

Vaughan Terrace,
North Melbourne
Transport Impact Assessment
Proposed Mixed-Use
Development



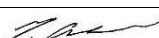
Vaughan Terrace, North Melbourne
Proposed Mixed-Use Development
Transport Impact Assessment

Client: Hydrox Nominees Pty Ltd

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GTA Consultants Office: Melbourne

Quality Record

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1. Introduction

1.1 Background

A town planning permit is currently being sought for a proposed mixed-use development on land at 2-24 Vaughan Terrace, 101-117 Canning Street and 168-190 Macaulay Road in North Melbourne.

The development proposal comprises 304 residential apartments, a 4,350sqm supermarket, 1,543sqm of specialty retail and two on-site car parks. Two vehicle accesses are proposed to the car parks, one on Canning Street providing access to resident car parking and the second on Macaulay Road providing access to retail and some residential car parking.

A loading area is proposed along the southwest site frontage with a separate vehicle entry and exit crossover onto Macaulay Road.

GTA Consultants was commissioned by the Applicant in March 2011 to undertake a transport impact assessment of the proposed development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated parking, traffic and transport implications of the proposed development, including consideration of the following:

- i existing traffic conditions surrounding the site
- ii parking demand likely to be generated by the proposed development
- iii suitability of the proposed parking in terms of supply (quantum) and layout
- iv traffic generation characteristics of the proposed development
- v proposed access arrangements for the site
- vi transport impact of the development proposal on the surrounding road network.

1.3 Referenced Documents

In preparing this report, reference has been made to a number of background documents, including:

- Melbourne Planning Scheme
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- plans for the proposed development prepared by The Buchan Group
- traffic and car parking surveys undertaken by GTA Consultants as referenced in the context of this report
- various technical data as referenced in this report
- an inspection of the site and its surrounds
- other documents as nominated.

2. Existing Conditions

2.1 Subject Site

The subject site is located on land at 2-24 Vaughan Terrace, 101-117 Canning Street and 168-190 Macaulay Road in North Melbourne. The site has a site area of 8,156sqm (approximately) and has frontages of approximately 150m to Canning Street, 75m to Vaughan Terrace and 80m to Macaulay Road.

The site is located within a Mixed-Use Zone (MUZ) and is currently occupied by a commercial property.

The surrounding properties include a mix of residential and commercial land uses. The notable exception includes Clayton Reserve, located in the immediate vicinity of the site and the North Melbourne Cricket Ground which is located to the south of the subject site.

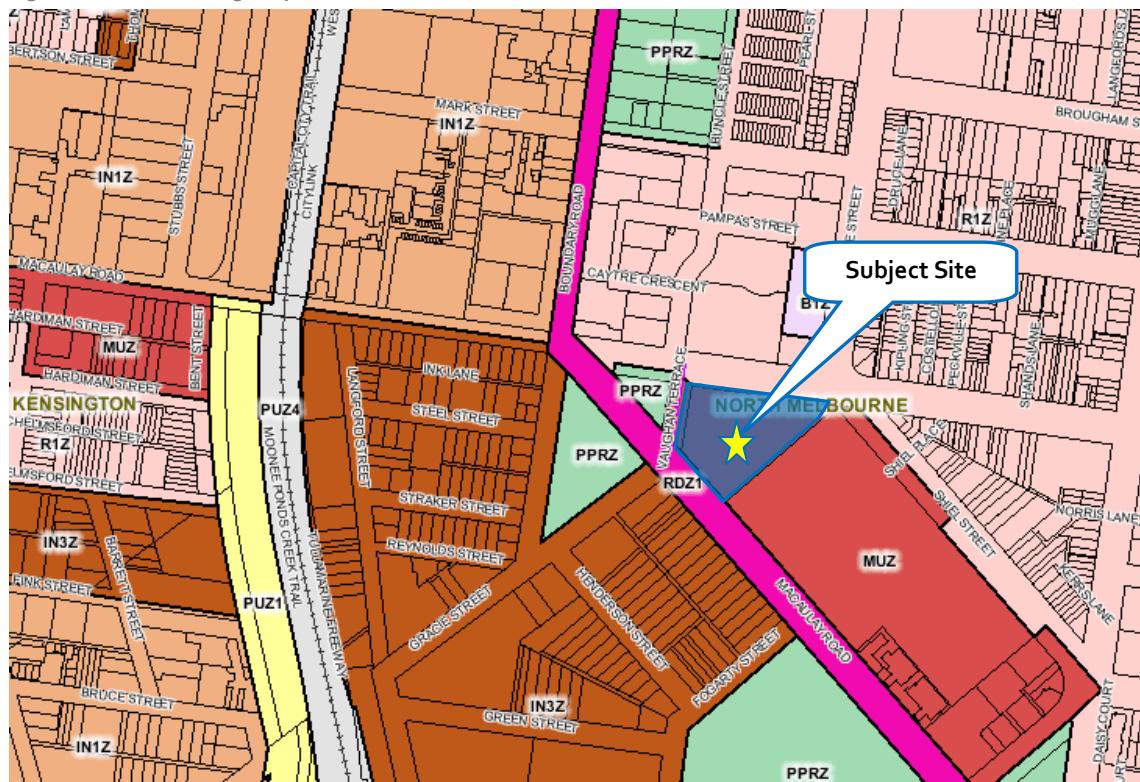
The location of the subject site and the surrounding environs is shown in Figure 2.1, and the land use zoning is shown in Figure 2.2.

Figure 2.1: Subject Site and its Environs



(PhotoMap courtesy of NearMap Pty Ltd)

Figure 2.2: Land Zoning Map



(Reproduced from Land Channel web site)

2.2 Road Network

2.2.1 Adjoining Roads

Macaulay Road

Macaulay Road functions as an arterial road (VicRoads controlled) and is listed as a Road Zone (Category 1) in the Melbourne Planning Scheme. It is a two-way road aligned in a northwest to southeast direction and configured with a two-lane (one lane in each direction), 23m wide carriageway set within a 30m wide road reserve (approx). A painted median, with intermittently spaced kerbed islands, is provided on the road past the subject site.

Kerbside parallel parking is permitted on both sides of the road and is subject to time restrictions.

Macaulay Road carries an average of 20,989 vehicles per weekday¹.

Canning Street

Canning Street functions as a local road (Melbourne City Council controlled). It is a two-way road configured with a two-lane (one lane in each direction), 20m wide carriageway set within a 30m wide road reserve (approx). Unrestricted kerbside parallel parking is permitted on both sides of the road.

Canning Street carries an average of 2,632 vehicles per weekday¹.

¹ Based on 24-hour pneumatic tube count surveys undertaken for a one week period from Saturday 19 March 2011 to Friday 25 March 2011.

Vaughan Terrace

Vaughan Terrace functions as a local road (Melbourne City Council controlled). It is a two-way road configured with a two-lane (one lane in each direction), 14m wide carriageway set within a 17.5m wide road reserve (approx). Unrestricted kerbside parallel parking is permitted on both sides of the road.

Vaughan Terrace carries an average of 2,961 vehicles per weekday¹.

Local Roads

Other roads within the vicinity of the site include Arden Street, Boundary Road, Melrose Street and Buncle Street.

Macaulay Road, Canning Street and Vaughan Terrace are shown in Figure 2.3 to Figure 2.8 respectively.

**Figure 2.3: Macaulay Road looking north-west
(adjacent to site)**



**Figure 2.4: Macaulay Road looking south-east
(adjacent to site)**



**Figure 2.5: Canning Street looking east
(adjacent to site)**



**Figure 2.6: Canning Street looking west
(adjacent to site)**



**Figure 2.7: Vaughan Terrace looking north
(adjacent to site)**



**Figure 2.8: Vaughan Terrace looking south
(adjacent to site)**



2.2.2 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Macaulay Road/Canning Street/Boundary Road (signalised intersection)
- Canning Street/Buncle Street/Vaughan Terrace (unsignalised intersection)
- Vaughan Terrace/ Macaulay Road/Gracie Street (unsignalised intersection)
- Melrose Street/Canning Street (unsignalised intersection)
- Macaulay Road/Arden Street/Dryburgh Street (signalised intersection).

2.2.3 Traffic Volumes

GTA Consultants undertook traffic movement counts on Friday 18 March 2011 from 7:00am to 9:00am and 4:00pm to 7:00pm, and on Saturday 19 March 2011 from 11:00am to 3:00pm at the following intersections:

- Macaulay Road/Vaughan Terrace/Gracie Street intersection
- Buncle Street/Vaughan Terrace/Canning Street intersection
- Canning Street/Melrose Street intersection.

GTA Consultants also obtained SCATS traffic volume data from VicRoads for the Macaulay Road/Canning Street/Boundary Road signalised intersection and the Macaulay Road/Arden Street/Dryburgh Street intersection for a one week period from Monday 28 February 2011 to Sunday 6 March 2011.

Further, 24-hour pneumatic tube count surveys were undertaken at the following locations for a one week period from Saturday 19 March 2011 to Friday 25 March 2011:

- Macaulay Road directly to the southeast of Vaughan Terrace
- Canning Street directly to the east of Vaughan Terrace
- Melrose Street directly to the north of Canning Street
- Vaughan Terrace directly to the south of Canning Street

The Friday PM peak hour and Saturday Midday peak hour traffic volumes are shown in Figure A1 and Figure A2 in Appendix A.

2.2.4 Traffic Capacity Surveys (Field Measurements)

Gap acceptance surveys were undertaken at the proposed location of the vehicle access to the subject site on Macaulay Road on Friday 29 April 2011 and Saturday April 2011. These surveys recorded the frequency and duration of gaps in the traffic stream along Macaulay Road during both free flow and queued conditions to identify the total number of vehicles that could undertake the left and right turn movements from the proposed vehicle access based on existing actual opportunities. The results of the gap acceptance surveys are summarised in Table 2.1.

Table 2.1: Absorption Capacity of Macaulay Road

Period	Movement	Available Capacity
Friday PM Peak	Left Turn Out	1,205vph
	Right Turn Out	246vph
Saturday MID Peak	Left Turn Out	992vph
	Right Turn Out	303vph

vph denotes vehicles per hour

2.2.5 Existing Intersection Operation

The operation of the following intersections have been assessed using SIDRA Intersection 5.0², a computer based modelling package which calculates intersection performance.

- Macaulay Road/Canning Street/Boundary Road (signalised intersection)
- Canning Street/Buncle Street/Vaughan Terrace (unsignalised intersection)
- Vaughan Terrace/ Macaulay Road/Gracie Street (unsignalised intersection)
- Melrose Street/Canning Street (unsignalised intersection)
- Macaulay Road/Arden Street/Dryburgh Street (signalised intersection).

The commonly used measure of intersection performance is referred to as the Degree of Saturation (DOS). The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. A DOS of around 0.90 and 0.95 for unsignalised and signalised intersections respectively is typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately³.

Table 2.2 to Table 2.6 present a summary of the existing operation of the intersections, with full results presented in Appendix B of this report.

² Program used under license from Akcelik & Associates Pty Ltd.

³ SIDRA INTERSECTION adopts the following criteria for Level of Service assessment:

		Intersection Degree of Saturation (X)	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	<=0.50	<=0.60
B	Very Good	0.50-0.70	0.60-0.75
C	Good	0.70-0.80	0.75-0.90
D	Acceptable	0.80-0.90	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0

Table 2.2: Macaulay Road/Canning Street/Boundary Road Signalised Intersection – Existing Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Boundary Road (south)	Friday PM	0.14	29 sec	26m
	Saturday MID	0.14	38 sec	16m
Macaulay Road (south-east)	Friday PM	0.65	24 sec	89m
	Saturday MID	0.58	17 sec	77m
Boundary Road (north)	Friday PM	0.67#	36 sec	75m
	Saturday MID	0.59	46 sec	60m
Macaulay Road (west)	Friday PM	0.65	30 sec	114m
	Saturday MID	0.60#	21 sec	130m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Macaulay Road/Canning Street/Boundary Road intersection currently operates satisfactorily with acceptable queues and delays on all approaches.

Table 2.3: Canning Street/Buncle Street/Vaughan Terrace Unsignalised Intersection – Existing Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Vaughan Terrace (south)	Friday PM	0.15#	12 sec	6m
	Saturday MID	0.11#	11 sec	4m
Canning Street (east)	Friday PM	0.04	7 sec	1m
	Saturday MID	0.04	7 sec	0m
Buncle Street (north)	Friday PM	0.04	11 sec	1m
	Saturday MID	0.03	11 sec	1m
Canning Street (west)	Friday PM	0.01	5 sec	0m
	Saturday MID	0.01	5 sec	0m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Canning Street/Buncle Street/Vaughan Terrace intersection currently operates satisfactorily with acceptable queues and delays on all approaches.

Table 2.4: Macaulay Road/Vaughan Terrace/Gracie Street Unsignalised Intersection – Existing Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Gracie Street (south)	Friday PM	0.48	97 sec	13m
	Saturday MID	0.23	53 sec	6m
Macaulay Road (east)	Friday PM	0.51	1 sec	2m
	Saturday MID	0.35	1 sec	1m
Vaughan Terrace (north)	Friday PM	1.00#	175 sec	55m
	Saturday MID	0.94#	115 sec	48m
Macaulay Road (west)	Friday PM	0.33	1 sec	1m
	Saturday MID	0.35	1 sec	1m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Vaughan Terrace/Macaulay Road/Gracie Street intersection is operating at its practical capacity during the Friday PM and Saturday Midday peak hours. The analysis suggests that the Vaughan Terrace (north) approach is the critical approach to the intersection.

Table 2.5: Melrose Street/Canning Street Unsignalised Intersection – Existing Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Canning Street (east)	Friday PM	0.13#	7 sec	5m
	Saturday MID	0.07#	5 sec	3m
Melrose Street (north)	Friday PM	0.06	12 sec	2m
	Saturday MID	0.06	12 sec	2m
Canning Street (west)	Friday PM	0.03	4 sec	0m
	Saturday MID	0.03	5 sec	0m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Melrose Street/Canning Street intersection currently operates satisfactorily with acceptable queues and delays on all approaches.

Table 2.6: Macaulay Road/Arden Street/Dryburgh Street Signalised Intersection – Existing Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Dryburgh Street (south)	Friday PM	0.69	39 sec	117m
	Saturday MID	0.45#	35 sec	79m
Arden Street (east)	Friday PM	0.69#	12 sec	76m
	Saturday MID	0.41	11 sec	34m
Macaulay Road (north)	Friday PM	0.67	28 sec	63m
	Saturday MID	0.45	25 sec	64m
Arden Street (west)	Friday PM	0.60	38 sec	93m
	Saturday MID	0.22	25 sec	47m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Macaulay Road/Arden Street/Dryburgh Street intersection currently operates satisfactorily with acceptable queues and delays on all approaches.

2.2.6 Accident Statistics

A review of the reported accident casualty history for the roads and intersections adjoining the subject site has been sourced from VicRoads accident database. The 'CrashStats' database includes all reported casualty accidents since 1987.

A summary of the accidents for the last available five year period (1 June 2005 to 31 May 2010) is presented in Table 2.7.

Table 2.7: Casualty Accident History

Location	Accident No.		
	Fatality	Serious Injury	Other Injury
Macaulay Road and Gracie Street intersection	0	1	0
Canning Street and Melrose Street intersection	0	0	1
Total	0	1	1

Source: VicRoads

Table 2.7 indicates that two accidents have been recorded during the nominated accident period. The 'serious injury' accident recorded at the Macaulay Road/Gracie Street intersection involved a vehicle losing control on the carriageway and colliding with a cyclist.

Based on the available data, there does not appear to be an accident trend on any part of the road network in the immediate vicinity of the subject site.

2.3 Sustainable Transport Infrastructure

2.3.1 Public Transport

Figure 2.9 shows the subject site in relation to existing public transport routes within its vicinity whilst Table 2.8 summarises the road based routes and major destinations that can be reached using these services.

Figure 2.9: Public Transport Map



Table 2.8: Road Based Public Transport Provision

Service	Route Nos	Route Description	Distance to Nearest Stop (m)	Significant Destinations On Route	Frequency On/Off peak
Tram	57	West Maribyrnong – City Elizabeth St	600m	Flinders Street Railway Station, Lonsdale Street, Queen Victoria Market, Melbourne Showgrounds.	12mins
Bus	402	Footscray – East Melbourne via North Melbourne	130m	Kensington Railway Station, Royal Melbourne Hospital, St Vincent's Hospital.	10mins

In addition to road based public transport, Macaulay rail station on the Upfield line is located approximately 1.3km from the subject site.

2.3.2 Pedestrian Infrastructure

Pedestrian paths are located as follows:

- Canning Street (both sides)
- Boundary Road (both sides)
- Macaulay Road (both sides)
- Gracie Street (both sides)
- Melrose Street (both sides).

2.3.3 Cycle Infrastructure

On street bicycle paths are located as follows:

- Macaulay Road (both sides)
- Melrose Street (both sides).

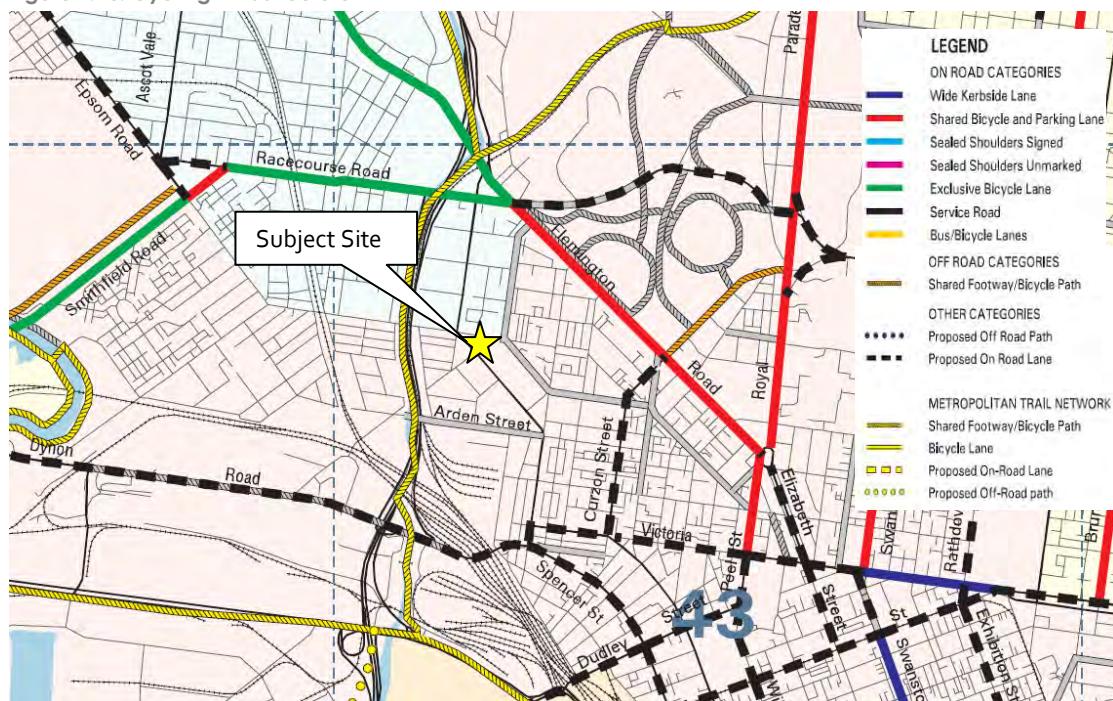
VicRoads Principle Bicycle Network (PBN)

The Principal Bicycle Network (PBN) is a network of arterial cycling routes in metropolitan Melbourne:

- The PBN currently consists of approximately 3,500 kilometres of existing and proposed on-road and off-road bicycle routes. So far, approximately 1,200 kilometres of the network has been completed.
- VicRoads has primary responsibility for managing the development of the PBN.
- Bicycle facilities on the PBN are implemented by VicRoads and local councils depending on whether they are on an arterial or local road.

Figure 2.10 shows the existing and proposed on and off road bicycle facilities making up the PBN in the vicinity of the subject site.

Figure 2.10: Cycling Infrastructure



(Reproduced from VicRoads Website)

2.3.4 Local Car Sharing Services

There are a number of Flexicar car sharing pods located in the vicinity of the subject site as follows:

- Near the Gower Street/Macaulay Road intersection approximately 800m from the site
- At North Melbourne rail station (located at the eastern entrance of the station on Adderley Street), approximately 1.3km from the site
- Located on the eastern side of Errol Street, just north of Queensbury Street and at the intersection with Bendigo Street, approximately 1.1km from the site
- On Wreckyn Street, southwest of Flemington Road, near Royal Melbourne Hospital, approximately 1.5km from the site.

3. Development Proposal

3.1 Land Uses

The development proposal includes the construction of a mixed-use development comprising a mixture of retail and residential land uses, as summarised in Table 3.1.

Table 3.1: Development Schedule

Use	Size
Residential	145 x 1-bedroom apartments
	122 x 2-bedroom apartments (includes 2 home offices)
	37 x 3-bedroom apartments
Residential Total	304 apartments
Supermarket	4,350sqm floor area
Specialty retail	1,543sqm floor area (includes 371sqm cafe)
Commercial Total	5,893sqm floor area

3.2 Car Parking

A total of 605 car spaces are proposed in separate podium and basement levels of car parking.

Two podium levels of car parking are proposed for residents, with two basement levels of car parking proposed for the retail uses, with some resident car parking. The breakdown of the car parking is as follows:

- Podium Level 1 – 134 resident car spaces
- Podium Level 2 – 147 resident car spaces
- Basement Level 1 – 156 retail spaces
- Basement Level 2 – 145 retail spaces and 23 resident spaces.

A total of 304 resident spaces and 301 retail car spaces are proposed.

3.3 Vehicle Access

Vehicle access to the podium level resident car parking is proposed from a new access onto Canning Street, with vehicle access to the basement level retail/resident car parking proposed from a new access onto Macaulay Road.

The proposed access onto Canning Street will necessitate the relocation of an existing bus stop to the west of its current location. This proposal is shown on GTA Consultants drawing number JM15680-05-01P2 presented in Appendix C.

The proposed access onto Macaulay Road will necessitate the relocation of an existing kerbed island. It is proposed to relocate this island as shown on GTA Consultants drawing number JM15680-05-01P2 presented in Appendix C.

3.4 Taxi Pick-Up/Drop-Off Zone

A taxi pick-up/drop-off zone capable of accommodating two taxis is proposed on Vaughan Terrace, located directly to the northeast of Macaulay Road intersection.

3.5 Bicycle Facilities

Secure bicycle parking for retail staff is proposed in the basement level 1 car park.

Secure bicycle parking for residents is proposed within two separate storages areas located on podium level 3.

Bicycle parking hoops are proposed on the Vaughan Terrace and Canning Street footpaths for use by retail customers and residential visitors.

3.6 Pedestrian Facilities

Secure pedestrian access to the residential use is proposed via two entrances, one accessed from Vaughan Terrace and the second accessed from Canning Street. Both accesses are proposed to lead to an internal lobby area containing lifts and stairs providing access between levels.

Pedestrian access to the retail uses is proposed via a main entrance on Canning Street, with a second entrance proposed on Vaughan Terrace.

3.7 Loading Areas

An on-site loading dock for the supermarket and retail uses is proposed with access onto Macaulay Road. The loading area has been designed with two loading docks, one serving the supermarket and capable of accommodating a 19m semi-trailer, with the second serving the retail uses and capable of accommodating an 8.8m medium rigid vehicle.

The loading dock is proposed with a floor area of 500sqm.

Further discussion regarding the adequacy of loading and proposed access arrangements is presented in Section 6 of this report.

4. Car Parking

4.1 Statutory Car Parking Requirements

Statutory requirements for the provision of car parking are set out in Clause 52.06 of the Melbourne Planning Scheme, with parking rates specified in the Table to Clause 52.06-5. An assessment of the statutory parking requirements for the development proposal is set out in Table 4.1.

Table 4.1: Statutory Car Parking Requirements

Description	Use	Size	Statutory Parking Rate	Statutory Parking Requirement
Supermarket	Supermarket	4,350sqm	8 spaces per 100m ²	348 spaces
Specialty Retail	Retail	1,543sqm [1]	8 spaces per 100m ²	123 spaces
Residential	Dwelling	304 dwellings	2 spaces per dwelling	608 spaces
				Total 1,079 spaces

[1] Includes 371sqm of cafe floor area.

The above assessment anticipates the development proposal has a statutory requirement of 1,079 car parking spaces. In this instance, the statutory level of parking is not being met and a planning permit is being sought to reduce this requirement.

4.2 Decision Guidelines

The Planning Scheme provides decision guidelines to reduce the statutory car parking requirement. Those guidelines that are considered appropriate in this instance are as follows:

- *"The availability of public transport in the locality.*
- *Any reduction in car parking demand due to the sharing of car spaces by multiple uses, either because of variation of car parking demand over time or because of efficiencies gained from the consolidation of shared car parking spaces.*
- *An empirical assessment of car parking demand.*
- *Any other relevant consideration."*

Each of the above guidelines is discussed in the following sections.

4.2.1 Public Transport Availability

As identified in Section 2.3 of this report the site is accessible by public transport, including tram route 57 located approximately 600m from the site.

4.2.2 Empirical Assessment of Parking Demand

Residential

Guidance on the car parking characteristics of the residential component of the proposed development has been sought from a number of sources, including:

- Clause 55 of the Melbourne Planning Scheme
- RTANSW 'Guide to Traffic Generating Developments'
- Australian Bureau of Statistics (ABS) Car Ownership Data 2006
- Car parking surveys undertaken at residential developments.

Clause 55 (ResCode)

Whilst not strictly applicable in this instance, Clause 55.03-11 of the Melbourne Planning Scheme details car parking rates for medium density residential developments less than four storeys in height as follows:

- 1-bedroom dwelling: 1 space per dwelling
- 2-bedroom dwelling: 1 space per dwelling
- 3-bedroom dwelling: 2 spaces per dwelling
- visitor car parking: 1 space per 5 dwellings.

Application of the above rates to the proposed residential use suggests a peak resident car parking demand of 341 spaces and a peak residential visitor car parking demand of 61 spaces.

RTANSW 'Guide to Traffic Generating Developments'

The nominated RTANSW document represents the most comprehensive traffic and parking survey database compiled in Australia and was most recently updated in 2002.

The recommended rates specified in this document for 'high density residential flat buildings'⁴ in metropolitan centres are reproduced as follows:

- 1-bedroom dwelling: 0.40 spaces per dwelling
- 2-bedroom dwelling: 0.70 spaces per dwelling
- 3-bedroom dwelling: 1.20 spaces per dwelling
- Visitor car parking: 1 spaces per 7 dwellings.

Application of the above rates to the proposed residential use suggests a peak resident car parking demand of 188 spaces and a peak residential visitor car parking demand of 43 spaces.

Australian Bureau of Statistics (ABS) 2006 Car Ownership Rates

The 2006 Census by the Australian Bureau of Statistics (ABS) provides an indicator of typical resident car parking demands within the suburb of North Melbourne.

The Census reports the following car ownership levels for apartments of one or more storeys in North Melbourne:

- 1-bedroom dwelling: 0.45 spaces per dwelling
- 2-bedroom dwelling: 0.70 spaces per dwelling
- 3-bedroom dwelling: 0.90 spaces per dwelling

Application of these rates to the proposed residential use suggests a peak resident car parking demand of 184 spaces.

Other Surveys

Visitors

Guidance on visitor car parking has been sought from surveys undertaken by other Melbourne traffic consultants. These surveys indicate typical peak visitor parking demands of 0.12 spaces per dwelling⁵. Application of this rate to the proposed residential use suggests a peak visitor car parking demand of 37 spaces. Peak visitor demands typically occur in the evening of a weekend, with daytime demand typically 50% of the peak demands.

⁴ Defined in RTANSW (2002) as a building containing 20 or more dwellings.

⁵ Surveys undertaken at a 68 unit site at 380 Toorak Road, South Yarra as reported by Grogan Richards Pty Ltd (August 1996).

Supermarket

Guidance on the parking generating characteristics for the supermarket use has been sourced from the RTANSW 'Guide to Traffic Generating Developments' and other surveys undertaken by numerous traffic engineering consultants throughout metropolitan Melbourne.

Section 5.7.1 of the RTANSW document nominates a peak parking rate of 4.2 spaces per 100sqm GLFA (gross leasable floor area) for supermarkets, noting that this rate is considered to be conservative on the high side given that car parking surveys contained within GTA's database for supermarkets located in and around metropolitan Melbourne indicate an average peak car parking rate of 3.7 spaces per 100sqm on a typical weekday.

Notwithstanding this, for the purposes of presenting a conservative assessment, a car parking rate of 4.3 spaces per 100sqm of floor area has been adopted, with the application of this rate to the proposed supermarket (4,350sqm floor area) indicating that this use could be expected to generate a peak parking requirement of 187 car spaces.

Empirical evidence suggests that retail uses generate staff car parking demands at a rate of 20% of the total car parking demand. The supermarket is therefore anticipated to generate a demand of 37 staff spaces and 150 customer spaces.

Specialty Retail (Including Cafe)

Further to the discussion presented later in this report, adoption of the draft Clause 52.06 rate of 3.5 spaces per 100sqm of floor area is considered to be appropriate – whilst still conservative on the high side – for the specialty retail floor area.

Application of this rate to the proposed specialty retail floor area (1,543sqm floor area) indicates that that this use could be expected to generate a peak parking requirement of 54 car spaces.

Empirical evidence suggests that retail uses generate staff car parking demands at a rate of 20% of the total car parking demand. The specialty retail is therefore anticipated to generate a demand of 11 staff spaces and 43 customer spaces.

4.2.3 Shared Uses

It is considered that the occurrence of all uses generating their peak car parking requirements at the same time is unlikely to occur in practice – particularly with regard to the visitor/shopper parking demands. Peak residential visitor parking demands are likely to be generated during the evening and the peak supermarket and specialty retail demands during the late afternoon and weekend midday periods.

It is noted that the predominant contributors to the visitor/shopper car parking demand are the supermarket and specialty retail uses, and it is accordingly envisaged that the efficiencies gained by providing shared parking for short-term visitors to the site would be limited to approximately 19 car spaces (i.e. approximately half of the residential visitors).

This analysis suggests that the overall peak short-term (customer and residential visitor) car parking requirement of the proposed development could be expected to be in the order of 211 car spaces.

4.2.4 Other Considerations

The State Planning Policy Framework contained within the Melbourne Planning Scheme sets out a range of objectives and implementation strategies to guide development within the entire State of Victoria.

Embedded within the Framework is a range of policies with the overall objective to increase the integration and utilisation of sustainable transport. For example:

Objectives

Clause 18.01-1:

"To create a safe and sustainable transport system by integrating land-use and transport."

Clause 18.02-1:

"To promote the use of sustainable personal transport."

Strategies

Clause 18.01-1:

"Plan urban development to make jobs and community services more accessible by:

- Ensuring access is provided to developments in accordance with forecast demand, taking advantage of all available modes of transport and to minimize adverse impacts on existing transport networks and the amenity of surrounding areas."*

Clause 18.02-1:

"Ensure development provides opportunities to create more sustainable transport options such as walking, cycling and public transport."

Encouraging the use of all modes of transport other than private motor vehicles is central to achieving these objectives. In this regard, the proposed development represents a prime opportunity to promote the visions of the above policies by encouraging the use of more sustainable forms of transport by adopting a strategy to avoid an over-abundance of car parking on the site and, in turn, an overuse of motor vehicles.

4.3 Adequacy of Parking Supply

It is proposed to allocate 304 car spaces to residents. This provision equates to a car parking rate of one car space per dwelling. On the basis of available empirical car parking data, particularly the ABS 2006 car ownership data for North Melbourne, it is considered that this provision will satisfactorily meet the anticipated peak resident car parking demands.

It is proposed to allocate 301 car spaces to the retail uses. This provision equates to a car parking rate of 5.11 car spaces per 100sqm of floor area. These spaces would also be used to meet the residential visitor car parking demands.

Based upon the above discussions and analysis, it is considered that the proposed car parking provision of 605 car spaces can be expected to exceed the anticipated peak car parking requirement associated with the overall development proposal.

4.4 Car Parking Layout (General)

The car parking layout is generally compliant with the Melbourne Planning Scheme and Australian/New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking, noting the following:

- Car spaces are 4.9m long by 2.6m wide accessed from a minimum 7.0m wide aisle. The dimensions exceed the Planning Scheme requirements.
- One way aisles are proposed with a minimum width of 3.4m. This dimension exceeds the minimum Planning Scheme accessway width requirements.

- Columns are located between 250mm and 1250mm from the car park aisle. This is considered satisfactory.
- A 1:20 ramp is provided for the first 6.0m of the two proposed vehicle accesses measured from the property boundary.
- Proposed ramp grades on the vehicle accesses and the internal ramps are considered satisfactory.
- A 2.5m x 2.0m pedestrian visibility triangle is provided on the exit side of the resident and retail car park accesses. It is unclear however whether the pedestrian visibility triangle for the retail car park is achievable without the need for third party land.
- The proposed disabled car parking arrangements in the resident and retail car parks are considered satisfactory.
- Access to the retail car parking is proposed to be barrier controlled. Analysis suggests that the barrier control system will necessitate the flaring of the single lane entry to two lanes on the approach to the barrier control point to avoid vehicle queues on the entry. Two exit lanes are also proposed to avoid vehicle queuing within the site.
- GTA Consultants has been advised that a minimum height clearance of 2.2m is achievable within the car parks and on the accesses, with a 2.5m height clearance above the disabled car spaces.

5. Sustainable Transport Infrastructure

5.1 Bicycle End of Trip Facilities

Clause 52.34 of the Melbourne Planning Scheme (Bicycle Facilities) seeks to encourage cycling as a mode of transport with the provision of secure, accessible and convenient bicycle parking spaces and associated shower and change facilities.

Table 1 to Clause 52.34-3 sets out the standard requirement for the provision of bicycle spaces for a range of uses. Tables 2 and 3 set out the requirements for showers and change rooms, respectively. Clause 52.34-5 also requires signage to direct cyclists to the required facilities.

Clause 52.34-2 says a permit may be granted to vary, reduce or waive any requirement.

The statutory requirement for the provision of bicycle facilities for the subject use is set out in Table 5.1.

Table 5.1: Statutory Requirement for Bicycle Facilities

Use	Size	Statutory Rate		Statutory Requirement	
		Resident & Staff	Visitor & Customer	Resident & Staff	Visitor & Customer
Supermarket	4,350sqm	1 to each 600sqm of leasable floor area	1 to each 500sqm of leasable floor area	7 spaces	9 spaces
Specialty Retail	1,543sqm			3 spaces	3 spaces
Residential	304 dwellings	1 to each 5 dwellings	1 to each 10 dwellings	61 spaces	30 spaces
			Total	71 spaces	42 spaces

Table 5.1 indicates that there is a statutory requirement to provide a total 113 bicycle spaces, including 71 resident spaces and 42 visitor spaces.

As a minimum, it is recommended that the bicycle spaces be provided in a vertical storage arrangement adopting the Bicycle Victorian 'Ned Kelly' type parking that provides spaces that are 1.2m long and 0.5m wide accessed from a 1.5m wide aisle.

A secure bicycle storage area is proposed for retail staff in the basement level 1 car park. It is considered that the storage area has suitable dimensions to accommodate in excess of 10 retail staff spaces.

The current plans suggest that up to 220 resident bicycle spaces are to be provided at podium level 3 in two secure storage areas.

Visitor bicycle parking demands are to be met by the provision of bicycle parking rails on the Canning Street and Vaughan Terrace footpaths. It is recommended that a suitable number of bicycle rails be provided to meet the anticipated visitor bicycle parking demand of 42 spaces.

In addition to the requirement for bicycle parking facilities, Clause 52.34-3 of the Melbourne Planning Scheme requires one shower for the first five employee bicycle parking spaces and one shower for each subsequent ten employee bicycle parking spaces if five or more employee bicycle parking spaces are required. Further, each shower must have access to a change room. On this basis, there is a requirement for one staff shower and change room facility for the supermarket use.

6. Loading Facilities

6.1 Statutory Requirements

Clause 52.07 of the Melbourne Planning Scheme is applicable where buildings or works are constructed for the manufacture, servicing, storage or sale of goods or materials.

The application of this Clause to the total retail floor area of 5,893sqm indicates that a loading area of 60.3sqm would be statutorily required for the proposed development.

6.2 Adequacy of Proposed Loading

As outlined in Section 3.7 of this report, the proposed loading dock has been designed with an overall area of approximately 500sqm. The dimensions of this loading area exceed the statutory requirement. The current plans suggest that a height clearance in excess of 4.0m is proposed in the loading dock.

The loading area has been designed to accommodate vehicles of a size up to and including 19m semi-trailers. In this regard, a swept-path assessment has been undertaken of the loading area for a 19m design vehicle and this is presented in Appendix C of this report.

The assessment indicates that all vehicle movements are contained within the site. Entry and exit movements to and from the loading area are achievable in a forward direction.

6.3 Waste Collection

It is proposed to store waste from the retail uses in a ground level waste room, with the waste to be collected from the proposed loading dock.

It is proposed to store waste from the residential use and the cafe use in separate waste rooms located on the mezzanine level, with the waste to be collected from two locations on Canning Street.

It is anticipated that the waste collection will be undertaken by a private contractor, and controlled by the implementation of an appropriate waste management plan.

7. Traffic Impact Assessment

7.1 Traffic Generation

7.1.1 Design Rates

Traffic generation estimates for the proposed development have been sourced from the RTANSW 'Guide to Traffic Generating Developments' and other rates collected during surveys undertaken by GTA Consultants and other Melbourne traffic engineering consultants at similar uses.

The estimates are presented in Tables D1, D2 and D3 within Appendix D for the Friday AM, Friday PM and Saturday Midday peak hours respectively, with a summary as follows:

- Friday AM Peak Hour: 18 entry and 73 exit vehicle movements.
- Friday PM Peak Hour: 428 entry and 409 exit vehicle movements.
- Saturday Midday Peak Hour: 426 entry and 426 exit vehicle movements.

In light of the fact that existing Friday AM and PM peak hour traffic volumes in the vicinity of the site are similar, and that the estimated traffic volumes from the proposed development in the PM peak hour are higher than those in the AM peak hour, it is evident that the critical assessment periods will be the Friday PM and Saturday Midday peak hours. The analysis presented in the subsequent sections of this report accordingly only considers these two time periods.

7.1.2 Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the following:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- surrounding employment centres, retail centres and schools in relation to the site
- likely distribution of employee's residences in relation to the site
- configuration of access points to the site.

The distribution of retail traffic has been based on an economic assessment for the proposed Woolworths supermarket⁶. This assessment suggests that the trade catchment for the proposed supermarket will be evenly distributed between the areas to the east and west of the proposed store. As such, it is considered reasonable to expect that vehicle movements attributable to the retail use will be evenly split on the road network.

Consideration has also been given to the existing performance of the intersections in the vicinity of the subject site. The SIDRA Intersection existing performance output for the Vaughan Terrace/Macaulay Road intersection suggests that the Vaughan Terrace approach is presently operating at its practical capacity, with delays to right turn movements from Vaughan Terrace. It is therefore considered reasonable to expect that residents wishing to travel westbound from the subject site will seek an alternative route that avoids this intersection. As such, the estimated traffic distribution assumes a higher proportion of right turning vehicle movements from Canning Street into Buncle Street, with no development traffic anticipated to turn right from Vaughan Terrace into Macaulay Road.

⁶ Report prepared by Pitney Bowes and dated 23 August 2010.

Having regard to the above, Figure E1 to Figure E4 in Appendix E have been prepared to show the anticipated distribution of the residential and retail traffic during the Friday PM and Saturday Midday peak hours. The estimated marginal increase in turning movements in the vicinity of the subject site (following full site development) during the Friday PM and Saturday Midday peak hours is presented in Figures F1 to F6 in Appendix F.

By adding the development generated traffic volumes shown in Appendix F to the existing traffic shown in Appendix A, the post-development traffic volumes have been estimated and these are shown in Figure G1 and Figure G2 in Appendix G⁷.

7.2 Traffic Impact – Peak Hour

7.2.1 Existing Road Network

The impact of development traffic upon the operation of the surrounding road network has been assessed using SIDRA Intersection. On the basis of the turning movement estimates presented in Appendix G, Table 7.1 to Table 7.5 presents a summary of the anticipated future operation of the nominated intersections following the full development of the site. Detailed results of this analysis are provided in Appendix H of this report.

As described earlier, a DOS of around 0.90 for unsignalised intersections has traditionally been considered the limit beyond which intersection performance is unsatisfactory, as beyond this value queues and delays increase disproportionately. Similarly a DOS of 0.95 is considered the limit for signalised intersections.

Table 7.1: Macaulay Road/Canning Street/Boundary Road Intersection – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Boundary Road (south)	Friday PM	0.14	29 sec	26m
	Saturday MID	0.14	38 sec	16m
Macaulay Road (south-east)	Friday PM	0.88	30 sec	132m
	Saturday MID	0.75	19 sec	103m
Boundary Road (north)	Friday PM	0.89#	43 sec	108m
	Saturday MID	0.78	50 sec	81m
Macaulay Road (west)	Friday PM	0.87	40 sec	179m
	Saturday MID	0.79#	25 sec	195m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is considered that the Macaulay Road/Canning Street/Boundary Road intersection will operate satisfactorily post development with acceptable queues and delays on all approaches. The assessment suggests that a maximum DOS of 0.89 could be expected on the Boundary Road (north) approach during the Friday PM peak hour, with a maximum 95th percentile queue of 195m on the Macaulay Road (west) approach during the Saturday Midday peak hour.

⁷ It is noted that whilst the analysis presented in this report does not make any allowance for traffic volume growth along Macaulay Road, the traffic generation estimates used in this report similarly do not make any allowance for 'passer-by' traffic that is already on the abutting road network and hence does not represent a new vehicle movement on the road network. It is envisaged that these factors would neutralise each other and that the analysis is accordingly sufficient for the purposes of assessing the vehicle access arrangements.

Table 7.2: Canning Street/Buncle Street/Vaughan Terrace Intersection – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Vaughan Terrace (south)	Friday PM	0.19#	12 sec	7m
	Saturday MID	0.15#	12 sec	6m
Canning Street (east)	Friday PM	0.05	7 sec	1m
	Saturday MID	0.05	7 sec	1m
Buncle Street (north)	Friday PM	0.05	11 sec	1m
	Saturday MID	0.03	12 sec	1m
Canning Street (west)	Friday PM	0.01	5 sec	0m
	Saturday MID	0.01	5 sec	0m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Canning Street/Buncle Street/Vaughan Terrace intersection will operate satisfactorily post development with acceptable queues and delays on all approaches.

Table 7.3: Macaulay Road/Vaughan Terrace/Gracie Street Intersection – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Gracie Street (south)	Friday PM	0.99	423 sec	57m
	Saturday MID	0.85	260 sec	26m
Macaulay Road (east)	Friday PM	0.61	1 sec	3m
	Saturday MID	0.46	1 sec	3m
Vaughan Terrace (north)	Friday PM	1.00#	320 sec	67m
	Saturday MID	1.25#	321 sec	118m
Macaulay Road (west)	Friday PM	0.43	1 sec	2m
	Saturday MID	0.46	1 sec	1m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Vaughan Terrace approach will continue to operate at its practical capacity post development. It is anticipated that the proposed development will add up to 40 vehicle movements onto Vaughan Terrace during any peak hour and it is considered that the intersection performance is sensitive to small increases in vehicle movements.

Table 7.4: Melrose Street/Canning Street Intersection – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Canning Street (east)	Friday PM	0.14#	6 sec	6m
	Saturday MID	0.07	5 sec	3m
Melrose Street (north)	Friday PM	0.08	13 sec	3m
	Saturday MID	0.08#	12 sec	3m
Canning Street (west)	Friday PM	0.03	4 sec	0m
	Saturday MID	0.04	5 sec	0m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Melrose Street/Canning Street intersection will operate satisfactorily post development with acceptable queues and delays on all approaches.

Table 7.5: Macaulay Road/Arden Street/Dryburgh Street Intersection – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Dryburgh Street (south)	Friday PM	0.82	43 sec	154m
	Saturday MID	0.60	36 sec	106m
Arden Street (east)	Friday PM	0.88#	14 sec	77m
	Saturday MID	0.59	12 sec	37m
Macaulay Road (north)	Friday PM	0.87	29 sec	79m
	Saturday MID	0.61#	25 sec	84m
Arden Street (west)	Friday PM	0.46	31 sec	86m
	Saturday MID	0.23	25 sec	48m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the Macaulay Road/Arden Street/Dryburgh Street intersection will operate satisfactorily post development with acceptable queues and delays on all approaches.

7.2.2 Site Access

The impact of development traffic upon the operation of the proposed site accesses on Macaulay Road and Canning Street has been assessed using SIDRA Intersection. On the basis of the turning movement estimates presented in Appendix G, Table 7.6 and Table 7.7 present a summary of the operation of the two accesses following the full development of the site. Detailed results of this analysis are provided in Appendix H of this report.

Table 7.6: Macaulay Road/Site Access – Post Development Operation

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Macaulay Road (east)	Friday PM	0.53	3 sec	15m
	Saturday Midday	0.48	5 sec	20m
Site Access (north)	Friday PM	0.79#	37 sec	49m
	Saturday Midday	0.73#	25 sec	36m
Macaulay Road (west)	Friday PM	0.42	2 sec	0m
	Saturday Midday	0.46	2 sec	0m

DOS – Degree of saturation, # - Intersection DOS

The SIDRA Intersection model has been calibrated to reflect the available gap acceptance opportunities that presently exist onto Macaulay Road. This has resulted in the use of below minimum gap acceptance parameters for the left and right turn movements from the site access.

On the basis of the above assessment, it is evident that the site access on Macaulay Road will operate satisfactorily on full development of the site with acceptable queues and delays on all approaches.

Table 7.7: Canning Street/Site Access – Post Development Operating Conditions

Approach	Peak Hour	Performance Output		
		DOS	Average Delay	95 th Percentile Queue (m)
Site Access (south)	Friday PM	0.04	10 sec	2m
	Saturday Midday	0.05	9 sec	2m
Canning Street (east)	Friday PM	0.06	2 sec	0m
	Saturday Midday	0.06	2 sec	0m
Canning Street (west)	Friday PM	0.07#	2 sec	1m
	Saturday Midday	0.04#	2 sec	1m

DOS – Degree of saturation, # - Intersection DOS

On the basis of the above assessment, it is evident that the site access on Canning Street will operate satisfactorily on full development of the site with acceptable queues and delays on all approaches.

7.3 Traffic Impact – Daily

The anticipated daily traffic volumes generated by the proposed development have been superimposed onto the existing average weekday and Saturday daily traffic volumes⁸ on Canning Street, Melrose Street, Vaughan Terrace and Macaulay Road. This information is presented in Table 7.8 and Table 7.9.

Table 7.8: Post Development Average Weekday Daily Traffic Volumes

Location	Description		
	Existing Traffic Volume	Anticipated Development Traffic Volume [1]	Post Development Traffic Volume
Canning Street	2,632vpd	580vpd	3,212vpd
Melrose Street	2,881vpd	260vpd	3,141vpd
Vaughan Terrace	2,961vpd	400vpd	3,361vpd
Macaulay Road	20,989vpd	3,860vpd	24,849vpd

[1] Based on a peak to daily ratio of 10%

Table 7.9: Post Development Saturday Daily Traffic Volumes

Location	Description		
	Existing Traffic Volume	Anticipated Development Traffic Volume [1]	Post Development Traffic Volume
Canning Street	1,881vpd	540vpd	2,421vpd
Melrose Street	1,785vpd	300vpd	2,085vpd
Vaughan Terrace	2,260vpd	400vpd	2,660vpd
Macaulay Road	18,158vpd	4,150vpd	22,308vpd

[1] Based on a peak to daily ratio of 10%

Reference is made to Clause 56.06 of the Melbourne Planning Scheme and specifically Table C1. On the basis of the information presented in Table C1, and the characteristics exhibited by each of the roads, it is considered that the following classifications apply to the roads:

- Canning Street – Connector Street – Level 2
- Melrose Street – Connector Street – Level 2
- Vaughan Terrace – Connector Street – Level 2
- Macaulay Road – Arterial Road.

⁸ As obtained from 24-hour pneumatic tube counts undertaken for a one week period from Saturday 19 March 2011 to Friday 25 March 2011.

A 'Connector Street – Level 2' has an indicative maximum daily traffic volume of 3,000 to 7,000 vehicles per day and an 'Arterial Road' has an indicative maximum daily traffic volume greater than 7,000 vehicles per day.

As presented in Table 7.8 and Table 7.9 the post development daily traffic volumes on Canning Street, Melrose Street and Vaughan Terrace are less than the indicative maximum daily traffic volumes nominated for a 'Connector Street – Level 2'.

It is considered that Macaulay Road will be capable of accommodating the post development traffic volumes.

7.4 Traffic Impact Summary

Against existing traffic volumes in the vicinity of the site and the traffic anticipated to be generated by the proposed development, it is considered that the additional traffic generated by the proposed development could not be expected to compromise the safety or function of the surrounding road network.

8. Conclusion

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

- i The proposed development generates a statutory parking requirement of 1,079 spaces.
- ii The proposed supply of 605 car parking spaces is considered to be appropriate having consideration to the relevant decision guidelines.
- iii The proposed car parking layout is generally consistent with the dimensional requirements set out in the Melbourne Planning Scheme and Australian/New Zealand Standards for Off Street Car Parking (AS/NZS2890.1:2004).
- iv The proposed on-site staff and resident bicycle parking quantum and arrangements are considered satisfactory. It is recommended that the number of bicycle parking rails proposed on the Canning Street and Vaughan Terrace footpaths be increased to ensure that the residential visitor and customer bicycle parking demands are met.
- v A loading dock of 500sqm floor area is proposed with access onto Macaulay Road. The area of the loading dock exceeds the statutory requirements. The loading and service vehicle access arrangements are considered satisfactory for the development noting the limitations on concurrent 19m semi-trailer and 12.5 large rigid vehicle movements within the loading dock. Entry and exit movements to and from the loading area will be in a forward direction.
- vi It is proposed to store waste from the retail uses in a ground level waste room, with the waste to be collected from the proposed loading dock. It is proposed to store waste from the residential use and the cafe use in separate waste rooms located on the mezzanine level, with the waste to be collected from two locations on Canning Street. It is anticipated that the waste collection will be undertaken by a private contractor, and controlled by the implementation of an appropriate waste management plan.
- vii The site is expected to generate up to 852 vehicle movements in any peak hour.
- viii It is considered that there is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development.

Appendix A

Existing Vehicle Movements

Appendix A

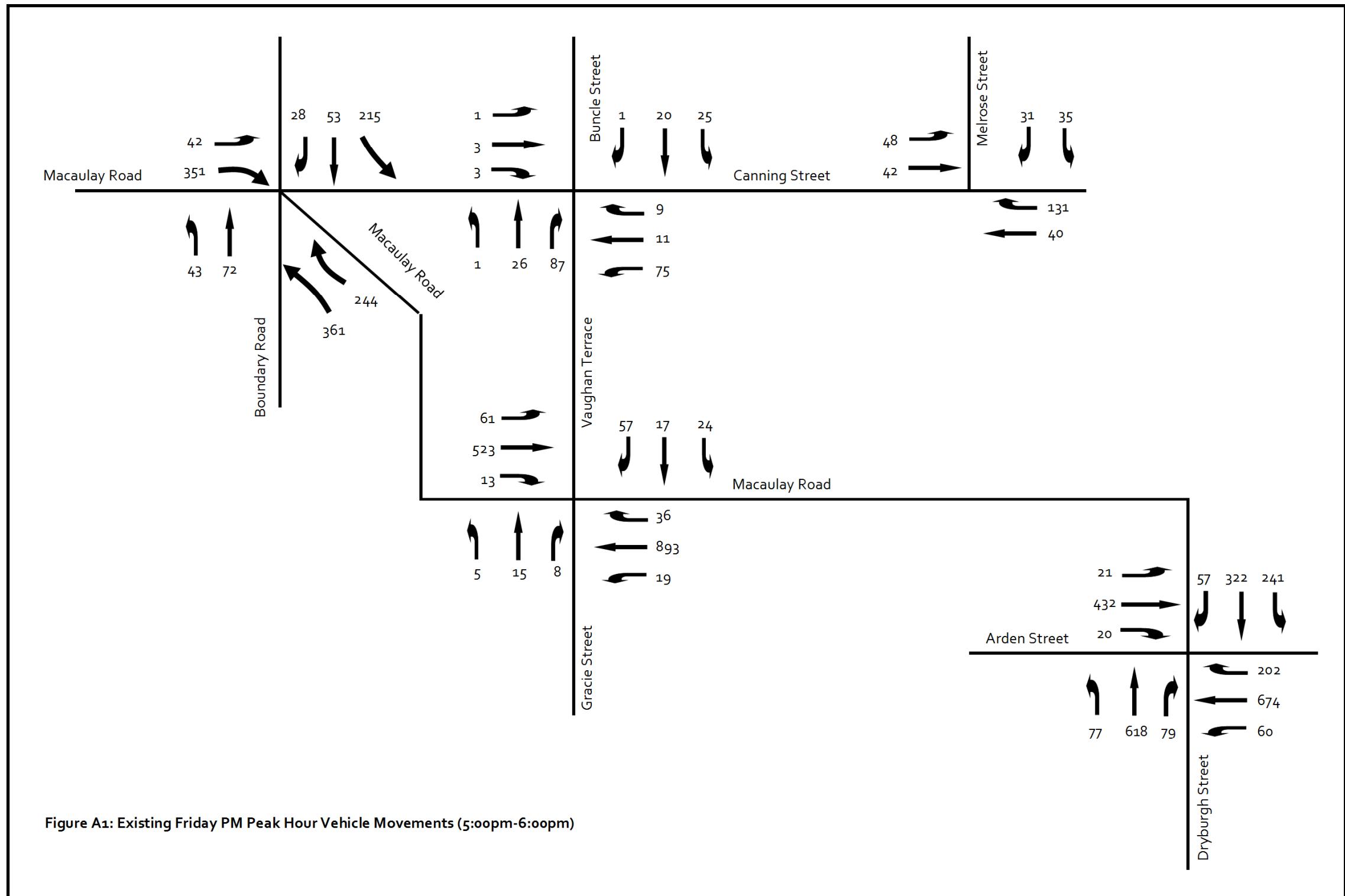
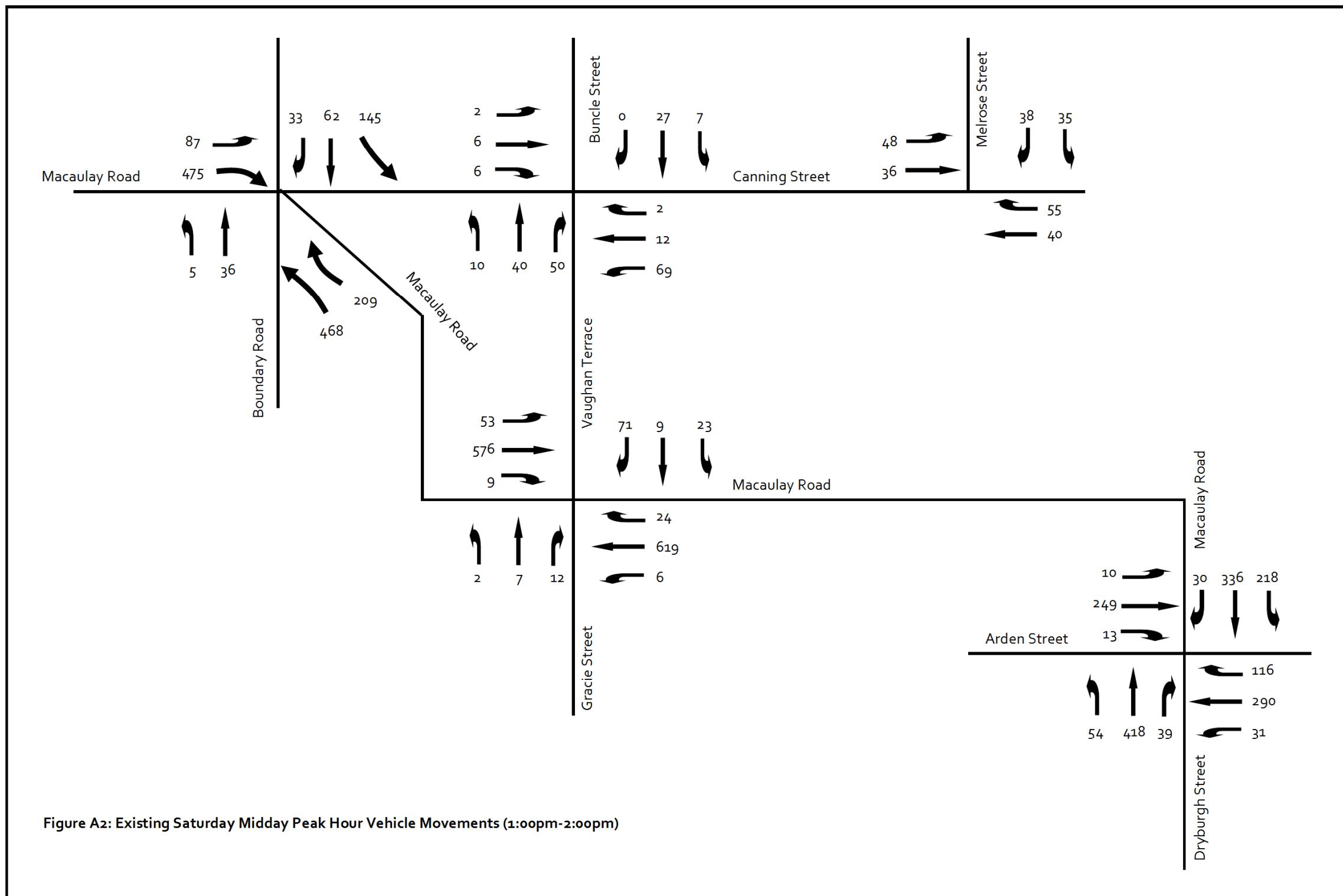


Figure A1: Existing Friday PM Peak Hour Vehicle Movements (5:00pm-6:00pm)



Appendix B

SIDRA Intersection Results – Existing Conditions

Appendix B

Macaulay Road/Canning Street/Boundary Road Signalised Intersection

MOVEMENT SUMMARY

Site: Existing Friday PM Peak

Macaulay Road/Canning Street/Boundary Road intersection
 Existing Friday PM Peak
 Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn w/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Boundary Road (south)											
1	L	45	5.0	0.091	34.3	LOS C	2.2	16.2	0.77	0.74	30.9
2	T	76	5.0	0.144	26.4	LOS C	3.6	26.3	0.79	0.62	33.3
Approach		121	5.0	0.144	29.4	LOS C	3.6	26.3	0.78	0.66	32.4
East: Macaulay Road (south-east)											
5	T	380	5.0	0.342	10.1	LOS B	10.2	74.4	0.55	0.48	45.0
6	R	257	5.0	0.645	43.5	LOS D	12.2	68.7	0.96	0.84	27.3
Approach		637	5.0	0.645	23.6	LOS C	12.2	68.7	0.72	0.62	35.7
North: Boundary Road (north)											
7	L	226	5.0	0.669	36.6	LOS D	10.2	74.6	0.88	0.83	29.1
8	T	56	5.0	0.195	27.1	LOS C	4.1	29.9	0.80	0.64	32.3
9	R	29	5.0	0.194	35.5	LOS D	4.1	29.9	0.80	0.62	31.3
Approach		312	5.0	0.669	36.2	LOS D	10.2	74.6	0.86	0.79	29.8
West: Macaulay Road (west)											
10	L	44	5.0	0.227	32.6	LOS C	2.1	15.3	0.75	0.72	31.6
11	T	369	5.0	0.652	29.9	LOS C	15.6	114.2	0.93	0.80	31.4
Approach		414	5.0	0.652	30.2	LOS C	15.6	114.2	0.91	0.79	31.4
All Vehicles		1483	5.0	0.669	26.6	LOS C	15.6	114.2	0.80	0.71	32.8

MOVEMENT SUMMARY

Site: Existing Saturday PM Peak

Macaulay Road/Canning Street/Boundary Road intersection
 Existing Saturday PM Peak
 Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn w/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Boundary Road (south)											
1	L	5	5.0	0.020	44.3	LOS D	0.3	2.3	0.88	0.86	27.1
2	T	38	5.0	0.139	37.1	LOS D	2.2	16.3	0.91	0.67	28.5
Approach		43	5.0	0.139	38.0	LOS D	2.2	16.3	0.90	0.67	28.3
East: Macaulay Road (south-east)											
5	T	493	5.0	0.361	5.0	LOS A	9.7	70.9	0.40	0.36	51.0
6	R	220	5.0	0.581	43.6	LOS D	10.6	77.4	0.95	0.82	27.3
Approach		713	5.0	0.581	16.9	LOS B	10.6	77.4	0.57	0.50	40.2
North: Boundary Road (north)											
7	L	153	5.0	0.589	48.8	LOS D	8.2	60.1	0.98	0.81	25.6
8	T	65	5.0	0.423	39.4	LOS D	5.6	41.2	0.95	0.75	27.0
9	R	35	5.0	0.423	47.9	LOS D	5.6	41.2	0.95	0.79	26.7
Approach		253	5.0	0.589	46.3	LOS D	8.2	60.1	0.97	0.79	26.1
West: Macaulay Road (west)											
10	L	92	5.0	0.381	23.9	LOS C	3.4	24.6	0.62	0.74	36.2
11	T	500	5.0	0.596	20.3	LOS C	17.7	129.6	0.81	0.72	36.6
Approach		592	5.0	0.596	20.9	LOS C	17.7	129.6	0.78	0.72	36.6
All Vehicles		1600	5.0	0.586	23.6	LOS C	17.7	129.6	0.72	0.63	35.5

Canning Street/Buncle Street/Vaughan Terrace Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Existing

 Buncle Street/Canning Street/Vaughan Terrace Intersection
 Friday PM Existing Conditions

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Quailed	Effective Stop Rate per veh	Average Speed km/h
South: Vaughan Terrace											
1	L	1	0.0	0.002	10.9	LOS B	0.0	0.0	0.13	0.90	46.4
2	T	27	0.0	0.149	11.8	LOS B	0.8	5.6	0.27	0.84	45.8
3	R	92	0.0	0.149	11.6	LOS B	0.8	5.6	0.27	0.89	45.9
Approach		120	0.0	0.149	11.6	LOS B	0.8	5.6	0.27	0.88	45.9
East: Canning Street (East Approach)											
4	L	79	0.0	0.043	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	12	0.0	0.013	0.0	LOS A	0.1	0.5	0.03	0.00	59.3
6	R	9	0.0	0.013	8.2	LOS A	0.1	0.5	0.03	0.82	48.9
Approach		100	0.0	0.043	7.2	LOS A	0.1	0.5	0.01	0.60	50.0
North: Buncle Street											
7	L	26	0.0	0.043	10.7	LOS B	0.1	0.7	0.14	0.86	46.4
8	T	21	0.0	0.025	11.6	LOS B	0.1	0.9	0.25	0.86	46.0
9	R	1	0.0	0.025	11.2	LOS B	0.1	0.9	0.25	0.86	46.3
Approach		48	0.0	0.043	11.1	LOS B	0.1	0.9	0.19	0.87	46.2
West: Canning Street (West Approach)											
10	L	1	0.0	0.005	8.5	LOS A	0.0	0.2	0.20	0.63	48.5
11	T	3	0.0	0.005	0.3	LOS A	0.0	0.2	0.20	0.00	55.5
12	R	3	0.0	0.005	8.6	LOS A	0.0	0.2	0.20	0.72	48.4
Approach		7	0.0	0.005	5.0	LOS A	0.0	0.2	0.20	0.40	51.2
All Vehicles		276	0.0	0.149	9.8	NA	0.8	5.6	0.16	0.77	47.5

MOVEMENT SUMMARY

Site: Saturday Midday Peak Hour Existing

 Buncle Street/Canning Street/Vaughan Terrace Intersection
 Saturday Lunch Peak Hour Existing Conditions

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Quailed	Effective Stop Rate per veh	Average Speed km/h
South: Vaughan Terrace											
1	L	11	0.0	0.018	10.9	LOS B	0.0	0.3	0.13	0.91	46.4
2	T	42	0.0	0.112	11.6	LOS B	0.6	4.2	0.23	0.86	46.0
3	R	53	0.0	0.112	11.3	LOS B	0.6	4.2	0.23	0.90	46.1
Approach		105	0.0	0.112	11.4	LOS B	0.6	4.2	0.22	0.88	46.1
East: Canning Street (East Approach)											
4	L	73	0.0	0.039	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	13	0.0	0.008	0.0	LOS A	0.1	0.4	0.05	0.00	59.0
6	R	2	0.0	0.008	8.2	LOS A	0.1	0.4	0.05	0.95	48.9
Approach		87	0.0	0.039	7.0	LOS A	0.1	0.4	0.01	0.58	50.2
North: Buncle Street											
7	L	7	0.0	0.012	10.7	LOS B	0.0	0.2	0.04	0.96	46.4
8	T	28	0.0	0.033	11.5	LOS B	0.2	1.2	0.25	0.86	46.0
9	R	1	0.0	0.033	11.2	LOS B	0.2	1.2	0.25	0.89	46.3
Approach		37	0.0	0.033	11.4	LOS B	0.2	1.2	0.21	0.58	46.1
West: Canning Street (West Approach)											
10	L	2	0.0	0.009	8.5	LOS A	0.1	0.4	0.19	0.64	48.5
11	T	6	0.0	0.009	0.3	LOS A	0.1	0.4	0.19	0.00	55.6
12	R	6	0.0	0.009	8.6	LOS A	0.1	0.4	0.19	0.72	48.4
Approach		15	0.0	0.009	5.0	LOS A	0.1	0.4	0.19	0.40	51.3
All Vehicles		244	0.0	0.112	9.4	NA	0.8	4.2	0.14	0.75	47.8

Macaulay Road/Vaughan Terrace/Gracie Street Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Existing

 Gracie Street/Vaughan Terrace/Macaulay Road - 2011 Friday PM Existing Conditions
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Gracie Street											
1	L	5	0.0	0.020	22.2	LOS C	0.1	0.5	0.78	1.00	36.3
2	T	16	0.0	0.478	113.0	LOS F	1.9	13.3	0.97	1.05	14.8
3	R	8	0.0	0.495	112.8	LOS F	1.9	13.3	0.97	1.05	14.8
Approach		29	0.0	0.482	96.7	LOS F	1.9	13.3	0.94	1.04	16.6
East: Macaulay Road (East Approach)											
4	L	20	0.0	0.513	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
5	T	940	5.0	0.593	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	38	0.0	0.062	11.8	LOS B	0.2	1.7	0.55	0.80	45.2
Approach		996	4.7	0.503	0.6	LOS B	0.2	1.7	0.02	0.05	59.0
North: Vaughan Terrace											
7	L	25	0.0	0.346	47.0	LOS E	1.5	10.3	0.88	1.06	26.7
8	T	18	0.0	0.351	47.2	LOS E	1.5	10.3	0.88	1.04	26.7
9	R	60	0.0	1.000 ⁺	266.6	LOS F	7.8	54.8	1.00	1.46	7.2
Approach		103	0.0	1.000	174.8	LOS F	7.8	54.8	0.95	1.30	10.4
West: Macaulay Road (West Approach)											
10	L	64	0.0	0.326	8.2	LOS A	0.0	0.0	0.00	1.02	49.0
11	T	551	5.0	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	14	0.0	0.038	17.0	LOS C	0.2	1.1	0.76	0.92	40.8
Approach		626	4.4	0.326	1.2	LOS C	0.2	1.1	0.02	0.12	56.1
All Vehicles		1759	4.2	1.000	12.6	NA	7.8	54.8	0.09	0.17	44.6

MOVEMENT SUMMARY

Site: Saturday Midday Peak Hour Existing

 Gracie Street/Vaughan Terrace/Macaulay Road 2011 Saturday Lunch Peak Hour Existing Conditions
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Gracie Street											
1	L	2	0.0	0.008	15.5	LOS C	0.0	0.1	0.58	0.85	43.1
2	T	7	0.0	0.230	56.7	LOS F	0.9	6.4	0.93	1.02	23.9
3	R	13	0.0	0.230	56.5	LOS F	0.9	6.4	0.93	1.02	23.9
Approach		22	0.0	0.231	52.7	LOS F	0.9	6.4	0.90	1.00	24.9
East: Macaulay Road (East Approach)											
4	L	6	0.0	0.351	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
5	T	652	5.0	0.348	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	25	0.0	0.038	12.3	LOS B	0.2	1.2	0.57	0.80	44.8
Approach		663	4.8	0.348	0.5	LOS B	0.2	1.2	0.02	0.04	59.1
North: Vaughan Terrace											
7	L	24	0.0	0.149	24.2	LOS C	0.5	3.8	0.77	1.00	37.0
8	T	9	0.0	0.148	24.3	LOS C	0.5	3.8	0.77	1.00	36.9
9	R	75	0.0	0.946	156.6	LOS F	6.9	45.2	0.99	1.36	11.4
Approach		106	0.0	0.941	115.4	LOS F	6.9	48.2	0.92	1.26	14.5
West: Macaulay Road (West Approach)											
10	L	56	0.0	0.351	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
11	T	606	5.0	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	9	0.0	0.021	12.0	LOS B	0.1	0.5	0.56	0.74	45.1
Approach		672	4.5	0.351	0.8	LOS B	0.1	0.5	0.01	0.10	56.6
All Vehicles		1485	4.2	0.941	9.8	NA	6.9	48.2	0.09	0.17	47.4

Melrose Street/Canning Street Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Existing

 Melrose Street/Canning Street - 2011 Friday PM Existing Conditions
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Canning Street (East Approach)											
5	T	42	0.0	0.126	0.4	LOS A	0.7	5.2	0.21	0.00	55.1
6	R	138	0.0	0.126	8.5	LOS A	0.7	5.2	0.21	0.66	48.3
Approach		180	0.0	0.126	6.6	LOS A	0.7	5.2	0.21	0.51	49.8
North: Melrose Street											
7	L	37	0.0	0.063	11.0	LOS B	0.1	1.0	0.16	0.90	46.4
9	R	33	0.0	0.052	13.2	LOS B	0.2	1.7	0.41	0.86	44.8
Approach		69	0.0	0.063	12.0	LOS B	0.2	1.7	0.28	0.89	45.6
West: Canning Street (West Approach)											
10	L	51	0.0	0.027	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	44	0.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		95	0.0	0.027	4.4	LOS A	0.0	0.0	0.00	0.36	53.6
All Vehicles		344	0.0	0.126	7.1	NA	0.7	5.2	0.17	0.54	49.8

MOVEMENT SUMMARY

Site: Saturday Midday Peak Hour Existing

 Melrose Street/Canning Street - 2011 Saturday Lunch Peak Hour Existing Conditions
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Canning Street (East Approach)											
5	T	42	0.0	0.065	0.3	LOS A	0.4	2.7	0.19	0.00	55.6
6	R	58	0.0	0.065	6.4	LOS A	0.4	2.7	0.19	0.71	46.6
Approach		100	0.0	0.065	5.0	LOS A	0.4	2.7	0.19	0.41	51.3
North: Melrose Street											
7	L	37	0.0	0.063	10.9	LOS B	0.1	1.0	0.15	0.90	46.4
9	R	40	0.0	0.056	12.2	LOS B	0.3	1.9	0.33	0.87	45.6
Approach		77	0.0	0.063	11.6	LOS B	0.3	1.9	0.25	0.89	45.9
West: Canning Street (West Approach)											
10	L	51	0.0	0.027	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	38	0.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		88	0.0	0.027	4.7	LOS A	0.0	0.0	0.00	0.36	53.2
All Vehicles		285	0.0	0.065	6.6	NA	0.4	2.7	0.14	0.54	50.2

Macaulay Road/Arden Street/Dryburgh Street Signalised Intersection

MOVEMENT SUMMARY

Site: Existing Friday PM Peak_Peds

Macaulay Road/Arden Street/Dryburgh Street intersection
 Existing Friday PM Peak
 Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Sat. v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Dryburgh Street											
1	L	81	5.0	0.427	40.2	LOS D	4.4	32.0	0.82	0.75	26.5
2	T	651	5.0	0.689	37.4	LOS D	16.0	116.8	0.96	0.83	28.3
3	R	83	5.0	0.510	48.6	LOS D	5.1	37.3	0.92	0.78	25.7
Approach		815	5.0	0.689	38.9	LOS D	16.0	116.8	0.95	0.82	26.0
East: Arden Street											
4	L	63	5.0	0.327	17.5	LOS B	10.3	75.2	0.50	0.83	42.0
5	T	709	5.0	0.326	9.1	LOS A	10.4	75.7	0.50	0.44	46.0
6	R	213	5.0	0.691	20.9	LOS C	6.4	46.8	0.66	0.79	38.3
Approach		985	5.0	0.692	12.2	LOS B	10.4	75.7	0.53	0.55	43.8
North: Macaulay Road											
7	L	254	5.0	0.673	12.3	LOS B	4.4	31.9	0.41	0.71	45.1
8	T	339	5.0	0.359	33.6	LOS C	8.6	52.6	0.87	0.71	29.9
9	R	60	5.0	0.497	57.7	LOS E	4.2	30.8	0.99	0.77	23.2
Approach		653	5.0	0.673	27.5	LOS C	8.6	52.6	0.70	0.72	33.4
West: Arden Street											
10	L	22	5.0	0.164	24.0	LOS C	1.3	9.3	0.77	0.73	36.9
11	T	455	5.0	0.601	37.9	LOS D	12.7	92.9	0.95	0.79	26.0
12	R	21	5.0	0.602	46.6	LOS D	11.3	82.2	0.95	0.84	27.5
Approach		496	5.0	0.601	37.7	LOS D	12.7	92.9	0.94	0.79	26.3
All Vehicles		2951	5.0	0.692	27.3	LOS C	16.0	116.8	0.75	0.70	33.3

MOVEMENT SUMMARY

Site: Existing Saturday PM Peak_Peds

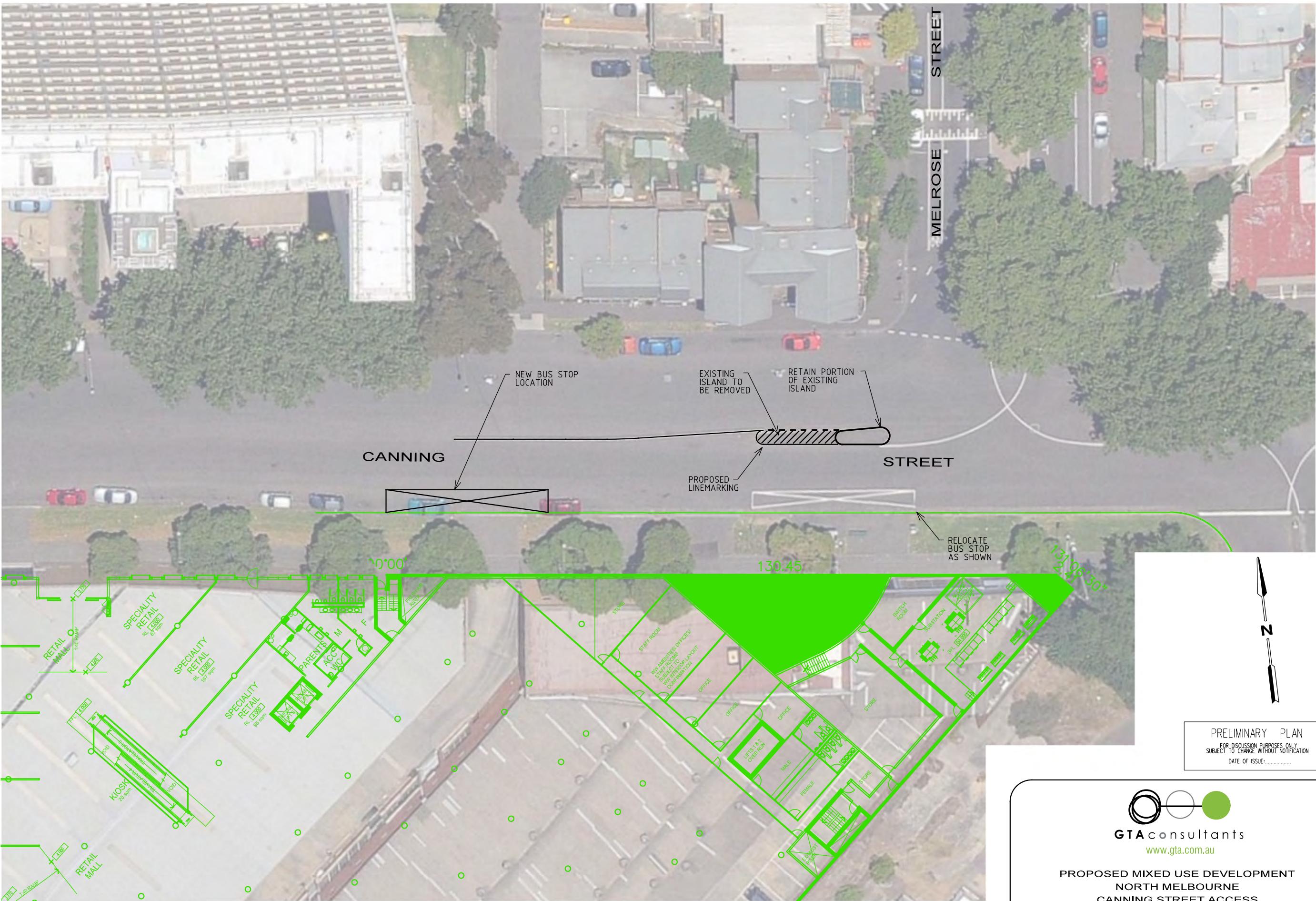
Macaulay Road/Arden Street/Dryburgh Street intersection
 Existing Saturday PM Peak
 Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Sat. v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Dryburgh Street											
1	L	57	5.0	0.295	38.8	LOS D	3.1	22.6	0.80	0.74	29.0
2	T	440	5.0	0.443	33.7	LOS C	10.8	78.6	0.89	0.74	29.8
3	R	41	5.0	0.249	46.0	LOS D	2.6	18.8	0.87	0.74	26.5
Approach		536	5.0	0.448	35.2	LOS D	10.8	78.6	0.88	0.74	29.4
East: Arden Street											
4	L	33	5.0	0.145	16.7	LOS B	4.7	34.1	0.44	0.91	42.4
5	T	305	5.0	0.145	8.4	LOS A	4.7	34.4	0.44	0.37	46.9
6	R	122	5.0	0.411	17.2	LOS B	3.5	25.9	0.56	0.72	40.8
Approach		460	5.0	0.411	11.3	LOS B	4.7	34.4	0.47	0.50	44.8
North: Macaulay Road											
7	L	229	5.0	0.448	8.9	LOS A	2.3	18.5	0.26	0.66	48.2
8	T	354	5.0	0.360	32.8	LOS C	8.8	64.3	0.86	0.71	30.2
9	R	32	5.0	0.227	47.9	LOS D	2.1	15.1	0.89	0.74	25.9
Approach		615	5.0	0.448	24.7	LOS C	8.8	64.3	0.64	0.69	34.8
West: Arden Street											
10	L	11	5.0	0.060	18.7	LOS B	0.5	3.3	0.61	0.70	40.2
11	T	262	5.0	0.221	25.1	LOS C	6.5	47.4	0.75	0.61	33.9
12	R	14	5.0	0.221	33.4	LOS C	8.0	44.2	0.75	0.85	32.6
Approach		286	5.0	0.221	25.2	LOS C	8.5	47.4	0.75	0.63	34.1
All Vehicles		1699	5.0	0.448	24.5	LOS C	10.8	78.6	0.68	0.65	34.8

Appendix C

Swept Path Assessment and Concept Site Access Layout

Appendix C



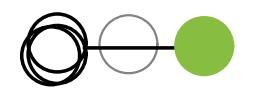
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION
DATE OF ISSUE:



GTA consultants
planners

**PROPOSED MIXED USE DEVELOPMENT
NORTH MELBOURNE
CANNING STREET ACCESS**

04 JULY '11
SCALE 1:400 @ A3
JM15680-05-FIG01-P2



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**PROPOSED MIXED USE DEVELOPMENT
MACAULEY ROAD, NORTH MELBOURNE**

15.011 SEMI-TRAILER
SWEPT PATH ASSESSMENT

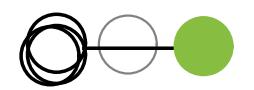
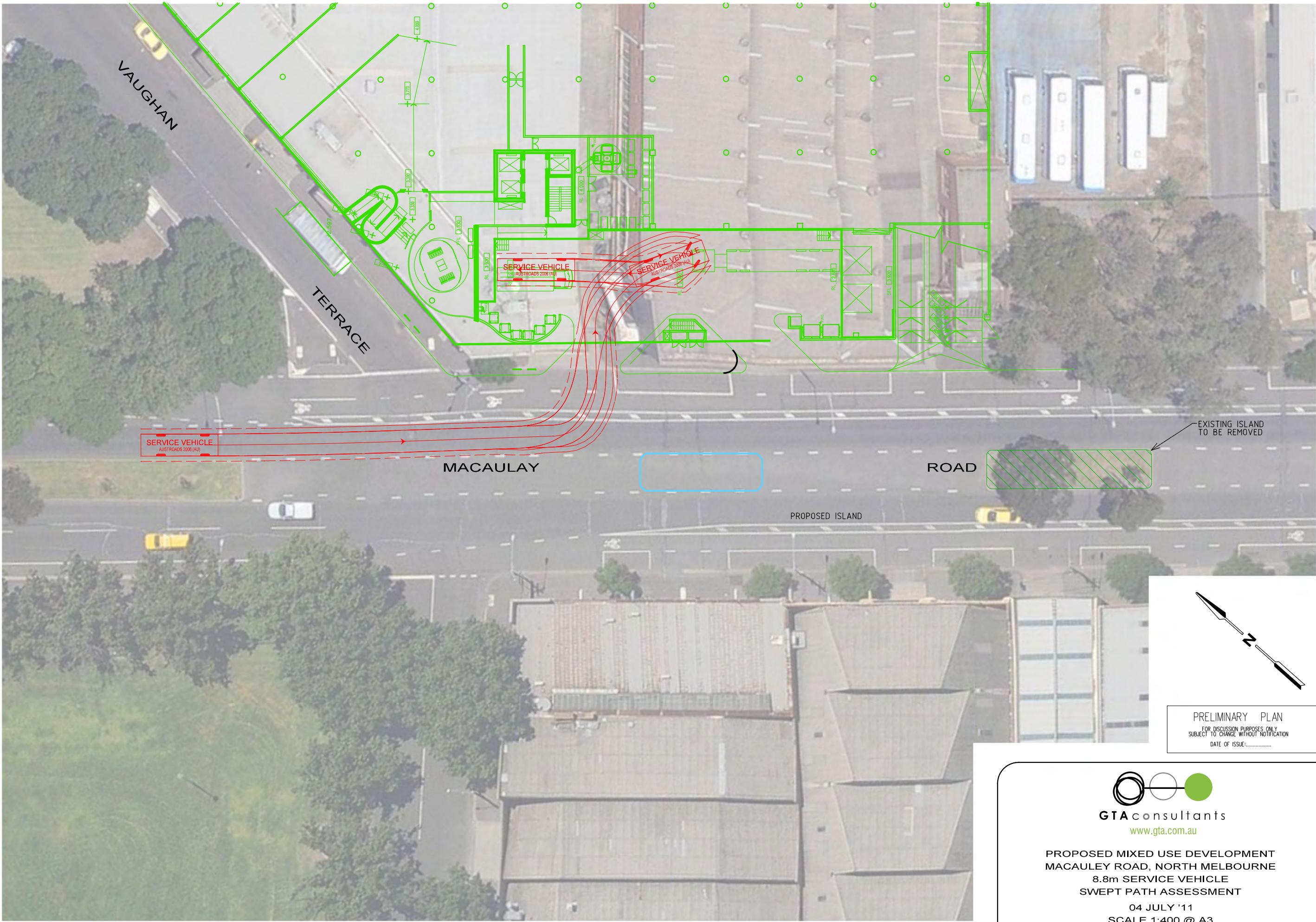
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PROPOSED MIXED USE DEVELOPMENT
MACAULEY ROAD, NORTH MELBOURNE
8.8m SERVICE VEHICLE
SWEPT PATH ASSESSMENT
04 JULY '11
SCALE 1:400 @ A3
JM15680-05-AT02P2

Appendix D

Traffic Generation Estimates

Appendix D

Table D1: Traffic Generation Estimates – Weekday AM Peak Period

Use	Size	GTA Rate	Percentage Split		Traffic Generation	
			IN	OUT	IN	OUT
Dwellings	304 units	0.30 vehicle movements per unit [1]	20%	80%	18vph	73vph
Sum Total				91vph		

[1] Source: RTANSW

vph denotes vehicles per hour.

Table D2: Traffic Generation Estimates – Weekday PM Peak Period

Use	Size	GTA Rate	Percentage Split		Traffic Generation	
			IN	OUT	IN	OUT
Dwellings	304 units	0.30 vehicle movements per unit [1]	60%	40%	55vph	36vph
Supermarket	4,350sqm	15.50 vehicle movements per 100sqm [1]	50%	50%	337vph	337vph
Specialty Retail	1,543sqm	4.60 vehicle movements per 100sqm [1]	50%	50%	36vph	36vph
Total – In/Out Split				428vph		409vph
Sum Total				837vph		

[1] Source: RTANSW

vph denotes vehicles per hour.

Table D3: Traffic Generation Estimates – Weekend Midday Peak Period

Use	Size	GTA Rate	Percentage Split		Traffic Generation	
			IN	OUT	IN	OUT
Dwellings	304 units	0.15 vehicle movements per unit [1]	50%	50%	23vph	23vph
Supermarket	4,350sqm	14.70 vehicle movements per 100sqm [1]	50%	50%	320vph	320vph
Specialty Retail	1,543sqm	10.70 vehicle movements per 100sqm [1]	50%	50%	83vph	83vph
Total – In/Out Split				426vph		426vph
Sum Total				852vph		

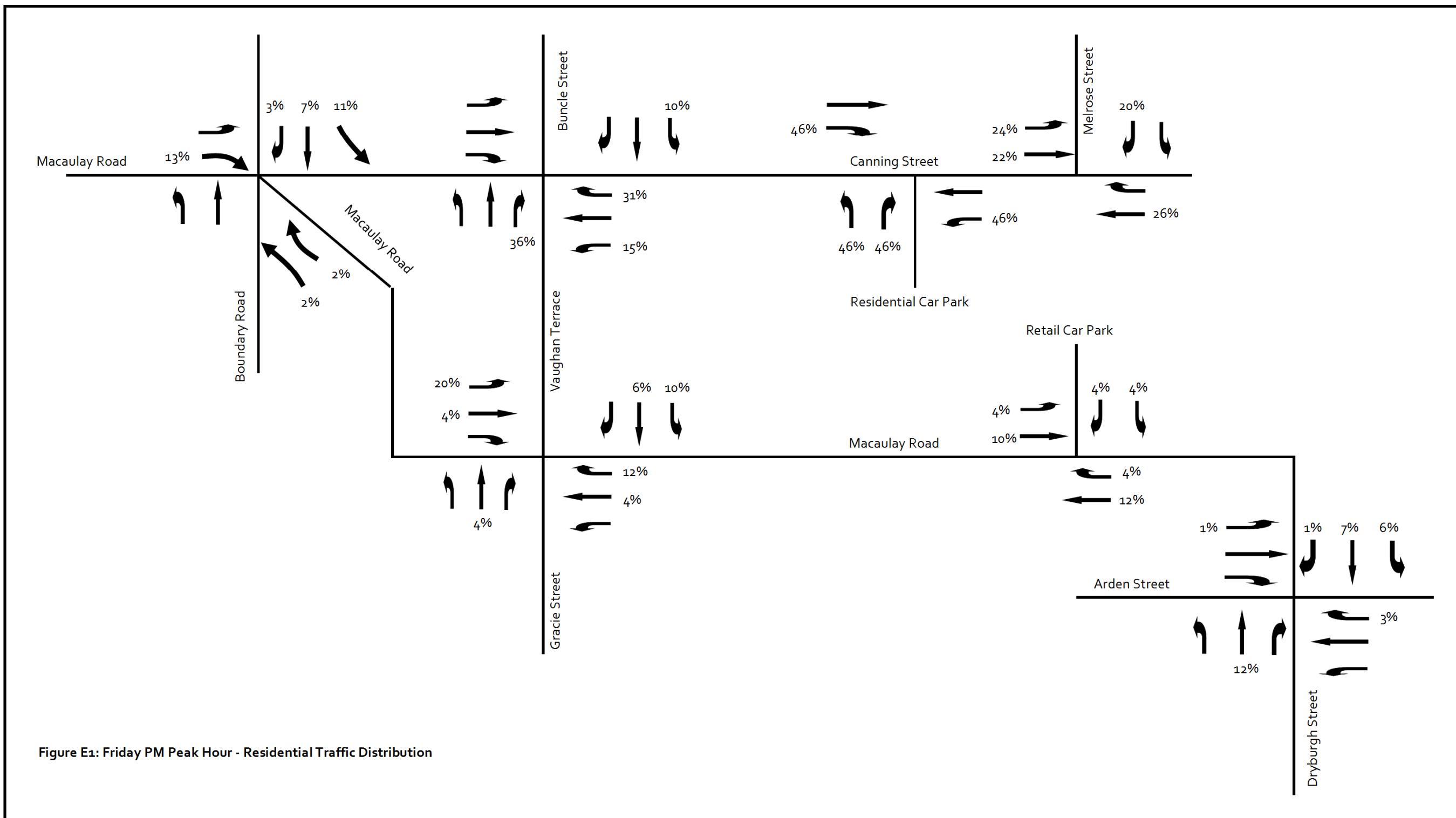
[1] Source: RTANSW

vph denotes vehicles per hour.

Appendix E

Proposed Development Traffic Distribution

Appendix E



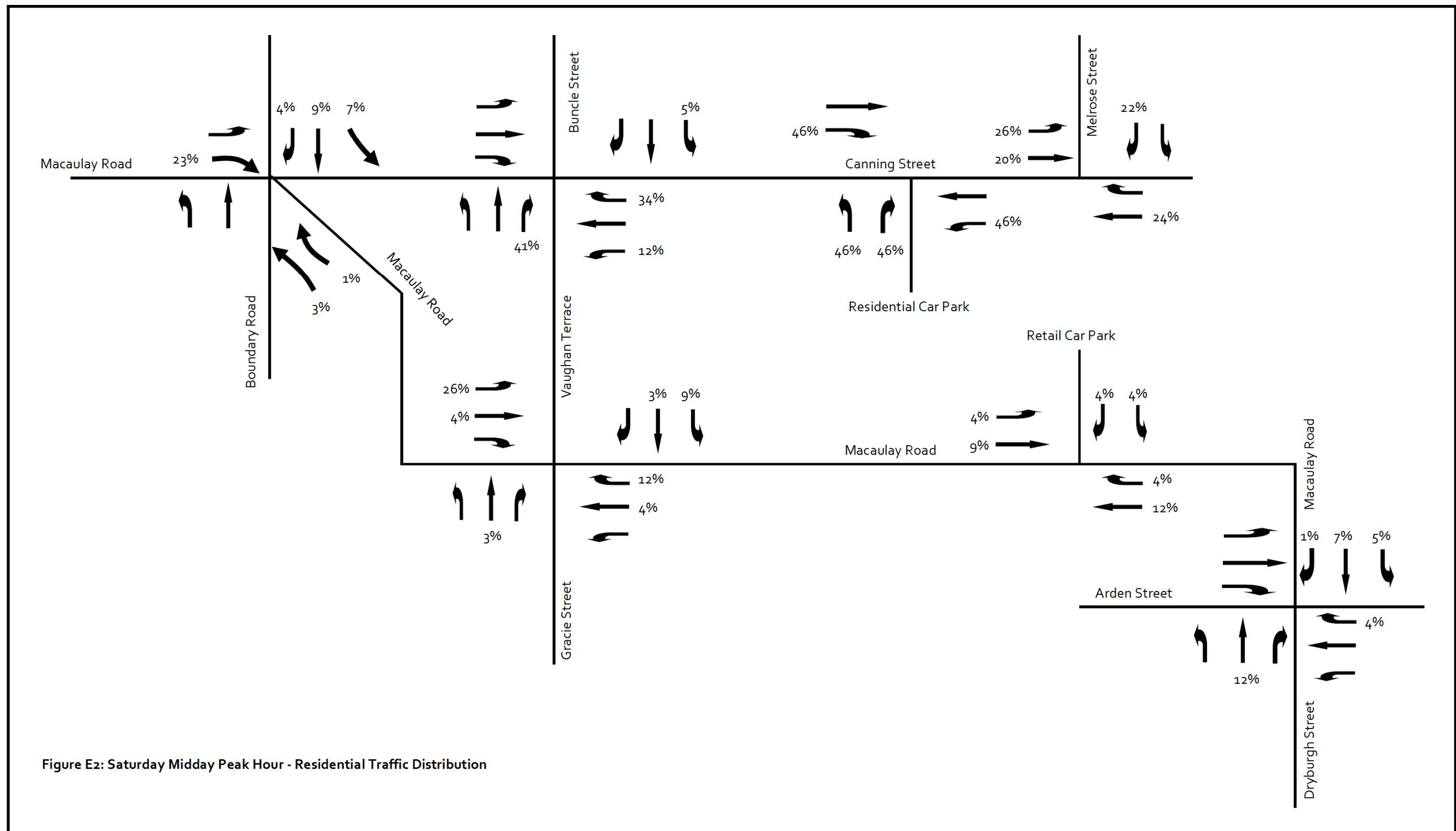


Figure E2: Saturday Midday Peak Hour - Residential Traffic Distribution

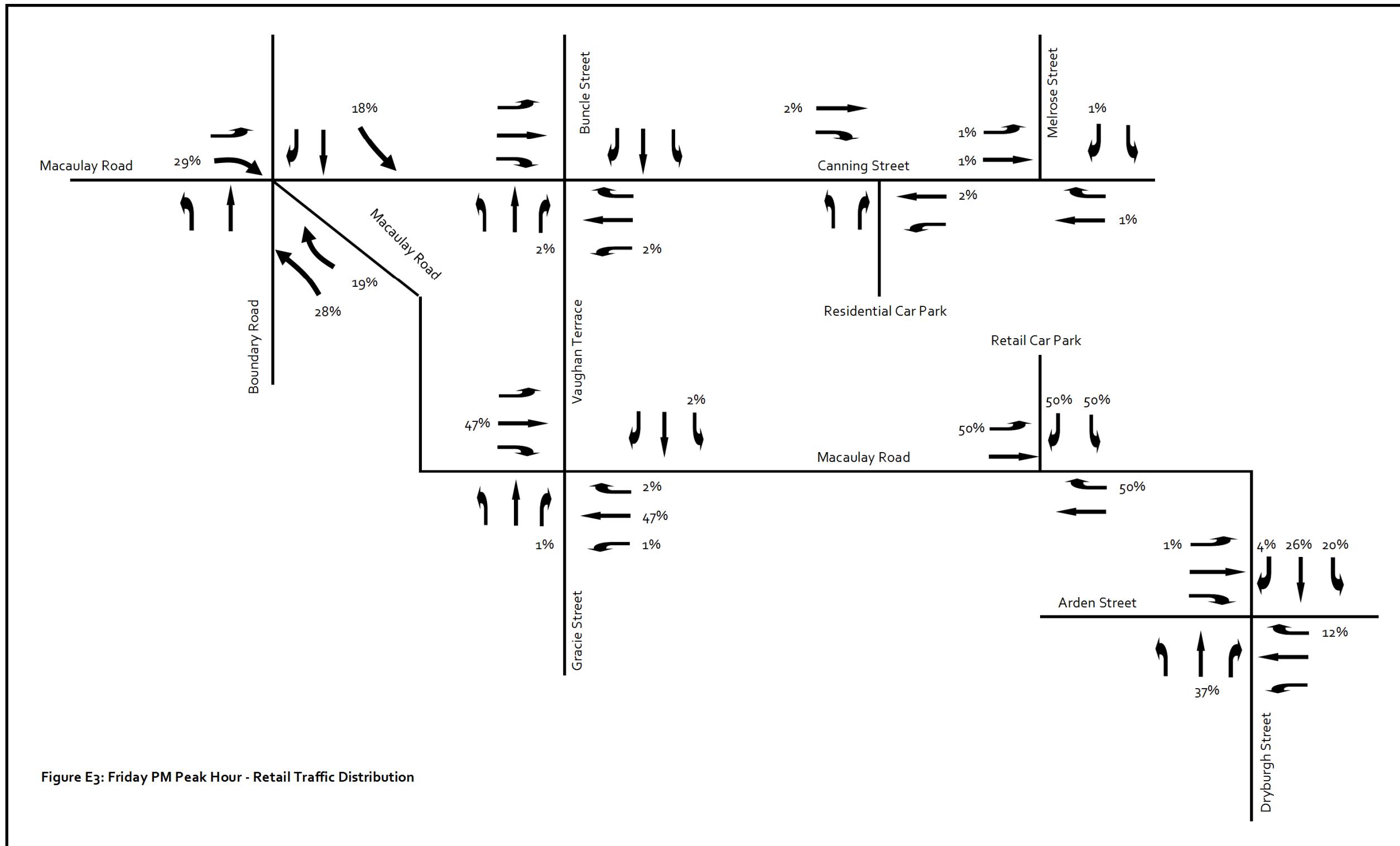


Figure E3: Friday PM Peak Hour - Retail Traffic Distribution

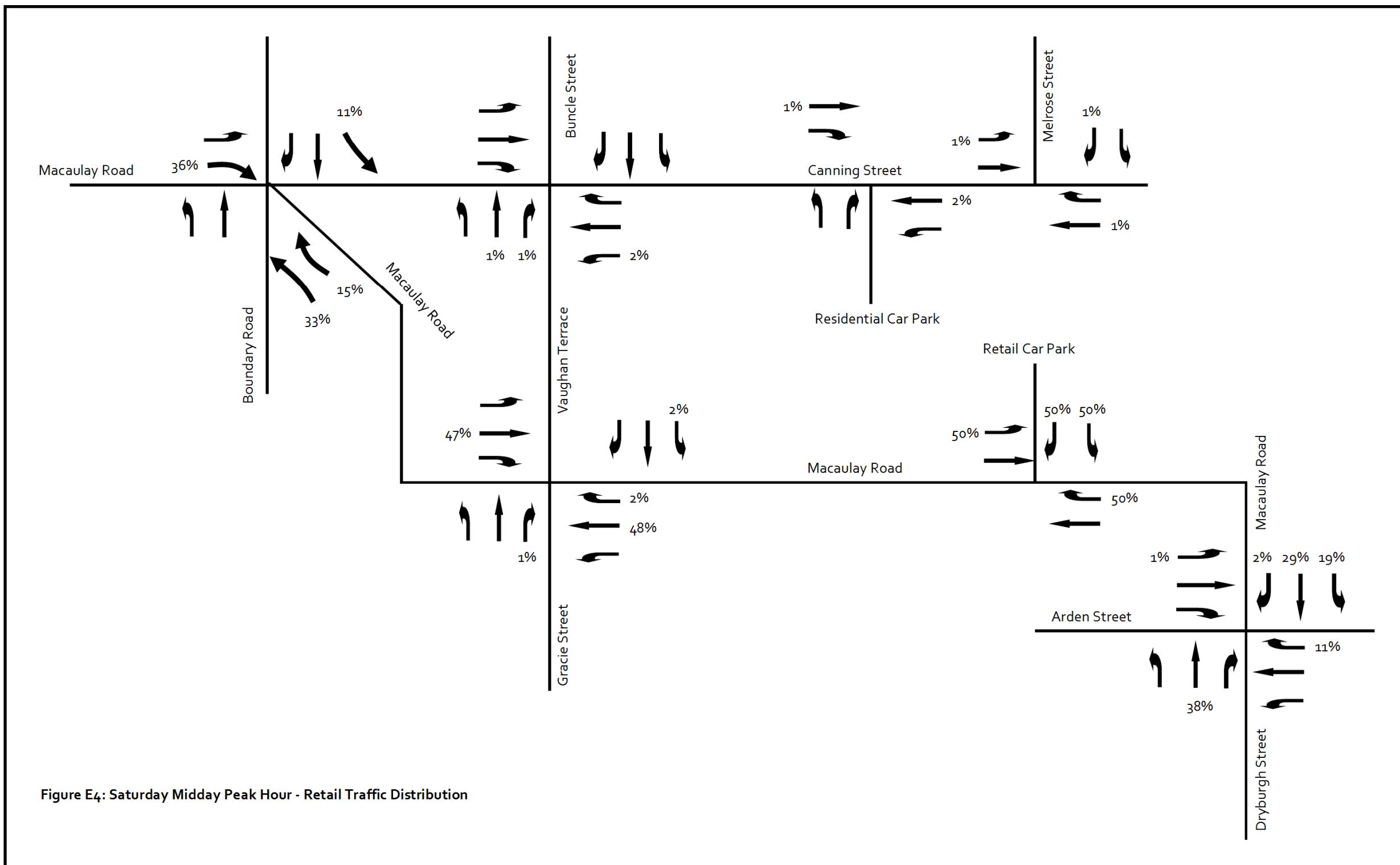


Figure E4: Saturday Midday Peak Hour - Retail Traffic Distribution

Appendix F

Proposed Development Vehicle Movements

Appendix F

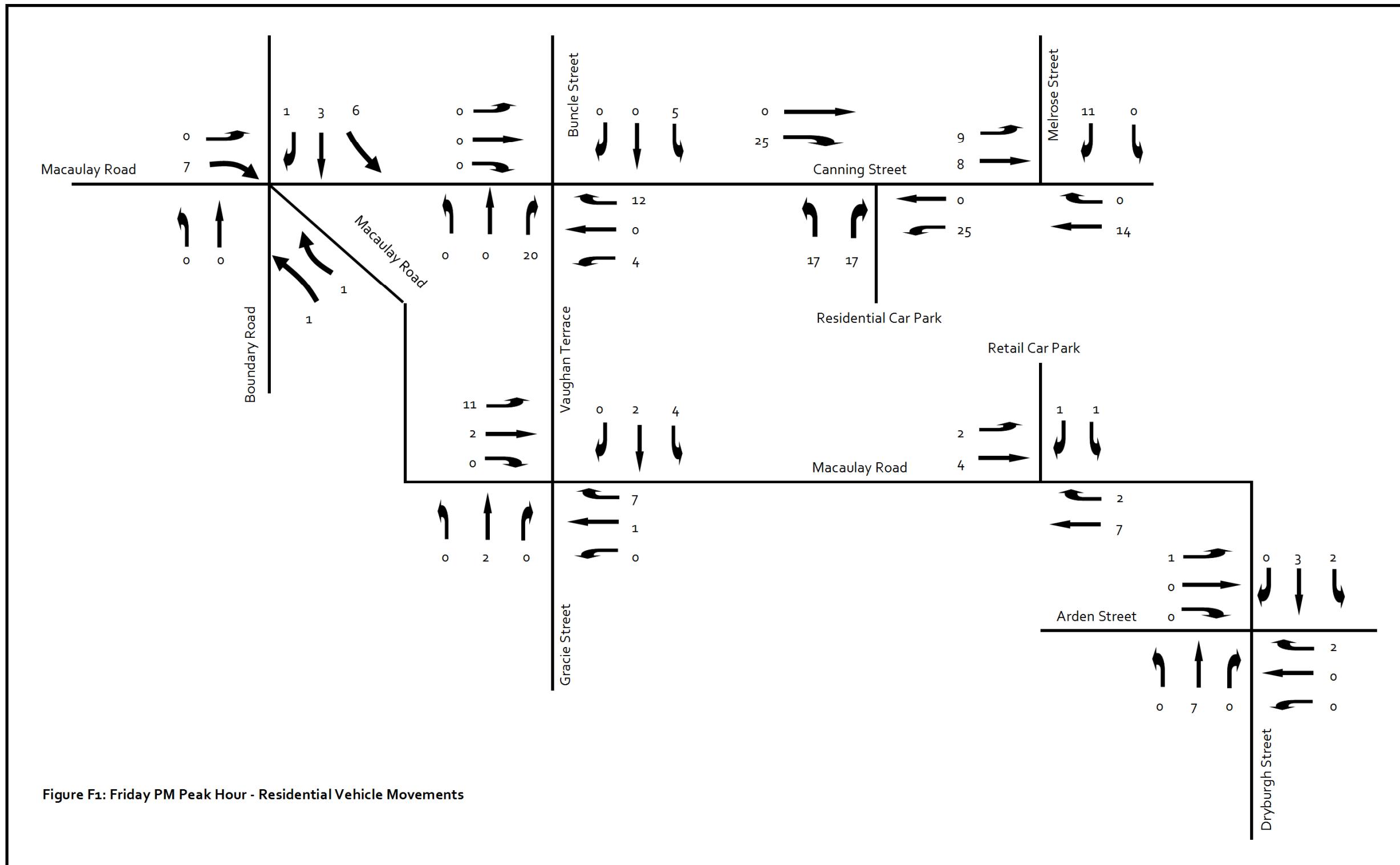
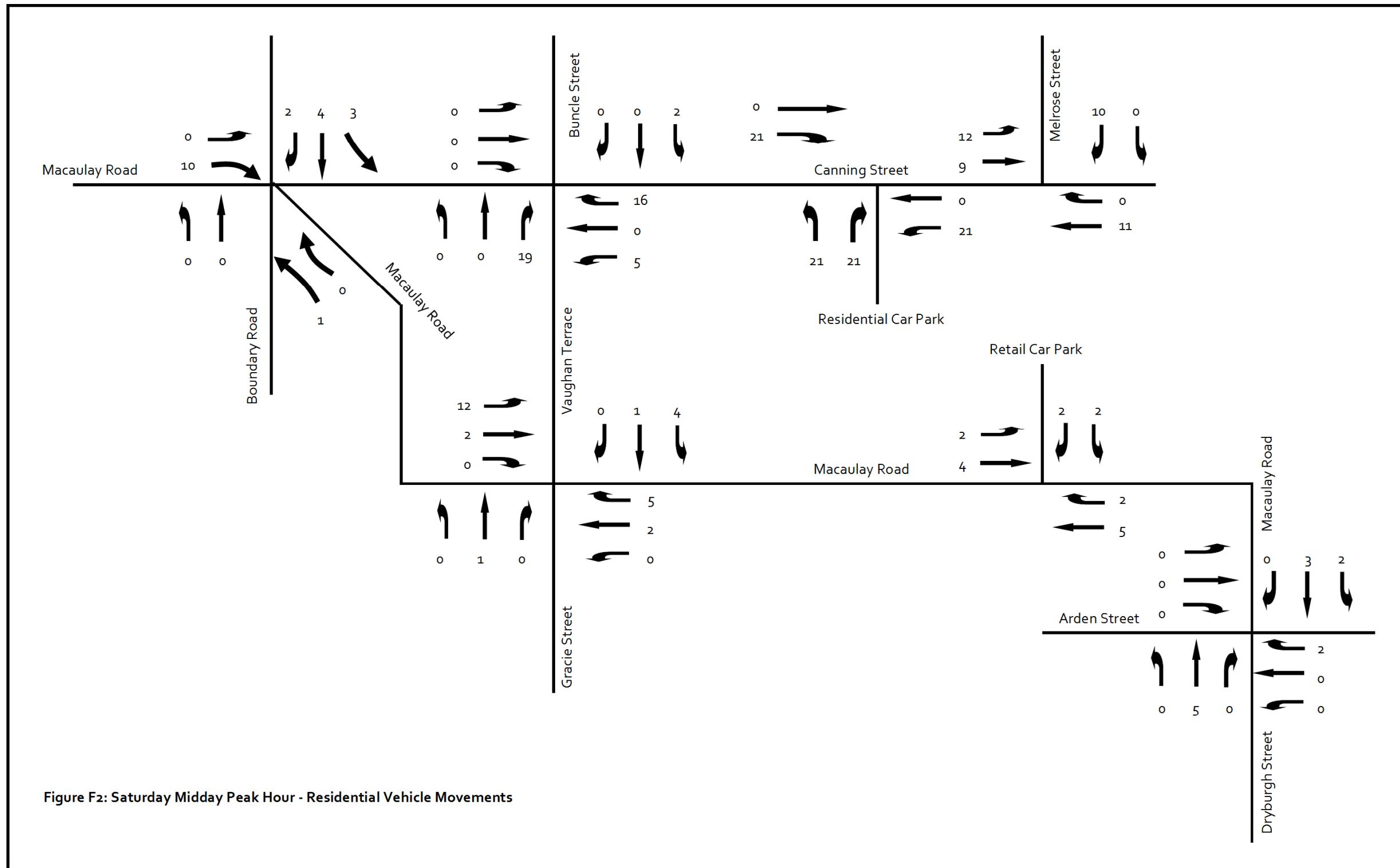


Figure F1: Friday PM Peak Hour - Residential Vehicle Movements



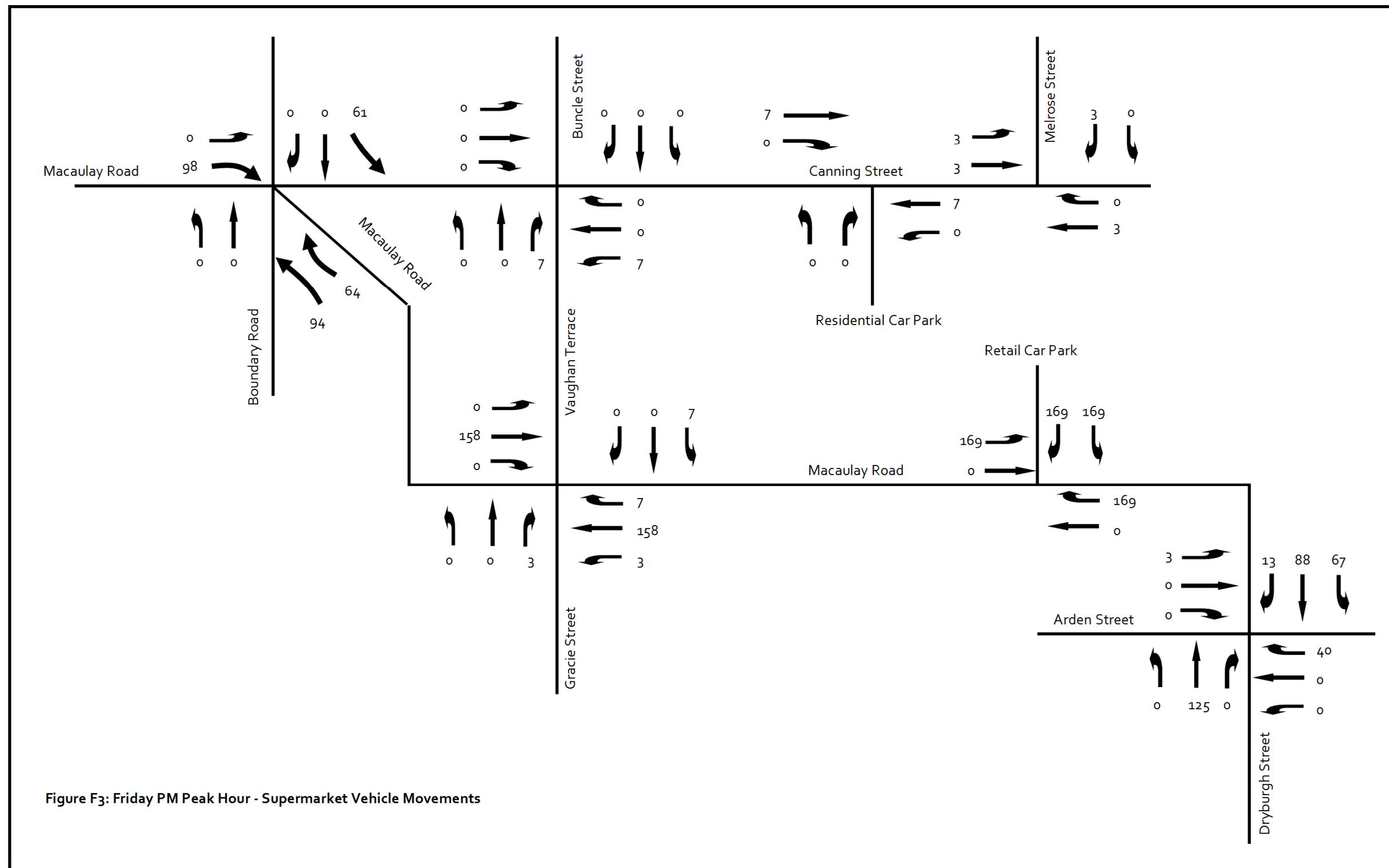
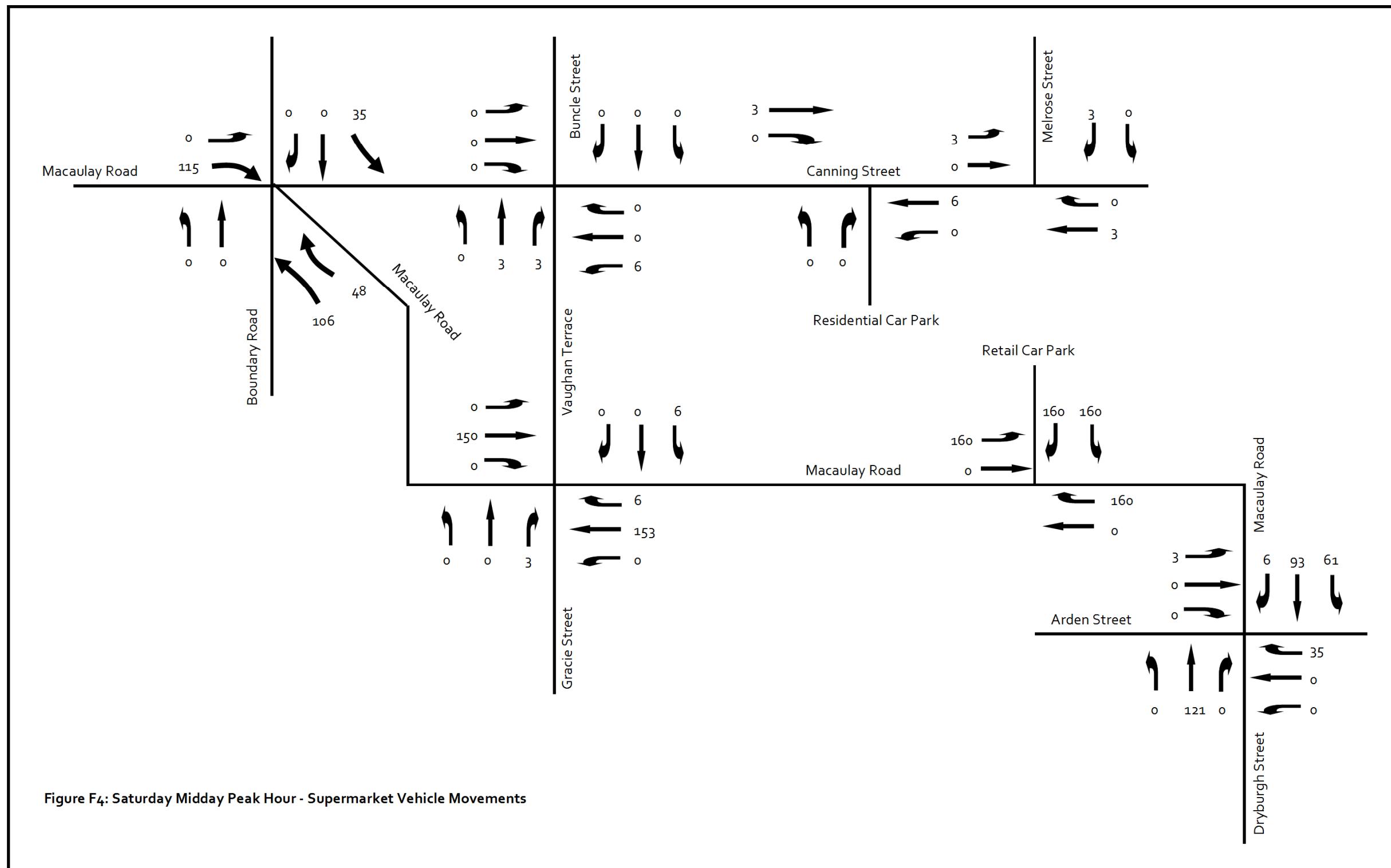


Figure F3: Friday PM Peak Hour - Supermarket Vehicle Movements



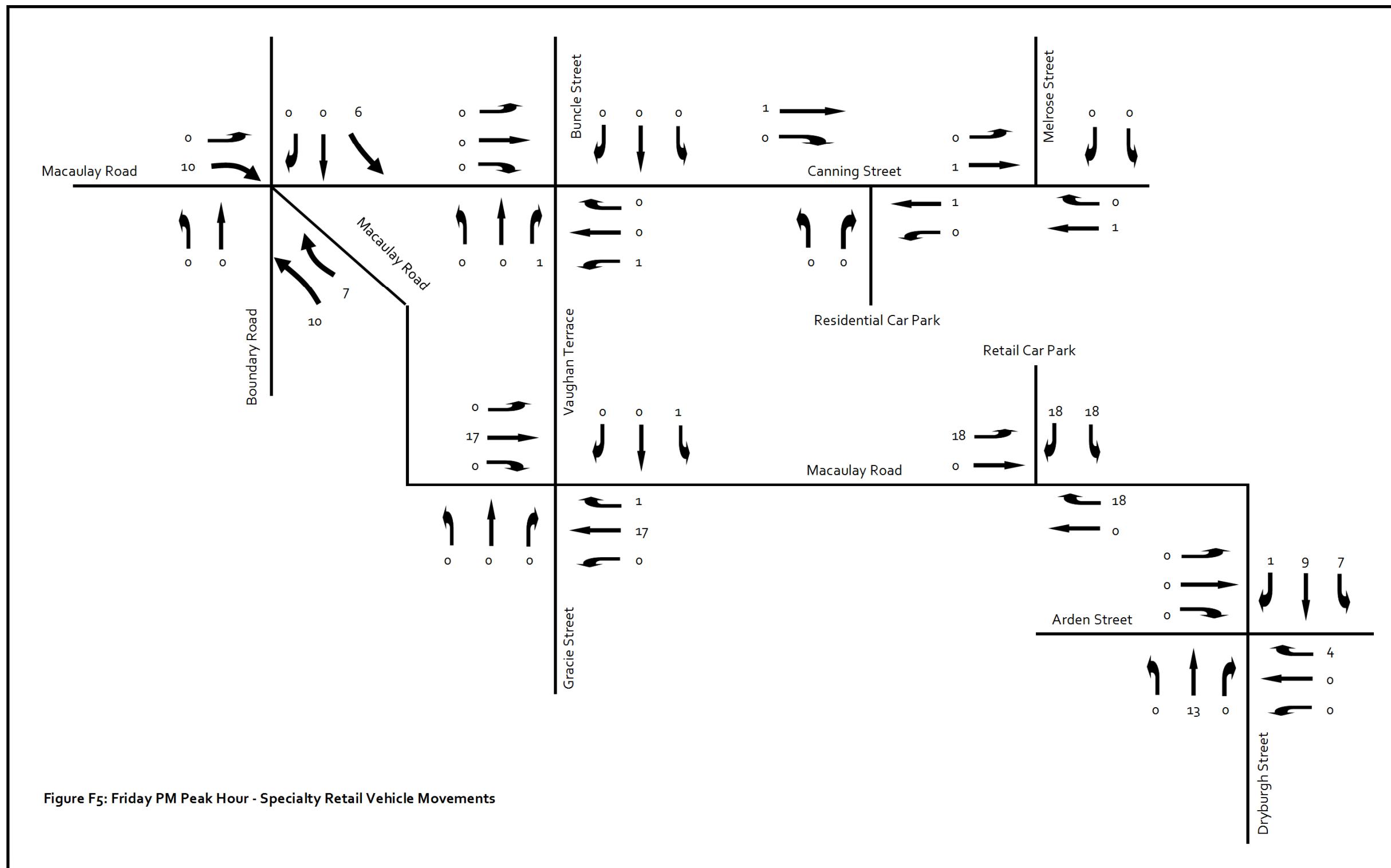
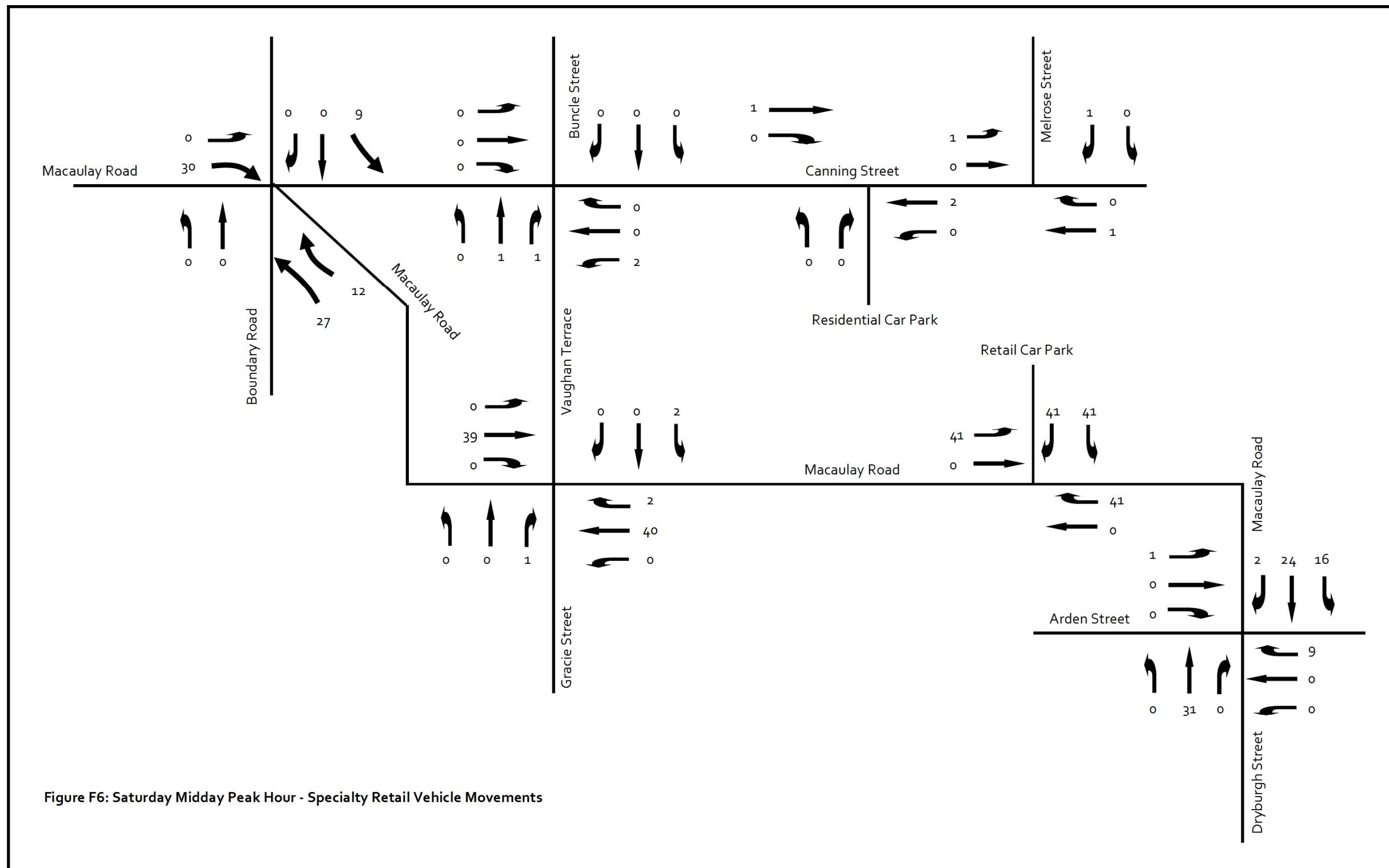


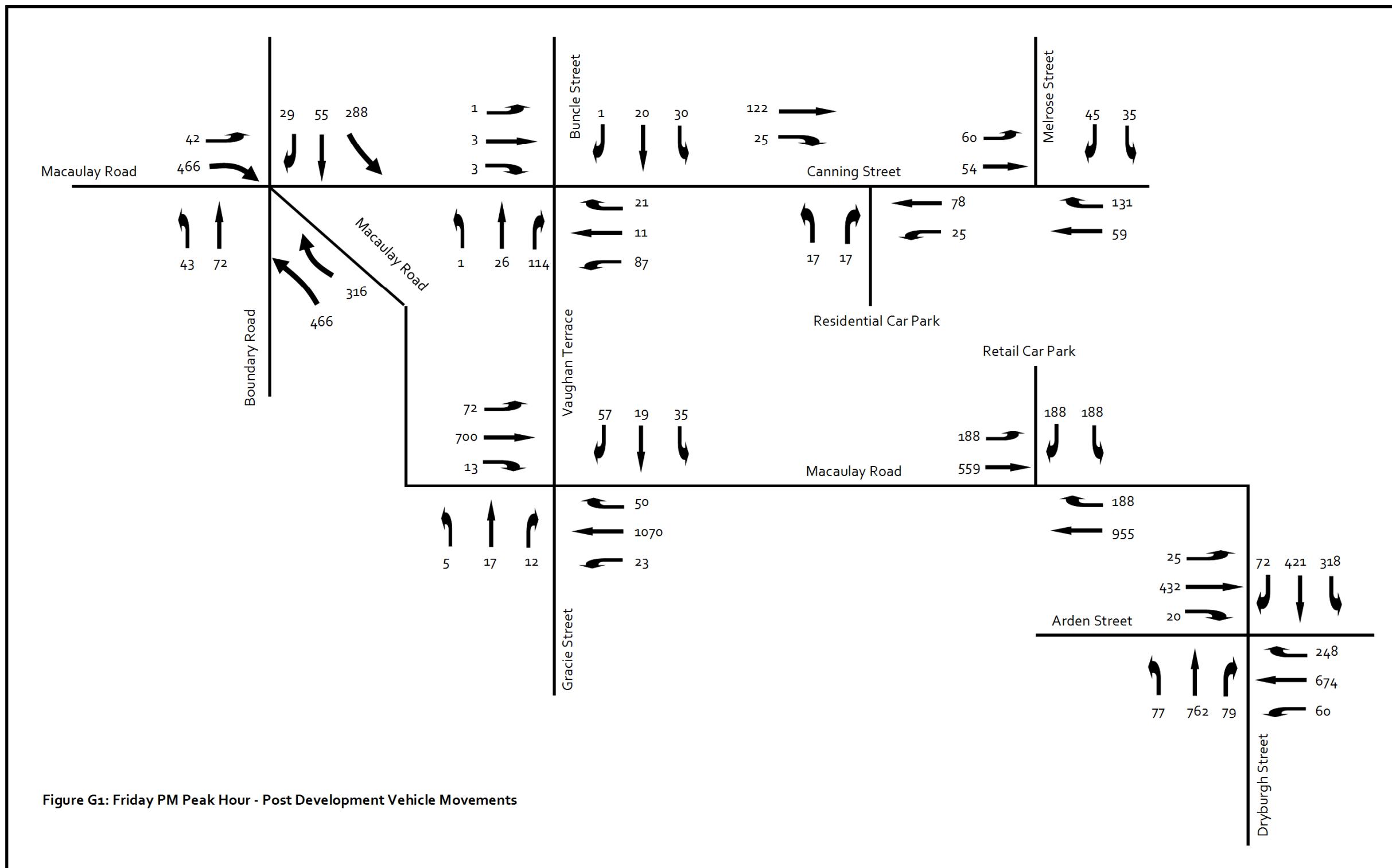
Figure F5: Friday PM Peak Hour - Specialty Retail Vehicle Movements

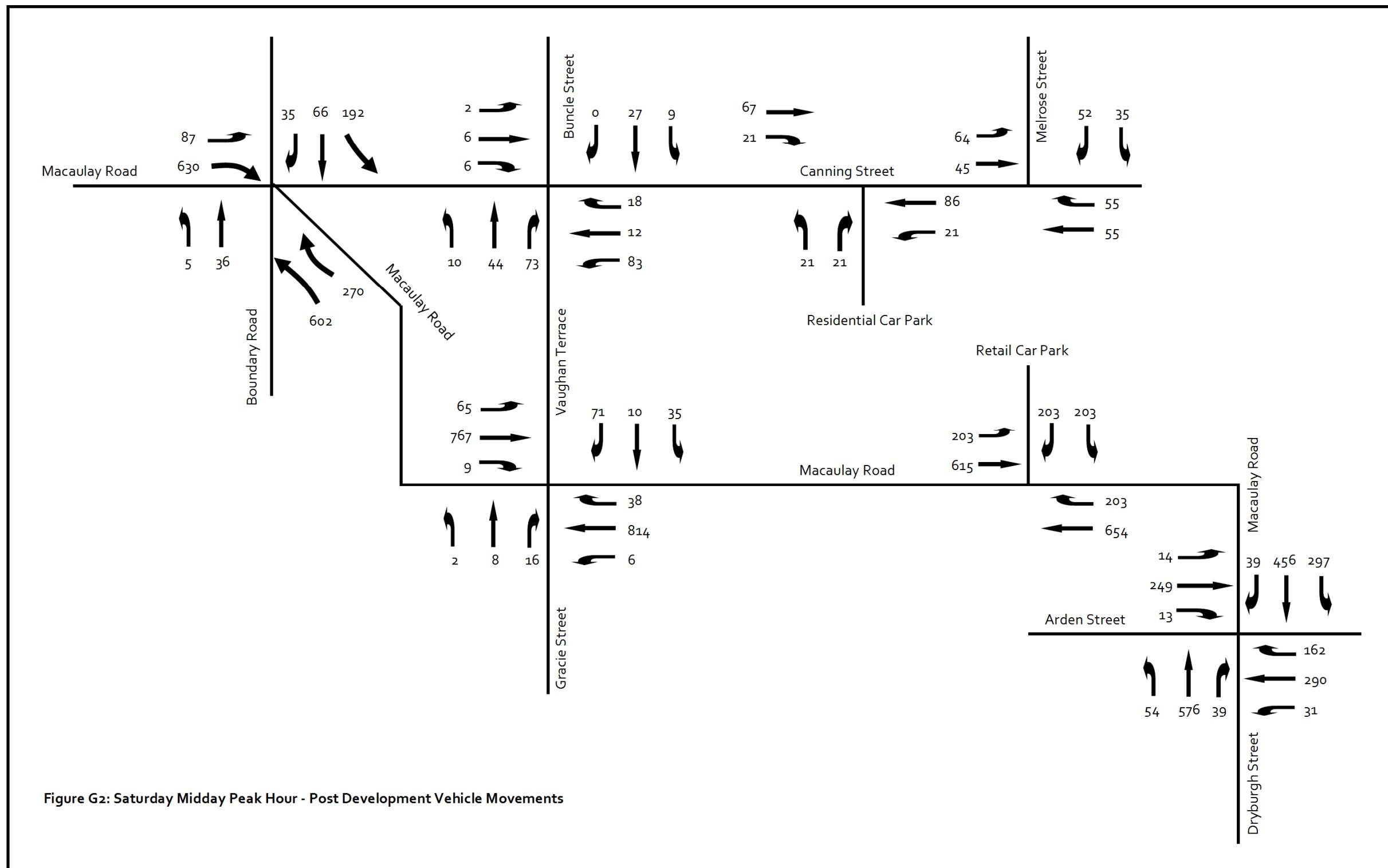


Appendix G

Post Development Vehicle Movements

Appendix G





Appendix H

SIDRA Intersection Results – Post Development

Appendix H

Macaulay Road/Canning Street/Boundary Road Signalised Intersection
MOVEMENT SUMMARY

Site: Post Development Friday PM Peak

 Macaulay Road/Canning Street/Boundary Road intersection
 Post Development Friday PM Peak
 Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/h	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Boundary Road (south)												
1	L	45	5.0	0.087	33.5	LOS C	2.2	15.9	0.76	0.74	31.3	
2	T	76	5.0	0.139	25.6	LOS C	3.6	25.9	0.78	0.61	33.7	
Approach		121	5.0	0.139	26.5	LOS C	3.6	25.9	0.77	0.66	32.8	
East: Macaulay Road (south-east)												
5	T	491	5.0	0.449	11.6	LOS B	13.7	99.9	0.61	0.54	43.6	
6	R	333	5.0	0.879	56.5	LOS E	18.0	131.7	1.00	0.99	23.5	
Approach		823	5.0	0.879	29.7	LOS C	18.0	131.7	0.77	0.72	32.4	
North: Boundary Road (north)												
7	L	303	5.0	0.886	47.2	LOS D	14.8	106.2	0.91	0.82	26.1	
8	T	58	5.0	0.194	26.2	LOS C	4.2	30.5	0.79	0.63	32.7	
9	R	31	5.0	0.194	34.7	LOS C	4.2	30.5	0.79	0.62	31.7	
Approach		392	5.0	0.886	43.2	LOS D	14.8	106.2	0.88	0.87	27.3	
West: Macaulay Road (west)												
10	L	44	5.0	0.227	32.6	LOS C	2.1	15.3	0.75	0.72	31.6	
11	T	491	5.0	0.866	41.1	LOS D	24.5	176.9	1.00	1.03	26.9	
Approach		535	5.0	0.866	40.4	LOS D	24.5	176.9	0.98	1.01	27.3	
All Vehicles		1871	5.0	0.886	35.5	LOS D	24.5	176.9	0.85	0.83	29.7	

MOVEMENT SUMMARY

Site: Post Development Saturday PM Peak

 Macaulay Road/Canning Street/Boundary Road intersection
 Post Development Saturday PM Peak
 Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/h	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Boundary Road (south)												
1	L	5	5.0	0.020	44.3	LOS D	0.3	2.3	0.88	0.66	27.1	
2	T	38	5.0	0.139	37.1	LOS D	2.2	16.3	0.91	0.67	28.5	
Approach		43	5.0	0.139	38.0	LOS D	2.2	16.3	0.90	0.67	28.3	
East: Macaulay Road (south-east)												
5	T	634	5.0	0.464	5.5	LOS A	13.0	95.1	0.45	0.41	50.1	
6	R	284	5.0	0.751	47.4	LOS D	14.1	102.6	0.99	0.89	26.0	
Approach		916	5.0	0.751	18.5	LOS B	14.1	102.6	0.62	0.56	39.0	
North: Boundary Road (north)												
7	L	202	5.0	0.780	53.3	LOS D	11.1	81.1	1.00	0.90	24.3	
8	T	69	5.0	0.449	39.6	LOS D	6.0	43.6	0.96	0.76	26.9	
9	R	37	5.0	0.448	46.1	LOS D	6.0	43.6	0.96	0.80	26.7	
Approach		308	5.0	0.780	49.6	LOS D	11.1	81.1	0.99	0.86	25.1	
West: Macaulay Road (west)												
10	L	92	5.0	0.381	23.9	LOS C	3.4	24.6	0.62	0.74	36.2	
11	T	663	5.0	0.790	25.2	LOS C	26.8	195.3	0.92	0.87	33.7	
Approach		755	5.0	0.790	25.0	LOS C	26.8	195.3	0.88	0.85	34.0	
All Vehicles		2024	5.0	0.790	26.1	LOS C	26.8	195.3	0.78	0.71	34.0	

Canning Street/Buncle Street/Vaughan Terrace Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Post Development

 Buncle Street/Canning Street/Vaughan Terrace Intersection
 Friday PM Post Development

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/hr	HV %	Deg. Satn vch	Average Delay sec	Level of Service	95% Back of Queue Vehicles vch	Distance m	Prop Queued	Effective Stop Rate per vch	Average Speed km/h
South: Vaughan Terrace											
1	L	1	0.0	0.002	10.9	LOS B	0.0	0.0	0.14	0.89	46.4
2	T	27	0.0	0.193	12.2	LOS B	1.1	7.4	0.32	0.83	45.5
3	R	120	0.0	0.192	11.9	LOS B	1.1	7.4	0.32	0.89	45.7
Approach		148	0.0	0.192	12.0	LOS B	1.1	7.4	0.32	0.86	45.7
East: Canning Street (East Approach)											
4	L	92	0.0	0.049	8.2	LOS A	0.0	0.0	0.00	0.87	49.0
5	T	12	0.0	0.021	0.0	LOS A	0.1	0.8	0.03	0.00	59.3
6	R	22	0.0	0.021	8.2	LOS A	0.1	0.8	0.03	0.75	48.9
Approach		125	0.0	0.049	7.4	LOS A	0.1	0.8	0.01	0.62	49.7
North: Buncle Street											
7	L	32	0.0	0.052	10.7	LOS B	0.1	0.8	0.17	0.85	46.4
8	T	21	0.0	0.026	11.8	LOS B	0.1	0.9	0.28	0.86	45.9
9	R	1	0.0	0.026	11.4	LOS B	0.1	0.9	0.28	0.86	46.2
Approach		54	0.0	0.052	11.2	LOS B	0.1	0.9	0.21	0.85	46.2
West: Canning Street (West Approach)											
10	L	1	0.0	0.005	8.5	LOS A	0.0	0.2	0.22	0.62	48.4
11	T	3	0.0	0.005	0.3	LOS A	0.0	0.2	0.22	0.00	55.2
12	R	3	0.0	0.005	8.6	LOS A	0.0	0.2	0.22	0.71	48.4
Approach		7	0.0	0.005	5.1	LOS A	0.0	0.2	0.22	0.39	51.1
All Vehicles		335	0.0	0.192	10.0	NA	1.1	7.4	0.18	0.77	47.3

MOVEMENT SUMMARY

Site: Saturday Midday Peak Hour Post Development

 Buncle Street/Canning Street/Vaughan Terrace Intersection
 Saturday Lunch Peak Hour Post Development

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/hr	HV %	Deg. Satn vch	Average Delay sec	Level of Service	95% Back of Queue Vehicles vch	Distance m	Prop Queued	Effective Stop Rate per vch	Average Speed km/h
South: Vaughan Terrace											
1	L	11	0.0	0.018	10.9	LOS B	0.0	0.3	0.14	0.90	46.4
2	T	46	0.0	0.153	11.9	LOS B	0.8	5.8	0.29	0.85	45.7
3	R	77	0.0	0.153	11.7	LOS B	0.8	5.8	0.29	0.89	45.9
Approach		134	0.0	0.153	11.7	LOS B	0.8	5.8	0.28	0.86	45.9
East: Canning Street (East Approach)											
4	L	87	0.0	0.047	8.2	LOS A	0.0	0.0	0.00	0.87	49.0
5	T	13	0.0	0.020	0.0	LOS A	0.1	0.8	0.05	0.00	56.9
6	R	19	0.0	0.020	8.2	LOS A	0.1	0.8	0.05	0.76	48.8
Approach		119	0.0	0.047	7.3	LOS A	0.1	0.8	0.01	0.61	49.8
North: Buncle Street											
7	L	9	0.0	0.016	10.7	LOS B	0.0	0.2	0.04	0.96	46.4
8	T	28	0.0	0.034	11.8	LOS B	0.2	1.2	0.29	0.86	45.9
9	R	1	0.0	0.034	11.5	LOS B	0.2	1.2	0.29	0.86	46.2
Approach		39	0.0	0.034	11.5	LOS B	0.2	1.2	0.23	0.86	46.0
West: Canning Street (West Approach)											
10	L	2	0.0	0.009	8.5	LOS A	0.1	0.4	0.21	0.62	48.4
11	T	6	0.0	0.009	0.3	LOS A	0.1	0.4	0.21	0.00	55.2
12	R	6	0.0	0.009	8.8	LOS A	0.1	0.4	0.21	0.72	48.4
Approach		15	0.0	0.009	5.1	LOS A	0.1	0.4	0.21	0.40	51.1
All Vehicles		306	0.0	0.153	9.7	NA	0.8	5.8	0.16	0.75	47.6

Macaulay Road/Vaughan Terrace/Gracie Street Unsignalised Intersection

MOVEMENT SUMMARY

Site: Friday PM Post Development

 Gracie Street/Vaughan Terrace/Macaulay Road
 2011 Friday PM Post Development
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	Hv %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Gracie Street												
1	L	5	0.0	0.035	32.2	LOS D	0.1	0.9	0.88	1.00	32.7	
2	T	18	0.0	0.994	490.6	LOS F	8.2	57.3	1.00	1.16	4.2	
3	R	13	0.0	0.972	490.4	LOS F	8.2	57.3	1.00	1.16	4.1	
Approach		36	0.0	1.000	423.1	LOS F	8.2	57.3	0.98	1.15	4.8	
East: Macaulay Road (East Approach)												
4	L	24	0.0	0.605	8.2	LOS A	0.0	0.0	0.00	1.06	49.0	
5	T	1126	5.0	0.609	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
6	R	53	0.0	0.107	14.5	LOS B	0.5	3.2	0.68	0.90	42.8	
Approach		1203	4.7	0.609	0.8	LOS B	0.5	3.2	0.03	0.06	58.7	
North: Vaughan Terrace												
7	L	37	0.0	0.996	113.0	LOS F	4.3	30.4	0.98	1.11	14.8	
8	T	20	0.0	1.000 ³	113.2	LOS F	4.3	30.4	0.98	1.06	14.8	
9	R	60	0.0	1.000 ⁴	516.3	LOS F	9.6	66.9	1.00	1.80	3.9	
Approach		117	0.0	1.000	320.1	LOS F	9.6	66.9	0.99	1.46	6.1	
West: Macaulay Road (West Approach)												
10	L	76	0.0	0.431	8.2	LOS A	0.0	0.0	0.00	1.03	49.0	
11	T	737	5.0	0.431	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
12	R	14	0.0	0.064	23.9	LOS C	0.2	1.7	0.86	0.95	36.1	
Approach		826	4.5	0.431	1.1	LOS C	0.2	1.7	0.01	0.11	58.2	
All Vehicles		2182	4.3	1.000	25.0	NA	9.6	66.9	0.09	0.17	35.7	

MOVEMENT SUMMARY

Site: Saturday Midday Peak Hour Post Development

 Gracie Street/Vaughan Terrace/Macaulay Road
 2011 Saturday Lunch Peak Hour Post Development
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	Hv %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Gracie Street												
1	L	2	0.0	0.006	19.4	LOS C	0.0	0.2	0.73	0.90	40.2	
2	T	8	0.0	0.842	279.9	LOS F	3.7	26.0	0.99	1.13	6.8	
3	R	17	0.0	0.842	279.7	LOS F	3.7	26.0	0.99	1.13	6.8	
Approach		27	0.0	0.848	259.7	LOS F	3.7	26.0	0.97	1.11	7.4	
East: Macaulay Road (East Approach)												
4	L	6	0.0	0.451	8.2	LOS A	0.0	0.0	0.00	1.09	49.0	
5	T	857	5.0	0.457	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
6	R	40	0.0	0.093	15.6	LOS C	0.4	2.7	0.72	0.91	42.0	
Approach		903	4.7	0.457	0.7	LOS C	0.4	2.7	0.03	0.05	58.8	
North: Vaughan Terrace												
7	L	37	0.0	0.368	45.4	LOS E	1.5	10.7	0.90	1.05	27.3	
8	T	11	0.0	0.376	45.6	LOS E	1.5	10.7	0.90	1.04	27.2	
9	R	75	0.0	1.246	496.3	LOS F	16.8	117.5	1.00	2.02	4.1	
Approach		122	0.0	1.246	321.4	LOS F	16.8	117.5	0.96	1.65	6.1	
West: Macaulay Road (West Approach)												
10	L	68	0.0	0.465	8.2	LOS A	0.0	0.0	0.00	1.04	49.0	
11	T	807	5.0	0.464	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
12	R	9	0.0	0.026	14.9	LOS B	0.1	0.6	0.70	0.85	42.6	
Approach		865	4.6	0.464	0.6	LOS B	0.1	0.6	0.01	0.09	58.7	
All Vehicles		1938	4.3	1.246	24.6	NA	16.8	117.5	0.09	0.18	35.9	

Melrose Street/Canning Street Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Post Development

 Melrose Street/Canning Street -
 Friday PM Post Development
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Canning Street (East Approach)											
5	T	62	0.0	0.139	0.5	LOS A	0.9	6.0	0.24	0.00	54.4
6	R	136	0.0	0.139	8.6	LOS A	0.9	6.0	0.24	0.66	48.3
Approach		200	0.0	0.139	6.1	LOS A	0.9	6.0	0.24	0.47	50.1
North: Melrose Street											
7	L	37	0.0	0.063	11.0	LOS B	0.2	1.1	0.19	0.89	46.4
9	R	47	0.0	0.081	13.7	LOS B	0.4	2.7	0.45	0.90	44.4
Approach		84	0.0	0.081	12.6	LOS B	0.4	2.7	0.34	0.90	45.2
West: Canning Street (West Approach)											
10	L	63	0.0	0.034	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	57	0.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		120	0.0	0.034	4.3	LOS A	0.0	0.0	0.00	0.35	53.6
All Vehicles		404	0.0	0.139	6.9	NA	0.9	6.0	0.19	0.52	49.9

MOVEMENT SUMMARY

Site: Saturday Midday Peak - Post Development

 Melrose Street/Canning Street -
 Saturday Lunch Post Development
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Canning Street (East Approach)											
5	T	58	0.0	0.074	0.4	LOS A	0.5	3.2	0.23	0.00	55.0
6	R	58	0.0	0.074	8.6	LOS A	0.5	3.2	0.23	0.73	48.6
Approach		116	0.0	0.074	4.5	LOS A	0.5	3.2	0.23	0.36	51.6
North: Melrose Street											
7	L	37	0.0	0.063	11.0	LOS B	0.1	1.0	0.18	0.89	46.4
9	R	55	0.0	0.081	12.6	LOS B	0.4	2.6	0.37	0.86	45.2
Approach		92	0.0	0.081	12.0	LOS B	0.4	2.6	0.29	0.86	45.7
West: Canning Street (West Approach)											
10	L	67	0.0	0.036	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	47	0.0	0.024	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		115	0.0	0.036	4.8	LOS A	0.0	0.0	0.00	0.39	53.0
All Vehicles		322	0.0	0.081	6.7	NA	0.5	3.2	0.17	0.52	50.2

Macaulay Road/Arden Street/Dryburgh Street Signalised Intersection
MOVEMENT SUMMARY

Site: Post Development Friday PM Peak_Peds

 Macaulay Road/Arden Street/Dryburgh Street intersection
 Post Development Friday PM Peak
 Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Dryburgh Street											
1	L	81	5.0	0.421	39.3	LOS D	4.3	31.6	0.81	0.75	26.8
2	T	602	5.0	0.817	42.6	LOS D	21.0	153.6	1.00	0.96	26.5
3	R	63	5.0	0.525	50.2	LOS D	5.2	36.1	0.94	0.76	25.2
Approach		966	5.0	0.817	43.0	LOS D	21.0	153.6	0.98	0.93	26.5
East: Arden Street											
4	L	63	5.0	0.332	18.0	LOS B	10.5	76.9	0.51	0.93	41.7
5	T	709	5.0	0.331	9.6	LOS A	10.6	77.4	0.51	0.45	45.5
6	R	261	5.0	0.874	24.6	LOS C	8.4	61.3	0.69	0.81	35.8
Approach		1034	5.0	0.875	13.9	LOS B	10.6	77.4	0.56	0.57	42.4
North: Macaulay Road											
7	L	335	5.0	0.872	14.9	LOS B	6.0	43.7	0.57	0.76	42.8
8	T	443	5.0	0.451	33.7	LOS C	10.6	79.1	0.89	0.74	29.8
9	R	76	5.0	0.793	65.9	LOS E	5.6	41.2	1.00	0.90	21.4
Approach		654	5.0	0.872	29.2	LOS C	10.6	79.1	0.77	0.76	32.6
West: Arden Street											
10	L	26	5.0	0.126	19.0	LOS B	0.9	6.6	0.66	0.72	40.0
11	T	455	5.0	0.462	31.2	LOS C	11.8	86.3	0.87	0.73	30.8
12	R	21	5.0	0.462	39.8	LOS D	10.4	75.8	0.87	0.85	30.0
Approach		502	5.0	0.462	31.0	LOS C	11.8	86.3	0.88	0.73	31.1
All Vehicles		3356	5.0	0.875	28.7	LOS C	21.0	153.6	0.78	0.75	32.5

MOVEMENT SUMMARY

Site: Post Development Saturday PM Peak_Peds

 Macaulay Road/Arden Street/Dryburgh Street intersection
 Post Development Saturday PM Peak
 Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Dryburgh Street											
1	L	57	5.0	0.291	38.0	LOS D	3.1	22.3	0.79	0.74	29.4
2	T	606	5.0	0.595	34.5	LOS C	14.5	105.5	0.92	0.79	29.4
3	R	41	5.0	0.258	48.4	LOS D	2.7	19.4	0.90	0.75	25.8
Approach		704	5.0	0.595	35.6	LOS D	14.5	105.5	0.91	0.78	29.2
East: Arden Street											
4	L	33	5.0	0.147	17.2	LOS B	4.8	34.9	0.45	0.91	42.1
5	T	305	5.0	0.147	8.6	LOS A	4.8	35.2	0.45	0.38	46.4
6	R	171	5.0	0.588	16.0	LOS B	5.0	36.7	0.59	0.74	40.3
Approach		506	5.0	0.588	12.4	LOS B	5.0	36.7	0.50	0.53	43.9
North: Macaulay Road											
7	L	313	5.0	0.610	9.5	LOS A	3.2	23.6	0.39	0.70	47.5
8	T	480	5.0	0.471	33.2	LOS C	11.5	84.2	0.89	0.74	30.0
9	R	41	5.0	0.311	52.1	LOS D	2.8	20.4	0.93	0.75	24.7
Approach		834	5.0	0.610	25.2	LOS C	11.5	84.2	0.70	0.73	34.5
West: Arden Street											
10	L	15	5.0	0.061	13.8	LOS B	0.4	2.9	0.49	0.72	44.1
11	T	262	5.0	0.225	25.5	LOS C	6.5	47.5	0.76	0.61	33.7
12	R	14	5.0	0.225	34.2	LOS C	6.1	44.3	0.76	0.85	32.3
Approach		291	5.0	0.225	25.4	LOS C	6.5	47.5	0.74	0.63	34.0
All Vehicles		2337	5.0	0.610	25.6	LOS C	14.5	105.5	0.73	0.69	34.1

Macaulay Road/Proposed Site Access Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Peak_Macaulay Road_Site Access

 MacAulay Road_Site Access
 Friday PM Peak Hour - Post Development
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: MacAulay Road (south)											
5	T	1005	5.0	0.532	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	198	0.0	0.384	16.2	LOS C	2.2	15.1	0.74	0.99	41.4
Approach		1203	4.2	0.532	2.7	LOS C	2.2	15.1	0.12	0.16	55.9
North: Site Access											
7	L	198	0.0	0.188	11.7	LOS B	1.3	6.9	0.70	0.63	45.4
9	R	198	0.0	0.792	61.3	LOS F	7.0	48.9	0.98	1.32	22.2
Approach		396	0.0	0.793	36.5	LOS F	7.0	48.9	0.84	1.07	29.9
West: MacAulay Road (north)											
10	L	198	0.0	0.418	8.2	LOS A	0.0	0.0	0.00	0.93	49.0
11	T	588	5.0	0.418	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		786	3.7	0.418	2.1	LOS A	0.0	0.0	0.00	0.23	56.8
All Vehicles		2385	3.3	0.793	8.1	NA	7.0	46.9	0.20	0.34	49.1

MOVEMENT SUMMARY

Site: Saturday MID Peak_Macaulay Road_Site Access

 MacAulay Road_Site Access
 Saturday MID Peak Hour - Post Development
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: MacAulay Road (south)											
5	T	688	5.0	0.364	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	214	0.0	0.480	19.0	LOS C	2.8	19.8	0.81	1.05	39.3
Approach		902	3.8	0.480	4.5	LOS C	2.8	19.8	0.19	0.25	53.4
North: Site Access											
7	L	214	0.0	0.284	12.9	LOS B	1.6	11.4	0.66	0.82	44.2
9	R	214	0.0	0.727	36.8	LOS E	5.1	36.0	0.95	1.23	29.7
Approach		427	0.0	0.728	24.9	LOS E	5.1	36.0	0.81	1.07	35.5
West: MacAulay Road (north)											
10	L	214	0.0	0.458	8.2	LOS A	0.0	0.0	0.00	0.94	49.0
11	T	647	5.0	0.458	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		861	3.8	0.458	2.0	LOS A	0.0	0.0	0.00	0.23	56.8
All Vehicles		2191	3.0	0.728	7.5	NA	5.1	36.0	0.24	0.40	49.7

Canning Street/Proposed Site Access Unsignalised Intersection
MOVEMENT SUMMARY

Site: Friday PM Peak Canning Street_Site Access

 Canning Street_Site Access
 Friday PM Peak Hour (Post Development)
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	Hv %	Deg. Seln v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access											
1	L	18	0.0	0.045	9.6	LOS A	0.2	1.5	0.27	0.60	47.4
3	R	18	0.0	0.045	9.6	LOS A	0.2	1.5	0.27	0.69	47.2
Approach		36	0.0	0.045	9.7	LOS A	0.2	1.5	0.27	0.65	47.3
East: Canning Street (east)											
4	L	26	0.0	0.058	6.2	LOS A	0.0	0.0	0.00	0.94	49.0
5	T	82	5.0	0.058	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		108	3.8	0.058	2.0	LOS A	0.0	0.0	0.00	0.23	56.9
West: Canning Street (west)											
11	T	128	5.0	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	26	0.0	0.020	5.8	LOS A	0.1	0.7	0.21	0.63	47.8
Approach		155	4.1	0.068	1.5	LOS A	0.1	0.7	0.04	0.11	57.5
All Vehicles		299	3.5	0.068	2.7	NA	0.2	1.5	0.05	0.22	55.9

MOVEMENT SUMMARY

Site: Saturday Midday Peak Canning Street_Site Access

 Canning Street_Site Access
 Saturday Midday Peak Hour (Post Development)
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	Hv %	Deg. Seln v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access											
1	L	22	0.0	0.053	9.4	LOS A	0.2	1.7	0.27	0.61	47.7
3	R	22	0.0	0.053	9.5	LOS A	0.2	1.7	0.27	0.68	47.5
Approach		44	0.0	0.053	9.4	LOS A	0.2	1.7	0.27	0.64	47.6
East: Canning Street (east)											
4	L	22	0.0	0.060	8.2	LOS A	0.0	0.0	0.00	0.96	49.0
5	T	91	5.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		113	4.0	0.060	1.6	LOS A	0.0	0.0	0.00	0.18	57.5
West: Canning Street (west)											
11	T	71	5.0	0.037	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	22	0.0	0.017	8.8	LOS A	0.1	0.6	0.21	0.63	47.8
Approach		93	3.8	0.037	2.1	LOS A	0.1	0.6	0.05	0.15	56.6
All Vehicles		249	3.2	0.060	3.2	NA	0.2	1.7	0.07	0.26	55.1

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