

Appendix L

Transport Impact Assessment

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Alkimos Central Precinct Plan

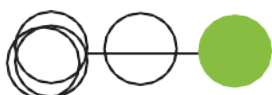
Transport Impact Assessment

Prepared by: GTA Consultants (WA) Pty Ltd for Development WA c/-Cossill & Webley

on 23/11/21

Reference: W148892

Issue #: C



GTAconsultants

Alkimos Central Precinct Plan

Transport Impact Assessment

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A-Dr	19/06/20	Draft	Angela Zhang Kieran Mann	Trish Robertson Aaron MacNish	Tanya Moran	-
B-Dr	28/07/20	Draft updated with Project Team Comments	Angela Zhang Kieran Mann Trish Robertson	Aaron MacNish	Tanya Moran	-
A-Final	10/08/20	Rev A - Final	Angela Zhang Kieran Mann Trish Robertson	Aaron MacNish	Tanya Moran	-
B-Final	24/06/21	Rev B – Revised SP with Romeo Road realignment	Aaron MacNish William Finlay	Aaron MacNish	Tanya Moran	
C-Dr	21/09/21	Rev C Draft – minor text updates	Aaron MacNish	Tanya Moran	Tanya Moran	
C-Final	23/11/21	Rev C – updated figures to latest masterplan	Aaron MacNish	Tanya Moran	Tanya Moran	

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1. INTRODUCTION

01

1.1. Background & Proposal

The Alkimos Central Precinct Plan, also known as Alkimos Central, aims to be an employment focus and social hub with the requisite key services for the Alkimos-Eglinton District and its anticipated 57,000 residents over the next 25 to 30 years.

Alkimos Central is identified as a Secondary Centre in the Department of Planning, Lands and Heritage's policy documents for metropolitan Perth. Alkimos Central will be the major centre in the 25km corridor of coastal development between the Strategic Regional Centres of Joondalup and Yanchep.

The Alkimos City Centre Activity Centre Plan (Alkimos ACP) was commenced in August 2013 and was approved by the Western Australian Planning Commission (WAPC) in August 2018. Given the changing retail landscape and the time that has lapsed since the Alkimos ACP was initially designed, an independent design review of the Precinct Plan and Masterplan has been undertaken, and subsequently a number of changes have been made.

The development potential modelled within this Alkimos Central Precinct Plan (ACPP) is estimated to include:

- 2,457 dwellings by year 2051
- 106,875sqm of commercial office floor space
- 101,086sqm of retail, predominantly within the Alkimos Retail Precinct located in the western portion of the Precinct Plan
- 76,257sqm of service commercial
- Railway and bus interchange
- Health, educational, civic, community and recreational facilities.

A context plan for the ACPP and its surrounds is shown in Figure 1.1.

1.2. Purpose of this Report

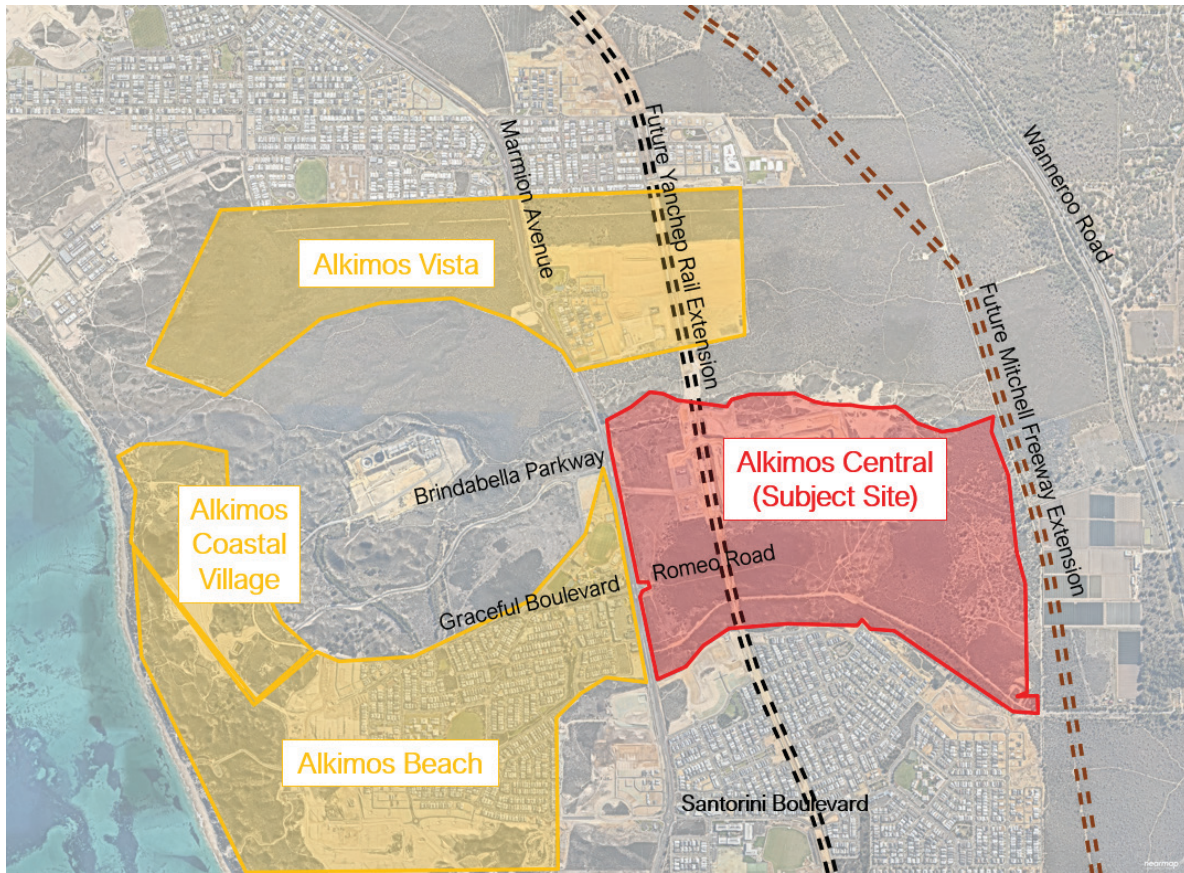
The *Western Australian Planning Commission Transport Assessment Guidelines (WAPC Guidelines)* require Structure Plans to be supported by a Transport Impact Assessment (TIA) and given the revised Precinct Plan, a fresh TIA has been conducted.

In accordance with the WAPC Guidelines, this TIA outlines:

- Existing transport conditions proximate to the site
- The adequacy of the proposed site layout
- The traffic generating characteristics of the proposed development
- The anticipated impact of the proposed development on the surrounding road network.

Volume 2 of the WAPC Guidelines provides direction on the preparation of a TIA specifically relating to Planning Schemes, Structure Plans and Activity Centre Plans. The WAPC Guidelines identify that a TIA for a Structure Plan is to provide a broad-brush assessment addressing key transport related issues, consistent with the level of planning ordinarily undertaken during this stage of development.

Figure 1.1: ACPP Context Plan



(PhotoMap courtesy of NearMap Pty Ltd)

1.3. Summary of Key Issues

From a traffic and transport point of view, the following key issues are of relevance to this TIA:

- As Alkimos Central is built around the future Alkimos Train Station and Bus Transfer Station, it is vital to provide high amenity pedestrian and cycling links both internally and from surrounding developments into Alkimos Central.
 - Marmion Avenue / Brindabella Parkway
 - Marmion Avenue / Romeo Road
 - Romeo Road / Benenden Avenue
 - Romeo Road / NS 1
 - Romeo Road / NS 2.

- The above is also the case for external through traffic along Marmion Avenue adjacent to the Precinct Plan, where traffic volumes expected to use this link are very high up until 2031, prior to the Mitchell Freeway planned extension north, past Romeo Road.
- The reduced levels of service for intersections accessing the Precinct Plan area are primarily due to the very high volumes of through traffic on the regional road network of Romeo Road and Marmion Avenue as these roads are effectively the end of the freeway. It is anticipated that as the centre matures changes in trip behaviour to utilise the excellent public transport offering combined with the extension of the freeway north through to Yanchep will provide an acceptable level of service to these intersections accessing Alkimos Central.

1.4. References

In preparing this report, reference has been made to the following:

- Concept Masterplan for the proposed development (Drawing No. 12.4, Project No. P0008935), prepared by Urbis, dated 07.10.2021, provided at Appendix A
- City of Wanneroo District Planning Scheme No. 2
- Liveable Neighbourhoods Guidelines
- WAPC Transport Assessment Guidelines for Development: Volume 2 – Planning Schemes, Structure Plans and Activity Centre Plans
- various technical data and other documents as referenced in the context of this report.

A number of previous studies have also been reviewed in the preparation of this TIA. These include:

- Alkimos City Centre Plan: Traffic and Movement Network (Bruce Aulabaugh Traffic Engineering & Transport Planning, Nov 2012 and rev 2, 9 May 2013)
- Alkimos City Centre Activity Centre Structure Plan: Strategic Transport and Public Transport Planning Report (Jacobs, 14 December 2012)
- Alkimos City Centre and Central Alkimos Memorandum (Jacobs, 27 October 2015).

2. PRECINCT PLAN OUTLINE

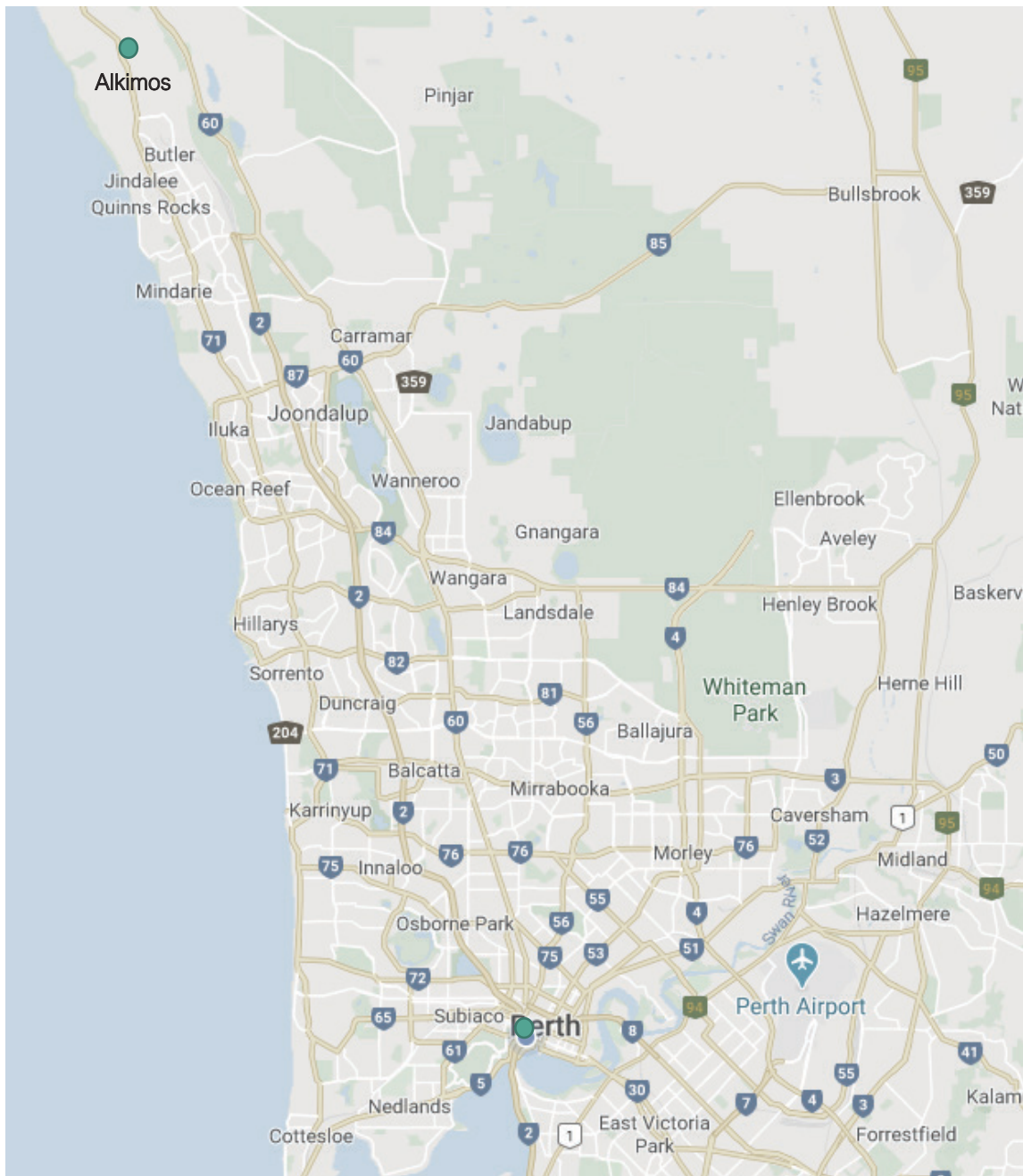
02

2.1. Regional Context

Alkimos Central is identified as a Secondary Centre in the Department of Planning, Lands and Heritage’s policy documents for metropolitan Perth. Alkimos Central will be the major centre in the 25km corridor of coastal development between the Strategic Regional Centres of Joondalup and Yanchep.

The subject site is located in the suburb of Alkimos, within the City of Wanneroo. The site is approximately 40km north of the Perth CBD.

Figure 2.1: Location Map



(PhotoMap courtesy of GoogleMaps)

2.2. Proposed Land Uses

The development potential modelled within the ACPP is estimated to include:

- 2,457 dwellings by year 2051
- 106,875sqm of commercial office floor space
- 101,086sqm of retail, predominantly within the Alkimos Retail Precinct
- 76,257sqm of service commercial
- Railway and bus interchange
- Health, educational, civic, community and recreational facilities.

The key land use differences between this ACPP and the originally approved 2018 Structure Plan are defined in Table 2.1.

Table 2.1: Comparison of Development Yields

Structure Plan / Precinct Plan	Residential (Dwellings)	Mixed Use (office) (m ² GFA)	Retail (m ² GLAR)	Bulky Good / Service Commercial (m ² NLA)	Non-tertiary Education	TAFE (m ² GFA)	Aquatic Centre + Other uses	Park 'n' Ride
2018 Structure Plan	3,335	120,500	67,000	60,000	4.5ha site	-	-	
2021 Precinct Plan	2,457	106,875 <ul style="list-style-type: none"> • OF (office) = 106,875 	101,086 <ul style="list-style-type: none"> • SHP (shop/retail) = 72,362 • RET (other retail) = 28,725 	76,257 <ul style="list-style-type: none"> • MAN (manufacturing) = 17,211 • STO (storage/distribution) = 26,983 • SER (service industry) = 32,063 	4.0ha site	31,394	35,000	660 bays
Difference	-752	-13,625	+34,086	+16,257	-		-	-

Note: Floor areas are at the time of writing this TIA.

As can be seen, the number of residential dwellings is reducing by approximately 750 dwellings when comparing full development scenarios between the two plans. It is worth noting that the original 2018 Structure Plan forecasted full build out around the year 2060, whereas the ACPP forecasts full build out closer to year 2051.

Of note, the construction of the Yanchep Rail Extension has now commenced as part of METRONET providing confidence that Alkimos Central will have a major public transport hub within the centre to influence sustainable travel behaviour from Day 1 of opening.

2.3. Attractors or Generators of Traffic (non-residential)

There are numerous supporting facilities proposed within the ACPP which are considered attractors or generators of traffic, such as:

- Education (for the purposes of this proposal assumed as Primary School and TAFE)

- Sport and Recreation Centre
- Commercial (Retail and Entertainment)
- Mixed Use Development
- Service Commercial.

2.4. Specific Transport Issues

The development of Alkimos Central is projected to occur over the course of 30 years. This is a relatively long timeframe and as such, it is a challenge to provide the necessary infrastructure for ultimate development to support the vehicle trips expected based on existing travel mode preference of today's users, whilst balancing the aspirational goals of increased public transport, walking, and cycling mode shares and the rapid technological advancements effecting travel behaviours for the future.

There has been a conscious decision to design the transport network such that it continues to encourage alternative and sustainable modes of transport through providing priority to pedestrian and cycling safety and amenity, as well as a permeable and legible bus access. These design outcomes have been supplemented with allowing some measure of private motor vehicle congestion at key locations within the city centre, to further aid in driving the required mode share shift in future years.

In support of the reduction in private motor vehicle trips, the target modal splits for Alkimos Central are:

- Car Driver 45%
- Car Passenger 19%
- Public Transport 10%
- Cycling 6%
- Walking 20%.

These modal splits are for an ultimate development scenario and have previously been approved by the City of Wanneroo and the Department of Planning, Lands and Heritage as included in the 2014 Integrated Parking Strategy for Alkimos Central. It is expected that in the initial stages of development there will likely be a reliance on car vehicle trips until a local population is established. The benefit is that Alkimos Central will now have an operational train station and bus station from day one opening allowing public transport to establish itself as a valid trip pattern for trips to and from Alkimos.

3. EXISTING SITUATION

03

3.1. Subject Site

The City of Wanneroo's District Planning Scheme No. 2 (DPS 2) identifies that the subject site is zoned as 'Centre', and under the Metropolitan Region Scheme (MRS) it is zoned 'Central City Area'. The surrounding land uses include a mix of zones including Residential to the south, and Parks and Recreation to the north.

The subject site is bound by Marmion Avenue (an Other Regional Road, now under the care and control of Main Roads WA) to the west, the Mitchell Freeway Primary Regional Road Reserve to the east and the Romeo Road Other Regional Road Reserve along the southern boundary.

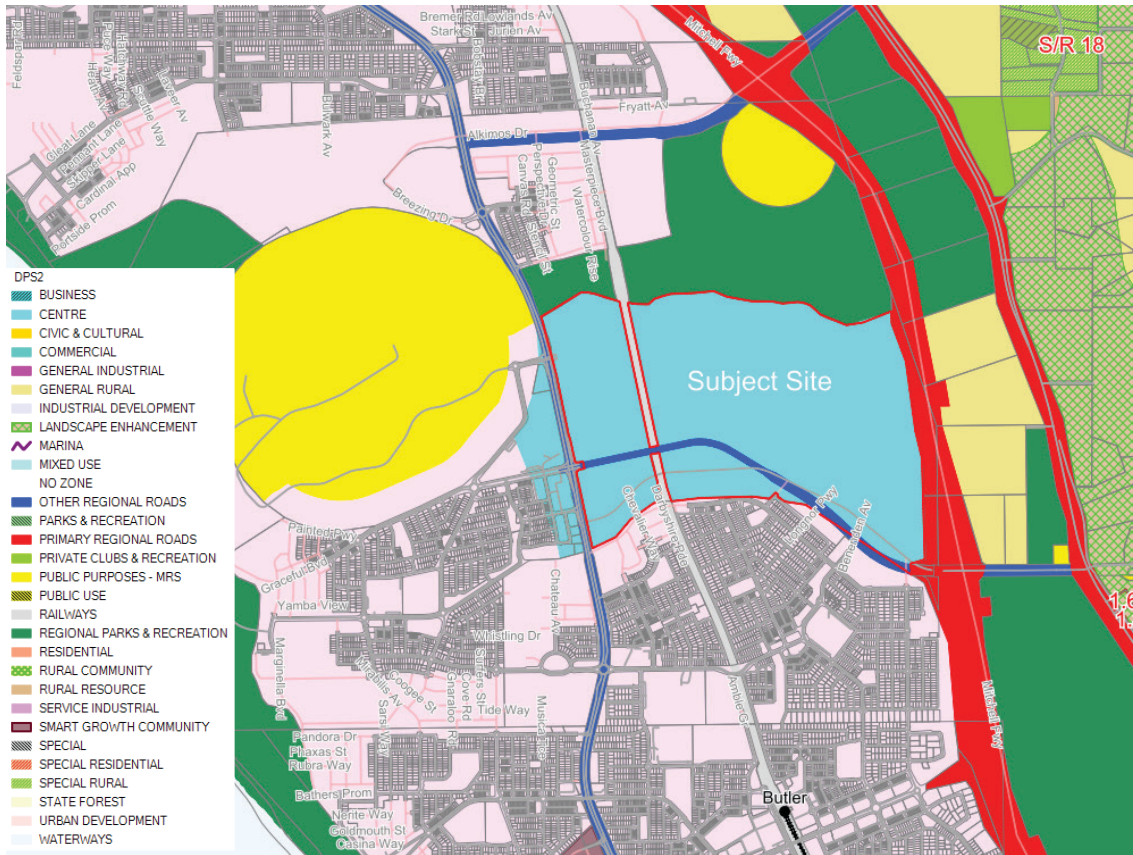
The location of the subject site and the surrounding environs is shown in Figure 3.1. The land zoning is shown in Figure 3.2.

Figure 3.1: Subject Site and its Environs



(PhotoMap courtesy of NearMap Pty Ltd)

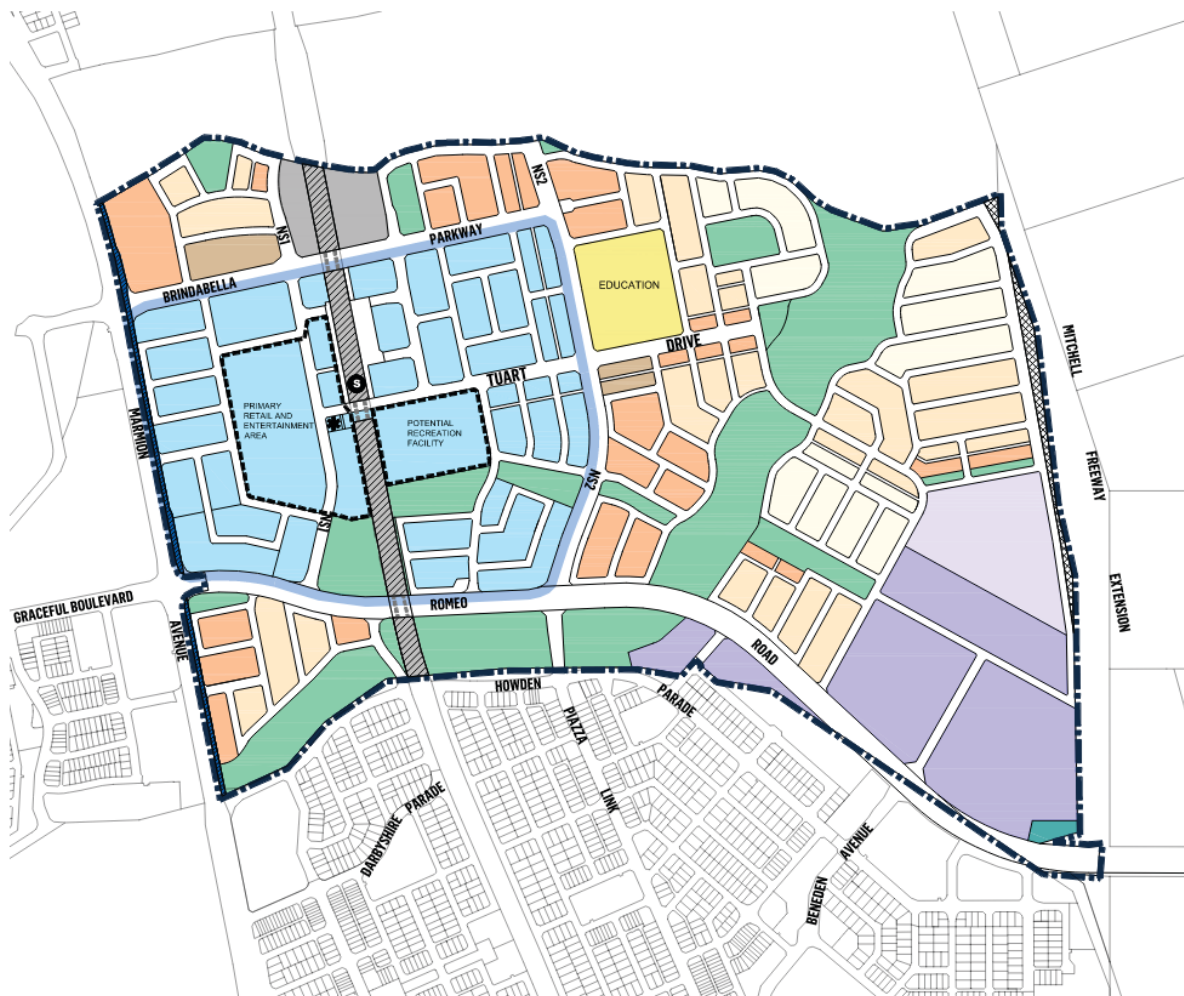
Figure 3.2: Land Zoning Map



(Reproduced from City of Wanneroo Intramaps)

The full proposed ACPP is shown below in Figure 3.3 for context.

Figure 3.3: Proposed ACPP A



Source: Alkimos Central Precinct Plan, Urbis 26/10/2021

3.2. Existing Movement Network

3.2.1. Roads

The wider Alkimos area is currently being developed and therefore development is occurring at different stages. Currently, the land immediately to the north is reserved for Parks and Recreation, limiting the potential for development. However, much of the surrounding area is zoned for Urban Development. The higher order road network has been established with reserves in place. There is also a railway reserve which runs north / south through the subject site. The land is currently vacant, with the only established road being Marmion Avenue.

Marmion Avenue

Marmion Avenue runs in a north / south alignment to the west of the subject site. It is currently the key access point for the development. It is identified as an “Other Regional Road” under the Metropolitan Region Scheme (MRS). It is identified as a Primary Distributor Road with a posted speed limit of 80km/h as per the

Main Roads Western Australia (Main Roads WA) Functional Road Hierarchy and Road Information Mapping System.

Marmion Avenue has recently been duplicated to a four-lane dual carriageway up to Yanchep Beach Road and currently carries over 23,000 vehicles per day is under the care and control of Main Roads WA as a state road.

3.2.2. Pedestrian and Cyclist Network

Existing pedestrian and cyclist access to the subject site is currently limited as the area is yet to be developed. However, there is a newly constructed Shared Path adjacent to Marmion Avenue which was provided as part of the recent duplication. A Principal Shared Path will also be constructed as part of the Mitchell Freeway Extension to the east of the subject site.

3.2.3. Public Transport

There are currently two bus services which operate along Marmion Avenue (Route 490 and 491). The closest bus stops are located to the north and south of Sanderling Street on Marmion Avenue.

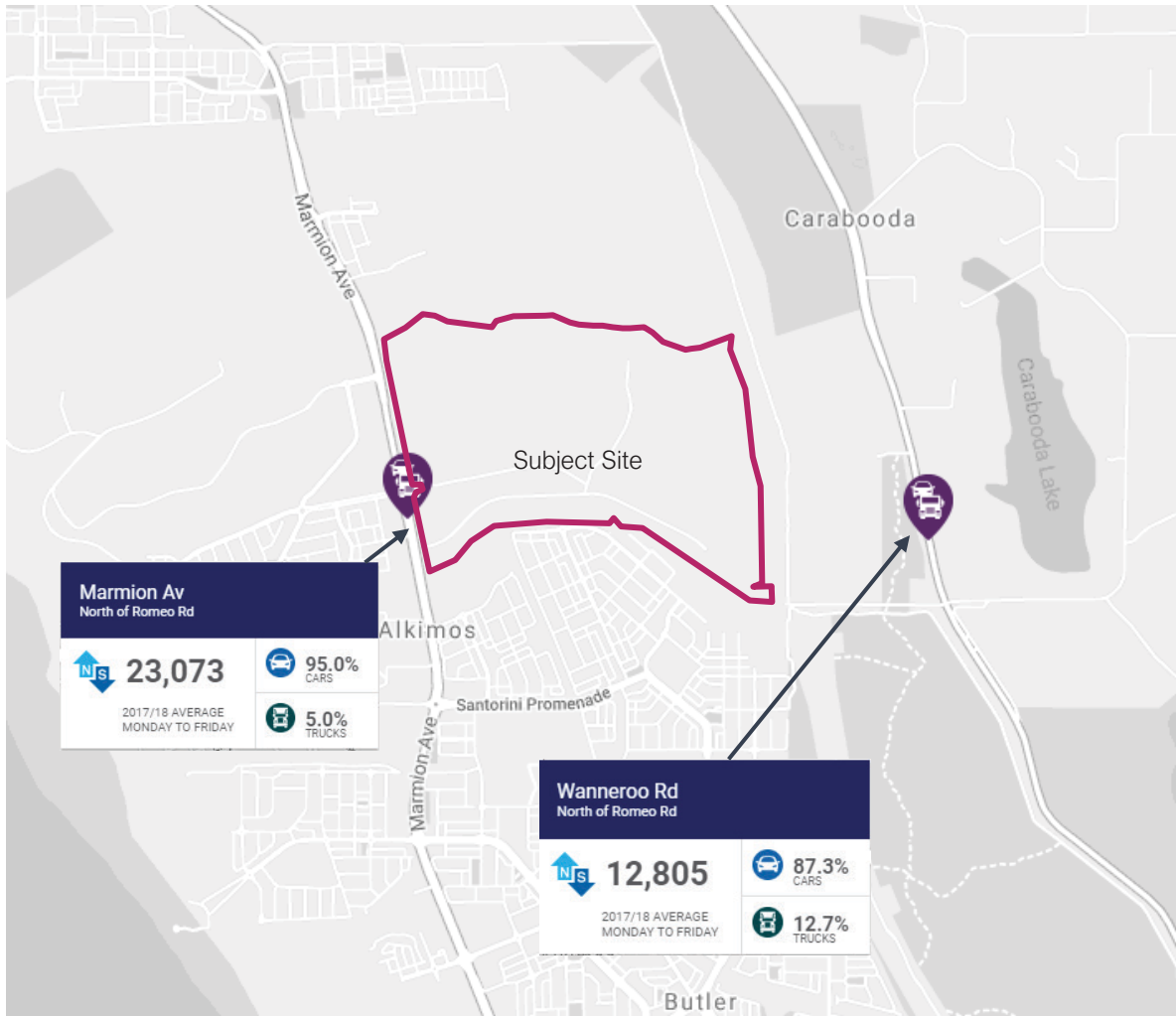
3.3. Existing Road Network (Within 2km)

Currently there is limited road network in the ACPP, given that the subject site has not been developed, and the landlocked nature of the area. To the north, there is a small but increasing amount of residential development as part of Alkimos Vista, followed by another residential development north of that known as Shorehaven. To the south is the Trinity Estate which connects to the Butler Town Centre. The Water Corporation Wastewater Treatment plant encompasses the land immediately to the west with the residential development of Alkimos Beach located southwest of Alkimos Central. To the east is the Mitchell Freeway Road Reserve, which further limits the subject site's direct accessibility.

3.4. Traffic Counts (within 2km)

Traffic counts obtained from the Main Roads WA Traffic Map for roads proximate to the subject site are shown in Figure 3.4.

Figure 3.4: Location of Counters



Source: Main Roads Traffic Map

4. PROPOSED TRANSPORT NETWORKS

04

4.1. Changes to Existing Road Network

With the development of the northern suburbs, several existing key roads are being upgraded. These upgrades will alter the future transport movement in the area. Descriptions of the proposed road upgrades to existing roads are set out below. This section specifically discusses existing roads. Romeo Road is discussed later in the next section 4.2 Proposed Roads.

Mitchell Freeway

Mitchell Freeway currently terminates at Hester Avenue in Ridgewood, 5.6km south of the subject site. Mitchell Freeway is a Main Roads WA owned State Road and is identified as a Primary Distributor Road in the Main Roads WA Functional Road Hierarchy and Road Information Mapping System.

Main Roads WA are currently planning for the extension of Mitchell Freeway, with a 5.6km extension from Hester Avenue to Romeo Road, with two traffic lanes in each direction and provision for future widening. A new Principal Shared Path for cyclists and pedestrians is also proposed on the western side of the freeway in this section.

In addition to this, Romeo Road will be constructed between Marmion Avenue and Wanneroo Road as part of Main Roads WA's freeway extension.

Works are commencing in 2021 and is anticipated to be completed by 2023.

Wanneroo Road

Wanneroo Road is a State Road and a Primary Distributor Road. However, as part of the Mitchell Freeway extension, Romeo Road will connect the subject site to Wanneroo Road. Wanneroo Road will also be duplicated from Romeo Road north to Trian Road.

Marmion Avenue

Marmion Avenue has recently been upgraded from 2-lanes to a 4-lane dual carriageway adjacent to the subject site. A new 3-way signalised intersection has been constructed at Graceful Boulevard, to be converted to a 4-way intersection at the completion of Romeo Road. A future 4-way signalised intersection is also planned at Brindabella Parkway/Marmion Avenue.

4.2. Proposed Road Hierarchy, Road Reserve Widths and Speed Limits

The transport and movement network within Alkimos Central is proposed to consist of the following streets and roads and is shown in Figure 4.1:

- **Marmion Avenue**
 - Ultimate 6 lane divided arterial road adjacent to Alkimos Central.
 - Other Regional Road in the MRS
 - Primary Distributor function (Currently 80km/h posted speed limit with potential for this to be reduced as built form increases and the Precinct Plan matures).
- **Romeo Road**
 - Ultimate 4 lane divided arterial (44m – 49m road reserve)
 - Other Regional Road in the MRS

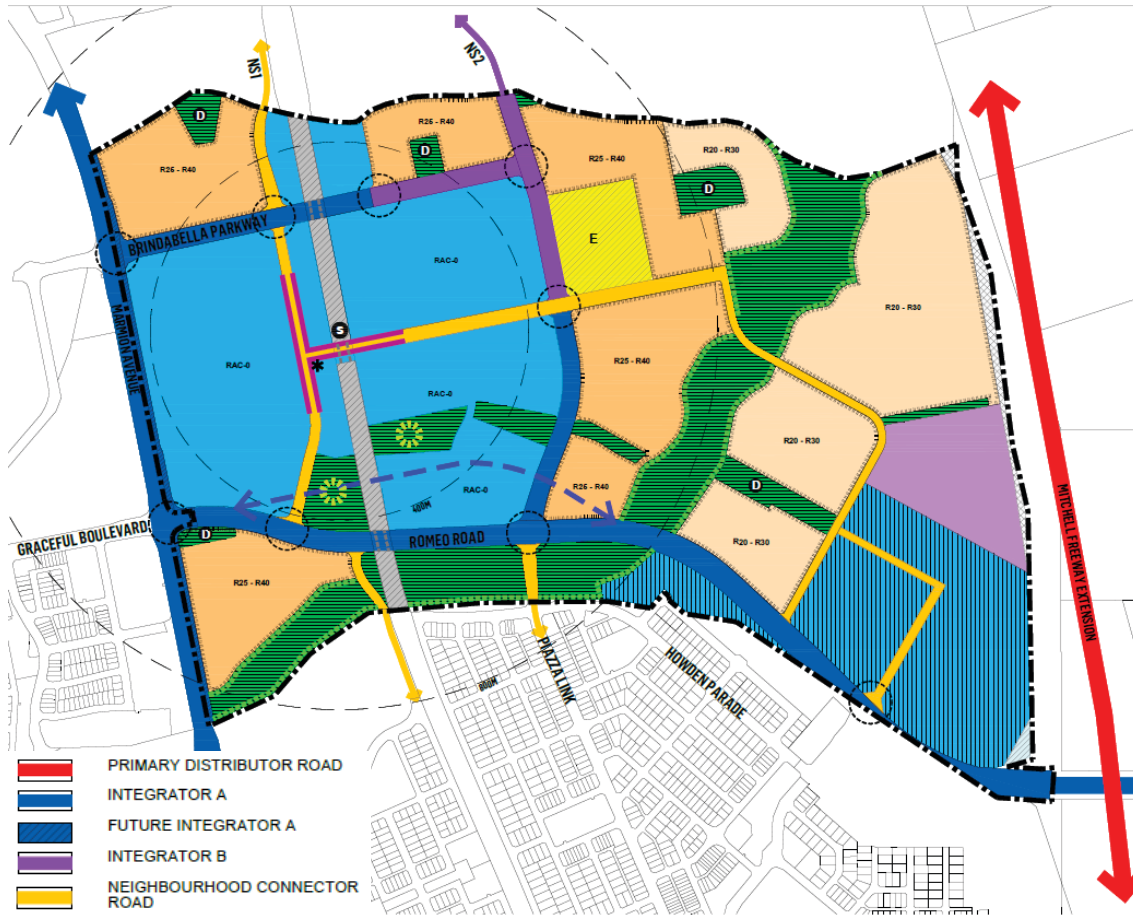
- Primary Distributor function (Currently 80km/h posted speed limit with potential for this to be reduced as built form increases and the Precinct Plan matures).
- **Brindabella Parkway**
 - Ultimate 4 lane divided arterial west of NS1 (40m road reserve)
 - Integrator A function west of NS1 (60km/hr posted speed limit)
 - 2 lane divided arterial east of 'North South Bus Road' (24m road reserve)
 - Integrator B function east of NS1 (50km/hr default speed limit).
- **NS1 – Main Street**
 - Main Street typology prioritising pedestrian movements particularly east west across the corridor between the train station and the retail precinct.
 - Limit 'through vehicle' movements adjacent to the station, discouraging erroneous vehicles trips with raised intersections, alternative pavement treatments and 40km/h posted speed limit.
- **NS1 – Except Main Street**
 - Ultimate 2 lane divided street (22m road reserve)
 - Neighbourhood Connector function enabling access to the city centre.
- **NS2**
 - Ultimate 4 lane divided arterial south of Tuart Drive (36m road reserve)
 - Integrator A function south of Tuart Drive
 - 2 lane divided minor arterial north of Tuart Drive (24m road reserve)
 - Integrator B function north of Tuart Drive (50km/hr default speed limit).
- **Tuart Drive**
 - 2 lanes minor arterial adjacent to the train station (20m road reserve)
 - Neighbourhood Connector function (40km/hr posted speed limit)
 - 2 lane divided minor arterial east of the train station (30m road reserve)
 - Neighbourhood Connector function (50km/hr default speed limit).

The remainder of the local road network will consist of Access Street (A/B/C/D) and laneways as required with road reserves between 15 – 17m and subject to the default built up speed limit of 50km/h. As the Marmion Avenue and Romeo Road corridors mature the currently proposed posted speed limit of 80km/h may be investigated for reduction to 60km/hr or similar through a built-up urban environment.

The proposed road layout and hierarchy as per Liveable Neighbourhoods (2009) is found at Figure 4.1 and the discussion and analysis around the ultimate road volumes are in Section 6.

PROPOSED TRANSPORT NETWORKS

Figure 4.1: Internal Road Layout and Proposed Road Hierarchy – Ultimate



Source: Alkimos Central Precinct Plan, Urbis, 2021

4.3. Proposed Road Access Strategy

Direct lot access is to be provided by Neighbourhood Connector Roads or lower. Due to their proposed volumes exceeding 500 vehicles per hour there is no direct lot access proposed on Romeo Road, Marmion Avenue, Brindabella Parkway or NS2.

NS1 is being designed and considered as a Main Street style development. As such, there will be limited direct lot access to NS1 for those lots on the western edge of the rail reserve with no alternative access and these access points should be in the form of shared accesses where possible. Vehicle access to and from the retail core (between Marmion Avenue and NS1) will be supported by a lower order road network, leaving NS1 with a focus on pedestrian activity, safety, and amenity.

Marmion Avenue and Romeo Road are both through-traffic carrying road barriers to the Alkimos Central Precinct area. As these roads are both expected to function as busy 4-lane dual carriageway even in the short to medium term (+10years) it is important for the Precinct Plan to consider access from and across these roads, for pedestrians, cyclists and vehicle users. Access onto and across Marmion Avenue from the ACPP is largely focused on two signal-controlled intersections at the northern and southern extent of the precinct intersecting with Brindabella Parkway in the north and Romeo Road in the south. These signalised intersections will provide crossing points for pedestrians and cyclists and will form the main connection for the

Precinct's vehicular traffic accessing Marmion Avenue. In addition to the two signalised intersections at Marmion Avenue there is a mid-block left-in-left-out intersection on the southbound carriageway of Marmion Avenue adding additional permeability for local trips into and out of the ACPP.

Crossing of Romeo Road will largely be concentrated as two (proposed) signalised intersections at NS2 and Benenden Avenue. At the time of writing this impact assessment the intersection of NS2 / Romeo Road and Benenden Avenue / Romeo Road have both received Gateway 1 endorsement for traffic signals from *MRWA Network Operations Directorate*, with Benenden Avenue / Romeo Road progressing through Gateway 2 and 3 approvals at present.

In addition to the two signalised intersections, there are some other key access points worth noting along Romeo Road. All minor intersections along Romeo Road are proposed to function as Left-In-Left-Out except for the following intersections:

- NS1 / Romeo Road: Right in, left in left out
- Darbyshire (NS3) / Romeo Road: Right in, left in left out
- Neighbourhood Connector (unnamed) / Romeo Road: Right in, left in left out.

The proposed right-in movements are subject to detailed design and are progressing at various stages. The right-in movements at NS1 and the unnamed neighbourhood connector both have conditional support from the City of Wanneroo at the time of writing this TIA. The proposed right-in movement onto Darbyshire Parade represents a logical movement pattern, although implementation of this right-in is largely dependent on future traffic volumes along Romeo Road and detailed design in coordination with the intersection design of NS1 / Romeo Road.

4.4. Intersection Controls

Intersection controls within Alkimos Central have been designed with due consideration of the design traffic volumes as detailed in Section 6 and proposed road function as detailed in Section 4.2.

Intersections which are expected to cater to higher volumes of traffic are proposed to be signalised or roundabouts as indicated in Figure 4.2. Minor intersections are proposed to be priority controlled, with further detail to be provided at individual development application stages for each subdivision.

Current MRWA endorsements for signalised intersections within the ACPP include:

- Marmion Avenue / Brindabella Parkway (Gateway 2 endorsement)
- Marmion Avenue / Romeo Road (Gateway 2 endorsement)
- Romeo Road / NS2 (Gateway 1 endorsement)
- Romeo Road / Benenden Avenue (Gateway 1 endorsement).

There are two other proposed signalised intersections within the ACPP that have not yet had an application for endorsement from MRWA, those being at the intersections of NS1 / Brindabella Parkway and Brindabella Parkway / Bus Station Access Road. The need for these intersections to be signalised is not expected to be until at least +5 after the opening of the ACPP and therefore outside of the endorsement lifetime (2 years) for signalised intersections. It is expected that these intersections will undergo the relevant assessment and endorsement process during subsequent stages of subdivision when the timing falls into the endorsement lifetime for the progressive land use.

PROPOSED TRANSPORT NETWORKS

Figure 4.2: Intersection Controls (refer to current endorsement vs future endorsement discussion above)



Source: ACPP Movement Network Plan, Urbis, 07.10.21

4.5. Pedestrian / Cycle Networks and Crossing Facilities

4.5.1. Pedestrian / Cycling Network

On April 27, 2016, WA's laws were changed to allow cyclists of all ages to use footpaths, unless otherwise signed. The amendment to the *Road Traffic Code 2000* brought WA's bicycle laws into line with the rest of Australia, making it legal for parents to cycle alongside their children on footpaths, improving safety especially for vulnerable road users.

The Precinct Plan has been designed in accordance with *Liveable Neighbourhoods* and is cognisant of achieving walkable catchments with high cycling and pedestrian amenity. The proposed networks of paths within the Precinct Plan area will provide an excellent level of accessibility and permeability for pedestrians and cyclists.

The proposed Precinct Plan includes the provision of footpaths along every street. Additionally, it includes the provision of shared paths along the following roads:

- NS1
- NS2
- Brindabella Parkway
- Tuart Drive
- Romeo Road.

PROPOSED TRANSPORT NETWORKS

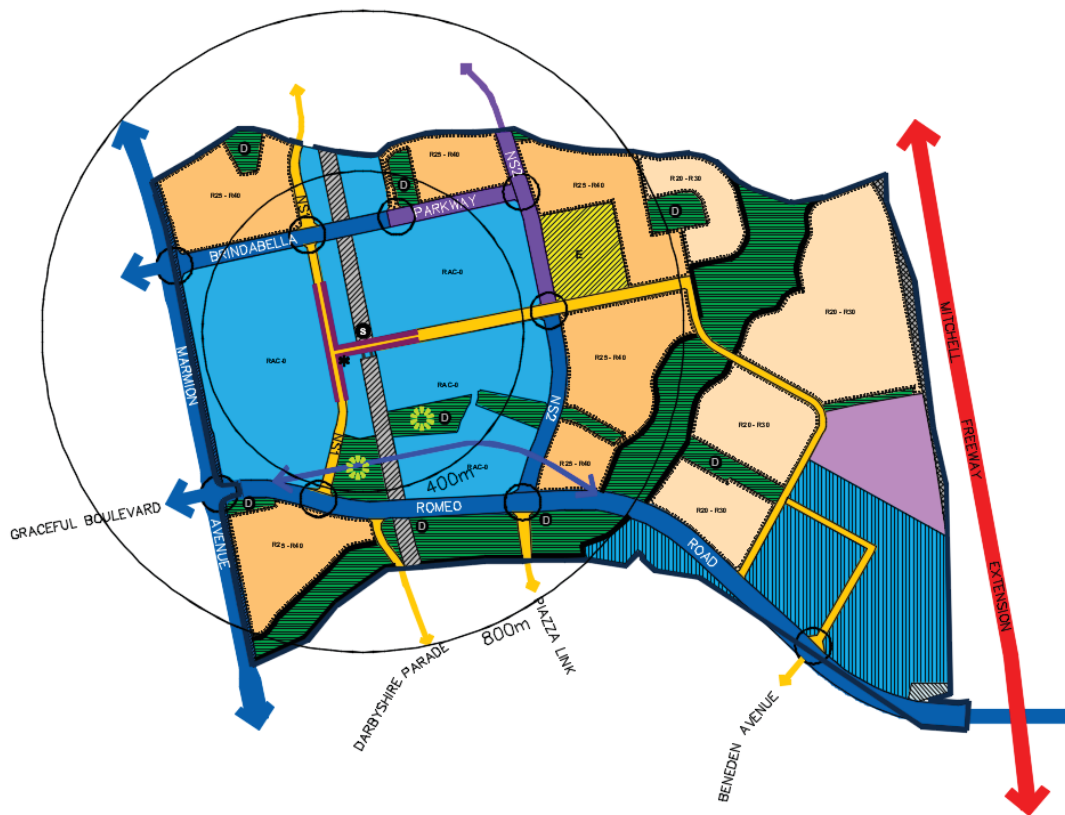
4.5.2. Station Catchment Analysis

The Alkimos Train Station is located adjacent to several higher density land uses such as the retail, office space, school, and recreational facility. Access to the station is to be supported via an extensive active transport network.

Analysis has been completed to determine the 400m and 800m walking catchment for the station. This analysis indicates that all higher density uses are contained within a 400m and 800m walking catchment.

The analysis map is contained in Figure 4.3.

Figure 4.3: Station Walkability Catchment (400m and 800m)



Source: Development WA, 2021

4.6. Public Transport Routes

The proposed Yanchep Rail Extension is a 14.5km rail line proposed by the Western Australian government connecting the existing Butler Station to Yanchep to the north of the site. This project has commenced construction and is expected to be completed by 2022 with a station proposed at Alkimos located within the Precinct Plan. Additional stations are proposed at Yanchep and Eglinton north of the proposed Alkimos Station.

A map of the proposed Yanchep Rail Extension is contained in Figure 4.4.

Figure 4.4: Yanchep Rail Extension Map



Source: METRONET Yanchep Rail Extension, July 2018

To service the proposed development and provide connectivity to the proposed train station it is expected that several feeder bus routes will run radially to the station from surrounding suburbs. Preliminary information has been provided by the PTA for future bus services that will service Alkimos Central. Information provided by PTA indicates the suburbs serviced and their general route of travel. However, the route utilised within Alkimos Central has not been finalised.

As discussed above the design of the NS1 – Main Street prioritises pedestrian movements over vehicle movements. There are also several street alignments that intersect with NS1 that have fixed locations due to adjoining lot depths and minimum developable areas. The design of NS1 has tight turn radii and narrow traffic lanes which prioritises safer pedestrian movements and therefore does not result in a suitable environment as a bus corridor.

This restriction of vehicles on NS1 is further supported by the requirement for the intersection of NS1 and Romeo Road which due to the proximity to Marmion Avenue is limited to a Left in – left out – right in configuration and does not allow a right-out vehicle movement.

The road network planning that has been undertaken for the ACPD supports bus access to the station via Marmion Avenue, along Brindabella Parkway then entering the station through the proposed eastern access (the same access used by all other bus services to the eastern side of the rail). Consistent with the Transport Impact Assessment undertaken for the Alkimos Train Station (NEWest Alliance, Rev C 25-Aug-2021) there is provision for a left-in only bus movement into the bus station from the northern portion of NS1 before the

PROPOSED TRANSPORT NETWORKS

pedestrian treatments. NEWest have confirmed that the proposed bus movements from NS1 are limited to left-in movements only with all other entry and exit movements to occur on the eastern side of the rail line. The proposed routes in and out of the bus station are shown in Figure 4.5.

It is acknowledged that this does result in marginally longer trips for the 480, 482 and STS services (south-west quadrant). However, with this being so minor, it should not adversely impact the attractiveness of the uses of buses as a viable mode to/from the Alkimos Train Station and surrounds, particularly as there is no planned bus stop opportunities between the Station and the current stops on Graceful Boulevard (482 and STS) Given this, it is considered acceptable in the context of achieving the 'people and place' focus that METRONET is advocating in proximity to stations.

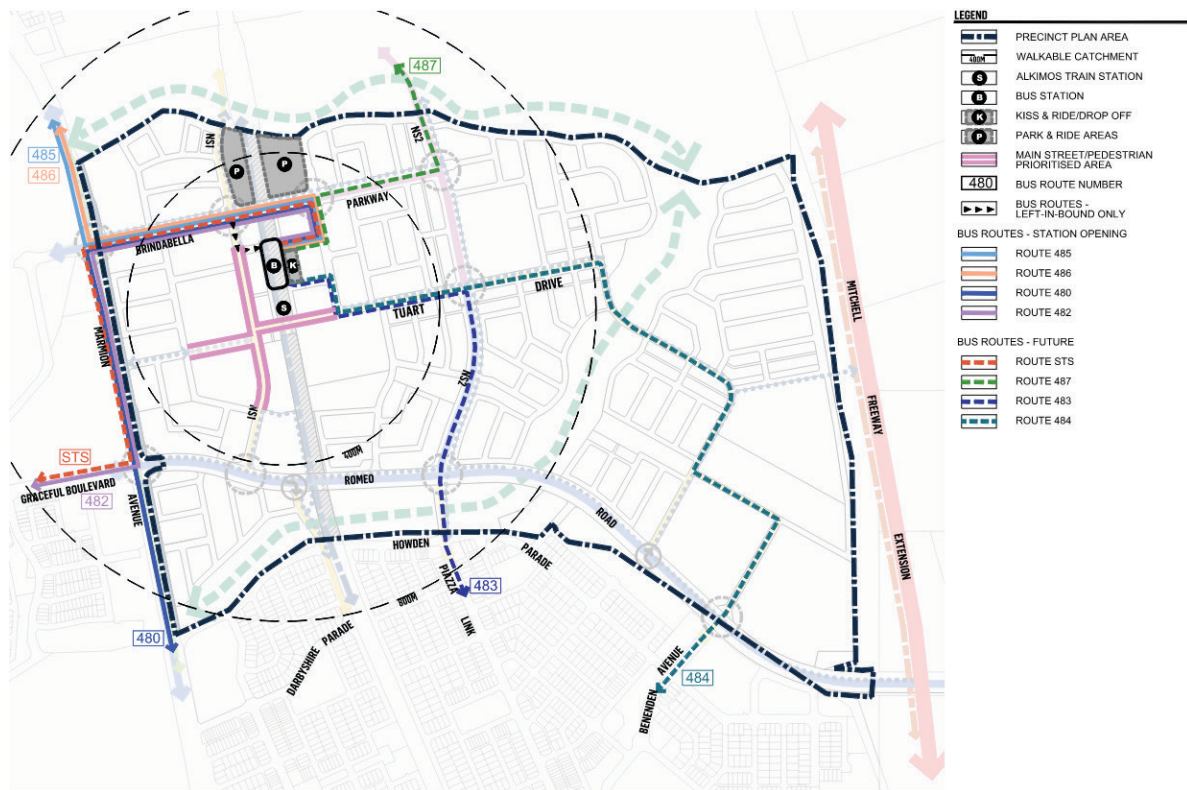
Details of the proposed routes and frequencies are provided in Table 4.1.

Table 4.1: Road Based Public Transport Provision

Service	Route Number	Route Description	Frequency On / Off Peak
Bus	480	Clarkson Stn via Marmion Av to Alkimos Central Station	10mins On / 30mins Off
Bus	482	Clarkson Stn via Jindee Estate & Alkimos Beach to Alkimos Central Station	10mins On / 30mins Off
Bus	483	Clarkson / Butler Stns to Alkimos Central Station	10mins On / 30mins Off
Bus	484	Clarkson / Butler Stns to Alkimos Central Station	10mins On / 30mins Off
Bus	485	Eglinton Stn via Shorehaven West to Alkimos Central Station	10mins On / 30mins Off
Bus	486	Eglinton Stn via Marmion Av to Alkimos Central Station	10mins On / 30mins Off
Bus	487	Eglinton Stn via Shorehaven East to Alkimos Central Station	10mins On / 30mins Off
Bus	STS (special transit service)	Eglinton Stn to Alkimos Central Station	10mins On / 15mins Off

PROPOSED TRANSPORT NETWORKS

Figure 4.5: Bus Network Planning



Source: Base plan, Urbis 2021

5. INTEGRATION WITH SURROUNDING AREA

05

5.1. Major Trip Attractors and Generators

Typically, a Transport Impact Assessment will consider major trip attractors and generators within 800m of a Precinct Plan.

Trip generators within 800m of the Precinct Plan include all the surrounding residential subdivisions including Trinity, Alkimos Beach, Alkimos Vista and Shorehaven.

The substantial mixed use, office and retail land uses proposed within the Alkimos Central retail core are likely to be attractors of trips for residents both internal and external to the subdivision. The Precinct Plan allows direct connections to adjacent residential developments to the north and south via internal local distributor roads designated as NS1 and NS2 with connections to other neighbouring suburbs achieved through Marmion Avenue and the Mitchell Freeway via Romeo Road.

Alkimos Central is well placed between the two lower order District Centres of Butler and Eglinton and approximately halfway between the two Strategic Metropolitan Centres of Joondalup and Yanchep.

5.2. Changes to Land Uses within 800m

Land uses are not expected to change significantly from the approved Precinct Plans in the vicinity of the Alkimos Centre Precinct Plan. The impact of any changes should be considered upon assessment of those respective structure plans.

5.3. Travel Desire Lines from Precinct Plan to these Attractors / Generators

Travel desire lines to local attractors such as Education and Retail Centre will be well catered for when developed as they are all easily accessible as they are all connected on the major (such as Marmion Avenue and Romeo Road) and minor road (such as NS1 and NS2) network which will cater for motor vehicles, pedestrians, and cyclists.

5.4. Adequacy and Deficiencies in External Transport Networks

A few deficiencies exist in the external road transport network adjoining the site. These are detailed as follows:

- Marmion Avenue has recently been upgraded to a 4-lane dual carriageway standard to cater for the future traffic generated from the development and adjoining developments. It is noted that this upgrade has not included a proposed 3rd southbound lane on Marmion Avenue from Brindabella Parkway to Romeo Road.
- Romeo Road, a proposed 4-lane dual carriageway standard east-west road is currently unconstructed. This road is needed to provide access to Wanneroo Road to the east and interchange with the Mitchell Freeway.
- The Mitchell Freeway is proposed to be extended to bypass the east of the Precinct Plan. In the initial stages, it will run to the proposed Romeo Road project, funnelling the freeway traffic to Marmion Avenue in the interim until the ultimate extension is constructed bypassing Alkimos Central.

The proposed staged nature of Marmion Avenue may result in considerable traffic congestion and from a traffic operation point of view, a 3rd southbound lane on Marmion Avenue could allow for traffic intending to turn left onto Romeo Road to reduce the queue length for the southbound movements.

The proposed staged construction of the Mitchell Freeway Extension will result in high traffic volumes being funnelled onto Romeo Road and then Marmion Avenue, potentially resulting in considerable traffic congestion in peak periods.

The proposed roads to be constructed as discussed above, should also provide active transport connections and crossing points in the initial stages, to encourage active transport usage and provide adequate levels of infrastructure for safe transport.

Similarly, the proposed roads will need to cater for adequate road public transport routing in an interim and long-term scenario, which may be different for each development stage.

5.5. Remedial Measures to Address Deficiencies

The identified deficiencies in the road network such as the potential congestion on Romeo Road and Marmion Avenue in the short term can be alleviated/mitigated by a potential 3rd lane on Marmion Avenue southbound between Brindabella Parkway and Romeo Road. In the medium term (10 years, to 2031), it is expected traffic congestion on Marmion Avenue and to a lesser extent, Romeo Road will exceed available capacity. The proposed Mitchell Freeway extension to bypass the Precinct Plan should be planned to be completed within 10 years prior to 2031.

6. ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

06

6.1. Assessment Year(s) and Time Period(s)

The ACPP has a long development period of 30 years. As such this Precinct Plan TIA has assessed the following design horizons:

- 10-year design horizon - 2031
- 20-year design horizon - 2041
- Ultimate Development - 2051

Key intersections have been assessed for the 10-year design horizon (2031) to determine anticipated levels of traffic operations. The ultimate development (2051) has been assessed to determine the required road hierarchy and in turn ultimate road cross-sectional requirements as per the WAPC Guidelines for TIAs for Structure Planning.

The full staging of the Precinct Plan is proposed as follows; this is an indicative plan for development which is subject to change dependant on market conditions.

Figure 6.1: Indicative Alkimos Central Precinct Plan Staging



Source: GTA, 2020

6.2. Precinct Plan Generated Traffic

6.2.1. Vehicle Trip Generation

Trip generations for the proposed land uses were taken from accepted values used by the *Institute of Transportation Engineers (ITE)*.

Trip generation rates are contained in Table 6.1.

Table 6.1: Trip Generation Rates

		Residential (lots) (trips per lot)	Office (trips per 100m ²)	Shopping (trips per 100m ²)	Specialty Retail (trips per 100m ²)	Service Commercial (trips per 100m ²)	Hospital (trips per bed)	P n R (trips per space)	Aquatic Centre (trips per ha)	School (trips per student)
AM	Production	0.53	0.40	0.63	0.33	0.24	0.95	0.15	2.37	0.5
	Attraction	0.18	1.60	0.63	0.31	0.96	0.37	0.56	2.37	0.5
PM	Production	0.26	1.60	2.50	0.21	0.96	0.47	0.47	7.13	0.5
	Attraction	0.44	0.40	2.50	0.26	0.24	0.95	0.16	7.13	0.5

The trip generation of the site for the 10-year design horizon, 20-year design horizon and ultimate development are contained in Table 6.2.

Table 6.2: Trip Generation

Year	Period	Generated	Attracted	Total
2032	AM Peak	612	583	1195
	PM Peak	936	863	1799
2042	AM Peak	1503	1498	3001
	PM Peak	2298	2005	4302
2052	AM Peak	2178	2344	4522
	PM Peak	3516	2954	6470

6.2.2. Vehicle Trip Distribution and Assignment

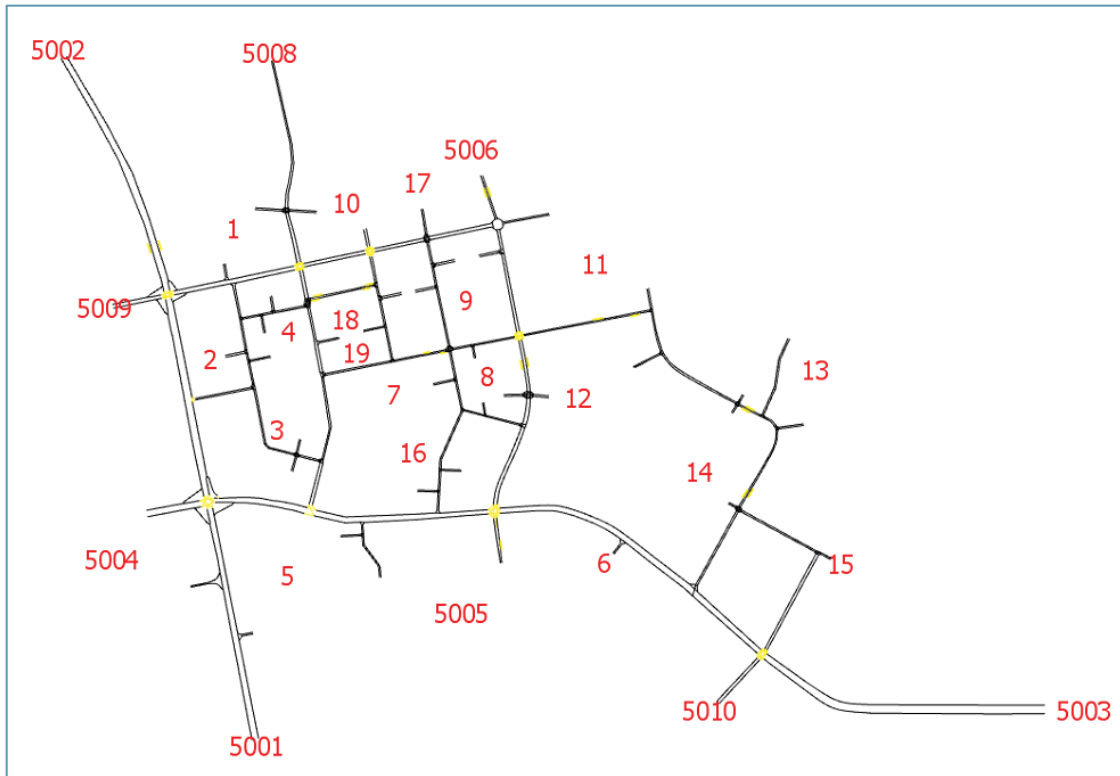
Traffic generation was distributed onto the road network using the following assumptions:

- The network was disaggregated into 19 zones, with each zone including a single or mix of land uses, as contained in Figure 6.2 (5000 series zones are external zones, low series zones are internal zones)
- The development generated traffic was split between internal trips and intra trips.

ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

- The external traffic distribution was informed by the ROM24 model extracts provided by Main Roads WA on the 7th of October 2019. The distribution is based on this model, with some variation applied to reflect more realistic local distribution patterns.

Figure 6.2: Traffic Assessment Zones



6.3. Extraneous (Through) Traffic

The Precinct Plan in its current form provides links to Trinity in the south and Alkimos Vista to the north. These links are provided by a Neighbourhood Connector B NS1 and a District Distributor B NS2 (nominated as the equivalent Integrator A in Figure 4.1) running north-south through the Precinct Plan.

Due to their nature, Marmion Avenue and Romeo Road both carry a significant volume of through (background) traffic not attributed to the ACPP area. This significant level of traffic has impacts on the operations of intersections on Marmion Avenue and Romeo Road, with some intersections exceeding capacity prior to the Mitchell Freeway extension north of Romeo Road. Should intersections exceed capacity, it is expected the extraneous traffic may seek alternative routes around the site (naturally redistribute) potentially leading to the intersections to operate at capacity.

The through traffic on Marmion Avenue and Romeo Road adjacent the Precinct Plan is expected to reduce post 2031 when the Mitchell Freeway extension is expected to be completed. This will provide a major free-flow alternative north-south route for through traffic and is expected to significantly reduce the peak traffic on Marmion Avenue and Romeo Road.

The 2051 external traffic volumes are contained in Figure 6.3 and Figure 6.4 for the AM peak and PM peak respectively.

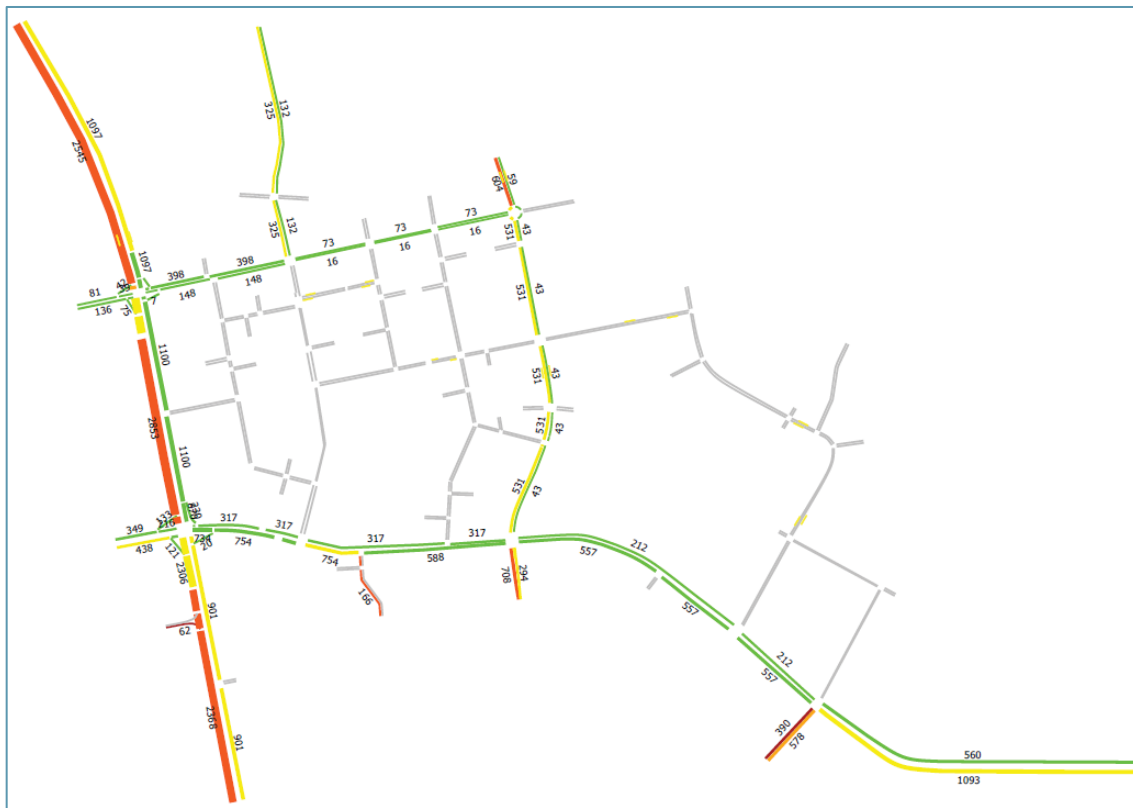
ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

Figure 6.3: External Traffic Flows – 2051 – AM Peak



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Figure 6.4: External Traffic Flows – 2051 – PM Peak



6.4. Design Traffic Flows

The expected AM and PM Peak design traffic flows based on the extraneous traffic and development generated traffic are contained in Figure 6.5 and Figure 6.6. Anticipated all-day volumes assuming a typical 10% peak hour are shown in Figure 6.7 based on the critical PM peak volumes. Larger copies of these plans are included in Appendix D.

It is noted that the design traffic flows used in the LinSIG modelling at the intersections of Marmion Avenue / Romeo Road and Marmion Avenue / Brindabella Parkway in 2031 are based on the turning volumes provided by Main Roads WA. These volumes therefore differ slightly from the volumes reported in this TIA due to more granular land use assumptions within this TIA.

ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

Figure 6.5: Design Traffic Flows – 2051 – AM Peak

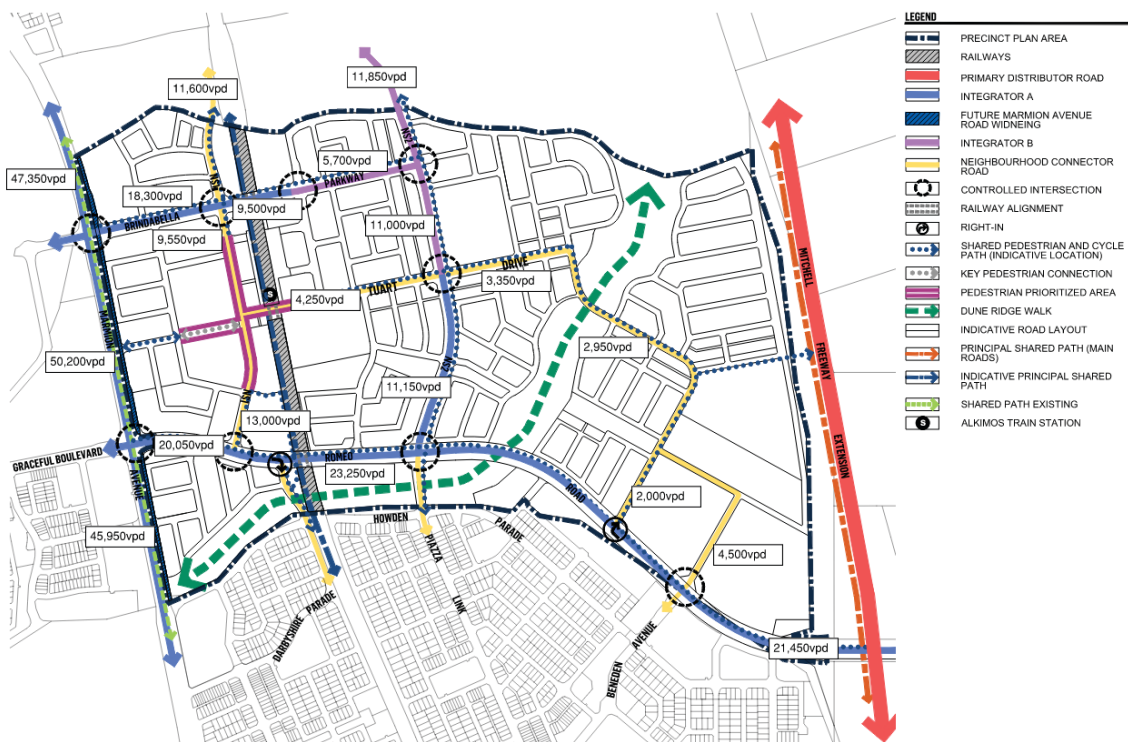


Figure 6.6: Design Traffic Flows – 2051 – PM Peak



ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

Figure 6.7: Forecast Design Traffic Flows (background + development) – 2051 – Daily Flows (10% peak hour)



Source: Base plan, Urbis 2021. Volumes added by GTA Consultants.

The indicative upper volumes and target speeds for the road classifications outlined in Figure 4.1 have been summarised in Table 6.3 below. These are based on *Liveable Neighbourhood* Guidelines.

Table 6.3: Road Hierarchy

Road Classification	Indicative upper volume (vpd)	Target Speed (km/h)
Primary Distributor	35,000 (4 lanes) – 50,000 (6 lanes)	80km/h
Integrator A	15,000 – 35,000	60km/h – 70km/h
Integrator B	15,000	60km/h
Neighbourhood Connector	7,000	50km/h

The 2051 modelled daily volumes presented in Figure 6.7 generally align with the target volumes outlined in Table 6.3, except for:

- **Marmion Avenue** is a 4-lane carriageway where the 4-lane sections are anticipated to exceed the upper limit with 50,000vpd expected to travel along the Primary Distributor, most vehicles trips are attributed to external traffic.
- **NS1** is designated as a Neighbourhood Connector and is anticipated to record a maximum of around 13,000vpd exceeding the 7,000vpd upper limit indicated in Table 6.3. However, the trips attributed to NS1 are travelling to/from the Alkimos Retail Core where a low-speed environment is acceptable and promoted within the vicinity. Furthermore, the volumes are modelled for a 30-year

ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

horizon to 2051 where potential upgrades or strategies could be implemented alleviate any potential issues that arise.

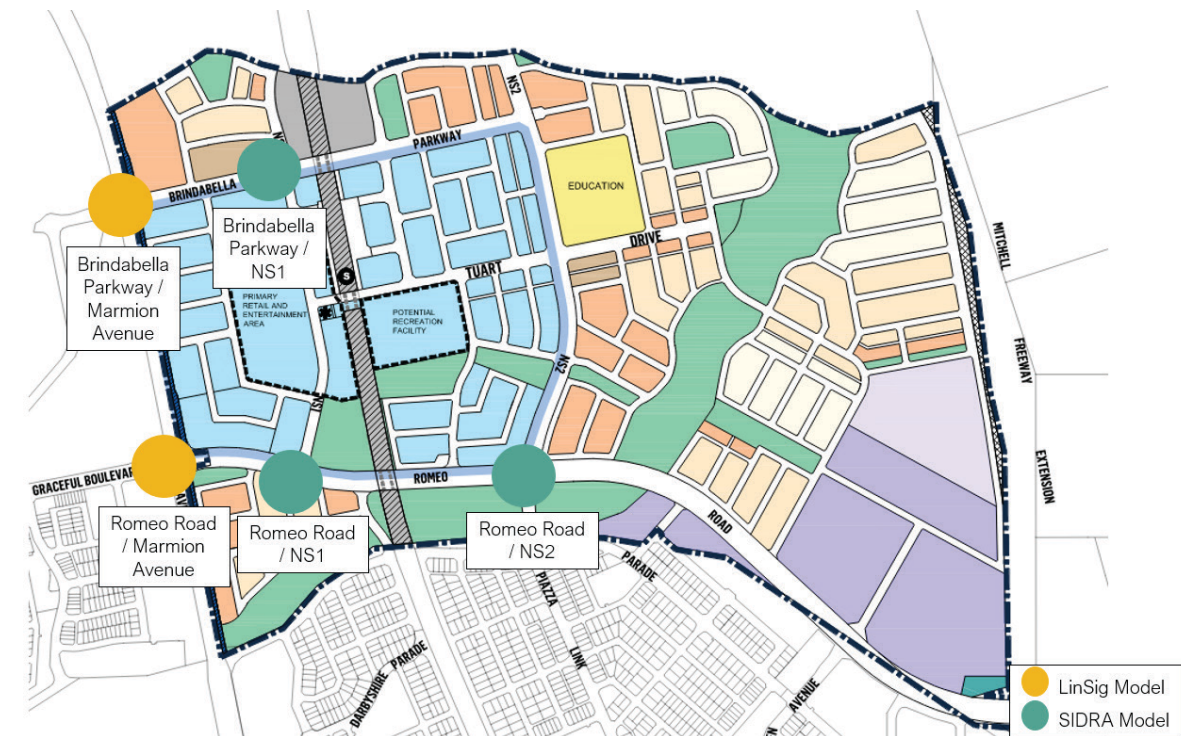
6.5. Intersection Analysis

The proposed Precinct Plan results in several intersections operating at capacity or near capacity prior to the Mitchell Freeway Extension. As a result of this, these intersections have been modelled utilising the preliminary design traffic for the 10-year design horizon (this is theoretically the worst performance prior to the planned Mitchell Freeway extension). The Marmion Avenue intersections have been modelled in LinSIG¹ and other critical intersections in SIDRA.

This TIA demonstrates the major intersections within the ACPP area can function at an acceptable level of service up to 2031.

The modelled intersections are shown in Figure 6.8.

Figure 6.8: Proposed Intersection Controls



The Marmion Avenue / Brindabella Parkway intersection is expected to operate poorly for some approaches in 2031 but achieves an overall intersection with Degree of Saturation equal or less than 100% in both AM and PM peaks in accordance with Main Roads WA Modelling Guidelines.

The modelled intersection geometry is shown in Figure 6.9 and intersection operational results in Table 6.4.

¹ The Marmion Avenue intersections were modelled in LinSIG as a requirement of MRWA for the completion of Stage 2 of the Traffic Signal Approval Policy that is currently underway concurrently with this TIA assessment.

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Figure 6.9: Marmion Avenue / Brindabella Parkway - Intersection Geometry

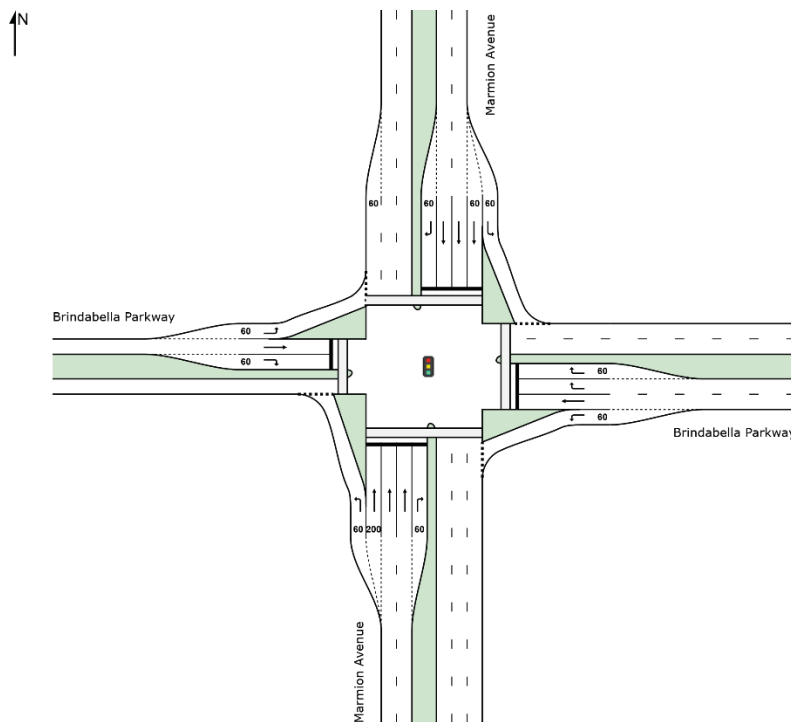


Table 6.4: Marmion Avenue / Brindabella Parkway Intersection Performance 2031

Arm	AM			PM		
	DOS	LOS	Mean Maximum Queue (pcu)	DOS	LOS	Mean Maximum Queue (pcu)
Marmion Ave (S)	0.99	F	23.0	0.78	D	27.0
Brindabella Pkwy (E)	1.00	F	29.7	0.94	F	30.8
Marmion Ave (N)	1.00	F	47.5	0.94	F	30.8
Brindabella Pkwy (W)	0.28	E	3.9	0.34	F	2.7
Intersection	1.00	E	47.5	0.94	D	30.8

Marmion Avenue & Romeo Road

The Marmion Avenue / Romeo Road intersection is expected to operate poorly in 2031 achieving a Degree of Saturation beyond 100% in the PM peak. This is a result of the extraneous through (background) traffic utilising Romeo Road and Marmion Avenue. Once the Mitchell Freeway extension bypasses the site the intersection operations are expected to return to satisfactory levels.

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The modelled intersection geometry is shown in Figure 6.10 and intersection operational results in Table 6.5.

Figure 6.10: Marmion Avenue / Romeo Road - Intersection Geometry

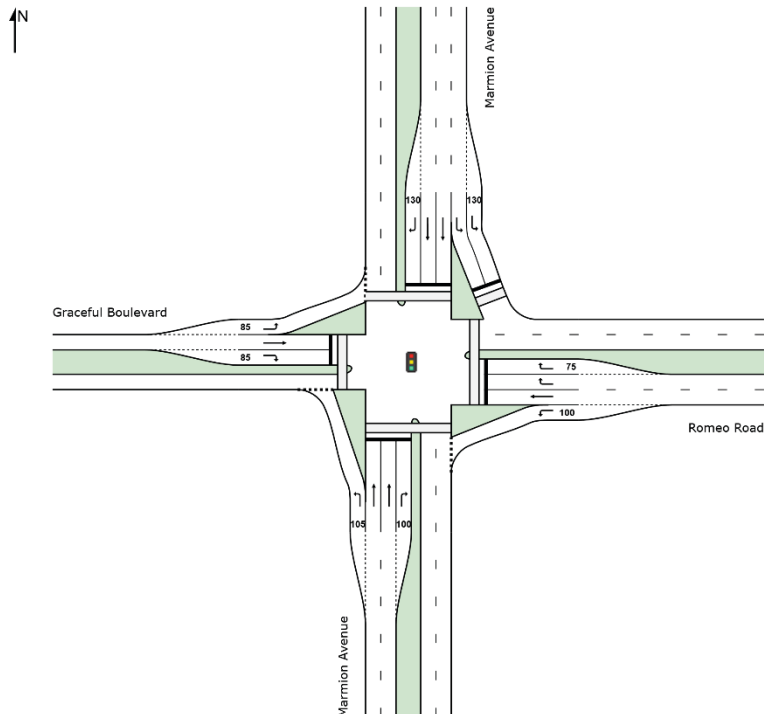


Table 6.5: Marmion Avenue / Romeo Road Intersection Performance 2031

Arm	AM			PM		
	DOS	LOS	Mean Maximum Queue (pcu)	DOS	LOS	Mean Maximum Queue (pcu)
Marmion Ave (S)	0.90	F	18.3	1.03	F	23.1
Romeo Rd (E)	0.94	F	26.7	1.15	F	148.8
Marmion Ave (N)	0.95	D	74.8	1.14	F	68.7
Graceful Blvd (W)	0.91	F	14.8	1.14	F	42.4
Intersection	0.95	D	74.8	1.15	F	68.7

Brindabella Parkway / NS1

The Brindabella Parkway / NS1 intersection is expected to operate well in 2031 achieving a Level of Service of B in the AM peak and Level of Service C in the PM peak.

The modelled intersection geometry is shown in Figure 6.11 and intersection operational results in Table 6.6.

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Figure 6.11: Brindabella Parkway / NS1 - Intersection Geometry

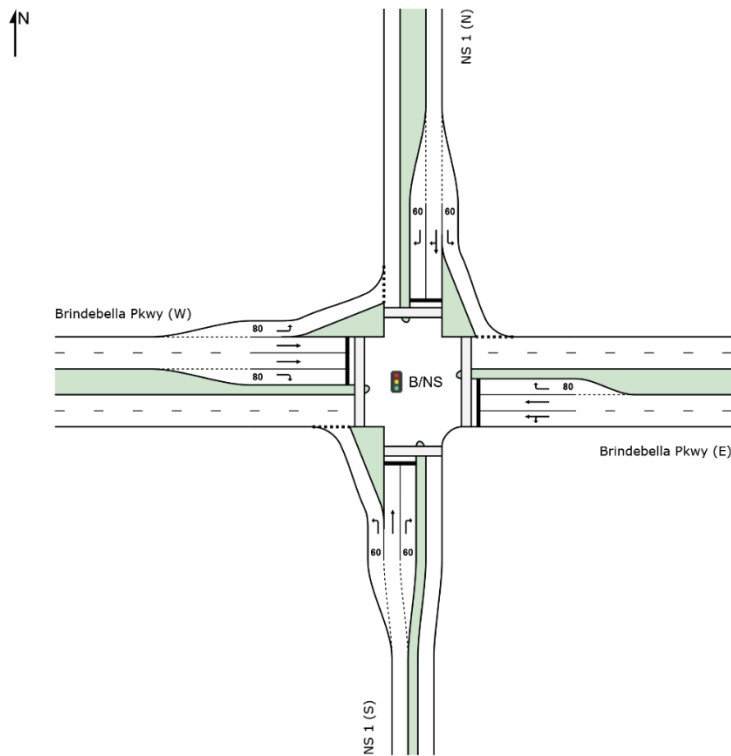


Table 6.6: Brindabella Parkway / NS1 Intersection Performance 2031

Arm	AM			PM		
	DOS	LOS	95th %ile Queue (m)	DOS	LOS	95th %ile Queue (m)
NS 1 (S)	0.56	B	24m	0.44	B	19m
Brindabella Pkwy (E)	0.01	B	0m	0.01	B	0m
NS 1 (N)	0.28	C	12m	0.65	C	33m
Brindabella Pkwy (W)	0.43	B	17m	0.64	C	32m
Intersection	0.56	B	24m	0.65	C	33m

Romeo Road / NS1

The Romeo Road / NS1 intersection is expected to operate well in 2031 achieving a Level of Service of A in both AM and PM peaks.

The modelled intersection geometry is shown in Figure 6.12 and intersection operational results in Table 6.7.

ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

Figure 6.12: Romeo Road / NS1 – Intersection Geometry

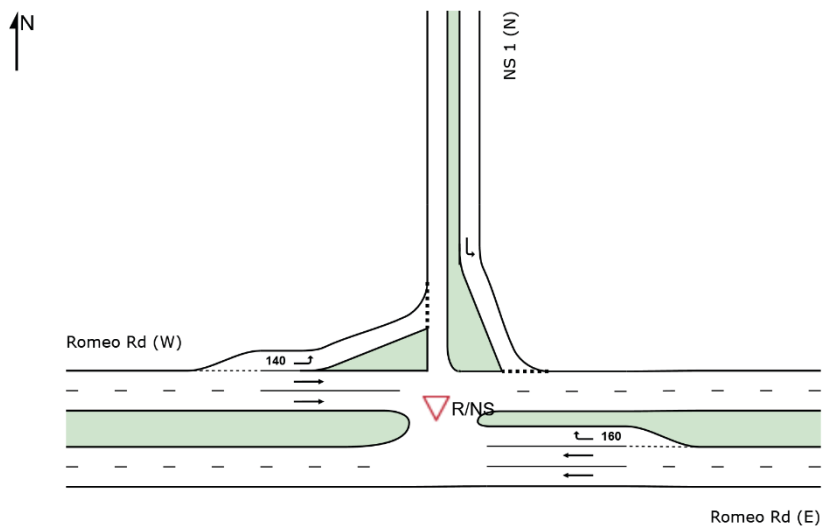


Table 6.7: Romeo Road / NS1 – Intersection Performance 2031

Arm	AM			PM		
	DOS	LOS	95th %ile Queue (m)	DOS	LOS	95th %ile Queue (m)
Romeo Rd (E)	0.25	-	8m	0.18	-	6m
NS 1 (N)	0.10	A	3m	0.17	A	5m
Romeo Rd (W)	0.22	A	2m	0.11	A	4m
Intersection	0.25	-	8m	0.18	-	6m

Romeo Road / NS2

The Romeo Road / NS2 intersection is expected to operate well in 2031 achieving a Level of Service of C in both AM and PM peaks.

The modelled intersection geometry is shown in Figure 6.13 and intersection operational results in Table 6.8.

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Figure 6.13: Romeo Road / NS2 – Intersection Geometry

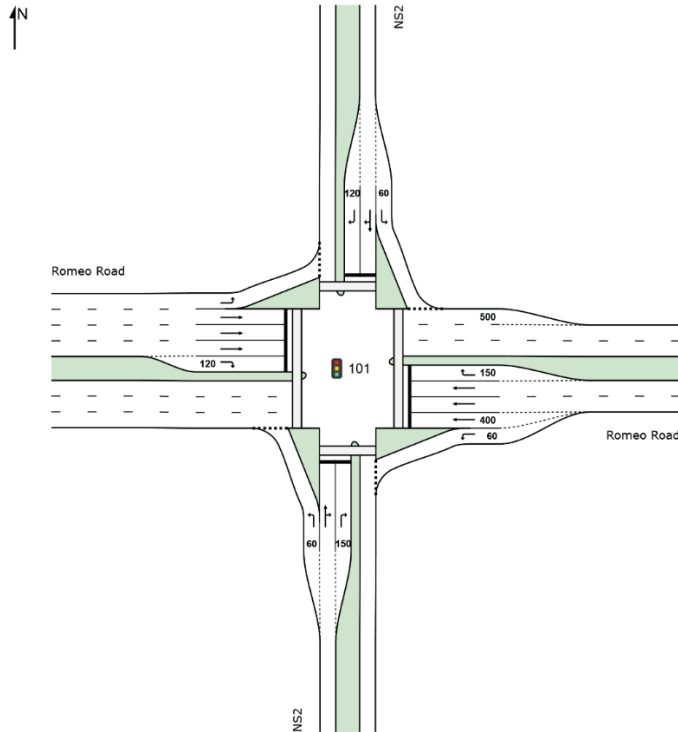


Table 6.8: Romeo Road / NS2 – Intersection Performance 2031

Arm	AM			PM		
	DOS	LOS	95th %ile Queue (m)	DOS	LOS	95th %ile Queue (m)
NS 2 (S)	0.05	C	2m	0.08	C	3m
Romeo Rd (E)	0.51	C	21m	0.71	C	41m
NS 2 (N)	0.26	C	10m	0.17	C	7m
Romeo Rd (W)	0.48	B	49m	0.61	C	26m
Intersection	0.51	C	49m	0.71	C	41m

6.6. Safe Routes to Schools

Within the Precinct Plan there is one proposed Primary School located centrally within Alkimos Central. The proposed school is well serviced by the proposed shared paths in the Precinct Plan, along with the footpaths on all local streets. Safe pedestrian crossings will be provided adjacent to the primary school at intersections and mid-block locations (to be determined as a part of the detailed design). Consideration will need to be given to the safe crossing of school students at the intersection of Tuart Drive and NS2 when determining the

ANALYSIS OF INTERNAL & EXTERNAL TRANSPORT NETWORKS

form of intersection control during future development stages as this is the logical crossing point of NS2 for students access the primary school.

External to Alkimos Central there are several other schools: Alkimos Primary School, Alkimos College and St James Anglican School. These schools will be accessible by the extensive path network proposed in the Precinct Plan. Protected pedestrian crossing points will be provided along Marmion Avenue and Romeo Road at signalised intersections to access the schools external to the Precinct Plan.

7. CONCLUSION

07

This Transport Impact Assessment Report has been prepared in support of the revised Alkimos Central Precinct Plan.






















Based on the analysis and discussions presented within this report, the following conclusions are made:

1. Alkimos Central will be a Secondary Activity Centre to service the 25km corridor of coastal development between the Strategic Regional Centres of Joondalup and Yanchep.
2. The development of Alkimos Central is projected to occur over a longer than typical 30 years, and as such, the challenge is to provide the necessary infrastructure to support the vehicle trips and existing mode preference of today's users, whilst balancing the aspirational goals of increased public transport, walking, and cycling mode shares and the rapid technological advancements effecting travel behaviours for the future.
3. The proposed site will include approximately 2,500 dwellings, 106,800sqm of commercial office space, 101,000 sqm of retail and 76,300qm of service commercial space when completely developed.
4. As Alkimos Central is built around the future Alkimos Train station and bus transfer station, the Precinct Plan has focussed on providing high amenity for active transport links both internally and from surrounding developments into Alkimos Central.
5. There has been a conscious decision to design the transport network within Alkimos Central such that it encourages alternative and sustainable modes of transport through providing increased pedestrian and cycling safety and amenity, permeable and legible bus access. Much of the centre is within a walkable 400m catchment of the railway station and bus station.
6. The proposed transport network has been designed with consideration of the existing and future transport network to provide good connectivity for all modes of travel.
7. A comprehensive network of shared paths will be provided along internal higher order roads (Neighbourhood Connectors and Integrators) and footpaths will be provided along all remaining roads. Pedestrian crossings will be provided at intersections and mid-block locations as required.
8. The site is expected to generate 3,000 trips per hour and 4,300 trips per hour for the AM and PM peak respectively in 2042 (20-year design horizon) and 4,522 trips per hour and 6,470 trips per hour for the AM and PM peak respectively when fully developed in 2051.
9. The road network within the Precinct Plan has been determined based on daily volume thresholds and demand for on-street parking in accordance with *Liveable Neighbourhoods*.
10. The land uses are consistent with previous planning for the Precinct Plan. Traffic impacts are expected to exceed the capacity of the network in 2031 at several intersections on Marmion Avenue and Romeo Road. This is attributed to the high traffic volumes of the extraneous through traffic that is passing the site. The completion of the planned Mitchell Freeway extension north of Romero Road will reduce this extraneous traffic resulting on these roads beyond this point in time and operate more satisfactorily.

A.PROPOSED PRECINCT PLAN

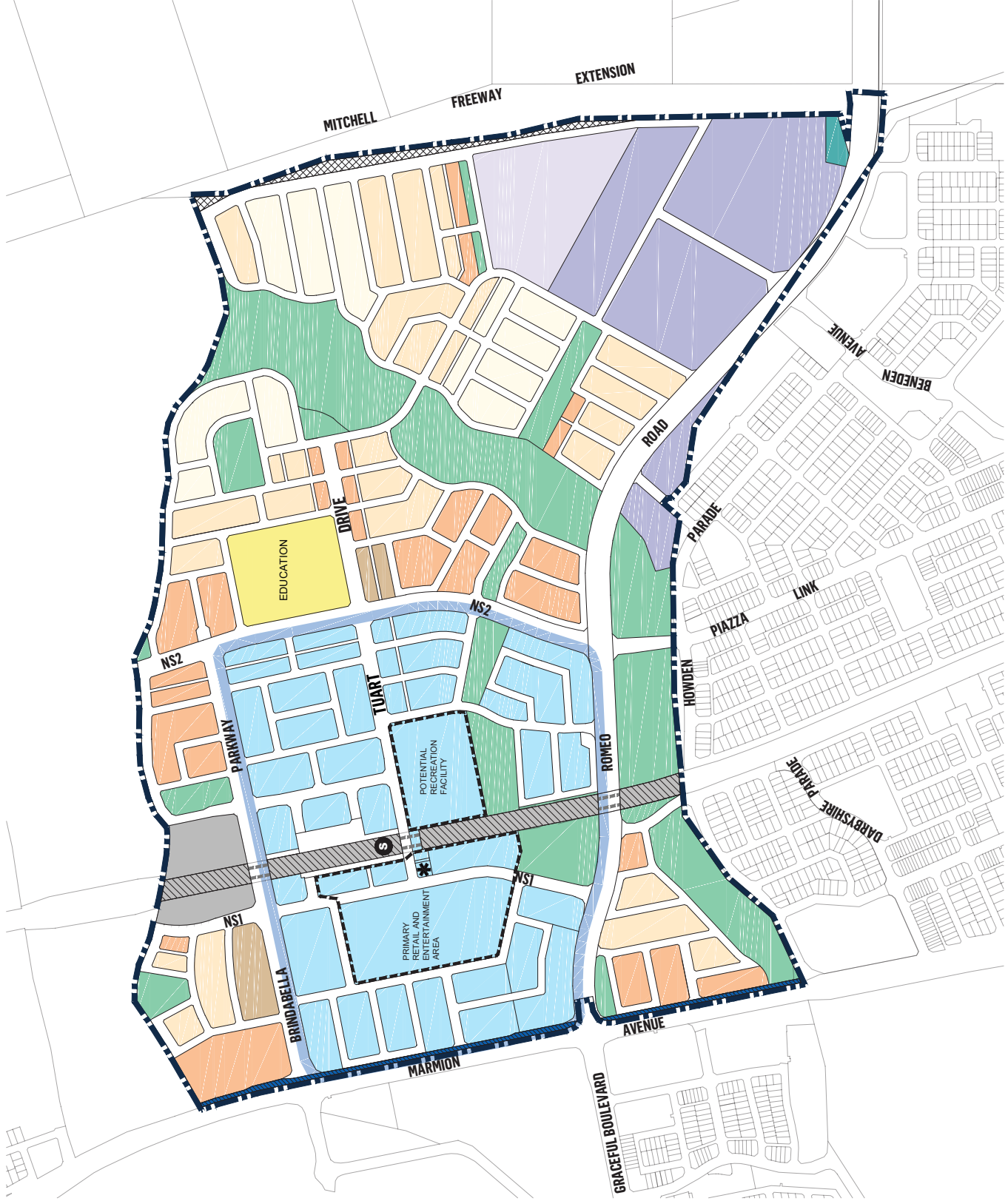


LEGEND

-  PRECINCT PLAN AREA
-  CITY CENTRE CORE
- INDICATIVE LAND USE & DENSITIES**
-  RESIDENTIAL - R20
-  RESIDENTIAL - R25
-  RESIDENTIAL - R30
-  RESIDENTIAL - R40
-  COMMERCIAL (RAC-0)
-  BUSINESS
-  SERVICE INDUSTRIAL
-  PUBLIC PURPOSE
-  PUBLIC OPEN SPACE
-  DRAINAGE
-  PTA CARPARK
-  OTHER
-  RAILWAYS
-  FUTURE WESTERN POWER CORRIDOR
-  TOWN SQUARE
-  FUTURE MARMION AVENUE ROAD WIDENING
-  INDICATIVE ROAD LAYOUT
-  RAILWAY ALIGNMENT
-  ALKIMOS TRAIN STATION

NOTE

- 1) R-Code densities are indicative. Refer to Plan 1 in Part 1
- 2) For land within RAC-0 built form controls are guided by the provisions of Part 1
- 3) Land uses within the Commercial Zone shall be in accordance with the land use permissibility in DPS2 (including a mix of retail, commercial, entertainment, food and beverage, recreational, civic, cultural and some residential land uses)



B.INTERSECTION CONTROLS

B

USER REPORT FOR SITE

 Project: 200408-W148892- NS1 Network - 2031

Template: GTA Appendix Site

Site: B/NS [Brindabella Pkwy / NS 1 - 2031 AM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 48 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

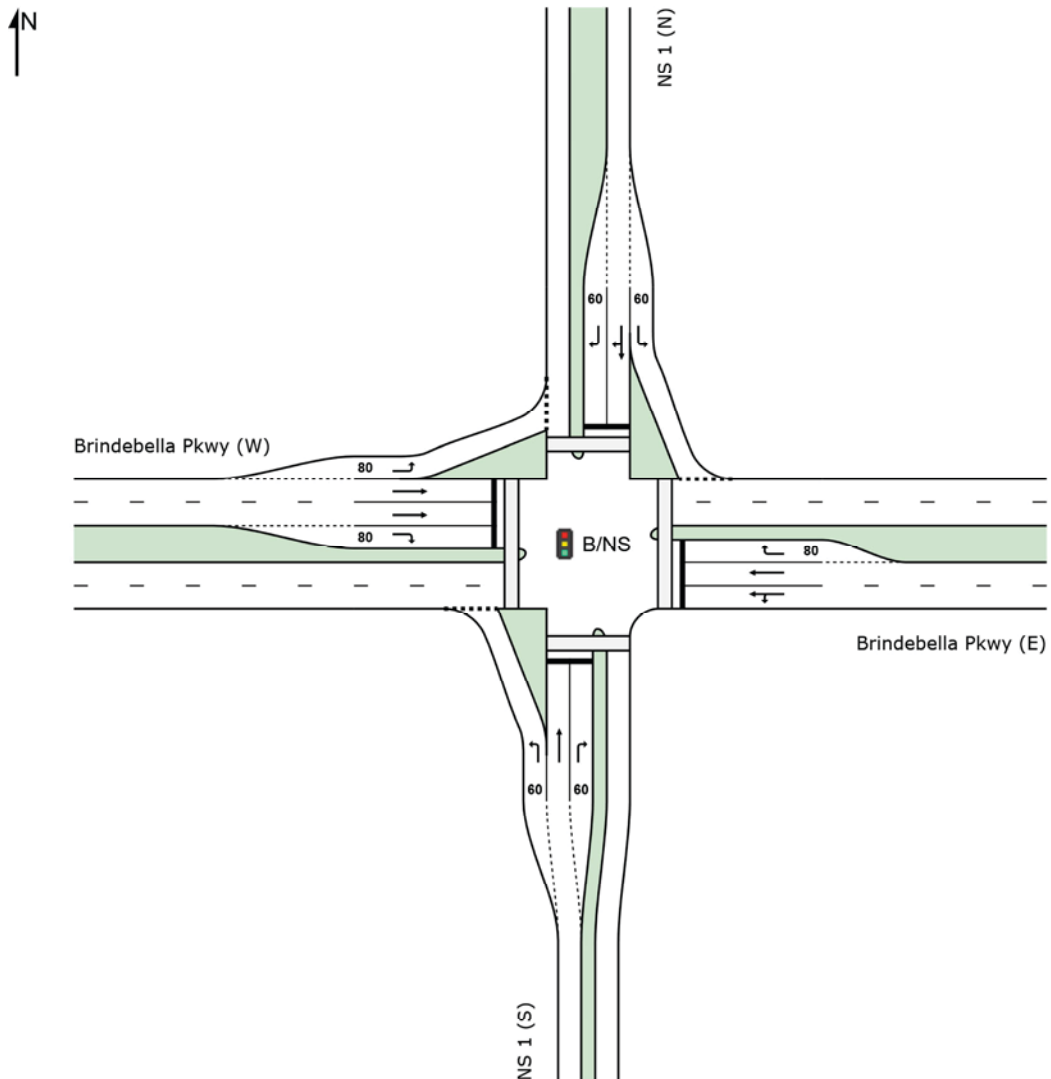
Reference Phase: Phase F

Input Phase Sequence: A, D, E, F, F1*, F2*

Output Phase Sequence: A, D, E, F

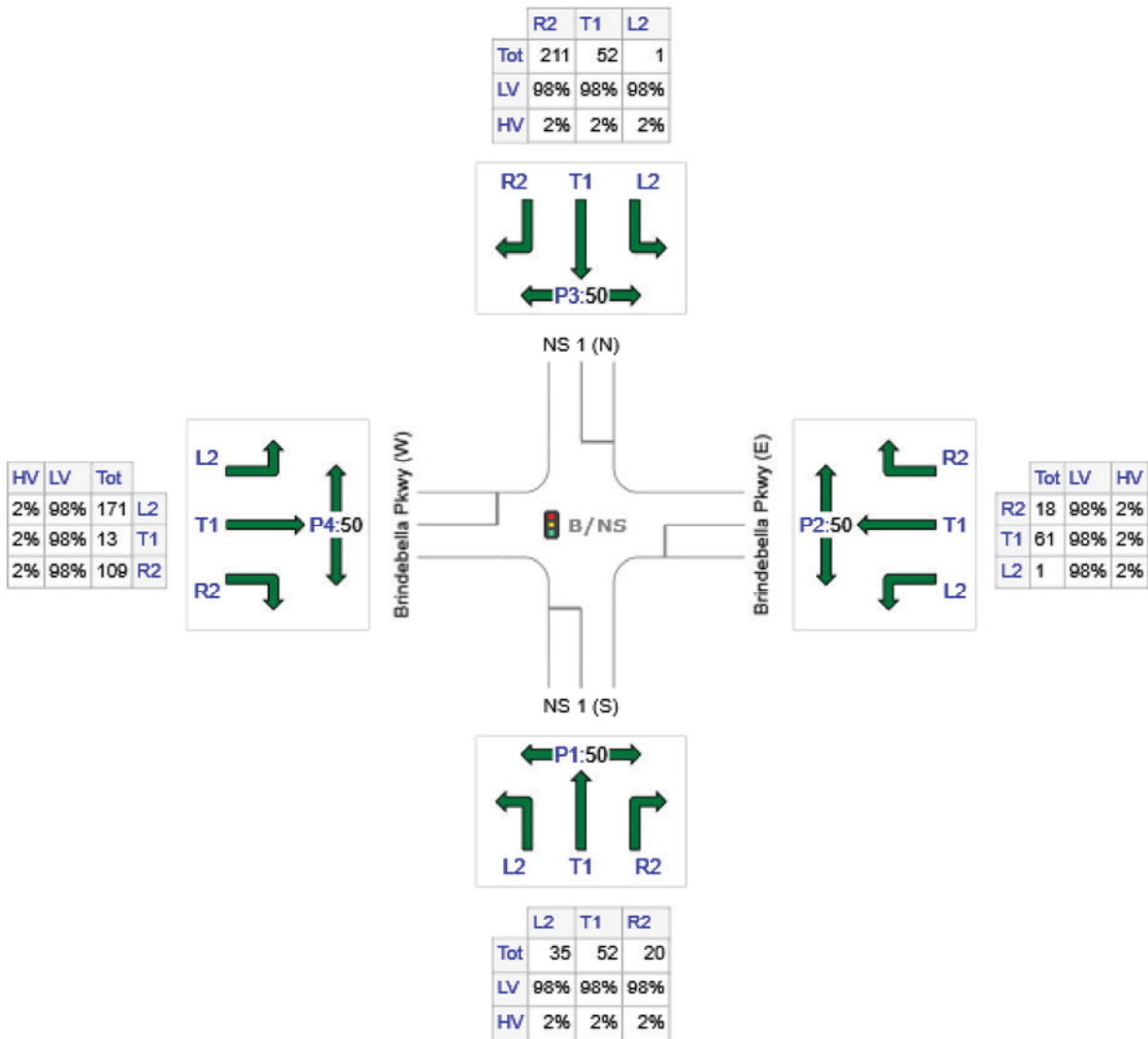
(* Variable Phase)

Site Layout



Input Volumes

Volume Display Method: Total and %



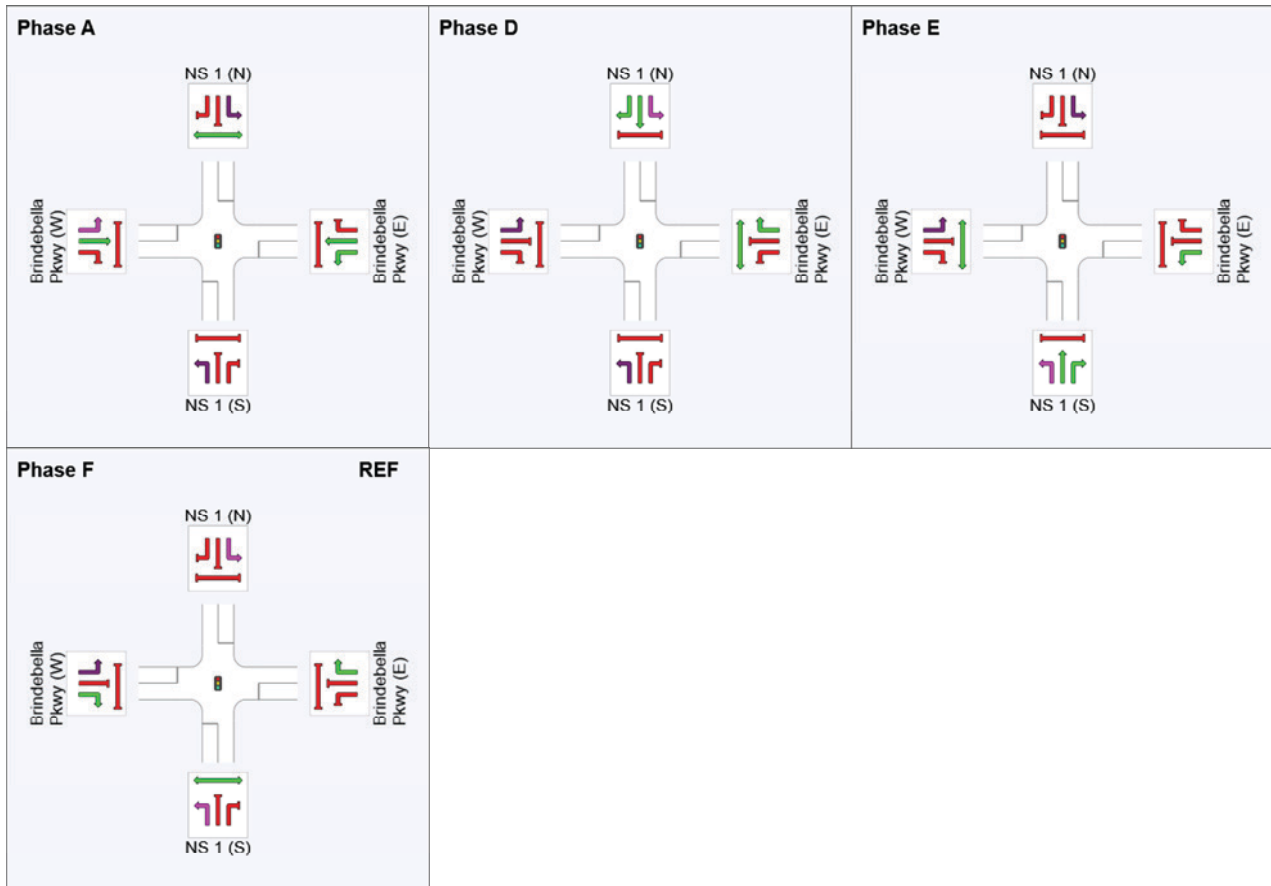
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NS 1 (S)	107	105	2
E: Brindebella Pkwy (E)	80	78	2
N: NS 1 (N)	264	259	5
W: Brindebella Pkwy (W)	293	287	6
Total	744	729	15

Phase Timing Summary

Phase	A	D	E	F
Phase Change Time (sec)	12	24	36	0
Green Time (sec)	6	6	6	6
Phase Time (sec)	12	12	12	12
Phase Split	25%	25%	25%	25%

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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %						Veh	Dist m				
South: NS 1 (S)													
Lane 1	37	2.0	1229	0.030	100	7.1	LOS A	0.2	1.4	Short	60	0.0	NA
Lane 2	55	2.0	239	0.229	100	21.9	LOS C	1.2	9.3	Full	90	0.0	0.0
Lane 3	21	2.0	227	0.093	100	26.9	LOS C	0.5	3.5	Short	60	0.0	NA
Approach	113	2.0		0.229		18.0	LOS B	1.2	9.3				
East: Brindebella Pkwy (E)													
Lane 1	33	2.0	241	0.136	100	21.9	LOS C	0.7	5.0	Full	170	0.0	0.0
Lane 2	32	2.0	239	0.136	100	21.5	LOS C	0.7	5.4	Full	170	0.0	0.0
Lane 3	19	2.0	455	0.042	100	13.4	LOS B	0.2	1.3	Short	80	0.0	NA
Approach	84	2.0		0.136		19.8	LOS B	0.7	5.4				
North: NS 1 (N)													
Lane 1	1	2.0	1358	0.001	100	6.4	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	140	2.0	232	0.603	100	27.2	LOS C	3.4	25.7	Full	295	0.0	0.0
Lane 3	137	2.0	227	0.603	100	29.4	LOS C	3.4	25.3	Short	60	0.0	NA
Approach	278	2.0		0.603		28.2	LOS C	3.4	25.7				
West: Brindebella Pkwy (W)													
Lane 1	180	2.0	1264	0.142	100	6.7	LOS A	0.7	5.2	Short	80	0.0	NA
Lane 2	7	2.0	239	0.029	100	20.8	LOS C	0.1	1.1	Full	300	0.0	0.0
Lane 3	7	2.0	239	0.029	100	20.8	LOS C	0.1	1.1	Full	300	0.0	0.0
Lane 4	115	2.0	227	0.505	100	28.6	LOS C	2.7	20.6	Short	80	0.0	NA
Approach	308	2.0		0.505		15.5	LOS B	2.7	20.6				
Intersection	783	2.0		0.603		20.8	LOS C	3.4	25.7				

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.

Site: R/NS [Romeo Road / NS 1 - 2031 AM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Double Diamond

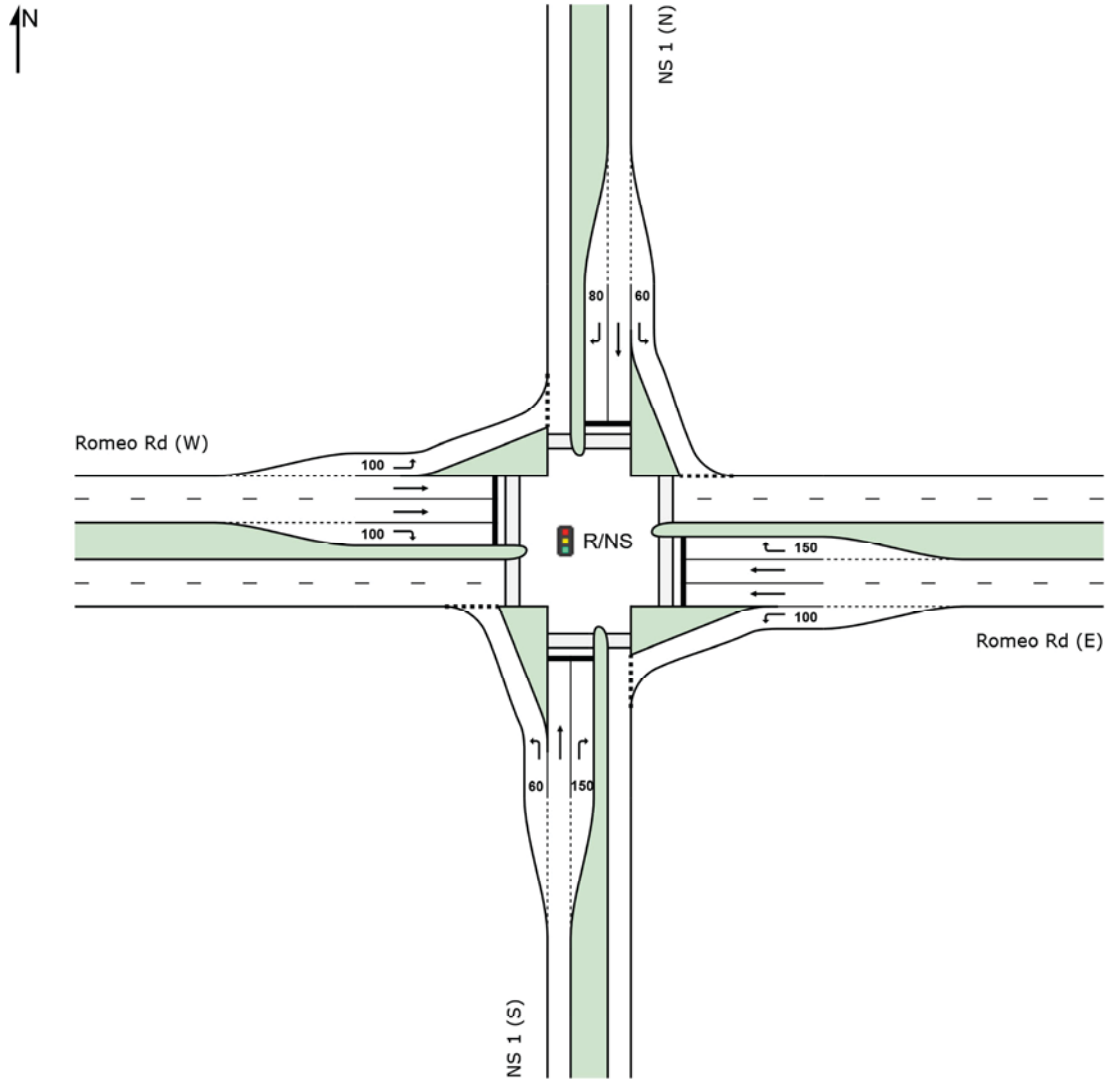
Reference Phase: Phase F

Input Phase Sequence: A, B, C, F, F1*, F2*

Output Phase Sequence: A, B, C, F, F1*

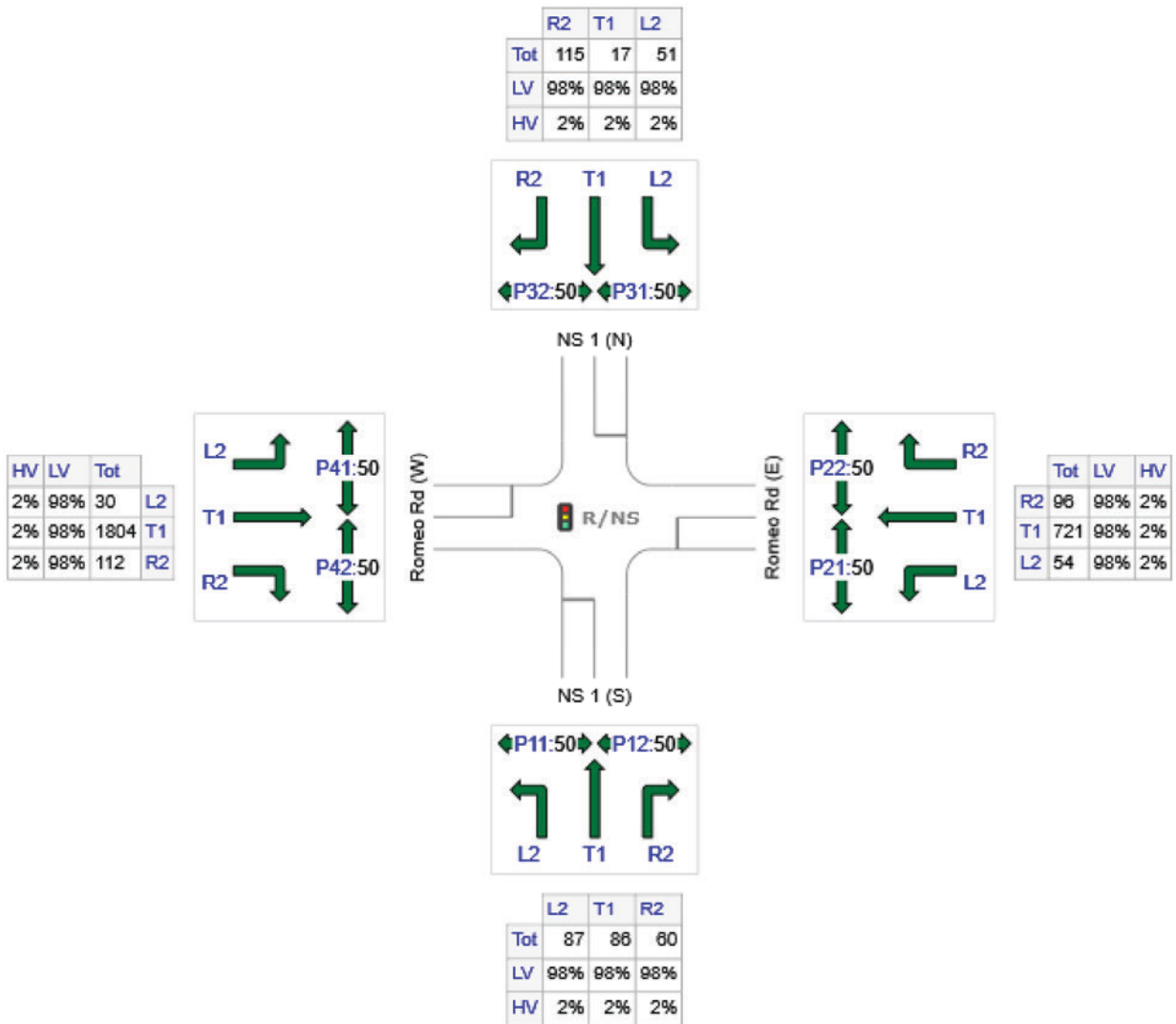
(* Variable Phase)

Site Layout



Input Volumes

Volume Display Method: Total and %



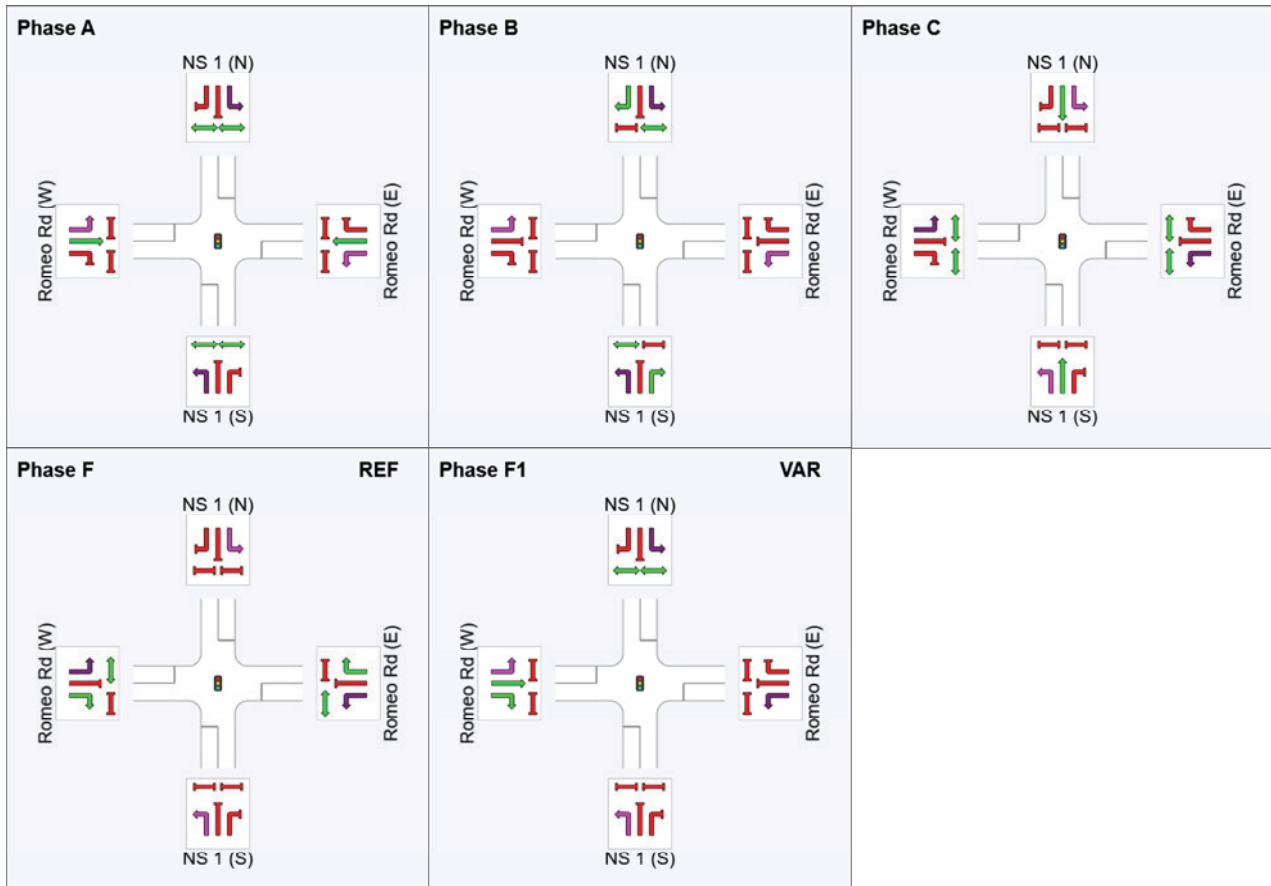
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NS 1 (S)	233	228	5
E: Romeo Rd (E)	871	854	17
N: NS 1 (N)	183	179	4
W: Romeo Rd (W)	1946	1907	39
Total	3233	3168	65

Phase Timing Summary

Phase	A	B	C	F	F1
Phase Change Time (sec)	28	101	117	0	15
Green Time (sec)	67	10	7	9	7
Phase Time (sec)	73	16	13	15	13
Phase Split	56%	12%	10%	12%	10%

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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %						Veh	Dist m				
South: NS 1 (S)													
Lane 1	92	2.0	1044	0.088	100	9.8	LOS A	1.4	10.8	Short	60	0.0	NA
Lane 2	91	2.0	103	0.879	100	77.3	LOS E	6.5	48.7	Full	500	0.0	0.0
Lane 3	63	2.0	140	0.452	100	70.3	LOS E	4.0	30.1	Short	150	0.0	NA
Approach	245	2.0		0.879		50.3	LOS D	6.5	48.7				
East: Romeo Rd (E)													
Lane 1	57	2.0	1497	0.038	100	6.6	LOS A	0.4	3.0	Short	100	0.0	NA
Lane 2	379	2.0	985	0.385	100	20.1	LOS C	14.3	107.2	Full	240	0.0	0.0
Lane 3	379	2.0	985	0.385	100	20.1	LOS C	14.3	107.2	Full	240	0.0	0.0
Lane 4	101	2.0	126	0.803	100	77.1	LOS E	6.9	52.1	Short	150	0.0	NA
Approach	917	2.0		0.803		25.6	LOS C	14.3	107.2				
North: NS 1 (N)													
Lane 1	54	2.0	449	0.119	100	28.3	LOS C	2.1	15.7	Short	60	0.0	NA
Lane 2	18	2.0	103	0.174	100	66.4	LOS E	1.1	8.5	Full	100	0.0	0.0
Lane 3	121	2.0	140	0.866	100	80.0	LOS E	8.6	64.3	Short	80	0.0	NA
Approach	193	2.0		0.866		64.3	LOS E	8.6	64.3				
West: Romeo Rd (W)													
Lane 1	32	2.0	1486	0.021	100	7.3	LOS A	0.3	2.3	Short	100	0.0	NA
Lane 2	980	2.0	1153 ¹	0.850	100	21.5	LOS C	48.8	366.5	Full	300	0.0	23.2
Lane 3	919	2.0	1080 ¹	0.850	100	21.3	LOS C	43.8	328.9	Full	300	0.0	13.3
Lane 4	118	2.0	308	0.383	100	57.9	LOS E	6.7	50.5	Short	100	0.0	NA
Approach	2048	2.0		0.850		23.3	LOS C	48.8	366.5				
Intersection	3403	2.0		0.879		28.2	LOS C	48.8	366.5				

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.

- 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.

Site: B/NS [Brindabella Pkwy / NS 1 - 2031 PM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

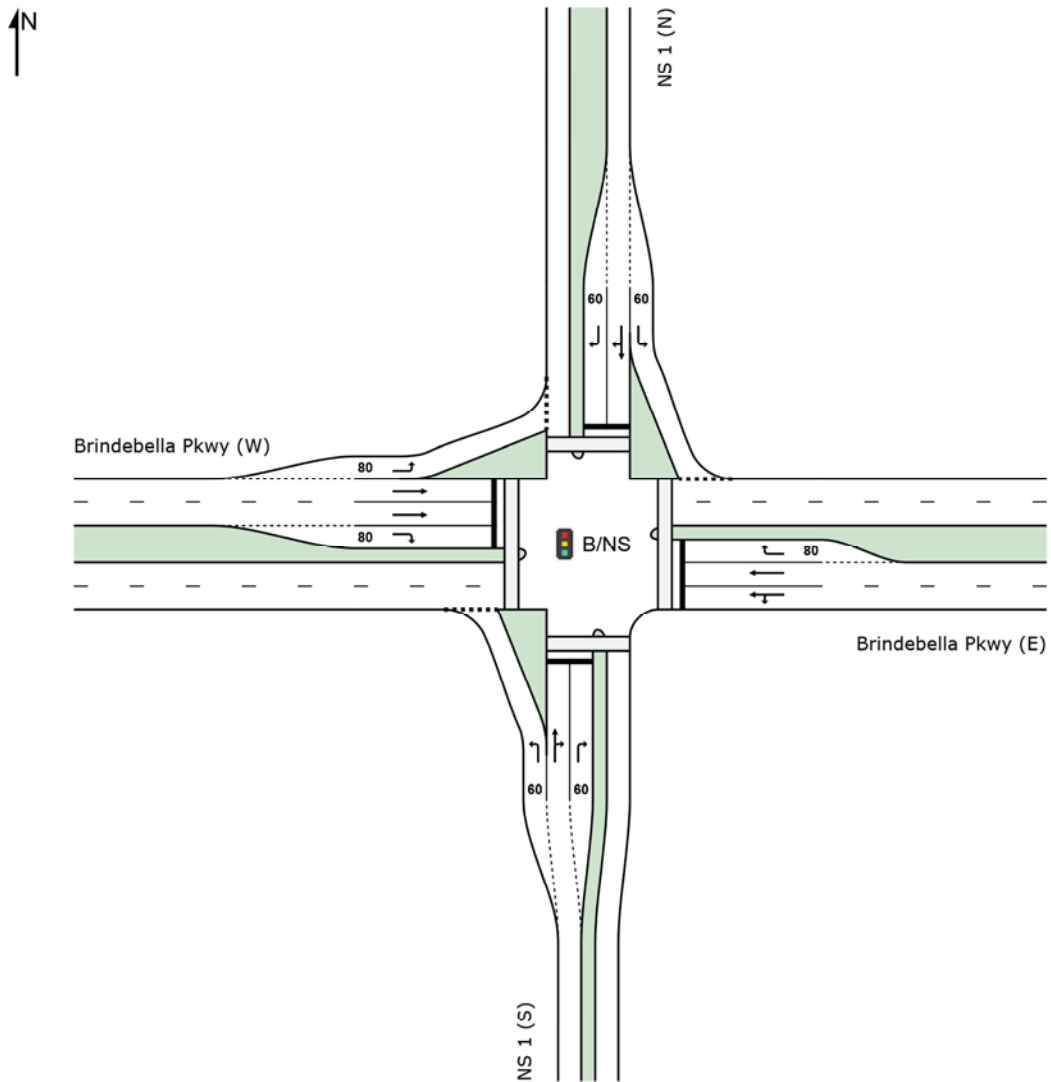
Reference Phase: Phase F

Input Phase Sequence: A, D, E, F, F1*, F2*

Output Phase Sequence: A, D, E, F

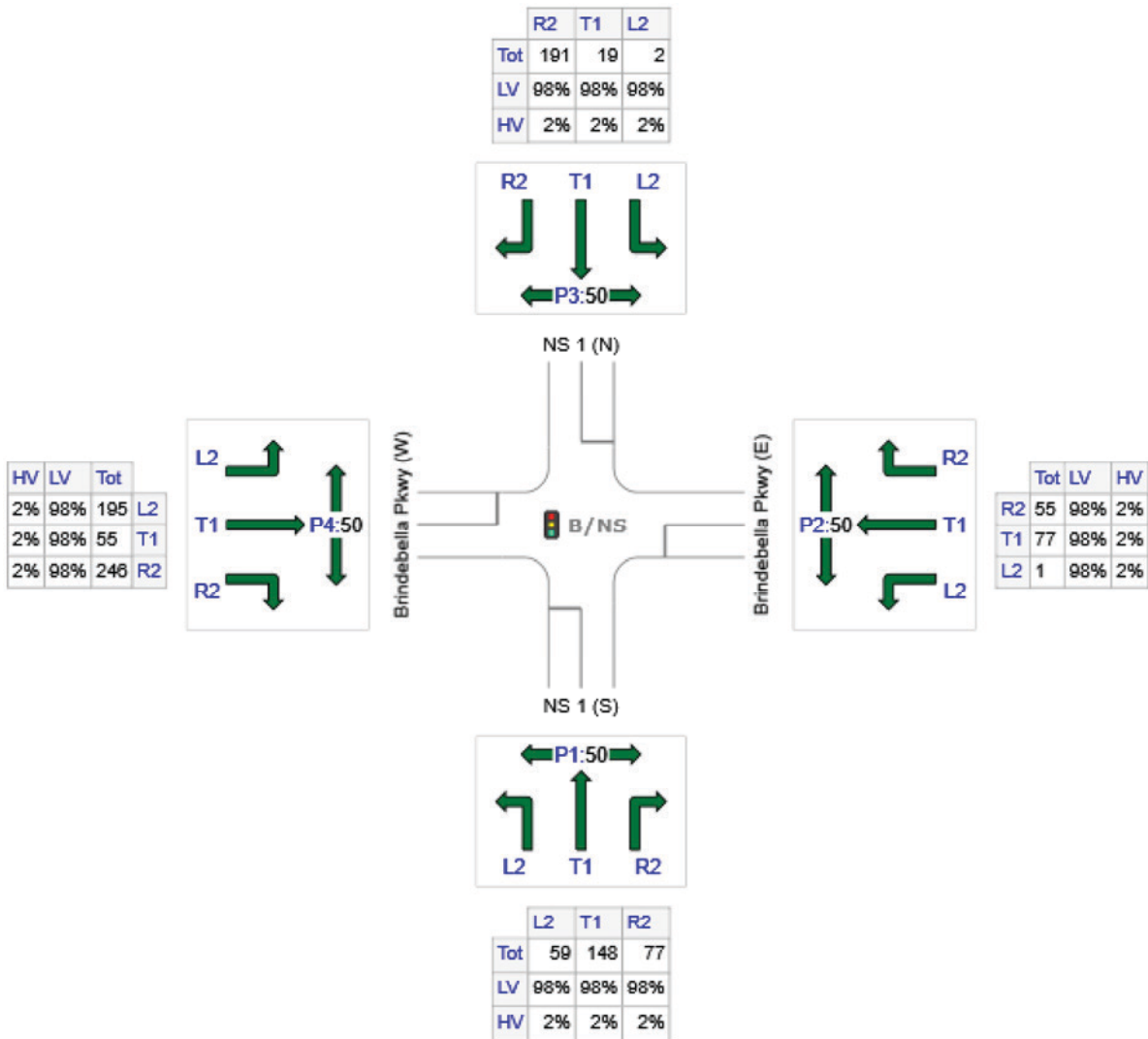
(* Variable Phase)

Site Layout



Input Volumes

Volume Display Method: Total and %



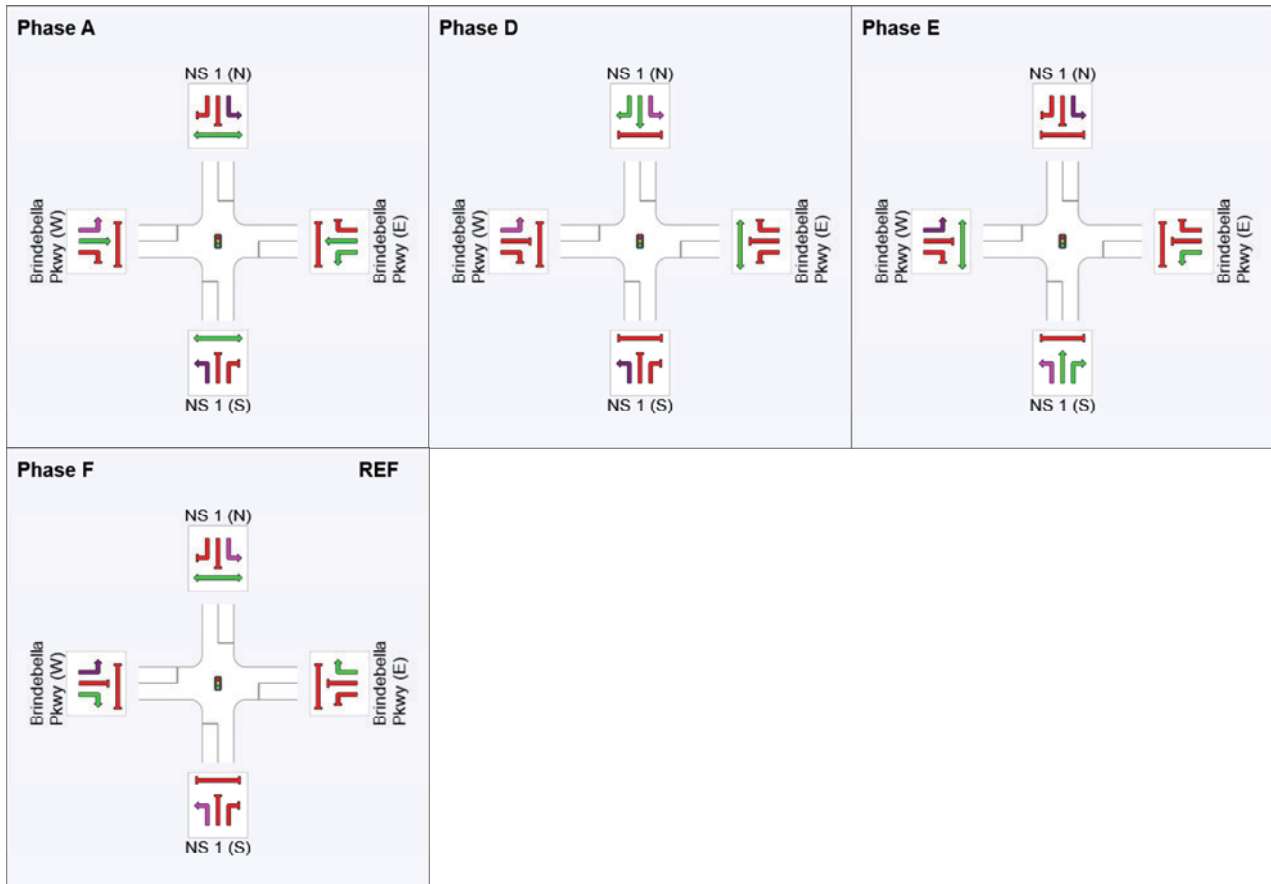
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NS 1 (S)	284	278	6
E: Brindebella Pkwy (E)	133	130	3
N: NS 1 (N)	212	208	4
W: Brindebella Pkwy (W)	496	486	10
Total	1125	1103	23

Phase Timing Summary

Phase	A	D	E	F
Phase Change Time (sec)	14	26	38	0
Green Time (sec)	6	6	6	8
Phase Time (sec)	12	12	12	14
Phase Split	24%	24%	24%	28%

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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %						Veh	Dist m				
			veh/h	v/c	%	sec			m		%	%	
South: NS 1 (S)													
Lane 1	62	2.0	1275	0.049	100	6.9	LOS A	0.3	2.2	Short	60	0.0	NA
Lane 2	156	2.0	229	0.679	100	25.7	LOS C	4.1	30.7	Full	90	0.0	0.0
Lane 3	81	2.0	218	0.372	55 ⁵	29.2	LOS C	2.0	14.8	Short	60	0.0	NA
Approach	299	2.0		0.679		22.7	LOS C	4.1	30.7				
East: Brindebella Pkwy (E)													
Lane 1	41	2.0	230	0.179	100	24.0	LOS C	0.9	6.9	Full	170	0.0	0.0
Lane 2	41	2.0	229	0.179	100	22.8	LOS C	1.0	7.2	Full	170	0.0	0.0
Lane 3	58	2.0	291	0.199	100	26.4	LOS C	1.3	9.7	Short	80	0.0	NA
Approach	140	2.0		0.199		24.6	LOS C	1.3	9.7				
North: NS 1 (N)													
Lane 1	2	2.0	1293	0.002	100	6.7	LOS A	0.0	0.1	Short	60	0.0	NA
Lane 2	111	2.0	220	0.504	100	28.8	LOS C	2.8	20.8	Full	295	0.0	0.0
Lane 3	110	2.0	218	0.504	100	29.8	LOS C	2.7	20.6	Short	60	0.0	NA
Approach	223	2.0		0.504		29.1	LOS C	2.8	20.8				
West: Brindebella Pkwy (W)													
Lane 1	205	2.0	1206	0.170	100	7.6	LOS A	1.3	9.6	Short	80	0.0	NA
Lane 2	29	2.0	229	0.126	100	22.6	LOS C	0.7	5.0	Full	300	0.0	0.0
Lane 3	29	2.0	229	0.126	100	22.6	LOS C	0.7	5.0	Full	300	0.0	0.0
Lane 4	259	2.0	291	0.890	100	37.9	LOS D	8.0	60.3	Short	80	0.0	NA
Approach	522	2.0		0.890		24.3	LOS C	8.0	60.3				
Intersection	1184	2.0		0.890		24.8	LOS C	8.0	60.3				

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

Lane LOS values are based on average delay per lane.

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.

5 Lane under-utilisation found by the program

Site: R/NS [Romeo Road / NS 1 - 2031 PM]

New Site

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

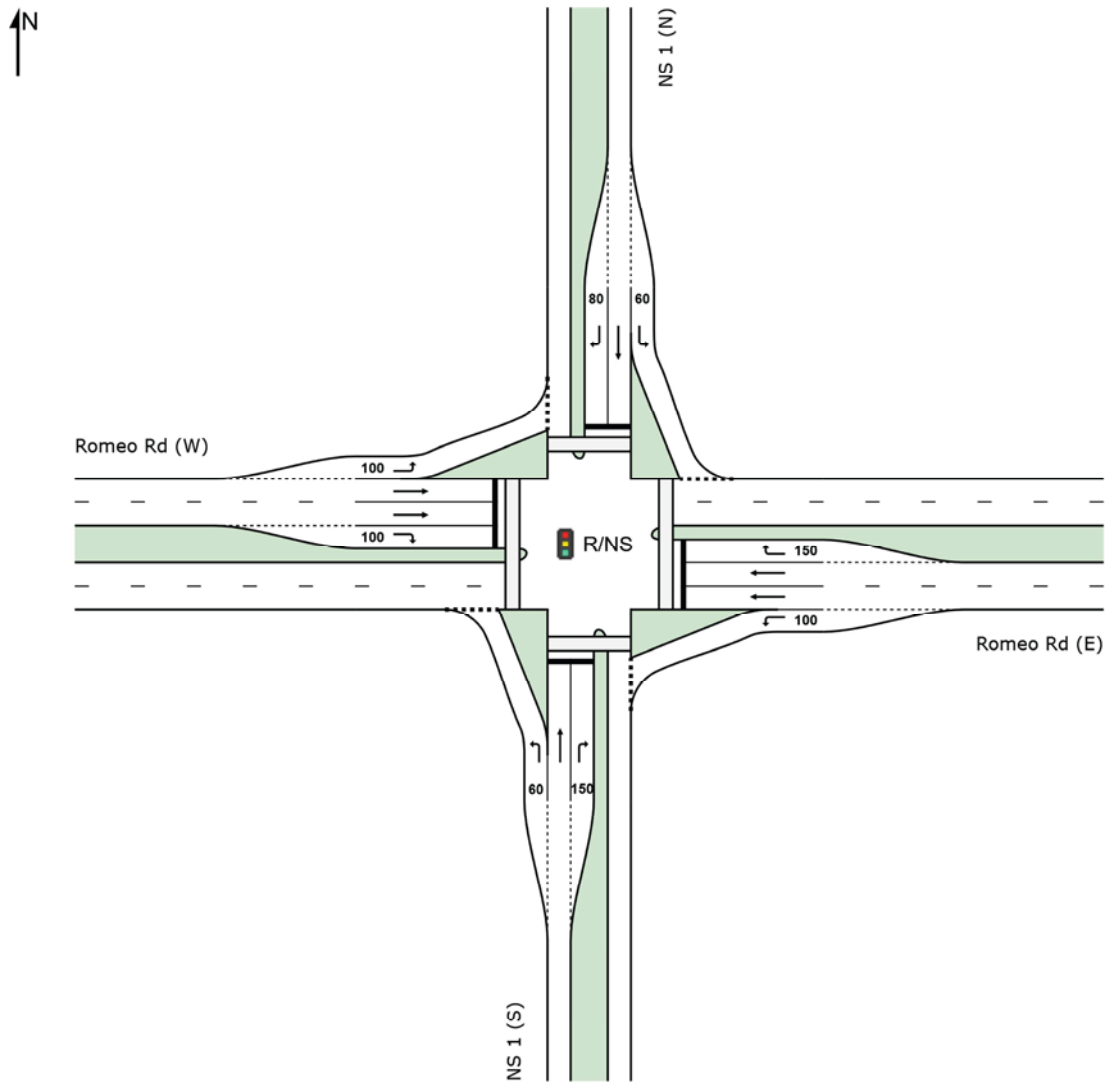
Reference Phase: Phase C

Input Phase Sequence: A, B1*, B2*, C, D, E1*, E2*, F

Output Phase Sequence: A, B2*, C, D, E2*, F

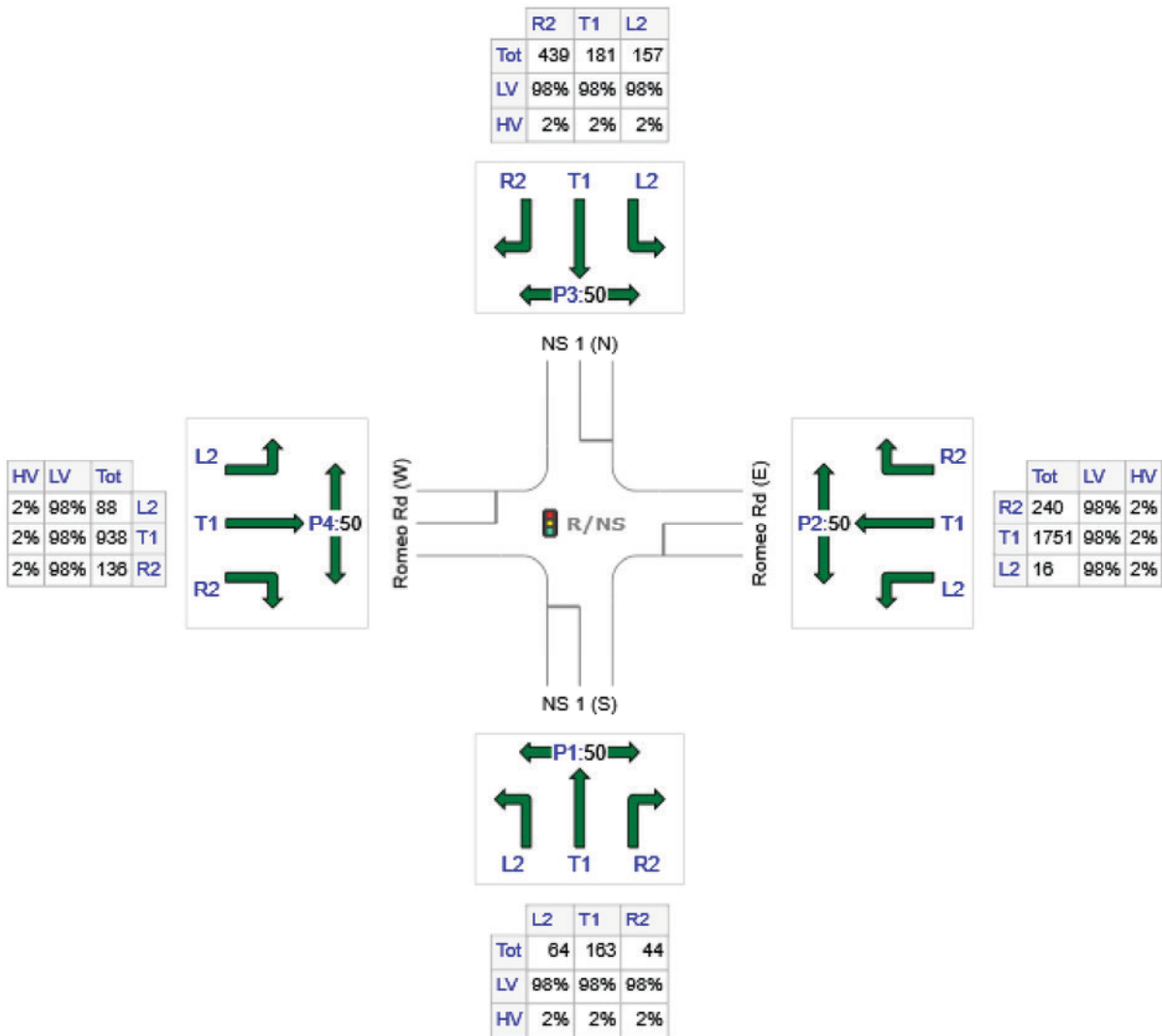
(* Variable Phase)

Site Layout



Input Volumes

Volume Display Method: Total and %



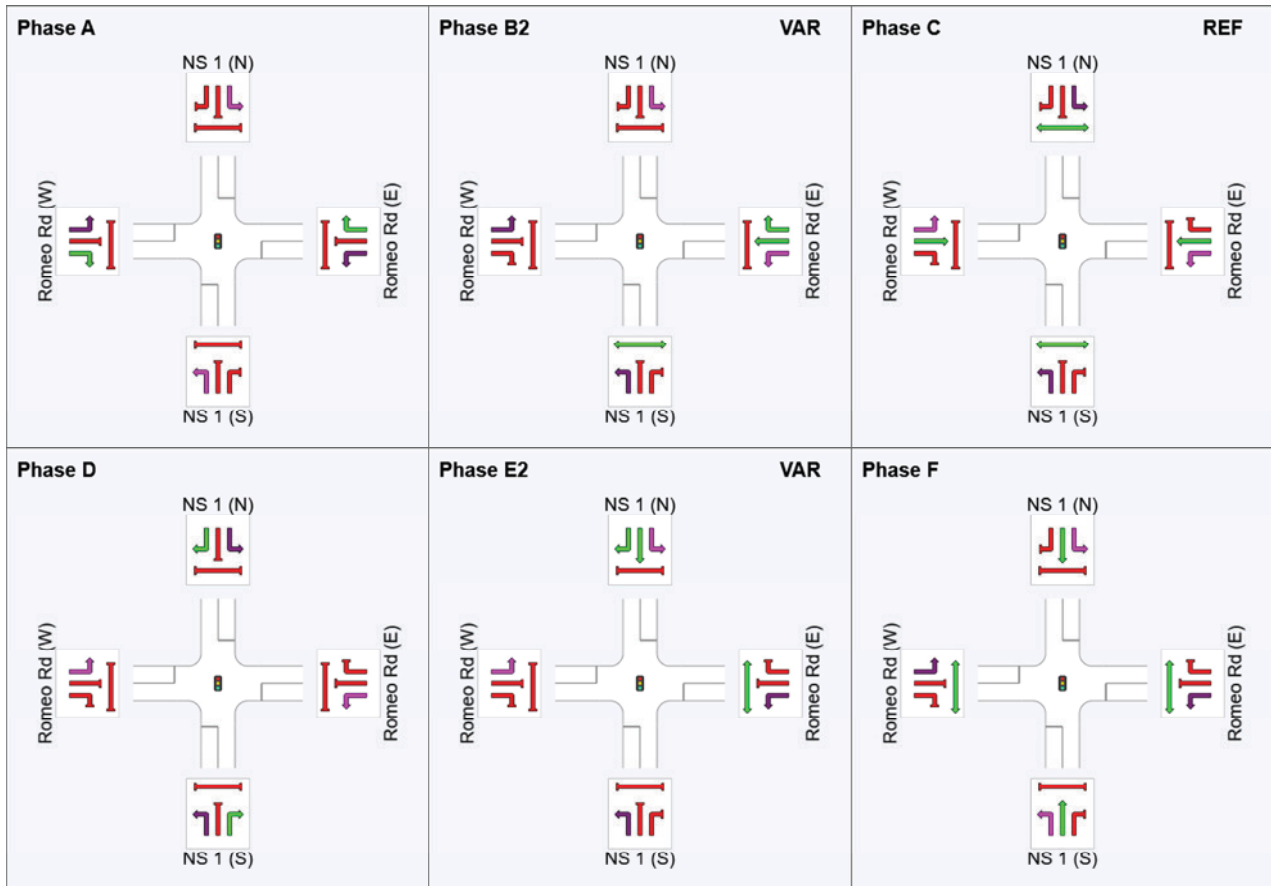
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NS 1 (S)	271	266	5
E: Romeo Rd (E)	2007	1967	40
N: NS 1 (N)	777	761	16
W: Romeo Rd (W)	1162	1139	23
Total	4217	4133	84

Phase Timing Summary

Phase	A	B2	C	D	E2	F
Phase Change Time (sec)	86	99	0	42	55	72
Green Time (sec)	7	5	36	7	11	8
Phase Time (sec)	13	11	42	13	17	14
Phase Split	12%	10%	38%	12%	15%	13%

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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %						Veh	Dist m				
South: NS 1 (S)													
Lane 1	67	2.0	478	0.141	100	37.4	LOS D	2.8	20.7	Short	60	0.0	NA
Lane 2	172	2.0	139	1.234	100	268.9	LOS F	23.9	179.6	Full	500	0.0	0.0
Lane 3	46	2.0	116	0.400	100	62.4	LOS E	2.5	19.1	Short	150	0.0	NA
Approach	285	2.0		1.234		180.7	LOS F	23.9	179.6				
East: Romeo Rd (E)													
Lane 1	17	2.0	1340	0.013	100	8.2	LOS A	0.2	1.4	Short	100	0.0	NA
Lane 2	939	2.0	810 ¹	1.159	100	200.8	LOS F	118.4	888.3	Full	240	0.0	100.0
Lane 3	904	2.0	780 ¹	1.159	100	201.4	LOS F	114.2	857.1	Full	240	0.0	100.0
Lane 4	253	2.0	297	0.849	100	62.1	LOS E	14.8	111.4	Short	150	0.0	NA
Approach	2113	2.0		1.159		182.9	LOS F	118.4	888.3				
North: NS 1 (N)													
Lane 1	165	2.0	1060	0.156	100	12.5	LOS B	3.3	24.4	Short	60	0.0	NA
Lane 2	191	2.0	434	0.439	100	39.7	LOS D	8.9	66.5	Full	100	0.0	100.0 ⁸
Lane 3	462	2.0	383 ¹	1.206	100	250.8	LOS F	62.5	469.0	Short	80	0.0	NA
Approach	818	2.0		1.206		153.4	LOS F	62.5	469.0				
West: Romeo Rd (W)													
Lane 1	93	2.0	1258	0.074	100	10.1	LOS B	1.4	10.5	Short	100	0.0	NA
Lane 2	505	2.0	619 ¹	0.815	100	40.4	LOS D	26.5	198.9	Full	300	0.0	0.0
Lane 3	483	2.0	592 ¹	0.815	100	40.1	LOS D	25.1	188.3	Full	300	0.0	0.0
Lane 4	143	2.0	116	1.237	100	277.7	LOS F	20.1	151.0	Short	100	0.0	NA
Approach	1223	2.0		1.237		65.8	LOS E	26.5	198.9				
Intersection	4439	2.0		1.237		145.1	LOS F	118.4	888.3				

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

Lane LOS values are based on average delay per lane.

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.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

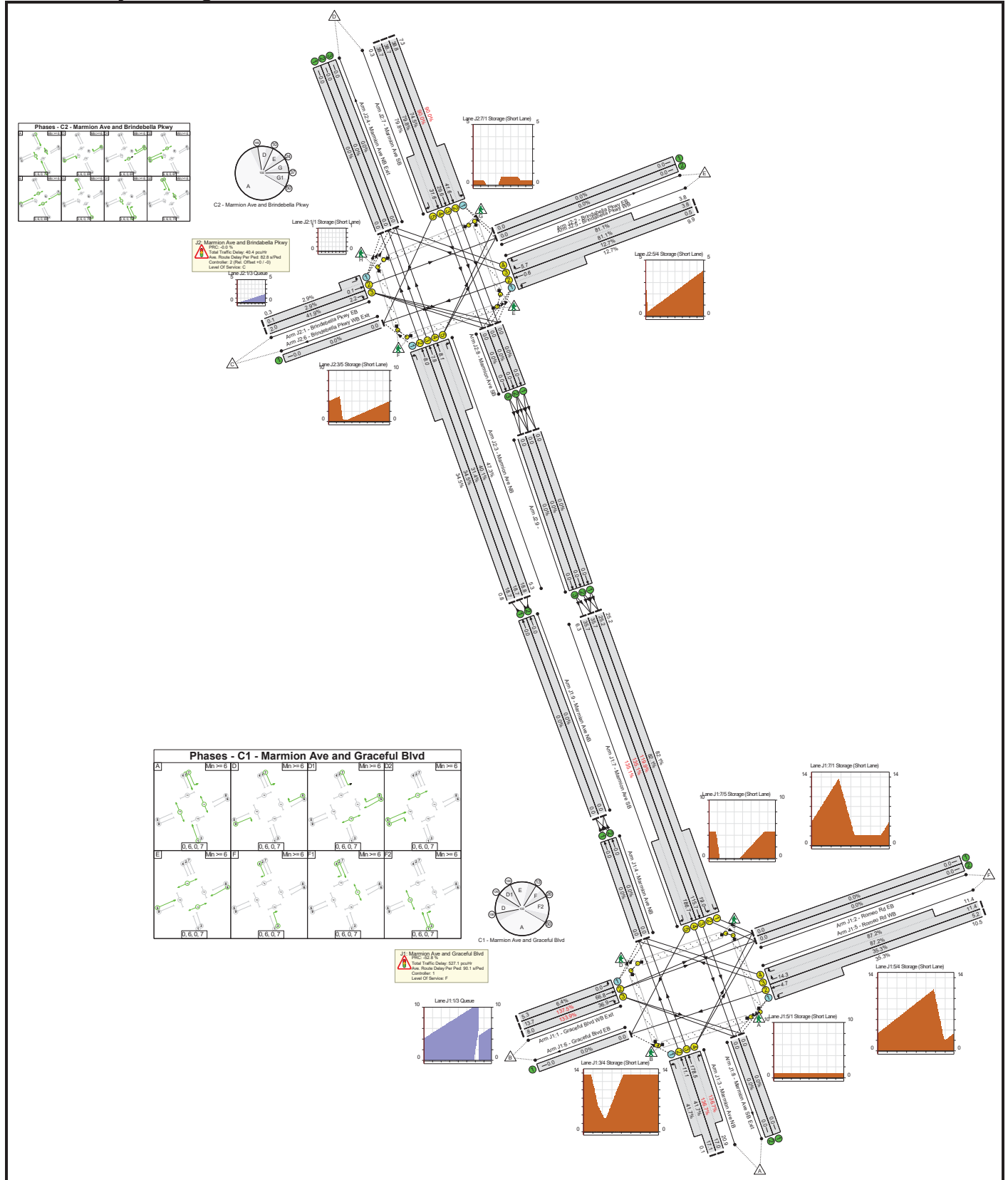
Main Roads Reports
Main Roads Reports

Project and User Details

Project:	Alkimos Central
Title:	Stage 2 - 2026 - 2031 Full Build of Marmion Avenue
Location:	Alkimos
File name:	200409-Alkimos - Marmion Ave.lsg3x
Author:	Kieran Mann
Company:	GTA Consultants
Address:	Level 2, 5 Mill Street, Perth, WA 6000

Scenario 1: '2032 AM Peak Stage 2' (FG1: '2032 AM Peak', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue										
J1: Marmion Ave and Graceful Blvd										
1/1	Graceful Blvd WB Exit Left	-	126	1965	1965	6.4%	0.0	1.0	A	0.0
1/2	Graceful Blvd WB Exit Ahead	17	328	2105	239	137.5%	60.0	658.5	F	66.8
1/3	Graceful Blvd WB Exit Right	11	193	1965	144	133.9%	33.0	616.4	F	36.9
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	75	413	1965:1965	982+7	41.7 : 41.7%	3.1	26.6	C	11.1
3/3+3/4	Marmion Ave NB Right Ahead	75:30	910	1965:1965	299+366	136.7 : 136.7%	149.2	590.4	F	178.5
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	30	375	1965:1965	351+710	35.3 : 35.3%	2.0	19.6	B	4.7
5/3+5/4	Romeo Rd WB Right	24	548	1965:1965	314+314	87.2 : 87.2%	12.5	82.2	F	14.3
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	82	1212	1965:1965	738+738	82.1 : 82.1%	9.8	29.0	C	19.0
7/3	Marmion Ave SB Ahead	51	858	2105	716	119.9%	94.6	397.0	F	115.7
7/4+7/5	Marmion Ave SB Right Ahead	51:13	1008	1965:1965	635+111	135.1 : 135.1%	162.8	581.4	F	186.7
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

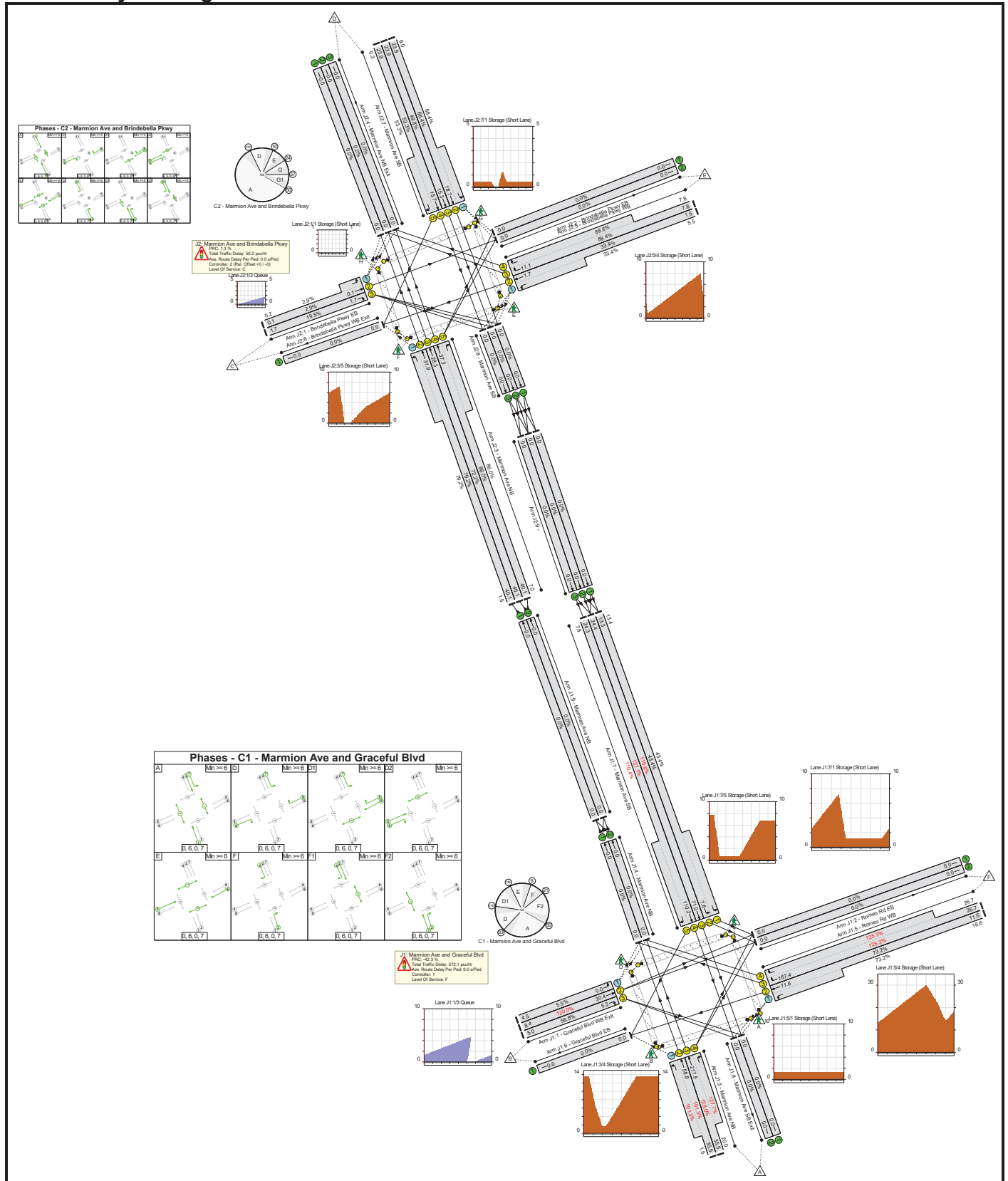
Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	40	-	1440	2.8%	0.7	66.1	-	-	1.7
Ped Link: P2	Unnamed Ped Link	3	40	-	1440	2.8%	0.8	75.1	-	-	1.7
Ped Link: P3	Unnamed Ped Link	3	40	-	1440	2.8%	0.6	54.1	-	-	1.7
Ped Link: P4	P4	3	40	-	1440	2.8%	0.8	75.1	-	-	1.7
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	90.0%	40.4	-	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	9	1965:1965	103+205	2.9 : 2.9%	0.1	28.6	C	C	0.1
1/3	Brindabella Pkwy EB Right	8	47	2105	112	41.9%	1.3	96.1	F	F	2.2
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	102	467	1965:1965	1301+52	34.5 : 34.5%	1.5	11.6	B	B	8.0
3/3	Marmion Ave NB Ahead	102	449	2105	1431	31.4%	1.4	11.6	B	B	7.8
3/4+3/5	Marmion Ave NB Right Ahead	102:19	576	1965:2105	1121+267	40.1 : 47.3%	3.7	23.3	C	C	8.1
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	250	1965:1965	102+1863	12.7 : 12.7%	0.3	4.6	A	A	0.6
5/3+5/4	Brindabella Pkwy WB Right	8	182	2105:2105	112+112	81.1 : 81.1%	5.5	109.0	F	F	5.7
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	89	1107	1965:1965	1034+195	90.0 : 90.0%	11.2	36.4	D	D	41.6
7/3	Marmion Ave SB Ahead	89	930	2105	1249	74.5%	7.2	27.8	C	C	29.6
7/4+7/5	Marmion Ave SB Right Ahead	89:6	936	1965:1965	1166+8	79.8 : 79.8%	8.1	31.3	C	C	31.6

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	P1	3	40	-	1440	2.8%	0.6	52.3	-	1.7
Ped Link: P2	P2	3	40	-	1440	2.8%	0.5	45.8	-	1.7
Ped Link: P3	P3	3	40	-	1440	2.8%	0.8	75.1	-	1.7
Ped Link: P4	P4	3	40	-	1440	2.8%	0.8	75.1	-	1.7
C1 - Marmion Ave and Graceful Blvd C2 - Marmion Ave and Brindebella Pkwy PRC for Signalled Lanes (%): -52.8 PRC for Signalled Lanes (%): -0.0 PRC Over All Lanes (%): -52.8 Total Delay for Signalled Lanes (pcuHr): 527.04 Total Delay for Signalled Lanes (pcuHr): 40.36 Total Delay Over All Lanes (pcuHr): 567.44 Cycle Time (s): 150 Cycle Time (s): 150										

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue										
J1: Marmion Ave and Graceful Blvd										
1/1	Graceful Blvd WB Exit Left	-	109	1965	1965	5.5%	0.0	1.0	A	0.0
1/2	Graceful Blvd WB Exit Ahead	12	202	2105	168	120.0%	26.1	465.1	F	30.4
1/3	Graceful Blvd WB Exit Right	16	119	1965	210	56.8%	2.8	83.3	F	5.3
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	65	889	1965:1965	841+37	101.3 : 101.3%	29.0	117.6	F	55.8
3/3+3/4	Marmion Ave NB Right Ahead	65:35	1333	1965:1965	665+377	128.0 : 127.7%	187.3	505.8	F	217.5
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	35	725	1965:1965	380+611	73.2 : 73.2%	5.3	26.4	C	11.6
5/3+5/4	Romeo Rd WB Right	39	1280	1965:1965	511+511	125.3 : 125.3%	164.5	462.8	F	167.4
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	82	641	1965:1965	737+739	43.4 : 43.4%	3.7	20.6	C	7.6
7/3	Marmion Ave SB Ahead	36	585	2105	505	115.8%	57.6	354.6	F	71.0
7/4+7/5	Marmion Ave SB Right Ahead	36:13	772	1965:1965	460+170	127.1 : 110.4%	95.7	446.4	F	110.2
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

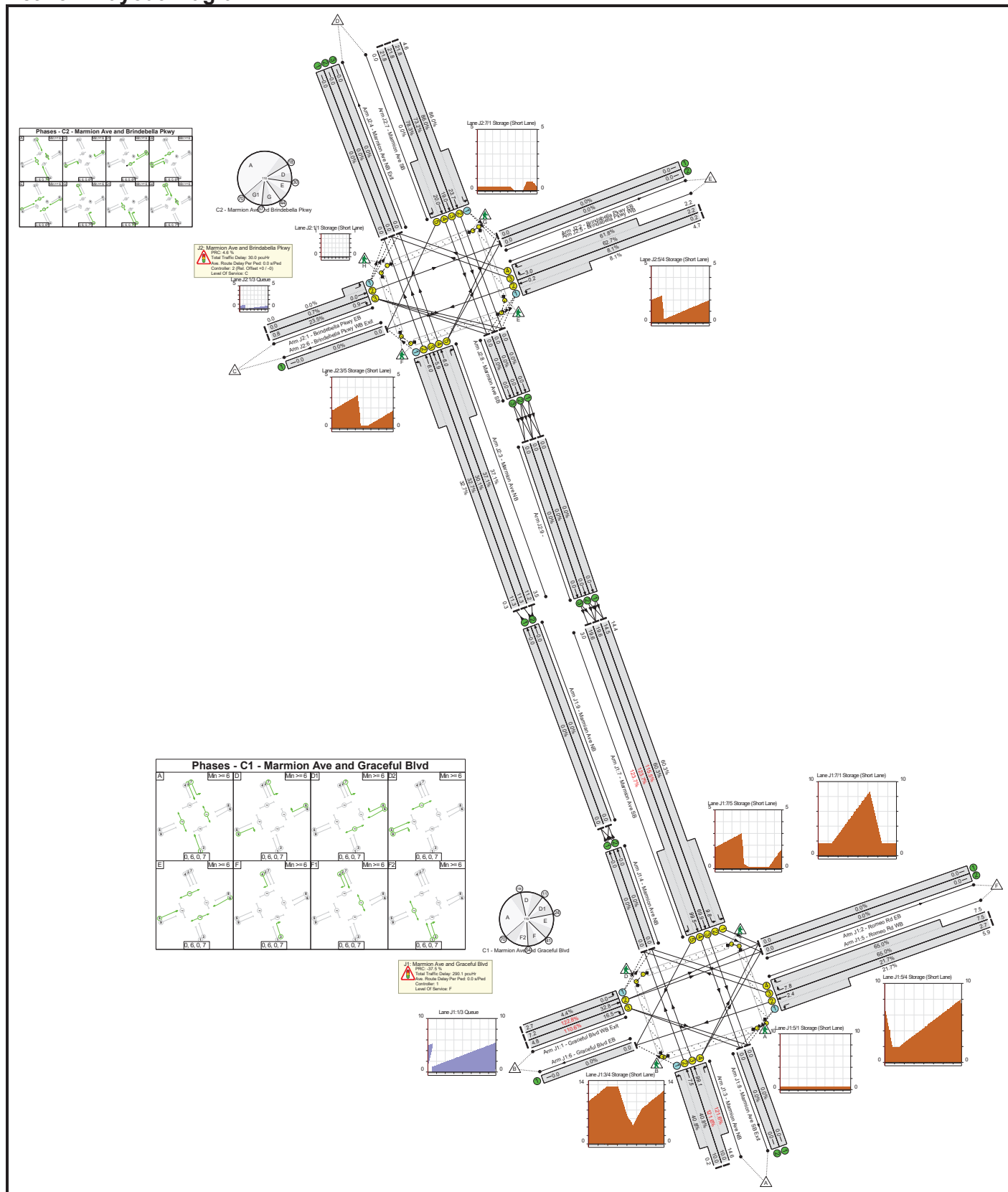
Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P2	Unnamed Ped Link	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P3	Unnamed Ped Link	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1440	0.0%	0.0	0.0	-	0.0
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	88.8%	50.2	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	7	1965:1965	104+138	2.9 : 2.9%	0.1	36.7	D	0.1
1/3	Brindabella Pkwy EB Right	15	41	2105	210	19.5%	0.8	72.6	E	1.7
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	95	999	1965:1965	1216+45	79.2 : 79.2%	7.3	26.1	C	31.9
3/3	Marmion Ave NB Ahead	95	963	2105	1333	72.2%	6.3	23.4	C	28.3
3/4+3/5	Marmion Ave NB Right Ahead	95:19	1131	1965:2105	1119+197	86.0 : 86.0%	12.0	38.1	D	37.3
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	166	1965:1965	105+392	33.4 : 33.4%	0.9	19.9	B	1.7
5/3+5/4	Brindabella Pkwy WB Right	15	373	2105:2105	210+210	88.4 : 88.8%	10.3	99.5	F	11.1
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	82	788	1965:1965	863+324	66.4 : 66.4%	4.6	20.9	C	18.7
7/3	Marmion Ave SB Ahead	82	573	2105	1151	49.8%	3.9	24.3	C	15.3
7/4+7/5	Marmion Ave SB Right Ahead	82:6	579	1965:1965	1074+11	53.3 : 53.3%	4.1	25.8	C	15.7

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	P1	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P2	P2	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P3	P3	3	0	-	1440	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1440	0.0%	0.0	0.0	-	0.0
C1 - Marmion Ave and Graceful Blvd		PRC for Signalled Lanes (%):	-42.3	Total Delay for Signalled Lanes (pcuHr):	572.08	Cycle Time (s):	150			
C2 - Marmion Ave and Brindebella Pkwy		PRC for Signalled Lanes (%):	1.3	Total Delay for Signalled Lanes (pcuHr):	50.19	Cycle Time (s):	150			
		PRC Over All Lanes (%):	-42.3	Total Delay Over All Lanes (pcuHr):	622.30					

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue										
J1: Marmion Ave and Graceful Blvd										
1/1	Graceful Blvd WB Exit Left	-	87	1965	1965	4.4%	0.0	1.0	A	0.0
1/2	Graceful Blvd WB Exit Ahead	10	235	2105	191	122.8%	29.8	456.4	F	32.8
1/3	Graceful Blvd WB Exit Right	8	158	1965	143	110.6%	14.3	324.8	F	16.5
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	45	336	1965:1965	804+20	40.8 : 40.8%	2.4	26.2	C	7.5
3/3+3/4	Marmion Ave NB Right Ahead	45:22	805	1965:1965	269+393	121.6 : 121.6%	86.4	386.4	F	99.1
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	23	282	1965:1965	411+891	21.7 : 21.7%	1.0	13.1	B	2.4
5/3+5/4	Romeo Rd WB Right	21	488	1965:1965	375+375	65.0 : 65.0%	6.5	47.9	D	7.8
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	57	945	1965:1965	784+782	60.3 : 60.3%	5.2	19.7	B	9.8
7/3	Marmion Ave SB Ahead	29	641	2105	555	115.5%	58.1	326.1	F	69.9
7/4+7/5	Marmion Ave SB Right Ahead	29:13	739	1965:1965	518+79	123.7 : 123.7%	86.4	420.8	F	99.5
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

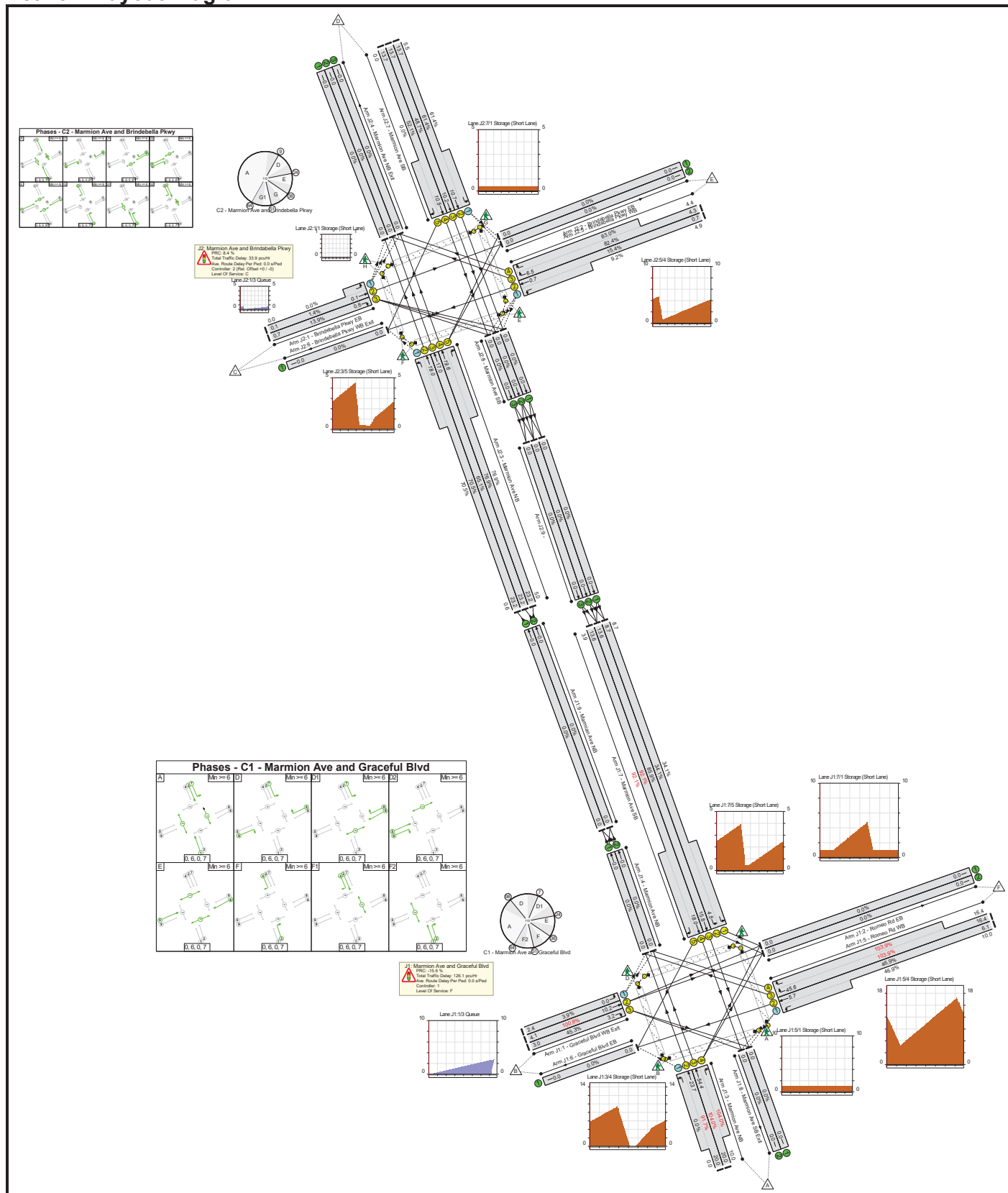
Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	0.0	-	0.0
Ped Link: P2	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	0.0	-	0.0
Ped Link: P3	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	0.0	0.0	-	0.0
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	86.0%	30.0	-	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	1	1965:1965	143+0	0.7 : 0.0%	0.0	60.5	60.5	E	0.0
1/3	Brindabella Pkwy EB Right	6	27	2105	115	23.5%	0.5	70.3	70.3	E	0.9
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	0.0	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	64	380	1965:1965	1129+34	32.7 : 32.7%	1.5	13.8	13.8	B	6.0
3/3	Marmion Ave NB Ahead	64	369	2105	1225	30.1%	1.4	13.8	13.8	B	5.9
3/4+3/5	Marmion Ave NB Right Ahead	64:19	483	1965:2105	991+310	37.1 : 37.1%	2.8	20.7	20.7	C	6.0
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	159	1965:1965	74+1891	8.1 : 8.1%	0.1	2.8	2.8	A	0.2
5/3+5/4	Brindabella Pkwy WB Right	6	143	2105:2105	115+115	62.7 : 61.8%	2.8	71.3	71.3	E	3.0
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	51	866	1965:1965	830+177	86.0 : 86.0%	8.1	33.7	33.7	C	23.7
7/3	Marmion Ave SB Ahead	51	714	2105	976	73.2%	6.1	30.7	30.7	C	19.0
7/4+7/5	Marmion Ave SB Right Ahead	51:6	713	1965:1965	911+0	78.3 : 0.0%	6.7	33.8	33.8	C	20.0

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	-	0.0
Ped Link: P1	P1	3	0	-	1964	0.0%	0.0	-	0.0
Ped Link: P2	P2	3	0	-	1964	0.0%	0.0	-	0.0
Ped Link: P3	P3	3	0	-	1964	0.0%	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	-	0.0
C1 - Marmion Ave and Graceful Blvd		PRC for Signalled Lanes (%):	-37.5	Total Delay for Signalled Lanes (pcuHr):	290.05	Cycle Time (s):	110		
C2 - Marmion Ave and Brindebella Pkwy		PRC for Signalled Lanes (%):	4.6	Total Delay for Signalled Lanes (pcuHr):	30.05	Cycle Time (s):	110		
		PRC Over All Lanes (%):	-37.5	Total Delay Over All Lanes (pcuHr):	320.12				

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue	-	-	-	-	-	104.0%	159.9	-	E	-
J1: Marmion Ave and Graceful Blvd	-	-	-	-	-	104.0%	126.1	-	F	-
1/1	Graceful Blvd WB Exit Left	-	77	1965	1965	3.9%	0.0	1.0	A	0.0
1/2	Graceful Blvd WB Exit Ahead	7	135	2105	134	100.8%	8.1	215.0	F	10.2
1/3	Graceful Blvd WB Exit Right	12	97	1965	214	45.3%	1.6	61.2	E	3.2
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	40	655	1965:1965	715+0	91.7 : 0.0%	10.8	59.5	E	23.7
3/3+3/4	Marmion Ave NB Right Ahead	40:19	982	1965:1965	630+314	104.0 : 104.0%	39.2	143.9	F	54.4
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	24	528	1965:1965	429+697	46.9 : 46.9%	2.5	17.3	B	5.7
5/3+5/4	Romeo Rd WB Right	29	1076	1965:1965	518+518	103.9 : 103.9%	42.4	142.0	F	45.6
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	63	570	1965:1965	837+837	34.1 : 34.1%	2.1	13.4	B	4.5
7/3	Marmion Ave SB Ahead	27	444	2105	517	85.9%	7.7	62.7	E	15.8
7/4+7/5	Marmion Ave SB Right Ahead	27:13	573	1965:1965	482+140	92.1 : 92.1%	11.5	72.1	E	18.0
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

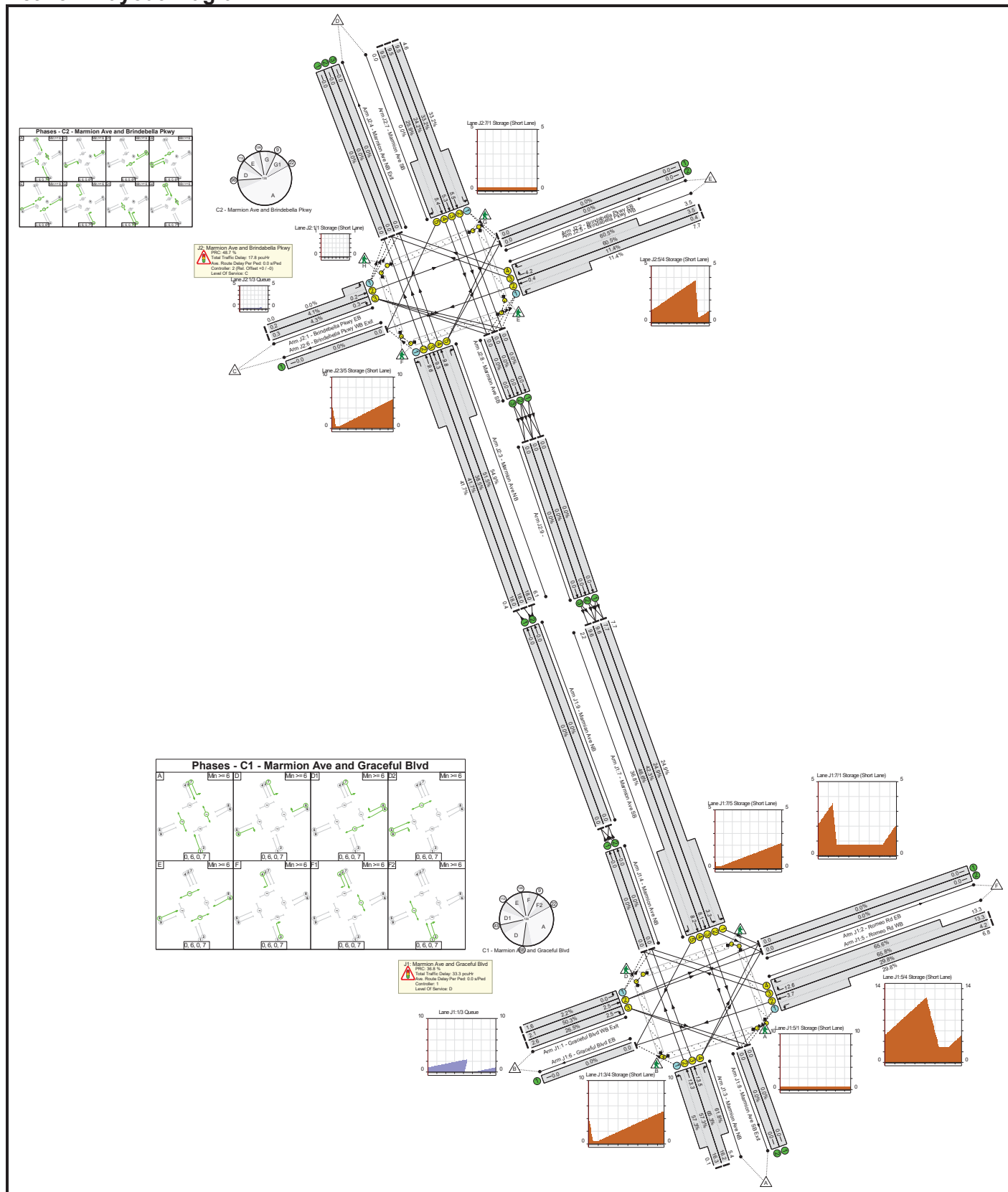
Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P2	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P3	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	0.0	-	0.0
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	83.0%	33.9	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	2	1965:1965	143+0	1.4 : 0.0%	0.0	60.5	E	0.1
1/3	Brindabella Pkwy EB Right	9	24	2105	172	13.9%	0.4	59.1	E	0.8
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	61	781	1965:1965	1078+30	70.5 : 70.5%	4.9	22.8	C	18.0
3/3	Marmion Ave NB Ahead	61	760	2105	1167	65.1%	4.5	21.5	C	17.0
3/4+3/5	Marmion Ave NB Right Ahead	61:19	922	1965:2105	988+211	76.9 : 76.9%	7.2	28.3	C	19.6
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	181	1965:1965	143+1726	15.4 : 9.2%	0.3	6.9	A	0.7
5/3+5/4	Brindabella Pkwy WB Right	9	285	2105:2105	172+172	82.4 : 83.0%	6.2	77.9	E	6.5
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	48	626	1965:1965	728+292	61.4 : 61.4%	3.6	20.7	C	10.7
7/3	Marmion Ave SB Ahead	48	447	2105	919	48.7%	3.2	26.0	C	10.2
7/4+7/5	Marmion Ave SB Right Ahead	48:6	447	1965:1965	857+0	52.1 : 0.0%	3.4	27.0	C	10.5

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	P1	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P2	P2	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P3	P3	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	0.0	-	0.0
C1 - Marmion Ave and Graceful Blvd		PRC for Signalled Lanes (%):	-15.6	Total Delay for Signalled Lanes (pcuHr):	126.07	Cycle Time (s):	110			
C2 - Marmion Ave and Brindebella Pkwy		PRC for Signalled Lanes (%):	8.4	Total Delay for Signalled Lanes (pcuHr):	33.85	Cycle Time (s):	110			
		PRC Over All Lanes (%):	-15.6	Total Delay Over All Lanes (pcuHr):	159.95					

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue	-	-	-	-	-	65.8%	51.0	-	C	-
	-	-	-	-	-	65.8%	33.3	-	D	-
J1: Marmion Ave and Graceful Blvd	Graceful Blvd WB Exit Left	-	43	1965	1965	2.2%	0.0	0.9	A	0.0
1/1	Graceful Blvd WB Exit Ahead	7	57	2105	113	50.3%	1.4	91.2	F	2.5
1/2	Graceful Blvd WB Exit Right	18	72	1965	272	26.5%	1.2	59.1	E	2.5
1/3	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Marmion Ave NB Ahead Left	52	453	1965:1965	786+5	57.3 : 57.3%	4.5	35.5	D	13.3
3/2+3/1	Marmion Ave NB Right Ahead	52:19	599	1965:1965	688+243	65.3 : 61.8%	6.8	41.0	D	13.5
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	26	304	1965:1965	386+634	29.8 : 29.8%	1.6	19.2	B	3.7
5/3+5/4	Romeo Rd WB Right	37	735	1965:1965	559+559	65.8 : 65.6%	9.3	45.6	D	12.6
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	83	427	1965:1965	861+857	24.9 : 24.9%	1.3	10.9	B	3.3
7/3	Marmion Ave SB Ahead	39	267	2105	632	42.3%	3.1	41.4	D	8.1
7/4+7/5	Marmion Ave SB Right Ahead	39:13	327	1965:1965	573+163	46.6 : 36.8%	4.0	44.5	D	8.2
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

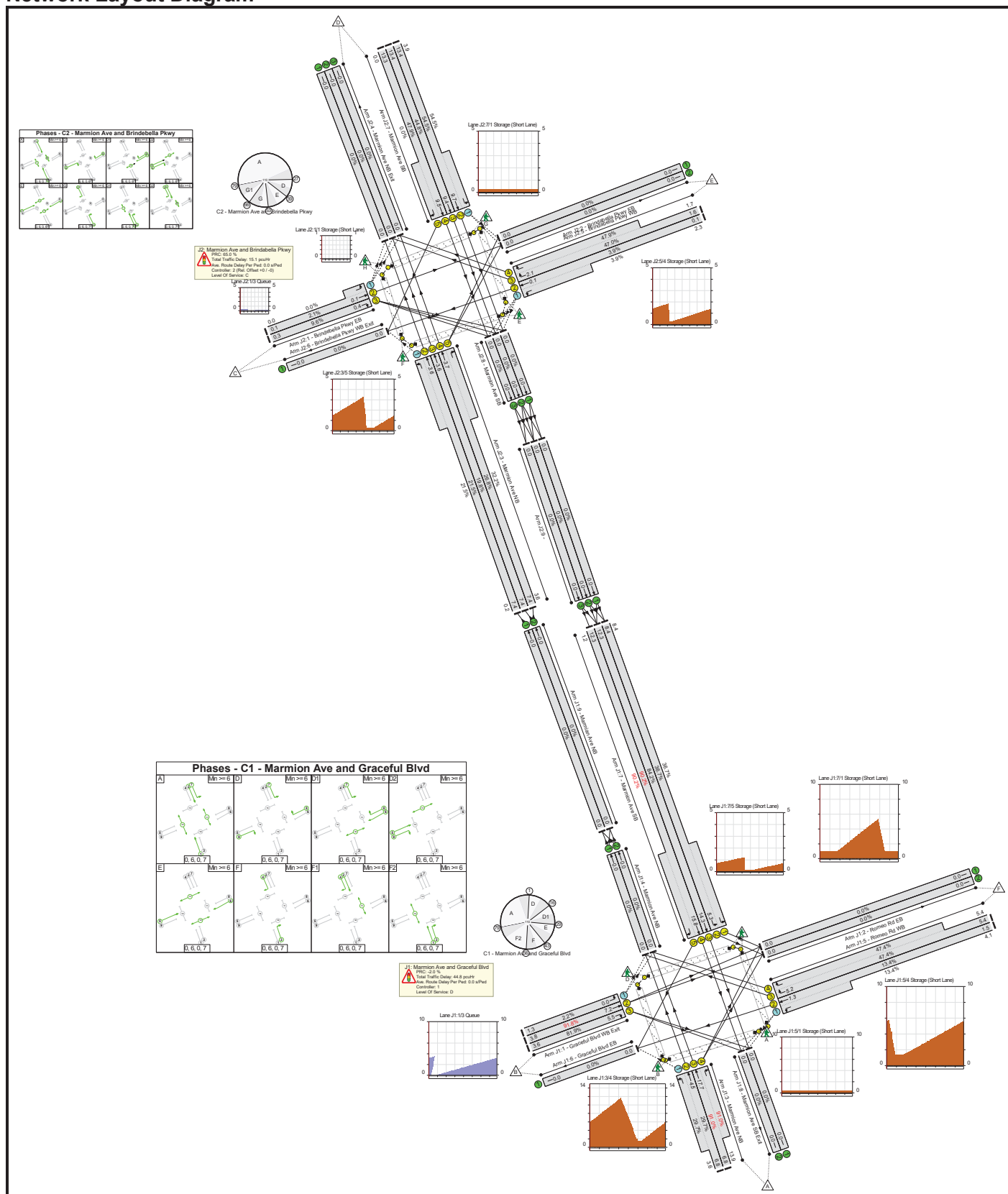
Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P2	Unnamed Ped Link	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P3	Unnamed Ped Link	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1662	0.0%	0.0	0.0	-	0.0
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	60.5%	17.8	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	5	1965:1965	121+0	4.1 : 0.0%	0.1	73.2	E	0.2
1/3	Brindabella Pkwy EB Right	10	7	2105	162	4.3%	0.1	67.5	E	0.3
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	80	509	1965:1965	1198+24	41.7 : 41.7%	2.1	15.2	B	9.6
3/3	Marmion Ave NB Ahead	80	499	2105	1295	38.5%	2.1	14.9	B	9.3
3/4+3/5	Marmion Ave NB Right Ahead	80:19	668	1965:2105	969+308	51.5 : 54.9%	4.8	25.6	C	9.8
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	224	1965:1965	88+1877	11.4 : 11.4%	0.2	3.6	A	0.4
5/3+5/4	Brindabella Pkwy WB Right	10	196	2105:2105	162+162	60.5 : 60.5%	3.9	72.0	E	4.2
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	67	390	1965:1965	793+383	33.2 : 33.2%	1.5	14.2	B	5.5
7/3	Marmion Ave SB Ahead	67	262	2105	1085	24.2%	1.4	19.6	B	5.3
7/4+7/5	Marmion Ave SB Right Ahead	67:6	262	1965:1965	1013+0	25.9 : 0.0%	1.5	20.0	C	5.4

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	P1	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P2	P2	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P3	P3	3	0	-	1662	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1662	0.0%	0.0	0.0	-	0.0
C1 - Marmion Ave and Graceful Blvd		PRC for Signalled Lanes (%):	36.8	Total Delay for Signalled Lanes (pcuHr):	33.25	Cycle Time (s):	130			
C2 - Marmion Ave and Brindebella Pkwy		PRC for Signalled Lanes (%):	48.7	Total Delay for Signalled Lanes (pcuHr):	17.76	Cycle Time (s):	130			
		PRC Over All Lanes (%):	36.8	Total Delay Over All Lanes (pcuHr):	51.01					

Network Layout Diagram



Main Roads Reports
Network Results

Item	Lane Description	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Level Of Service	Mean Max Queue (pcu)
Network: Stage 2 - 2026 - 2031 Full Build of Marmion Avenue	-	-	-	-	-	91.8%	59.9	-	D	-
	-	-	-	-	-	91.8%	44.8	-	D	-
J1: Marmion Ave and Graceful Blvd	Graceful Blvd WB Exit Left	-	44	1965	1965	2.2%	0.0	0.9	A	0.0
1/1	Graceful Blvd WB Exit Ahead	7	123	2105	134	91.8%	5.2	152.1	F	7.2
1/2	Graceful Blvd WB Exit Right	8	117	1965	143	81.9%	3.6	110.6	F	5.5
1/3	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/1	Romeo Rd EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Marmion Ave NB Ahead Left	48	342	1965:1965	755+398	29.7 : 29.7%	1.4	15.1	B	4.5
3/2+3/1	Marmion Ave NB Right Ahead	48:29	678	1965:1965	246+499	91.0 : 91.0%	10.6	56.2	E	17.7
4/1	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
5/2+5/1	Romeo Rd WB Ahead Left	20	182	1965:1965	357+997	13.4 : 13.4%	0.6	11.5	B	1.3
5/3+5/4	Romeo Rd WB Right	21	356	1965:1965	375+375	47.4 : 47.4%	4.4	44.2	D	5.2
6/1	Graceful Blvd EB	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left	53	549	1965:1965	746+749	36.7 : 36.7%	2.9	19.1	B	5.3
7/3	Marmion Ave SB Ahead	25	403	2105	478	84.2%	7.1	63.0	E	14.3
7/4+7/5	Marmion Ave SB Right Ahead	25:13	443	1965:1965	447+44	90.2 : 90.2%	9.1	73.8	E	15.8
8/1	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/1	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0

Main Roads Reports

9/2	Marmion Ave NB Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P2	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P3	Unnamed Ped Link	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	0.0	-	0.0
J2: Marmion Ave and Brindabella Pkwy	-	-	-	-	-	54.5%	15.1	-	C	-
1/2+1/1	Brindabella Pkwy EB Ahead Left	8	3	1965:1965	143+0	2.1 : 0.0%	0.1	60.6	E	0.1
1/3	Brindabella Pkwy EB Right	6	11	2105	115	9.6%	0.2	67.0	E	0.4
2/1	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
2/2	Brindabella Pkwy EB	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
3/2+3/1	Marmion Ave NB Ahead Left	64	249	1965:1965	1132+28	21.5 : 21.5%	0.9	12.7	B	3.6
3/3	Marmion Ave NB Ahead	64	243	2105	1225	19.8%	0.9	12.7	B	3.6
3/4+3/5	Marmion Ave NB Right Ahead	64:19	359	1965:2105	904+364	26.8 : 32.2%	2.2	22.4	C	3.7
4/1	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/2	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
4/3	Marmion Ave NB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
5/2+5/1	Brindabella Pkwy WB Ahead Left	8	77	1965:1965	77+1888	3.9 : 3.9%	0.1	2.8	A	0.1
5/3+5/4	Brindabella Pkwy WB Right	6	109	2105:2105	115+115	47.0 : 47.9%	2.0	65.3	E	2.1
6/1	Brindabella Pkwy WB Exit	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
7/2+7/1	Marmion Ave SB Left Ahead	51	564	1965:1965	801+233	54.5 : 54.5%	3.1	19.6	B	9.7
7/3	Marmion Ave SB Ahead	51	437	2105	976	44.8%	2.8	23.3	C	9.4
7/4+7/5	Marmion Ave SB Right Ahead	51:6	436	1965:1965	911+0	47.9 : 0.0%	2.9	24.1	C	9.5

Main Roads Reports

8/1	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
8/2	Marmion Ave SB Ahead	-	0	2105	2105	0.0%	0.0	0.0	-	0.0
8/3	Marmion Ave SB Ahead	-	0	1965	1965	0.0%	0.0	0.0	-	0.0
9/1	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/2	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
9/3	Ahead	-	0	Inf	Inf	0.0%	0.0	0.0	-	0.0
Ped Link: P1	P1	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P2	P2	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P3	P3	3	0	-	1964	0.0%	0.0	0.0	-	0.0
Ped Link: P4	P4	3	0	-	1964	0.0%	0.0	0.0	-	0.0
C1 - Marmion Ave and Graceful Blvd		PRC for Signalled Lanes (%):	-2.0	Total Delay for Signalled Lanes (pcuHr):	44.80	Cycle Time (s):	110			
C2 - Marmion Ave and Brindebella Pkwy		PRC for Signalled Lanes (%):	65.0	Total Delay for Signalled Lanes (pcuHr):	15.08	Cycle Time (s):	110			
		PRC Over All Lanes (%):	-2.0	Total Delay Over All Lanes (pcuHr):	59.88					

C. WAPC GUIDELINES CHECKLIST



APPENDIX: WAPC GUIDELINES CHECKLIST

Item	Provided	Comments/Proposals
Summary	✓	
Introduction/Background	✓	
Precinct Plan proposal	✓	
regional context	✓	Section 2.1
proposed land uses	✓	Section 2.2
table of land uses and quantities	✓	Section 2.2
major attractors/generators	✓	Section 2.3
specific issues	✓	Section 2.4
Existing situation		
existing land uses within Precinct Plan	N/A	No existing development
existing land uses within 800 metres of Precinct Plan area	✓	Section 3.1
existing road network within Precinct Plan area	N/A	No existing development
existing pedestrian/cycle networks within Precinct Plan area	N/A	No existing development
existing public transport services within Precinct Plan area	N/A	No existing development
existing road network within 2 (or 5) km of Precinct Plan area	✓	Section 3.3
traffic flows on roads within Precinct Plan area (PM and/or AM peak hours)	N/A	No existing development
traffic flows on roads within 2 (or 5) km of Precinct Plan area (AM and/or PM peak hours)	✓	Section 3.4
existing pedestrian/cycle networks within 800m of Precinct Plan area	✓	Section 3.2.2
existing public transport services within 800m of Precinct Plan area	✓	Section 3.2.3
Proposed internal transport networks		
changes/additions to existing road network or proposed new road network	✓	Section 4.1
road reservation widths	✓	Section 4.2
road cross-sections & speed limits	✓	Section 4.2
intersection controls	✓	Section 4.4
pedestrian/cycle networks and crossing facilities	✓	Section 4.5
public transport routes	✓	Section 4.6
Changes to external transport networks		
road network	✓	Section 4.1
intersection controls	✓	Section 4.4
pedestrian/cycle networks and crossing facilities	✓	Section 4.5

APPENDIX: WAPC GUIDELINES CHECKLIST

public transport services	✓	Section 4.6
Integration with surrounding area		
trip attractors/generators within 800 metres	✓	Section 5.1
proposed changes to land uses within 800 metres	✓	Section 5.2
travel desire lines from Precinct Plan to these attractors/generators	✓	Section 5.3
adequacy of external transport networks	✓	Section 5.4
deficiencies in external transport networks	✓	Section 5.4
remedial measures to address deficiencies	✓	Section 5.5
Analysis of internal transport networks		
assessment year(s) and time period(s)	✓	Section 6.1
Precinct Plan generated traffic	✓	Section 6.2
extraneous (through) traffic	✓	Section 6.3
design traffic flows (that is, total traffic)	✓	Section 6.4
road cross-sections	✓	Section 4.2
intersection controls	✓	Section 4.4
access strategy	✓	Section 4.3
pedestrian/cycle networks	✓	Section 4.5
safe routes to schools	✓	Section 6.6
pedestrian permeability & efficiency	✓	Section 4.5
access to public transport	✓	Section 4.6
Analysis of external transport networks		
extent of analysis	✓	Section 6.1
base flows for assessment year(s)	N/A	New development with no base flows
total traffic flows	✓	Section 6.4
road cross-sections	✓	Section 4.2
intersection layouts & controls	✓	Section 4.4
pedestrian/cycle networks	✓	Section 4.5
Conclusions		

Proponent's Name: Damien Guiduci

Company: Development WA

Date: 13/10/2021

Transport Assessor's Name: Aaron MacNish

Company: GTA Consultants, now Stantec

Date: 13/10/2021

