	43.3
North: Lakeside Drive (N)											
7	L2	16	0.0	0.014	7.0	LOS A	0.1	0.6	0.26	0.59	51.0
8	T1	137	1.0	0.116	20.3	LOS C	2.0	14.2	0.73	0.57	48.4
9	R2	204	0.0	0.552	33.2	LOS C	7.1	49.4	0.91	0.81	39.3
Approach		357	0.4	0.552	27.1	LOS C	7.1	49.4	0.81	0.71	43.3
West: Oonoonba Road (W)											
10	L2	362	0.0	0.261	6.8	LOS A	2.3	16.1	0.27	0.63	53.7
11	T1	206	1.0	0.284	18.9	LOS B	5.7	39.9	0.74	0.62	40.7
12	R2	18	0.0	0.128	45.1	LOS D	0.7	4.8	0.96	0.69	38.2
Approach		586	0.4	0.284	12.2	LOS B	5.7	39.9	0.46	0.63	49.0
All Vehicles		1796	1.0	0.552	18.3	LOS B	11.9	84.0	0.63	0.66	45.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	9	26.4	LOS C	0.0	0.0	0.81	0.81
All Pedestrians		9	26.4	LOS C			0.81	0.81

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2023 WD]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive (S)													
Lane 1	35	0.0	862	0.040	100	9.7	LOS A	0.3	2.3	Short	70	0.0	NA
Lane 2	54	2.0	626	0.087	39 [6]	20.2	LOS C	1.5	10.4	Full	830	0.0	0.0
Lane 3	138	2.0	626	0.221	100	21.3	LOS C	4.0	28.2	Short	125	0.0	NA
Lane 4	75	6.0	405	0.185	100	28.5	LOS C	2.2	16.3	Short	60	0.0	NA
Approach	302	2.8		0.221		21.5	LOS C	4.0	28.2				
East: Oonoonba Road (E)													
Lane 1	157	2.0	1398	0.112	100	6.4	LOS A	0.7	4.9	Short	75	0.0	NA
Lane 2	387	1.0	719 [1]	0.539	100	21.2	LOS C	11.9	84.0	Full	140	0.0	0.0
Lane 3	6	0.0	139	0.045	100	44.3	LOS D	0.2	1.7	Short	42	0.0	NA
Approach	551	1.3		0.539		17.2	LOS B	11.9	84.0				
North: Lakeside Drive (N)													
Lane 1	16	0.0	1138	0.014	100	7.0	LOS A	0.1	0.6	Short	70	0.0	NA
Lane 2	64	1.0	630	0.101	87 [6]	20.3	LOS C	1.7	12.2	Short	85	0.0	NA
Lane 3	73	1.0	630	0.116	100	20.4	LOS C	2.0	14.2	Full	575	0.0	0.0
Lane 4	204	0.0	370	0.552	100	33.2	LOS C	7.1	49.4	Short	75	0.0	NA
Approach	357	0.4		0.552		27.1	LOS C	7.1	49.4				
West: Oonoonba Road (W)													
Lane 1	362	0.0	1390	0.261	100	6.8	LOS A	2.3	16.1	Short	75	0.0	NA
Lane 2	206	1.0	727	0.284	100	18.9	LOS B	5.7	39.9	Full	500	0.0	0.0
Lane 3	18	0.0	139	0.128	100	45.1	LOS D	0.7	4.8	Short	70	0.0	NA
Approach	586	0.4		0.284		12.2	LOS B	5.7	39.9				
Intersection	1796	1.0		0.552		18.3	LOS B	11.9	84.0				

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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

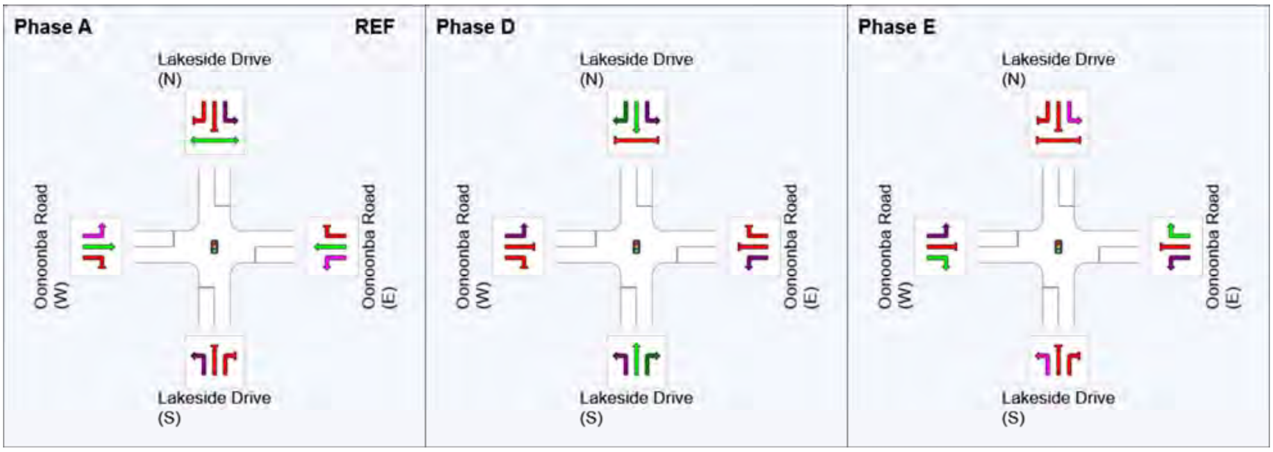
Site: 1 [Lakeside / Oonoonba PM 2023 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	36	68
Green Time (sec)	30	26	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	36	32	12
Phase Split	45 %	40 %	15 %



REF: Reference Phase
VAR: Variable Phase

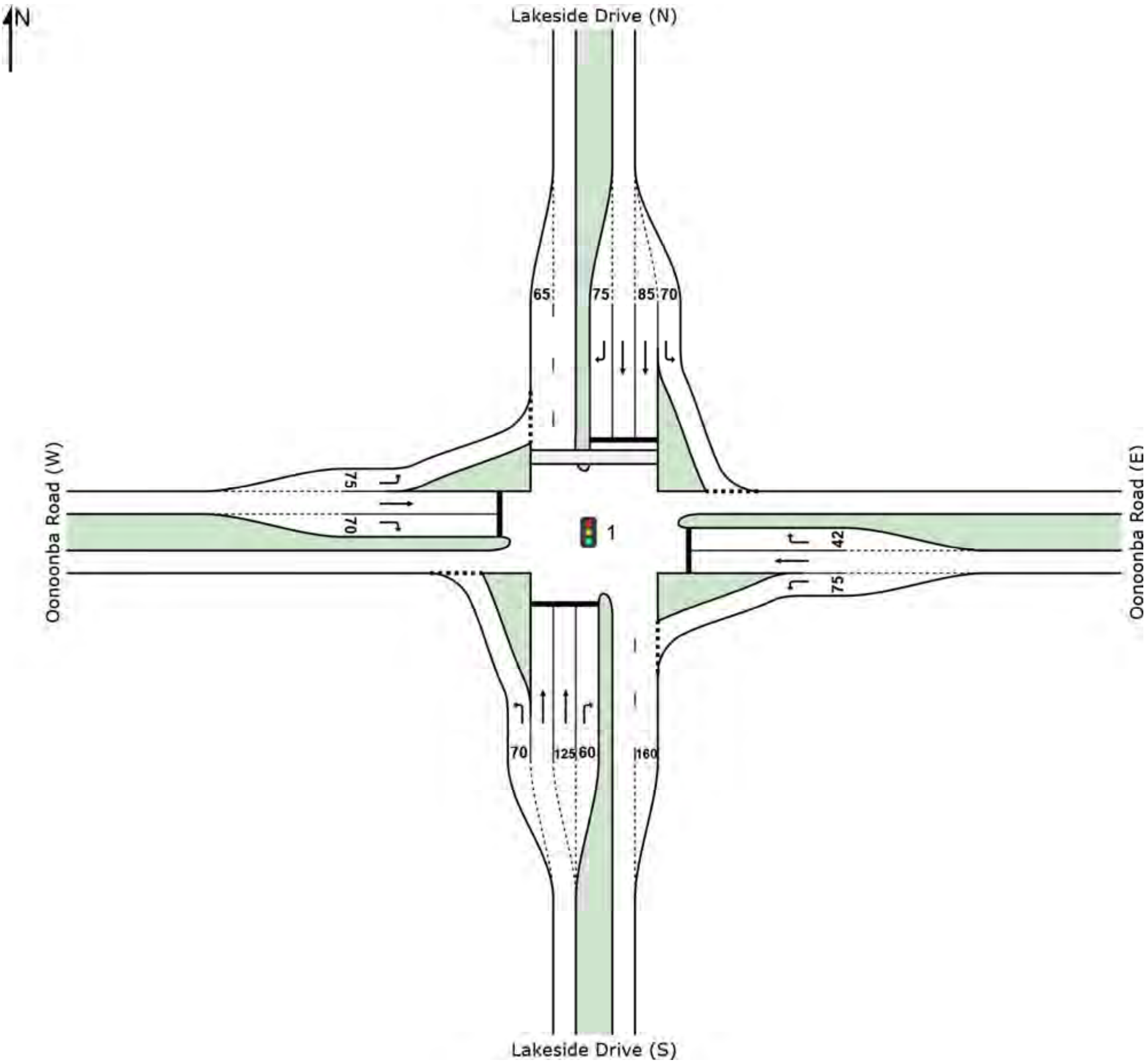
Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Processed: Friday, March 24, 2017 8:51:12 AM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba AM 2033 WD]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2033 WD]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	144	9.0	0.142	8.3	LOS A	1.3	9.9	0.37	0.64	53.7
2	T1	220	5.0	0.203	15.9	LOS B	4.0	28.9	0.67	0.54	50.6
3	R2	299	4.0	0.553	25.9	LOS C	9.2	66.5	0.82	0.81	41.0
Approach		663	5.4	0.553	18.8	LOS B	9.2	66.5	0.67	0.68	47.2
East: Oonoonba Road (E)											
4	L2	255	4.0	0.186	6.3	LOS A	1.0	7.5	0.20	0.61	53.2
5	T1	296	3.0	0.538	26.3	LOS C	9.9	71.1	0.90	0.76	36.1
6	R2	1	0.0	0.008	43.5	LOS D	0.0	0.3	0.94	0.59	29.8
Approach		552	3.5	0.538	17.1	LOS B	9.9	71.1	0.58	0.69	44.1
North: Lakeside Drive (N)											
7	L2	22	17.0	0.027	9.4	LOS A	0.2	1.7	0.42	0.62	47.8
8	T1	101	6.0	0.070	15.1	LOS B	1.3	9.3	0.63	0.48	51.0
9	R2	91	1.0	0.199	24.8	LOS C	2.5	17.5	0.72	0.74	42.9
Approach		214	5.0	0.199	18.6	LOS B	2.5	17.5	0.65	0.61	47.3
West: Oonoonba Road (W)											
10	L2	325	1.0	0.242	6.8	LOS A	2.0	14.1	0.26	0.63	53.7
11	T1	220	5.0	0.405	25.1	LOS C	7.0	51.3	0.85	0.71	36.8
12	R2	14	0.0	0.098	44.9	LOS D	0.5	3.7	0.96	0.68	38.2
Approach		559	2.5	0.405	14.9	LOS B	7.0	51.3	0.51	0.66	47.0
All Vehicles		1987	4.0	0.553	17.2	LOS B	9.9	71.1	0.60	0.67	46.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	2	32.4	LOS D	0.0	0.0	0.90	0.90
All Pedestrians		2	32.4	LOS D			0.90	0.90

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba AM 2033 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive (S)													
Lane 1	144	9.0	1016	0.142	100	8.3	LOS A	1.3	9.9	Short	70	0.0	NA
Lane 2	62	5.0	779	0.079	39 [6]	15.2	LOS B	1.5	10.6	Full	830	0.0	0.0
Lane 3	158	5.0	779	0.203	100	16.2	LOS B	4.0	28.9	Short	125	0.0	NA
Lane 4	299	4.0	541	0.553	100	25.9	LOS C	9.2	66.5	Short	60	0.0	NA
Approach	663	5.4		0.553		18.8	LOS B	9.2	66.5				
East: Oonoonba Road (E)													
Lane 1	255	4.0	1372	0.186	100	6.3	LOS A	1.0	7.5	Short	75	0.0	NA
Lane 2	296	3.0	550	0.538	100	26.3	LOS C	9.9	71.1	Full	140	0.0	0.0
Lane 3	1	0.0	139	0.008	100	43.5	LOS D	0.0	0.3	Short	42	0.0	NA
Approach	552	3.5		0.538		17.1	LOS B	9.9	71.1				
North: Lakeside Drive (N)													
Lane 1	22	17.0	808	0.027	100	9.4	LOS A	0.2	1.7	Short	70	0.0	NA
Lane 2	47	6.0	774	0.061	87 [6]	15.1	LOS B	1.1	8.1	Short	85	0.0	NA
Lane 3	54	6.0	774	0.070	100	15.2	LOS B	1.3	9.3	Full	575	0.0	0.0
Lane 4	91	1.0	455	0.199	100	24.8	LOS C	2.5	17.5	Short	75	0.0	NA
Approach	214	5.0		0.199		18.6	LOS B	2.5	17.5				
West: Oonoonba Road (W)													
Lane 1	325	1.0	1345	0.242	100	6.8	LOS A	2.0	14.1	Short	75	0.0	NA
Lane 2	220	5.0	543	0.405	100	25.1	LOS C	7.0	51.3	Full	500	0.0	0.0
Lane 3	14	0.0	139	0.098	100	44.9	LOS D	0.5	3.7	Short	70	0.0	NA
Approach	559	2.5		0.405		14.9	LOS B	7.0	51.3				
Intersection	1987	4.0		0.553		17.2	LOS B	9.9	71.1				

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.

6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

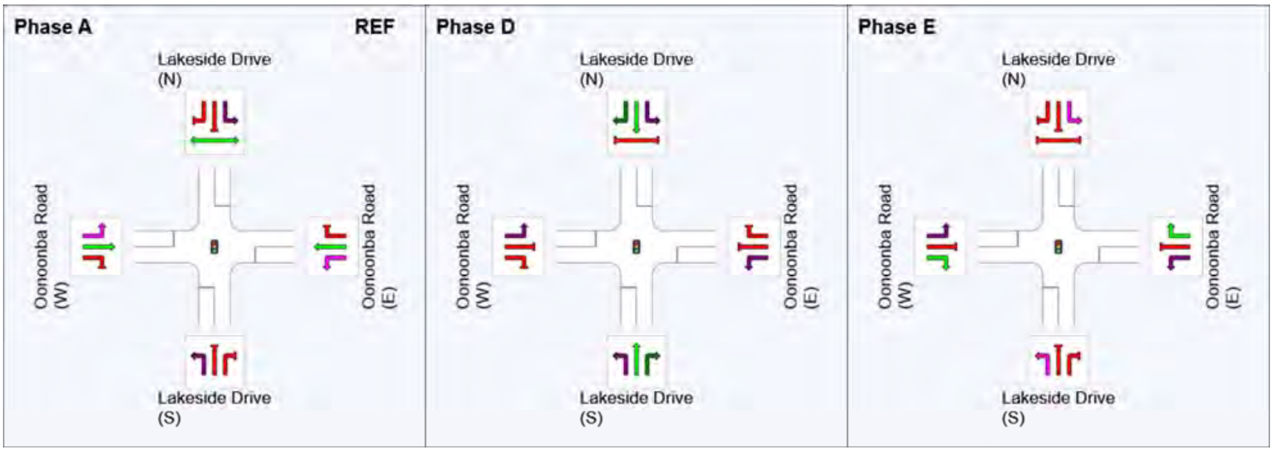
Site: 1 [Lakeside / Oonoonba AM 2033 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	29	68
Green Time (sec)	23	33	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	29	39	12
Phase Split	36 %	49 %	15 %



REF: Reference Phase
VAR: Variable Phase

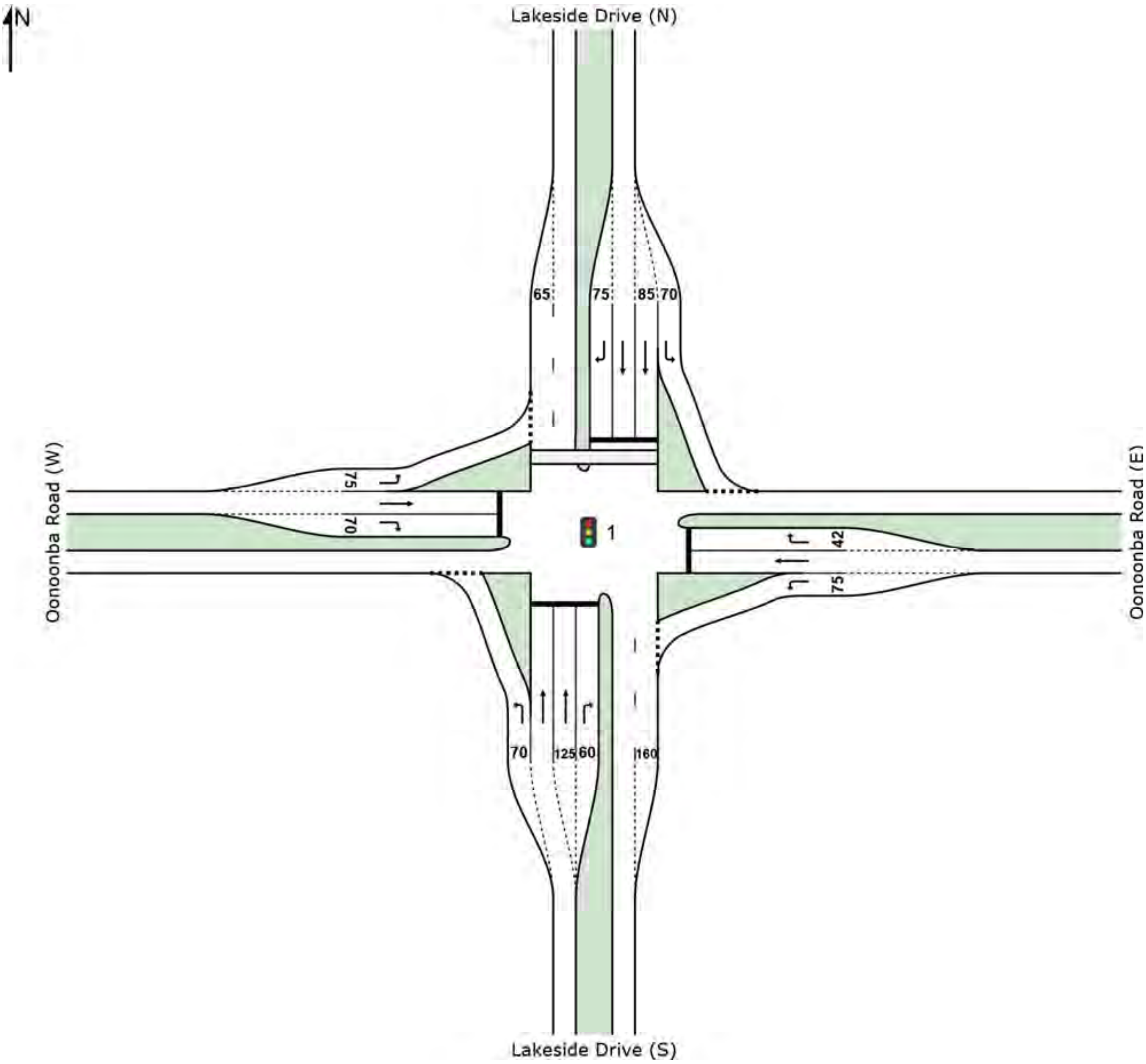
Normal Movement
Permitted/Opposed
Slip/Bypass-Lane Movement
Opposed Slip/Bypass-Lane
Stopped Movement
Turn On Red
Other Movement Class Running
Other Movement Class Stopped
Mixed Running & Stopped Movement Classes
Undetected Movement
Phase Transition Applied

Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Processed: Friday, March 24, 2017 8:49:23 AM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

SITE LAYOUT

Site: 1 [Lakeside / Oonoonba PM 2033 WD]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2033 WD]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive (S)											
1	L2	9	0.0	0.010	8.4	LOS A	0.1	0.6	0.35	0.60	53.9
2	T1	203	2.0	0.304	26.2	LOS C	4.7	33.5	0.84	0.67	45.9
3	R2	163	6.0	0.493	35.1	LOS D	5.7	42.1	0.91	0.80	37.0
Approach		376	3.7	0.493	29.6	LOS C	5.7	42.1	0.86	0.72	42.5
East: Oonoonba Road (E)											
4	L2	596	2.0	0.413	6.7	LOS A	3.7	26.4	0.29	0.64	53.0
5	T1	421	1.0	0.491	16.7	LOS B	11.6	81.7	0.75	0.65	42.3
6	R2	9	0.0	0.068	44.6	LOS D	0.4	2.5	0.96	0.67	29.4
Approach		1026	1.6	0.491	11.1	LOS B	11.6	81.7	0.48	0.65	48.8
North: Lakeside Drive (N)											
7	L2	12	0.0	0.011	7.6	LOS A	0.1	0.6	0.31	0.60	50.4
8	T1	107	1.0	0.119	25.1	LOS C	1.7	12.3	0.80	0.61	46.4
9	R2	72	0.0	0.264	35.9	LOS D	2.5	17.2	0.88	0.76	38.3
Approach		191	0.6	0.264	28.1	LOS C	2.5	17.2	0.80	0.67	43.5
West: Oonoonba Road (W)											
10	L2	232	0.0	0.165	6.8	LOS A	1.5	10.2	0.26	0.63	53.6
11	T1	188	1.0	0.216	14.4	LOS B	4.5	31.5	0.65	0.54	44.1
12	R2	17	0.0	0.121	45.0	LOS D	0.7	4.6	0.96	0.69	38.2
Approach		437	0.4	0.216	11.6	LOS B	4.5	31.5	0.45	0.59	49.2
All Vehicles		2029	1.6	0.493	16.2	LOS B	11.6	81.7	0.58	0.65	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	9	21.8	LOS C	0.0	0.0	0.74	0.74
All Pedestrians		9	21.8	LOS C			0.74	0.74

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

LANE SUMMARY

Site: 1 [Lakeside / Oonoonba PM 2033 WD]

New Site
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive (S)													
Lane 1	9	0.0	969	0.010	100	8.4	LOS A	0.1	0.6	Short	70	0.0	NA
Lane 2	57	2.0	481	0.119	39 [6]	25.2	LOS C	1.7	12.4	Full	830	0.0	0.0
Lane 3	146	2.0	481	0.304	100	26.6	LOS C	4.7	33.5	Short	125	0.0	NA
Lane 4	163	6.0	331	0.493	100	35.1	LOS D	5.7	42.1	Short	60	0.0	NA
Approach	376	3.7		0.493		29.6	LOS C	5.7	42.1				
East: Oonoonba Road (E)													
Lane 1	596	2.0	1443	0.413	100	6.7	LOS A	3.7	26.4	Short	75	0.0	NA
Lane 2	421	1.0	858 [1]	0.491	100	16.7	LOS B	11.6	81.7	Full	140	0.0	0.0
Lane 3	9	0.0	139	0.068	100	44.6	LOS D	0.4	2.5	Short	42	0.0	NA
Approach	1026	1.6		0.491		11.1	LOS B	11.6	81.7				
North: Lakeside Drive (N)													
Lane 1	12	0.0	1050	0.011	100	7.6	LOS A	0.1	0.6	Short	70	0.0	NA
Lane 2	50	1.0	484	0.103	87 [6]	25.0	LOS C	1.5	10.7	Short	85	0.0	NA
Lane 3	57	1.0	484	0.119	100	25.2	LOS C	1.7	12.3	Full	575	0.0	0.0
Lane 4	72	0.0	271	0.264	100	35.9	LOS D	2.5	17.2	Short	75	0.0	NA
Approach	191	0.6		0.264		28.1	LOS C	2.5	17.2				
West: Oonoonba Road (W)													
Lane 1	232	0.0	1404	0.165	100	6.8	LOS A	1.5	10.2	Short	75	0.0	NA
Lane 2	188	1.0	872	0.216	100	14.4	LOS B	4.5	31.5	Full	500	0.0	0.0
Lane 3	17	0.0	139	0.121	100	45.0	LOS D	0.7	4.6	Short	70	0.0	NA
Approach	437	0.4		0.216		11.6	LOS B	4.5	31.5				
Intersection	2029	1.6		0.493		16.2	LOS B	11.6	81.7				

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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

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Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS\Lakeside_Oonoonba.sip7

PHASING SUMMARY

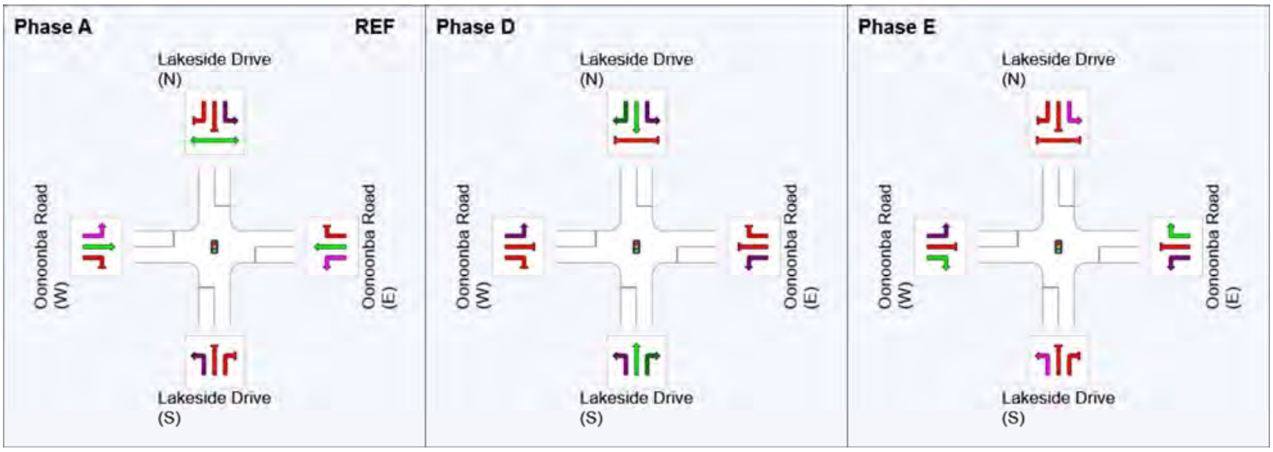
Site: 1 [Lakeside / Oonoonba PM 2033 WD]

New Site
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B*, C*, D, E, E1*, E2*
Output Sequence: A, D, E
(* Variable Phase)

Phase Timing Results

Phase	A	D	E
Phase Change Time (sec)	0	42	68
Green Time (sec)	36	20	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	42	26	12
Phase Split	53 %	33 %	15 %



REF: Reference Phase
VAR: Variable Phase

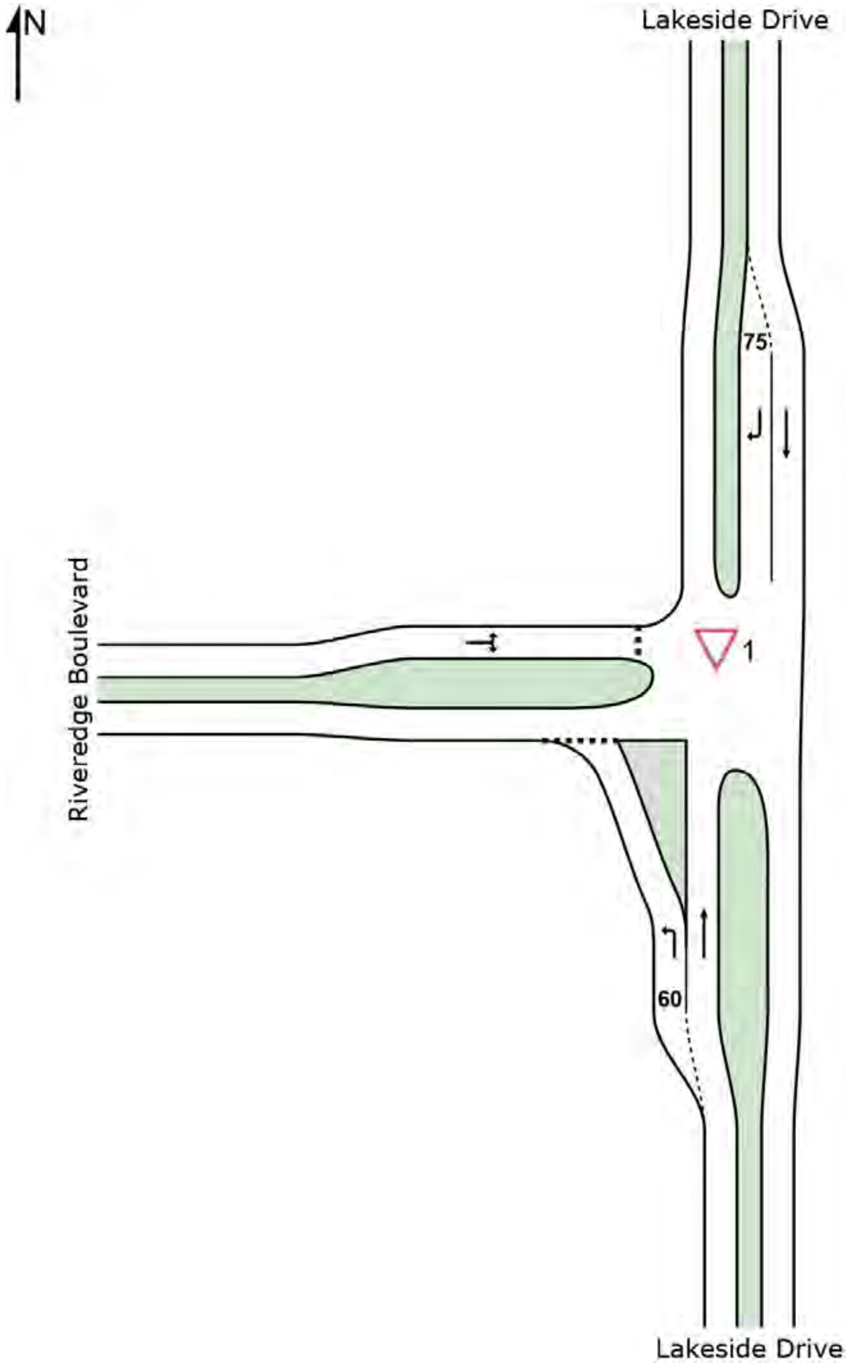
Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Processed: Friday, March 24, 2017 8:53:15 AM
Project: \\gocnas01\projects\15-000745.04 The Village, Oonoonba, TIA &Modelling\02_Docs\Reports\15-000745.ER01 - TIA\SIDRAS \Lakeside_Oonoonba.sip7

SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge AM 2015]

New Site
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Lakeside / Riveredge AM 2015]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	20	21.0	0.014	6.0	LOS A	0.1	0.5	0.11	0.51	46.9
2	T1	616	2.0	0.320	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		636	2.6	0.320	0.2	LOS A	0.1	0.5	0.00	0.02	59.5
North: Lakeside Drive											
8	T1	134	2.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	37	11.0	0.044	8.6	LOS A	0.2	1.3	0.57	0.73	33.8
Approach		171	3.9	0.069	1.9	NA	0.2	1.3	0.12	0.16	55.4
West: Riveredge Boulevard											
10	L2	151	3.0	0.342	10.6	LOS B	1.5	10.8	0.66	0.91	31.5
12	R2	29	11.0	0.342	19.7	LOS C	1.5	10.8	0.66	0.91	40.7
Approach		180	4.3	0.342	12.1	LOS B	1.5	10.8	0.66	0.91	33.7
All Vehicles		986	3.1	0.342	2.7	NA	1.5	10.8	0.14	0.20	54.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

Site: 1 [Lakeside / Riveredge AM 2015]

New Site
Giveway / Yield (Two-Way)

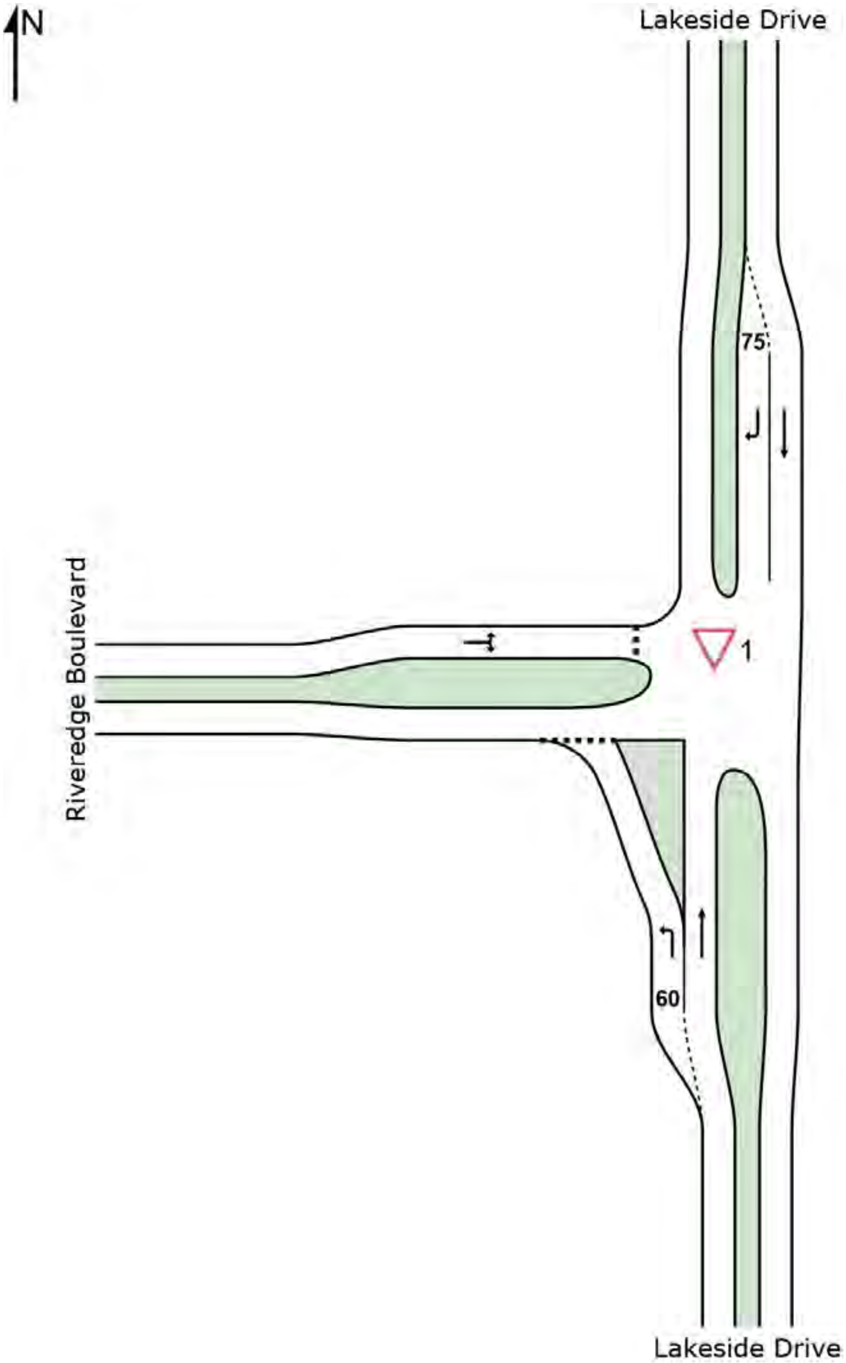
Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	20	21.0	1430	0.014	100	6.0	LOS A	0.1	0.5	Short	60	0.0	NA
Lane 2	616	2.0	1925	0.320	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	636	2.6		0.320		0.2	LOS A	0.1	0.5				
North: Lakeside Drive													
Lane 1	134	2.0	1925	0.069	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	37	11.0	837	0.044	100	8.6	LOS A	0.2	1.3	Short	75	0.0	NA
Approach	171	3.9		0.069		1.9	NA	0.2	1.3				
West: Riveredge Boulevard													
Lane 1	180	4.3	527	0.342	100	12.1	LOS B	1.5	10.8	Full	85	0.0	0.0
Approach	180	4.3		0.342		12.1	LOS B	1.5	10.8				
Intersection	986	3.1		0.342		2.7	NA	1.5	10.8				

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.
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.

SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge PM 2015]

New Site
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2015]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	40	0.0	0.027	5.9	LOS A	0.1	0.7	0.19	0.52	47.0
2	T1	359	1.0	0.185	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		399	0.9	0.185	0.6	LOS A	0.1	0.7	0.02	0.05	58.5
North: Lakeside Drive											
8	T1	221	0.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	105	1.0	0.083	6.8	LOS A	0.4	2.6	0.43	0.64	36.3
Approach		326	0.3	0.113	2.2	NA	0.4	2.6	0.14	0.21	53.9
West: Riveredge Boulevard											
10	L2	44	5.0	0.122	7.1	LOS A	0.4	3.2	0.52	0.73	34.2
12	R2	27	8.0	0.122	13.6	LOS B	0.4	3.2	0.52	0.73	43.3
Approach		72	6.1	0.122	9.6	LOS A	0.4	3.2	0.52	0.73	38.7
All Vehicles		797	1.1	0.185	2.1	NA	0.4	3.2	0.11	0.18	55.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2015]

New Site
Giveway / Yield (Two-Way)

Lane Use and Performance

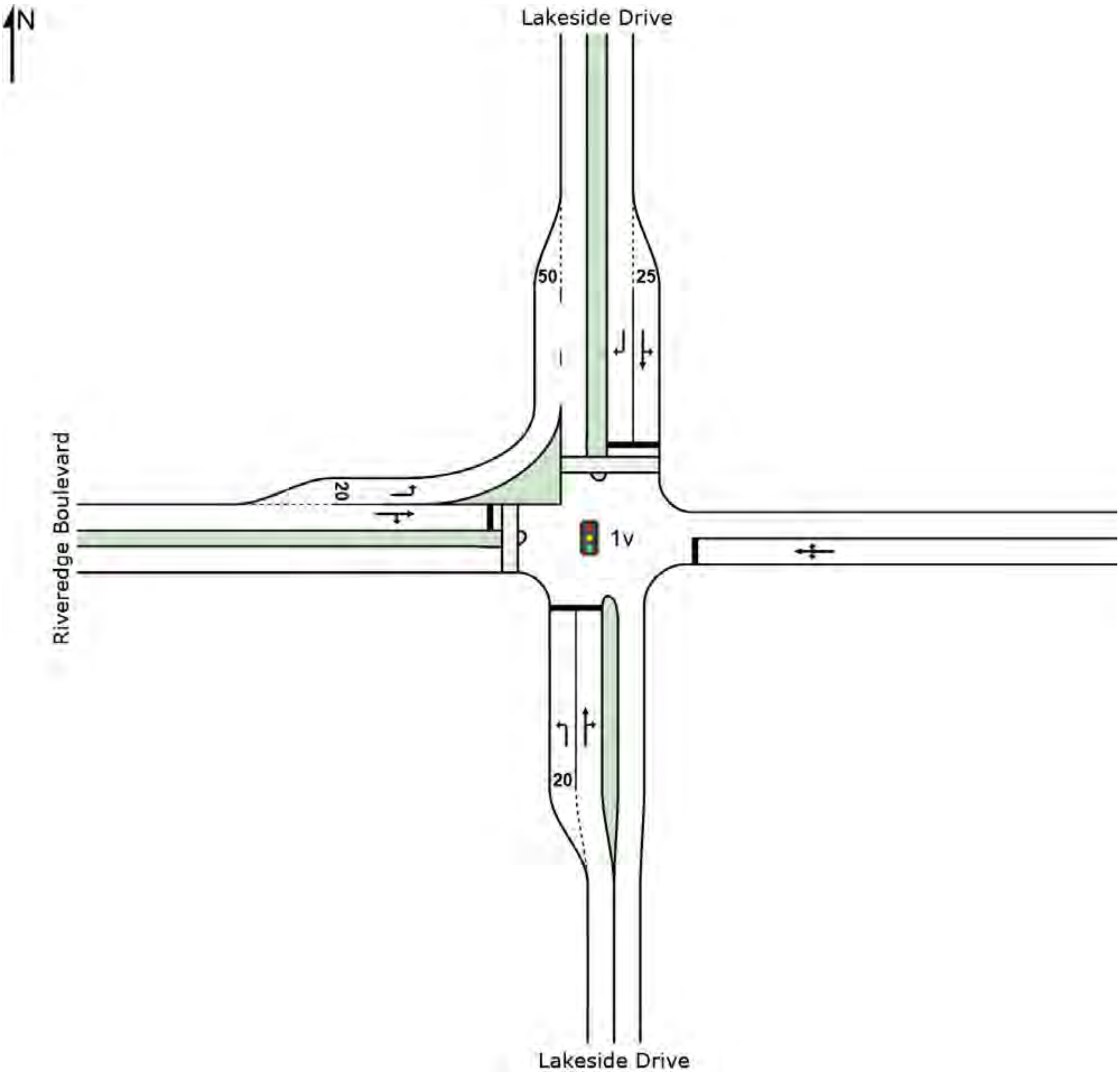
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	40	0.0	1498	0.027	100	5.9	LOS A	0.1	0.7	Short	60	0.0	NA
Lane 2	359	1.0	1937	0.185	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	399	0.9		0.185		0.6	LOS A	0.1	0.7				
North: Lakeside Drive													
Lane 1	221	0.0	1950	0.113	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	105	1.0	1265	0.083	100	6.8	LOS A	0.4	2.6	Short	75	0.0	NA
Approach	326	0.3		0.113		2.2	NA	0.4	2.6				
West: Riveredge Boulevard													
Lane 1	72	6.1	589	0.122	100	9.6	LOS A	0.4	3.2	Full	85	0.0	0.0
Approach	72	6.1		0.122		9.6	LOS A	0.4	3.2				
Intersection	797	1.1		0.185		2.1	NA	0.4	3.2				

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.
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Riveredge AM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1v [Lakeside / Riveredge AM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	135	21.0	0.135	11.0	LOS B	1.7	13.6	0.44	0.68	41.5
2	T1	641	2.0	0.609	6.1	LOS A	10.4	74.2	0.58	0.53	51.0
3	R2	19	0.0	0.609	11.5	LOS B	10.4	74.2	0.58	0.53	46.6
Approach		795	5.2	0.609	7.0	LOS A	10.4	74.2	0.56	0.55	49.2
East: Service Station											
4	L2	4	2.0	0.202	32.2	LOS C	1.2	8.3	0.92	0.72	29.6
5	T1	7	2.0	0.202	26.6	LOS C	1.2	8.3	0.92	0.72	16.6
6	R2	31	2.0	0.202	32.1	LOS C	1.2	8.3	0.92	0.72	19.8
Approach		42	2.0	0.202	31.2	LOS C	1.2	8.3	0.92	0.72	20.6
North: Lakeside Drive											
7	L2	5	0.0	0.115	9.8	LOS A	1.6	11.3	0.40	0.34	20.2
8	T1	139	2.0	0.115	4.2	LOS A	1.6	11.3	0.40	0.34	53.3
9	R2	180	11.0	0.544	18.2	LOS B	3.9	30.2	0.75	0.79	25.6
Approach		324	7.0	0.544	12.1	LOS B	3.9	30.2	0.59	0.59	37.9
West: Riveredge Boulevard											
10	L2	587	3.0	0.323	5.3	LOS A	0.0	0.0	0.00	0.53	44.7
11	T1	18	0.0	0.599	27.8	LOS C	4.5	33.8	0.98	0.82	16.1
12	R2	133	11.0	0.599	33.1	LOS C	4.5	33.8	0.98	0.82	28.2
Approach		738	4.4	0.599	10.9	LOS B	4.5	33.8	0.20	0.59	37.3
All Vehicles		1899	5.1	0.609	9.9	LOS A	10.4	74.2	0.43	0.58	42.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	6.1	LOS A	0.0	0.0	0.45	0.45
All Pedestrians		105	15.2	LOS B			0.68	0.68

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

LANE SUMMARY

Site: 1v [Lakeside / Riveredge AM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	135	21.0	996	0.135	100	11.0	LOS B	1.7	13.6	Short	20	0.0	NA
Lane 2	660	1.9	1083 [1]	0.609	100	6.3	LOS A	10.4	74.2	Full	420	0.0	0.0
Approach	795	5.2		0.609		7.0	LOS A	10.4	74.2				
East: Service Station													
Lane 1	42	2.0	209	0.202	100	31.2	LOS C	1.2	8.3	Full	100	0.0	0.0
Approach	42	2.0		0.202		31.2	LOS C	1.2	8.3				
North: Lakeside Drive													
Lane 1	144	1.9	1250	0.115	100	4.4	LOS A	1.6	11.3	Short	25	0.0	NA
Lane 2	180	11.0	331	0.544	100	18.2	LOS B	3.9	30.2	Full	160	0.0	0.0
Approach	324	7.0		0.544		12.1	LOS B	3.9	30.2				
West: Riveredge Boulevard													
Lane 1	587	3.0	1818	0.323	100	5.3	LOS A	0.0	0.0	Short	20	0.0	NA
Lane 2	151	9.7	251	0.599	100	32.5	LOS C	4.5	33.8	Full	85	0.0	0.0
Approach	738	4.4		0.599		10.9	LOS B	4.5	33.8				
Intersection	1899	5.1		0.609		9.9	LOS A	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.

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.

PHASING SUMMARY

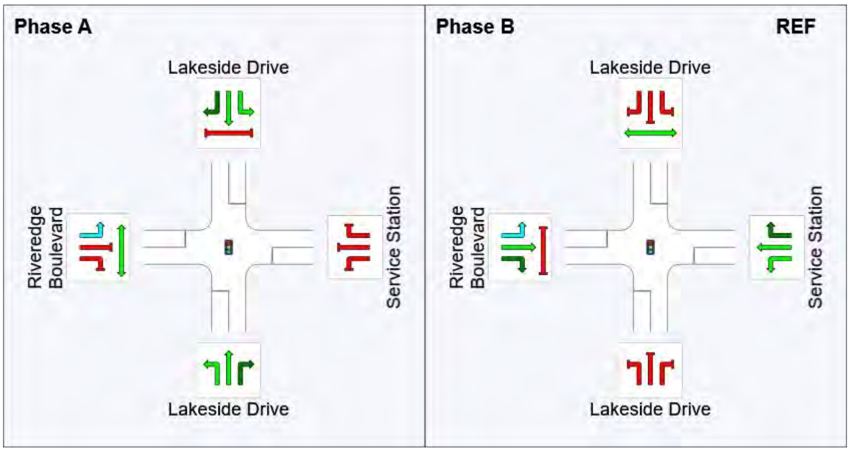
Site: 1v [Lakeside / Riveredge AM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

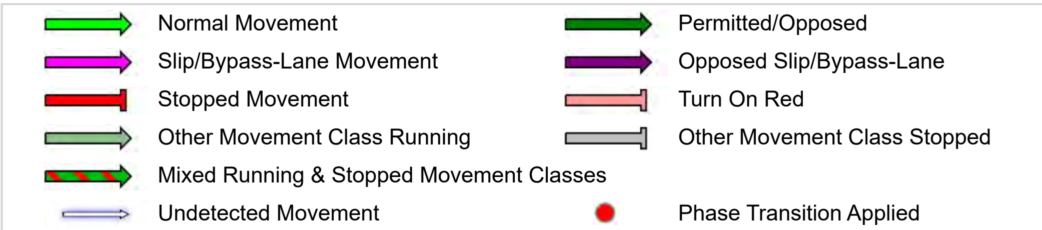
Phase Times determined by the program
Sequence: Two phase
Reference Phase: Phase B
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Phase Change Time (sec)	15	0
Green Time (sec)	39	9
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	45	15
Phase Split	75%	25%



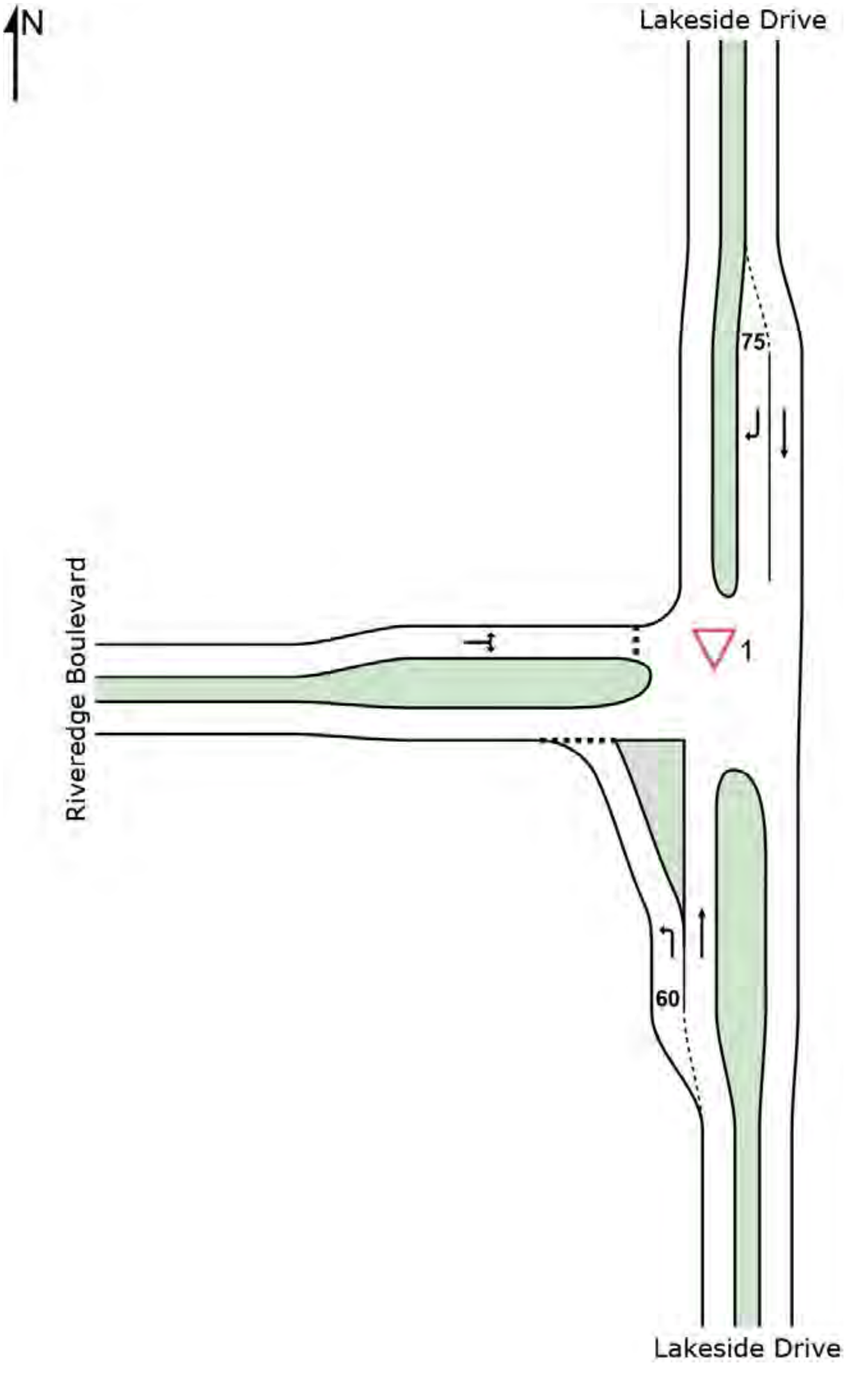
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Riveredge AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	21	21.0	0.015	6.0	LOS A	0.1	0.5	0.11	0.51	46.8
2	T1	641	2.0	0.333	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		662	2.6	0.333	0.2	LOS A	0.1	0.5	0.00	0.02	59.4
North: Lakeside Drive											
8	T1	139	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	38	11.0	0.047	8.8	LOS A	0.2	1.4	0.58	0.74	33.6
Approach		177	3.9	0.072	1.9	NA	0.2	1.4	0.12	0.16	55.4
West: Riveredge Boulevard											
10	L2	181	3.0	0.433	11.9	LOS B	2.1	15.1	0.71	0.97	30.0
12	R2	36	11.0	0.433	22.2	LOS C	2.1	15.1	0.71	0.97	39.5
Approach		217	4.3	0.433	13.6	LOS B	2.1	15.1	0.71	0.97	32.2
All Vehicles		1056	3.2	0.433	3.2	NA	2.1	15.1	0.17	0.24	53.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Riveredge AM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

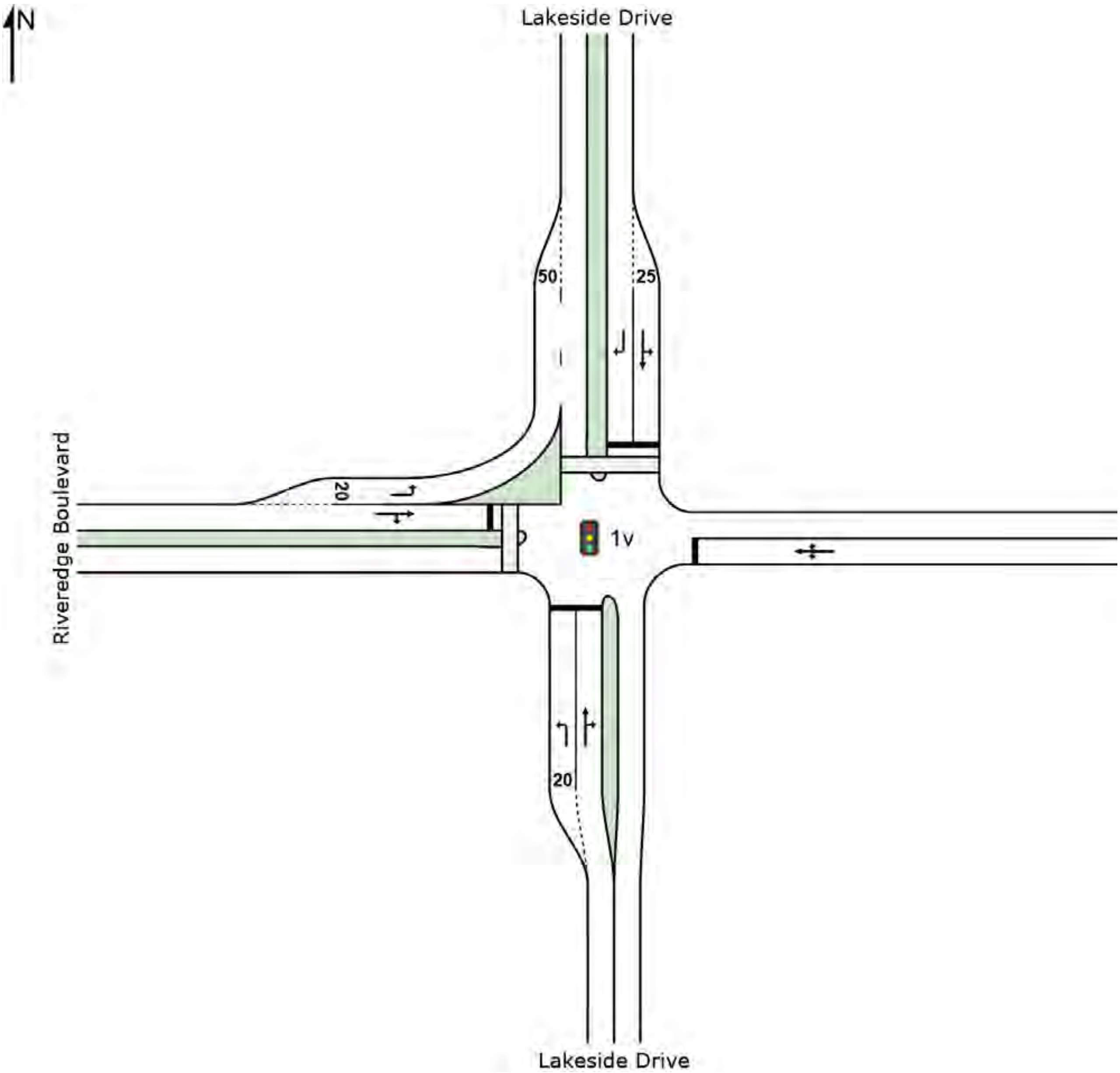
Lane Use and Performance														
	Demand Flows Total	Demand Flows HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive													
Lane 1	21	21.0	1428	0.015	100	6.0	LOS A	0.1	0.5	Short	60	0.0	NA
Lane 2	641	2.0	1925	0.333	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	662	2.6		0.333		0.2	LOS A	0.1	0.5				
North: Lakeside Drive													
Lane 1	139	2.0	1925	0.072	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	38	11.0	805	0.047	100	8.8	LOS A	0.2	1.4	Short	75	0.0	NA
Approach	177	3.9		0.072		1.9	NA	0.2	1.4				
West: Riveredge Boulevard													
Lane 1	217	4.3	501	0.433	100	13.6	LOS B	2.1	15.1	Full	85	0.0	0.0
Approach	217	4.3		0.433		13.6	LOS B	2.1	15.1				
Intersection	1056	3.2		0.433		3.2	NA	2.1	15.1				

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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Riveredge PM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1v [Lakeside / Riveredge PM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	109	0.0	0.243	29.0	LOS C	3.1	21.6	0.84	0.76	29.8
2	T1	374	1.0	0.888	37.8	LOS D	15.6	110.0	0.98	1.07	29.0
3	R2	13	0.0	0.888	43.3	LOS D	15.6	110.0	0.98	1.07	26.3
Approach		496	0.8	0.888	36.0	LOS D	15.6	110.0	0.95	1.00	29.1
East: Service Station											
4	L2	15	2.0	0.196	36.5	LOS D	1.4	9.7	0.93	0.71	28.3
5	T1	18	2.0	0.196	31.0	LOS C	1.4	9.7	0.93	0.71	15.6
6	R2	9	2.0	0.196	36.5	LOS D	1.4	9.7	0.93	0.71	18.8
Approach		42	2.0	0.196	34.1	LOS C	1.4	9.7	0.93	0.71	21.8
North: Lakeside Drive											
7	L2	20	0.0	0.184	9.4	LOS A	2.9	20.4	0.37	0.34	20.3
8	T1	231	0.0	0.184	3.8	LOS A	2.9	20.4	0.37	0.34	53.6
9	R2	547	1.0	0.695	22.7	LOS C	12.0	85.0	0.87	0.94	22.9
Approach		798	0.7	0.695	16.9	LOS B	12.0	85.0	0.71	0.75	31.5
West: Riveredge Boulevard											
10	L2	211	5.0	0.117	5.3	LOS A	0.0	0.0	0.00	0.52	44.4
11	T1	11	0.0	0.703	35.4	LOS D	5.1	38.2	1.00	0.88	13.7
12	R2	131	8.0	0.703	40.7	LOS D	5.1	38.2	1.00	0.88	25.3
Approach		352	6.0	0.703	19.4	LOS B	5.1	38.2	0.40	0.66	30.9
All Vehicles		1687	1.8	0.888	23.5	LOS C	15.6	110.0	0.72	0.81	30.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	23.3	LOS C	0.1	0.1	0.82	0.82
All Pedestrians		105	26.3	LOS C			0.87	0.87

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

LANE SUMMARY

Site: 1v [Lakeside / Riveredge PM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	109	0.0	451	0.243	100	29.0	LOS C	3.1	21.6	Short	20	0.0	NA
Lane 2	386	1.0	435[1]	0.888	100	38.0	LOS D	15.6	110.0	Full	420	0.0	0.0
Approach	496	0.8		0.888		36.0	LOS D	15.6	110.0				
East: Service Station													
Lane 1	42	2.0	214	0.196	100	34.1	LOS C	1.4	9.7	Full	100	0.0	0.0
Approach	42	2.0		0.196		34.1	LOS C	1.4	9.7				
North: Lakeside Drive													
Lane 1	251	0.0	1360	0.184	100	4.3	LOS A	2.9	20.4	Short	25	0.0	NA
Lane 2	547	1.0	787	0.695	100	22.7	LOS C	12.0	85.0	Full	160	0.0	0.0
Approach	798	0.7		0.695		16.9	LOS B	12.0	85.0				
West: Riveredge Boulevard													
Lane 1	211	5.0	1793	0.117	100	5.3	LOS A	0.0	0.0	Short	20	0.0	NA
Lane 2	141	7.4	201	0.703	100	40.3	LOS D	5.1	38.2	Full	85	0.0	0.0
Approach	352	6.0		0.703		19.4	LOS B	5.1	38.2				
Intersection	1687	1.8		0.888		23.5	LOS C	15.6	110.0				

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 full-length lanes. Some upstream delays at entry to short lanes are not included.

PHASING SUMMARY

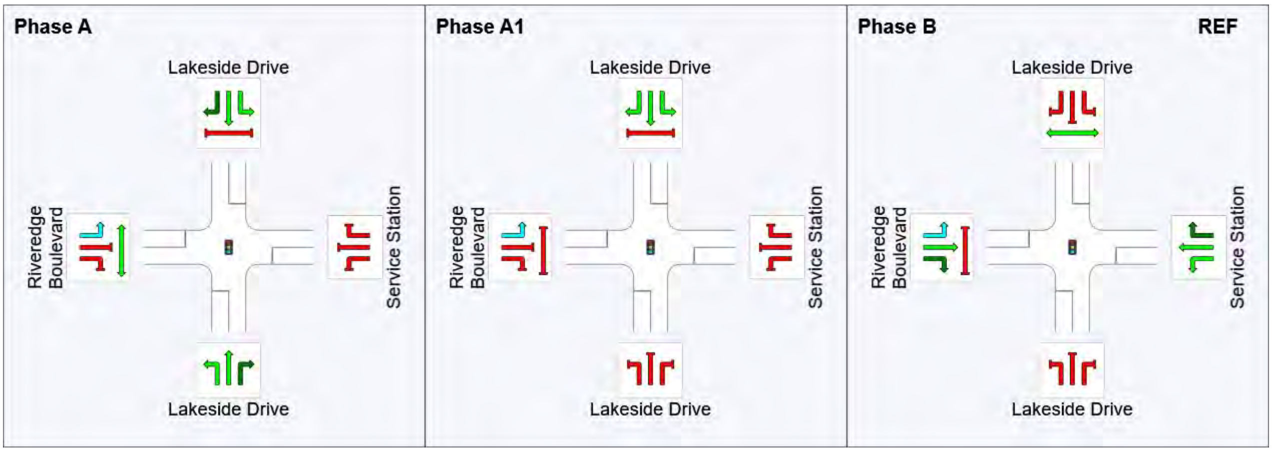
Site: 1v [Lakeside / Riveredge PM 2023 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: Opposed Turns
Reference Phase: Phase B
Input Sequence: A, A1, B
Output Sequence: A, A1, B

Phase Timing Results

Phase	A	A1	B
Phase Change Time (sec)	15	40	0
Green Time (sec)	19	24	9
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	25	30	15
Phase Split	36%	43%	21%



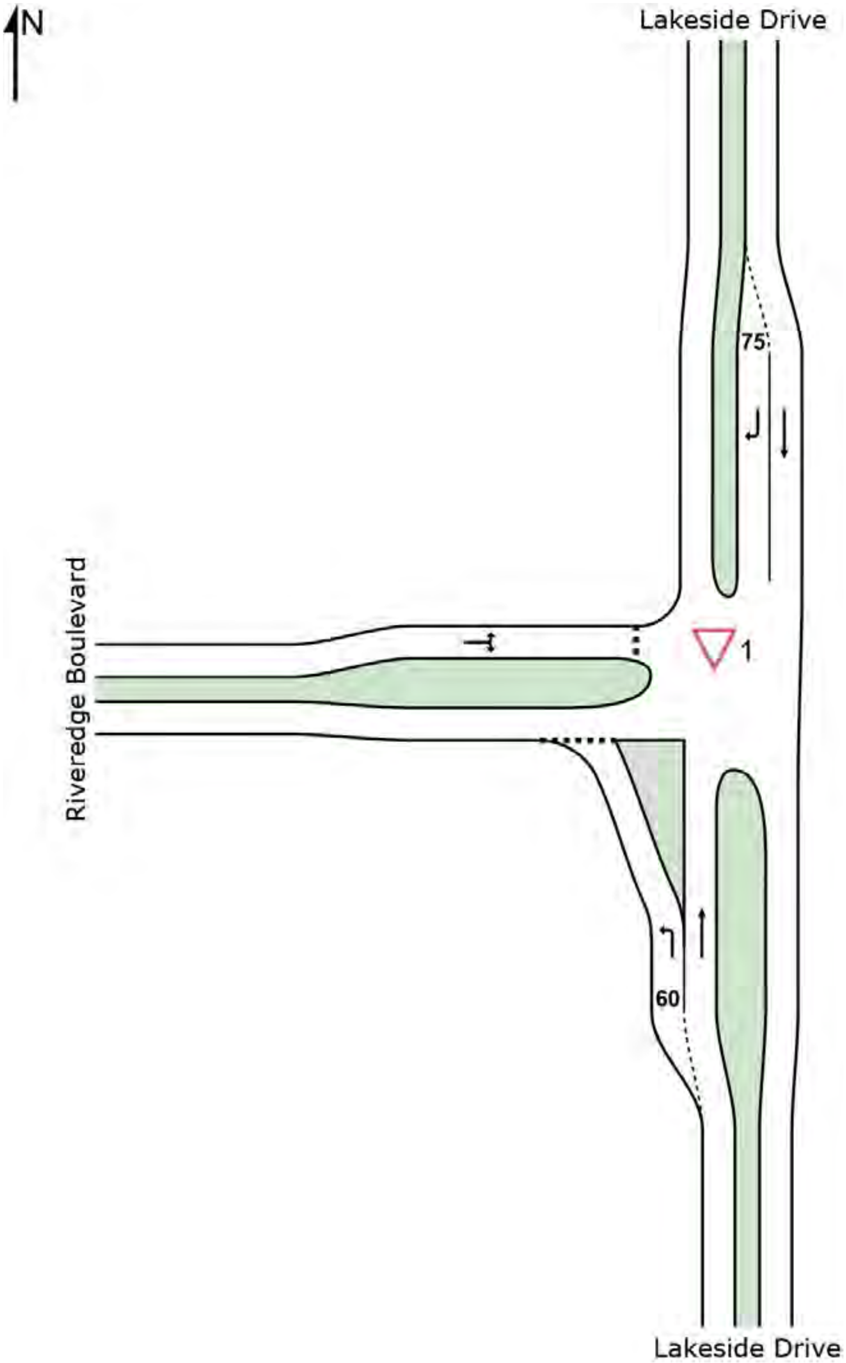
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	42	0.0	0.028	5.9	LOS A	0.1	0.8	0.20	0.52	47.0
2	T1	374	1.0	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		416	0.9	0.193	0.6	LOS A	0.1	0.8	0.02	0.05	58.5
North: Lakeside Drive											
8	T1	231	0.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	109	1.0	0.088	6.8	LOS A	0.4	2.7	0.44	0.65	36.2
Approach		340	0.3	0.118	2.2	NA	0.4	2.7	0.14	0.21	53.9
West: Riveredge Boulevard											
10	L2	53	5.0	0.150	7.3	LOS A	0.5	4.0	0.54	0.75	33.7
12	R2	33	8.0	0.150	14.4	LOS B	0.5	4.0	0.54	0.75	42.9
Approach		85	6.1	0.150	10.0	LOS A	0.5	4.0	0.54	0.75	38.3
All Vehicles		841	1.2	0.193	2.2	NA	0.5	4.0	0.12	0.19	54.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2023 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

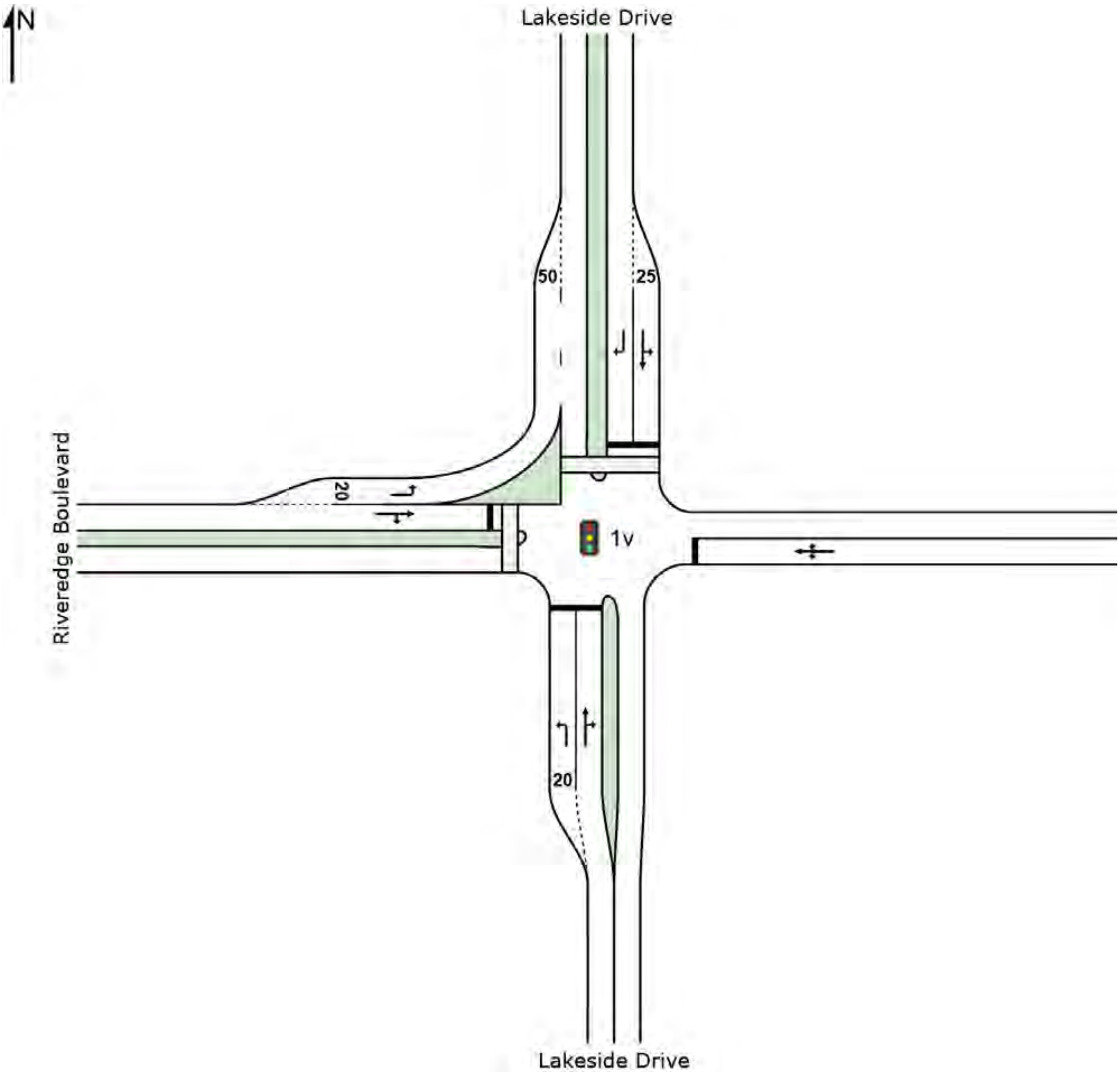
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive													
Lane 1	42	0.0	1492	0.028	100	5.9	LOS A	0.1	0.8	Short	60	0.0	NA
Lane 2	374	1.0	1937	0.193	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	416	0.9		0.193		0.6	LOS A	0.1	0.8				
North: Lakeside Drive													
Lane 1	231	0.0	1950	0.118	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	109	1.0	1244	0.088	100	6.8	LOS A	0.4	2.7	Short	75	0.0	NA
Approach	340	0.3		0.118		2.2	NA	0.4	2.7				
West: Riveredge Boulevard													
Lane 1	85	6.1	567	0.150	100	10.0	LOS A	0.5	4.0	Full	85	0.0	0.0
Approach	85	6.1		0.150		10.0	LOS A	0.5	4.0				
Intersection	841	1.2		0.193		2.2	NA	0.5	4.0				

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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Riveredge AM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1v [Lakeside / Riveredge AM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	137	21.0	0.134	10.5	LOS B	1.6	13.2	0.42	0.68	41.9
2	T1	621	2.0	0.571	5.4	LOS A	9.4	67.2	0.54	0.49	51.9
3	R2	19	0.0	0.571	10.9	LOS B	9.4	67.2	0.54	0.49	47.3
Approach		777	5.3	0.571	6.5	LOS A	9.4	67.2	0.52	0.52	49.9
East: Service Station											
4	L2	3	2.0	0.230	33.4	LOS C	1.2	8.6	0.94	0.73	29.0
5	T1	7	2.0	0.230	27.9	LOS C	1.2	8.6	0.94	0.73	16.1
6	R2	32	2.0	0.230	33.4	LOS C	1.2	8.6	0.94	0.73	19.3
Approach		42	2.0	0.230	32.4	LOS C	1.2	8.6	0.94	0.73	19.8
North: Lakeside Drive											
7	L2	5	0.0	0.032	9.1	LOS A	0.4	2.9	0.36	0.32	20.3
8	T1	36	2.0	0.032	3.6	LOS A	0.4	2.9	0.36	0.32	53.5
9	R2	169	11.0	0.479	16.3	LOS B	3.4	25.9	0.68	0.77	27.0
Approach		211	9.2	0.479	14.0	LOS B	3.4	25.9	0.62	0.68	31.7
West: Riveredge Boulevard											
10	L2	631	3.0	0.347	5.3	LOS A	0.0	0.0	0.00	0.52	44.7
11	T1	18	0.0	0.467	27.8	LOS C	3.1	23.3	0.97	0.77	16.2
12	R2	88	11.0	0.467	33.1	LOS C	3.1	23.3	0.97	0.77	28.4
Approach		737	3.9	0.467	9.2	LOS A	3.1	23.3	0.14	0.56	39.0
All Vehicles		1766	5.1	0.571	9.1	LOS A	9.4	67.2	0.38	0.56	43.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	5.6	LOS A	0.0	0.0	0.43	0.43
All Pedestrians		105	15.0	LOS B			0.67	0.67

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

LANE SUMMARY

Site: 1v [Lakeside / Riveredge AM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive													
Lane 1	137	21.0	1023	0.134	100	10.5	LOS B	1.6	13.2	Short	20	0.0	NA
Lane 2	640	1.9	1121 [1]	0.571	100	5.6	LOS A	9.4	67.2	Full	420	0.0	0.0
Approach	777	5.3		0.571		6.5	LOS A	9.4	67.2				
East: Service Station													
Lane 1	42	2.0	183	0.230	100	32.4	LOS C	1.2	8.6	Full	100	0.0	0.0
Approach	42	2.0		0.230		32.4	LOS C	1.2	8.6				
North: Lakeside Drive													
Lane 1	41	1.7	1277	0.032	100	4.3	LOS A	0.4	2.9	Short	25	0.0	NA
Lane 2	169	11.0	354	0.479	100	16.3	LOS B	3.4	25.9	Full	160	0.0	0.0
Approach	211	9.2		0.479		14.0	LOS B	3.4	25.9				
West: Riveredge Boulevard													
Lane 1	631	3.0	1818	0.347	100	5.3	LOS A	0.0	0.0	Short	20	0.0	NA
Lane 2	106	9.1	228	0.467	100	32.2	LOS C	3.1	23.3	Full	85	0.0	0.0
Approach	737	3.9		0.467		9.2	LOS A	3.1	23.3				
Intersection	1766	5.1		0.571		9.1	LOS A	9.4	67.2				

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.

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.

PHASING SUMMARY

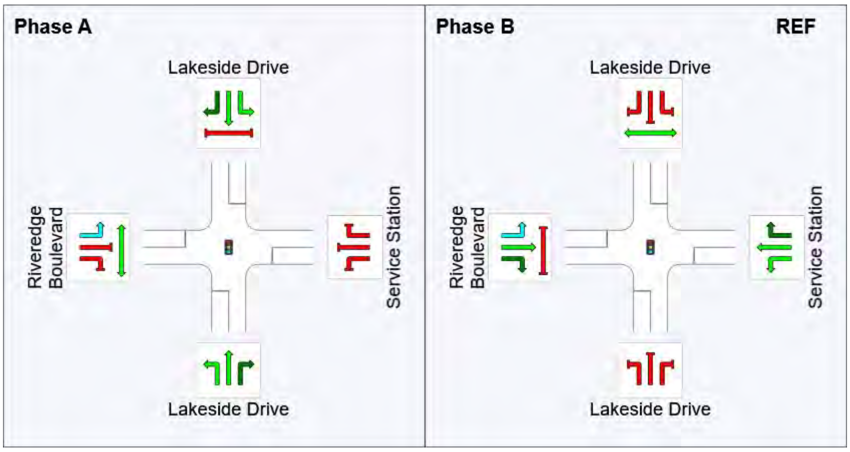
Site: 1v [Lakeside / Riveredge AM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Phase Times determined by the program
Sequence: Two phase
Reference Phase: Phase B
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	**A**	**B**
Phase Change Time (sec)	14	0
Green Time (sec)	40	8
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	46	14
Phase Split	77%	23%



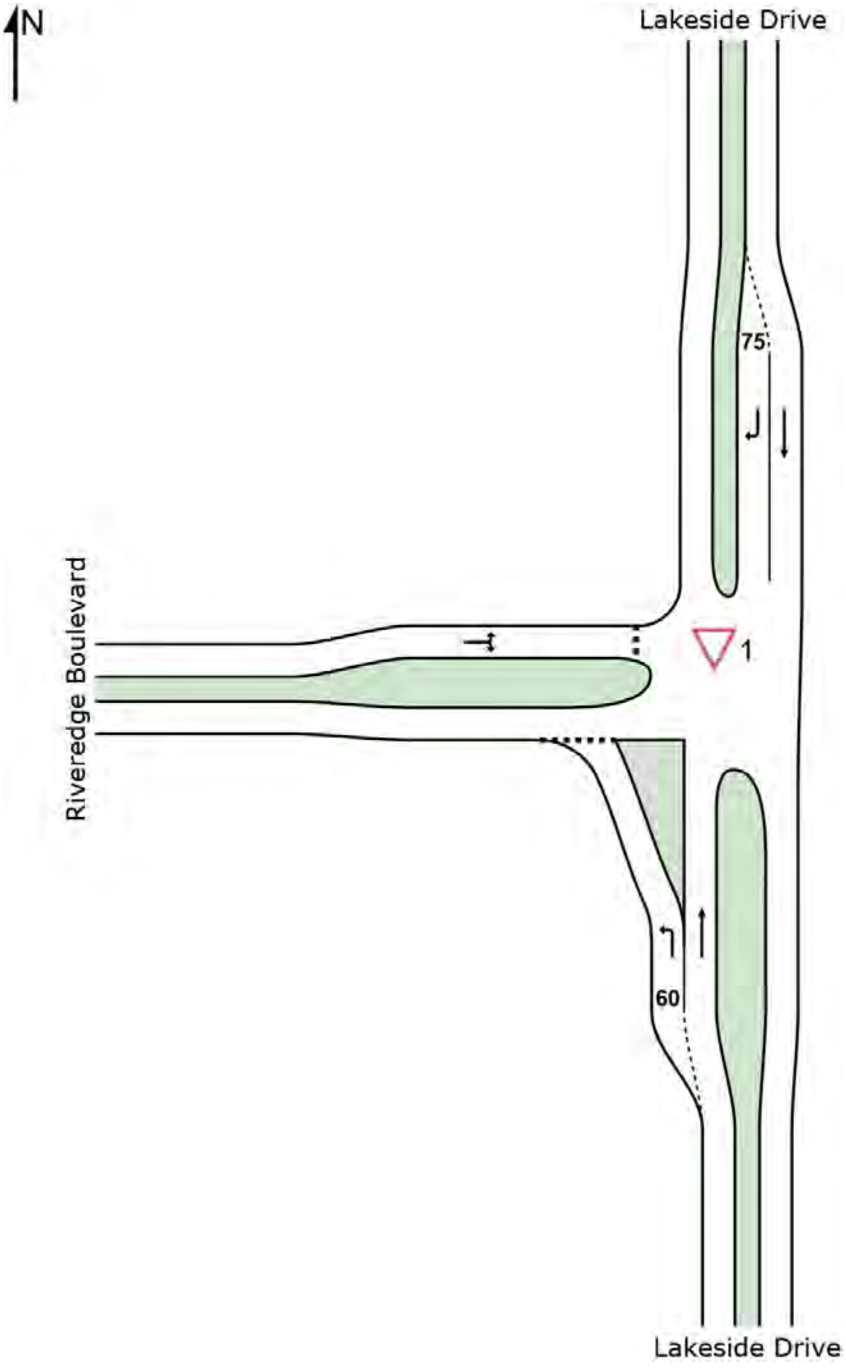
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Riveredge AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	22	21.0	0.015	5.9	LOS A	0.1	0.5	0.09	0.51	46.9
2	T1	621	2.0	0.323	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		643	2.7	0.323	0.2	LOS A	0.1	0.5	0.00	0.02	59.4
North: Lakeside Drive											
8	T1	36	2.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	27	11.0	0.033	8.6	LOS A	0.1	1.0	0.57	0.72	33.8
Approach		63	5.9	0.033	3.7	NA	0.1	1.0	0.25	0.31	50.3
West: Riveredge Boulevard											
10	L2	188	3.0	0.379	11.0	LOS B	1.8	12.7	0.66	0.92	31.9
12	R2	26	11.0	0.379	17.4	LOS C	1.8	12.7	0.66	0.92	41.0
Approach		215	4.0	0.379	11.8	LOS B	1.8	12.7	0.66	0.92	33.5
All Vehicles		921	3.2	0.379	3.2	NA	1.8	12.7	0.17	0.25	53.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Riveredge AM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

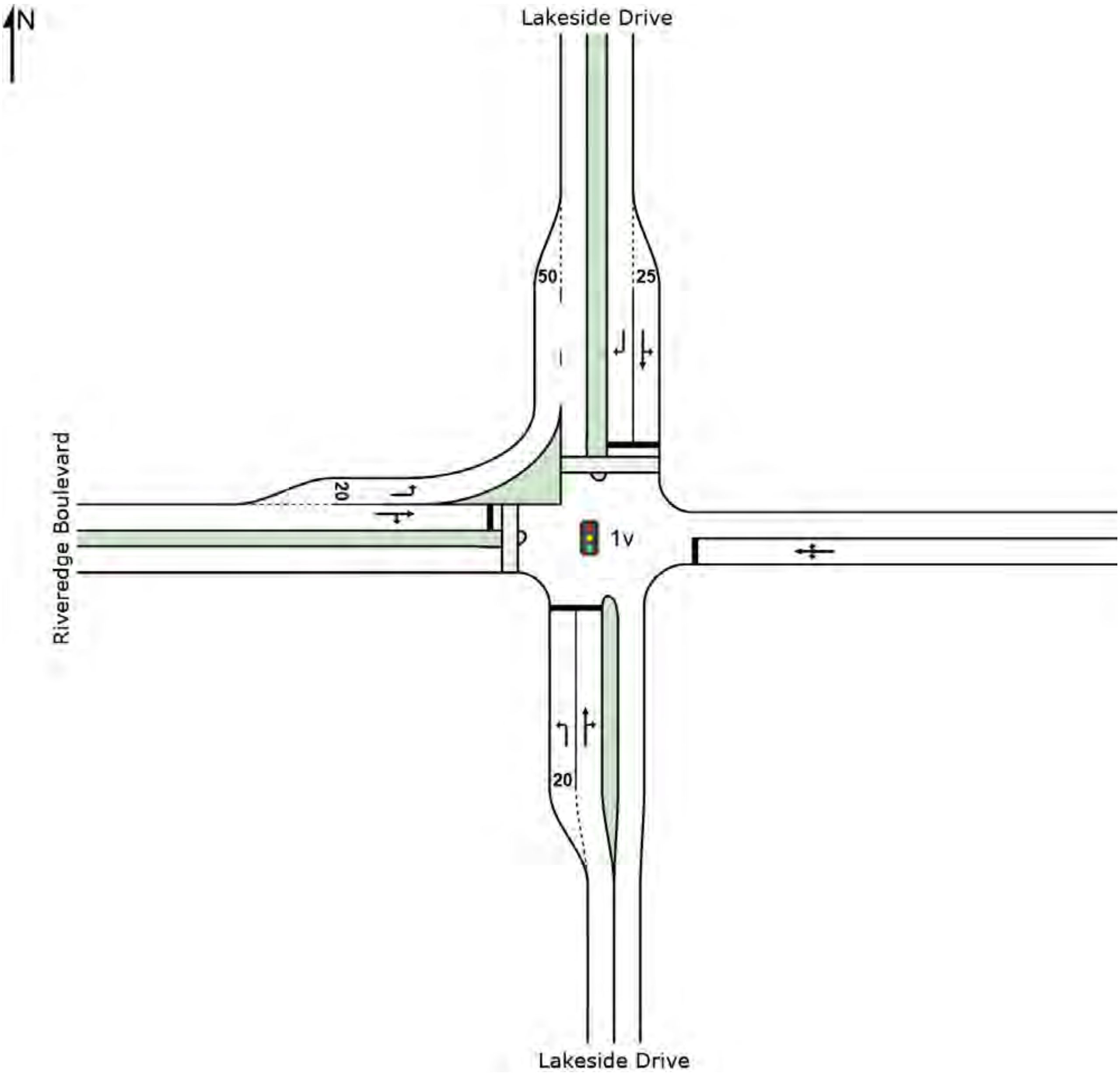
Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	22	21.0	1443	0.015	100	5.9	LOS A	0.1	0.5	Short	60	0.0	NA
Lane 2	621	2.0	1925	0.323	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	643	2.7		0.323		0.2	LOS A	0.1	0.5				
North: Lakeside Drive													
Lane 1	36	2.0	1925	0.019	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	27	11.0	831	0.033	100	8.6	LOS A	0.1	1.0	Short	75	0.0	NA
Approach	63	5.9		0.033		3.7	NA	0.1	1.0				
West: Riveredge Boulevard													
Lane 1	215	4.0	567	0.379	100	11.8	LOS B	1.8	12.7	Full	85	0.0	0.0
Approach	215	4.0		0.379		11.8	LOS B	1.8	12.7				
Intersection	921	3.2		0.379		3.2	NA	1.8	12.7				

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.
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.
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.

SITE LAYOUT

Site: 1v [Lakeside / Riveredge PM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1v [Lakeside / Riveredge PM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lakeside Drive											
1	L2	89	0.0	0.193	25.2	LOS C	2.1	14.8	0.82	0.75	31.8
2	T1	367	1.0	0.798	25.6	LOS C	11.5	81.4	0.95	0.94	34.8
3	R2	13	0.0	0.798	31.1	LOS C	11.5	81.4	0.95	0.94	31.6
Approach		469	0.8	0.798	25.7	LOS C	11.5	81.4	0.93	0.90	34.1
East: Service Station											
4	L2	15	2.0	0.168	30.8	LOS C	1.1	8.1	0.91	0.70	30.9
5	T1	18	2.0	0.168	25.2	LOS C	1.1	8.1	0.91	0.70	17.8
6	R2	9	2.0	0.168	30.8	LOS C	1.1	8.1	0.91	0.70	21.0
Approach		42	2.0	0.168	28.4	LOS C	1.1	8.1	0.91	0.70	24.3
North: Lakeside Drive											
7	L2	20	0.0	0.128	8.7	LOS A	1.7	11.6	0.35	0.33	20.5
8	T1	154	0.0	0.128	3.2	LOS A	1.7	11.6	0.35	0.33	54.2
9	R2	582	1.0	0.756	22.8	LOS C	12.2	86.2	0.91	0.98	22.8
Approach		756	0.8	0.756	18.4	LOS B	12.2	86.2	0.78	0.83	28.9
West: Riveredge Boulevard											
10	L2	243	5.0	0.136	5.3	LOS A	0.0	0.0	0.00	0.52	44.4
11	T1	11	0.0	0.683	29.2	LOS C	5.0	37.0	1.00	0.87	15.5
12	R2	151	8.0	0.683	34.5	LOS C	5.0	37.0	1.00	0.87	27.6
Approach		404	6.0	0.683	16.8	LOS B	5.0	37.0	0.40	0.66	32.9
All Vehicles		1672	2.1	0.798	20.3	LOS C	12.2	86.2	0.73	0.81	31.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	20.1	LOS C	0.1	0.1	0.82	0.82
All Pedestrians		105	22.2	LOS C			0.86	0.86

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

LANE SUMMARY

Site: 1v [Lakeside / Riveredge PM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Phase Times)

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lakeside Drive													
Lane 1	89	0.0	464	0.193	100	25.2	LOS C	2.1	14.8	Short	20	0.0	NA
Lane 2	380	1.0	476[1]	0.798	100	25.8	LOS C	11.5	81.4	Full	420	0.0	0.0
Approach	469	0.8		0.798		25.7	LOS C	11.5	81.4				
East: Service Station													
Lane 1	42	2.0	251	0.168	100	28.4	LOS C	1.1	8.1	Full	100	0.0	0.0
Approach	42	2.0		0.168		28.4	LOS C	1.1	8.1				
North: Lakeside Drive													
Lane 1	174	0.0	1357	0.128	100	3.8	LOS A	1.7	11.6	Short	25	0.0	NA
Lane 2	582	1.0	769	0.756	100	22.8	LOS C	12.2	86.2	Full	160	0.0	0.0
Approach	756	0.8		0.756		18.4	LOS B	12.2	86.2				
West: Riveredge Boulevard													
Lane 1	243	5.0	1793	0.136	100	5.3	LOS A	0.0	0.0	Short	20	0.0	NA
Lane 2	161	7.5	236	0.683	100	34.2	LOS C	5.0	37.0	Full	85	0.0	0.0
Approach	404	6.0		0.683		16.8	LOS B	5.0	37.0				
Intersection	1672	2.1		0.798		20.3	LOS C	12.2	86.2				

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.

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.

PHASING SUMMARY

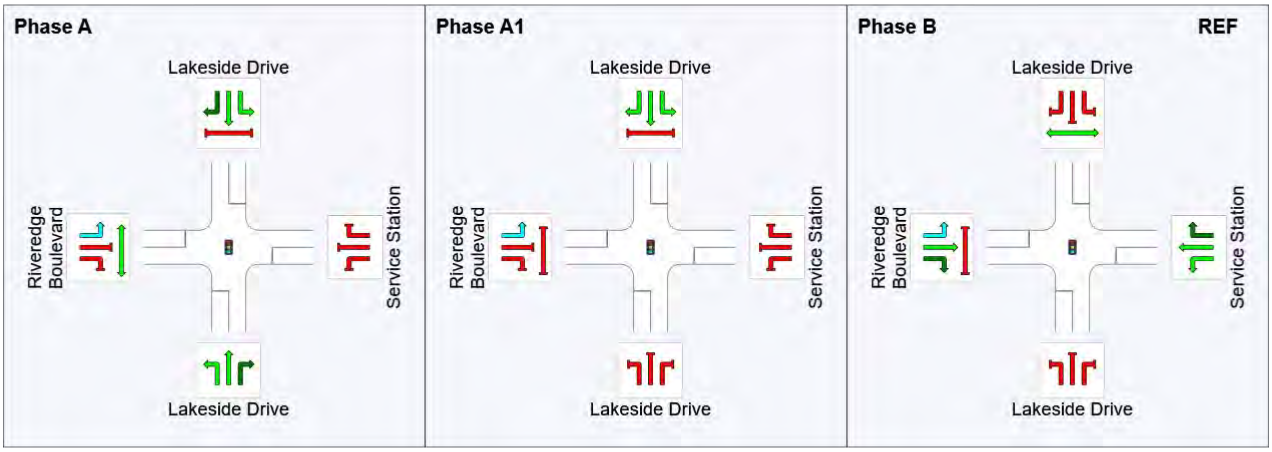
Site: 1v [Lakeside / Riveredge PM 2033 WD TS-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Phase Times)

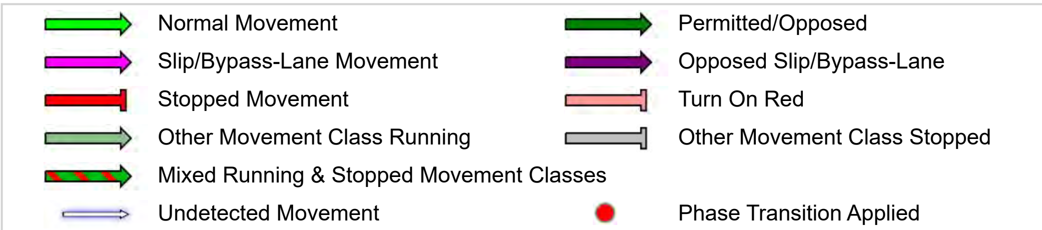
Phase Times specified by the user
Sequence: Opposed Turns
Reference Phase: Phase B
Input Sequence: A, A1, B
Output Sequence: A, A1, B

Phase Timing Results

Phase	A	A1	B
Phase Change Time (sec)	12	35	0
Green Time (sec)	17	19	9
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	25	12
Phase Split	38%	42%	20%



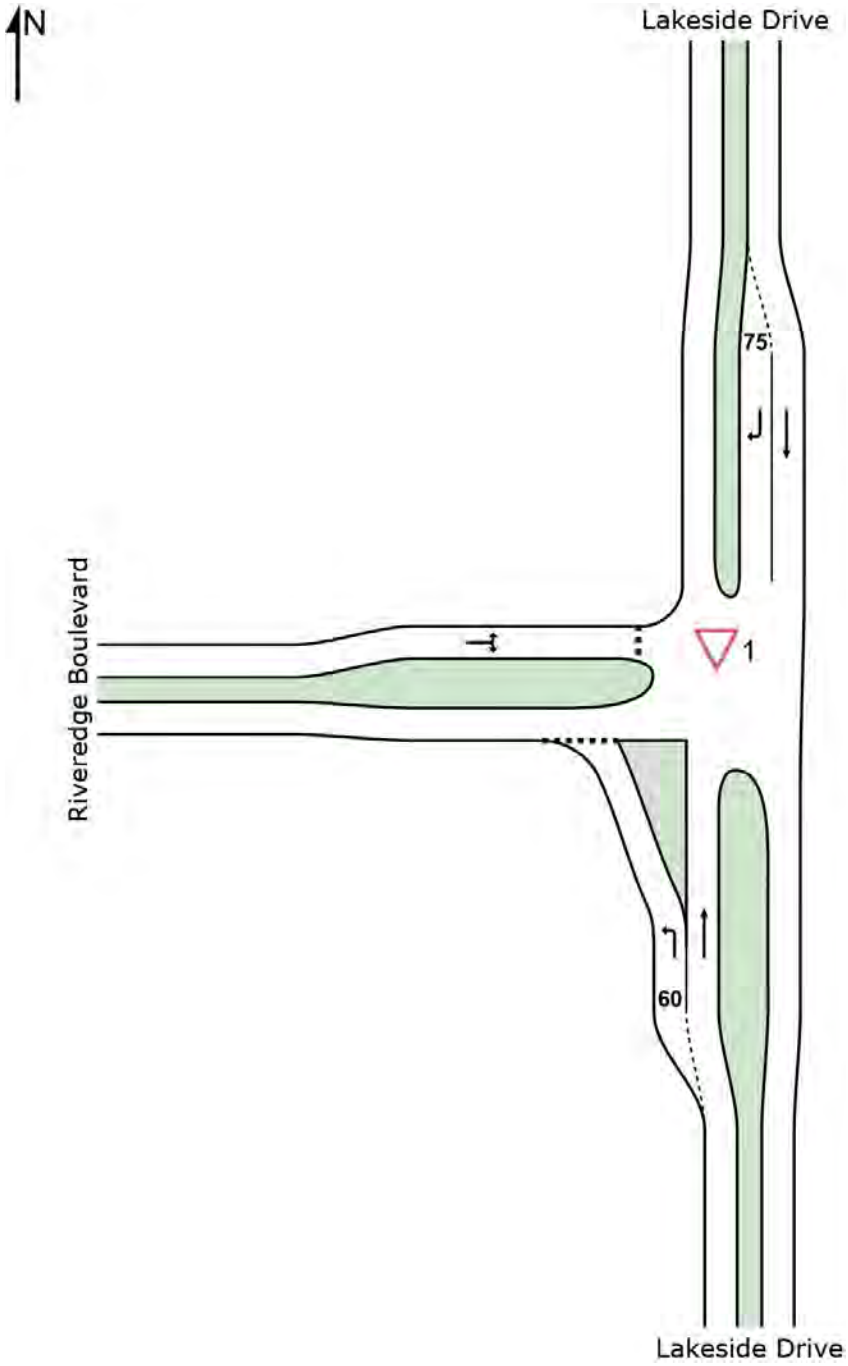
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

▽ Site: 1 [Lakeside / Riveredge PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
Movement Performance - Vehicles											
South: Lakeside Drive											
1	L2	22	0.0	0.015	6.0	LOS A	0.1	0.4	0.23	0.52	46.8
2	T1	367	1.0	0.190	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		389	0.9	0.190	0.4	LOS A	0.1	0.4	0.01	0.03	59.1
North: Lakeside Drive											
8	T1	154	0.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	144	1.0	0.115	6.8	LOS A	0.5	3.6	0.45	0.65	36.2
Approach		298	0.5	0.115	3.3	NA	0.5	3.6	0.22	0.32	50.4
West: Riveredge Boulevard											
10	L2	85	5.0	0.229	7.3	LOS A	0.9	6.4	0.55	0.76	34.0
12	R2	53	8.0	0.229	13.7	LOS B	0.9	6.4	0.55	0.76	43.1
Approach		138	6.1	0.229	9.8	LOS A	0.9	6.4	0.55	0.76	38.5
All Vehicles		825	1.6	0.229	3.0	NA	0.9	6.4	0.18	0.26	52.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

LANE SUMMARY

▽ Site: 1 [Lakeside / Riveredge PM 2033 W/O D-Final]

Without Dev Traffic
Giveway / Yield (Two-Way)

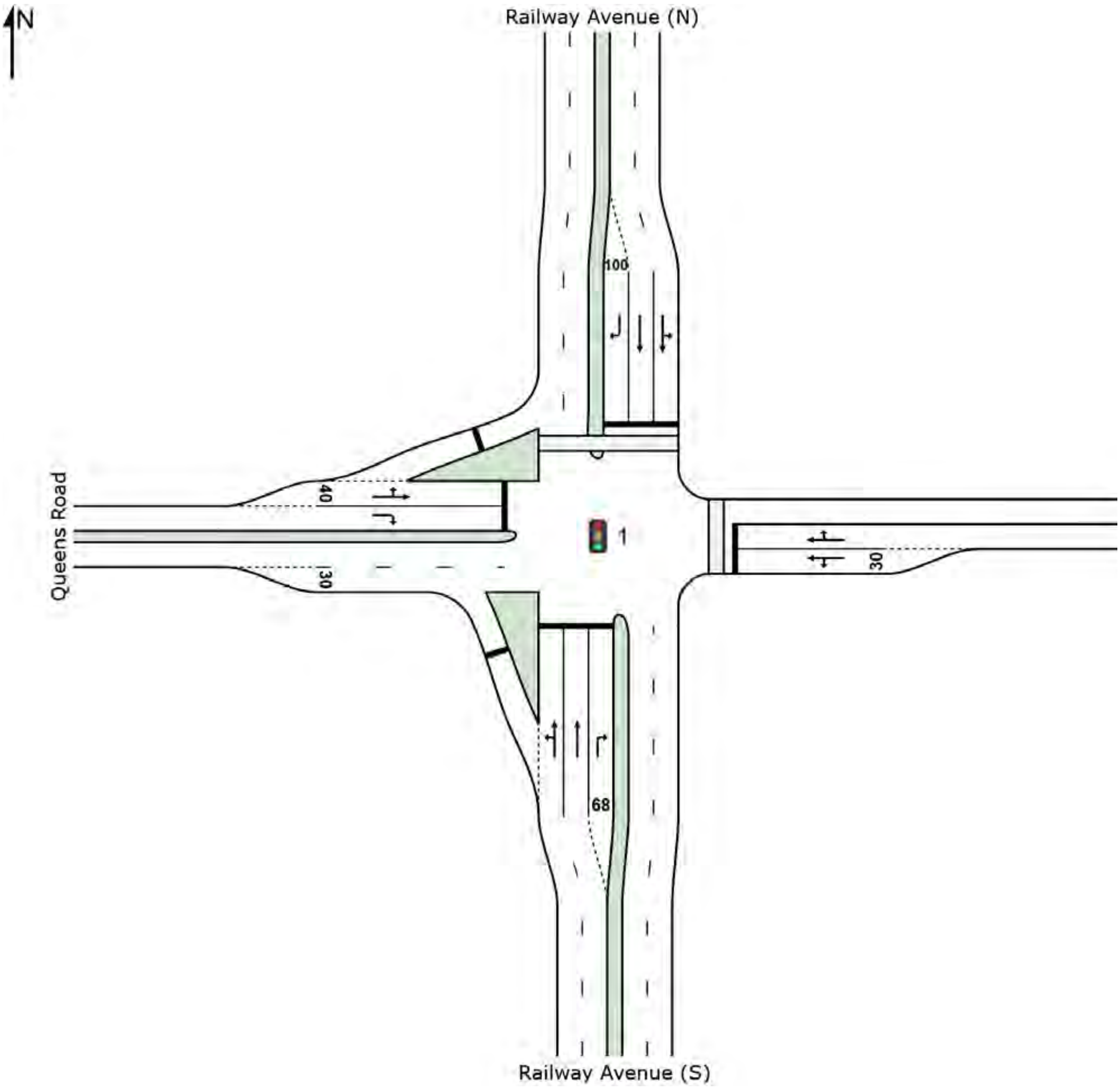
Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lakeside Drive													
Lane 1	22	0.0	1447	0.015	100	6.0	LOS A	0.1	0.4	Short	60	0.0	NA
Lane 2	367	1.0	1937	0.190	100	0.0	LOS A	0.0	0.0	Full	420	0.0	0.0
Approach	389	0.9		0.190		0.4	LOS A	0.1	0.4				
North: Lakeside Drive													
Lane 1	154	0.0	1950	0.079	100	0.0	LOS A	0.0	0.0	Full	160	0.0	0.0
Lane 2	144	1.0	1253	0.115	100	6.8	LOS A	0.5	3.6	Short	75	0.0	NA
Approach	298	0.5		0.115		3.3	NA	0.5	3.6				
West: Riveredge Boulevard													
Lane 1	138	6.1	603	0.229	100	9.8	LOS A	0.9	6.4	Full	85	0.0	0.0
Approach	138	6.1		0.229		9.8	LOS A	0.9	6.4				
Intersection	825	1.6		0.229		3.0	NA	0.9	6.4				

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.
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.

SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2016]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 141 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	159	8.1	0.588	21.8	LOS C	27.2	199.6	0.64	0.63	41.4
2	T1	1219	5.0	0.588	16.0	LOS B	27.2	199.6	0.63	0.60	42.7
3	R2	11	0.0	0.023	15.9	LOS B	0.3	1.9	0.39	0.64	38.3
Approach		1388	5.3	0.588	16.6	LOS B	27.2	199.6	0.63	0.60	42.5
East: Putt Street											
4	L2	38	0.0	0.374	69.8	LOS E	5.0	34.8	0.97	0.76	19.4
5	T1	38	0.0	0.374	64.7	LOS E	5.0	34.8	0.97	0.76	14.2
6	R2	98	0.0	1.564	598.4	LOS F	21.9	153.6	1.00	1.62	1.8
Approach		174	0.0	1.564	366.6	LOS F	21.9	153.6	0.99	1.24	3.4
North: Railway Avenue (N)											
7	L2	22	0.0	0.222	8.8	LOS A	5.3	38.5	0.25	0.25	21.3
8	T1	657	5.0	0.222	3.3	LOS A	5.3	38.6	0.25	0.24	55.3
9	R2	162	4.7	0.432	19.6	LOS B	6.3	45.7	0.78	0.81	33.9
Approach		841	4.8	0.432	6.6	LOS A	6.3	45.7	0.35	0.35	49.7
West: Queens Road											
10	L2	136	6.6	0.793	77.8	LOS E	10.6	77.8	1.00	0.89	16.1
11	T1	11	0.0	0.793	72.1	LOS E	10.6	77.8	1.00	0.89	12.9
12	R2	106	4.8	0.918	93.6	LOS F	8.6	62.5	1.00	1.00	18.7
Approach		253	5.5	0.918	84.2	LOS F	10.6	77.8	1.00	0.94	17.3
All Vehicles		2656	4.8	1.564	42.8	LOS D	27.2	199.6	0.60	0.60	28.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	4.1	LOS A	0.0	0.0	0.24	0.24
P3	North Full Crossing	1	64.6	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		2	34.4	LOS D			0.60	0.60

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 141 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	689	5.7	1172	0.588	100	17.4	LOS B	27.2	199.6	Full	450	0.0	0.0
Lane 2	689	5.0	1173[1]	0.588	100	15.9	LOS B	26.9	196.7	Full	450	0.0	0.0
Lane 3	11	0.0	458	0.023	100	15.9	LOS B	0.3	1.9	Short	68	0.0	NA
Approach	1388	5.3		0.588		16.6	LOS B	27.2	199.6				
East: Putt Street													
Lane 1	76	0.0	202	0.374	24[5]	67.2	LOS E	5.0	34.8	Short	30	0.0	NA
Lane 2	98	0.0	63	1.564	100	598.4	LOS F	21.9	153.6	Full	80	0.0	65.4
Approach	174	0.0		1.564		366.6	LOS F	21.9	153.6				
North: Railway Avenue (N)													
Lane 1	339	4.7	1525	0.222	100	3.7	LOS A	5.3	38.5	Full	210	0.0	0.0
Lane 2	340	5.0	1527	0.222	100	3.3	LOS A	5.3	38.6	Full	210	0.0	0.0
Lane 3	162	4.7	375	0.432	100	19.6	LOS B	6.3	45.7	Short	100	0.0	NA
Approach	841	4.8		0.432		6.6	LOS A	6.3	45.7				
West: Queens Road													
Lane 1	146	6.1	184[1]	0.793	100	77.4	LOS E	10.6	77.8	Short	40	0.0	NA
Lane 2	106	4.8	116	0.918	100	93.6	LOS F	8.6	62.5	Full	250	0.0	0.0
Approach	253	5.5		0.918		84.2	LOS F	10.6	77.8				
Intersection	2656	4.8		1.564		42.8	LOS D	27.2	199.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program

PHASING SUMMARY

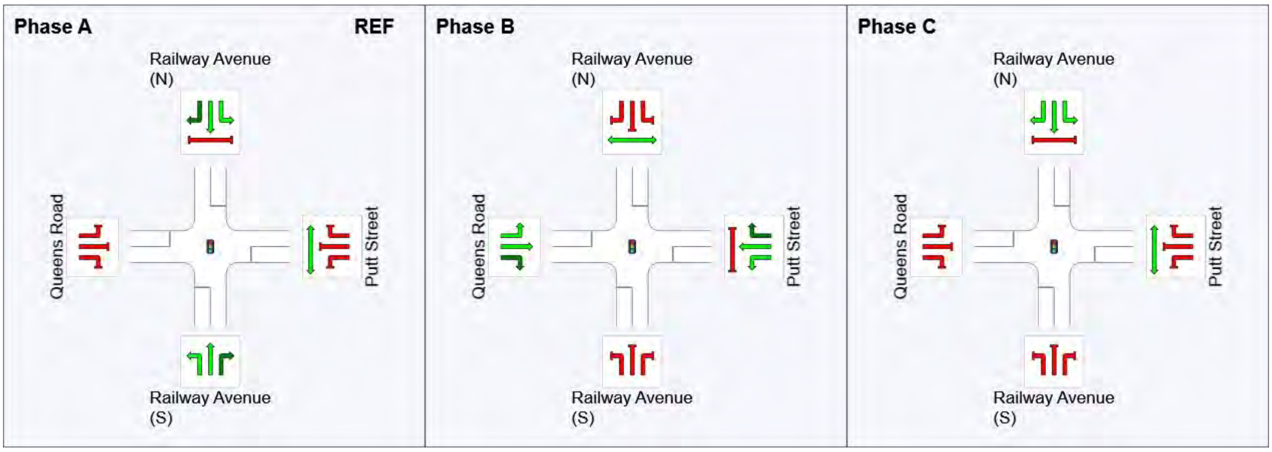
Site: 1 [Railway / Queens / Putt AM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

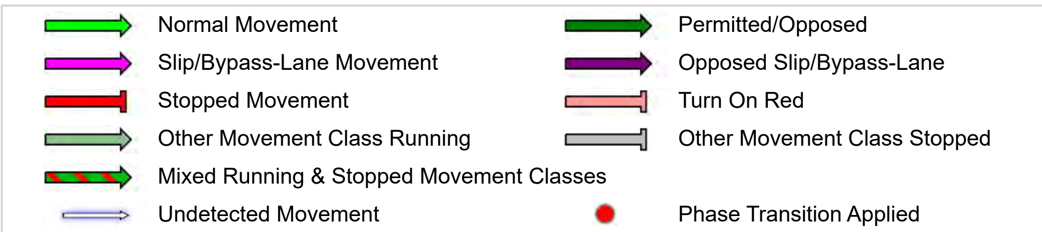
Phase Times specified by the user
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	95	116
Green Time (sec)	89	15	19
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	95	21	25
Phase Split	67%	15%	18%



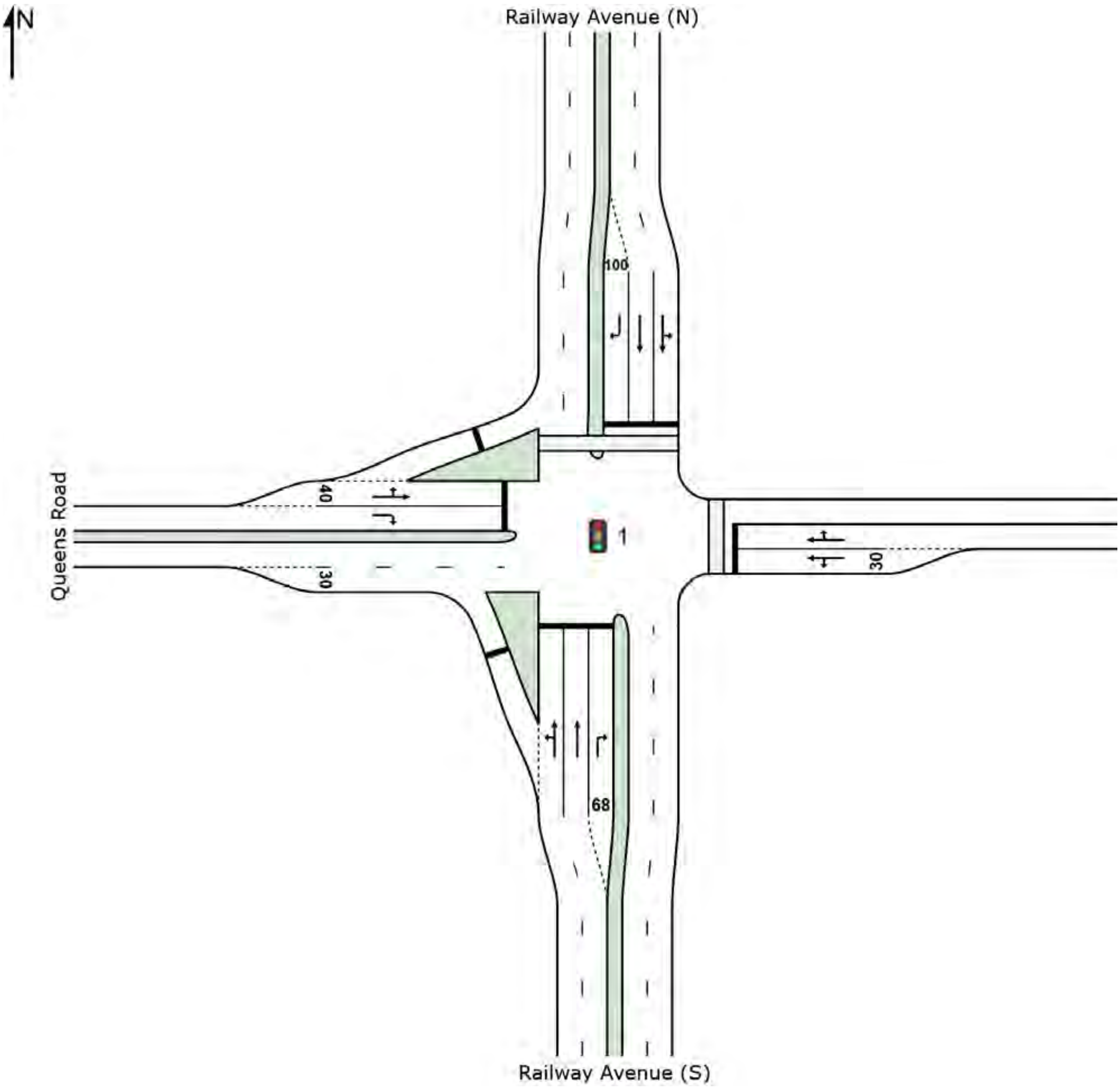
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2016]

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2016]

New Site
Signals - Fixed Time Isolated Cycle Time = 138 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	116	8.0	0.430	20.3	LOS C	16.9	124.0	0.56	0.56	42.4
2	T1	869	5.0	0.430	14.5	LOS B	16.9	123.6	0.56	0.53	43.8
3	R2	15	0.0	0.079	17.4	LOS B	0.4	2.9	0.42	0.66	37.2
Approach		1000	5.3	0.430	15.2	LOS B	16.9	124.0	0.56	0.53	43.5
East: Putt Street											
4	L2	16	0.0	0.084	66.5	LOS E	1.0	6.8	0.94	0.69	19.5
5	T1	16	0.0	0.234	67.8	LOS E	1.9	13.2	0.98	0.72	13.8
6	R2	13	0.0	0.234	73.0	LOS E	1.9	13.2	0.98	0.72	12.3
Approach		44	0.0	0.234	68.8	LOS E	1.9	13.2	0.96	0.71	15.5
North: Railway Avenue (N)											
7	L2	144	0.0	0.449	9.6	LOS A	13.3	96.3	0.32	0.38	20.7
8	T1	1229	5.0	0.449	4.0	LOS A	13.4	97.5	0.32	0.33	53.9
9	R2	553	4.7	1.076	148.3	LOS F	60.3	439.2	1.00	1.27	9.6
Approach		1926	4.5	1.076	45.8	LOS D	60.3	439.2	0.52	0.61	25.3
West: Queens Road											
10	L2	81	6.6	0.525	71.2	LOS E	6.3	46.4	0.99	0.78	17.3
11	T1	15	0.0	0.525	65.5	LOS E	6.3	46.4	0.99	0.78	13.9
12	R2	203	4.8	1.791	801.1	LOS F	51.8	377.3	1.00	2.13	3.1
Approach		299	5.0	1.791	567.0	LOS F	51.8	377.3	1.00	1.70	3.8
All Vehicles		3269	4.7	1.791	84.4	LOS F	60.3	439.2	0.58	0.68	18.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	3.9	LOS A	0.0	0.0	0.24	0.24
P3	North Full Crossing	1	63.1	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		2	33.5	LOS D			0.60	0.60

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	491	5.7	1143	0.430	100	15.9	LOS B	16.9	124.0	Full	450	0.0	0.0
Lane 2	494	5.0	1151[1]	0.430	100	14.5	LOS B	16.9	123.6	Full	450	0.0	0.0
Lane 3	15	0.0	186	0.079	100	17.4	LOS B	0.4	2.9	Short	68	0.0	NA
Approach	1000	5.3		0.430		15.2	LOS B	16.9	124.0				
East: Putt Street													
Lane 1	16	0.0	188	0.084	36[5]	66.5	LOS E	1.0	6.8	Short	30	0.0	NA
Lane 2	28	0.0	121	0.234	100	70.1	LOS E	1.9	13.2	Full	80	0.0	0.0
Approach	44	0.0		0.234		68.8	LOS E	1.9	13.2				
North: Railway Avenue (N)													
Lane 1	686	3.9	1527	0.449	100	5.2	LOS A	13.3	96.3	Full	210	0.0	0.0
Lane 2	688	5.0	1533	0.449	100	4.0	LOS A	13.4	97.5	Full	210	0.0	73.7[8]
Lane 3	553	4.7	514	1.076	100	148.3	LOS F	60.3	439.2	Short	100	0.0	NA
Approach	1926	4.5		1.076		45.8	LOS D	60.3	439.2				
West: Queens Road													
Lane 1	96	5.5	183	0.525	100	70.3	LOS E	6.3	46.4	Short	40	0.0	NA
Lane 2	203	4.8	113	1.791	100	801.1	LOS F	51.8	377.3	Full	250	0.0	42.7
Approach	299	5.0		1.791		567.0	LOS F	51.8	377.3				
Intersection	3269	4.7		1.791		84.4	LOS F	60.3	439.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

PHASING SUMMARY

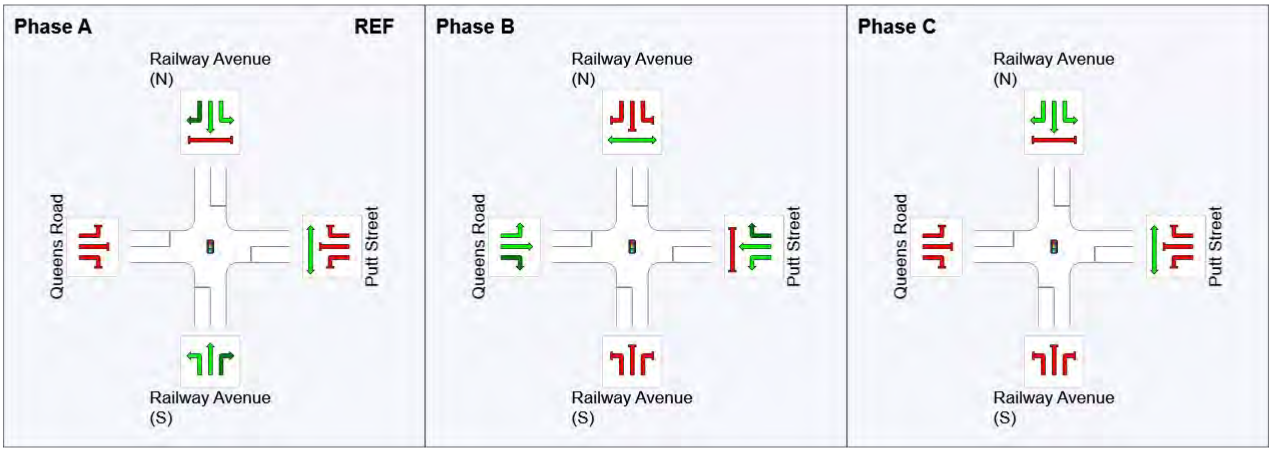
Site: 1 [Railway / Queens / Putt PM 2016]

New Site
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Phase Times)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times specified by the user
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	91	111
Green Time (sec)	85	14	21
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	91	20	27
Phase Split	66%	14%	20%



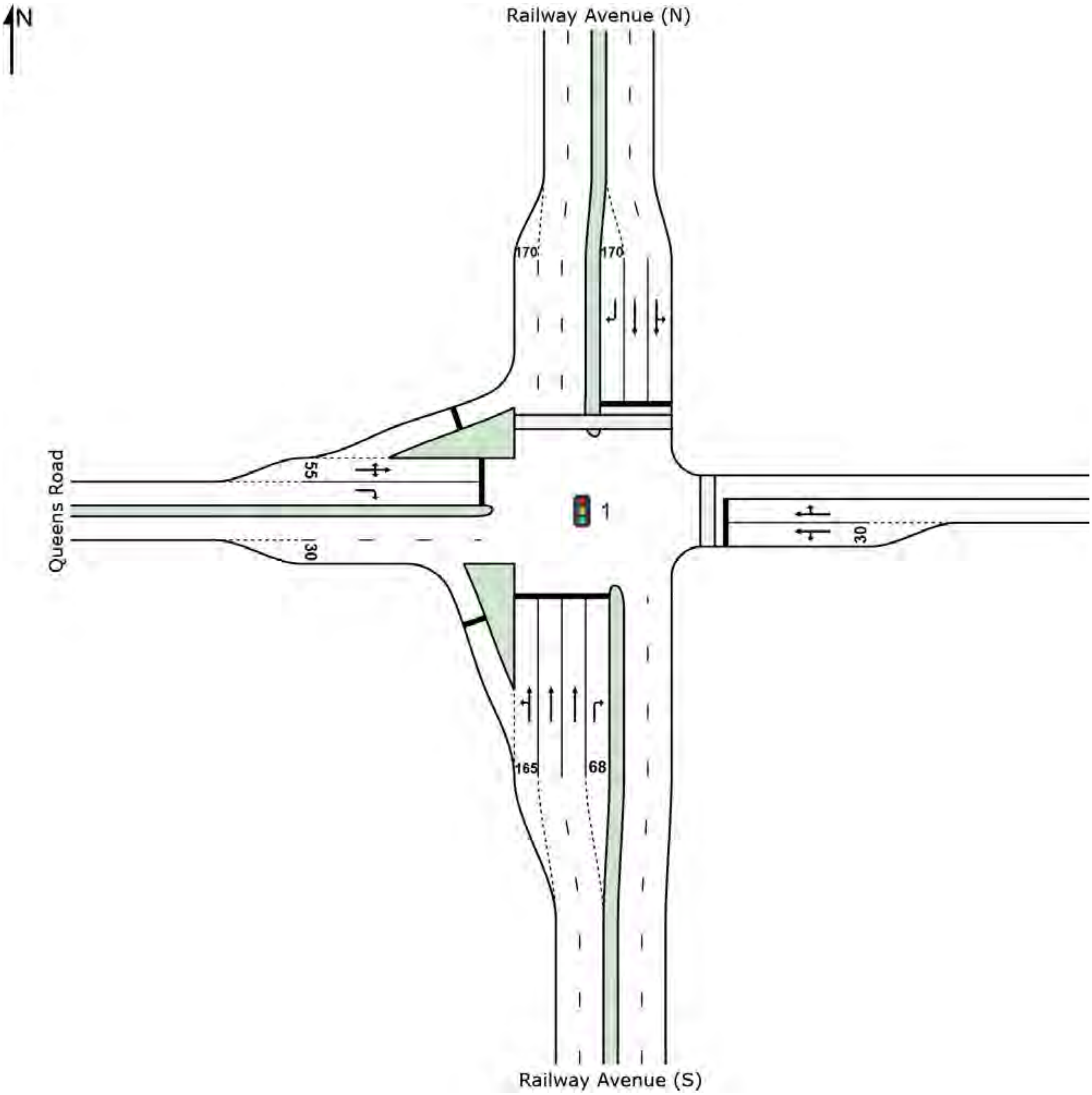
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	198	8.1	0.771	28.3	LOS C	21.8	160.6	0.91	0.87	37.2
2	T1	1793	5.0	0.834	25.9	LOS C	27.1	197.7	0.94	0.93	36.4
3	R2	13	0.0	0.044	19.8	LOS B	0.3	2.0	0.60	0.67	35.6
Approach		2003	5.3	0.834	26.1	LOS C	27.1	197.7	0.94	0.92	36.5
East: Putt Street											
4	L2	40	0.0	0.246	44.1	LOS D	1.5	10.8	0.97	0.73	25.0
5	T1	38	0.0	0.837	46.2	LOS D	6.1	42.8	1.00	0.96	17.7
6	R2	100	0.0	0.837	51.3	LOS D	6.1	42.8	1.00	0.96	15.8
Approach		178	0.0	0.837	48.6	LOS D	6.1	42.8	0.99	0.90	18.5
North: Railway Avenue (N)											
7	L2	26	0.0	0.411	15.1	LOS B	9.6	70.1	0.58	0.53	19.0
8	T1	886	5.0	0.411	9.6	LOS A	9.6	70.3	0.58	0.52	48.4
9	R2	194	4.7	0.811	30.3	LOS C	5.2	37.7	1.00	0.93	28.2
Approach		1106	4.8	0.811	13.4	LOS B	9.6	70.3	0.66	0.59	43.5
West: Queens Road											
10	L2	139	6.6	0.832	51.1	LOS D	6.6	48.3	1.00	0.96	21.4
11	T1	9	0.0	0.832	45.4	LOS D	6.6	48.3	1.00	0.96	17.7
12	R2	113	4.8	0.627	46.0	LOS D	4.6	33.3	1.00	0.82	28.7
Approach		261	5.5	0.832	48.7	LOS D	6.6	48.3	1.00	0.90	24.6
All Vehicles		3548	4.9	0.837	24.9	LOS C	27.1	197.7	0.86	0.82	36.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	10.0	LOS B	0.0	0.0	0.50	0.50
P3	North Full Crossing	1	34.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		2	22.1	LOS C			0.71	0.71

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	622	6.0	807	0.771	92 [6]	24.4	LOS C	21.8	160.6	Short	165	0.0	NA
Lane 2	689	5.0	826	0.834	100	27.0	LOS C	27.1	197.7	Full	450	0.0	0.0
Lane 3	679	5.0	813 [1]	0.834	100	26.9	LOS C	26.5	193.4	Full	450	0.0	0.0
Lane 4	13	0.0	289	0.044	100	19.8	LOS B	0.3	2.0	Short	68	0.0	NA
Approach	2003	5.3		0.834		26.1	LOS C	27.1	197.7				
East: Putt Street													
Lane 1	40	0.0	163	0.246	29 [5]	44.1	LOS D	1.5	10.8	Short	30	0.0	NA
Lane 2	138	0.0	165	0.837	100	49.9	LOS D	6.1	42.8	Full	80	0.0	0.0
Approach	178	0.0		0.837		48.6	LOS D	6.1	42.8				
North: Railway Avenue (N)													
Lane 1	456	4.7	1108	0.411	100	9.9	LOS A	9.6	70.1	Full	210	0.0	0.0
Lane 2	457	5.0	1110	0.411	100	9.6	LOS A	9.6	70.3	Full	210	0.0	0.0
Lane 3	194	4.7	239	0.811	100	30.3	LOS C	5.2	37.7	Short	170	0.0	NA
Approach	1106	4.8		0.811		13.4	LOS B	9.6	70.3				
West: Queens Road													
Lane 1	148	6.1	178	0.832	100	50.7	LOS D	6.6	48.3	Short	55	0.0	NA
Lane 2	113	4.8	180	0.627	75 [5]	46.0	LOS D	4.6	33.3	Full	250	0.0	0.0
Approach	261	5.5		0.832		48.7	LOS D	6.6	48.3				
Intersection	3548	4.9		0.837		24.9	LOS C	27.1	197.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

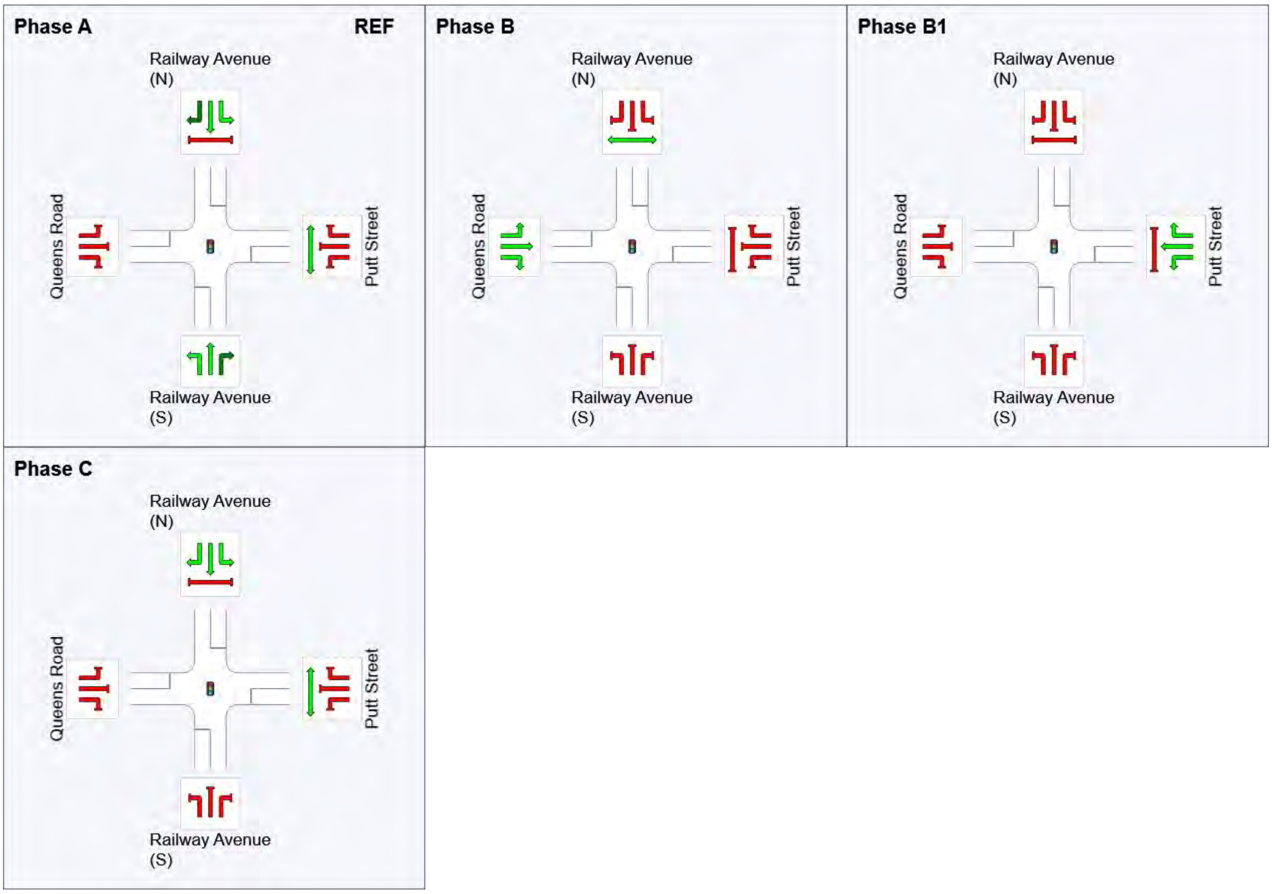
Site: 1 [Railway / Queens / Putt AM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	41	55	68
Green Time (sec)	35	8	7	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	41	14	13	12
Phase Split	51%	18%	16%	15%



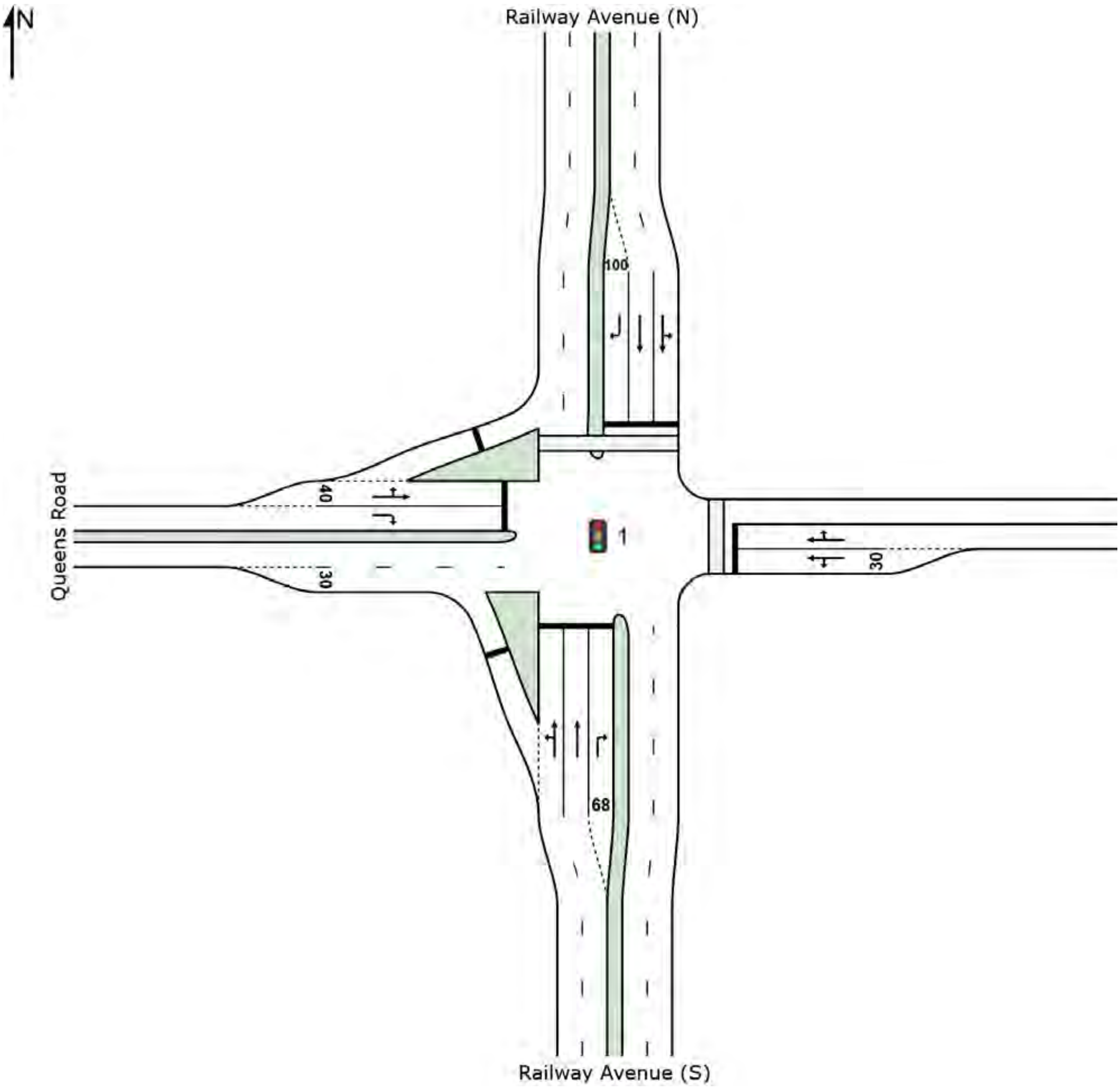
REF: Reference Phase
VAR: Variable Phase

- Normal Movement
- Permitted/Opposed
- Slip/Bypass-Lane Movement
- Opposed Slip/Bypass-Lane
- Stopped Movement
- Turn On Red
- Other Movement Class Running
- Other Movement Class Stopped
- Mixed Running & Stopped Movement Classes
- Undetected Movement
- Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	160	8.0	0.717	26.9	LOS C	37.9	277.9	0.77	0.73	38.3
2	T1	1423	5.0	0.717	21.0	LOS C	37.9	277.9	0.76	0.71	39.2
3	R2	11	0.0	0.030	18.1	LOS B	0.3	2.1	0.43	0.65	36.7
Approach		1594	5.3	0.717	21.6	LOS C	37.9	277.9	0.76	0.71	39.1
East: Putt Street											
4	L2	38	0.0	0.186	58.4	LOS E	3.7	25.7	0.89	0.73	21.7
5	T1	38	0.0	0.715	59.0	LOS E	8.0	56.3	0.93	0.77	15.0
6	R2	100	0.0	0.715	74.9	LOS E	8.0	56.3	1.00	0.86	11.7
Approach		176	0.0	0.715	67.9	LOS E	8.0	56.3	0.96	0.81	14.5
North: Railway Avenue (N)											
7	L2	26	0.0	0.307	12.1	LOS B	9.7	70.7	0.37	0.35	20.1
8	T1	829	5.0	0.307	6.6	LOS A	9.7	71.0	0.37	0.34	51.5
9	R2	194	4.7	0.722	46.5	LOS D	10.1	73.7	1.00	0.96	22.1
Approach		1049	4.8	0.722	14.1	LOS B	10.1	73.7	0.48	0.45	42.7
West: Queens Road											
10	L2	139	6.6	0.469	62.3	LOS E	9.3	68.3	0.95	0.80	18.8
11	T1	9	0.0	0.469	56.7	LOS E	9.3	68.3	0.95	0.80	15.3
12	R2	105	4.8	0.647	73.4	LOS E	7.3	53.1	1.00	0.82	21.9
Approach		254	5.6	0.647	66.7	LOS E	9.3	68.3	0.97	0.81	20.2
All Vehicles		3073	4.8	0.722	25.4	LOS C	37.9	277.9	0.69	0.64	35.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	6.9	LOS A	0.0	0.0	0.31	0.31
P3	North Full Crossing	1	60.9	LOS F	0.0	0.0	0.93	0.93
All Pedestrians		2	33.9	LOS D			0.62	0.62

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	795	5.6	1108	0.717	100	22.4	LOS C	37.9	277.9	Full	450	0.0	0.0
Lane 2	788	5.0	1098[1]	0.717	100	20.9	LOS C	36.9	269.1	Full	450	0.0	0.0
Lane 3	11	0.0	353	0.030	100	18.1	LOS B	0.3	2.1	Short	68	0.0	NA
Approach	1594	5.3		0.717		21.6	LOS C	37.9	277.9				
East: Putt Street													
Lane 1	62	0.0	336	0.186	26[6]	56.3	LOS E	3.7	25.7	Short	30	0.0	NA
Lane 2	113	0.0	159	0.715	100	74.3	LOS E	8.0	56.3	Full	80	0.0	0.0
Approach	176	0.0		0.715		67.9	LOS E	8.0	56.3				
North: Railway Avenue (N)													
Lane 1	428	4.7	1392	0.307	100	6.9	LOS A	9.7	70.7	Full	210	0.0	0.0
Lane 2	428	5.0	1393	0.307	100	6.6	LOS A	9.7	71.0	Full	210	0.0	0.0
Lane 3	194	4.7	268	0.722	100	46.5	LOS D	10.1	73.7	Short	100	0.0	NA
Approach	1049	4.8		0.722		14.1	LOS B	10.1	73.7				
West: Queens Road													
Lane 1	148	6.1	316	0.469	100	62.0	LOS E	9.3	68.3	Short	40	0.0	NA
Lane 2	105	4.8	163	0.647	100	73.4	LOS E	7.3	53.1	Full	250	0.0	0.0
Approach	254	5.6		0.647		66.7	LOS E	9.3	68.3				
Intersection	3073	4.8		0.722		25.4	LOS C	37.9	277.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

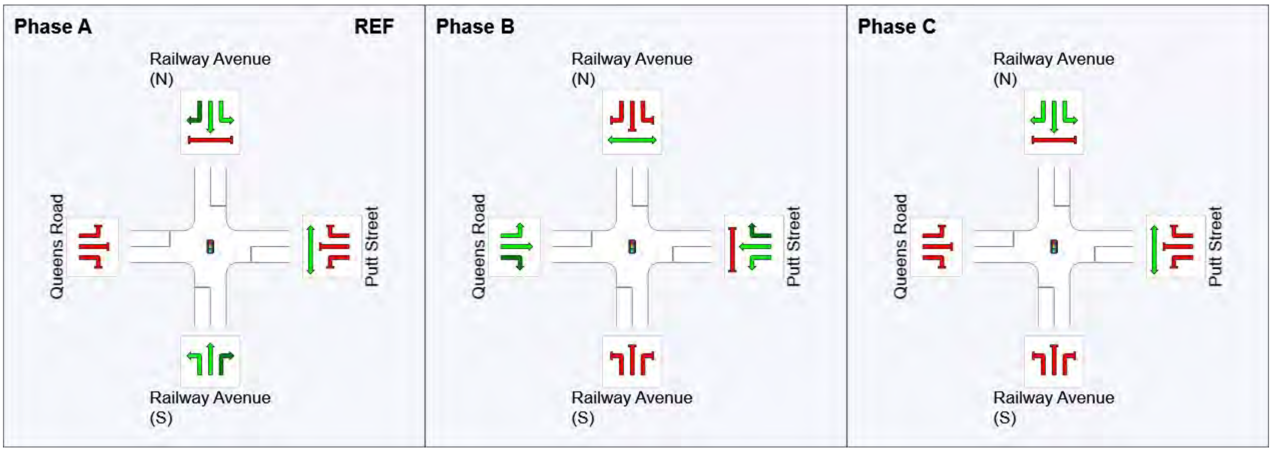
Site: 1 [Railway / Queens / Putt AM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	90	121
Green Time (sec)	84	25	14
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	90	31	20
Phase Split	64%	22%	14%



REF: Reference Phase
VAR: Variable Phase

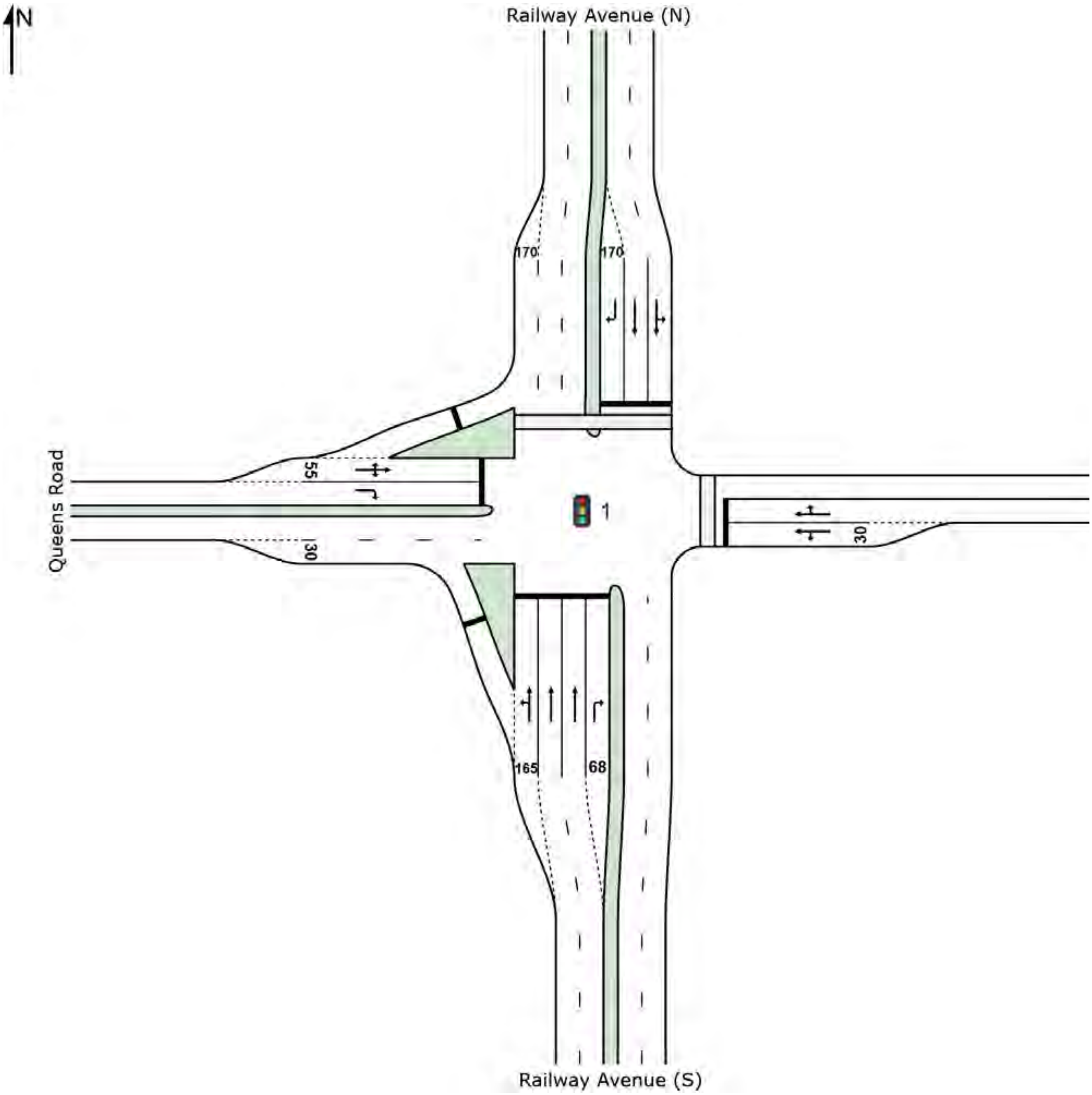
Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

Organisation: CALIBRE CONSULTING (QLD) PTY LTD | Processed: Friday, 24 March 2017 4:57:47 PM
Project: C:\Users\Meng Kong\Desktop\Railway_Queens_Putt.sip7

SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	143	8.0	0.743	41.6	LOS D	20.3	149.1	0.96	0.86	31.2
2	T1	1206	5.0	0.804	38.3	LOS D	24.0	175.0	0.97	0.91	30.7
3	R2	24	0.0	0.274	39.4	LOS D	1.1	7.4	0.80	0.75	26.3
Approach		1374	5.2	0.804	38.6	LOS D	24.0	175.0	0.96	0.90	30.7
East: Putt Street											
4	L2	19	0.0	0.179	59.1	LOS E	1.0	6.9	0.98	0.70	21.0
5	T1	16	0.0	0.271	54.4	LOS D	1.5	10.8	0.99	0.71	16.2
6	R2	14	0.0	0.271	59.6	LOS E	1.5	10.8	0.99	0.71	14.5
Approach		48	0.0	0.271	57.7	LOS E	1.5	10.8	0.99	0.71	17.9
North: Railway Avenue (N)											
7	L2	146	0.0	0.792	18.7	LOS B	35.5	257.6	0.77	0.74	17.8
8	T1	1845	5.0	0.792	13.1	LOS B	35.6	259.8	0.77	0.72	45.0
9	R2	428	4.7	0.692	30.4	LOS C	14.5	105.7	0.92	0.90	28.1
Approach		2420	4.6	0.792	16.5	LOS B	35.6	259.8	0.80	0.76	39.9
West: Queens Road											
10	L2	76	6.6	0.835	63.2	LOS E	8.9	65.1	1.00	0.95	18.7
11	T1	20	0.0	0.835	57.5	LOS E	8.9	65.1	1.00	0.95	15.2
12	R2	219	4.8	0.835	63.2	LOS E	8.9	65.1	1.00	0.95	24.2
Approach		315	4.9	0.835	62.8	LOS E	8.9	65.1	1.00	0.95	22.5
All Vehicles		4157	4.8	0.835	27.8	LOS C	35.6	259.8	0.87	0.82	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	8.4	LOS A	0.0	0.0	0.40	0.40
P3	North Full Crossing	1	46.7	LOS E	0.0	0.0	0.94	0.94
All Pedestrians		2	27.5	LOS C			0.67	0.67

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	430	6.0	579	0.743	92 [6]	37.8	LOS D	20.3	149.1	Short	165	0.0	NA
Lane 2	477	5.0	594	0.804	100	39.2	LOS D	24.0	175.0	Full	450	0.0	0.0
Lane 3	442	5.0	550 [1]	0.804	100	38.8	LOS D	21.9	159.6	Full	450	0.0	0.0
Lane 4	24	0.0	88	0.274	100	39.4	LOS D	1.1	7.4	Short	68	0.0	NA
Approach	1374	5.2		0.804		38.6	LOS D	24.0	175.0				
East: Putt Street													
Lane 1	19	0.0	106	0.179	66 [5]	59.1	LOS E	1.0	6.9	Short	30	0.0	NA
Lane 2	29	0.0	109	0.271	100	56.8	LOS E	1.5	10.8	Full	80	0.0	0.0
Approach	48	0.0		0.271		57.7	LOS E	1.5	10.8				
North: Railway Avenue (N)													
Lane 1	995	4.3	1256	0.792	100	13.9	LOS B	35.5	257.6	Full	210	0.0	23.5
Lane 2	997	5.0	1259	0.792	100	13.1	LOS B	35.6	259.8	Full	210	0.0	24.3
Lane 3	428	4.7	619	0.692	100	30.4	LOS C	14.5	105.7	Short	170	0.0	NA
Approach	2420	4.6		0.792		16.5	LOS B	35.6	259.8				
West: Queens Road													
Lane 1	158	5.0	189	0.835	100	62.4	LOS E	8.9	65.1	Short	55	0.0	NA
Lane 2	157	4.8	188	0.835	100	63.2	LOS E	8.9	64.7	Full	250	0.0	0.0
Approach	315	4.9		0.835		62.8	LOS E	8.9	65.1				
Intersection	4157	4.8		0.835		27.8	LOS C	35.6	259.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

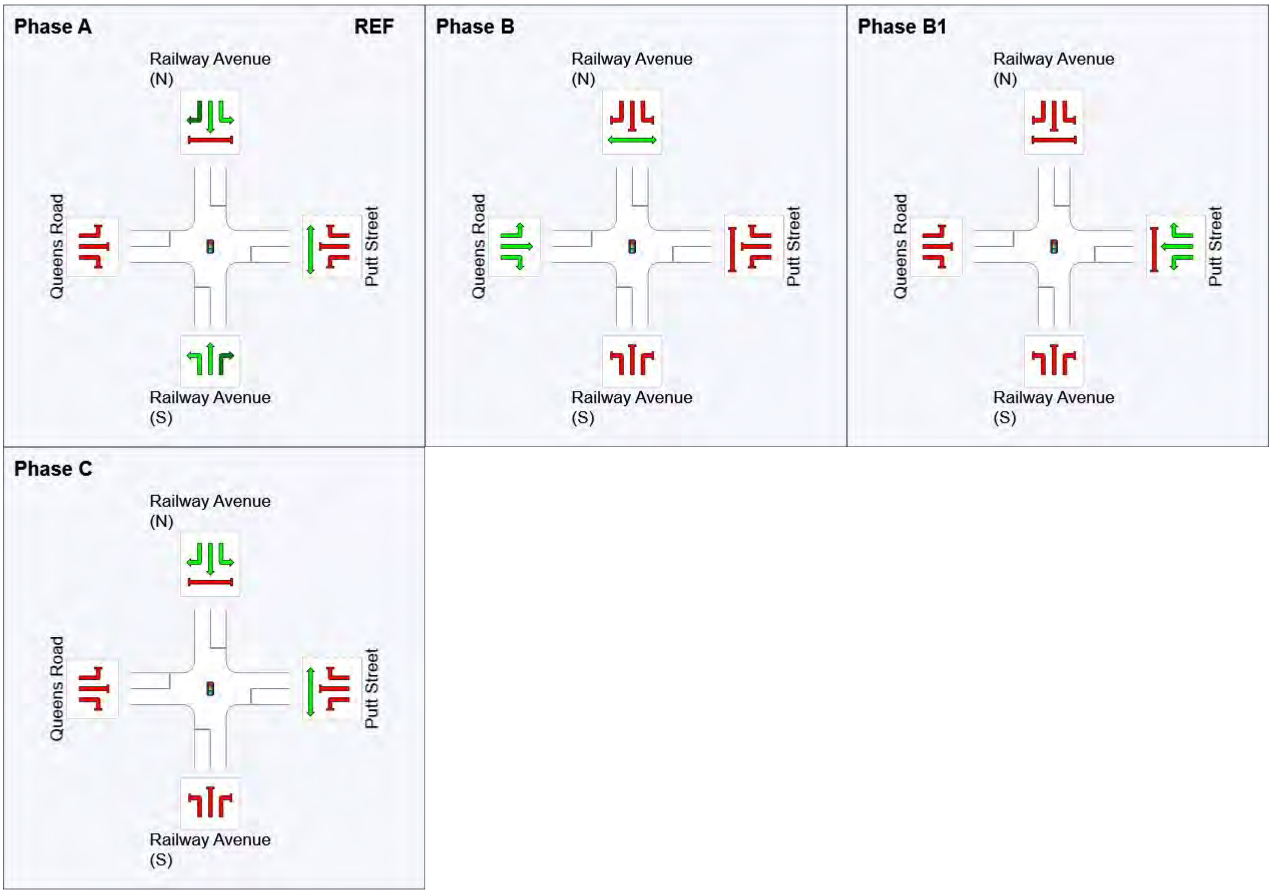
Site: 1 [Railway / Queens / Putt PM 2023 WD S3-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

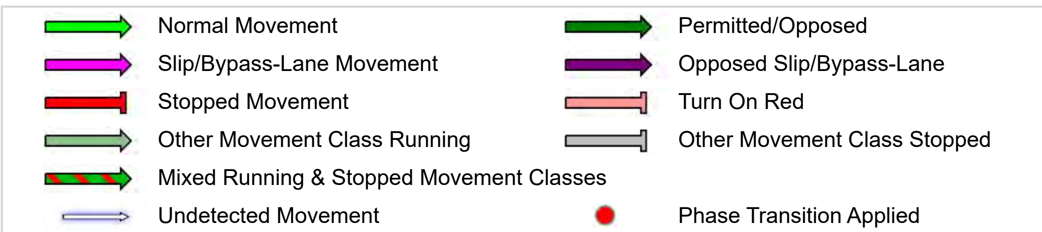
Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	39	56	68
Green Time (sec)	33	11	6	31
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	39	17	12	37
Phase Split	37%	16%	11%	35%



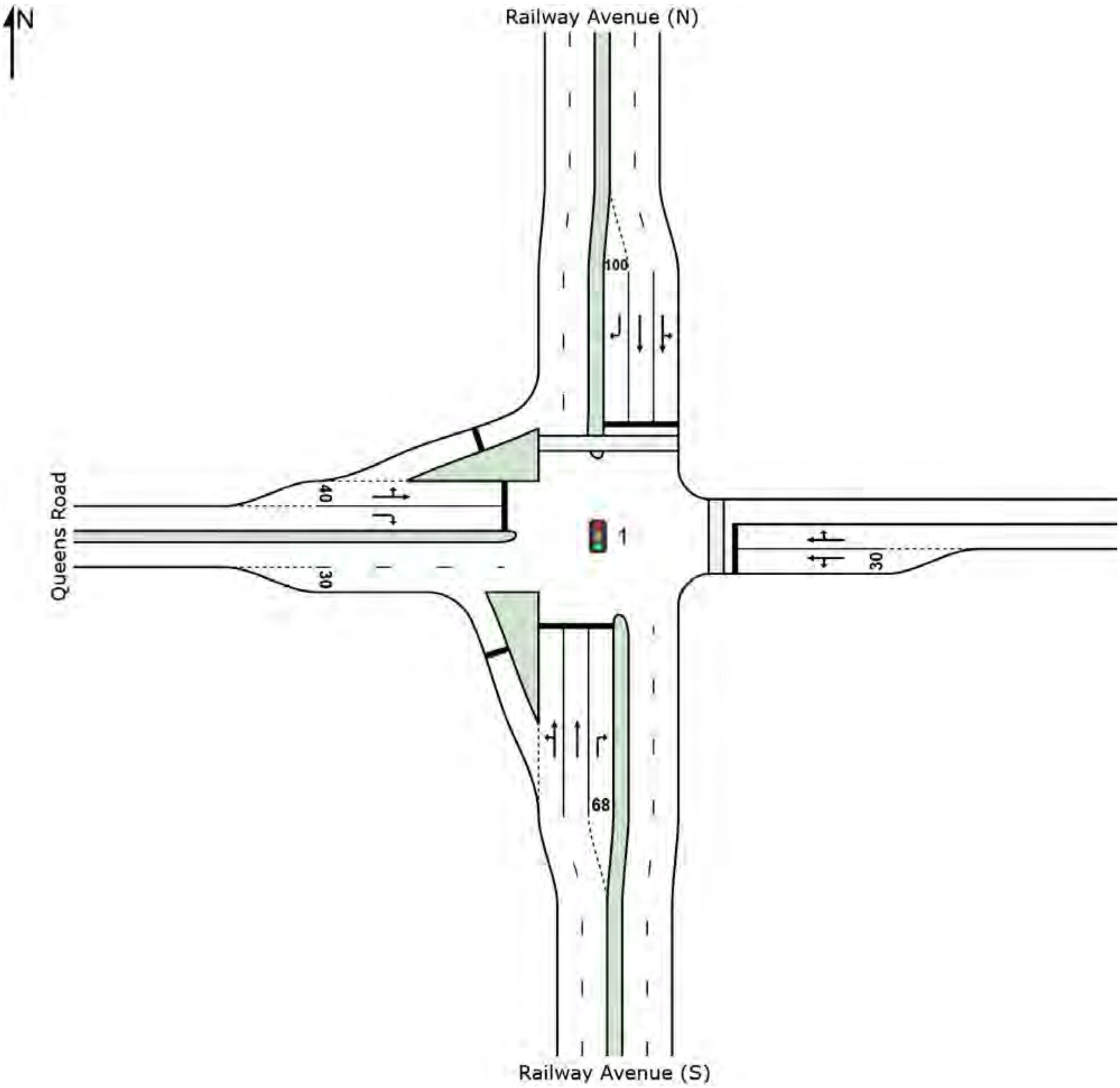
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	128	8.1	0.853	51.3	LOS D	41.4	303.4	0.98	0.94	28.1
2	T1	1064	5.0	0.853	45.1	LOS D	41.4	303.4	0.95	0.91	28.3
3	R2	22	0.0	0.209	37.0	LOS D	1.0	7.3	0.69	0.73	27.1
Approach		1215	5.2	0.853	45.6	LOS D	41.4	303.4	0.95	0.91	28.2
East: Putt Street											
4	L2	16	0.0	0.045	54.1	LOS D	0.9	6.0	0.85	0.69	22.2
5	T1	16	0.0	0.114	53.9	LOS D	1.7	12.0	0.89	0.69	16.2
6	R2	14	0.0	0.114	59.0	LOS E	1.7	12.0	0.89	0.69	14.5
Approach		45	0.0	0.114	55.5	LOS E	1.7	12.0	0.87	0.69	18.0
North: Railway Avenue (N)											
7	L2	146	0.0	0.741	17.4	LOS B	39.6	287.1	0.65	0.64	18.2
8	T1	1475	5.0	0.741	10.3	LOS B	39.6	287.1	0.56	0.54	47.4
9	R2	428	4.7	0.736	44.4	LOS D	20.7	150.4	0.95	0.96	22.7
Approach		2049	4.6	0.741	17.9	LOS B	39.6	287.1	0.65	0.63	38.4
West: Queens Road											
10	L2	76	6.6	0.281	57.6	LOS E	5.6	40.6	0.90	0.76	20.0
11	T1	20	0.0	0.281	52.0	LOS D	5.6	40.6	0.90	0.76	16.4
12	R2	178	4.8	0.838	75.5	LOS E	12.9	94.0	1.00	0.93	21.5
Approach		274	4.9	0.838	68.8	LOS E	12.9	94.0	0.97	0.87	20.9
All Vehicles		3583	4.8	0.853	31.7	LOS C	41.4	303.4	0.78	0.75	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	7.3	LOS A	0.0	0.0	0.33	0.33
P3	North Full Crossing	1	58.4	LOS E	0.0	0.0	0.92	0.92
All Pedestrians		2	32.9	LOS D			0.62	0.62

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	633	5.6	741	0.853	100	46.8	LOS D	41.4	303.4	Full	450	0.0	0.0
Lane 2	560	5.0	656[1]	0.853	100	44.6	LOS D	35.1	256.3	Full	450	0.0	0.0
Lane 3	22	0.0	106	0.209	100	37.0	LOS D	1.0	7.3	Short	68	0.0	NA
Approach	1215	5.2		0.853		45.6	LOS D	41.4	303.4				
East: Putt Street													
Lane 1	16	0.0	350	0.045	40[5]	54.1	LOS D	0.9	6.0	Short	30	0.0	NA
Lane 2	29	0.0	259	0.114	100	56.3	LOS E	1.7	12.0	Full	80	0.0	0.0
Approach	45	0.0		0.114		55.5	LOS E	1.7	12.0				
North: Railway Avenue (N)													
Lane 1	1011	4.3	1364	0.741	100	12.7	LOS B	39.6	287.1	Full	210	0.0	33.5
Lane 2	610	5.0	823[1]	0.741	100	8.1	LOS A	16.3	118.9	Full	210	0.0	0.0
Lane 3	428	4.7	582	0.736	100	44.4	LOS D	20.7	150.4	Short	100	0.0	NA
Approach	2049	4.6		0.741		17.9	LOS B	39.6	287.1				
West: Queens Road													
Lane 1	96	5.2	341	0.281	100	56.4	LOS E	5.6	40.6	Short	40	0.0	NA
Lane 2	178	4.8	212[1]	0.838	100	75.5	LOS E	12.9	94.0	Full	250	0.0	0.0
Approach	274	4.9		0.838		68.8	LOS E	12.9	94.0				
Intersection	3583	4.8		0.853		31.7	LOS C	41.4	303.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program

PHASING SUMMARY

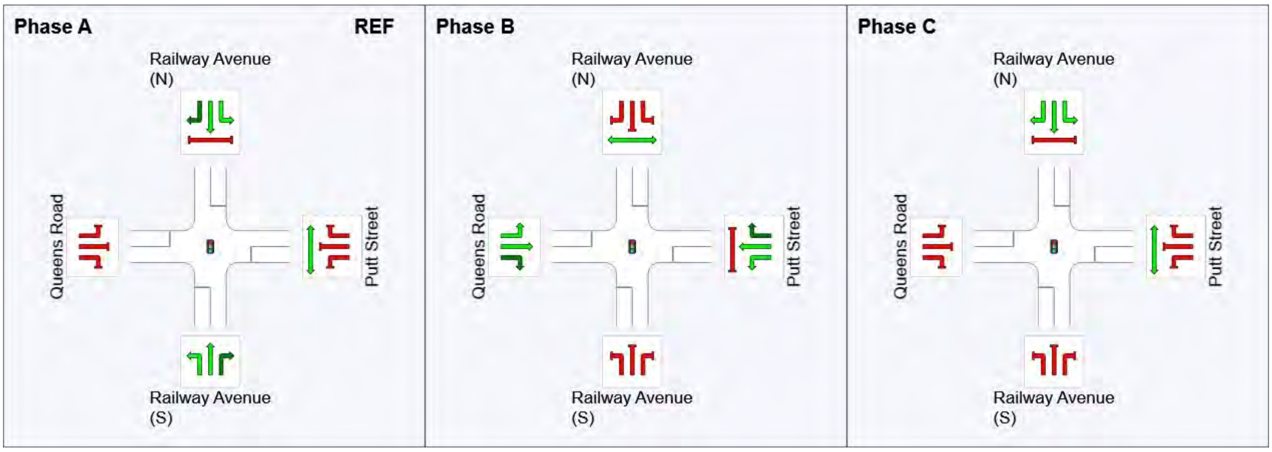
Site: 1 [Railway / Queens / Putt PM 2023 W/O D-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

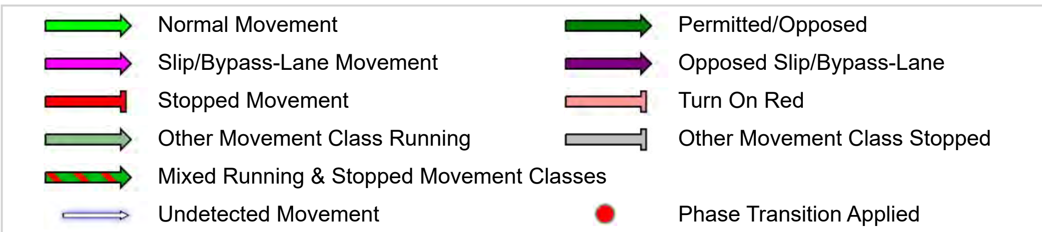
Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	61	93
Green Time (sec)	55	26	39
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	61	32	45
Phase Split	44%	23%	33%



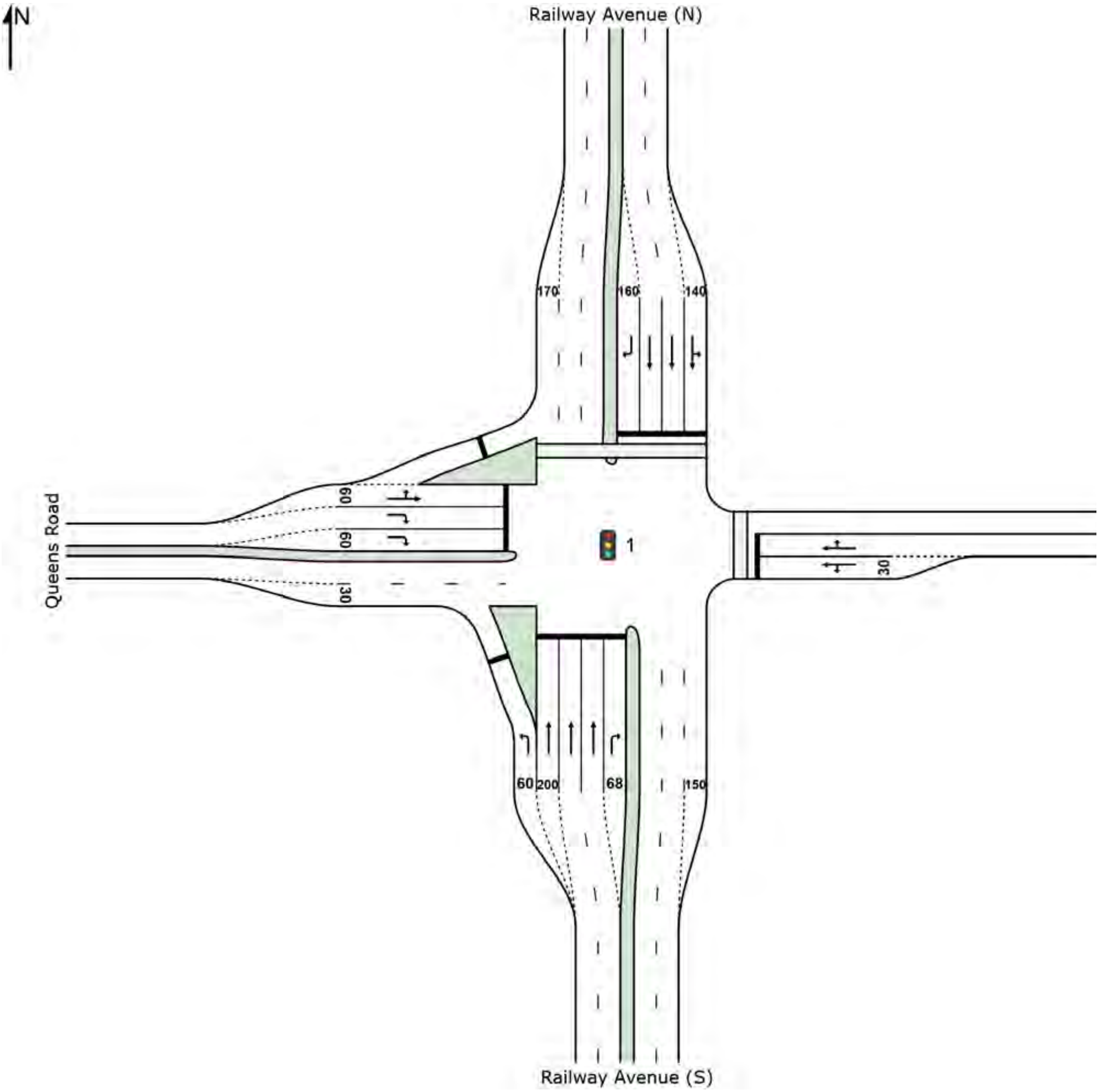
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	205	8.1	0.242	24.9	LOS C	6.9	51.8	0.62	0.73	37.1
2	T1	2214	5.0	0.879	35.4	LOS D	47.1	343.6	0.93	0.91	32.1
3	R2	12	0.0	0.046	23.5	LOS C	0.4	2.6	0.55	0.67	33.5
Approach		2431	5.2	0.879	34.4	LOS C	47.1	343.6	0.90	0.90	32.5
East: Putt Street											
4	L2	38	0.0	0.242	61.6	LOS E	2.3	16.3	0.97	0.73	20.6
5	T1	36	0.0	0.811	63.5	LOS E	8.7	60.7	1.00	0.90	14.3
6	R2	105	0.0	0.811	69.5	LOS E	8.7	60.7	1.00	0.92	12.7
Approach		179	0.0	0.811	66.6	LOS E	8.7	60.7	0.99	0.87	14.8
North: Railway Avenue (N)											
7	L2	27	0.0	0.264	14.9	LOS B	7.8	56.9	0.45	0.42	19.2
8	T1	1075	5.0	0.317	9.6	LOS A	9.8	71.8	0.47	0.42	48.4
9	R2	239	4.7	0.862	60.0	LOS E	12.1	88.0	1.00	1.04	19.1
Approach		1341	4.8	0.862	18.7	LOS B	12.1	88.0	0.56	0.53	39.6
West: Queens Road											
10	L2	159	6.6	0.872	73.2	LOS E	11.1	81.7	1.00	0.98	16.8
11	T1	9	0.0	0.872	67.5	LOS E	11.1	81.7	1.00	0.98	13.5
12	R2	115	4.8	0.295	60.4	LOS E	3.2	23.3	0.96	0.75	24.9
Approach		283	5.6	0.872	67.8	LOS E	11.1	81.7	0.98	0.89	20.0
All Vehicles		4234	4.9	0.879	33.0	LOS C	47.1	343.6	0.80	0.78	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	10.0	LOS B	0.0	0.0	0.41	0.41
P3	North Full Crossing	1	54.2	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		2	32.1	LOS D			0.68	0.68

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Railway Avenue (S)													
Lane 1	205	8.1	849	0.242	100	24.9	LOS C	6.9	51.8	Short	60	0.0	NA
Lane 2	635	5.0	766[1]	0.828	94[6]	29.9	LOS C	31.0	226.2	Short	200	0.0	NA
Lane 3	802	5.0	913	0.879	100	37.6	LOS D	47.1	343.6	Full	450	0.0	0.0
Lane 4	777	5.0	884[1]	0.879	100	37.5	LOS D	44.9	328.0	Full	450	0.0	0.0
Lane 5	12	0.0	249	0.046	100	23.5	LOS C	0.4	2.6	Short	68	0.0	NA
Approach	2431	5.2		0.879		34.4	LOS C	47.1	343.6				
East: Putt Street													
Lane 1	41	0.0	171	0.242	30[6]	61.1	LOS E	2.3	16.3	Short	30	0.0	NA
Lane 2	138	0.0	170[1]	0.811	100	68.3	LOS E	8.7	60.7	Full	80	0.0	0.0
Approach	179	0.0		0.811		66.6	LOS E	8.7	60.7				
North: Railway Avenue (N)													
Lane 1	324	4.6	1226	0.264	83[6]	9.8	LOS A	7.8	56.9	Short	140	0.0	NA
Lane 2	389	5.0	1228	0.317	100	9.8	LOS A	9.8	71.8	Full	210	0.0	0.0
Lane 3	389	5.0	1228	0.317	100	9.8	LOS A	9.8	71.8	Full	210	0.0	0.0
Lane 4	239	4.7	277	0.862	100	60.0	LOS E	12.1	88.0	Short	160	0.0	NA
Approach	1341	4.8		0.862		18.7	LOS B	12.1	88.0				
West: Queens Road													
Lane 1	168	6.2	193	0.872	100	72.9	LOS E	11.1	81.7	Short	60	0.0	NA
Lane 2	57	4.8	195	0.295	100	60.4	LOS E	3.2	23.3	Full	250	0.0	0.0
Lane 3	57	4.8	195	0.295	100	60.4	LOS E	3.2	23.3	Short	60	0.0	NA
Approach	283	5.6		0.872		67.8	LOS E	11.1	81.7				
Intersection	4234	4.9		0.879		33.0	LOS C	47.1	343.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

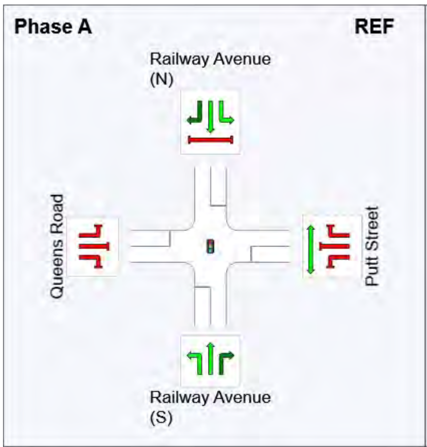
Site: 1 [Railway / Queens / Putt AM 2033 WD S5-Final]

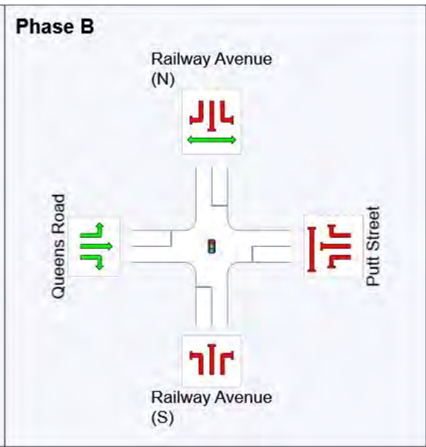
With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

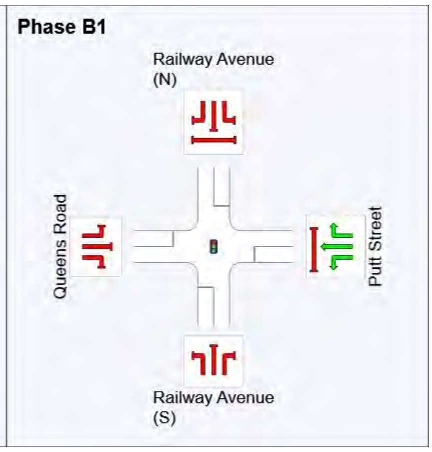
Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

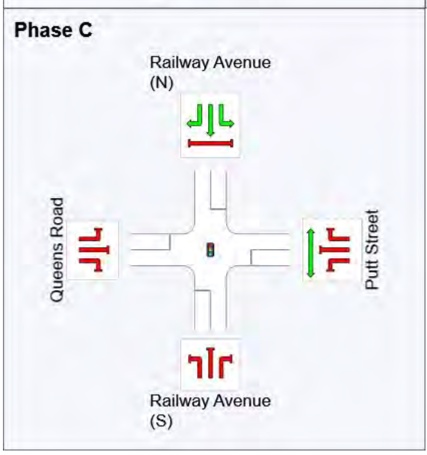
Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	64	83	100
Green Time (sec)	58	13	11	14
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	64	19	17	20
Phase Split	53%	16%	14%	17%









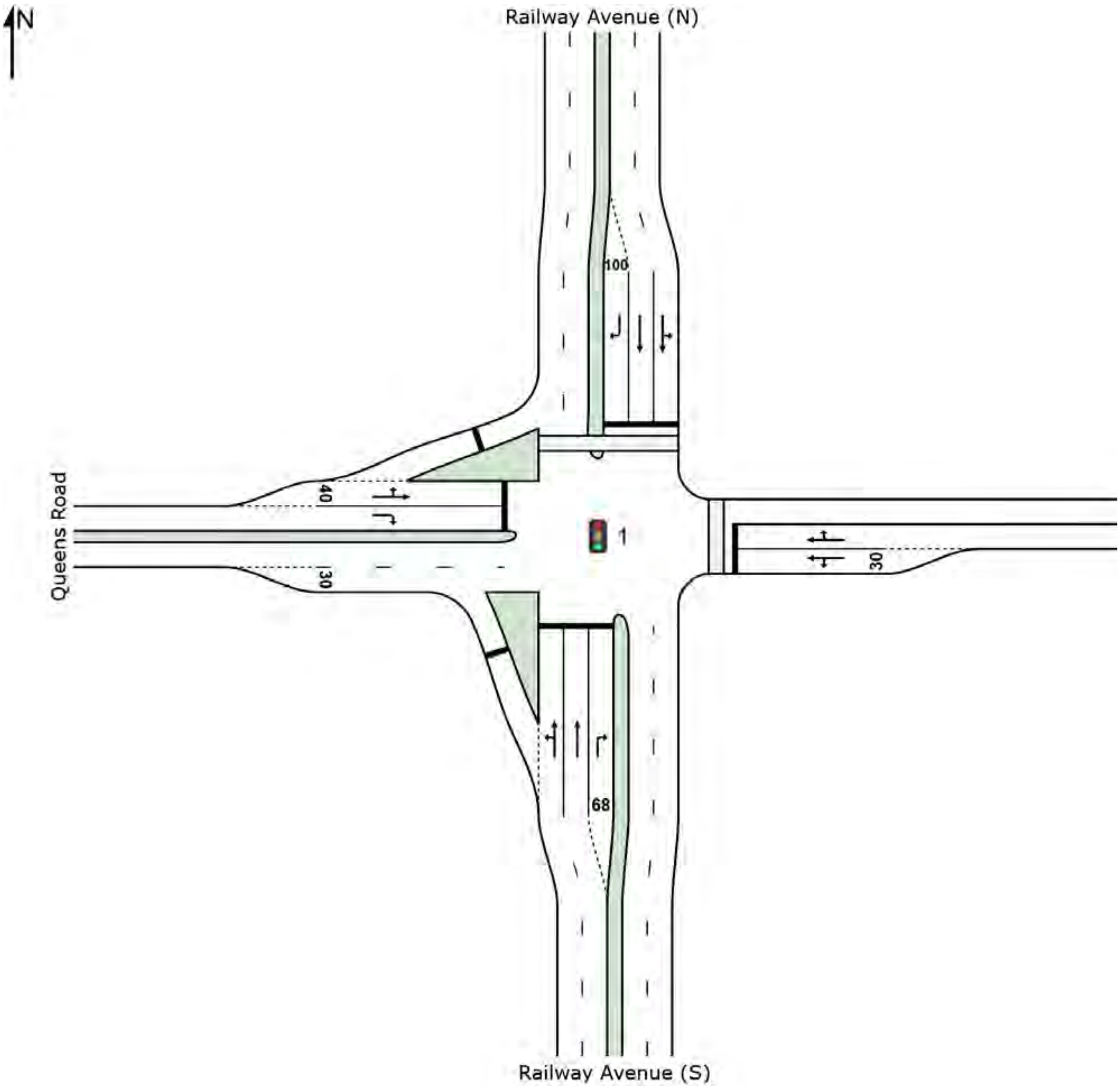
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	168	8.1	0.930	50.5	LOS D	73.6	539.4	1.00	1.02	28.5
2	T1	1808	5.0	0.930	44.5	LOS D	73.6	539.4	0.98	1.01	28.5
3	R2	9	0.0	0.035	19.7	LOS B	0.3	2.0	0.45	0.65	35.7
Approach		1986	5.2	0.930	44.9	LOS D	73.6	539.4	0.98	1.01	28.5
East: Putt Street											
4	L2	36	0.0	0.241	61.7	LOS E	4.4	30.5	0.92	0.74	21.0
5	T1	36	0.0	0.241	56.6	LOS E	4.4	30.5	0.92	0.74	15.6
6	R2	105	0.0	0.948	100.0	LOS F	8.9	62.1	1.00	1.04	9.2
Approach		177	0.0	0.948	83.5	LOS F	8.9	62.1	0.97	0.91	12.3
North: Railway Avenue (N)											
7	L2	27	0.0	0.365	11.5	LOS B	11.7	84.9	0.36	0.35	20.3
8	T1	1018	5.0	0.365	5.9	LOS A	11.7	85.2	0.36	0.34	52.2
9	R2	239	4.7	0.763	63.1	LOS E	12.6	91.7	1.00	1.00	18.2
Approach		1284	4.8	0.763	16.7	LOS B	12.6	91.7	0.48	0.46	40.8
West: Queens Road											
10	L2	159	6.6	0.673	67.0	LOS E	11.1	81.7	0.98	0.83	17.9
11	T1	9	0.0	0.673	61.4	LOS E	11.1	81.7	0.98	0.83	14.5
12	R2	108	4.8	0.589	70.3	LOS E	7.3	53.1	0.99	0.80	22.5
Approach		277	5.6	0.673	68.1	LOS E	11.1	81.7	0.99	0.82	19.8
All Vehicles		3724	4.9	0.948	38.7	LOS D	73.6	539.4	0.81	0.80	29.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	6.0	LOS A	0.0	0.0	0.29	0.29
P3	North Full Crossing	1	63.7	LOS F	0.0	0.0	0.95	0.95
All Pedestrians		2	34.8	LOS D			0.62	0.62

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	996	5.5	1071	0.930	100	45.7	LOS D	73.6	539.4	Full	450	0.0	21.4
Lane 2	981	5.0	1055[1]	0.930	100	44.3	LOS D	70.9	517.2	Full	450	0.0	17.6
Lane 3	9	0.0	270	0.035	100	19.7	LOS B	0.3	2.0	Short	68	0.0	NA
Approach	1986	5.2		0.930		44.9	LOS D	73.6	539.4				
East: Putt Street													
Lane 1	72	0.0	297	0.241	25[5]	59.2	LOS E	4.4	30.5	Short	30	0.0	NA
Lane 2	105	0.0	111	0.948	100	100.0	LOS F	8.9	62.1	Full	80	0.0	0.0
Approach	177	0.0		0.948		83.5	LOS F	8.9	62.1				
North: Railway Avenue (N)													
Lane 1	522	4.7	1432	0.365	100	6.2	LOS A	11.7	84.9	Full	210	0.0	0.0
Lane 2	523	5.0	1433	0.365	100	5.9	LOS A	11.7	85.2	Full	210	0.0	0.0
Lane 3	239	4.7	313	0.763	100	63.1	LOS E	12.6	91.7	Short	100	0.0	NA
Approach	1284	4.8		0.763		16.7	LOS B	12.6	91.7				
West: Queens Road													
Lane 1	168	6.2	250[1]	0.673	100	66.7	LOS E	11.1	81.7	Short	40	0.0	NA
Lane 2	108	4.8	184	0.589	100	70.3	LOS E	7.3	53.1	Full	250	0.0	0.0
Approach	277	5.6		0.673		68.1	LOS E	11.1	81.7				
Intersection	3724	4.9		0.948		38.7	LOS D	73.6	539.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program

PHASING SUMMARY

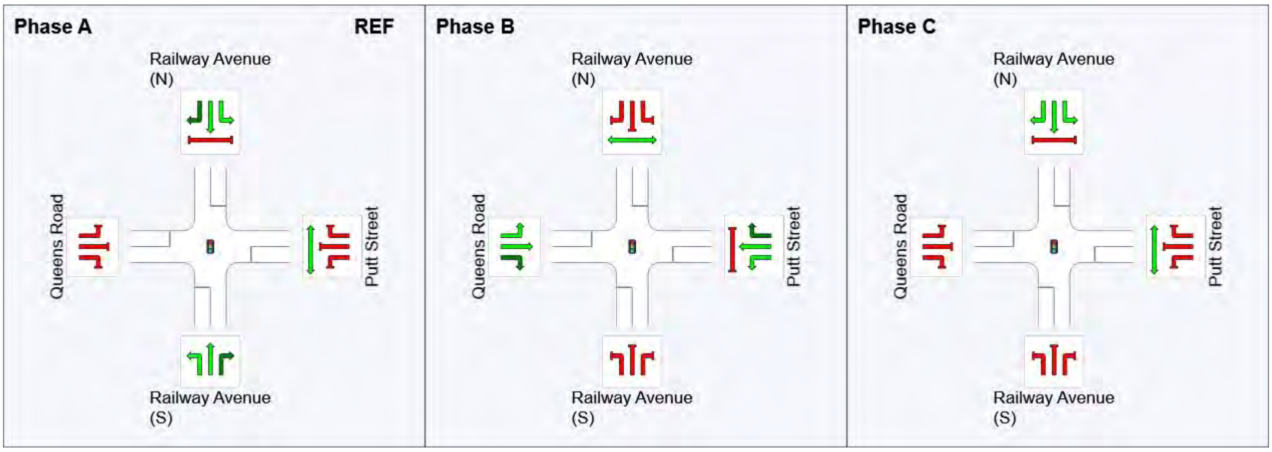
Site: 1 [Railway / Queens / Putt AM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 141 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	87	115
Green Time (sec)	81	22	20
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	87	28	26
Phase Split	62%	20%	18%



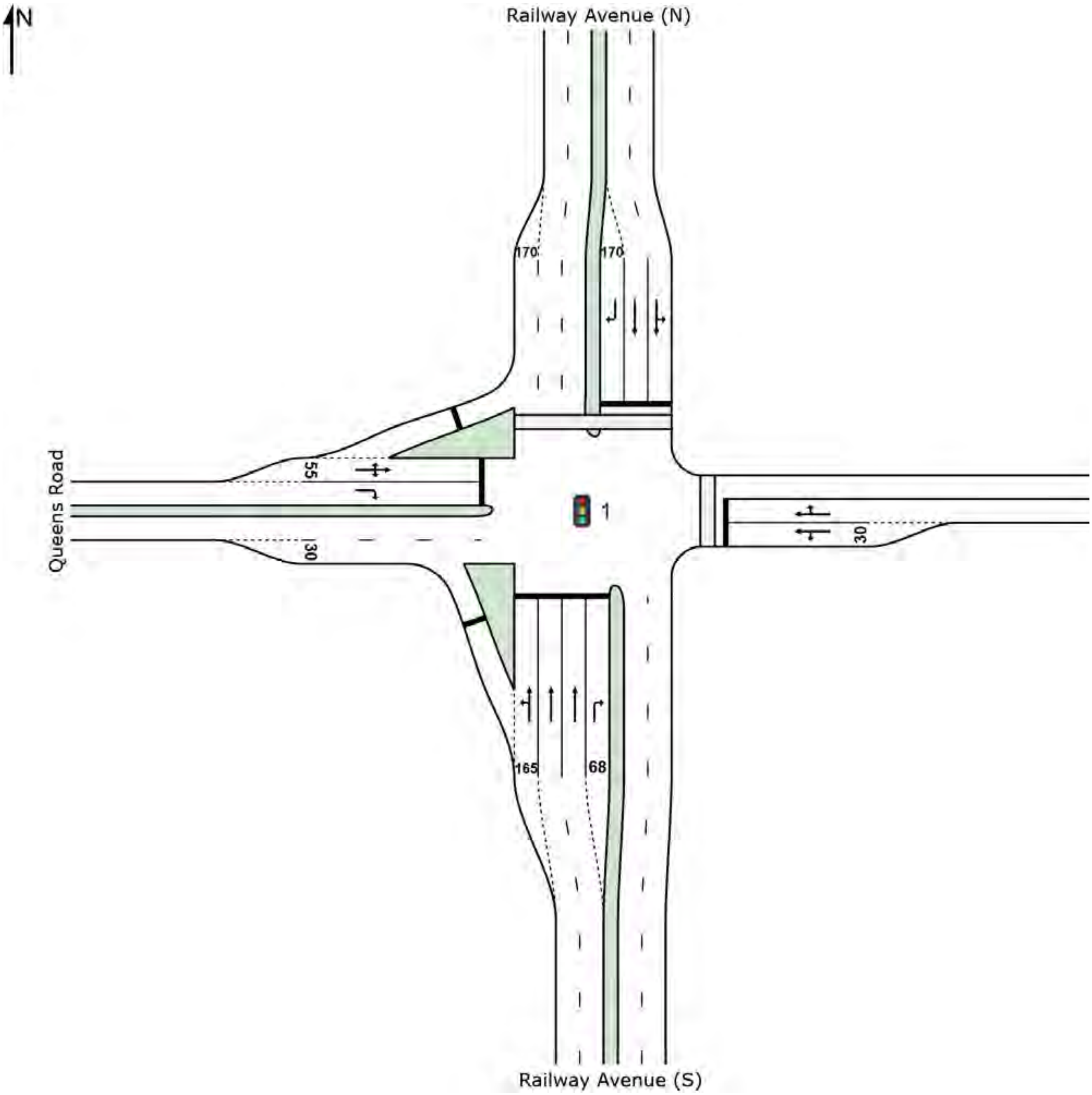
REF: Reference Phase
VAR: Variable Phase

- Normal Movement
- Permitted/Opposed
- Slip/Bypass-Lane Movement
- Opposed Slip/Bypass-Lane
- Stopped Movement
- Turn On Red
- Other Movement Class Running
- Other Movement Class Stopped
- Mixed Running & Stopped Movement Classes
- Undetected Movement
- Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt AM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	168	8.1	0.738	32.1	LOS C	27.2	200.2	0.88	0.81	35.4
2	T1	1808	5.0	0.799	28.2	LOS C	32.3	235.5	0.91	0.84	35.2
3	R2	9	0.0	0.040	23.9	LOS C	0.3	2.0	0.58	0.67	33.2
Approach		1986	5.2	0.799	28.5	LOS C	32.3	235.5	0.91	0.84	35.2
East: Putt Street											
4	L2	36	0.0	0.222	57.1	LOS E	1.9	13.6	0.96	0.73	21.5
5	T1	36	0.0	0.815	59.4	LOS E	8.1	56.9	1.00	0.91	14.9
6	R2	105	0.0	0.815	64.9	LOS E	8.1	56.9	1.00	0.92	13.2
Approach		177	0.0	0.815	62.2	LOS E	8.1	56.9	0.99	0.88	15.4
North: Railway Avenue (N)											
7	L2	27	0.0	0.441	16.7	LOS B	14.2	103.5	0.56	0.51	18.5
8	T1	1018	5.0	0.441	11.2	LOS B	14.2	103.8	0.56	0.50	46.9
9	R2	239	4.7	0.814	46.5	LOS D	9.8	71.0	1.00	0.98	22.3
Approach		1284	4.8	0.814	17.9	LOS B	14.2	103.8	0.64	0.59	40.0
West: Queens Road											
10	L2	159	6.6	0.799	62.6	LOS E	9.7	71.3	1.00	0.92	18.7
11	T1	9	0.0	0.799	56.9	LOS E	9.7	71.3	1.00	0.92	15.3
12	R2	108	4.8	0.511	56.6	LOS E	5.7	41.3	0.98	0.79	25.7
Approach		277	5.6	0.799	60.0	LOS E	9.7	71.3	0.99	0.87	21.5
All Vehicles		3724	4.9	0.815	28.8	LOS C	32.3	235.5	0.82	0.76	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	10.5	LOS B	0.0	0.0	0.44	0.44
P3	North Full Crossing	1	49.2	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		2	29.8	LOS C			0.69	0.69

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt AM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	621	5.8	841	0.738	92[6]	27.9	LOS C	27.2	200.2	Short	165	0.0	NA
Lane 2	686	5.0	858	0.799	100	28.9	LOS C	32.3	235.5	Full	450	0.0	0.0
Lane 3	670	5.0	838[1]	0.799	100	28.8	LOS C	31.2	227.8	Full	450	0.0	0.0
Lane 4	9	0.0	237	0.040	100	23.9	LOS C	0.3	2.0	Short	68	0.0	NA
Approach	1986	5.2		0.799		28.5	LOS C	32.3	235.5				
East: Putt Street													
Lane 1	38	0.0	169	0.222	27[6]	56.8	LOS E	1.9	13.6	Short	30	0.0	NA
Lane 2	139	0.0	171	0.815	100	63.7	LOS E	8.1	56.9	Full	80	0.0	0.0
Approach	177	0.0		0.815		62.2	LOS E	8.1	56.9				
North: Railway Avenue (N)													
Lane 1	522	4.7	1184	0.441	100	11.5	LOS B	14.2	103.5	Full	210	0.0	0.0
Lane 2	523	5.0	1185	0.441	100	11.2	LOS B	14.2	103.8	Full	210	0.0	0.0
Lane 3	239	4.7	294	0.814	100	46.5	LOS D	9.8	71.0	Short	170	0.0	NA
Approach	1284	4.8		0.814		17.9	LOS B	14.2	103.8				
West: Queens Road													
Lane 1	168	6.2	211	0.799	100	62.3	LOS E	9.7	71.3	Short	55	0.0	NA
Lane 2	108	4.8	212	0.511	64[5]	56.6	LOS E	5.7	41.3	Full	250	0.0	0.0
Approach	277	5.6		0.799		60.0	LOS E	9.7	71.3				
Intersection	3724	4.9		0.815		28.8	LOS C	32.3	235.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

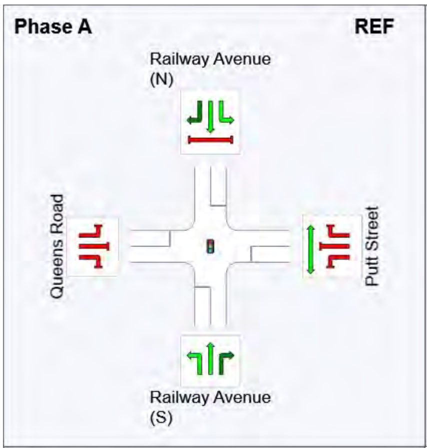
Site: 1 [Railway / Queens / Putt AM 2033 W/O D S3-Final]

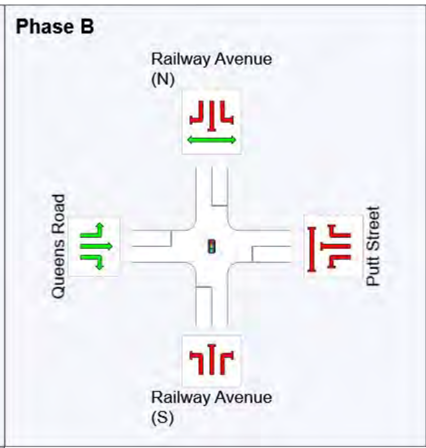
Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

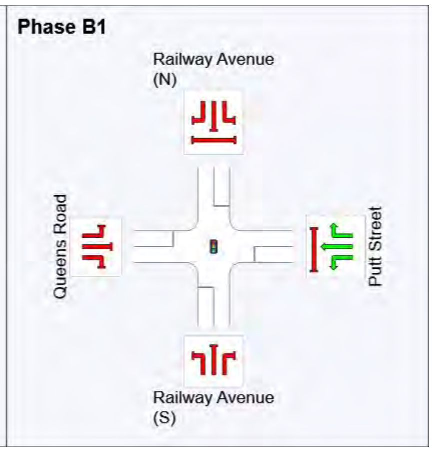
Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

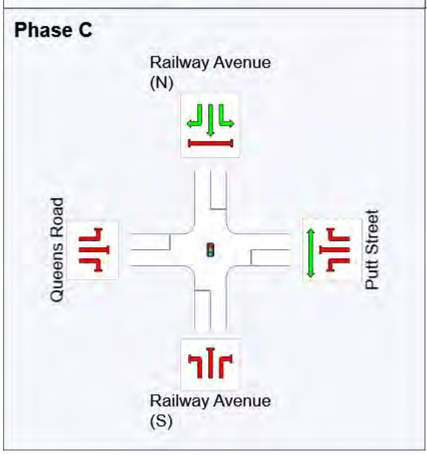
Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	56	75	91
Green Time (sec)	50	13	10	13
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	56	19	16	19
Phase Split	51%	17%	15%	17%









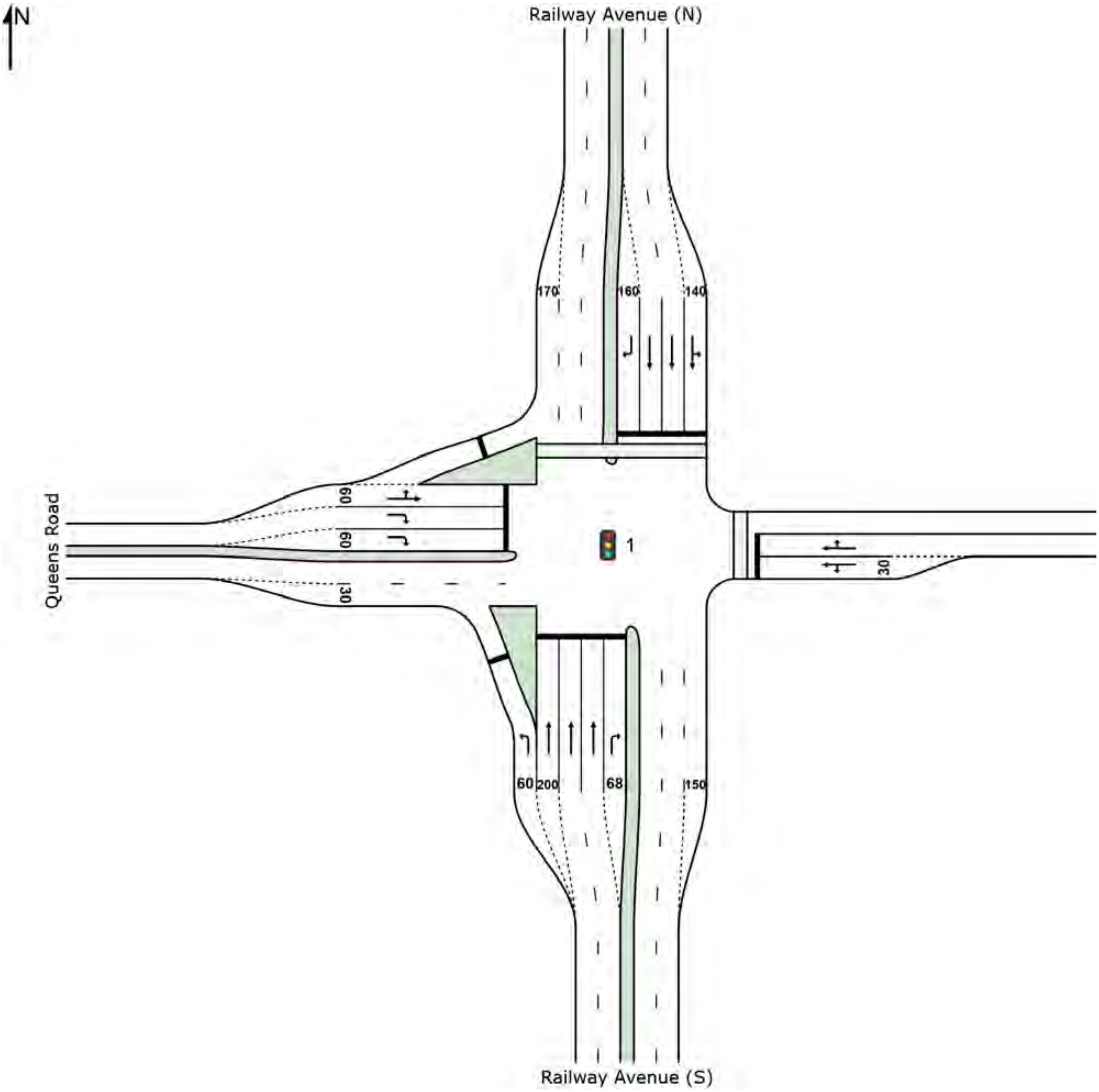
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	146	8.1	0.255	34.9	LOS C	5.8	43.0	0.78	0.76	32.5
2	T1	1454	5.0	0.858	43.0	LOS D	29.9	218.2	0.97	0.96	29.2
3	R2	22	0.0	0.270	38.3	LOS D	1.0	6.8	0.77	0.74	26.8
Approach		1622	5.2	0.858	42.2	LOS D	29.9	218.2	0.95	0.94	29.4
East: Putt Street											
4	L2	18	0.0	0.177	61.9	LOS E	1.0	6.8	0.98	0.69	20.4
5	T1	15	0.0	0.284	57.3	LOS E	1.6	11.3	0.99	0.71	15.7
6	R2	15	0.0	0.284	62.5	LOS E	1.6	11.3	0.99	0.71	14.2
Approach		47	0.0	0.284	60.7	LOS E	1.6	11.3	0.99	0.71	17.2
North: Railway Avenue (N)											
7	L2	151	0.0	0.546	13.6	LOS B	18.2	132.0	0.51	0.53	19.4
8	T1	2335	5.0	0.656	8.9	LOS A	25.2	183.9	0.57	0.54	48.9
9	R2	511	4.7	0.767	35.6	LOS D	20.7	150.8	0.94	0.95	26.1
Approach		2996	4.7	0.767	13.7	LOS B	25.2	183.9	0.63	0.61	42.5
West: Queens Road											
10	L2	94	6.6	0.852	69.3	LOS E	6.7	49.4	1.00	0.95	17.6
11	T1	18	0.0	0.852	63.6	LOS E	6.7	49.4	1.00	0.95	14.3
12	R2	229	4.8	0.878	71.2	LOS E	7.1	51.4	1.00	0.98	22.6
Approach		341	5.0	0.878	70.3	LOS E	7.1	51.4	1.00	0.97	21.0
All Vehicles		5006	4.8	0.878	27.3	LOS C	29.9	218.2	0.76	0.74	34.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	6.9	LOS A	0.0	0.0	0.35	0.35
P3	North Full Crossing	1	49.2	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		2	28.0	LOS C			0.65	0.65

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	146	8.1	575	0.255	100	34.9	LOS C	5.8	43.0	Short	60	0.0	NA
Lane 2	446	5.0	552[1]	0.809	94[6]	39.4	LOS D	22.8	166.1	Short	200	0.0	NA
Lane 3	530	5.0	618	0.858	100	44.9	LOS D	29.9	218.2	Full	450	0.0	0.0
Lane 4	477	5.0	556[1]	0.858	100	44.4	LOS D	26.3	192.0	Full	450	0.0	0.0
Lane 5	22	0.0	82	0.270	100	38.3	LOS D	1.0	6.8	Short	68	0.0	NA
Approach	1622	5.2		0.858		42.2	LOS D	29.9	218.2				
East: Putt Street													
Lane 1	18	0.0	101	0.177	62[5]	61.9	LOS E	1.0	6.8	Short	30	0.0	NA
Lane 2	29	0.0	104	0.284	100	59.9	LOS E	1.6	11.3	Full	80	0.0	0.0
Approach	47	0.0		0.284		60.7	LOS E	1.6	11.3				
North: Railway Avenue (N)													
Lane 1	729	4.0	1335	0.546	83[6]	9.2	LOS A	18.2	132.0	Short	140	0.0	NA
Lane 2	878	5.0	1339	0.656	100	9.2	LOS A	25.2	183.9	Full	210	0.0	0.0
Lane 3	878	5.0	1339	0.656	100	9.2	LOS A	25.2	183.9	Full	210	0.0	0.0
Lane 4	511	4.7	666	0.767	100	35.6	LOS D	20.7	150.8	Short	160	0.0	NA
Approach	2996	4.7		0.767		13.7	LOS B	25.2	183.9				
West: Queens Road													
Lane 1	112	5.5	131	0.852	100	68.4	LOS E	6.7	49.4	Short	60	0.0	NA
Lane 2	115	4.8	131	0.878	100	71.2	LOS E	7.1	51.4	Full	250	0.0	0.0
Lane 3	115	4.8	131	0.878	100	71.2	LOS E	7.1	51.4	Short	60	0.0	NA
Approach	341	5.0		0.878		70.3	LOS E	7.1	51.4				
Intersection	5006	4.8		0.878		27.3	LOS C	29.9	218.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

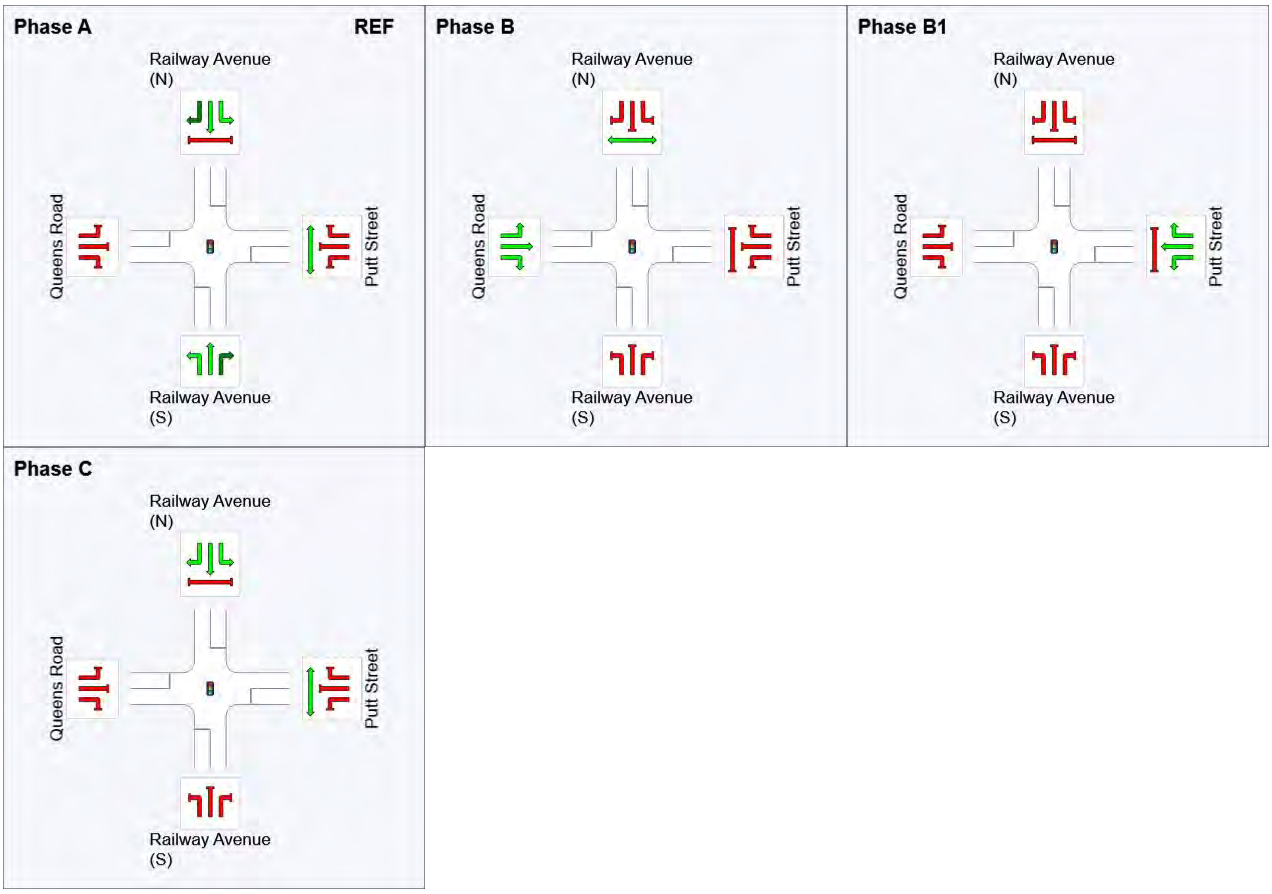
Site: 1 [Railway / Queens / Putt PM 2033 WD S5-Final]

With Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	42	56	68
Green Time (sec)	36	8	6	36
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	42	14	12	42
Phase Split	38%	13%	11%	38%



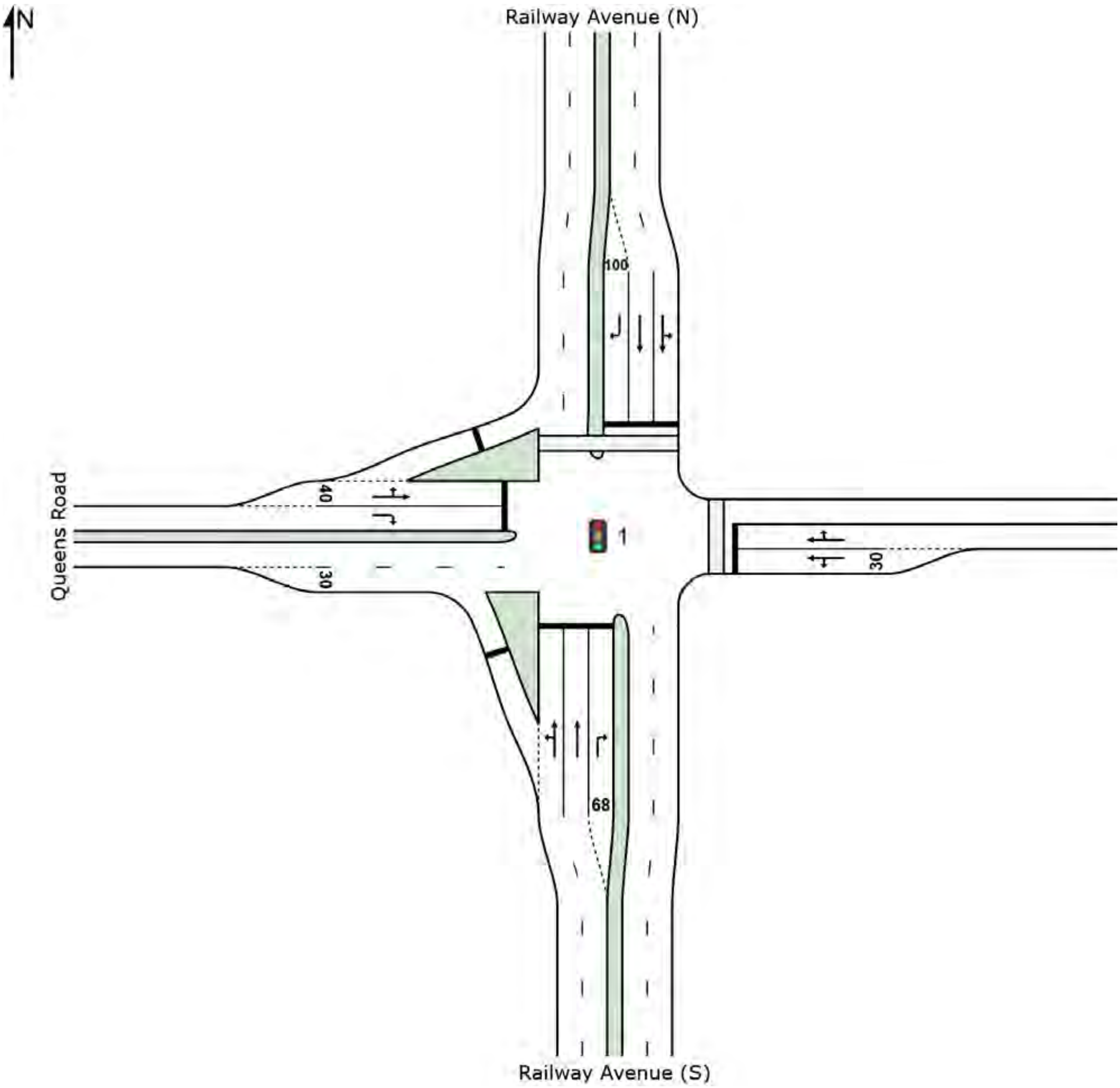
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	132	8.1	1.000	99.9	LOS F	74.4	545.3	1.00	1.23	18.4
2	T1	1311	5.0	1.000	99.5	LOS F	74.4	545.3	1.00	1.25	17.3
3	R2	20	0.0	0.311	51.5	LOS D	1.2	8.2	0.82	0.75	22.6
Approach		1462	5.2	1.000	98.9	LOS F	74.4	545.3	1.00	1.24	17.5
East: Putt Street											
4	L2	15	0.0	0.044	55.0	LOS D	0.8	5.7	0.85	0.69	22.0
5	T1	15	0.0	0.128	56.1	LOS E	1.8	12.3	0.91	0.70	15.8
6	R2	15	0.0	0.128	61.2	LOS E	1.8	12.3	0.91	0.70	14.1
Approach		44	0.0	0.128	57.4	LOS E	1.8	12.3	0.89	0.69	17.5
North: Railway Avenue (N)											
7	L2	151	0.0	0.855	19.5	LOS B	55.6	404.0	0.78	0.76	17.6
8	T1	1961	5.0	0.855	12.9	LOS B	55.6	404.0	0.69	0.66	45.2
9	R2	511	4.7	0.926	72.7	LOS E	36.5	266.0	1.00	1.09	16.5
Approach		2622	4.6	0.926	24.9	LOS C	55.6	404.0	0.75	0.75	34.6
West: Queens Road											
10	L2	94	6.6	0.342	59.2	LOS E	6.6	48.5	0.92	0.77	19.6
11	T1	18	0.0	0.342	53.5	LOS D	6.6	48.5	0.92	0.77	16.0
12	R2	191	4.8	1.010	134.0	LOS F	18.7	136.2	1.00	1.14	14.5
Approach		302	5.0	1.010	106.0	LOS F	18.7	136.2	0.97	1.01	15.5
All Vehicles		4431	4.8	1.010	55.2	LOS E	74.4	545.3	0.85	0.93	24.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	7.0	LOS A	0.0	0.0	0.32	0.32
P3	North Full Crossing	1	59.4	LOS E	0.0	0.0	0.93	0.93
All Pedestrians		2	33.2	LOS D			0.62	0.62

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	770	5.5	770	1.000	100	95.2	LOS F	74.4	545.3	Full	450	0.0	22.4
Lane 2	672	5.0	671[1]	1.000	100	104.5	LOS F	65.9	481.0	Full	450	0.0	11.0
Lane 3	20	0.0	64	0.311	100	51.5	LOS D	1.2	8.2	Short	68	0.0	NA
Approach	1462	5.2		1.000		98.9	LOS F	74.4	545.3				
East: Putt Street													
Lane 1	15	0.0	336	0.044	34[5]	55.0	LOS D	0.8	5.7	Short	30	0.0	NA
Lane 2	29	0.0	230	0.128	100	58.6	LOS E	1.8	12.3	Full	80	0.0	0.0
Approach	44	0.0		0.128		57.4	LOS E	1.8	12.3				
North: Railway Avenue (N)													
Lane 1	1179	4.4	1379	0.855	100	14.7	LOS B	55.6	404.0	Full	210	0.0	65.6
Lane 2	932	5.0	1090[1]	0.855	100	11.7	LOS B	33.7	245.8	Full	210	0.0	26.5[8]
Lane 3	511	4.7	551	0.926	100	72.7	LOS E	36.5	266.0	Short	100	0.0	NA
Approach	2622	4.6		0.926		24.9	LOS C	55.6	404.0				
West: Queens Road													
Lane 1	112	5.5	326	0.342	100	58.3	LOS E	6.6	48.5	Short	40	0.0	NA
Lane 2	191	4.8	189[1]	1.010	100	134.0	LOS F	18.7	136.2	Full	250	0.0	0.0
Approach	302	5.0		1.010		106.0	LOS F	18.7	136.2				
Intersection	4431	4.8		1.010		55.2	LOS E	74.4	545.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

PHASING SUMMARY

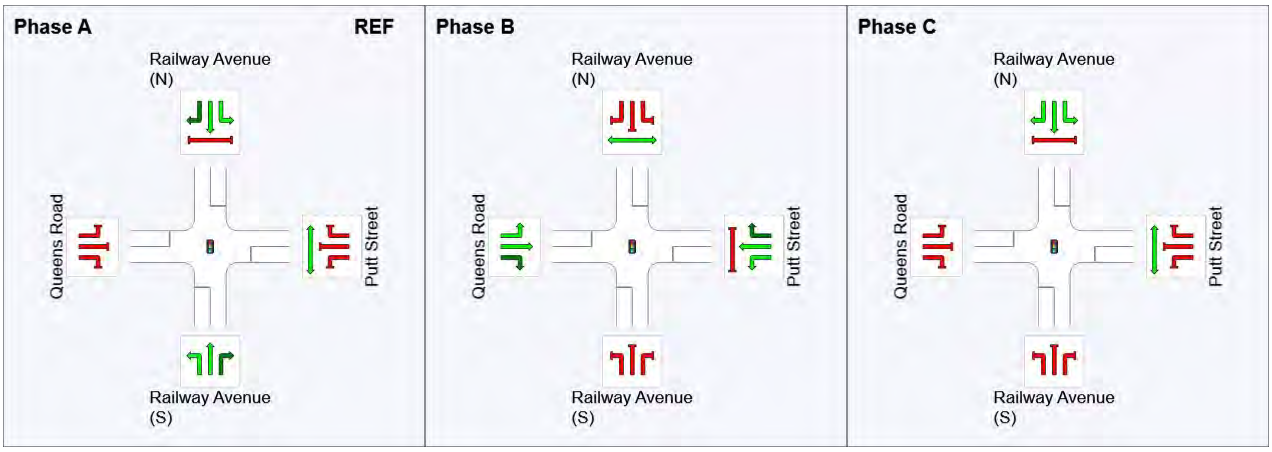
Site: 1 [Railway / Queens / Putt PM 2033 W/O D]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 138 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

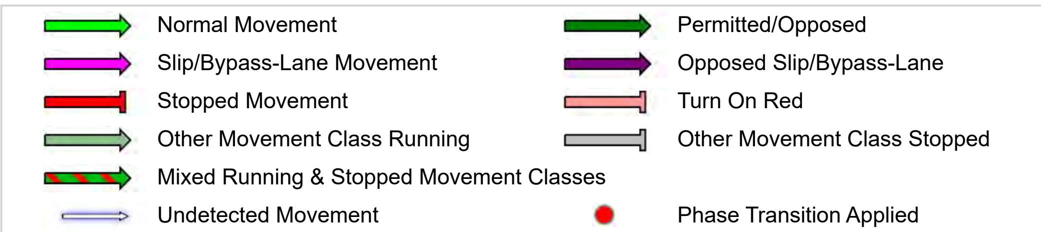
Phase Times determined by the program
Sequence: Variable Phasing
Reference Phase: Phase A
Input Sequence: A, B, C, D*
Output Sequence: A, B, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	63	94
Green Time (sec)	57	25	38
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	63	31	44
Phase Split	46%	22%	32%



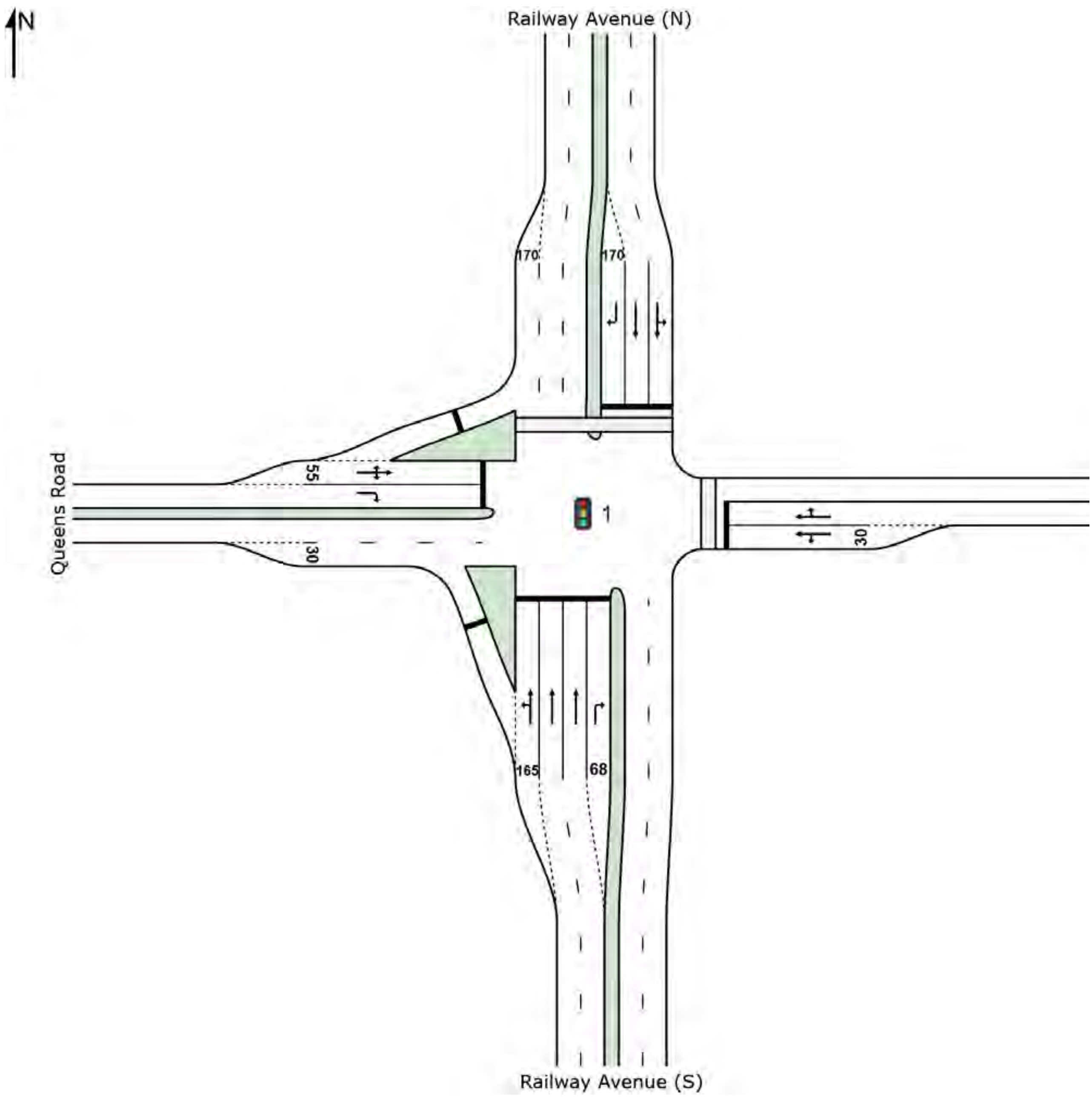
REF: Reference Phase
VAR: Variable Phase



SITE LAYOUT

Site: 1 [Railway / Queens / Putt PM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Avenue (S)											
1	L2	132	8.1	0.819	47.0	LOS D	23.8	175.3	0.99	0.95	29.4
2	T1	1311	5.0	0.886	46.9	LOS D	29.3	214.1	0.99	1.02	27.7
3	R2	20	0.0	0.240	41.6	LOS D	0.9	6.2	0.82	0.74	25.5
Approach		1462	5.2	0.886	46.8	LOS D	29.3	214.1	0.99	1.01	27.9
East: Putt Street											
4	L2	15	0.0	0.139	58.8	LOS E	0.8	5.3	0.98	0.69	21.1
5	T1	15	0.0	0.271	54.4	LOS D	1.5	10.8	0.99	0.71	16.1
6	R2	15	0.0	0.271	59.6	LOS E	1.5	10.8	0.99	0.71	14.4
Approach		44	0.0	0.271	57.6	LOS E	1.5	10.8	0.99	0.70	17.5
North: Railway Avenue (N)											
7	L2	151	0.0	0.828	19.1	LOS B	39.5	286.4	0.80	0.77	17.7
8	T1	1961	5.0	0.828	13.5	LOS B	39.5	288.5	0.80	0.76	44.7
9	R2	511	4.7	0.793	36.5	LOS D	20.9	152.3	0.96	0.96	25.6
Approach		2622	4.6	0.828	18.3	LOS B	39.5	288.5	0.83	0.80	38.7
West: Queens Road											
10	L2	94	6.6	0.882	67.6	LOS E	8.9	65.3	1.00	1.01	17.8
11	T1	18	0.0	0.882	61.9	LOS E	8.9	65.3	1.00	1.01	14.4
12	R2	191	4.8	0.882	67.6	LOS E	8.9	65.3	1.00	1.00	23.2
Approach		302	5.0	0.882	67.2	LOS E	8.9	65.3	1.00	1.00	21.2
All Vehicles		4431	4.8	0.886	31.4	LOS C	39.5	288.5	0.90	0.88	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	8.0	LOS A	0.0	0.0	0.39	0.39
P3	North Full Crossing	1	46.7	LOS E	0.0	0.0	0.94	0.94
All Pedestrians		2	27.3	LOS C			0.67	0.67

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

LANE SUMMARY

Site: 1 [Railway / Queens / Putt PM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Railway Avenue (S)													
Lane 1	461	5.9	563	0.819	92[6]	42.9	LOS D	23.8	175.3	Short	165	0.0	NA
Lane 2	510	5.0	576	0.886	100	48.9	LOS D	29.3	214.1	Full	450	0.0	0.0
Lane 3	471	5.0	531[1]	0.886	100	48.6	LOS D	26.7	194.7	Full	450	0.0	0.0
Lane 4	20	0.0	83	0.240	100	41.6	LOS D	0.9	6.2	Short	68	0.0	NA
Approach	1462	5.2		0.886		46.8	LOS D	29.3	214.1				
East: Putt Street													
Lane 1	15	0.0	106	0.139	51[5]	58.8	LOS E	0.8	5.3	Short	30	0.0	NA
Lane 2	29	0.0	109	0.271	100	57.0	LOS E	1.5	10.8	Full	80	0.0	0.0
Approach	44	0.0		0.271		57.6	LOS E	1.5	10.8				
North: Railway Avenue (N)													
Lane 1	1055	4.3	1274	0.828	100	14.3	LOS B	39.5	286.4	Full	210	0.0	33.3
Lane 2	1057	5.0	1277	0.828	100	13.5	LOS B	39.5	288.5	Full	210	0.0	34.0
Lane 3	511	4.7	644	0.793	100	36.5	LOS D	20.9	152.3	Short	170	0.0	NA
Approach	2622	4.6		0.828		18.3	LOS B	39.5	288.5				
West: Queens Road													
Lane 1	151	5.3	171	0.882	100	66.9	LOS E	8.9	65.3	Short	55	0.0	NA
Lane 2	151	4.8	171	0.882	100	67.6	LOS E	8.9	64.9	Full	250	0.0	0.0
Approach	302	5.0		0.882		67.2	LOS E	8.9	65.3				
Intersection	4431	4.8		0.886		31.4	LOS C	39.5	288.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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 full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

PHASING SUMMARY

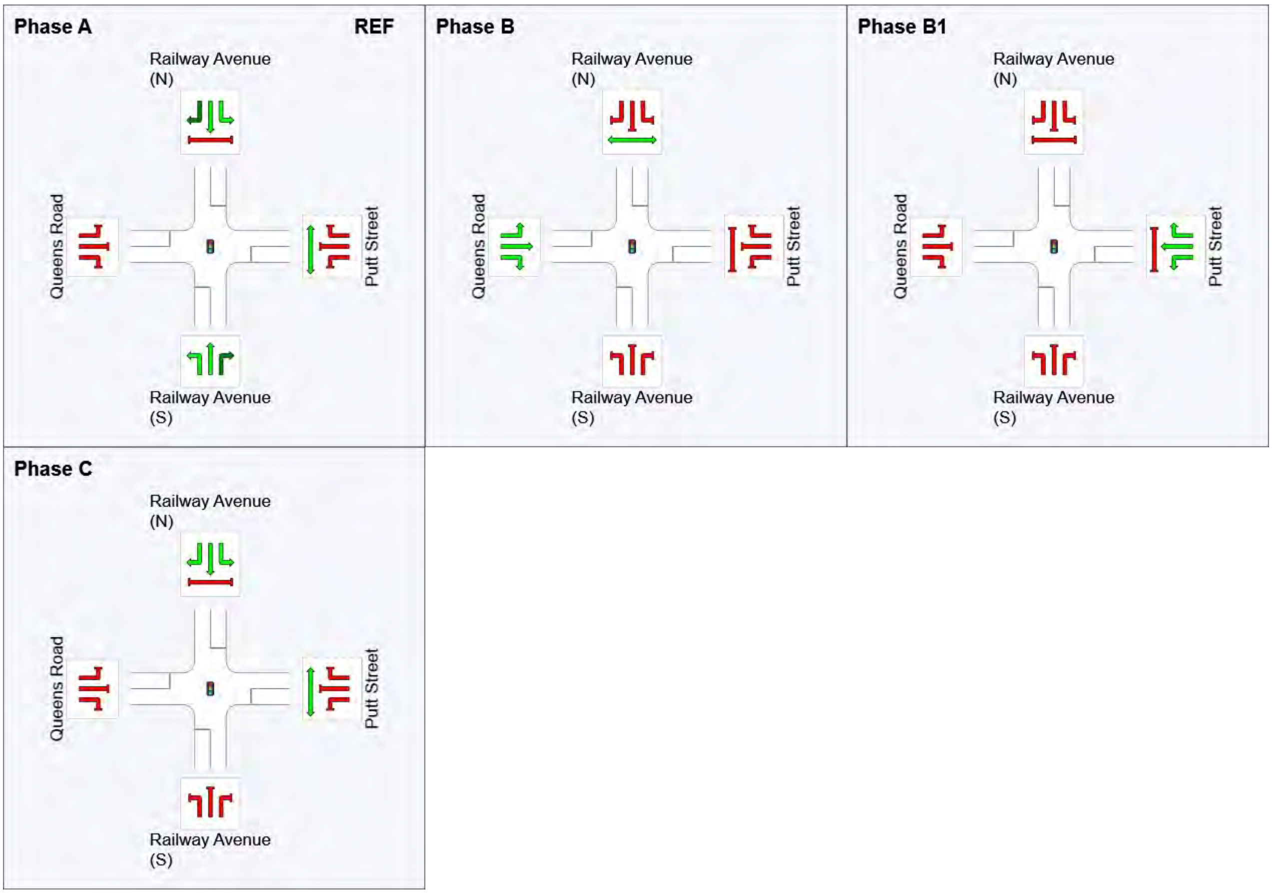
Site: 1 [Railway / Queens / Putt PM 2033 W/O D S3-Final]

Without Dev Traffic
Signals - Fixed Time Isolated   Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Phase Times determined by the program
Sequence: Variable Phasing 1
Reference Phase: Phase A
Input Sequence: A, B, B1, C, D*
Output Sequence: A, B, B1, C
(* Variable Phase)

Phase Timing Results

Phase	A	B	B1	C
Phase Change Time (sec)	0	38	54	66
Green Time (sec)	32	10	6	33
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	38	16	12	39
Phase Split	36%	15%	11%	37%



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 Running	Other Movement Class Stopped
Mixed Running & Stopped Movement Classes	
Undetected Movement	Phase Transition Applied

Appendix E – Oonoonba Urban Development Area, Open Space master Plan Report

Oonoonba Priority Development Area
Open Space Master Plan Report

August 2015

THE VILLAGE

CLIENT

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Approved by:	Martin Wilshire
Position:	Design Lead (Townsville)
Date:	15/09/2015
Document Reference:	3015014 OONOONBA OPEN SPACE MASTER PLAN (prev.ULD27)
Report:	OPEN SPACE MASTER PLAN REPORT
Issue:	C

Table of Contents

Introduction

Project Description

Existing Site

Oonoonba Priority Development Area (PDA) covers 83ha and is approximately three kilometres south of the Townsville CBD. The site is nestled on a prominent bend of the Ross River, a significant and beautiful geographical feature of Townsville. Parts of the site afford views of permanent water stretches of the River, where other parts adjoin wide sand beds adjacent to the river banks – these areas are inundated during flood events.

The site also features significant distant views to the prominent Townsville landmarks of Castle Hill and Mt Stuart.

Formerly used for primary industry research, the site is largely cleared but does include significant clusters of mature vegetation of both native and exotic species. A drainage corridor also runs through the middle, though this is highly modified due to previous agricultural pursuits.

Some of the buildings used for the agricultural research station are of cultural heritage interest, and the site also remarkably contains a bomb crater from the World War II bombing of Townsville by enemy forces.

Economic Development Queensland (EDQ) has been vested by the State Government to develop the site into a quality and diverse residential housing community.

Site Context Map

Oonoonba is in Townsville in Far North Queensland

The Oonoonba PDA is situated approx. 3km south of the Townsville CBD and adjoins the Ross River. The Development Boundary is indicated by the Dashed Red Line.

Project Vision

EDQ's vision for the site is...

"To create an ecologically sustainable residential development that incorporates existing trees and embraces the River. It will include a network of open parks and will link the existing riverfront with Fairfield Waters and Townsville City Council's cycle network. New development at Oonoonba will provide a range of housing choices to cater for the diverse needs of the Townsville community through a mix of densities, types, designs, price points and home ownership and rental options."

Open Space Master Plan Guiding Principles

Public Open Space:
Public open spaces are cool, green, comfortable, animated and attractive. They are robust, adaptable spaces that can accommodate a range of activities as well as future growth and changing community needs. The streets are important public spaces and streetscapes exhibit carefully considered physical parameters - footpath widths, build outs, setbacks, street furniture, planting areas, canopy shade trees, services and safety for users.

Sense of Place:
The Village is a relaxed, friendly, residential development set within a green, natural landscape setting. The Ross River, significant existing trees and views to Castle Hill and Mt Stuart are important contributing factors that define the sense of place.

Vegetation, Plantings and Green Space:
The Open Space Master Plan ensures significant existing vegetation is retained, where possible, within open space areas and along the riverfront. These spaces, as well as streetscape areas, are enhanced by canopy shade trees, shrubs, understorey plantings and extensive turf. New plantings also serve to enhance environmental functions including habitat provision and water treatment.

Re-use of existing trees on-site that would have been cleared in later stages have been identified for transplant wherever possible.

Wayfinding:
The Village is easy to navigate as a pedestrian or cyclist due to the basic grid development layout, well considered spaces and nodes, clearly defined edges, landmarks, key view corridors, signage and landscape elements.

Walking and Cycling:
Pedestrian and bicycle pathways are visible, attractive and safe and link key destinations and nodes within the development, as well as connecting to adjoining existing pathways.

Safety:
The Village is a safe place for residents and visitors, both day and night, with Crime Prevention Through Environmental Design (CPTED) principles integrated into the design. Built elements comply with relevant standards and best practices to minimise accidental injury.

Public Art:
Interpretive and artistic elements are integrated throughout the public realm, with plans to incorporate passive play elements using elements on-site where possible, e.g. tree trunks, vegetation, soil.

Sustainability:
Sustainable, innovative initiatives and measures in relation to the design, construction and maintenance of landscape elements are embraced in the Open Space Master Plan.

Heritage
The site is on a bend of the Ross River where a natural crossing point exists at low tide; this may have been used prior to Europen settlers using the site, little evidence of aborignal signifigance is apparent elsewhere.

The stables on-site were just over 100 years old, demonstrating a long association with the site as an agricultural research station (Department of Primary Industries then as Department of Agriculture, Fisheries and Forestry). A number of items will be re-used within the site for interpretive elements to inform people of the site's cultural history.

The site also has the dubious honour of a bomb crater from WWII. The site will be re-established with interpretive signage within a park area.

Site Analysis

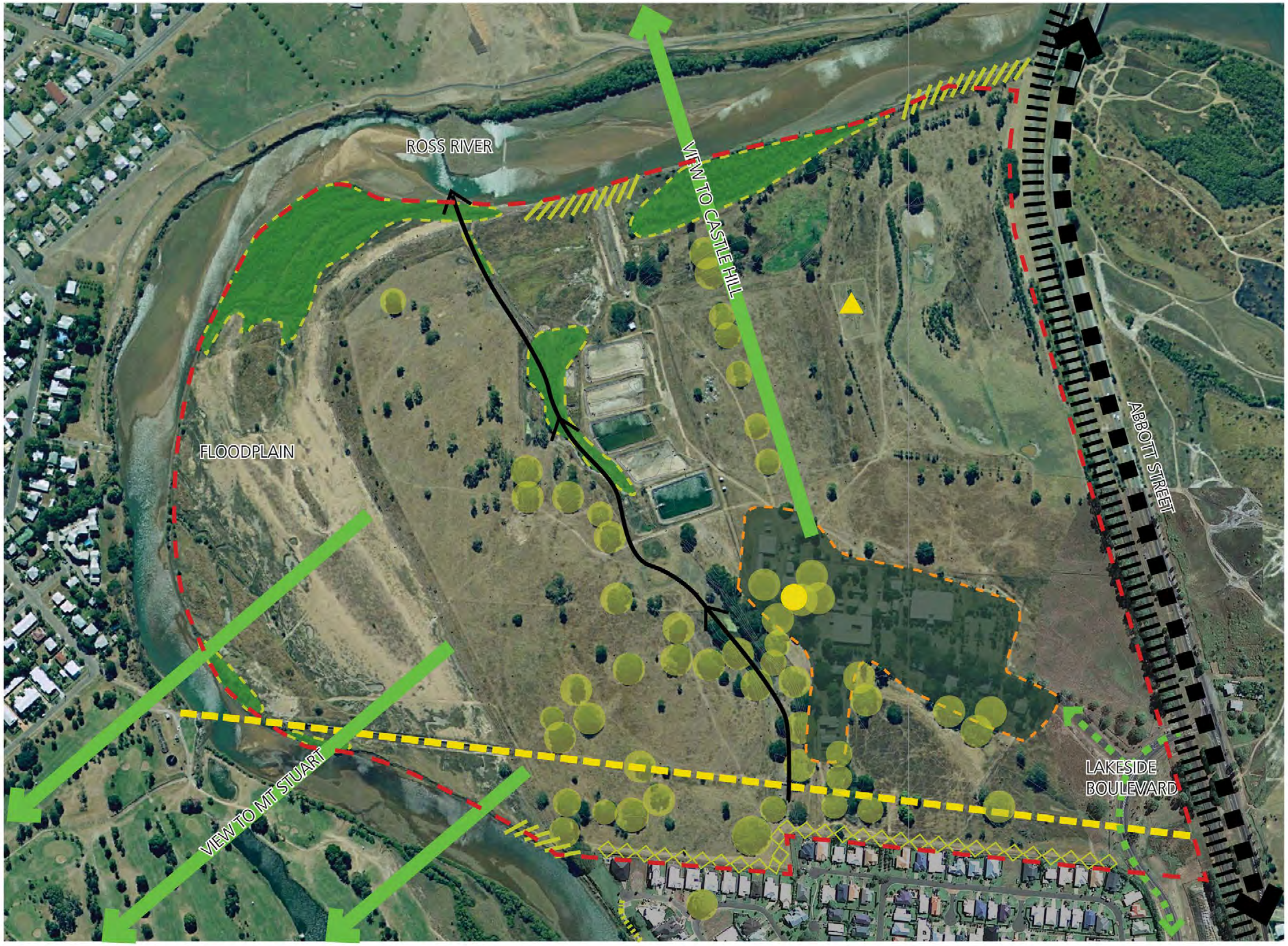
Site Features - Rain Trees, Mt Stuart and Existing Structures from the Research Facility

A site analysis has been undertaken, which has identified constraints and opportunities for the development and open space areas and which forms the foundation for appropriate design responses.

KEY FINDINGS AND RECOMMENDATIONS

- There are significant stands of existing trees throughout the site as well as significant vegetation and mangrove communities along the riverbank and in low lying areas in the central drainage corridor (northern portion). Therefore there is potential to **retain and protect significant vegetation** within open space areas and along the riverfront and sandbank tidal flat.
- The **Ross River** encompasses the site on the northern and western side, providing opportunities to include **visual and physical connections** through boardwalks, pathways and open space areas next to the River; **symbolic connections** through theming and public art, and also to improve **stormwater treatment measures** in the open space areas, which ultimately connect to the river system.
- Amongst the existing structures from the DPI agricultural research facility - barns, sheds, shelters for livestock, etc. - there are some unique and beautiful architectural forms. Depending on the outcomes of the Building Survey, there is potential to **re-use some of the timber structures** - or, at least, replicate their forms - for picnic shelters and other shelters and parkland structures.
- A key feature of the open space masterplan would be to maximise opportunities to **capture the key views** from the site to the iconic **Castle Hill and Mt Stuart.**
- It is important to **connect to the existing shared pathway** facility that runs along the riverfront of the ajoining Fairfield Waters residential development, and to connect to other key pathway systems external to the site.
- Proposed open space areas that interface with the existing residences in the Fairfield Waters development are to be sensitive to the interface and boundary treatments in terms of noise, lighting, vehicular traffic, privacy, safety and security.
- The central drainage corridor that runs through the site may be integrated as a feature into a linear open space corridor.
- Maximise opportunities to include pathways, lookouts, boardwalks, birdhides or other ways and means of **bringing people to the edge of the River** to appreciate the site's proximity to this key feature.
- There is a significant birdlife community that exists on the site, so the opportunity to **incorporate bird watching areas and facilities** in the open space areas exists, especially in future areas such as The Glen, which will have interpretive signage and bird hides.

Site Analysis Plan



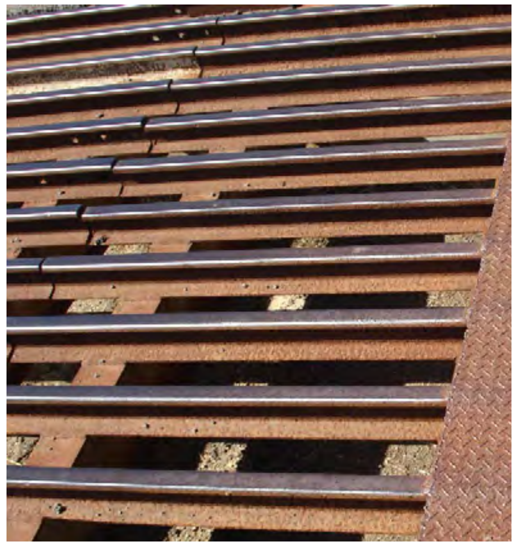
Legend

- Significant Vegetation Communities
- Exisitng Buildings and Structures (Refer to future Architectural Assessment to Determine Significance and Opportunity to Retain or Reuse)
- Significant Trees for Possible Retention (Predominantly Rain Trees and Eucalypts)
- Historical Bomb Crater and Palm Tree Plantings
- Silo
- Major Road (Abbott Street)
- Railway
- Existing Sewer (Pressure Main)
- Existing Vehicular Access to Site
- Exisitng Pedestrian/Cycle Route (2.5m Width)
- Close Proximity to River from Within Development Area
- Interface with Existing Residential Lots
- Extent of Development
- Drainage Corridor

N

1:5000 @ A3

Site Photos



Plan of Development

EDQ's Plan of Development illustrates the objectives that it set out for itself from the start; to provide diversity in housing product, meet high levels of environmental integrity and integrate open space throughout the community.

Open Space Master Plan

Key Nodes within the Master Plan

Wes Barrett Park from the outset has been an outstanding success due to its simplicity, and massive rain trees providing elevated shade. A number of events have already been staged in the park, including "Fringe Ephemera".

Riverside Esplanade is the junction between the open space walk along the river and one of the main circulation corridors within the site.

Skinny Thomas Park serves as a transition space utilising the existing drainage corridor, existing mature trees and revegetated open space; existing site trees have also been relocated to this area.

The Glen will be transformed into a wildlife habitat that conceals the water sensitive urban design catchment that treats the majority of the site's storm water run-off. Interpretive signage will be incorporated into the site, along with bird hides and pathway circulation.

Memorial Square is situated where a bomb from WWII exploded, damaging a number of palms. The future park, in consultation with the local RSL, will be re-established to ensure the history of the site is acknowledged.

Village Green, the 'hub' of the site, will be the meeting place and the heart of The Village. With a future community centre and mixed commercial site, the Village Green will always be 'busy'.

Open Space Master Plan

LEGEND

1. ENTRY LANDSCAPE FEATURE
2. COMMERCIAL / RETAIL
3. VILLAGE GREEN
4. SKINNY THOMAS PARK
5. THE GLEN (WETLAND)
6. WES BARRETT PARK
7. MEMORIAL SQUARE
8. 2.5m PEDESTRIAN / CYCLE PATH
9. COMMUNITY / VILLAGE CENTRE

N

1:4000 @ A3

Public Open Space Provision

The original Open Space Master Plan was prepared to assist in the implementation of the EDQ's vision for 'The Village' – Oonoonba.

The key objectives of the Open Space Masterplan in terms of the provision of open space were:

- Provision of a riverside park to view key stretches of the Ross River. This has been achieved with the completed 'Wes Barrett Park', a major gathering node with a picnic shelter, barbecue and playground.

- Provision of a riverside esplanade around the balance river frontage. This has now started with the first stage of this circulation along Stages 4 & 6 constructed with a 2.5m wide path already being utilised by the public.

- Retention of existing mature vegetation. This has been achieved with advice from arborists in The Village Centre, Wes Barrett Park and Skinny Thomas Park; ongoing feasibility is being done to check existing trees along Holyoak Avenue.

- Provision of deliberate views to Castle Hill and Mt Stuart. Wes Barrett Park and the circulation esplanade along Stages 4 & 6 have focused upon retaining views to Mt Stuart across the Ross River. Similar thought towards maintaining views of Castle Hill are also being implemented for Stages 10, 11 & 15 incorporating a 2.5m path for circulation into the Village Centre.

- Provision of a Memorial square on the site of the bomb crater. This is to be done in consultation with the Townsville RSL and a concept for this space is under development so it can used as a recreational park as well as a site of rememberance.

- Retention of open space along the drainage corridor to provide an additional park corridor in the middle of the development. The construction of Central Gully (Skinny Thomas Park) allows for access through a revegetated open space that has pockets of turf areas, plus acts as the main drainage corridor through the centre of the site.

The open space areas are linked by an integrated pedestrian and cyclist network, which allows pedestrians and cyclists continuous recreation along the riverfront and around the site via 2.5m wide pathways.

The Open Space Masterplan also explores surface finishes, planting and styling of open space areas, with the intended overall landscape character to be consistent with Townsville's dry tropic setting using the existing shade trees and native vegetation along with being aligned with The Village's marketing and branding.

PARKLAND SPACES FEATURE VIEWS TO MT STUART (TOP) AND PROVIDE VISTAS ALONG KEY STRETCHES OF THE RIVER (MIDDLE AND BOTTOM).

Public Open Space Plan

Place Design Group

THE VILLAGE

Vegetation, Planting and Green Space

Existing trees, new trees and shrub and understorey planting will provide shade, comfort, character, amenity and habitat functions. Signature plantings and street trees will be used as wayfinding markers, whilst sustainable irrigation strategies, maintenance regimes and stormwater treatment are considered in the open space areas.

Significant Existing Trees / Vegetation:
The Master Plan seeks to protect existing significant stands of vegetation and individual trees within open space and streetscape areas where possible. The existing large rain trees and other established trees will provide significant amenity and shade in the public spaces throughout The Village. Riverfront vegetation and mangrove communities will be protected as part of the river edge and esplanade open space areas.

Plants for Birds and Wildlife:
Existing vegetation to be retained will also support and encourage native wildlife and birdlife within The Village open space areas, whilst supplementary plantings will enhance these functions. There are also opportunities to include interpretive signage to recognise the significance of select species and / or plant communities.

Canopy Shade Trees and Understorey Planting:
Across the open space and streetscape areas, existing trees and proposed new plantings are utilised to provide shade and comfort for people, to help minimise the urban heat island effect, cool the spaces and soften built form. Clear sightlines are maintained throughout for pedestrian and cyclist safety, whilst a continuity of tree and plant species assists with wayfinding.

Edible Plants and Food Gardens:
There is opportunity to include edible plants, food gardens and bush tucker plants in open space areas within The Village, which perhaps could be used as a source of food for the Community Centre, and be combined with interpretive signage and information. The Community Centre may have groups that maintain these edible plants, and teach people how they can be harvested and used.

Plant Palette and Feature Planting:
Tropical, proven species and native plants are selected for their low maintenance requirements and contribution to landscape character. Species that have established over time on the site are included in the plant palette. At key nodes, at entry / arrival points to the precinct and as landmarks, feature trees / planting are used.

Streetscapes / Roads:
Streets are a key component of the public domain, providing green relief through shade tree planting and amenity planting and pedestrian and vehicular access to residences and commercial buildings. The design of the streetscape areas enhances pedestrian connections and improves the visual quality of the space. A consistent and simplified palette of materials and vegetation will help reinforce The Village's distinct landscape character.

The street tree planting strategy for the roads in The Village:

Entry Avenue Planting Scheme - informal groups of mixed native species, with existing trees retained where possible in medians and road verges

Holyoak Avenue Planting Scheme - a distinct row of existing rain trees will try to be retained on the wider western road verge, alternatively the use of Pterocarpus indicus (Rosewood) will be used to establish a recognisable feature collector road tree. Supplementary native tree plantings in groupings along the Avenue will provide additional shade and colour.

Collector Road Planting Scheme - formal arrangement of signature tree planting (large canopy), minimum one per lot frontage and maximum spacing 15m (for large canopy tree)

Access Street Planting Scheme - formal arrangement of tree plantings (medium or small canopy, depending on space constraints), minimum one per lot frontage and maximum spacing 10m (medium canopy trees) or 7.5m (small canopy trees)

Corner treatments are also nominated to provide opportunities for wayfinding, as well as spaces for meeting and gathering, landscaping and street furniture. Water Sensitive Urban Design (WSUD) measures are also interwoven into streetscape designs.

Road verges are carefully articulated to allow space for street tree and understorey planting, whilst providing the necessary services (power, water, telecommunications etc).

WSUD measures are explored within streetscapes and public car parks along with the collection of stormwater through the proposed Wetland Area.

Structural Soils and Permeable Pavements:
Structural soil and permeable pavement technology can be used to support planting areas and trees within hard paved areas to improve tree and plant health, to direct stormwater runoff to planting areas and to reduce future arboricultural and maintenance costs.

Vegetation, Planting and Green Space Plan

Legend

- Exisiting Significant Tree to be Retained
- Significant Palm Trees continue to idenitfy the bomb crater site
- Riveredge Boulevard Planting Scheme
- Holyoake Avenue Planting Scheme
- Significant tree planting in roundabout
- Collector Roads Planting Scheme
- Access Street Planting Scheme

N

1:4000 @ A3

Place Design Group

THE VILLAGE

Plant Palette

TREES

ALBIZIA SAMAN (RAIN TREE)
CALOPHYLLUM INOPHYLLUM (BEACH CALOPHYLLUM)
CASSIA FISTULA (CASCARA, GOLDEN SHOWER)
CASSIA JAVANICA (PINK SHOWER)
CASUARINA CUNNINGHAMIANA (RIVER SHE-OAK)
CASUARINA EQUISETIFOLIA (COAST SHE-OAK, BEACH SHE-OAK)
CORYMBIA CITRIODORA (LEMON-SCENTED GUM)
CORYMBIA TESSELLARIS (MORETON BAY ASH, CARBEEN)
CUPANIOPSIS ANACARDIOIDES (TUCKEROO, CUPANIA)
ELAEOCARPUS RETICULATIS (QUANDONG)
EUCALYPTUS PLATYPHYLLA (POPLAR GUM, CABBAGE GUM)
FLINDERSIA BRAYLEYANA (QUEENSLAND MAPLE)
GREVILLEA BAILEYANA (BAILEY'S GREVILLEA)
HARPULLIA PENDULA (TULIPWOOD)
LOPHOSTEMON GRANDIFLORUS (NORTHERN SWAMP MAHOGANY)
MELALEUCA LEUCADENDRA (WEEPING PAPERBARK)
MELALEUCA QUINQUENERVIA (BROAD LEAVED PAPERBARK)
MIMUSOPS ELENGI (RED GOONDOO)
NAUCLEA ORIENTALIS (LEICHARDT TREE)
PANDANUS
PTEROCARPUS INDICUS (ROSEWOOD)
SYZYGIUM TIERNEYANUM (RIVER CHERRY)
TERMINALIA CATAPPA (INDIAN ALMOND, SEA ALMOND)
TERMINALIA SERICOCARPA (DAMSON)
XANTHOSTEMON CHRYSANTHUS (GOLDEN PENDA, YELLOW PENDA)

PALMS

ARCHONTOPHOENIX ALEXANDRAE (ALEXANDER PALM)
BISMARCKIA NOBILIS (BISMARCKIA PALM)
LICUALA RAMSAYI (AUSTRALIAN FAN PALM)
LIVISTONA SPP. (CABBAGE PALM)
RAVENEA RIVULARIS (MAJESTIC PALM, MAJESTY PALM)
WODYETIA BIFURCATA (FOXTAIL PALM)


CORYMBIA TESSELLARIS FORM (LEFT) AND CLOSE UP OF BARK (RIGHT)


ALBIZIA SAMAN (RAIN TREE)


MELALEUCA WETLAND CHARACTER ALONG ABBOTT ST RAIL CORRIDOR


SYZYGIUM TIERNEYANUM


PTEROCARPUS INDICUS

SHRUBS

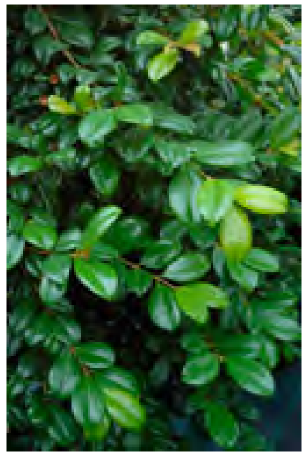
ACACIA SPP.
BAECKEA SPP (BAECKEA)
CALLISTEMON SPP. (BOTTLEBRUSH)
CODIAEUM VARIEGATUM (CROTON)
CORDYLINE SPP. (CORDYLINE)
CRINUM PEDUNCULATUM (SWAMP LILY)
DIANELLA SPP. (BLUE FLAX LILY)
DIETES BICOLOR (YELLOW WILD IRIS)
GREVILLEA SPP. (GREVILLEA)
HYMENOCALLIS LITTORALIS (SPIDER LILY)
LEPTOSPERMUM SPP. (TEA TREE)
LOMANDRA SPP. (MAT-RUSH)
MELALEUCA SPP. (TEA TREE)
PHYLLANTHUS MULTIFLORUS (PHYLLANTHUS)
RUSSELLIA EQUISETIFORMIS (CORAL PLANT)
SYZYGIUM SPP. (LILLYPILLY)

CLIMBER / VINE

CLERODENDRUM SPLENDENS (FLAMING GLORYBOWER VINE, BLEEDING HEART VINE)
FICUS PUMILA (CLIMBING FIG)
JASMINUM POLYANTHUM (STAR JASMINE)
PETREA VOLUBILIS (BLUE PETREA, PURPLE WREATH)
PYROSTEGIA IGNEA (FORMERLY VENUSTA - GOLDEN SHOWER, FLAME VINE)
TECOMARIA CAPENSIS (CAPE HONEYSUCKLE)

SPECIES FOR BIO-RETENTION / WSUD AREAS

SPECIES TO BE SELECTED, IN ACCORDANCE WITH THE *WSUD TECHNICAL DESIGN GUIDELINES FOR THE COASTAL DRY TROPICS REGION (TOWNSVILLE)*.
CYMBOPOGON BOMBICYNUS (SILKY OIL GRASS)
FIMBRISTYLIS DICHOTOMA (COMMON FRINGE-SEDGE)
LEERSIA HEXANDRA (SWAMP RICEGRASS)
THEMEDA TRIANDRA (KANGAROO GRASS)



SYZYGIUM AUSSIE SOUTHERN

CALLISTEMON VIMINALIS

LEPTOSPERMUM POLYGALIFOLIUM

PHYLLANTHUS MULTIFLORUS

QUISQUALIS INDICA

PYROSTEGIA IGNEA

FIMBRISTYLIS DICHOTOMA

LOMANDRA LONGIFOLIA

LEERSIA HEXANDRA

Pedestrian and Cyclist Circulation

The Open Space Master Plan includes an integrated pedestrian and cyclist network, allowing the pedestrian and cyclist continuous recreation along the river frontage and through the development. The network links nodes and key destinations including the various parks, the commercial/retail area and proposed bus stops as well as providing connections to and from adjoining residential areas.

Key elements of the pedestrian and cyclist circulation include:

LOCATION	STANDARD
River esplanade	Shared path construction of 2.5m width along river esplanade
Skinny Thomas Park	Shared path construction of 2.0m width through a revegetated zone
Entry Road	Path construction of 1.5m on both sides of road plus Shared path construction of 1.5m width along one side of road from the roundabout heading west
Holyoak Avenue	Shared path construction of 2.5m width along one side of road
Collector Roads, Access Roads	Path construction of 1.5m width along one side of road
External connections	Connection with shared path along riverfront areas of Fairfield Waters residential development and to the newly constructed pathway along Abbot Street
Cyclist and Pedestrian facilities	Shade shelter, seating and drinking fountains to be provided at the parkland nodes around the development. In the commercial/retail zone the addition of bike racks are to be installed

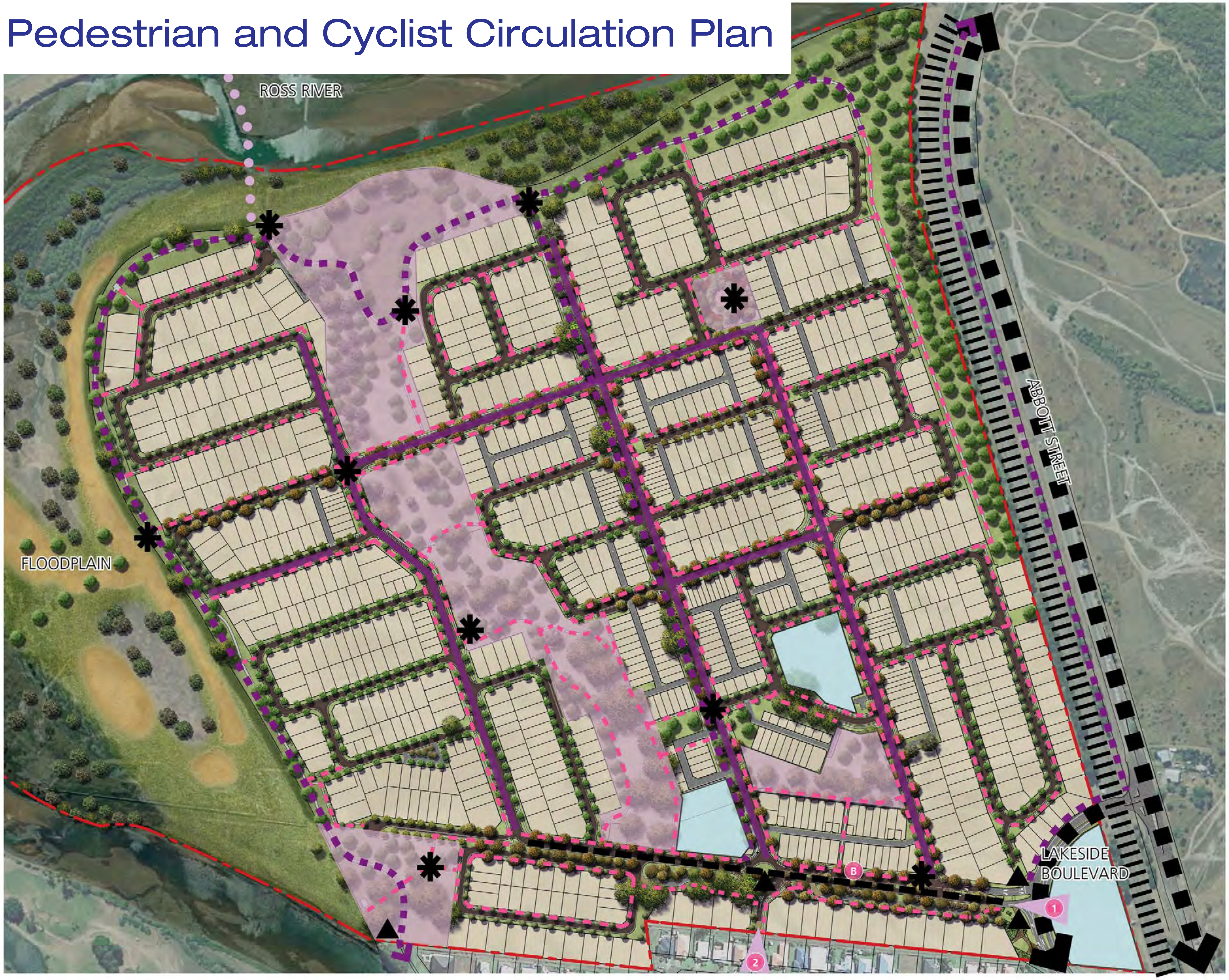
Ross River Pedestrian and Cyclist Bridge (Possible - Subject to further investigation)

A possible pedestrian/cyclist bridge link across the Ross River to Bicentennial Park is considered to be worth further investigation and discussion with Townsville City Council. The proposed link would make use of the existing rock shelf in the River for pier foundations and connect into a future Ross Creek/CBD connection that Townsville City Council are working to strengthen as part of the PDA (Priority Development Area).

Investigation would need to address:

- Feasibility and cost
- Structural foundation suitibility
- Resilience to river flooding
- Impact on river hydrology
- Connection to Bicentennial Park path system
- Alternative cost to providing a rail-crossing

Pedestrian and Cyclist Circulation Plan



Legend

- Open Space
- Commercial / Mixed Land Use
- Major Roadway
- Entry Avenue
- Primary Vehicular Circulation Route
- Primary Pedestrian/Cycle Route (2.5m Width)
- Secondary Pedestrian/Cycle Route (1.5 & 2.0m Width)
- Possible Future Pedestrian Boardwalk and Bridge
- Railway
- Wayfinding/Signage Marker
- Entry Statement
- Proposed Bus Stop Location (Refer to TTM Consulting Traffic Report)
- Primary Vehicular Entry
- Secondary Vehicular Entry

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Place Design Group

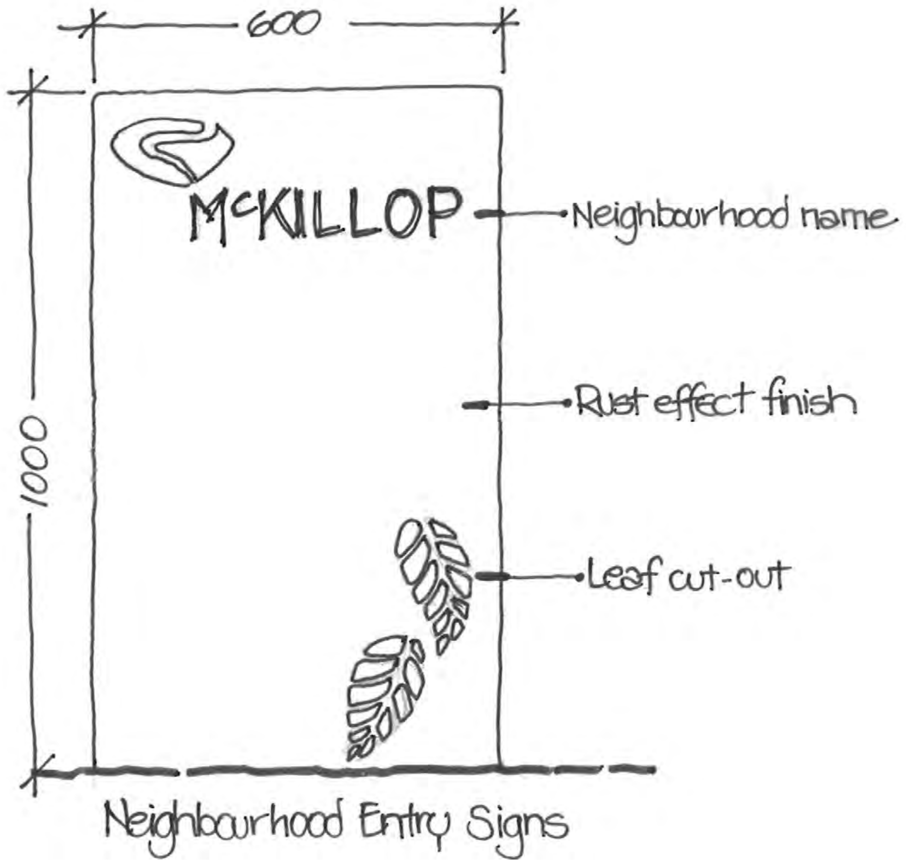
THE VILLAGE

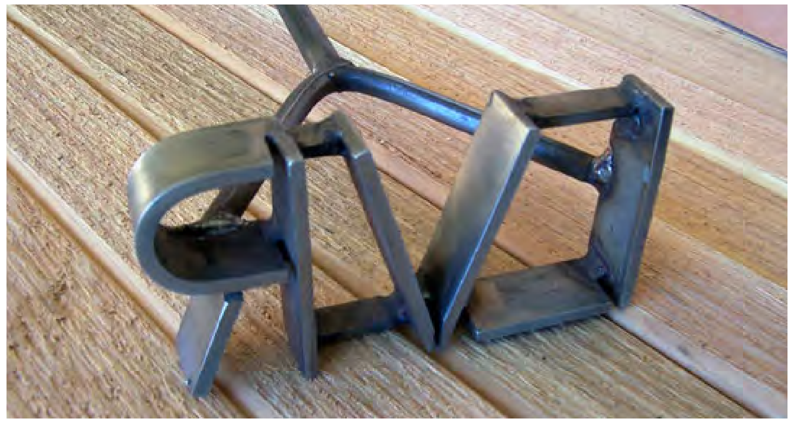
Neighbourhoods

Identity / character and locality are the key elements behind neighbourhoods within The Village. Visual recognition and association are strong indicators for people remembering a place they have visited.

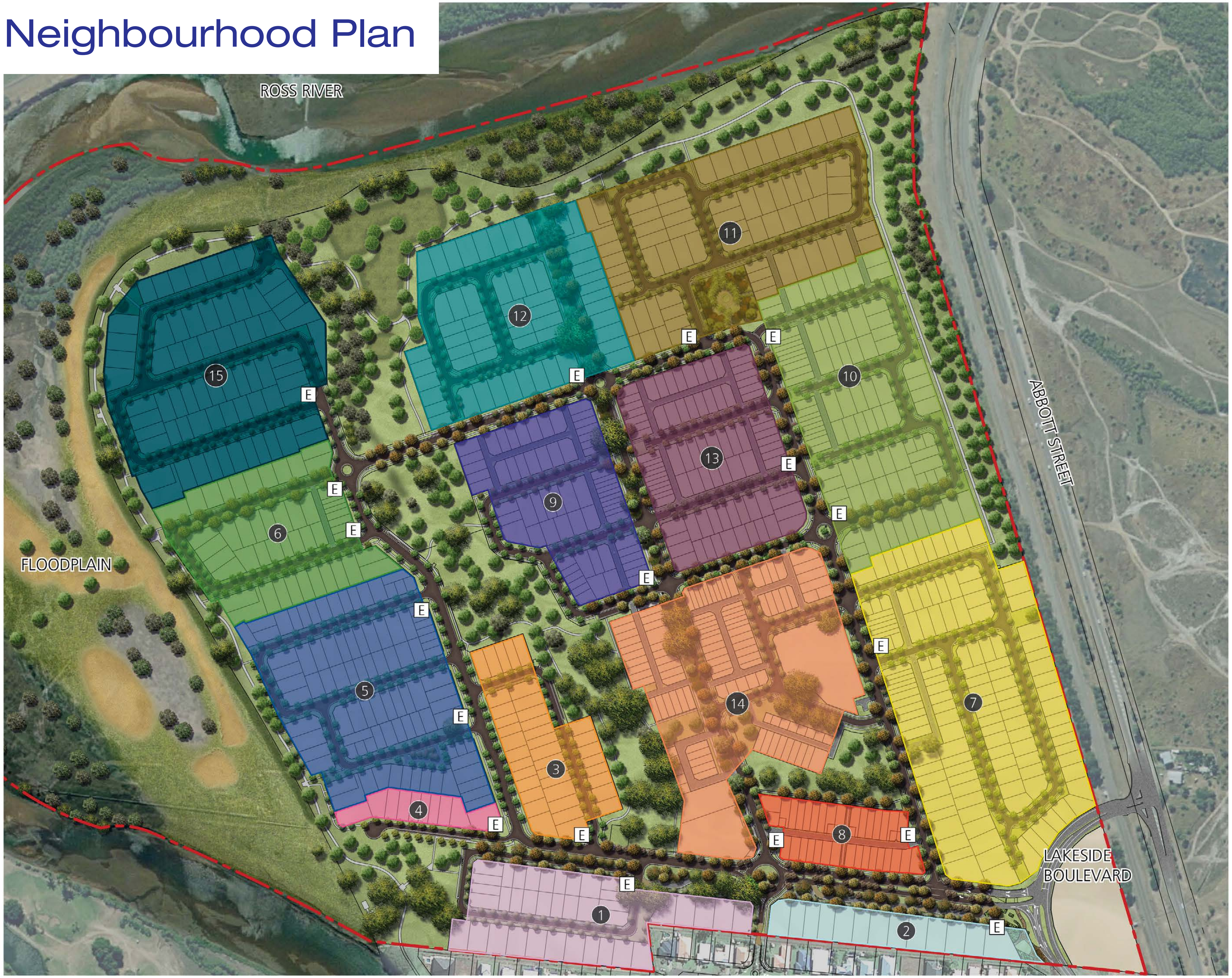
Each neighbourhood is to be named after a prominent female from the Townsville region. Depending upon the era they are from, small patterns may be incorporated into the footpath pavement as subtle visual keys. Other areas may use the 'stock brands' that were used by the Department of Primary Industries on this site, to convey a symbolic connection to the past.

Recognition: Entry to the neighbourhoods is highlighted with a small entry sign that matches the finish of the signs at the entry to The Village (rusted-steel effect with cut-out leaf insignia). The signs will have the name of the neighbourhood, which may include a brief commentary about the person, and will provide visual recognition and association with that particular neighbourhood.





Neighbourhood Plan



Legend

- Neighbourhood 1
- Neighbourhood 2
- Neighbourhood 3
- Neighbourhood 4
- Neighbourhood 5
- Neighbourhood 6
- Neighbourhood 7
- Neighbourhood 8
- Neighbourhood 9
- Neighbourhood 10
- Neighbourhood 11
- Neighbourhood 12
- Neighbourhood 13
- Neighbourhood 14
- Neighbourhood 15
- E Neighbourhood Entry Sign

N

NOT TO SCALE

Neighbourhood Enlargement Plans

With the introduction of neighbourhoods, the estate will develop a sense of ownership and pride in each residential area.

Legend

E Entry Sign

Road Pavement Threshold Treatment

Road Pavement Treatment Plan

Legend

- Open Space
- Commercial / Mixed Land Use
- Primary Vehicular Circulation Route Enhanced Road Pavement Treatment
- Laneways Distinct Road Pavement Treatment
- Road Threshold Treatment
- Proposed Bus Stop Location (Refer to TTM Consulting Traffic Report)

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Wayfinding

The design and arrangement of the open spaces and streetscape areas will help create identifiable, memorable images of the public realm. Clear, distinguishable landmarks, nodes, wayfinding markers, key views and pathways have been considered in the Open Space Master Plan, to ensure a distinct image of The Village is delivered and that the place is easily navigated on foot, on a bike, or in a vehicle.

Entry Landscape:
As people enter the site via Riveredge Boulevard their visual senses are impacted by the curving rustic steel feature walls and large shade trees that are a major landmark of the site. These steel walls are also lit at night from a sustainable power source using LED lighting to give them an ephemeral glow highlighting the silhouetted leaves cut through the steel plate.

Activity Nodes:
Activity nodes, or principal public open spaces, include the following key areas:

- Stage 2 Park
- Memorial Square (Bomb crater)
- Skinny Thomas Park
- RWes Barrett Park
- The Glen (Wetland Riverfront)

Landmarks:
Landmarks are used at the Entry with the revised Feature Entry Walls – rusted curved steel finish with leaf patterns cut through the steel and bold silver lettering and logo displayed in contrast to the rusted surface. Along with ex-ground trees forming a backdrop and canopy to these entry walls they feel harmonious with the landscape and are being used elsewhere in the estate to indicate entry into the site from Fairfield Waters. This may be expanded upon to designate the Village Centre as it becomes a Commercial/retail hub in the future, plus identify residential precincts within the site.

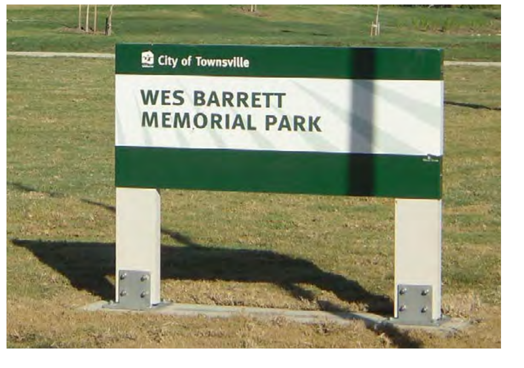
Visual references beyond the site are Mt Stuart and Castle Hill allowing people to easily identify where they are around the site.

Pedestrian and Bicycle Circulation:
The pedestrian and bicycle network is logical and connects all the key open space areas, key destinations (bus stops and commercial / retail precinct) and aligns with the grid road layout along the road edges.

Key Views & Sightlines:
The shared pedestrian / cyclist paths have strong legible connections to ensure people know they are on the main circulation paths through the site. Views along the riverfront areas are left open for the majority to make the most of the river views and views to Mt Stuart & Castle Hill. Holyoak Avenue is aligned on Castle Hill so there are glimpses in-between the Avenue trees before reaching the riverfront and seeing Castle Hill in full. Similar Avenue trees are being planted along Darter Street to establish strong recognition of the main connectors roads.

Palettes:
The hard and soft landscape palettes (planting, pavement, lighting, street furniture, materials and finishes) are similar throughout The Village's public realm. However it is proposed that each of the character zones may use similar materials yet be individual in nature so that they are recognisable as belonging to that zone.

Signage:
The wayfinding strategy would work on similar principles to the palette of materials and finishes, use of standard Townsville City Council signage for the parks however other nodes and zones within the estate may have an individual character.



Integrated Art

Key Principles

Integrated public art can contribute to the vitality of The Village, its character and identity, as well as enhancing the community's sense of place. The EDQ has allocated 5% of the landscape budget to public art for the Oonoonba development.

Key objectives for integrated art, include:

Public art, design, and interpretation elements reflect The Village cultural history, landscape character and valuable natural assets - potential themes include the Ross River, Rain Trees, Indigenous Themes, Agricultural Research, Bomb Crater and local flora/fauna.

Any permanent artworks, signage, interpretive displays, and appropriate infrastructure to be designed and constructed as integral components of the landscape and architectural design. Ensure types of artworks and media are diverse and varied.

TYPES OF PUBLIC ART

'Public art and design' is defined as art and activities that present a creative or interpretive statement in a public facility or space. It may comprise stand alone artworks or may be incorporated into buildings, infrastructure, or open space and can be:

- permanent; eg: Marion Gaemers sculpture "Growth"
- external or internal to any building or place;
- integrated into the design of the built or natural environment or within functional infrastructure;
- literary, visual, acoustic, multi-media, interactive, craft or design;
- decorative, where the primary purpose is to aesthetically enhance an environment or structure;
- iconic, site-specific or stand alone art;
- interpretive art, where the art describes, educates and comments on issues, events or situations.
- commemorative art to recall an event, activity, object or person; and
- ephemeral art, which is intended to be a temporary installation. E.g.: A portion of Strand Ephemera is being displayed in Wes Barrett Park with 7 artists involved, the first extension of this public art festival to date.

Potential themes for interpretive elements and public art include:

- the Ross River
- Rain Trees
- Indigenous Themes
- Agricultural Research
- Bomb Crater
- Flora and fauna

Potential areas / features to include integrated / public art:

1. Entry elements, (refer Masterplan for locations), to generate a sense of arrival in The Village as a destination, establish a recurrent theme that is recognisable throughout.
2. Wayfinding around the site and identifcation of character residential zones and interpretive signage associated with the Wetland area and Ross River.
3. Picnic shelters, or other shade structrures that could have sculptural elements attached or incorporated into there deisgn.
4. Street Furniture - lighting, seating, picnic tables, bbqs, signage poles, drinking fountains, handrails.
5. Walls - retaining walls, freestanding walls, interpretive walls.
6. Play equipment and playground theming.
7. Footpaths, road feature paving, hardstand areas, with printed patterns embossed into the surface.
8. Planting and softscape areas, grass art, the incorporation of rock and timber - natural elements.

Integrated Art

Interpretive Themes

Potential themes for interpretive elements and public art include:

- the Ross River
- Rain Trees
- Indigenous Themes
- Agricultural Research
- Bomb Crater
- Animals associated with site

Potential areas / features to include integrated / public art:

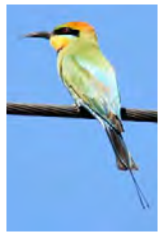
1. Entry elements, (refer Master Plan for locations), to generate a sense of arrival in The Village as a destination.
2. Wayfinding and interpretive signage.
3. Picnic shelters, other shade structrures, lookouts, arbours etc - to reflect tree canopies, to mimic the forms of the structures and built form associated with the research station; e.g. Cattle grid used as an arbour feature.
4. Street Furniture - lighting, seating, picnic tables, bbqs, signage poles, drinking fountains, handrails, bike racks.
5. Walls - retaining walls, freestanding walls, interpretive walls.
6. Integrated feature fence panels
7. Footpaths, road feature paving, hardstand areas.
8. Planting and softscape areas, grass art.















Appendix F – Oonoonba offsetable infrastructure maps

Map 2: Future water offsetable infrastructure

Legend

- Oonoonba Urban Development Area (UDA) boundary
- Water trunk infrastructure (future)
- Water trunk infrastructure (existing)

0 25 50 100 150 200
Metres

Map created at: **A3**
Coordinate System: GCS GDA 1994
Datum: GDA 1994

Trunk infrastructure data supplied by PIE Solutions

Oonoonba UDA Trunk Infrastructure Water

Map produced by the State Development, Infrastructure, Local Government and Planning Spatial Services Unit, 2/03/2021

Queensland Government

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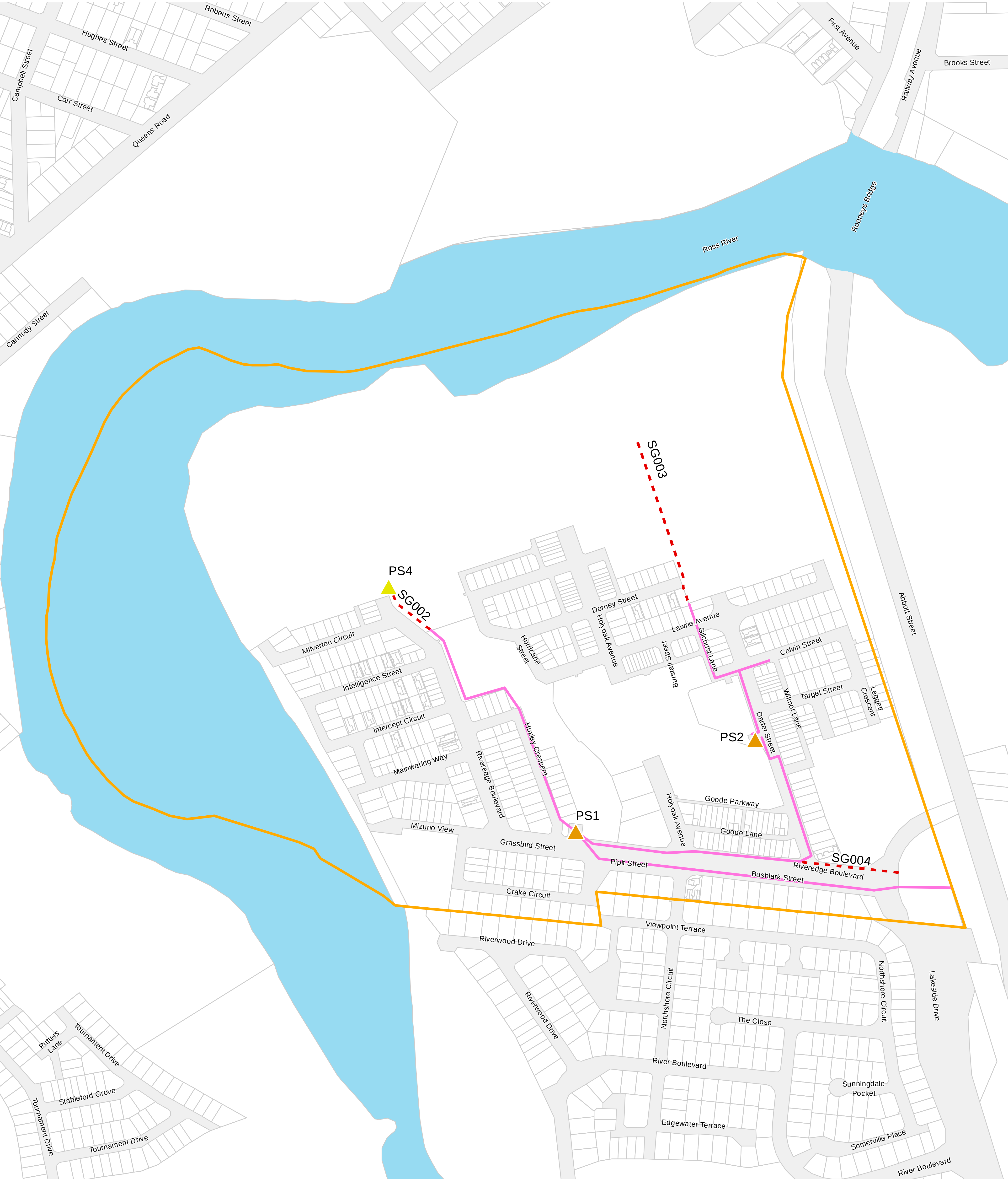
Map 3: Future sewer offsetable infrastructure



Legend

- Oonoonba Urban Development Area (UDA) boundary
- Lift station - trunk infrastructure (future)
- Pump/lift station - trunk infrastructure (existing)
- Sewer trunk infrastructure (future)
- Sewer trunk infrastructure (existing)

Trunk infrastructure data supplied by PIE Solutions

0 25 50 100 150 200
Metres

Map created at: **A3**
Coordinate System: GCS GDA 1994
Datum: GDA 1994

Oonoonba UDA Trunk Infrastructure Sewer

Map produced by the State Development, Infrastructure, Local Government and Planning Spatial Services Unit, 2/03/2021

Queensland Government

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Map 4: Future transport offsetable infrastructure

Legend

- Oonoonba Urban Development Area (UDA) boundary
- Intersection - trunk infrastructure (future)
- Road/active transport/trunk infrastructure (future)
- Road/active transport/trunk infrastructure (existing)

Trunk infrastructure data supplied by PIE Solutions

0 25 50 100 150 200
Metres

Map created at: **A3**
Coordinate System: GCS GDA 1994
Datum: GDA 1994

Oonoonba UDA
Trunk Infrastructure
Road and Active Transport

Map produced by the State Development, Infrastructure, Local Government and Planning Spatial Services Unit, 2/03/2021

Queensland Government

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Map 5: Future park offsetable infrastructure

Economic Development Queensland

Legend

- Oonoonba Urban Development Area (UDA) boundary
- Open space - trunk infrastructure (future)
- Parks - trunk infrastructure (existing)

Trunk infrastructure data supplied by PIE Solutions

0 25 50 100 150 200

Metres

Map created at: **A3**

Coordinate System: GCS GDA 1994

Datum: GDA 1994

Oonoonba UDA Trunk Infrastructure Parks and Open Space

Map produced by the State Development, Infrastructure, Local Government and Planning Spatial Services Unit, 2/03/2021

Queensland Government

Path: S:\Projects\EDQ\Oonoonba\20200207\mxd\20200212_Oonoonba_PDA_TrunkInf_Parks_A3P.mxd

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