Morley City Centre

Transport Assessment

Prepared for City of Bayswater
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Cardno
Shaping the Future

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Executive Summary

This report describes the transport environment for the ultimate development Morley City Centre (the City Centre) as defined in the *Morley City Centre Masterplan.* It is therefore an aspirational goal subject to a variety of external forces and requiring an effective transition plan to transform Morley from its current form into a dense, connected urban development.

The following key outcomes are proposed for the ultimate build-out scenario.

- **Dense Mixed Use Development:** The proposed density and range of land uses in the City Centre provides an opportunity for local residents and employees to access entertainment, retail and other uses without needing to create additional vehicular trips. This reduces the impact of development on the local road network, reduces the parking demand and helps to fulfil the economic, environmental and societal goals of the City.
- **Public Transport:** Bus priority measures are recommended including extension of the Beaufort Street part-time bus lanes and bus lanes along Russell Street to improve public transport access into the City Centre. Bus priority measures along Russell Street will provide capacity for the projected increased volume of buses into the Morley Bus Station, without significantly increasing private vehicle delays or impacting pedestrian crossing. The proposed bus/cycle lane also creates a segregated cycling link along Russell Street, minimising conflicts between cyclists and pedestrians. Expansion of the Morley Bus Station by the PTA will accommodate the growth of public transport service into Morley and provides an opportunity to integrate the Station with existing or future development. Bus priority measures should be implemented from 2021 as the City Centre develops.
- **Intersections:** Minor intersection improvement works may be required at a number of the existing signalised intersections, largely consisting of signal phase changes and increases in turning pocket length. The extent of works largely depends on the progression of the City Centre and the growth of regional traffic along the City Centre boundaries. In the event that there is significant growth along the Broun Avenue corridor, some local road widening of the southbound carriageway between Collier Road and Russell Street may be required. However, the extension of the Beaufort Street bus lanes through to Russell Street is expected to redirect traffic to other strategic corridors and reduce the likelihood of these road widening requirements.
- **Car Parking:** A reduction in statutory parking supply requirements is recommended to restrain private vehicle demand and engender mode shift towards sustainable modes. Parking requirements are also expected to move towards parking maximums, rather than the existing minimum rates. Public parking is recommended to be increased through future large-scale multi-deck car parking facilities paid for through cash-in-lieu and maintained by parking fees. The construction of off-street facilities should be undertaken in concert with development requirements, however a Car Parking Implementation Plan will be necessary to direct and support capital works funding. A transition towards on-street paid parking is recommended with fees set at a rate commensurate with demand. Approximately 13,400 parking bays are proposed for the Centre, including 4,400 commuter bays, 8,000 short-stay visitor bays and 1,000 flexible public off-street bays.
- **Pedestrians:** The adopted masterplan indicates high pedestrian demand along Russell Street and Rudloc Road. These corridors have been designated Pedestrian Activation Zones where safe and easy movement of pedestrians is emphasised. Traffic management measures are recommended along these streets to create prevailing speed limits of approximately 30km/hr. Improvements to crossing infrastructure are recommended to create safer pedestrian connections at the boundaries. Beyond the Pedestrian Activation Zones, general improvements to pedestrian infrastructure are recommended to improve permeability across the City Centre.
- **Cycling:** A major strategic cycling link is recommended along Light Street / Drake Street that connects Mirrabooka, Bayswater Station and Morley. New traffic management infrastructure is recommended to reduce the prevailing traffic speed to 30km/hr to allow for safe cycling in mixed traffic. The design of this ‘greenway’ is critical to create an attractive environment for local residents and students. Improvements to on-street and off-street cycling provisions throughout the City Centre are recommended to connect strategic links into the main Activity areas.
- **Road Form and Resumption:** The majority of the recommended changes to the road network can be accomplished without widening the road reserve. However, intersection modifications necessary to provide sufficient operation on a congested network may need localised resumption of land, with the extent of intersection upgrades dependent on the growth of regional traffic through the City Centre and the progression of Centre development.

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1 Introduction

1.1 Introduction

The City of Bayswater is working towards the revitalisation of the Morley City Centre (the Centre) in accordance with the State Government vision for the development of the Perth Metropolitan Area as encapsulated in *State Planning Policy (SPP) 4.2 – Activity Centres for Perth and Peel*, gazetted on the 31st August 2010. This document, which replaces the previous *Metropolitan Centres Policy*, requires that Activity Centre Structure Plans be prepared and endorsed for strategic metropolitan centres within three (3) years of the gazettal of the Policy and also that structure plans be in place prior to the approval of major developments within centres. In achieving revitalisation, and being proactive in the encouragement of appropriate new development and investment in the Centre, the City of Bayswater considers the preparation of a consolidated, cohesive and integrated structure plan drawing together land use, sustainability, transport, and urban form to be a priority.

As part of this process, a Transport Assessment for the Centre is required pursuant to the WAPC's *Guidelines for Transport Assessment: Volume 2 - Structure Plans*.

This report describes the transport environment for the ultimate development as defined in the *Morley City Centre Masterplan.* It is therefore an aspirational goal subject to a variety of external forces and requiring an effective transition plan to transform Morley from its current form into a dense, connected urban development.

1.2 Context Plan

The Centre is located at the conflux of a number of secondary strategic roads including Walter Road West, Broun Avenue/Beaufort Street, Collier Road, Wellington Road and Crimea Street. The City Centre is surrounded by residential neighbourhoods in Bayswater, Embleton, Bedford, Dianella and Noranda.

Access to the existing Centre location is provided almost exclusively by road, and primarily by private vehicle. The Morley Bus Station operates as an interchange servicing reasonably high frequency coverage services from the surrounding residential neighbourhoods.

The study area is shown in context by **Figure 1-1**.

Figure 1-1 Centre Context Plan

1.3 Points of Arrival

The point of arrival experienced by visitors to the Centre is influenced by their chosen transport mode. As such, the key entrance locations should be designed to accommodate the desired transport modes.

Private Vehicles

The main approach routes to the Centre include Morley Drive/Wellington Road, Walter Road West and Broun Avenue. Morley Drive and Broun Avenue do not pass through the Centre but bring significant traffic on the perimeter, whilst Walter Road West bisects the Centre area.

The high volume of passing traffic along these primary approach routes as a result of their strategic importance supports their continued use as 'points of arrival' for private vehicles. However, Russell Street and Rudloc Road, both of which currently provide high-efficiency connections between the boundary road network and the City Centre Core would transition towards a more sustainable transport focus.

Public Transport

The Morley Bus Station is a major interchange station that connects the north-eastern suburbs to the Perth CBD. This interchange also brings significant benefits to the City Centre including the existing Centro Centro Galleria and schools within the Centre by reducing the need for the use to private vehicles.

The Morley Bus Station will continue to be the main point of arrival, though its location may need to change as a result of the expansion of services in the region. This would provide the opportunity to improve the station including better integration with adjacent land uses.

Cycling

The existing cycling provision in and around Morley is heavily compromised by the large volumes of traffic and poor legibility resulting from the prevalence of secondary strategic roads (District Distributors). This effectively limits cycling activities to the existing residential and nearby education uses.

To rectify this, and to provide effective cycling connections into the Centre, a strong cycling corridor is proposed along the Light Street/Drake Street alignment. This link has the potential to extend well beyond the boundaries of the Activity Centre, linking it with Mirrabooka and the Light Rail to the north-west, and to Bayswater Station in the south-east.

Key Sites

Keys sites within the Centre include the Centro Galleria and the adjacent Coventry Markets site. John Forrest Senior High School, Morley Primary School and the Infant Jesus School are important for the local residential community and the Morley Bus Station represents the primary alternative transport destination in the Centre.

2 Existing Situation

2.1 Road Network

The MRWA Metropolitan Functional Road Hierarchy (MFRH) classifies the roads within and adjacent to the Centre as shown in **Table 2-1**.

Table 2-1 Metropolitan Functional Road Hierarchy (MFRH) Classifications

Morley Drive	Primary Distributor
Wellington Road	District Distributor (A)
Crimea Street	District Distributor (A)
Walter Road West	District Distributor (A)
Russell Road (south of Walter Road West)	District Distributor (A)
Russell Road (north of Walter Road West)	Local Distributor
Collier Road	District Distributor (A)
Broun Avenue	District Distributor (A)
Coode Street	District Distributor (A)
Rudloc Road	District Distributor (B)
Smith Street	Local Distributor
Peters Place	Access Road
Mansell Street	Access Road
Thorpe Street	Access Road
Jakobsons Way	Access Road
Light Street	Access Road
Progress Street	Access Road
Boag Road	Access Road
Boag Place	Access Road
Drake Street	Access Road
Mangini Street	Access Road
Wheeler Street	Access Road
Hewton Street	Access Road
Charnwood Street	Access Road
Bourne Street	Access Road
Stanbury Crescent	Access Road
Dewar Street	Local Distributor
Barnett Court	Access Road
Catherine Street	Access Road

These classifications are defined in the MFRH as follows:

> Primary Distributors: These provide for major regional and inter-regional traffic movement and carry large volumes of generally fast moving traffic. Some are strategic freight routes and all are National or State roads. They are managed by Main Roads.
> District Distributor A: These carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by Local Government.
> District Distributor B: Perform a similar function to type A district distributors but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with a traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and generally not through them, forming a grid which would ideally space them around 1.5 kilometres apart. They are managed by Local Government.
> Local Distributors: Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local government.
> Access Roads: Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by Local government.

Figure 2-1 shows the MRFH map for the City of Bayswater in the vicinity of the Centre. The entire map can be seen in **Appendix A**.

Figure 2-1 Main Roads Functional Road Hierarchy

2.2 Traffic Volumes

Existing traffic volumes are shown in **Figure 2-2**, as obtained from Main Roads Link Counts and SCATS data. *check*

Figure 2-2 Existing Daily (two-way) Traffic Volumes

2.3 Public Transport

Public transport serving the Centre and the Centro Galleria is provided by the Transperth bus network. The majority of the bus services from Morley Bus Station utilise Walter Road West and Broun Avenue, focusing on connections to the residential catchments in Noranda and Beechboro. The current Morley Bus Station primarily serves as an interchange point for passengers heading from these residential catchments into the Perth CBD. Exclusive park 'n' ride facilities are not currently provided, though nearby private commercial parking may be used as de-facto park 'n' ride, depending on the level of enforcement.

The existing bus route network and stop locations are shown in **Figure 2-3**.

Figure 2-3 Existing Transperth Bus Routes

The typical frequency of bus services is summarised for Mondays to Fridays in **Table 2-2**.

Table 2-2 Bus Service Frequency (Monday-Friday)

Route	Peak Frequency	Off-Peak Frequency
Walter Road West		
17 (Morley – Perth)	10 mins	20 mins
20 (Morley – Mt Lawley)	30 mins	60mins
21 (Morley – Perth)	20mins	60mins
48 (Morley – Perth)	20 mins	120mins
52 (Morley – Midland)	2 trips daily	2 trips daily
58 (Morley – Noranda)	60 mins	120mins
60 (Morley – Perth)	10mins	60mins
65 (Morley – Morley Senior High School)	15mins	60mins
98 (Circular Route)	10mins	30mins
99 (Circular Route)	10mins	60mins
341 (Morley – Beechboro)	30mins	60mins
343 (Morley – Beechboro)	30mins	60mins
344 (Morley – Warwick Senior High School)	15mins	60mins
371 (Morley – Warwick)	10mins	60mins
Broun Avenue		
22 (Morley – Perth)	5 mins	60mins
66 (Morley – Perth)	10mins	15mins
342 (Morley – Beechboro)	30mins	90mins
345 (Morley – Beechboro)	30mins	60mins
955 Morley – Ellenbrook)	20mins	60mins

As **Table 2-2** shows, the frequency of bus services is generally fairly high during the peak hour, with headways for high demand routes ranging from 10-15 minutes. Off-peak frequency is relatively poor, with 60 -120 minute headways for the majority of routes. This illustrates the existing function of the Morley Bus Station, operating as an interchange between local and line-haul services to the CBD.

As Morley develops, there will be a greater need for destination services to link the Centre to the surrounding public transport network, particularly the proposed MAX light rail in Mirrabooka and the Bayswater Train Station.

2.4 Pedestrian/Cycle Networks

The existing cycle network in the immediate area surrounding the Centre is shown in **Figure 2-4**. A consistent pedestrian network is provided across the Centre, although this infrastructure largely reflects the low volumes of pedestrians and will require improvement as part of the development process.

The existing network provides some amount of reasonable cycling infrastructure, but these provisions do not currently form a coherent network. Of the primary approach routes, only Broun Avenue has a consistent shared path and connections between the boundary road network and the activity in the Centre is not particularly legible.

Pedestrian crossing points are compromised by the volume and speed of traffic along the boundary roads, and through the Centre. Recent improvements, including signalisation of crossings at Progress Street, create additional opportunities for pedestrians to cross Walter Road.

Figure 2-4 Existing Pedestrian / Cycle Network

2.5 Freight Movement

Access to the existing Centre for freight movements is accommodated by the number and proximity of higher-order roads. Morley is also close to primary freight routes including Tonkin Highway.

2.6 Parking Provision

There is currently a large but unknown quantum of parking available within the Centre area. Large-scale retail car parks at the Galleria Shopping Centre, Bunnings and other businesses are all designed to be sufficient for customers/staff, but with no expectation for shared or reciprocal parking across the Centre. Commercial parking is also provided on an individual lot level.

Park 'n' ride is not available adjacent to the Morley Bus Station, which operates predominantly as an interchange facility. To manage this demand, nearby shopping centre parking is restricted by time to 4 hours duration and the level of enforcement determining where commuter park 'n' ride demand can be accommodated.

Very limited on-street parking is available on minor/access roads where traffic volumes are at a minimal. Streets in the Centre core which provide on-street parking include Catherine Street, Boag Road and Boag Place.

2.7 Existing Road Network

Figure 2-5 Broun Avenue (westbound) between Russell Street and McGregor Street

Broun Avenue is a major north-south strategic road connecting to Coode Street and Collier Road along the eastern boundary of the Centre. It provides regional connections along Beaufort Street in to the Perth CBD. The general form of Broun Avenue in the vicinity of the study area is two lanes of traffic in each direction and a 60km/h posted speed limit. A 40km/hr localized school zone is present adjacent to John Forrest Senior High School. A 5.5m central median is present for the majority of the road, allowing space for right-turning pockets and staged pedestrian crossing.

The Main Roads WA *Functional Road Hierarchy* designates Broun Avenue as a *District Distributor A,* which is defined to "…carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. The majority of the traffic will be personal vehicles with a small proportion of heavy vehicles making deliveries to the commercial centre. They are managed by Local Government."

The average volume of traffic on this road ranges from about 24,000 to 31,000 daily vehicles within the Centre area.

Broun Avenue is designed to support car traffic and some amount of freight/delivery. A shared path is provided along at least one side of the road, but there are no on-street cycling provisions and Broun Avenue is classified as a 'poor' road riding environment by the Perth Bicycle Network (PBN).

Broun Avenue is a major corridor for commuters traveling to and from the Perth CBD, with bus stop treatments including both embayed and in-lane stops. Part-time bus lanes for the prevailing traffic flow direction are in place during the peak hour. This restricts the capacity of the downstream road and may inhibit future peak-hour traffic growth along the corridor, particularly if bus lanes are extended northwards.

Nevertheless, ROM modelling shows a significant increase in traffic along Broun Avenue which represents a constraint to the network.

Collier Road

Figure 2-6 Collier Road (northbound)

Collier Road is a major distributor for traffic accessing the Centre from Tonkin Hwy. It is located on the eastern side of the Centre and connects to Broun Avenue and Walter Road West. The road comprises two lanes for traffic in each direction with a speed limit of 60km/h. A central median of about 4.5m provides opportunities for right-turning traffic and staged pedestrian crossing.

Collier Road has been identified as a *District Distributor A* with between 15,600vpd and 22,400vpd in the Centre area. This road is managed by the city of Bayswater.

A shared path is provided along some segments of the road. Collier Road has been classed as a 'poor' road riding environment in the PBN in recognition of the high traffic volumes, heavy vehicle movements, dual circulating roundabouts and lack of cycling facilities.

No buses utilise Collier Road between Walter Road West and Broun Avenue.

Walter Road West

Figure 2-7 Walter Road (eastbound)

Walter Road West is the main east-west access road through the Centre. It serves an active commercial precinct as well as regional traffic, carrying between 22,600vpd and 28,600vpd within the Centre area.

Walter Road West comprises 2 traffic lanes in each direction and includes turn pockets to cater for right-turn movements. Walter Road West has been classified as a *District Distributor A* and has a posted speed limit of 60km/hr

A footpath has been provided on both sides for pedestrians, but this has not been designated as a shared path in the PBN, suggesting that off-street cycling is not supported. Cycling conditions along this road have been classed as 'poor'.

Wellington Road

Figure 2-8 Wellington Road (southbound)

Wellington Road runs to the northern boundary of Centre and connects Walter Road West to Morley Drive. Wellington Road currently operates as a 4-lane divided road without crossover turning pockets between Walter Road and the Coventry Markets signalize intersection. North of this point, the northbound carriageway is reduced to 1 lane. There is not currently sufficient space within the road reserve to provide pockets for turning vehicles, requiring road widening if such infrastructure becomes warranted in the future.

The posted speed limit is 60km/h with a local school zone restriction reducing the speed to 40km/h. Current traffic volumes are in the order of 9,000vpd and 11,000vpd for southbound and northbound traffic respectively, giving Wellington Road a classification of *District Distributor A.*

Shared paths are provided on both sides of the road, allowing access to the main entrance of the Morley Recreational Centre and Coventry Markets.

Wellington Road has been recently refurbished between the Morley Recreational Centre and Walter Road West with new line markings and the installation of a narrow central median (2m). In-lane bus stopping allows for better travel times for routes along this corridor.

Coode Street

Figure 2-9 Coode Street (eastbound)

Coode Street is classified as a *District Distributor A* with peak two-way daily movements in the order of 10,000vpd. It is constructed as a wide 2-lane road with a narrow 2.5m median. The majority of traffic on Coode Street is expected to be generated by the nearby residential uses, though it forms an efficient connection across the Midland Train Line to Guildford Road and Whatley Crescent. A posted speed limit of 60km/hr operates along Coode Street.

A shared path is provided on the southern side for some portion of the Centre, providing access to the Broun Avenue shared path and John Forrest Senior High School.

Russell Street

Figure 2-10 Russell Road (eastbound) showing the existing Morley Bus Station

Russell Street is a major road linking Walter Road West to Broun Avenue comprising 4 lanes north of Rudloc Road and a wide 2-lane form south of Rudloc Road. A central median of approximately 4.5m provides space for right-turning pockets.

Russell Street represents the central spine road for the Centre, carrying approximately 11,200vpd at the centre of the study area, increasing to 15,700vpd at the Broun Avenue intersection. A large proportion of this traffic is associated with the Galleria Shopping Centre. Russell Street is classed as a *District Distributor A* in the Main Road Function Hierarchy and has a posted speed limit of 60km/hr.

A shared path is also provided on both sides of the road, between Walter Road West and the Morley Bus Station. The location of the Morley Bus Station near the Russell Road/Rudloc Road intersection creates a high volume of bus movements along Russell Road.

3 Multi-Modal Road Hierarchy (SmartRoads)

This section assesses the existing and future road hierarchy for the Centre, with respect to its intent and infrastructure provision for all transport modes. Graphical representations of the road hierarchy and indicative cross sections are shown for all roads in the City of Bayswater, with additional detail provided for the Centre to provide an overview of our initial approach, as well as a representation of the infrastructure works needed.

3.1 Existing Smart Roads Assessment Overview

The existing smart roads graphical presentation can be found at **Appendix A**. This map illustrates the manner in which the existing transport network supports the various transport modes. This assessment of current modal hierarchy is based on observations made during recent site inspections and through desktop analysis of function and usage. It has been noted that the majority of existing trips are made by private vehicle modes, and that the network is well suited to accommodating these trips, both along the higher-order roads, and local roads through the Centre. Turning restrictions at Walter Road/Drake Street have resulted in a relatively quiet street and done much to reduce traffic volumes and speed through existing residential areas. This treatment also creates opportunities for the promotion of alternative transport in the future.

Sustainable transport solutions are an integration of travel modes operating together to achieve maximum travel efficiency, minimal congesting and environment effects within a designed study area.

Buses predominately operate at the boundaries of the Centre, along Walter Road West and Broun Avenue, connecting through Russell Street to the Morley Bus Station. Buses represent an important transport mode, but are generally ranked lower in the existing heirarchy than private vehicles, evidenced by the legacy of bus embayments on the primary approaches.

Pedestrian movements are most limited to the areas in the vicinity of the schools, along residential verges and in and around Morley Galleria. Pedestrian crossing of the higher-order roads is largely restricted to the existing signalised intersections, with some, but not all having dedicated pedestrian phasing. This lack of protected crossing can create a barrier to pedestrian movements that diminish the attractiveness of this mode for even short trips.

Cycling is not currently promoted by the existing infrastructure as a viable transport mode, as the severance of the higher-order roads and the lack of a coherent network do not support cycling. However, some roads within the City of Bayswater such as Drake Street are described as a “Good Quality Environment” by DoT’s Perth Bicycle Network which indicates that the existing infrastructure is suitable for cycling. For example, Drake Street is defined by a low volume / low speed traffic environment which is supported through LATM measures and results in a “good” road riding environment.

3.2 Existing Infrastructure Overview

The Centre transport system is currently designed to accommodate and promote the use of private vehicle modes. This is evident in the layout of the roadway infrastructure (wide, multi-lane single carriageways and large numbers of signalised intersections to manage vehicle traffic). Bus services represent the only public transport option, which can take advantage of many of the infrastructure measures designed to support private vehicle use. However, the high volumes of local and regional traffic are likely to result in reduced efficiency, increased travel times and an overall reduction in public transport mode share.

With majority of the bus routes run along the boundaries of the Centre and the interchange station located at the centre, improvements are needed to meet the anticipated increase in demand as the city grows. Buses currently run in mixed traffic, with bus embayments along many sections reducing the efficiency of services. These bus embayments require buses to merge with the traffic after every stop and create the potential for significant delays across the journey. Removing the embayments would allow buses to stop in the lane, improving service but with some impact on other motorists and on-road cycling.

A number of shared paths are available on most major roads for pedestrian and cyclist use; but there is no coherent network which matches the desire lines of visitors or employees to the Centre. Footpath infrastructure is generally insufficient to cater for high volumes of pedestrian and cycling movements, and

safe crossing points are limited to existing signalised intersections. The existing footpath network may be characterised by narrow paths, limited or unsafe crossing points, or lack of connectivity from origin to destination, though recent improvements (such as adjacent to Coventry Markets) create pockets of good quality infrastructure. To provide a benchmark for improvements, a good quality shared path would generally be a minimum of 2.5m to allow safe passing for cyclist and pedestrians, be smooth and well-maintained and be part of a wider network which includes consideration for efficient, safe, road crossings either at traffic signals or through mid-block infrastructure.

3.3 Future Smart Roads Assessment Overview

The vision for the future of the Centre includes the majority of the commercial areas being transformed into mixed use development, with a large corresponding increase activity and travel demand. To accommodate this change, it is imperative that all modes are supported through the road hierarchy, and allocated space in a way that creates an effective access network. Through the SmartRoads assessment, these networks can be established, though they may be different for each mode.

A SmartRoads assessment considers each mode and determines a road hierarchy based on the needs of the integrated transport requirements of the network. Its primary outcome is a graphical representation of the road sections that are supported for use by each of the primary transport modes: Cars, Buses, Cyclists and Pedestrians.

The SmartRoads analysis for the future development scenario and associated infrastructure provision are summarised in **Appendix A**.

Pedestrian movements are considered to be the most vital for the successful operation of any city centre. A high quality pedestrian environment will support the economic, social and environmental aims of the City by making walking an attractive way to navigate the Centre. This will reduce the demand for driving while support trip-chaining, stimulating economic activity and reducing the area required for car parking. Trip-chaining in this context refers to a single primary leg (usually by car) ending in a car park, with multiple destinations accessed by other modes (usually pedestrian). The high density and mixed-use nature of the proposed Centre creates an ideal environment for trip-chaining.

A high quality streetscape also creates opportunities for residents, employees and visitors to interact and communicate. To create this environment, activated spaces need wide, attractive pedestrian areas, street trees and shade, safe and legible road crossings. The interactions between cyclists and pedestrians within the road verge also need to be carefully considered.

For the purpose of this assessment, pedestrian modes in high activity precincts will be given the highest priority. Access, safety and legibility are the focus along major approach routes, either between major destination nodes or from large-scale parking facilities.

Cycling is particularly attractive for employees and visitors who live within a relatively short distance (under 3km) from the Centre, and for residents commuting to other large employment centres. There are two distinct types of cyclist that should be accommodated; commuters who generally prefer safe, efficient, on-road provisions, and casual cyclists who generally prefer slower off-street facilities away from traffic. These two different sets of needs create complementary networks, sharing roadway space or verge space with cars and pedestrians as appropriate.

A suite of different infrastructure provisions is recommended, including slow speed, shared roadways in pedestrian activation zones, on-street cycle lanes along major regional and local routes and off-street shared paths where traffic speeds or volumes are high and where casual cycling demand is likely.

As the maps in **Appendix A** illustrate, there is a significant push to promote pedestrian and cyclist modes, particularly for short trips to and from the city centre.

Bus transport will remain essential to the effective operation of the Centre with the hierarchy of buses improved and increased provision to ensure that efficiency remains high. Taking into account that buses are an important transport mode for the Centre in the future, it's important that the infrastructure is available ensure it's a transport mode of choice. This includes proposals for partial- and full-time bus priority along existing routes and at intersections. Full time bus lanes are designed for bus usage only throughout the day to optimise the travel time and reduce congestion throughout the day. Part time bus lanes are designed to

give buses priority during certain times of the days, most likely to be between 7:00am to 9:00am and 4:00pm to 6:00pm during the AM and PM Peaks respectively. Localised bus priority measures such as turning movement de-restriction ("Buses Excepted"), or queue jump facilities also reduce travel times for buses. For the purpose of this assessment, there are no changes anticipated to the bus routes within the Centre, but service frequency is likely to increase with the increase in demand.

The existing higher-order road network is already well suited to cater for regional and local private vehicle and freight traffic. However, existing routes through the Centre which are popular with drivers accessing the centre will be reallocated to alternative modes through careful land-use decisions, infrastructure measures and additional LATM (Local Area Traffic Management). Wherever possible, private vehicles will be encouraged to use the major roadway access points instead. This will tend to reduce congestion and create a more pedestrian- and cyclist-friendly Centre.

The most substantial changes are proposed for Russell Street and Rudloc Road which run through the core of the Centre, and currently carry a sizeable amount of traffic. These streets are considered to be ideal for activation, providing direct high quality access throughout the City Centre and creating attractive approaches for pedestrians, cyclists and public transport. To achieve this aim, traffic calming would assist in reducing their attractiveness to private vehicles (allowing for the requirements of bus priority), while the introduction of street trees and high-quality pedestrian infrastructure should assist in creating the desired environment. Private vehicles would be directed towards car parking located at the margins of the City Centre core to reduce demand, with on-street parking provisions carefully considered to minimise the impact of searching behaviour, while still providing access for discretionary shopping and entertainment.

4 Existing (2013) Traffic Generation

The assessment in this section identifies the trip generation based on the land use in its existing form.

4.1 Existing Land Use and Trips

The following describes the existing land use and trip generation within the Centre. Information regarding existing land uses has been extracted from the floor area assumptions provided by the project's economic consultant, under the following assumptions:

> Entertainment, Retail and Commercial/Office land use growth will progress according to the target $7,500/sq.m projections through to 2021.
> 2031 land use projections are obtained from the *Morley City Centre Masterplan*.
> Residential land uses are assumed to reach 8,500 dwellings by 2031, with 2021 growth determined on a pro-rata basis.

Primary traffic generation is taken from best-practice theoretical statistics taken from ITE Trip Generation 7th Edition (2003) and Roads and Traffic Authority (RTA) Transport Assessment Guidelines.

Table 4-1 shows the theoretical generation rates based on the supplied land uses, given in **Table 4-2** for the existing 2013 scenario.

Table 4-1 ITE/RTA vehicle trip generation rates

Land Use	AM Peak Hour Generation Rates		PM Peak Hour Generation Rates		Weekday Daily Generation Rates	
Retail	1.50	/100m^2 GFA	4.60	/100m^2 GFA	50.00	/100m^2 GFA
Office	1.67	/100m^2 GFA	1.60	/100m^2 GFA	11.85	/100m^2 GFA
Commercial	1.54	/100m^2 GFA	1.39	/100m^2 GFA	13.73	/100m^2 GFA
Food	4.00	/100m^2 GFA	5.00	/100m^2 GFA	60.00	/100m^2 GFA
Residential	0.85	/ unit	0.85	/ unit	6.72	/ unit
Entertainment	1.50	/100m^2 GFA	3.00	/100m^2 GFA	22.00	/100m^2 GFA

Table 4-2 Area of specific land uses for the Centre (existing 2013 scenario)

	Map Area Floor Space (sq.m) by Land Use						
	Retail	Food	Residential	Commercial	Office	Entertainment	Total
2013 Scenario	67,172	3,535	655	83,000	70,081	21,450	245,894

Applying these generation rates to existing land uses indicates a traffic generation for the Centre as shown in Table 4-3.

Table 4-3 Traffic generation for the Centre (existing 2013 scenario)

Peak Time	Traffic Generation by Land Use							
	Retail	Food	Residential	Commercial	Office	Entertainment	Total	ROM (2013)
AM	1,008	141	557	1,277	1,169	322	4,473	5,012
PM	3,090	177	557	1,152	1,124	644	6,743	7,085
Daily	33,586	2,121	5,895	11,396	8,302	4,719	66,019	69,965

This traffic generation has then been used to determine theoretical trip generation through the application of existing private vehicle mode share values. Mode shares have been obtained from a review of ABS 2011 Census data (85% for workers in Bayswater, 76% for residents of Bayswater). It should be noted that ITE rates are based on data collected in the USA, which typically comprises approximately 95% private vehicle mode share, which is generally higher than local values.

Using these mode share values, a total of 82,461 daily trips (all modes) are assumed from Main Roads modelling for the Centre zones, approximately 18% higher than the 69,494 daily trips (all modes) modelled from theoretical trip generation. This reflects the difference in private vehicle mode share for retail/entertainment land uses as compared to workers. It is also understood that the existing Centre, and particularly Galleria Shopping Centre currently trades well above average for its floor area.

Existing traffic generation was therefore calibrated to the outputs from a Main Roads WA ROM to ensure consistency with strategic modelling. For the purpose of existing assessment, commercial generation has been increased by 20%, compared to theoretical values.

This calibration factor has been applied for the existing 2013 scenario, as well as the future 2021 and 2031 scenarios. This retains a level of conservatism for the future traffic scenario.

The results of theoretical trip generation (calibrated) for the existing 2013 scenario is given in **Table 4-4**.

Table 4-4 Trip generation (all modes) for the Centre (existing 2013 scenario)

Peak Time	Trip Generation by Land Use							
	Retail	Food	Residential	Commercial	Office	Entertainment	Total	ROM (2013)
AM	1,278	179	586	1,620	1,482	408	5,554	5,907
PM	3,919	224	586	1,461	1,425	816	8,432	8,351
Daily	42,597	2,690	6,205	14,453	10,530	5,985	82,461	82,461

5 Proposed Development Concept

5.1 Land Use

The proposed *Morley City Centre Masterplan* consists of a significant increase in land use mix and density, as shown in **Table 5-1** and described in **Figure 5-1**. In particular, the transition from commercial to office and residential will provide great opportunities for people to live and work in Morley.

A number of options were pursued in through the *Morley City Centre Masterplan*, with the final outcome being an amalgam of these.

Table 5-1 Area of specific land uses for the Centre (future scenarios)

	Map Area Floor Space (sq.m) by Land Use						
	Retail	Food	Residential	Commercial	Office	Entertainment	Total
2021 Scenario	122,946	13,661	4,583*	90,556	91,708	27,284	350,738
2031 Scenario	135,000	15,000	8,500	100,000	120,000	50,000	428,500

*2021 residential build-out is interpolated linearly from the 8,500 units projected for 2031

5.2 Parking Locations

To support these land uses, public parking will be provided for long-stay commuters at the periphery, reducing private vehicle trips through the City Centre, while short-stay retail/visitor parking will be located adjacent to major activity nodes. Private parking will still be provided at a reduced statutory rate to assist in improving efficiency.

Park ‘n’ ride car parking is not proposed to be constructed adjacent to the Morley Bus Station, but the growth of the Centre will help to create destination trips at this central node.

5.3 Transport Concept

The Centre has been designed under a *SmartRoads* framework consistent with the Department of Transport’s *Moving People Strategy*. Each road corridor has been assessed for function and capacity, with transport modes assigned to the network according to a needs assessment.

In general, regional traffic is encouraged to utilise higher-order boundary roads, rather than the internal road network. Activated streets will be designed for pedestrian legibility, with a low-speed roadway and high quality footpaths. The low-speed environment through the City Centre Core will encourage cyclists to share the road, rather than the footways. A primary cycling link is recommended, leveraging the existing infrastructure and environment along Drake Street to create a regional ‘bicycle boulevard’ that ultimately connects Morley to Mirrabooka and Bayswater Station.

Figure 5-1 Indicative Centre Development Plan

6 Road Hierarchy and Use

6.1 Access Priority

Access priorities have been established through consideration of *SmartRoads* principles. Transport modes have been assigned to road corridors so as to provide a comprehensive movement network while minimising conflicts between modes. A map of access priorities is shown in **Figure 6-1** and provided in more detail **Appendix A**.

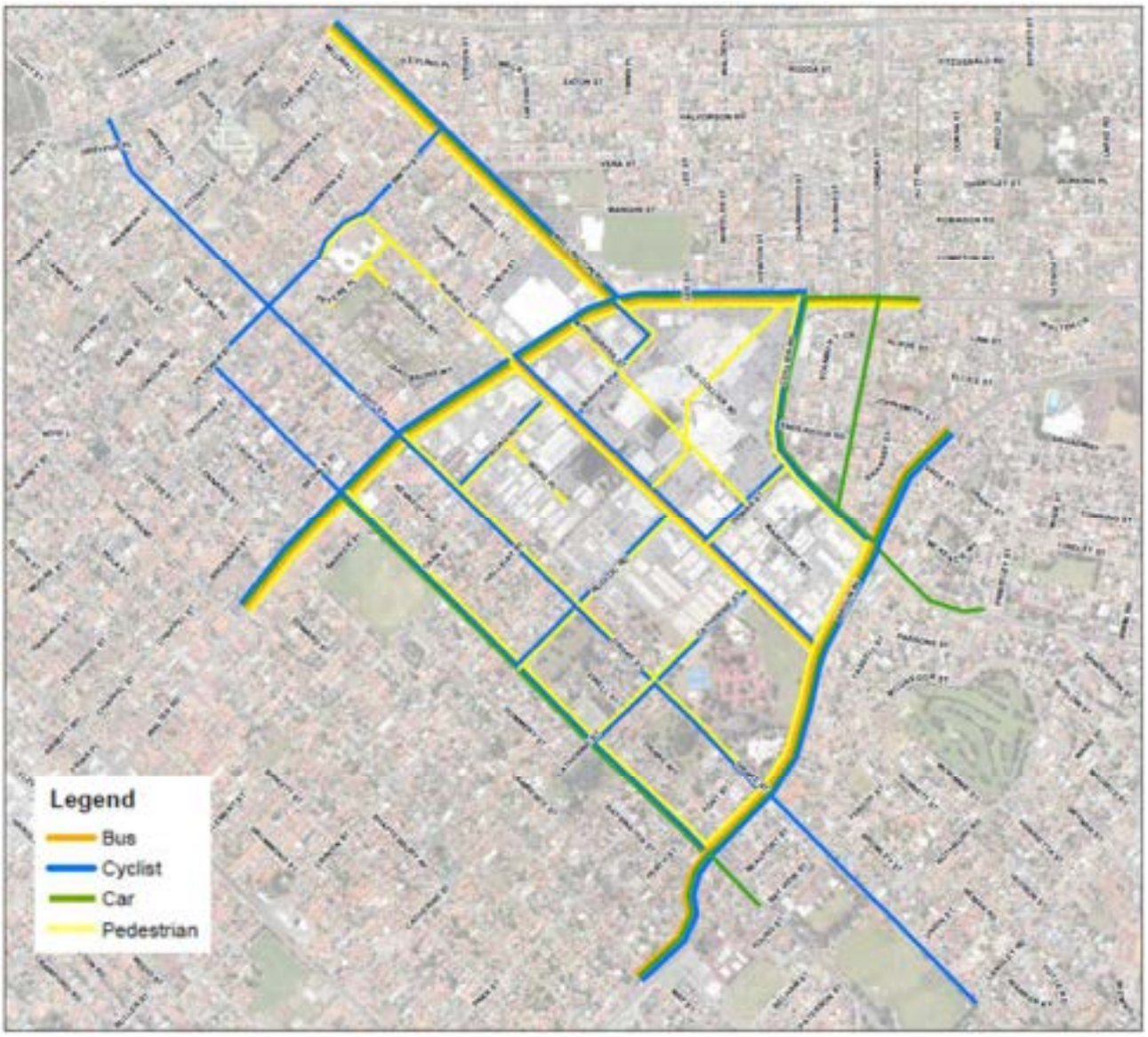

Figure 6-1 Future SmartRoads Access Priority Map

Mode choice is driven by traveller preference and is affected by a number of factors, particularly travel times and costs. As such, any measures intended to decrease the demand for private vehicles within the activity Centre through supply or demand management measures must be offset by an increase in alternative transport options. This would include such initiatives as increased public transport frequencies and new routes, improved cycling facilities and more a attractive pedestrian environment.

For the purpose of determining transport provision, a parking-based approach has been developed which determines the level of unsatisfied demand for a maximum parking supply scenario. This unsatisfied demand is then distributed across the remaining modes according to the likely uptake in mode share.

Road capacity analysis was investigated to provide a theoretical maximum trip generation that can be supported by the existing road environment, with the proposed function changes. The results of this assessment show that the growth in background traffic is sufficient to require some significant upgrades to the boundary road network. Therefore, maximum parking rates have been used to restrain development traffic, and the impact of this reduced generation used to determine mitigation measures.

A target mode share proportion has been established for non-resident trips to the Centre, consisting of the following and determined through detailed parking analysis:

> Drive Alone: 74% (currently 85%)
> Car Pool: 8% (currently 7%)
> Public Transport: 12% (currently 4%)
> Cycling: 3% (currently 1%)
> Pedestrian: 3% (currently 2%)

This represents a relatively minor shift in transport mode choice for commuters, acknowledging the lack of high-capacity public transport in the area, despite the location and strategic importance of the Morley Bus Station. For the purpose of this assessment, all internal trips (trips between land uses within the Centre), are assumed to be taken by non-car modes. A general split for internal trips has been assumed for the purpose of infrastructure provision:

> Pedestrian: 90%
> Cycling: 10%

The anticipated generation for the Activity Centre is in the order of 149,000 non-residential trips per day including 32,000 internal trips. The above target mode share would create approximately the following two-way demands:

> Private Vehicles: 87,000 trips (plus 9,000 passenger trips)
> Public Transport: 14,000 trips
> Cycling: 3,500 trips (plus 3,200 internal)
> Pedestrian: 3,500 trips (plus 28,800 internal)

These represent the approximate the demand that must be catered for by each mode.

6.2 User Hierarchy

Private Vehicles

A hierarchy of use has been determined for the Centre incorporating fundamental *SmartRoads* principles. In general, private vehicle use is promoted along the periphery of the site and supported through strategic location of peripheral car parking. Regional traffic will be retained along Wellington Street, Walter Road West, Broun Avenue, Collier Avenue and Crimea Street, with local access encouraged along the higher order road network. The use of internal roads by private vehicles, including Russell Street and Rudloc Road, is discouraged to preserve capacity within the internal road network for other transport modes. Local traffic will be slowed through reduced speed limits and Local Area Traffic Management to create a better integration with pedestrian and cycling modes. Car parking is generally located on or near the higher-order road network to minimise the volume of traffic in pedestrian-oriented areas.

Pedestrians

The activated central core, consisting largely of Russell Street and Rudloc Road will be oriented towards pedestrian accessibility, with wide, attractive pedestrian footways and legible road crossings. Areas nearer to the edge of the Centre, where densities are lower, will have a less pedestrian-focused design whilst still encouraging use by pedestrians. These roads include parts of Walter Road West, Collier Road and Broun Avenue, though crossing infrastructure will be particularly important to maintain pedestrian safety and legibility. A consistent provision of safe crossing points and high quality pedestrian facilities will be employed across the Activity Centre particularly focused on identified desire lines from between major transport and land use nodes.

Public Transport

Public transport is a high priority as it provides regional connection to the Centre and interchange opportunities at Morley Bus Station. These regional coverage services would be contained within higher-order road corridors to minimise delays and promote their existing core function. The alignment of these services will be chosen to maximise access to the proposed activity nodes. Various priority bus lanes (Part time and/or full time) are recommended as links to equivalent provisions, in addition to isolated intersection priority improvements to ensure effective public transport operation even during congested periods.

Cycling

Cycling will be promoted as a viable transport mode by creating a strong regional link along Light Street/Drake Street, linking to high-quality shared on-street facilities through the pedestrian activation zones. On- and off-street infrastructure will support a cycling network for local and long-distance commuting trips into the Centre.

Freight/Loading

Local freight movement is a fundamental requirement for the success of the Centre. The connectivity provided by the higher-order road network allows for excellent access for freight from nearby primary roads, including Morley Drive and Tonkin Highway. Wherever possible, access directly off the higher-order roads will be promoted, though freight traffic would only be actively discouraged within the Russell Street and Rudloc Road.

Deliveries will be enabled through an increase in on-road loading zone areas, particularly in ‘main street’ precincts and where smaller office/retail development is located. Larger office/commercial buildings will be serviced via on-site docks connected to basement or undercroft parking structures. Access to dock areas through a laneway network is supported to minimise the impact of service/delivery vehicles on pedestrian, cycling and bus modes.

6.3 Form and Cross-Section

Each road in the proposed Centre network has been assessed according to function to determine a desirable road cross-section for each of the transport modes. The resulting infrastructure forms are described graphically in **Figure 6-2** and provided in more detail **Appendix A**.

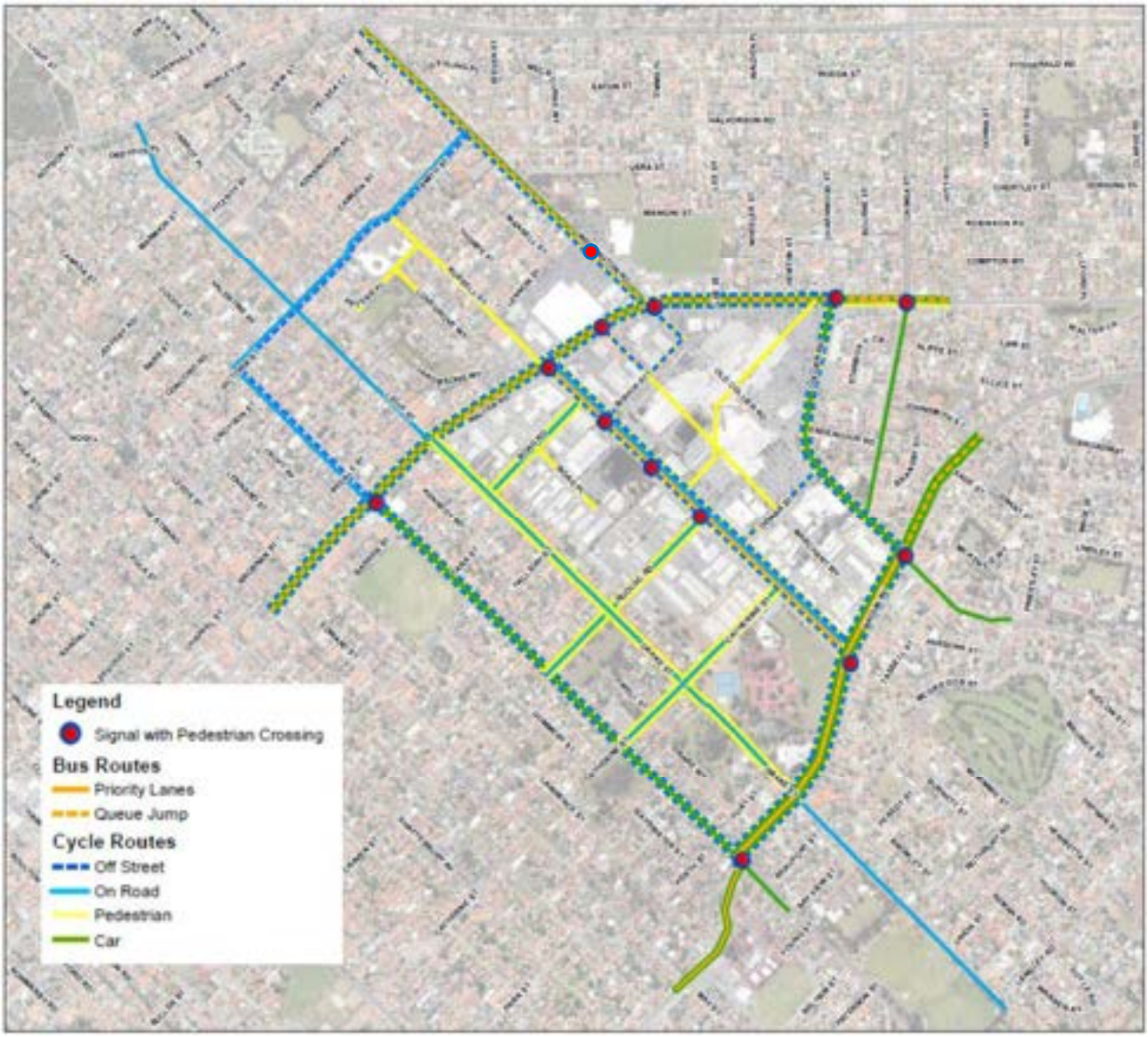

Figure 6-2 Representative Road Cross-Sections

Significant changes to the internal road environment are proposed to manage traffic flows through the Centre precincts. Vehicular traffic is accommodated within a few key streets and controlled through cross-section and priority measures, as well as the location of large-scale car parking.

Speed Zones

To promote the desired safe and legible pedestrian environment, the speed limit within the Centre is proposed to be decreased to 40km/hr along Russell Street and Rudloc Road. Boundary roads around the Centre such as Walter Road West, Collier Road, Broun Avenue and Coode Street are to remain at a 60km/hr posted speed limit due to the projected continued use of the roads by regional bypass traffic.

Access Roads such as Drake Street and Rudloc Road are proposed to be kept in a narrow form to promote low speeds (ideally 30km/hr) while minimising the crossing distance for pedestrians. LATM measures including improved crossing facilities will assist in creating a low-speed 'shared zone'.

6.4 Road Infrastructure Changes

Each major road section within the Centre has been considered with respect to its future function and contribution to the multi-modal hierarchy. The results of this initial analysis are based solely upon transport benefits and may need to be revised to accommodate the land-use goals of the City. The accompanying

cross sections are shown to illustrate the proposed future road form. Local intersection improvements is discussed, as appropriate, in **Section 10**.

Broun Avenue: Coode Street to Russell Street

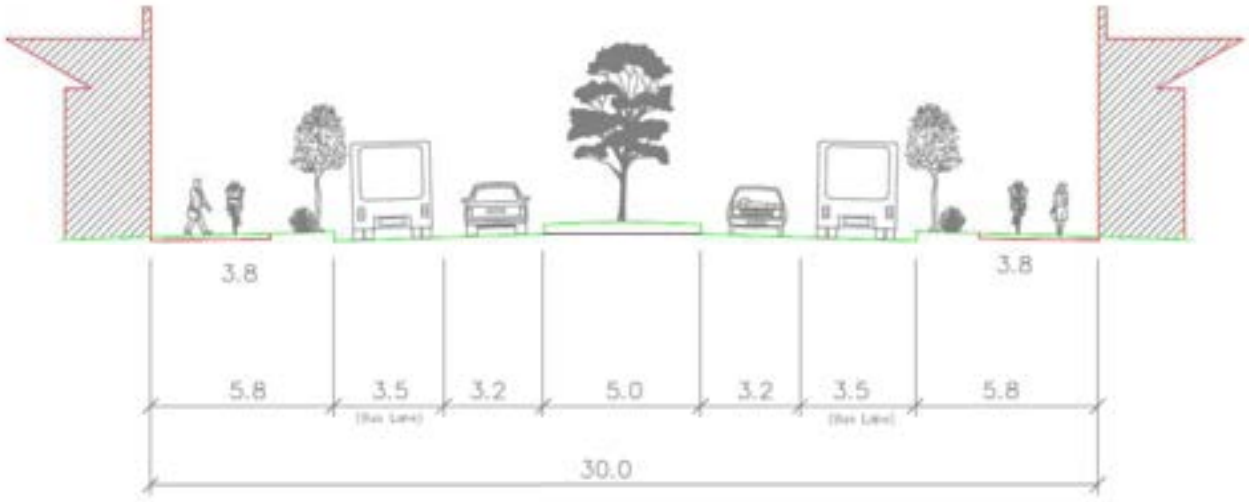

Figure 6-3 Broun Avenue: Coode Street to Russell Street

Broun Avenue currently consists of 2 lanes in each direction with a posted speed limit of 60km/hr. Broun Avenue is located on the boundary of the Centre and provides primary access for north-south trips into the Perth CBD for relatively high volumes of traffic. There are minimal pedestrian and cycling facilities along this corridor, but partial bus lanes are provided further to the south in the City of Stirling (Beaufort Street).

Future works will aim to widen pedestrian footpaths to promote walking and cycling, as well as an extension of the existing part-time bus lanes through to Russell Road at a minimum.

To accommodate the future demands of the Centre, only minor alternations to the road reserve will be required. This would involve widening the shared path to standard more conducive to high volumes of cycling and pedestrian transport. On-road cycling along this corridor is not considered consistent with the function of the part-time bus lanes, necessitating the proposed higher-quality off-street facility.

In the event that future public transport demands support a full-time bus lane, shared use of this facility by cyclists may be feasible. Alternatively, if bus lanes were to be removed as a result of the increase in regional car traffic, on-road cycle lanes would be beneficial along the corridor. These decisions regarding the function of Broun Avenue are considered to be outside of the City's control and contingent on regional transport demands.

Russell Street: Broun Avenue to Walter Road West

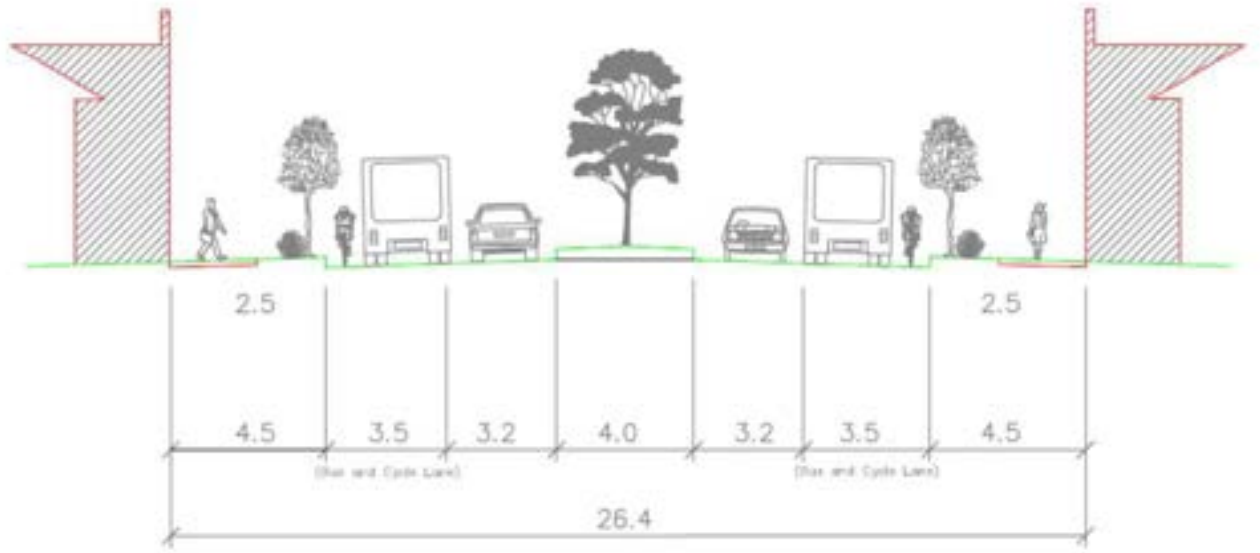

Figure 6-4 Russell Street: Broun Avenue to Walter Road West

Russell Street is the subject of a past study undertaken to create full-time bus priority lanes into the Morley Bus Station. Cardno supports the intent and overall design of the recommendations, so long as the modifications are also able to accommodate cycling. Few changes to the recommended layout would be necessary to include cycling facilities - namely the creation of an exclusive cycling zone immediately in front of the Morley Bus Station to ensure network continuity.

A shared cycling and pedestrian path would also be available for casual cyclists who wish to ride at a slower speed. Russell Street is likely to be a Pedestrian Activation Zone, with a high demand for pedestrian movements both along and across the road. This would support pedestrian facilities that extend from kerb to lot boundary.

To facilitate these movements additional LATM measures are recommended, including lane-width reductions and street trees to reduce visual width, a core Centre posted speed limit of 40km/hr, as well as high quality pedestrian crossing facilities.

The proposed geometry slightly increases the road reserve width, but allows sufficient median width for the improved pedestrian facilities and right-turning pockets (where necessary).

Car parking is not supported along Russell Street due to the impact on bus movements, though indented bike corrals would be effective in maintaining cyclists on-road.

Collier Road: Broun Avenue to Walter Road West

Figure 6-5 Collier Road: Broun Avenue to Walter Road West

Only minor improvements would be required along Collier Road to make it more pedestrian-friendly, including wider shared paths and street trees. Improved pedestrian crossings are recommended along identified desirelines.

Coode Street: Broun Avenue to Walter Road West

Figure 6-6 Coode Street: Walter Road West to Walter Road West

Only minor improvements would be required along Coode Street to make it more pedestrian-friendly, including wider shared paths and additional canopy trees.

The existing median would be removed to allow for improvements in the verge, and embayed on-street parking would continue to be supported for use by residential visitors.

Rudloc Road: Russell Street to Coode Street.

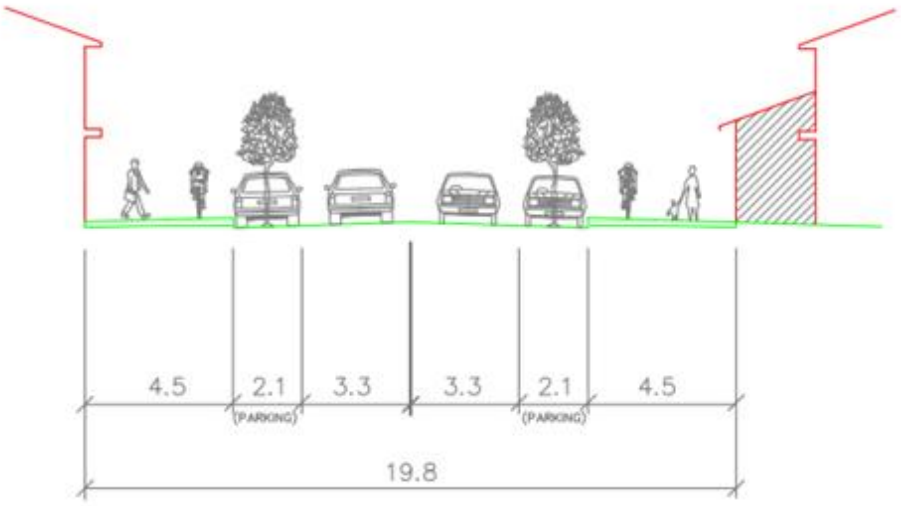

Figure 6-7 Rudloc Road: Russell Street to Coode Street

Rudloc Road currently consists of a 4-lane form, but this is proposed to be reduced to 2 lanes with embayed on-street parking in each direction. Rudloc Road is being promoted as an Activated Pedestrian Zone as well as a high quality connection between the high-density residential precinct to the south-west of the Centre and the business/retail core. Embayed parking in this area is intended for short-stay purposes, particularly associated with entertainment and restaurant uses which will ultimately replace the existing land-uses present along the corridor.

On-road cycling is supported in mixed traffic with LATM measures installed to reinforce the slow-speed environment. A 40km/hr speed limit is recommended for this road.

Wide pavements along Rudloc Road will allow for better use of this public space by adjacent businesses, while providing an environment focused on pedestrians and casual cyclists.

Rudloc Road is currently part of the Circle Route (Route 98/99), and may continue to be so into the future, but alternative alignments could be investigated to reduce the impact of public transport on kerb-side function.

Smith Street: Wellington Road to Coode Street

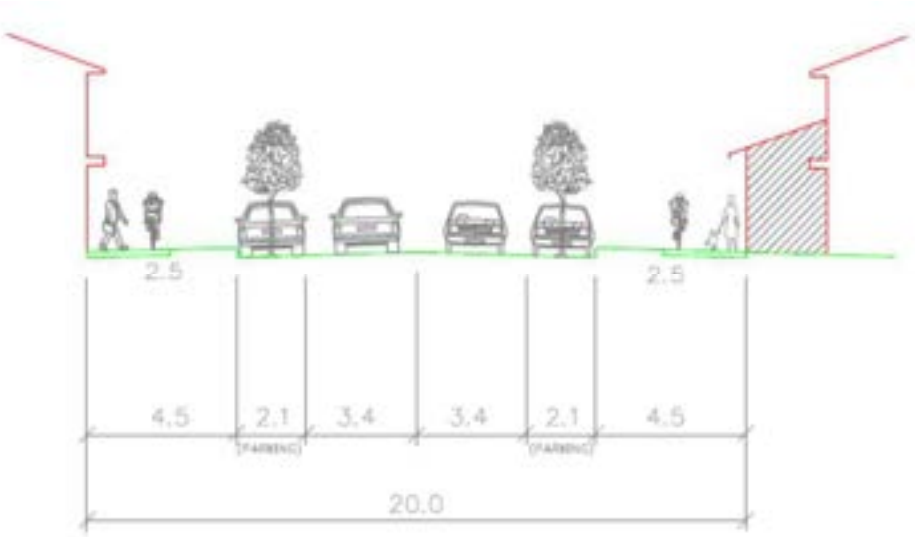

Figure 6-8 Smith Street: Wellington Road to Coode Street

Smith Street currently consists of a wide 2-lane, but quiet road. Only minor changes to road geometry are proposed, including indented parking to reduce the road width and reinforce the desired slow-speed environment. This will also improve pedestrian crossing opportunities and support on-road cycling. The addition of a shared path to the northern side will also improve pedestrian connectivity.

Drake Street: Broun Avenue to Smith Street

Figure 6-9 Drake Street: Broun Avenue to Smith Street

Access to Drake Street has been modified to restrict turning movement restrictions at Walter Road West. The result is a low volume, slow speed environment that is perfect for cycling access.

To reinforce Drake Street as the primary cycling corridor, further LATM measures are recommended, potentially including additional turning movement restrictions or cul-de-sacs as well as speed reduction devices to create a prevailing speed of approximately 30km/hr.

Light Street/Drake Street represents a tremendous opportunity to connect the Centre with strategic destinations from Mirrabooka to the Bayswater Station. This is particularly valuable in that it uses a direct route that is generally low volume and low speed along its full length. Connection through to the Centre core along Rudloc Road is also strong, though deviation at the boundary to Russell Road and the future bus/cycle lane also provides good legibility.

Indented parking is recommended along this road, to facilitate the requirements of residential visitors, and the creation of this road as a shared cycling environment (a “green way” or “bicycle boulevard”) eliminates ‘door-zone’ issues.

It should be noted that there is extensive work required to fully realize the above vision, which is outside of this study and consistent with the goals of a Local Bike Plan.

Walter Road West: Wellington Road to Russell Street

Figure 6-10 Walter Road West: Wellington Road to Russell Street

Walter Road is a major east-west link running parallel to Morley Drive. It is one of the main approach routes to the Centre and is strategically important to the region. However, traffic volumes reduce significantly to the east of Crimea Street and there are suggestions that the lack of traffic in the adjacent Bassendean area warrants reduction of the overall road form to 2 lanes beyond this point. This may have some impact on demand for the road and, with the number of alternative parallel routes available; there is the potential that bus priority measures might be feasible in the long-term.

If installed, these are most likely to consist of queue-jump facilities at traffic signals, with approximate cross-section geometry as shown above. In the event that bus transit is deemed unnecessary, allocation of road space to create a cycle lane is recommended. Improvements to the off-street shared path network are recommended under any future scenario, in addition to improved crossings at Light Street/Drake Street.

Wellington Road: Walter Road West towards Morley Drive

Figure 6-11 Wellington Road: Walter Road West to Morley Drive

While few changes are considered necessary in the short-term, future works may be required if the State Government's Public Transport for 2031 plan is realized. In particular, high frequency buses movements between the MAX light rail and the Centre are proposed and supported along the Wellington Road Corridor. This may require priority measures, though the extent is not currently understood. Facilities ranging from queue-jump to full-time bus lanes are possible.

New works to this section of the road will only be minor as Wellington Road as recently been refurbished due to the Coventry Market development. Some new works include wider shared paths for pedestrians and cyclists and a potential future bus priority lane or on-street cycle lane.

7 Parking Needs Assessment

7.1 Methodology

A parking demand model has been developed for the City Centre which incorporates the theoretical parking generation of the individual land uses within the existing and proposed developments and calibrates this model to the observed parking demand for a design day scenario. As part of this analysis the impacts of shared and reciprocal parking have been included.

7.2 Nomenclature

Parking Supply

Parking supply is the total quantum of parking spaces that are built or available within the study area, regardless of whether or not they are utilised. Parking supply only includes marked spaces and does not include areas designated for standing vehicles.

Parking Demand

Parking demand is the number of vehicles needing to be parked within the study area at any point in time. Parking demand includes all parking associated with the associated land uses, whether in an off-street facility, parked illegally, parked on-street or in remote parking lots. Parking demand does not include standing vehicles awaiting the pick-up or drop-off of passengers.

Shared Parking

Shared parking is parking that is used by 2 or more land uses instead of restricting parking to the exclusive use of a single land use - the more exclusive the parking is, the less effective it becomes for the development as a whole.

Reciprocal Parking

Reciprocal parking occurs when a visitor has more than one purpose within an area and hence only one trip is required to serve two or more purposes. As the Centre is a substantial mixed-use development with retail, office, residential and entertainment venues, there is likely to be a high degree of reciprocity at all times.

The degree of reciprocal parking occurring depends on the type of land use in the vicinity and the time of day. For the purpose of this assessment, reciprocal parking rates have been taken from the *National Cooperative Highway Research Program (NCHRP) Report 684* (March 2011).

The most important component to determine the rates of reciprocal parking is the proximity of the land use pairs. As all developments within the Centre are generally located within acceptable walking distances, and all parking within the Centre will be managed through paid parking or supply management, the reciprocal parking rates given in the NCHRP Report can therefore be considered to be reasonable estimates. By accommodating reciprocal parking a lower total parking supply will therefore be required to satisfy demand for the Centre.

Efficiency

The efficiency of parking is a measure of the practical maximum utilization rate of parking within a study area. An efficiency factor of less than 100% reflects a perception by drivers that all available parking within the study area is occupied, when in fact there may be parking spaces available. This may be in the form of parking spaces that are available only for some purposes, allocated to individual businesses, difficult to find or in the wrong location.

Increasing the efficiency of parking can be accomplished by better signage to inform drivers of the locations of parking spaces, or by introducing a method (through technology or dynamic signage) of alerting drivers when parking becomes available.

7.1 Theoretical Calculation of Existing Demand

The existing theoretical parking demand for the Morley Activity Centre was calculated by using the floor areas, residential dwelling numbers, employment opportunities and student enrolments provided by the City of Bayswater through their *Morley City Centre Masterplan* and development capacity modelling completed by the project economic consultant for the 2011, 2021 and 2031 horizon years, as described in **Table 9-1**.

This information was then used to calculate the theoretical parking demand based on parking demand rates published in *Parking Generation, 3rd Edition* by the Institute of Transportation Engineers, along with time-of-day utilisation rates for the different land uses. Based on this methodology, the gross theoretical peak parking demand for the existing (2011) land uses was determined to be 8,136 bays. This assumes exclusive parking associated with each land use (no reciprocal parking) and not calibrated to any observed data.

7.2 Calibration to Observations

Data calibration was performed to establish a theoretical peak parking demand, using a comparison of theoretical daily trip generation for the existing Centre to observed vehicle movements.

Main Roads ROM data was obtained in the form of cordon matrices for existing (2013), and future 2021 and 2031 projections. Traffic was disaggregated into local traffic and background (traffic not associated with the Centre). The resulting desktop model was then calibrated to ROM link count outputs, SCATS data and pneumatic link count information to establish a representative existing (2013) traffic model.

The scaling factor used to calibrate trip generation was then applied to the theoretical parking demand as determined above. The results showed that the Centre currently generates approximately 8% more vehicle trips than the theoretical assessment, suggesting an existing peak demand of 8,755 bays.

This scaling factor was separated into an ‘over-trading’ proportion and a mode share proportion based on ABS data, which determined that the existing non-residential land uses currently generate approximately 20% more trips (and therefore parking) than the theoretical assessment. The ‘overtrading’ proportion is assumed to represent the attractiveness of the Centre and so has been carried forward into future analysis, creating a conservative demand assessment for the future scenarios.

7.3 Shared Parking

It is acknowledged that there is significantly more parking than this quantum currently available across the Centre, almost exclusively in private car parks associated with individual developments. As a result the efficiency of existing parking is very low. However if a proportion of parking, particularly the quantum associated with retail, restaurant and entertainment uses can be shared and efficiency thereby increased.

The following **Figure 7-1** describes the parking demand profiles for a range of broad land uses including office and residential. For the purpose of a shared-use assessment, office and residential parking is assumed to be held in exclusive car parks, and is therefore ineligible for shared parking.

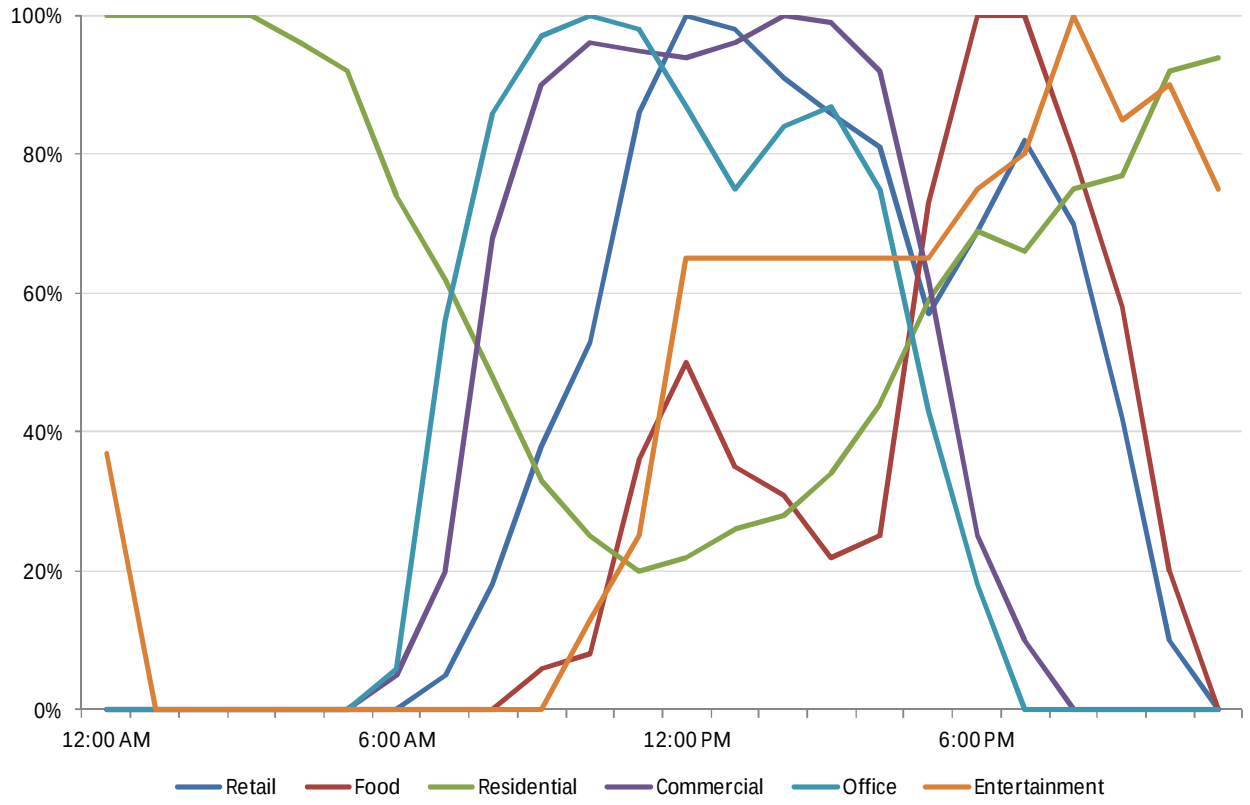

Figure 7-1 Theoretical Parking Demand Profile for a Typical Weekday

The results of non-residential shared parking assessment are shown for the 2021 and 2031 scenarios in **Figure 7-2** below. These graphs describe the required parking supply across the Centre for a typical weekday, under the two future scenarios and assuming no reciprocal parking. Office and commercial development parking is excluded from the shared parking quantum, creating a constant supply requirement for these developments categories.

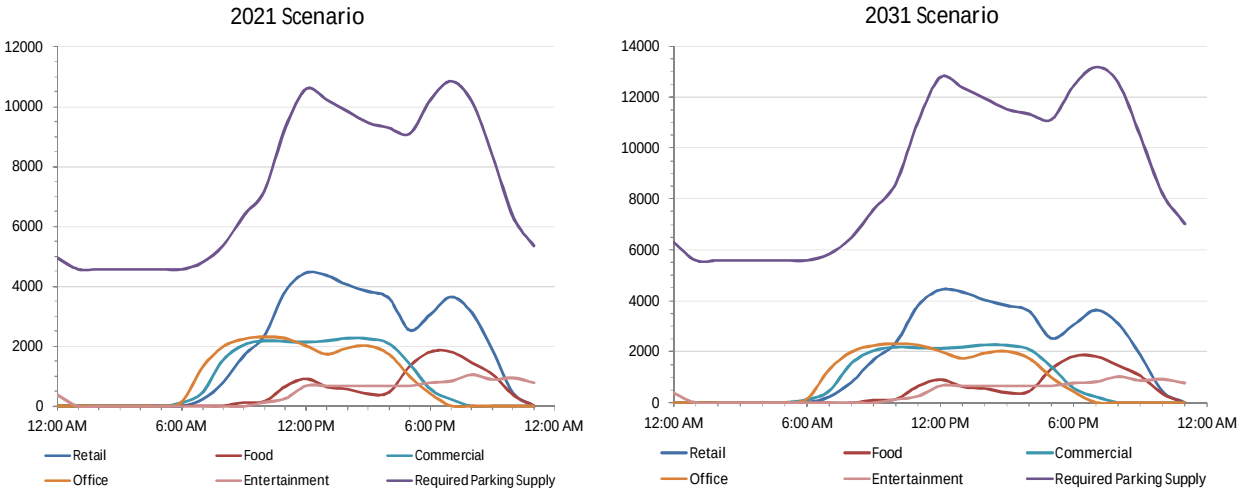

Figure 7-2 Theoretical Parking Supply Requirement, including Shared Parking

The level of reciprocal parking was determined through the use of best-practice reciprocity rates published by the National Cooperative Highway Research Program (NCHRP) *Report 684 (March 2011).* Residential parking was not included in the theoretical parking demand but was included in the reciprocal parking estimation, as residents are likely not to use their car within the Centre.

Table 7-1 shows the calculated reduction in parking demand resulting from land-use reciprocity, based on the NCHRP reciprocal parking rates.

Table 7-1 Calculated Reciprocal Parking Reductions for Future Land Use Scenarios

	2021 Scenario				2031 Scenario			
Time Starting	Residential	Non-Residential Commercial	Retail/ Entertainment/ Restaurant	Total Reciprocal	Residential	Non-Residential Commercial	Retail/ Entertainment/ Restaurant	Total Reciprocal
0:00	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0
6:00	8	0	0	8	9	0	0	9
7:00	121	68	0	189	143	75	0	218
8:00	157	198	0	356	292	229	0	521
9:00	134	385	35	554	230	438	39	707
10:00	117	505	46	669	191	573	52	815
11:00	222	876	209	1,307	296	985	233	1,513
12:00	290	250	501	1,041	376	285	607	1,267
13:00	238	239	391	868	328	272	480	1,080
14:00	227	222	362	810	320	253	433	1,007
15:00	207	207	296	709	313	236	350	899
16:00	253	197	315	765	389	225	365	978
17:00	506	165	637	1,308	655	190	709	1,555
18:00	600	181	857	1,638	772	217	954	1,943
19:00	572	96	880	1,548	733	108	980	1,820
20:00	496	0	712	1,208	661	0	792	1,453
21:00	404	0	501	904	562	0	557	1,119
22:00	210	0	165	374	250	0	183	433

A comparison of the reciprocity calculations to the gross parking demand shows a reduction of 16% in peak parking and vehicle trip generation across both future scenarios

7.4 Anticipated future parking demand

The 2021 and 2031 parking demands were determined using the methodology described above, with land use and dwelling yields as defined in the *Morley City Centre Masterplan* and by economic capacity analysis undertaken by the project economic consultant. Based on this information, uncalibrated gross peak parking demand of 12,785 and 15,395 bays was calculated for the 2021 and 2031 scenarios, respectively.

By including the effects of mode shift, over-trading, reciprocal and shared parking effects, the anticipated parking demand was reduced to 9,687 bays by 2021 and 10,974 bays for the 2031 development scenario.

It should be noted that parking in the Centre will not be able to achieve 100% efficiency since drivers do not have perfect information on parking availability, so additional parking will need to be provided to accommodate localised demand. Using a 90% overall efficiency as a goal, a parking supply of 13,400 bays consistent with the proposed parking maximum rates, should be sufficient to accommodate the demand at the target mode shares through to the 2031 development scenario. Given that parking demand rates are contingent on infrastructure provision, environmental and behavioural factors, an interim 2021 parking quantum of approximately 11,100 bays would be expected.

8 Parking Management

8.1 Parking Management Principles

As the Centre has a large commercial precinct at present with significant growth in commercial and mixed use development planned in the future, it is expected that there will be a high demand for both short-stay and commuter parking, in addition to the residential needs of the proposed development

However, a higher provision of car parking will result in an increase in private vehicle mode use, potentially beyond the capacity of the road network to support it and to the detriment of the social, environmental, cultural and economic goals of the *Morley City Centre Masterplan*.

Car parking management methodologies will need to be introduced to maintain a level of supply and demand which can be sustained by the local road network. The following fundamental principles have been considered for the proposed parking scenario:

8.2 Parking Priorities

A public parking supply can be managed to provide parking for a range of needs. The two broadest categories for non-residential parking consist of commuter and retail parking. These have overlapping but separate demand profiles and should be managed in different ways.

Retail and entertainment parking should be provided centrally, close to destination areas and easily accessible from the development. Within the City Centre, Centro Galleria provides the greatest quantum of retail/entertainment parking. The scale and location of this parking means that it is used by visitors to a variety of destinations. However, short-stay retail and entertainment parking is ideally supplied on-street or in multi-deck car parking with a demand responsive parking fee that promotes turnover. This is not currently feasible in the Centre, as the large quantum of parking is sufficient to satisfy all drivers, even at no cost.

Commuter parking tends to be of lesser value to the City Centre and should ideally be supplied on the periphery of the City in large-scale parking structures priced to support all-day parking. However, due to the low fees attached to all-day parking in an area such as Morley, there is very little chance that capital costs can be recouped from fees. This implies that an alternative mechanism is necessary to make all-day parking economically feasible and that most of the office/commercial car parking will ultimately be provided on-site.

The effort to create a communal all-day parking supply is considered worthwhile, since commuters tend to arrive during the roadway peak and have the greatest impact on traffic operations. Removing this demographic from the main activity areas improves pedestrian and cycling safety, public transport efficiency and intersection operation. Commuters are also more willing to walk long distances, particularly if the pedestrian environment is attractive.

Other specialised parking categories are also important and should be included in the on- and off-site parking supply. This includes:

> Disabled parking, demand for which will increase markedly over the next 20 years and should represent 2-3% of the overall non-residential supply;
> Loading bays adjacent to retail and entertainment or mixed-use developments which do not include on-site provision for service/delivery;
> Bus stops along service routes;
> Taxi stands in areas with high demand;
> Other types of very short-stay parking (ATM, post boxes, emergency service zones, etc.)

8.3 Distribution of Parking

Preliminary assessment of potential parking structure locations has been undertaken by the City of Bayswater and reassessed for the proposed development scenario. **Figure 8-1** shows potential locations for large public (and de-facto public) and private parking, to be supplemented by smaller-scale parking at the individual development level.

Figure 8-1 Location of Proposed Public and De-Facto Public Parking

8.4 Commuter Parking

Location

Commuter parking is proposed to be provided on the periphery of the City in large-scale parking structures priced to support all-day parking. Commuters tend to arrive during the roadway peak and have a significant impact on traffic operations. Removing this demographic from the main activity zones improves pedestrian and cycling safety, public transport efficiency and intersection operation. Commuters are also willing to walk longer distances, particularly if the pedestrian environment is attractive.

Quantum

Parking analysis shows that the peak unrestrained demand for commuter parking is approximately 5,500 spaces. The parking supply rates recommended by the WAPC, and adopted in this strategy as a reasonable target, result in a total office/commercial supply of 4,400 bays. Assuming that parking is utilised at 90% efficiency, this creates an 'effective' long-stay supply of 3,960 bays.

Ideally, 15-20% of the total long-stay supply (approximately 600-900 bays) would be available in communal parking areas, allowing efficiency at these locations to approach 100%. The nature of long-stay parking would also mean that these structures would be available during the peak destination entertainment demand, which tends to occur outside of standard business hours.

Under the above scenario, while actual bay numbers would remain at 4,400 bays, effective long-stay supply would increase to 4,050. This would require a mode shift for commuters from 85% car-as-driver down to 62%. The magnitude of this shift is considered feasible, based on the scale of the City Centre residential development, and appropriate improvements in alternative transport provision.

Access

Access to commuter parking will be primarily via major approach roads (Walter Road West and Broun Avenue) on the boundaries of the City Centre, to minimise the impact of commuter traffic on the operation of the internal road network.

Price

While it has been shown that the unrestrained demand for commuter parking exceeds the proposed supply, the willingness of commuters in the Morley area to pay for parking has not been satisfactorily demonstrated. Anecdotal evidence suggests that it is unlikely that the workforce will support commuter parking prices at economically sustainable levels, capable of funding the construction of commercial car parks. However, assuming that attractive cash-in-lieu policies are put in place, it is possibly that daily parking rates could meet or exceed levels sufficient to pay for upkeep and maintenance of public facilities. (i.e. $5-$8 per day).

8.5 Residential Parking

Parking Rates

Residential traffic is generally not considered to impact significantly on the Activity Centre road network due to its prevailing contra-flow direction. However, Morley is situated between a large residential catchment and the primary employment node of the Perth CBD, and as such residential traffic will tend to run with the primary traffic flow. Therefore, to ensure that residential traffic does not become an issue in the future, restraining parking provision to a minimum of 1 bay per unit would assist in supporting sustainable transport through reduction in private vehicle trip generation.

Unbundled Parking

The cost of parking for residential and commercial units is usually passed on to the occupants indirectly through the rent or purchase price (bundled) rather than through a separate transaction. This means that tenants or owners are not able to purchase additional parking if required or given the opportunity to save money by reducing their parking demand. Giving the tenants or owners the opportunity to rent or sell the parking spaces separately may also reduce the total amount of parking required for a development. The unbundling of parking can be introduced in several different ways:

> Facility managers can unbundle parking when renting building space;
> Developers can make some or all parking optional when selling buildings;
> Renters can be offered a discount on their rent for not using some or all of their allocated parking spaces; and
> Parking costs can be listed as a separate line item in the lease agreement to show tenants the cost and enable them to negotiate reductions.

Providing tenants or owners with the opportunity of unbundled parking is also likely to create a market for available parking spaces. It should be noted that if an unbundled parking policy is introduced, it is important to consider the cost of alternative parking in the nearby area. If there is a supply of free or low-cost parking nearby, there may be an incentive for tenants or owners to find other places to park their cars to avoid the parking charge, potentially resulting in spill-over effects.

8.6 Short-Stay/Visitor Parking

Currently, visitor parking within the Centre is almost exclusively free and provided by on-street and off-street retail parking facilities.

Location

Retail parking is proposed to be located adjacent to, but outside of, areas with high levels of activation. Parking would be primarily provided in public or private multi-deck parking facilities adjacent to these areas. Centro Galleria will likely remain the primary site for retail parking, and will continue to operate as a de-facto public car park. The remainder of short-stay parking bays would be distributed across the Centre.

The on-street parking supply should be reserved for visitor parking, through the use of parking pricing and timing restrictions. On-street parking within the Centre is encouraged in the majority of access streets, as well as along Rudloc Road and Coode Street. Parking along Russell Street is acceptable only beyond Walter Road West. Embayed on-street parking is preferred, to minimise pedestrian crossing distances and allow street trees to be planted closer to the traffic lanes.

Quantum

Outside of Centro Galleria, Coventry Markets and a few other large-scale retailers, on-site parking numbers for individual developments are likely to be small in scale. This creates significant efficiency issues where the parking supply is unevenly and inequitably spread across the City. Larger car parks are much more efficient, more legible and more manageable than a distributed system, particularly when parking is controlled by the City itself.

It is anticipated that there is a peak unrestrained demand for approximately 5,900 short-stay parking bays under the 2031 scenario. This assumes an equivalent percentage mode shift to commuters for external trips. However, it is noted that short-stay/visitor parking does not have the same impact on the road network as commuter parking, and a lesser mode shift is acceptable in this instance. It should also be noted that parking demand is reduced by as much as 1,300 bays due to reciprocal use (people walking from their office to get lunch, etc.).

However, the guidelines for parking supply, stipulating 4-5 bays per 100sq.m for retail uses, suggest that overall parking supply could end up being between 8,200 and 9,500 bays. This actually represents an oversupply of parking based on parking analysis and would support private vehicle mode shares at or above the existing rate. It is therefore recommended that some of the existing and future retail supply be allocated on a flexible basis to either short-stay or commuter parking, perhaps by introducing a small hourly fee equivalent to the day rate.

It is also suggested that the existing cash-in-lieu policy be modified to allow the City to attract and manage communal parking at a reduced overall rate. This will assist in improving the distribution of parking, maximising the effective use of land resources, and limit the upward pressure on private vehicle modes.

8.7 Park ‘n’ Ride

Exclusive park ‘n’ ride facilities are not currently provided, though nearby private commercial parking may be used as de-facto park ‘n’ ride, depending on the level of enforcement. The provision of park ‘n’ ride parking

for exclusive commuter use is not supported for the Morley Bus Station as this parking would attract a significant quantity of private vehicle trips into the Centre, with no associated benefit to the community.

8.8 Maximum Parking Rates

The constraints associated with road capacity and commercial sustainability for public parking support the modification of the existing standard parking minimum rates, as set out in Local Government Policy, to a simplified set of parking maximums. It is envisioned that land uses would be categorised according to simple criteria: Retail, Food, Commercial, Office, Residential and Entertainment. Any other non-standard uses would be assessed with respect to the goals of the City and Department of Planning.

Broad maximum parking rates are proposed in the DoT *Activity Centres Parking Discussion Paper* and provide a benchmark for development as follows:

> Retail: 4-5 bays per 100sq.m
> Office/Showroom: 1-2 bays per 100sq.m

These have been applied in the context of the proposed plan, with some additional detail to assist in determining overall parking quantum and private vehicle trip constraint.

> Retail: 5.0 bays per 100sq.m
> Commercial: 2.00 bays per 100sq.m
> Office: 2.00 bays per 100sq.m
> Restaurant*: 10.00 bays per 100sq.m
> Entertainment*: 4.50 bays per 100sq.m

*not stipulated in SPP 4.2

Calculations show that at the application of these rates to the proposed land uses creates the desired ultimate parking quantum, with a total parking supply across the Centre of approximately 13,400 bays at a representative 90% efficiency. However, a transitional plan which allows additional interim parking on a mandated schedule will be necessary to reflect the commercial realities of development.

Public car parking allows a more efficient and equitable allocation of parking resources across multiple land uses. Therefore, a proportion of public car parking is beneficial to the operation of the Activity Centre and should be supported by legislation.

A public parking quantum of approximately 1,000-1,500 bays across the Centre (including on-street provisions) would likely be sufficient to provide the necessary flexibility. This is additional to the de-facto public parking already provided in large-scale retail parking.

8.9 Parking Pricing

Parking infrastructure is expensive to construct and maintain. Where unrestrained parking demand rates significantly exceed the supply rate, the market price for hourly or daily parking can support the construction of public car parking on commercial grounds. However, market pricing of parking will have a significant impact on demand, with effects felt at relatively low rates. While there may be localised hotspots where parking is in sufficient demand to justify cost recovery pricing, it is likely that the majority of public parking will be unable to pay for itself through fees. This suggests that alternative funding methodologies will be necessary.

It should also be noted that parking management, enforcement and compliance is essential to the successful implementation of the parking management regime.

8.10 Cash-in-Lieu of Parking

Cash-in-lieu of parking is a mechanism by which developers contribute towards public parking and/or sustainable transport initiatives. This mechanism allows public infrastructure to be funded by development, without the requirements for a Development Contributions Scheme.

An attractive cash-in-lieu policy allows developers to fund a proportion of their maximum parking requirement in off-site parking to be constructed by the City, and to fund additional sustainable transport initiatives such

as cycling infrastructure and public transport improvements. Demonstrated synergies within a development which would reduce their parking demand could also be supported to reduce on-site supplies.

By this mechanism, public parking rates need only fund maintenance of infrastructure, rather than recover the costs of capital works. However, a Parking Implementation plan will be necessary to provide certainty to developers, and to satisfy the requirements of the City's cash-in-lieu policy.

Only minor modifications to the City's existing cash-in-lieu policy are recommended, allowing for a reduction in the contribution to encourage cash-in-lieu, and to acknowledge the improvements in efficiency associated with public infrastructure.

Record-Keeping

To maximise developer buy-in and ensure a streamlined process, it is important to ensure that there is an effective record-keeping process to manage cash-in-lieu contributions. This system would track payments by developers, current land and construction costs, infrastructure works and planning. Maintaining a transparent process of cash-in-lieu through which developers can see direct value will assist in achieving both mandatory and voluntary contributions.

8.11 Use of On-Street Parking

Residential Parking

On-street parking for residential uses is not supported except for visitor parking. It is expected that residential development will provide sufficient parking on-site. This will minimise conflicts over on-street supply and retain it for valuable short-stay parking.

Visitor / Retail Parking

The primary use of on-street parking will be for short-stay visitor parking, particularly in and around activated streets. This parking should be time-restricted to avoid illegitimate commuter parking or priced on a demand-sensitive basis to promote vacancies.

Loading Zones and Service/Delivery Docks

Deliveries will be enabled through an increase in on-road loading zone areas, particularly in 'main street' precincts and where smaller office/retail development is located. Larger office/commercial buildings will be serviced via on-site docks connected to basement or undercroft parking structures. Access to dock areas through a laneway network is supported to minimise the impact of service/delivery vehicles on pedestrian, cycling and bus modes.

ACROD Parking

It is recommended in the short term to promote ACROD parking rates above the stipulated rate given in the Building Code Australia (BCA). This reflects the growing mobility of people with disabilities and is consistent with the increasing uptake in ACROD permits in the Perth metropolitan region. Notwithstanding any provision in the BCA or AS2890, it is recommended that parking spaces for people with disabilities are to comprise 2-3% of the total number of parking spaces in non-residential development, with a higher provision rate required for car parks serving health facilities or which provide specific services for aged persons and people with disabilities. Location and accessibility of ACROD parking is also critical to its effective application.

Bus Stops and Layover

The location of bus stops will be dictated primarily by the associated road environment. Priority bus lanes on Russell Street, and Broun Avenue will be supplemented through in-lane stops throughout the Centre. This will ensure minimal disruption to bus services to ensure that services run on schedule.

Russell Street's full time bus lane is designed to encourage cars to use boundary corridors to travel around the Centre rather than through it. The Broun Avenue priority bus lanes are likely to be part time lanes intended for use in the prevailing flow direction during peak times, likely to be between 7:00am to 9:00am and 4:00pm to 6:00pm. There is the potential for this bus lane to transition to a full-time lane, following from the progression of infrastructure further to the south.

Bicycle Parking

In activated streets, or any streets with on-road cycling facilities, cycle parking would ideally be located in on-street corrals, as shown in **Figure 8-2**. This has the advantage of keeping cyclists away from pedestrian conflict and is a very effective way of creating cycle parking. It also functions as a promotion of cycling as a viable travel mode.

Figure 8-2 Bike Corral

Other Critical Short-Stay Parking

Consideration for other specialty uses should be undertaken, depending on the requirements of adjacent land uses. As on-street parking is expected to be in high demand, dedicated parking for emergency and postal vehicles may be necessary. Dedicated taxi stands will also be desirable in entertainment precincts and other high-demand areas. Specific land uses such as banks may require very short-stay parking (15 minutes) to facilitate customer needs.

8.12 Public Paid Parking

A Paid Car Parking Implementation Plan should be developed to guide the gradual introduction of pay and display meters in the Centre. The roll-out of paid parking will need to begin in locations with identified demand hot-spots and transition through the Centre in concert with development progression.

The introduction of paid parking allows for fine-grained control of parking demand on a precinct or road-specific basis. Ideally, parking rates would vary as required and set to a level which generates a vacancy on each block. A good example of this mechanism is provided by the SFPark system currently being trialled in San Fransisco.

Public car parking, particularly multi-deck parking stations, should be also constructed in concert with development. Therefore, the nexus for public parking need should be roughly simultaneous with the funds to construct public facilities (through cash-in-lieu). However, there may need to be a transitional form of public parking which satisfies the requirements of development in the medium-term. At-grade parking stations can be utilised during this transition period, before being employed as development sites later on. This should also be encapsulated in a Parking Implementation Plan, as it enables cash-in-lieu to be accepted under existing City of Bayswater policies.

8.13 Enforcement

Due to the increased attractiveness of parking within the activity centre, the enforcement of parking restrictions both within the Morley Activity Centre and in the periphery is essential to a successful outcome of the parking strategy.

9 Traffic Analysis

9.1 Trip Generation

The project economic consultant have provided the following (**Table 9-1**) projections of future land usage for the Centre for retail, mixed use, residential and entertainment. Theoretical development trip generation was determined using the land use projections below and the previously stated assumptions.

Table 9-1 Area of specific land uses for the Centre (future scenarios)

	Map Area Floor Space (sq.m) by Land Use						
	Retail	Food	Residential	Commercial	Office	Entertainment	Total
2021 Scenario	122,946	13,661	4,583*	90,556	91,708	27,284	350,738 (42% growth)
2031 Scenario	135,000	15,000	8,500	100,000	120,000	50,000	428,500 (74% growth)

*2021 residential build-out is interpolated linearly from the 8,500 units projected for 2031

Trip generation for 2021 and 2031 is described in **Table 9-2**.

Table 9-2 Trip generation (all modes) for the Centre (future scenarios)

Future 2021 Scenario							
Peak Time	Retail	Food	Residential	Commercial	Office	Entertainment	Total
AM	2,339	693	2653	1767	1940	519	9912
PM	7,173	866	3232	1594	1865	1038	15769
Daily	77,967	10,396	32419	15769	13779	7613	157942
Future 2031 Scenario							
Peak Time	Retail	Food	Residential	Commercial	Office	Entertainment	Total
AM	2568	761	4921	1952	2538	951	13691
PM	7876	951	5995	1760	2440	1902	20925
Daily	85611	11415	60126	17414	18030	13951	206547

It should be noted that private vehicle mode shares are assumed to be unchanged in this initial analysis, to establish a baseline scenario for future traffic growth within the Centre. Total ***maximum*** traffic volumes expected across the entire centre are as follows (**Table 9-3**), based on an unconstrained growth scenario:

Table 9-3 Unconstrained traffic growth for Centre (all scenarios)

Peak Time	2013	2021	2031
AM	5,012	8,201 (+64%)	11,230 (+124%)
PM	7,085	13,125 (+85%)	17,284 (+144%)
Daily	69,965	131,466 (+88%)	170,533 (+144%)

Therefore, traffic generation by the Centre is expected to grow by a ***maximum*** of 144% on average through to 2031. This will need to be reduced through mode shift resulting from car parking and travel demand management changes in the City to allow for the local road environment to accommodate the additional traffic.

In particular, parking pricing and parking rate reductions will have a significant combined effect. The extent of parking quantum restriction will be determined through detailed road capacity analysis, as well as through a parking demand analysis taking into account mode shift and shared and reciprocal use. The result of this further analysis will establish the likely real growth in Centre traffic through to the 2031 horizon.

9.2 Trip Distribution and Assignment

A desktop model of the Centre was developed in order to determine the impact of the planned developments on intersection performances and road capacities. SCATS data for the signalised intersections sourced from MRWA and supplementary traffic count data was used to determine the turning movements proportions at critical intersections in and around the Centre.

Main Roads ROM data was obtained in the form of cordon matrices for existing (2013), and future 2021 and 2031 projections. Traffic was disaggregated into local traffic and background (traffic not associated with the Centre). The resulting desktop model was then calibrated to ROM link count outputs, SCATS data and pneumatic link count information to establish a representative existing (2013) traffic model. From this model background traffic was then extracted and growthed to create 2021 and 2031 background traffic desktop models.

The link volume plot shown in **Figure 2-2**, for the existing 2013 scenario, include both development and regional background traffic, and is consistent with the information supplied by the City and Main Roads WA. These volumes form the basis for all future analysis.

For future 2021 and 2031 scenarios, Main Roads' ROM data is used only for background traffic. The development scenario employed in generating the ROM outputs is not consistent with the proposed Morley Activity Centre plan, and has therefore been omitted.

It should also be noted that 2011 ROM data was found to disagree with observed traffic volumes for the 2013 scenario, overstating the traffic demand by up to 100% for some approaches. A scaling factor was therefore applied at each intersection approach, modelled to relate the two datasets. For the purpose of this assessment, the resulting scaling factor was then assumed to represent a constant overestimation and applied to all future scenarios. The reason for this discrepancy is not completely known, but potentially results from the lack of constraint modelling in the ROM and/or out-of-date calibration.

Link volume plots for future 2021 and 2031 scenarios have been produced, including the effects of parking constraint and internal trip capture and are shown in **Figure 9-1**and **Figure 9-2**, respectively. It is expected that the volumes generated by Main Roads ROM model significantly overestimate future traffic, given that capacity constraints are not included for these future scenarios.

9.3 Traffic Growth Scenarios

The traffic growth experienced by the Centre will ultimately be focused on roads with high quality access to activities. It will be concentrated in areas which experience the greatest increase in density, or where large-scale multi-storey parking facilities create nodal demands for traffic.

Traffic will also be managed in a manner that maximises the opportunities for alternative transport modes, creating low volume, slow speed roads that can be shared with cyclists, attractive pedestrian environments and efficient public transport corridors. All of these changes will have an effect on traffic patterns and link volumes. For the purpose of this assessment, the rate of growth across the City is assumed to be reasonably homogeneous, equivalent to a flat 60% increase in commercial density in addition to the anticipated residential growth. However, traffic has been directed away from the Centre, to simulate the effect of strategic large-scale car parking and LATM traffic control measures along pedestrian activated streets. The impact of these measures is expected to reduce traffic along Rudloc Road and Russell Street west of Dewar Street by approximately 30%.

The scale of this effect is assumed for the purpose of assessment, but should be sufficient to assist in determining where issues may occur and will provide a basis for future shifts in demand.

Local area demand growth is considered to be entirely separate from the anticipated background growth which will occur along higher order roads independently to the changes to the Centre road network. Therefore, the effect of any modifications to the road network will be applied only to internal trips, and will be assumed to have no impact on regional traffic demands.

It should be noted that no background trips are assumed to be redirected into the Centre. This is a very conservative assumption as it removes the positive impact of pass-by, transferred or redirected trips which would otherwise tend to reduce traffic flow volumes along the strategic road network.

Figure 9-1 Future (2021) link traffic volumes

Figure 9-2 Future (2031) link traffic volumes

The following **Table 9-4** shows a comparison of the existing (2013) traffic volumes with the constrained future traffic scenario.

Table 9-4 Comparison of link traffic volumes between existing and future scenarios

Section of Road	Increase in Traffic Compared to 2013	
	2021	2031
Broun: Coode - Drake, East	15%	39%
Broun: Coode - Drake, West	69%	25%
Broun: Drake - Russell, East	27%	44%
Broun: Drake - Russell, West	62%	94%
Broun: Russell - Collier, East	19%	42%
Broun: Russell - Collier, West	36%	59%
Collier: Drewer - Walter, North	46%	83%
Collier: Drewer - Walter, South	22%	56%
Walter: Crimea - Collier, East	32%	58%
Walter: Crimea - Collier, West	50%	71%
Walter: Collier - Wellington, East	40%	55%
Walter: Collier - Wellington, West	33%	60%
Walter: Wellington - Russell, East	29%	57%
Walter: Wellington - Russell, West	27%	51%
Walter: Russell - Light/ Drake, East	19%	43%
Walter: Russell - Light/ Drake, West	21%	47%
Walter: Light/Drake - Coode, East	26%	52%
Walter: Light/Drake - Coode, West	42%	75%
Coode: Walter - Rudloc, North	66%	107%
Coode: Walter - Rudloc, South	35%	65%
Coode: Rudloc - Broun, North	63%	106%
Coode: Rudloc - Broun, South	50%	71%
Rudloc: Coode - Drake, East	40%	84%
Rudloc: Coode - Drake, West	40%	84%
Rudloc: Drake - Russell, East	-2%	29%
Rudloc: Drake - Russell, West	-2%	29%
Russell: Walter - Rudloc, North	34%	76%
Russell: Walter - Rudloc, South	0%	32%
Russell: Rudloc Broun, North	34%	76%
Russell: Rudloc Broun, South	39%	83%
Victoria: Coode - Light, East	40%	84%
Victoria: Coode - Light, West	40%	84%
Smith: Light - Russell, East	40%	84%
Smith: Light - Russell, West	40%	84%
Smith: Russell - Wellington, East	40%	84%
Smith: Russell - Wellington, West	69%	25%
Average	**35%**	**65%**

9.4 Impact of Regional Traffic

The existing road use shows a high volume of regional trips currently using the higher order road network, including Walter Road West, Collier Road and Broun Avenue. This traffic is expected to increase in the future as growth continues to the north. A summary of traffic growth at 8 major intersections is shown below in **Table 9-5**.

Table 9-5 Traffic Growth at Major Intersections

Intersection	Total Traffic Growth		Background Traffic Growth		Centre Traffic Growth	
	2021	2031	2021	2031	2021	2031
Broun - Coode	38%	69%	25%	38%	40%	84%
Broun - Russell	39%	69%	39%	53%	40%	84%
Broun - Collier	29%	56%	20%	32%	40%	84%
Walter - Crimea	35%	54%	20%	26%	40%	84%
Walter - Collier	34%	56%	31%	43%	40%	84%
Walter - Wellington	34%	63%	22%	33%	40%	84%
Walter - Russell	19%	45%	27%	43%	10%	44%
Walter - Coode	39%	71%	39%	55%	40%	84%

In this assessment, the growth in traffic demand has been disaggregated for Centre development and background traffic at major intersections in the Centre. A comparison of the components of traffic growth is shown below in **Table 9-6.**

Table 9-6 Makeup of Traffic Growth at Major Intersections

Intersection	2013	2021	2031
	Background : Centre	Background : Centre	Background : Centre
Broun - Coode	46:54	42:58	38:62
Broun - Russell	47:53	47:53	43:57
Broun - Collier	55:45	51:49	46:54
Walter - Crimea	74:26	66:34	60:40
Walter - Collier	68:32	66:34	62:38
Walter - Wellington	46:54	42:58	37:63
Walter - Russell	46:54	49:51	45:55
Walter - Coode	42:58	42:58	38:62

These tables show that Centre traffic contributes on average 47% of the existing traffic to the immediately adjacent higher-order roads. Through the greater intensity of development, this contribution is shown to increase to approximately 54% on average. Therefore, it can reasonably stated that the Centre is responsible for about half of the traffic associated with the boundary road network.

10 Traffic Operations Assessment

To evaluate the impact of the increased volumes anticipated for the ultimate development scenario (including background), SIDRA outputs for each approach are presented in the form of Degree of Saturation (DOS), Average Delay, Level of Service (LOS) and 95th Percentile Queue. These characteristics are defined as follows:

> Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for varied traffic flow up to one for saturated flow or capacity. The theoretical intersection capacity is exceeded for an un-signalised intersection where DOS > 0.80;

> Average Delay: is the average of all travel time delays for vehicles through the intersection. An un-signalised intersection can be considered to be operated at capacity where the average delay exceeds 40 seconds for any movement;

> Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as follows:

LOS	Description	Signalised Intersection Delay	Unsignalised Intersection Delay
A	Free-flow operations (best condition)	≤10 sec	≤10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	5-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

> 95% Queue: is the statistical estimate of the queue length below which 95% of all observed queues would be expected.

For the purpose of assessment, vehicle Level of Service is deemed acceptable if the intersection operates at a Level of Service E or better and the delays/queues generated by individual turning movements are not deemed to negatively impact adjacent intersections. These criteria are consistent with the intended operation of the Centre with a focus on pedestrian connectivity and sustainable transport modes.

10.1 Impact of Background and Centre Growth

SIDRA intersection operation analysis was undertaken for a series of critical intersections with peak hour traffic volumes determined through the desktop modelling process described above. Intersections were assessed for the ultimate demand scenario including redistribution of local traffic to reflect regional growth.

The following intersections were assessed in this analysis:

> Broun Avenue/Coode Street
> Broun Avenue/Russell Street
> Broun Avenue/Collier Road
> Collier Road/Crimea Street
> Walter Road West/Collier Road
> Walter Road West/Crimea Street
> Walter Road West/Wellington Road
> Walter Road West/Russell Street
> Walter Road West/Coode Street
> Walter Road West/Progress Street
> Russell Street/Rudloc Road
> Coode Street/Rudloc Road

10.2 Existing Operation

Broun Avenue/Coode Street

Broun Avenue/Coode Street is a signalised intersection located on the south-eastern corner of the Centre. It operates as a connection to residential developments to the east and west.

The existing intersection geometry is shown in **Figure 10-1**.

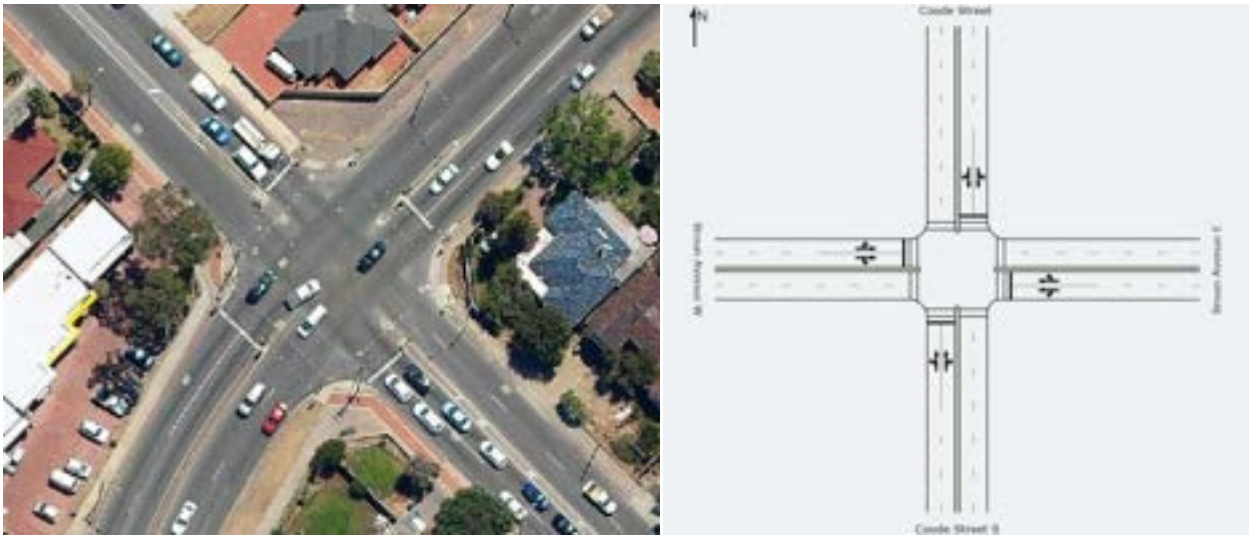

Figure 10-1 Broun Avenue/Coode Street – Existing Geometry

Table 10-1 and **Table 10-2** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-1 SIDRA Analysis for Broun Avenue/Coode Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	252	0.0	0.485	22.7	LOS C	6.2	43.1	0.84	0.82	37.3
2	T	211	0.0	0.485	15.7	LOS B	6.2	43.1	0.86	0.72	38.3
3	R	73	0.0	0.485	24.3	LOS C	4.7	33.1	0.87	0.84	37.4
Approach		535	0.0	0.485	20.2	LOS C	6.2	43.1	0.85	0.78	37.7
East: Broun Avenue E											
4	L	347	0.0	0.763	24.2	LOS C	14.2	99.7	0.91	0.94	36.9
5	T	882	0.0	0.763	16.0	LOS B	14.5	101.7	0.91	0.88	38.7
6	R	1	0.0	0.763	24.1	LOS C	14.5	101.7	0.91	0.97	38.6
Approach		1231	0.0	0.763	18.3	LOS B	14.5	101.7	0.91	0.90	38.2
North: Coode Street											
7	L	285	0.0	0.452	22.5	LOS C	5.6	39.2	0.83	0.81	37.0
8	T	101	0.0	0.281	15.0	LOS B	2.6	18.3	0.80	0.65	39.6
9	R	34	0.0	0.281	23.1	LOS C	2.6	18.3	0.80	0.83	38.3
Approach		420	0.0	0.452	20.7	LOS C	5.6	39.2	0.82	0.77	37.7
West: Broun Avenue W											
10	L	162	0.0	0.588	20.5	LOS C	9.1	63.9	0.82	0.87	39.9
11	T	506	0.0	0.588	14.4	LOS B	9.1	63.9	0.86	0.74	39.7
12	R	58	0.0	0.588	25.9	LOS C	5.6	39.5	0.91	0.85	36.8
Approach		726	0.0	0.588	16.7	LOS B	9.1	63.9	0.85	0.78	39.5
All Vehicles		2912	0.0	0.763	18.6	LOS B	14.5	101.7	0.87	0.83	38.3

Table 10-2 SIDRA Analysis for Broun Avenue/Coode Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	165	0.0	0.481	20.7	LOS C	2.5	17.8	0.93	0.79	38.4
2	T	92	0.0	0.481	12.7	LOS B	2.5	17.8	0.93	0.74	39.9
3	R	65	0.0	0.481	20.9	LOS C	2.1	14.4	0.93	0.80	39.5
Approach		322	0.0	0.481	18.5	LOS B	2.5	17.8	0.93	0.78	39.0
East: Broun Avenue E											
4	L	226	0.0	0.785	20.2	LOS C	9.6	66.9	0.93	1.01	40.2
5	T	688	0.0	0.785	13.1	LOS B	9.6	66.9	0.95	0.96	40.3
6	R	95	0.0	0.785	22.4	LOS C	6.8	47.8	0.97	1.00	39.2
Approach		1009	0.0	0.785	15.6	LOS B	9.6	66.9	0.95	0.98	40.1
North: Coode Street											
7	L	111	0.0	0.499	20.8	LOS C	2.7	18.9	0.93	0.80	39.2
8	T	178	0.0	0.499	12.7	LOS B	2.7	18.9	0.93	0.75	40.1
9	R	56	0.0	0.499	20.9	LOS C	2.2	15.7	0.93	0.81	39.8
Approach		344	0.0	0.499	16.6	LOS B	2.7	18.9	0.93	0.78	39.8
West: Broun Avenue W											
10	L	245	0.0	0.735	18.7	LOS B	8.2	57.5	0.91	0.95	41.2
11	T	886	0.0	0.735	10.5	LOS B	8.3	58.4	0.91	0.87	43.0
12	R	1	0.0	0.735	18.6	LOS B	8.3	58.4	0.91	0.97	42.7
Approach		1133	0.0	0.735	12.3	LOS B	8.3	58.4	0.91	0.89	42.6
All Vehicles		2808	0.0	0.785	14.7	LOS B	9.6	66.9	0.93	0.89	40.9

10.3 Broun Avenue/Russell Street

The signalised Broun Avenue/Russell Street intersection operates as a gateway into the Centre from the east and south. It is of major importance for access by bus services into the Morley Bus Station and currently carries a high volume of traffic heading into the Galleria Shopping Centre.

The existing intersection geometry is shown in **Figure 10-2**.

Figure 10-2 Broun venue/Russell Street – Existing Geometry

Table 10-3 and **Table 10-4** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-3 SIDRA Analysis for Broun Avenue/Russell Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Broun Avenue E											
5	T	1276	0.0	0.595	6.6	LOS A	8.5	59.8	0.72	0.63	47.9
6	R	289	0.0	0.573	15.9	LOS B	3.3	23.4	0.91	0.81	41.8
Approach		1565	0.0	0.595	8.4	LOS A	8.5	59.8	0.75	0.67	46.6
North: Russell Street N											
7	L	201	0.0	0.184	10.1	LOS B	1.3	9.2	0.50	0.70	46.8
9	R	157	0.0	0.310	25.5	LOS C	1.6	11.4	0.92	0.75	35.3
Approach		358	0.0	0.310	16.9	LOS B	1.6	11.4	0.68	0.73	41.0
West: Broun Avenue W											
10	L	272	0.0	0.240	9.5	LOS A	1.5	10.2	0.45	0.70	47.4
11	T	600	0.0	0.615	15.5	LOS B	5.6	39.2	0.94	0.80	39.5
Approach		872	0.0	0.615	13.6	LOS B	5.6	39.2	0.78	0.77	41.7
All Vehicles		2795	0.0	0.615	11.1	LOS B	8.5	59.8	0.75	0.71	44.2

Table 10-4 SIDRA Analysis for Broun Avenue/Russell Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Broun Avenue E											
5	T	712	0.0	0.315	5.9	LOS A	4.5	31.5	0.55	0.47	49.4
6	R	259	0.0	0.624	18.3	LOS B	3.5	24.5	0.93	0.83	39.9
Approach		971	0.0	0.624	9.2	LOS A	4.5	31.5	0.65	0.57	46.5
North: Russell Street N											
7	L	487	0.0	0.486	12.6	LOS B	6.1	42.8	0.66	0.77	44.4
9	R	381	0.0	0.718	31.4	LOS C	6.2	43.3	0.97	0.89	32.3
Approach		868	0.0	0.718	20.8	LOS C	6.2	43.3	0.80	0.83	38.2
West: Broun Avenue W											
10	L	424	0.0	0.381	9.4	LOS A	2.4	17.0	0.42	0.70	47.5
11	T	938	0.0	0.707	17.1	LOS B	10.7	75.2	0.93	0.84	38.5
Approach		1362	0.0	0.707	14.7	LOS B	10.7	75.2	0.77	0.80	40.9
All Vehicles		3201	0.0	0.718	14.7	LOS B	10.7	75.2	0.74	0.74	41.6

Broun Avenue/Collier Road

The Broun Avenue/Collier Road signalised intersection accommodates a significant volume regional traffic movements connecting Tonkin Highway, the Perth CBD and other locations further to the east such as the Ashfield Industrial Precinct. Daily traffic volumes at this intersection are currently in the order of 44,000 vehicles per day (vpd).

The existing intersection geometry is shown in **Figure 10-3**.

Figure 10-3 Broun Avenue/Collier Road – Existing Geometry

Table 10-5 and **Table 10-6** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-5 SIDRA Analysis for Broun Avenue/Collier Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	207	0.0	0.248	13.7	LOS B	3.1	21.4	0.54	0.72	43.6
2	T	376	0.0	0.749	35.6	LOS D	6.9	48.0	1.00	0.90	28.9
3	R	19	0.0	0.089	38.2	LOS D	0.6	4.2	0.91	0.70	29.3
Approach		602	0.0	0.749	28.1	LOS C	6.9	48.0	0.84	0.83	32.8
East: Broun Avenue E											
4	L	29	0.0	0.798	37.4	LOS D	15.7	109.6	0.99	0.96	31.3
5	T	858	0.0	0.798	29.2	LOS C	15.7	109.9	0.99	0.95	31.5
6	R	194	0.0	0.562	23.8	LOS C	4.0	28.0	0.95	0.80	36.4
Approach		1081	0.0	0.798	28.4	LOS C	15.7	109.9	0.98	0.92	32.3
North: Collier Road N											
7	L	115	0.0	0.154	8.9	LOS A	0.7	4.7	0.27	0.65	48.2
8	T	183	0.0	0.286	19.0	LOS B	4.7	32.8	0.78	0.64	37.6
9	R	323	0.0	0.761	44.8	LOS D	6.0	42.1	1.00	0.90	27.0
Approach		621	0.0	0.761	30.6	LOS C	6.0	42.1	0.80	0.78	32.3
West: Broun Avenue S											
10	L	271	0.0	0.294	11.2	LOS B	3.0	21.0	0.45	0.71	45.8
11	T	334	0.0	0.599	32.1	LOS C	5.7	39.6	0.98	0.80	30.3
12	R	192	0.0	0.802	45.3	LOS D	7.3	50.8	1.00	0.94	26.9
Approach		796	0.0	0.802	28.2	LOS C	7.3	50.8	0.81	0.81	33.1
All Vehicles		3100	0.0	0.802	28.7	LOS C	15.7	109.9	0.87	0.85	32.6

Table 10-6 SIDRA Analysis for Broun Avenue/Collier Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	338	0.0	0.450	11.3	LOS B	4.5	31.4	0.41	0.71	45.8
2	T	618	0.0	0.792	41.3	LOS D	14.1	98.7	1.00	0.94	26.9
3	R	26	0.0	0.100	41.3	LOS D	1.0	6.9	0.86	0.72	28.2
Approach		982	0.0	0.792	30.9	LOS C	14.1	98.7	0.79	0.85	31.4
East: Broun Avenue E											
4	L	14	0.0	0.582	45.9	LOS D	7.9	55.6	0.97	0.83	27.8
5	T	404	0.0	0.582	36.7	LOS D	9.2	64.7	0.96	0.79	28.5
6	R	99	0.0	0.467	32.9	LOS C	3.0	20.9	0.99	0.76	31.6
Approach		517	0.0	0.582	36.2	LOS D	9.2	64.7	0.97	0.79	29.0
North: Collier Road N											
7	L	98	0.0	0.193	9.9	LOS A	0.9	6.4	0.30	0.66	47.2
8	T	156	0.0	0.266	15.1	LOS B	3.7	25.7	0.80	0.64	40.2
9	R	275	0.0	0.740	54.7	LOS D	6.4	45.0	1.00	0.88	24.0
Approach		528	0.0	0.740	34.7	LOS C	6.4	45.0	0.81	0.77	30.4
West: Broun Avenue S											
10	L	464	0.0	0.524	11.7	LOS B	6.7	46.7	0.44	0.72	45.4
11	T	665	0.0	0.569	15.1	LOS B	6.9	48.4	0.89	0.75	40.0
12	R	236	0.0	0.762	31.9	LOS C	6.8	47.7	1.00	0.88	32.1
Approach		1365	0.0	0.762	16.8	LOS B	6.9	48.4	0.76	0.76	39.9
All Vehicles		3393	0.0	0.792	26.7	LOS C	14.1	98.7	0.81	0.79	33.7

Collier Road/Crimea Street

Collier Road/Crimea Street is a priority intersection located near the south-eastern corner of the city centre. This intersection largely services regional traffic wishing to head north and south along the boundary of the city centre without going through the city centre itself. The provision of a wide central median supports staged right-turning movements from Crimea Street into Collier Road northbound.

The existing intersection geometry is shown in **Figure 10-4**.

Figure 10-4 Collier Road / Crimea Street - Existing Geometry

Table 10-7 and **Table 10-8** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-7 SIDRA Analysis for Broun Avenue/Coode Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
2	T	596	0.0	0.153	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	243	0.0	0.329	12.6	LOS B	1.6	11.3	0.62	0.91	44.6
Approach		839	0.0	0.329	3.6	NA	1.6	11.3	0.18	0.26	54.5
East: Crimea Street E											
4	L	332	0.0	0.542	15.5	LOS C	3.4	24.0	0.68	1.03	42.0
6	R	123	0.0	0.204	23.6	LOS C	0.8	5.5	0.64	0.87	44.1
Approach		455	0.0	0.542	17.7	LOS C	3.4	24.0	0.77	0.99	42.6
North: Collier Road											
7	L	82	0.0	0.162	8.2	LOS A	0.0	0.0	0.00	0.93	49.0
8	T	547	0.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		629	0.0	0.162	1.1	NA	0.0	0.0	0.00	0.12	58.3
All Vehicles		1923	0.0	1.932	65.0	NA	43.6	305.5	0.26	0.51	21.5

Table 10-8 SIDRA Analysis for Broun Avenue/Coode Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
2	T	838	0.0	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	342	0.0	0.493	14.6	LOS B	3.1	21.4	0.69	1.01	42.8
Approach		1180	0.0	0.493	4.2	NA	3.1	21.4	0.20	0.29	53.8
East: Crimea Street E											
4	L	199	0.0	0.346	14.1	LOS B	1.6	11.1	0.62	0.93	43.2
6	R	74	0.0	0.146	27.6	LOS C	0.5	3.7	0.68	0.89	43.0
Approach		273	0.0	0.346	17.8	LOS C	1.6	11.1	0.0.64	0.92	43.2
North: Collier Road											
7	L	88	0.0	0.175	8.2	LOS A	0.0	0.0	0.00	0.93	49.0
8	T	591	0.0	0.175	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		679	0.0	0.175	1.1	NA	0.0	0.0	0.00	0.12	58.3
All Vehicles		2132	0.0	1.228	15.5	NA	12.8	89.7	0.20	0.35	42.0

Walter Road/Crimea Street

The Walter Road/Crimea Street intersection accommodates a high volume of regional traffic connecting from the Perth CBD from Morley Drive. Turning restrictions for the Crimea Street and western Walter Road approaches create very tidal traffic flows at this intersection.

The existing intersection geometry is shown in **Figure 10-5**.

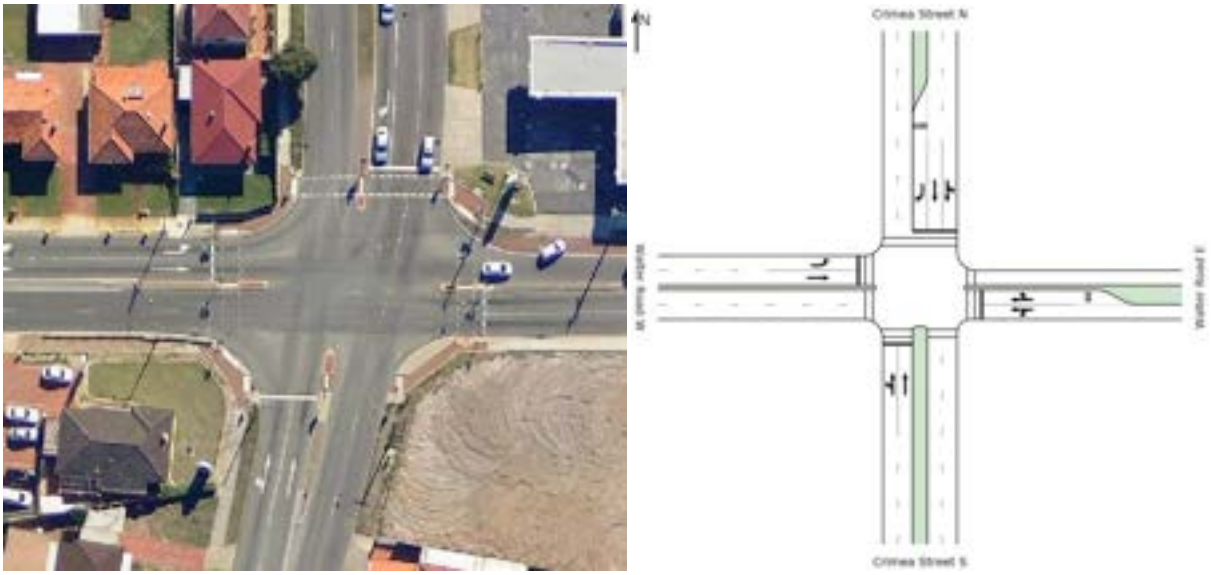

Figure 10-5 Walter Road/Crimea Street Intersection – Existing Geometry

Table 10-9 and **Table 10-10** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-9 SIDRA Analysis for Walter Road/Crimea Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Crimea Street S											
1	L	159	0.0	0.403	38.2	LOS D	5.5	38.4	0.91	0.80	29.2
2	T	100	0.0	0.241	28.7	LOS C	3.3	23.1	0.87	0.69	32.0
Approach		259	0.0	0.403	34.5	LOS C	5.5	38.4	0.89	0.75	30.2
East: Walter Road E											
4	L	119	0.0	0.493	34.1	LOS C	8.9	62.4	0.88	0.84	31.9
5	T	152	0.0	0.493	25.9	LOS C	8.9	62.4	0.88	0.74	32.5
6	R	225	0.0	0.825	48.5	LOS D	10.0	70.1	1.00	0.98	25.7
Approach		496	0.0	0.825	38.1	LOS D	10.0	70.1	0.93	0.87	28.9
North: Crimea Street N											
7	L	340	0.0	0.325	18.2	LOS B	7.1	49.5	0.57	0.78	39.9
8	T	336	0.0	0.306	9.9	LOS A	6.9	48.1	0.56	0.49	45.2
9	R	431	0.0	0.843	44.9	LOS D	18.4	128.7	1.00	0.96	26.8
Approach		1106	0.0	0.843	26.1	LOS C	18.4	128.7	0.74	0.76	34.6
West: Walter Road W											
10	L	268	0.0	0.227	14.7	LOS B	4.4	30.7	0.45	0.75	42.7
11	T	142	0.0	0.253	23.8	LOS C	4.3	30.1	0.81	0.65	34.6
Approach		411	0.0	0.253	17.9	LOS B	4.4	30.7	0.58	0.72	39.5
All Vehicles		2272	0.0	0.843	28.2	LOS C	18.4	128.7	0.77	0.78	33.4

Table 10-10 SIDRA Analysis for Walter Road/Crimea Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Crimea Street S											
1	L	296	0.0	0.708	41.0	LOS D	11.3	78.9	0.98	0.87	28.2
2	T	206	0.0	0.470	29.6	LOS C	7.1	50.0	0.92	0.75	31.5
Approach		502	0.0	0.708	36.3	LOS D	11.3	78.9	0.95	0.82	29.4
East: Walter Road E											
4	L	49	0.0	0.248	23.3	LOS C	2.8	19.5	0.65	0.82	37.5
5	T	67	0.0	0.248	15.1	LOS B	2.8	19.5	0.65	0.51	39.6
6	R	171	0.0	1.722	708.3	LOS F	36.8	257.4	1.00	2.37	2.9
Approach		287	0.0	1.722	427.9	LOS F	36.8	257.4	0.86	1.66	4.7
North: Crimea Street N											
7	L	144	0.0	0.226	23.9	LOS C	4.5	31.3	0.67	0.79	36.5
8	T	223	0.0	0.226	15.7	LOS B	4.6	32.5	0.67	0.56	39.8
9	R	301	0.0	0.825	34.4	LOS C	9.8	68.7	1.00	0.93	30.8
Approach		668	0.0	0.825	25.9	LOS C	9.8	68.7	0.82	0.78	34.6
West: Walter Road W											
10	L	968	0.0	0.834	24.9	LOS C	33.0	230.9	0.85	0.91	35.6
11	T	182	0.0	0.220	15.7	LOS B	4.5	31.5	0.67	0.56	40.1
Approach		1151	0.0	0.834	23.4	LOS C	33.0	230.9	0.82	0.86	36.2
All Vehicles		2608	0.0	1.722	71.1	LOS E	36.8	257.4	0.85	0.92	20.2

Walter Road/Collier Road

The Walter Road / Collier Road signalised T- intersection is a primary access point to the commercial/retail precinct to the Centre, currently accommodating approximately 32,000 vehicle movements daily.

The existing intersection geometry is shown in **Figure 10-6**.

Figure 10-6 Walter Road/Collier Road Intersection – Existing Geometry

Table 10-11 and **Table 10-12** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-11 SIDRA Analysis for Walter Road/Collier Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	234	0.0	0.213	18.3	LOS B	4.3	30.2	0.56	0.73	40.1
3	R	65	0.0	0.083	32.8	LOS C	1.2	8.1	0.79	0.72	31.5
Approach		299	0.0	0.213	21.5	LOS C	4.3	30.2	0.61	0.73	37.9
East: Walter Road E											
4	L	340	0.0	0.787	38.0	LOS D	18.6	130.0	0.97	0.93	29.7
5	T	640	0.0	0.787	29.7	LOS C	19.1	134.0	0.97	0.91	31.1
Approach		980	0.0	0.787	32.6	LOS C	19.1	134.0	0.97	0.92	30.6
West: Walter Road W											
11	T	355	0.0	0.152	7.5	LOS A	3.0	21.0	0.47	0.39	48.0
12	R	289	0.0	0.779	44.7	LOS D	11.8	82.6	1.00	0.92	27.0
Approach		644	0.0	0.779	24.2	LOS C	11.8	82.6	0.71	0.63	35.5
All Vehicles		1923	0.0	0.787	28.1	LOS C	19.1	134.0	0.83	0.79	33.1

Table 10-12 SIDRA Analysis for Walter Road/Collier Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	341	0.0	0.297	16.8	LOS B	5.6	39.0	0.57	0.74	41.2
3	R	383	0.0	0.423	30.0	LOS C	6.4	44.6	0.84	0.79	32.9
Approach		724	0.0	0.423	23.8	LOS C	6.4	44.6	0.71	0.77	36.4
East: Walter Road E											
4	L	422	0.0	0.796	37.5	LOS D	15.0	104.7	0.99	0.93	29.5
5	T	156	0.0	0.280	21.2	LOS C	4.2	29.4	0.82	0.66	36.1
Approach		578	0.0	0.796	33.1	LOS C	15.0	104.7	0.94	0.86	31.0
West: Walter Road W											
11	T	827	0.0	0.391	10.0	LOS A	8.2	57.3	0.62	0.54	44.9
12	R	257	0.0	0.807	43.4	LOS D	9.6	67.3	1.00	0.95	27.5
Approach		1084	0.0	0.807	17.9	LOS B	9.6	67.3	0.71	0.64	39.0
All Vehicles		2386	0.0	0.807	23.4	LOS C	15.0	104.7	0.77	0.73	36.0

Walter Road/Wellington Road

Walter Road/Wellington Road is a signalised intersection which acts as the main entrance to the Centre from the north. With an excess of over 42,000 vpd on a typical Thursday, it is one of the busiest intersections within the Centre. Adjacent land uses including the Coventry Markets create a high pedestrian crossing demand at this location that must be accommodated by the signals.

The existing intersection geometry is shown in **Figure 10-7**.

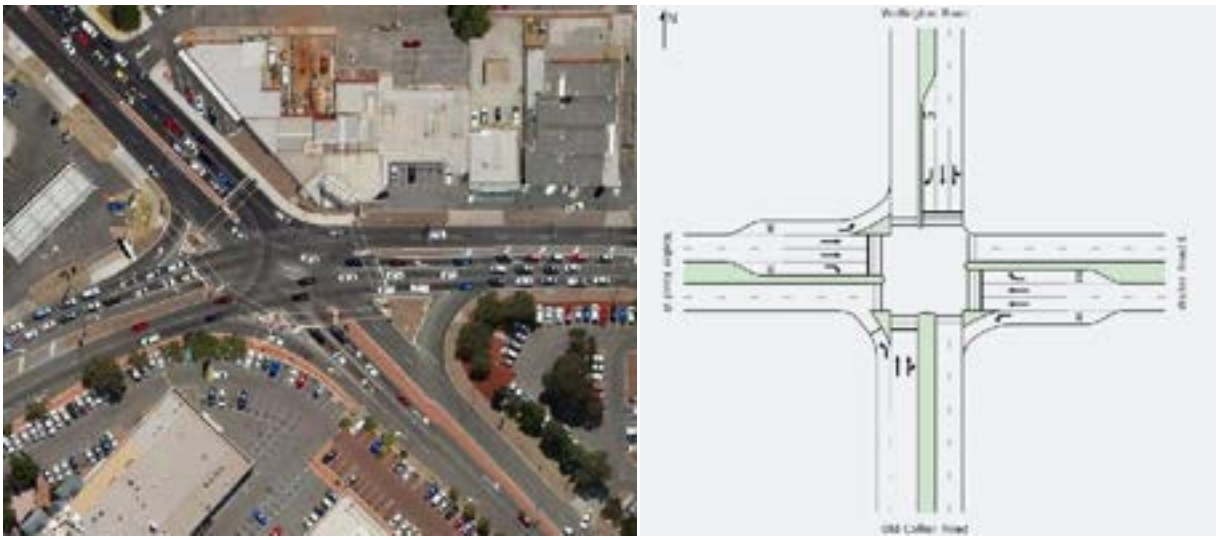

Figure 10-7 Walter Road/Wellington Road Intersection – Existing Geometry

Table 10-13 and **Table 10-14** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-13 SIDRA Analysis for Walter Road/Wellington Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Old Collier Road											
1	L	20	0.0	0.032	30.9	LOS C	0.6	4.5	0.69	0.69	32.6
2	T	38	0.0	0.093	34.4	LOS C	1.5	10.5	0.84	0.63	29.6
3	R	66	0.0	0.170	43.0	LOS D	2.7	18.7	0.86	0.75	27.6
Approach		124	0.0	0.170	38.4	LOS D	2.7	18.7	0.82	0.70	28.9
East: Walter Road E											
4	L	109	0.0	0.301	10.3	LOS B	1.2	8.3	0.30	0.66	46.8
5	T	555	0.0	0.508	32.8	LOS C	11.4	80.1	0.89	0.75	30.2
6	R	133	0.0	0.649	56.8	LOS E	6.6	46.0	1.00	0.82	23.5
Approach		797	0.0	0.649	33.7	LOS C	11.4	80.1	0.83	0.75	30.2
North: Wellington Road											
7	L	133	0.0	0.690	48.1	LOS D	13.2	92.2	0.98	0.86	26.5
8	T	421	0.0	0.690	40.9	LOS D	13.2	92.2	0.98	0.84	26.8
9	R	148	0.0	0.400	46.0	LOS D	6.4	44.9	0.92	0.80	26.6
Approach		702	0.0	0.690	43.3	LOS D	13.2	92.2	0.97	0.84	26.7
West: Walter Road W											
10	L	148	0.0	0.285	8.8	LOS A	1.0	7.1	0.22	0.65	48.3
11	T	408	0.0	0.436	35.1	LOS D	8.6	59.9	0.90	0.74	29.2
12	R	68	0.0	0.526	59.6	LOS E	3.5	24.2	1.00	0.76	22.8
Approach		625	0.0	0.526	31.5	LOS C	8.6	59.9	0.75	0.72	31.2
All Vehicles		2248	0.0	0.690	36.4	LOS D	13.2	92.2	0.85	0.77	29.2

Table 10-14 SIDRA Analysis for Walter Road/Wellington Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Old Collier Road											
1	L	99	0.0	0.152	31.5	LOS C	3.3	23.1	0.72	0.75	32.4
2	T	253	0.0	0.617	39.3	LOS D	11.4	79.8	0.96	0.80	27.6
3	R	271	0.0	0.694	48.7	LOS D	12.7	88.6	0.98	0.85	25.8
Approach		622	0.0	0.694	42.2	LOS D	12.7	88.6	0.93	0.82	27.4
East: Walter Road E											
4	L	122	0.0	0.259	9.1	LOS A	0.9	6.6	0.24	0.65	48.0
5	T	463	0.0	0.440	32.8	LOS C	9.4	66.0	0.88	0.73	30.2
6	R	283	0.0	0.897	64.9	LOS E	16.2	113.5	1.00	1.01	21.6
Approach		868	0.0	0.897	39.9	LOS D	16.2	113.5	0.83	0.81	28.0
North: Wellington Road											
7	L	283	0.0	0.373	28.9	LOS C	9.8	68.7	0.72	0.81	33.5
8	T	160	0.0	0.373	36.3	LOS D	9.8	68.7	0.89	0.72	28.7
9	R	205	0.0	0.553	47.4	LOS D	9.2	64.4	0.95	0.82	26.1
Approach		648	0.0	0.553	36.6	LOS D	9.8	68.7	0.84	0.79	29.6
West: Walter Road W											
10	L	205	0.0	0.779	21.0	LOS C	4.7	32.6	0.44	0.76	38.2
11	T	613	0.0	0.873	52.8	LOS D	16.8	117.8	1.00	1.02	23.5
12	R	65	0.0	0.439	57.9	LOS E	3.2	22.5	0.99	0.76	23.2
Approach		883	0.0	0.873	45.8	LOS D	16.8	117.8	0.87	0.94	25.9
All Vehicles		3022	0.0	0.897	41.4	LOS D	16.8	117.8	0.86	0.85	27.5

Walter Road/Progress Street

The Walter Road / Progress signalised T- intersection is an access point into the Galleria Shopping centre/precinct from the northern boundary currently accommodating approximately 28,000 vehicle movements daily.

The existing intersection geometry is shown in **Figure 10-8**.

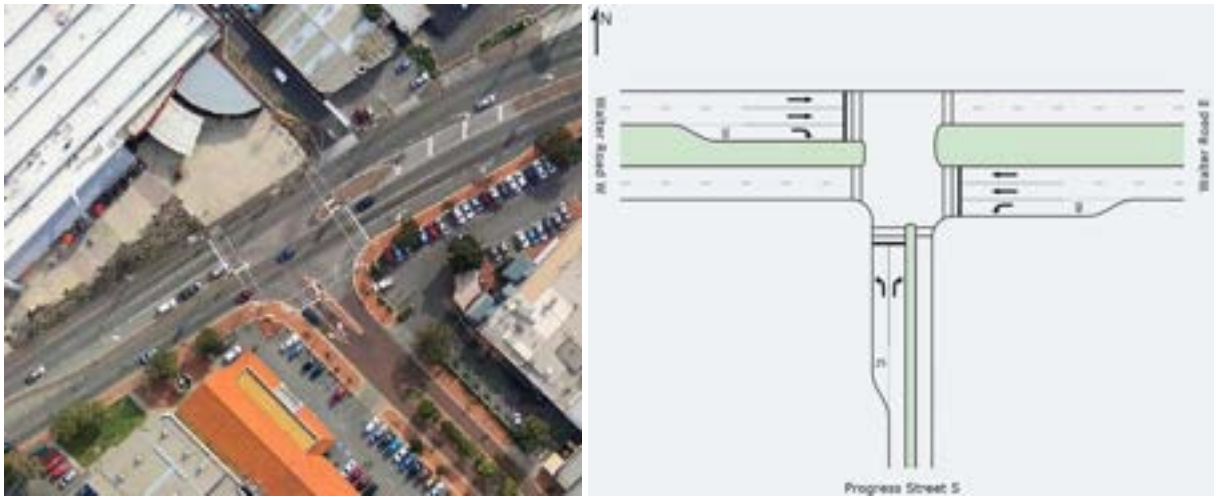

Figure 10-8 Walter Road/Progress Street Intersection – Existing Geometry

Table 10-15 and **Table 10-16** show the results of SIDRA analysis for the existing intersection geometry under the existing 2013 scenario, for the AM and PM Peak respectively.

Table 10-15 SIDRA Analysis for Walter Road/Collier Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Progress Street S											
1	L	25	0.0	0.092	20.6	LOS C	0.5	3.2	0.65	0.70	38.2
3	R	21	0.0	0.030	20.3	LOS C	0.4	2.7	0.65	0.69	38.6
Approach		46	0.0	0.092	20.5	LOS C	0.5	3.2	0.65	0.70	38.4
East: Walter Road E											
4	L	76	0.0	0.180	19.7	LOS B	1.4	9.5	0.64	0.73	38.9
5	T	833	0.0	0.512	14.2	LOS B	9.2	64.3	0.79	0.68	40.9
Approach		908	0.0	0.512	14.6	LOS B	9.2	64.3	0.78	0.69	40.7
West: Walter Road W											
11	T	673	0.0	0.414	13.5	LOS B	7.0	49.3	0.75	0.64	41.6
12	R	36	0.0	0.147	27.2	LOS C	0.8	5.9	0.80	0.74	34.4
Approach		708	0.0	0.414	14.2	LOS B	7.0	49.3	0.75	0.64	41.1
All Vehicles		1663	0.0	0.512	14.6	LOS B	9.2	64.3	0.76	0.67	40.8

Table 10-16 SIDRA Analysis for Walter Road/Collier Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Progress Street S											
1	L	44	0.0	0.161	20.8	LOS C	0.8	5.7	0.66	0.72	38.1
3	R	99	0.0	0.139	21.0	LOS C	1.9	13.3	0.68	0.74	38.1
Approach		143	0.0	0.161	20.9	LOS C	1.9	13.3	0.68	0.73	38.1
East: Walter Road E											
4	L	128	0.0	0.306	20.1	LOS C	2.4	16.6	0.66	0.75	38.6
5	T	741	0.0	0.456	13.8	LOS B	7.9	55.5	0.77	0.66	41.3
Approach		869	0.0	0.456	14.7	LOS B	7.9	55.5	0.75	0.67	40.9
West: Walter Road W											
11	T	942	0.0	0.580	14.7	LOS B	10.8	75.5	0.82	0.72	40.4
12	R	62	0.0	0.238	26.9	LOS C	1.5	10.4	0.80	0.76	34.5
Approach		1004	0.0	0.580	15.5	LOS B	10.8	75.5	0.82	0.72	40.0
All Vehicles		2017	0.0	0.580	15.5	LOS B	10.8	75.5	0.78	0.70	40.2

Walter Road/Russell Street

Walter Road/Russell Street is the other main gateway into the Centre for both cars and bus service. While it generally sees less traffic than some of the alternative Centre accesses, there are sizeable numbers of movements destined for the adjacent service station and fast food uses.

The existing intersection geometry is shown in **Figure 10-9**.

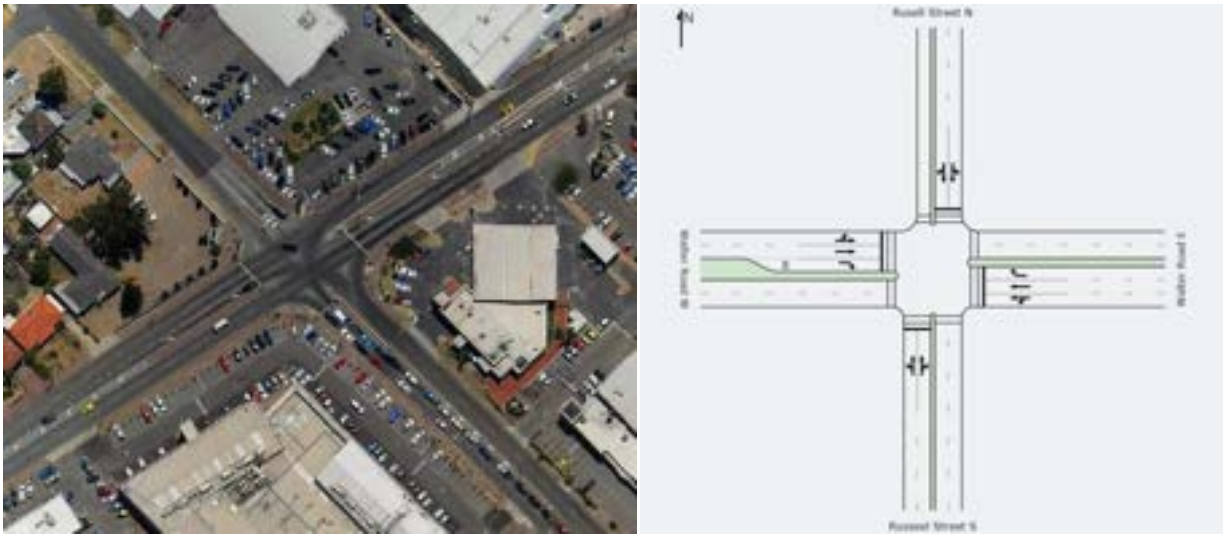

Figure 10-9 Walter Road/Russell Street Intersection – Existing Geometry

Table 10-17 and **Table 10-18** show the results of SIDRA analysis for the existing intersection geometry under the 2013 background plus existing development scenario, for the AM and PM Peak respectively.

Table 10-17 SIDRA Analysis for Walter Road/Russell Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Russell Street S											
1	L	111	0.0	0.156	21.4	LOS C	2.2	15.1	0.69	0.76	37.7
2	T	19	0.0	0.796	32.3	LOS C	6.5	45.3	1.00	0.95	28.7
3	R	179	0.0	0.796	40.3	LOS D	6.5	45.3	1.00	0.95	28.6
Approach		309	0.0	0.796	33.0	LOS C	6.5	45.3	0.89	0.88	31.3
East: Walter Road E											
4	L	190	0.0	0.752	29.4	LOS C	8.9	62.1	0.98	0.95	34.1
5	T	485	0.0	0.752	24.9	LOS C	9.7	67.6	0.99	0.92	33.2
6	R	43	0.0	0.160	29.8	LOS C	1.1	7.5	0.85	0.74	33.0
Approach		718	0.0	0.752	26.4	LOS C	9.7	67.6	0.98	0.92	33.4
North: Russell Street N											
7	L	78	0.0	0.782	41.3	LOS D	3.8	26.6	1.00	0.91	28.5
8	T	52	0.0	0.782	33.2	LOS C	4.8	33.6	1.00	0.91	28.6
9	R	133	0.0	0.782	41.5	LOS D	4.8	33.6	1.00	0.92	28.1
Approach		263	0.0	0.782	39.8	LOS D	4.8	33.6	1.00	0.92	28.3
West: Walter Road W											
10	L	49	0.0	0.282	18.8	LOS B	4.6	32.2	0.65	0.88	41.2
11	T	461	0.0	0.282	10.6	LOS B	4.6	32.5	0.65	0.55	44.0
12	R	232	0.0	0.833	41.3	LOS D	7.8	54.6	1.00	0.99	28.1
Approach		742	0.0	0.833	20.8	LOS C	7.8	54.6	0.76	0.71	37.2
All Vehicles		2032	0.0	0.833	27.1	LOS C	9.7	67.6	0.89	0.84	33.6

Table 10-18 SIDRA Analysis for Walter Road/Russell Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Russeel Street S											
1	L	283	0.0	0.305	20.8	LOS C	6.5	45.5	0.63	0.78	38.1
2	T	38	0.0	0.837	37.5	LOS D	16.6	116.5	1.00	0.97	26.9
3	R	353	0.0	0.837	45.5	LOS D	16.6	116.5	1.00	0.97	26.8
Approach		674	0.0	0.837	34.7	LOS C	16.6	116.5	0.84	0.89	30.6
East: Walter Road E											
4	L	193	0.0	0.830	40.1	LOS D	13.2	92.6	1.00	0.99	29.2
5	T	489	0.0	0.830	36.8	LOS D	13.8	96.5	1.00	0.99	28.1
6	R	49	0.0	0.244	38.8	LOS D	1.7	12.0	0.88	0.76	29.0
Approach		732	0.0	0.830	37.8	LOS D	13.8	96.5	0.99	0.97	28.5
North: Rusell Street N											
7	L	34	0.0	0.393	49.0	LOS D	2.2	15.6	0.99	0.75	26.0
8	T	22	0.0	0.393	40.8	LOS D	2.2	15.6	0.99	0.74	26.1
9	R	57	0.0	0.505	49.1	LOS D	2.3	16.0	0.99	0.75	25.5
Approach		113	0.0	0.505	47.5	LOS D	2.3	16.0	0.99	0.75	25.8
West: Walter Road W											
10	L	69	0.0	0.413	24.2	LOS C	9.5	66.3	0.72	0.89	37.5
11	T	652	0.0	0.413	16.0	LOS B	9.6	66.9	0.72	0.62	39.5
12	R	266	0.0	0.819	48.4	LOS D	11.4	79.5	1.00	0.94	25.7
Approach		987	0.0	0.819	25.3	LOS C	11.4	79.5	0.80	0.73	34.4
All Vehicles		2505	0.0	0.837	32.5	LOS C	16.6	116.5	0.87	0.84	31.0

Walter Road/Coode Street

Walter Road/Coode Street located on the western boundary of the Centre, satisfying traffic movements into the Perth CBD and the North Perth region.

The existing intersection geometry is shown in **Figure 10-10**.

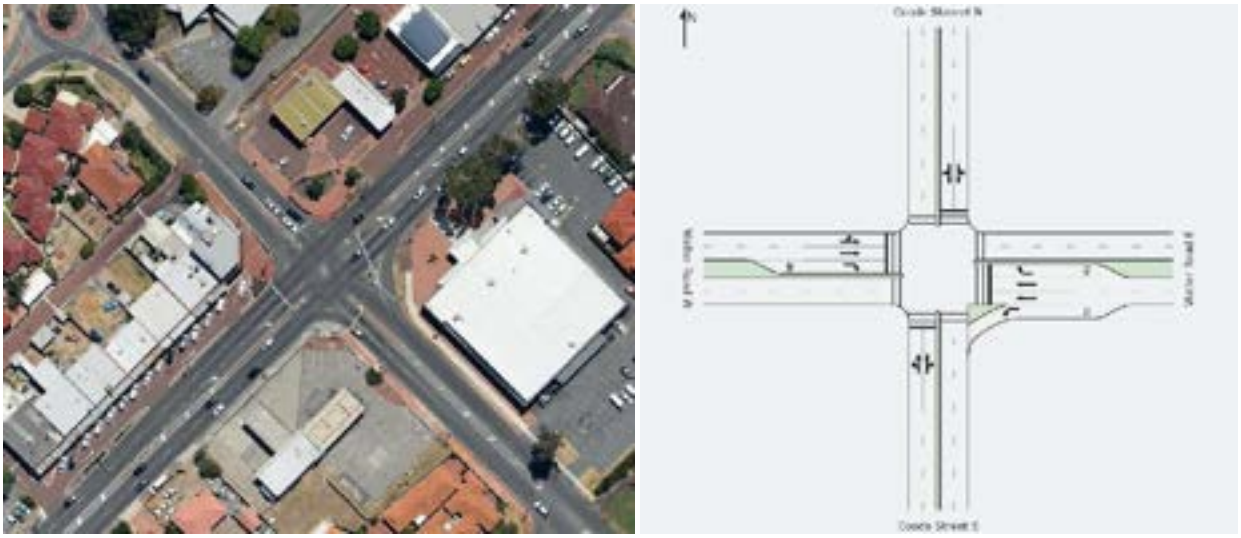

Figure 10-10 Walter Road/Coode Street Intersection – Existing Geometry

Table 10-19 and **Table 10-20** show the results of SIDRA analysis for the existing intersection geometry under the 2013 background plus existing development scenario, for the AM and PM Peak respectively.

Table 10-19 SIDRA Analysis for Walter Road/Coode Street - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	252	0.0	0.493	22.0	LOS C	4.4	30.5	0.89	0.81	37.3
2	T	80	0.0	0.485	14.8	LOS B	3.2	22.7	0.90	0.73	38.7
3	R	101	0.0	0.485	22.7	LOS C	3.2	22.7	0.90	0.81	37.9
Approach		433	0.0	0.493	20.9	LOS C	4.4	30.5	0.89	0.79	37.7
East: Walter Road E											
4	L	178	0.0	0.379	8.9	LOS A	0.7	5.0	0.38	0.68	47.7
5	T	518	0.0	0.312	8.4	LOS A	3.4	24.1	0.70	0.58	46.1
6	R	32	0.0	0.092	19.6	LOS B	0.5	3.3	0.75	0.72	38.9
Approach		727	0.0	0.379	9.0	LOS A	3.4	24.1	0.63	0.61	46.1
North: Coode Streeet N											
7	L	158	0.0	0.377	21.5	LOS C	3.2	22.6	0.85	0.80	38.1
8	T	87	0.0	0.377	14.4	LOS B	3.2	22.6	0.87	0.70	38.6
9	R	74	0.0	0.377	23.3	LOS C	2.2	15.6	0.89	0.79	37.5
Approach		319	0.0	0.377	20.0	LOS B	3.2	22.6	0.87	0.77	38.1
West: Walter Road W											
10	L	146	0.0	0.427	17.2	LOS B	4.9	34.3	0.75	0.85	42.1
11	T	554	0.0	0.427	9.0	LOS A	5.0	35.0	0.75	0.63	45.0
12	R	212	0.0	0.513	20.0	LOS C	3.5	24.6	0.84	0.81	38.7
Approach		912	0.0	0.513	12.9	LOS B	5.0	35.0	0.77	0.71	42.9
All Vehicles		2391	0.0	0.513	14.1	LOS B	5.0	35.0	0.76	0.70	42.0

Table 10-20 SIDRA Analysis for Walter Road/Coode Street - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	123	0.0	0.313	22.9	LOS C	2.3	15.9	0.87	0.78	36.9
2	T	45	0.0	0.313	14.9	LOS B	2.3	15.9	0.87	0.69	38.3
3	R	74	0.0	0.313	22.8	LOS C	1.9	13.5	0.87	0.78	37.6
Approach		242	0.0	0.313	21.4	LOS C	2.3	15.9	0.87	0.76	37.4
East: Walter Road E											
4	L	184	0.0	0.350	8.7	LOS A	0.6	4.5	0.35	0.67	47.9
5	T	535	0.0	0.289	7.0	LOS A	3.3	22.8	0.64	0.54	47.8
6	R	64	0.0	0.158	17.6	LOS B	0.9	6.2	0.70	0.75	40.4
Approach		783	0.0	0.350	8.3	LOS A	3.3	22.8	0.58	0.59	47.1
North: Coode Streeet N											
7	L	53	0.0	0.207	22.5	LOS C	1.5	10.3	0.85	0.77	37.9
8	T	43	0.0	0.207	14.5	LOS B	1.5	10.3	0.85	0.66	38.7
9	R	57	0.0	0.207	23.4	LOS C	1.1	7.9	0.87	0.75	36.7
Approach		153	0.0	0.207	20.6	LOS C	1.5	10.3	0.86	0.73	37.7
West: Walter Road W											
10	L	134	0.0	0.349	15.5	LOS B	4.0	28.0	0.67	0.85	43.4
11	T	506	0.0	0.349	7.3	LOS A	4.1	28.5	0.67	0.57	46.9
12	R	111	0.0	0.245	17.2	LOS B	1.5	10.7	0.70	0.76	40.7
Approach		751	0.0	0.349	10.2	LOS B	4.1	28.5	0.67	0.65	45.2
All Vehicles		1928	0.0	0.350	11.7	LOS B	4.1	28.5	0.68	0.64	44.1

Coode Street/Rudloc Road

Coode Street/Rudloc Road is situated on the eastern side of the city centre with access to the residential off Coode Street. While not modelled in the analysis below, the wide central median provides sufficient storage to allow for staged right-turning movements from Rudloc Road into Coode Street northbound. This will significantly improve the operation of the right-turn egress movement, compared to the results shown.

The existing intersection geometry is shown in **Figure 10-11**.

Figure 10-11 Coode Street/Rudloc Road Intersection – Existing Geometry

Table 10-21 and **Table 10-22** show the results of SIDRA analysis for the existing intersection geometry under the 2013 background plus existing development scenario, for the AM and PM Peak respectively.

Table 10-21 SIDRA Analysis for Russell Street/Rudloc Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
2	T	332	0.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	132	0.0	0.155	10.8	LOS B	0.6	4.3	0.51	0.78	46.2
Approach		463	0.0	0.170	3.1	NA	0.6	4.3	0.15	0.22	55.3
East: Rudloc Road											
4	L	102	0.0	0.329	10.8	LOS B	0.5	3.6	0.45	0.76	46.2
6	R	101	0.0	0.443	29.1	LOS D	2.0	13.8	0.84	1.03	33.3
Approach		203	0.0	0.443	19.9	LOS C	2.0	13.8	0.64	0.90	38.7
North: Coode Street N											
7	L	217	0.0	0.250	8.2	LOS A	0.0	0.0	0.00	0.84	49.0
8	T	260	0.0	0.250	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		477	0.0	0.250	3.7	NA	0.0	0.0	0.00	0.38	54.4
All Vehicles		1143	0.0	0.443	6.3	NA	2.0	13.8	0.17	0.41	51.1

Table 10-22 SIDRA Analysis for Russell Street/Rudloc Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
2	T	104	0.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	380	0.0	0.374	10.5	LOS B	2.1	14.5	0.51	0.78	46.5
Approach		484	0.0	0.374	8.3	NA	2.1	14.5	0.40	0.61	48.9
East: Rudloc Road											
4	L	139	0.0	0.407	10.2	LOS B	0.7	4.7	0.38	0.71	46.8
6	R	139	0.0	0.517	27.3	LOS D	2.6	18.4	0.83	1.07	34.3
Approach		278	0.0	0.517	18.7	LOS C	2.6	18.4	0.60	0.89	39.6
North: Coode Street N											
7	L	154	0.0	0.177	8.2	LOS A	0.0	0.0	0.00	0.84	49.0
8	T	183	0.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		337	0.0	0.177	3.7	NA	0.0	0.0	0.00	0.38	54.4
All Vehicles		1099	0.0	0.517	9.5	NA	2.6	18.4	0.33	0.61	47.5

Russell Street/Rudloc Road

Russell Street/Rudloc Road is situated in the middle of the Centre and primarily services movements to and from Centro Galleria, as well as buses to the Morley Bus Station. This intersection is particularly important as it is the only signal within the commercial/retail precinct.

The existing intersection geometry is shown in **Figure 10-12**.

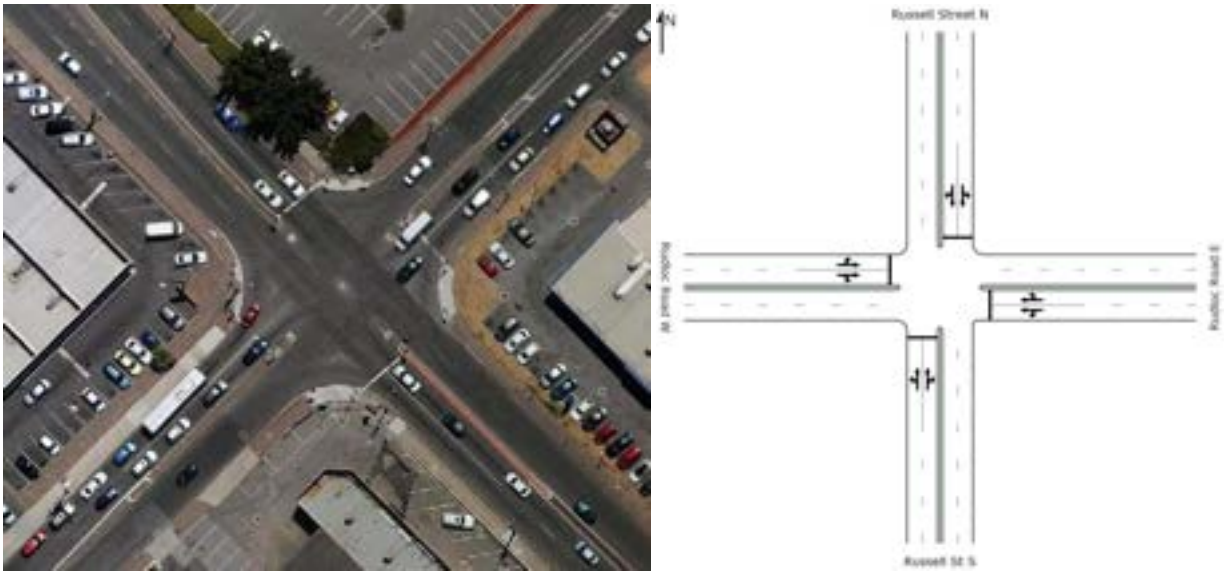

Figure 10-12 Russell Street/Rudloc Road Intersection – Existing Geometry

Table 10-23 and **Table 10-24** show the results of SIDRA analysis for the existing intersection geometry under the 2013 background plus existing development scenario, for the AM and PM Peak respectively.

Table 10-23 SIDRA Analysis for Russell Street/Rudloc Road - Existing 2013 Scenario (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	60	0.0	0.190	13.7	LOS B	2.0	14.1	0.56	0.86	45.0
2	T	180	0.0	0.190	5.7	LOS A	2.0	14.1	0.60	0.48	47.9
3	R	72	0.0	0.190	14.3	LOS B	1.3	9.0	0.70	0.78	43.9
Approach		312	0.0	0.190	9.2	LOS A	2.0	14.1	0.61	0.62	46.4
East: Rudloc Road E											
4	L	41	0.0	0.177	21.5	LOS C	1.2	8.7	0.82	0.78	38.7
5	T	47	0.0	0.177	14.3	LOS B	1.2	8.7	0.84	0.64	39.0
6	R	35	0.0	0.177	25.4	LOS C	0.9	6.0	0.91	0.74	35.8
Approach		123	0.0	0.177	19.8	LOS B	1.2	8.7	0.85	0.71	38.0
North: Russell Street N											
7	L	84	0.0	0.326	23.0	LOS C	2.4	16.8	0.88	0.79	37.6
8	T	141	0.0	0.326	14.9	LOS B	2.4	16.8	0.88	0.69	38.9
9	R	37	0.0	0.326	23.0	LOS C	2.2	15.1	0.88	0.80	38.4
Approach		262	0.0	0.326	18.6	LOS B	2.4	16.8	0.88	0.74	38.4
West: Rudloc Road W											
10	L	68	0.0	0.329	24.9	LOS C	2.0	14.0	0.91	0.78	36.4
11	T	99	0.0	0.329	16.8	LOS B	2.0	14.0	0.91	0.71	37.3
12	R	37	0.0	0.329	25.0	LOS C	1.8	12.4	0.91	0.78	36.9
Approach		204	0.0	0.329	21.0	LOS C	2.0	14.0	0.91	0.75	36.9
All Vehicles		901	0.0	0.329	16.1	LOS B	2.4	16.8	0.79	0.70	40.4

Table 10-24 SIDRA Analysis for Russell Street/Rudloc Road - Existing 2013 Scenario (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	87	0.0	0.264	13.4	LOS B	2.9	20.5	0.56	0.87	45.3
2	T	256	0.0	0.264	5.4	LOS A	2.9	20.5	0.60	0.49	48.2
3	R	98	0.0	0.264	14.1	LOS B	1.7	11.9	0.73	0.79	44.2
Approach		441	0.0	0.264	8.9	LOS A	2.9	20.5	0.62	0.63	46.7
East: Rudloc Road E											
4	L	87	0.0	0.328	22.2	LOS C	2.4	16.6	0.86	0.80	38.1
5	T	83	0.0	0.328	15.8	LOS B	2.4	16.6	0.89	0.70	37.7
6	R	44	0.0	0.328	27.0	LOS C	1.5	10.3	0.95	0.76	35.3
Approach		215	0.0	0.328	20.7	LOS C	2.4	16.6	0.89	0.75	37.3
North: Russell Street N											
7	L	127	0.0	0.454	22.7	LOS C	3.8	26.3	0.89	0.81	37.9
8	T	215	0.0	0.454	14.6	LOS B	3.8	26.3	0.89	0.73	39.1
9	R	57	0.0	0.454	22.7	LOS C	3.3	22.8	0.89	0.82	38.6
Approach		399	0.0	0.454	18.3	LOS B	3.8	26.3	0.89	0.77	38.6
West: Rudloc Road W											
10	L	73	0.0	0.396	26.2	LOS C	2.2	15.1	0.94	0.78	35.6
11	T	99	0.0	0.396	18.1	LOS B	2.2	15.1	0.94	0.73	36.4
12	R	33	0.0	0.396	26.4	LOS C	1.8	12.5	0.94	0.78	36.2
Approach		204	0.0	0.396	22.3	LOS C	2.2	15.1	0.94	0.76	36.1
All Vehicles		1259	0.0	0.454	16.1	LOS B	3.8	26.3	0.80	0.72	40.4

10.4 2021 Scenario - Using Existing Geometry

The identified critical signalised intersections were assessed in for a 2021 build-out scenario, using the existing intersection forms. This analysis was undertaken to see if any of the local intersections could retain existing geometry through to a 2021 time horizon.

The results of this assessment are presented in **Table 10-25** below.

Table 10-25 Summary of SIDRA outputs for a 2021 scenario using existing intersection geometry

Road Name	Level of Service	Average Delay (s)
Broun – Coode AM	**F**	**292**
Broun – Coode PM	**E**	**75**
Broun – Russell AM	B	17
Broun – Russell PM	D	35
Broun – Collier AM	**F**	**85**
Broun – Collier PM	**E**	**67**
Walter – Crimea AM	**E**	**69**
Walter – Crimea PM	**F**	**273**
Walter – Collier AM	D	53
Walter – Collier PM	D	49
Walter – Wellington AM	**E**	**75**
Walter – Wellington PM	**E**	**69**
Walter – Progress AM	B	15
Walter – Progress PM	B	16
Walter – Russell AM	C	24
Walter – Russell PM	**E**	**22**
Walter – Coode AM	B	18
Walter – Coode PM	B	14
Russell – Rudloc AM	B	16
Russell – Rudloc PM	B	16

These results suggest that about half of existing intersections will operate at an overall effective Level of Service through to a 2021 time horizon. It should be noted that there are some local delays for individual turning movements that may require minor modifications, depending on the scale of development and level of background traffic growth. That is, the 2021 time horizon represents an interim development scenario, not a strict timing trigger.

A reasonable trigger for intersection improvement is considered to be an intersection Level of Service of E or worse, suggesting that the following intersections may require mitigation measures by 2021:

> Broun Avenue/Coode Street
> Broun Avenue/Collier Road
> Walter Road West/Crimea Street; and
> Walter Road West/Wellington Street

The Walter Road West/Russell Street intersection is not considered to have a sufficiently high average delay to require modification, based on the results of this assessment. Localised delays at this intersection will likely be mitigated internally through redistribution of traffic to alternative egress points.

For those intersections that may require intersection modifications, it is recommended that the full requirements for the 2031 scenario traffic are installed at this time.

11 Critical Intersections

Critical intersections were identified for the 2031 build-out and assessed under a modified geometric scenario. Again, it should be noted that the 2031 build-out scenario represents the scale of development and not a strict timing trigger.

11.1 Mitigation Measures

Mitigation measures were proposed for each *Critical Intersection* to reduce the operational delays to a sustainable level. Note that peak demands below capacity were assumed to be acceptable for the majority of turning movements. Some congestion has been considered acceptable, during peak movements and within the Centre, so long as this is not considered to considerably impact regional traffic flows or compromise the performance of upstream intersections.

Generally, mitigation measures were limited to turning pocket installation and extension, minor signal timing changes and the introduction of pedestrian filters. The high volume of right-turning movements was addressed by allowing right-turning traffic to share the adjacent through lane in some locations. This scenario is generally consistent with the scale of these intersections, but restricts the flexibility of signal phasing outside of peak periods.

Significant intersection upgrades were shown to be necessary at Broun Avenue / Coode Street and Broun Avenue / Russell Street as a result of the large growth in regional traffic utilising the Broun Avenue corridor.

The existing geometry of intersections within the Centre is typically a simple 4-lane form without slip lanes or turning pockets. Due to the intensification of land uses in the Centre, and the projected background traffic growth, this form is not expected to remain suitable through to 2031. The increased control over turning traffic, involving the implementation of turning pockets, necessarily creates local road widening at the intersections. This will therefore require some localised land resumption, the extent of which will be determined over time as background traffic volumes are confirmed, and depending on the extent and timeframe for Centre build-out.

11.2 Broun Avenue/Coode Street

Changes to this intersection are largely as a result of the increased background traffic utilising Broun Avenue and the volume of traffic wishing to turn right via Coode Street. The modelled geometry for the mitigated scenario is illustrated in **Figure 11-1**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

The works required to accommodate the traffic growth include the following:

> Installation of left-turning pockets and slip lanes on both end of Broun Avenue;
> Installation of right-turning pockets on all approaches.
> Modification of signal phasing (described in detail in **Appendix B**).

Figure 11-1 Broun Avenue /Coode Street – Mitigated Geometry

Table 11-1 and **Table 11-2** show the results of SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-1 SIDRA Analysis for Broun Avenue/Coode Street - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	304	0.0	0.829	45.0	LOS D	16.9	118.5	1.00	0.92	27.0
2	T	361	0.0	0.829	51.8	LOS D	18.3	128.0	1.00	0.95	23.7
3	R	140	0.0	0.566	51.9	LOS D	7.3	51.1	0.98	0.81	24.9
Approach		805	0.0	0.829	49.2	LOS D	18.3	128.0	1.00	0.91	25.0
East: Broun Avenue E											
4	L	606	0.0	0.748	10.2	LOS B	7.1	49.4	0.41	0.72	46.8
5	T	1642	0.0	0.849	30.9	LOS C	42.6	298.5	0.94	0.91	30.9
6	R	301	0.0	0.847	64.1	LOS E	18.2	127.4	1.00	0.94	21.8
Approach		2549	0.0	0.849	29.9	LOS C	42.6	298.5	0.82	0.86	31.9
North: Coode Street											
7	L	335	0.0	0.415	32.1	LOS C	12.8	89.9	0.74	0.81	31.8
8	T	153	0.0	0.410	44.5	LOS D	7.6	53.4	0.92	0.75	25.9
9	R	59	0.0	0.591	59.5	LOS E	3.2	22.6	0.97	0.77	22.9
Approach		547	0.0	0.591	38.5	LOS D	12.8	89.9	0.81	0.79	28.8
West: Broun Avenue W											
10	L	289	0.0	0.588	17.4	LOS B	7.1	49.4	0.52	0.73	40.7
11	T	933	0.0	0.671	33.6	LOS C	22.1	154.6	0.91	0.80	29.8
12	R	46	0.0	0.475	69.1	LOS E	2.7	18.9	1.00	0.74	20.8
Approach		1268	0.0	0.671	31.2	LOS C	22.1	154.6	0.82	0.78	31.3
All Vehicles		5169	0.0	0.849	34.1	LOS C	42.6	298.5	0.85	0.84	30.1

Table 11-2 SIDRA Analysis for Broun Avenue/Coode Street - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	151	0.0	0.718	29.4	LOS C	5.0	34.7	1.00	0.86	33.5
2	T	158	0.0	0.718	33.8	LOS C	5.0	34.7	1.00	0.86	29.3
3	R	76	0.0	0.279	34.4	LOS C	2.3	16.2	0.93	0.73	30.9
Approach		385	0.0	0.718	32.2	LOS C	5.0	34.7	0.99	0.83	31.2
East: Broun Avenue E											
4	L	362	0.0	0.352	8.9	LOS A	2.2	15.7	0.30	0.68	48.1
5	T	1122	0.0	0.719	19.9	LOS B	16.7	116.7	0.90	0.81	36.7
6	R	172	0.0	0.810	46.4	LOS D	6.6	46.1	1.00	0.95	26.5
Approach		1656	0.0	0.810	20.2	LOS C	16.7	116.7	0.78	0.80	37.2
North: Coode Street N											
7	L	202	0.0	0.577	35.7	LOS D	7.2	50.6	0.95	0.82	30.4
8	T	122	0.0	0.577	34.3	LOS C	7.2	50.6	0.99	0.79	29.1
9	R	68	0.0	0.383	34.3	LOS C	2.1	14.5	0.93	0.73	31.0
Approach		392	0.0	0.577	35.0	LOS D	7.2	50.6	0.96	0.79	30.1
West: Broun Avenue W											
10	L	354	0.0	0.407	10.5	LOS B	3.6	25.0	0.42	0.71	46.5
11	T	1194	0.0	0.824	26.7	LOS C	21.1	148.0	0.97	0.97	32.8
12	R	56	0.0	0.434	42.8	LOS D	1.9	13.6	0.98	0.74	27.7
Approach		1604	0.0	0.824	23.7	LOS C	21.1	148.0	0.85	0.90	34.9
All Vehicles		4037	0.0	0.824	24.2	LOS C	21.1	148.0	0.85	0.84	34.8

The results of assessment for this revised geometry show that the intersection will operate acceptably during the weekday peak periods, using the proposed mitigation measures.

Figure 11-2 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

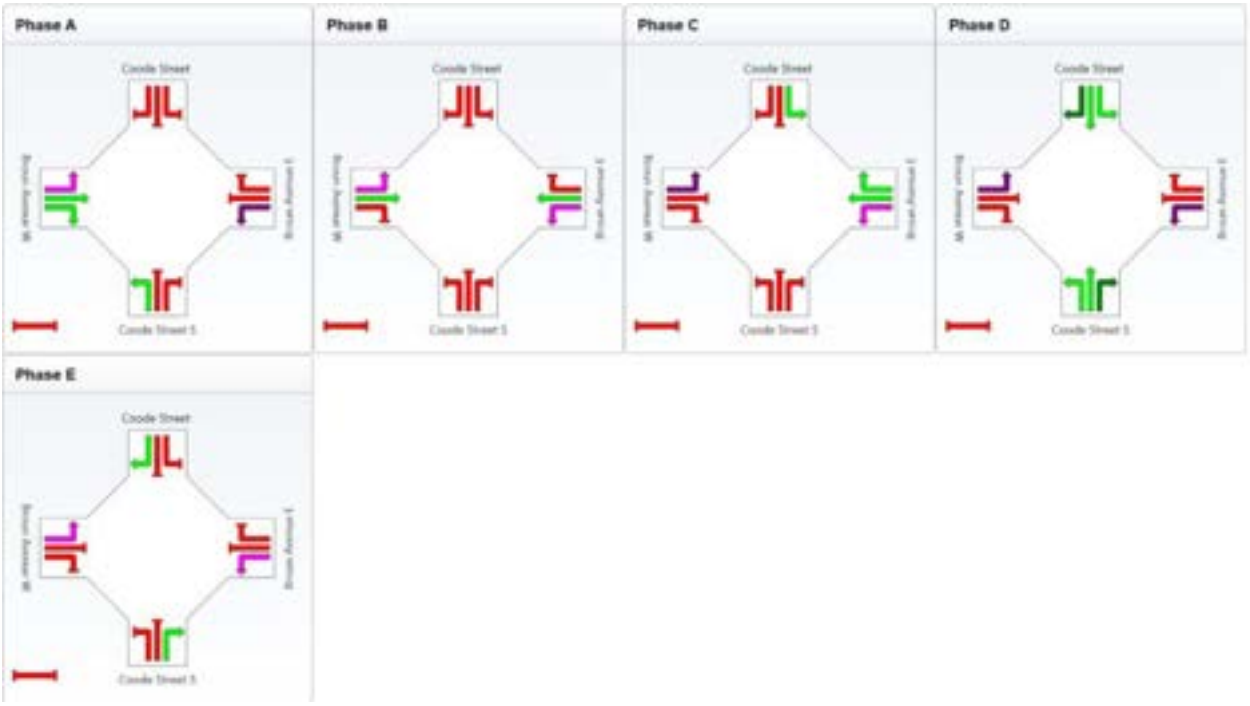

Figure 11-2 Broun Avenue /Coode Street – AM/PM Peak Phasing Summary

11.3 Broun Avenue/Russell Street

A large increase in regional traffic has been modelled by Main Roads WA along the Broun Avenue corridor. An assessment of the requirements to accommodate these volumes shows that an additional through lane is necessary for the southbound carriageway between Collier Road and Russell Street.

It should be noted that this requirement assumes full build-out of the Centre and regional traffic growth consistent with Main Roads projections. It is also noted that the impacts of downstream bus lanes do not seem to be included in existing Main Roads modelling, nor the constraining effects of potential extension of these lanes through the Centre. The assessment below therefore depicts a highly conservative traffic-only scenario which may not ever be realised.

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-3**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

The works required to accommodate the traffic growth include the following:

> Extension of left turning pocket on Russell Street.
> Modification of Russell Street to improve right-turning movements, particularly to service bus priority needs.
> Additional southbound lane on Broun Avenue to cater for the increase in background through traffic.
> Modification of signal phasing (described in detail in **Appendix B**).

Figure 11-3 Broun Avenue/Russell Street – Mitigated Geometry

Table 11-3 and **Table 11-4** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-3 SIDRA Analysis for Broun Avenue/Russell Street - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Broun Avenue E											
5	T	3039	0.0	0.712	8.0	LOS A	27.3	191.4	0.61	0.57	46.9
6	R	496	0.0	0.763	40.5	LOS D	22.3	155.8	0.95	0.89	28.5
Approach		3535	0.0	0.763	12.6	LOS B	27.3	191.4	0.66	0.61	43.0
North: Russell Street N											
7	L	344	0.0	0.369	12.7	LOS B	5.7	39.8	0.44	0.72	44.5
9	R	269	0.0	0.483	51.1	LOS D	6.2	43.4	0.96	0.79	25.0
Approach		613	0.0	0.483	29.6	LOS C	6.2	43.4	0.67	0.75	33.2
West: Broun Avenue W											
10	L	432	0.0	0.601	14.1	LOS B	8.5	59.4	0.51	0.74	43.3
11	T	926	0.0	0.742	33.7	LOS C	20.6	144.5	0.95	0.85	29.7
Approach		1358	0.0	0.742	27.5	LOS C	20.6	144.5	0.81	0.82	33.0
All Vehicles		5506	0.0	0.763	18.1	LOS B	27.3	191.4	0.70	0.68	38.8

Table 11-4 SIDRA Analysis Broun Avenue/Russell Street - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Broun Avenue E											
5	T	1704	0.0	0.396	5.7	LOS A	11.1	77.7	0.40	0.36	50.2
6	R	366	0.0	0.943	77.2	LOS E	25.0	174.7	1.00	1.07	19.3
Approach		2070	0.0	0.943	18.3	LOS B	25.0	174.7	0.51	0.49	39.1
North: Russell Street N											
7	L	678	0.0	1.000	328.6	LOS C	28.0	196.2	0.91	0.87	33.7
9	R	545	0.0	0.950	81.9	LOS F	18.7	131.2	1.00	1.09	18.5
Approach		1223	0.0	1.000	52.3	LOS D	28.0	196.2	0.95	0.97	24.7
West: Broun Avenue W											
10	L	557	0.0	0.690	12.9	LOS B	10.5	73.8	0.45	0.72	44.3
11	T	1703	0.0	0.924	46.3	LOS D	53.3	373.3	1.00	1.08	25.3
Approach		2260	0.0	0.924	38.1	LOS D	53.3	373.3	0.87	0.99	28.3
All Vehicles		5553	0.0	1.000	33.9	LOS C	53.3	373.3	0.75	0.80	30.5

The results of assessment for this revised geometry show that the intersection will operate acceptably during the weekday peak periods. Queue lengths for all turning movements are maintained at a sustainable level that will limit the impact on upstream intersections. Modified signal phasing and turning geometry are a key component to achieving this target.

Figure 11-4 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

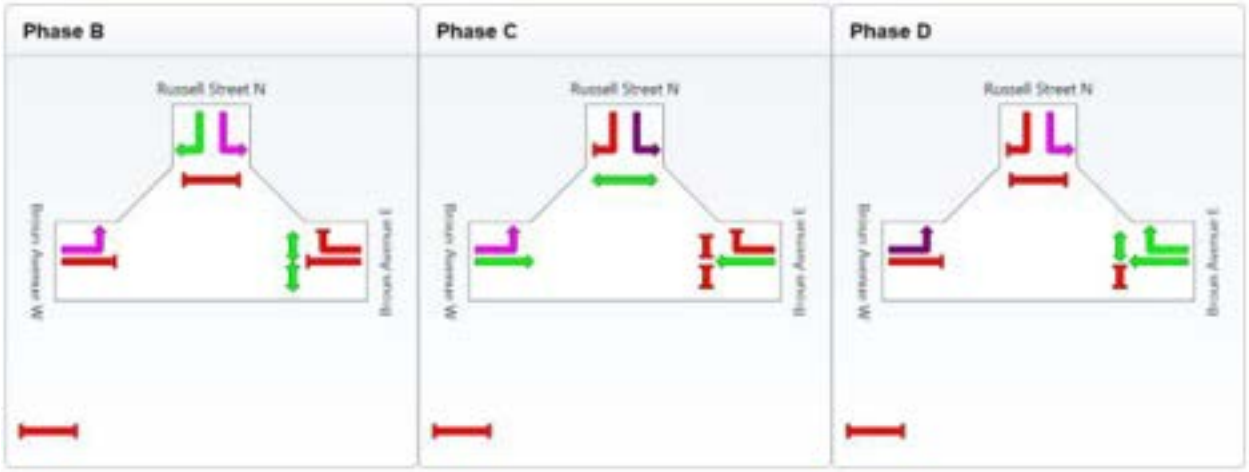

Figure 11-4 Broun Avenue/Russell Street – AM/PM Peak Phasing Summary

11.4 Broun Avenue / Collier Road

Physical modifications to Collier Road are fairly minor, but some significant changes to Broun Avenue are considered necessary to accommodate the regional traffic growth along this corridor. An assessment of the requirements to accommodate these volumes shows that an additional through lane is necessary for the southbound carriageway between Collier Road and Russell Street.

It should be noted that this requirement assumes full build-out of the Centre and regional traffic growth consistent with Main Roads projections. It is also noted that the impacts of downstream bus lanes do not seem to be included in existing Main Roads modelling, nor the constraining effects of potential extension of these lanes through the Centre. The assessment below therefore depicts a highly conservative traffic-only scenario which may not ever be realised

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-5**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

The works required to accommodate the traffic growth include the following:

> Extension of the left turning pocket at the Collier Road north approach
> Additional right turning pockets required on Broun Avenue at both approaches
> Modification of signal phasing (described in detail in **Appendix B**).

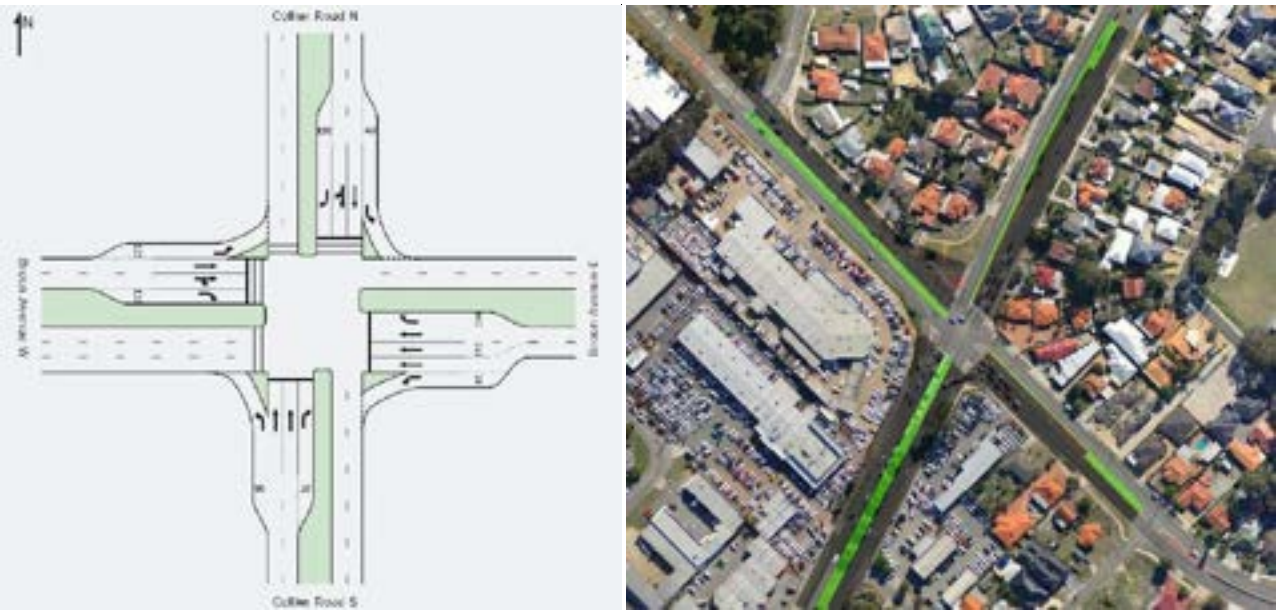

Figure 11-5 Broun Avenue/ Collier Road – Mitigated Geometry

Table 11-5 and **Table 11-6** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-5 SIDRA Analysis for Broun Avenue/ Collier Road - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	325	0.0	0.801	39.2	LOS D	16.1	112.5	0.71	0.83	29.1
2	T	579	0.0	0.828	67.5	LOS E	21.1	148.0	1.00	0.94	20.3
3	R	21	0.0	0.336	84.7	LOS F	1.5	10.7	1.00	0.70	18.2
Approach		925	0.0	0.828	58.0	LOS E	21.1	148.0	0.90	0.90	22.7
East: Broun Avenue E											
4	L	48	0.0	0.595	23.9	LOS C	1.5	10.8	0.46	0.70	36.4
5	T	1501	0.0	0.949	74.7	LOS E	44.0	308.1	1.00	1.07	19.0
6	R	332	0.0	0.926	89.0	LOS F	27.5	192.8	1.00	1.01	17.5
Approach		1881	0.0	0.949	75.9	LOS E	44.0	308.1	0.99	1.05	19.0
North: Collier Road N											
7	L	195	0.0	0.481	13.4	LOS B	3.9	27.3	0.35	0.68	44.0
8	T	490	0.0	0.687	41.5	LOS D	29.1	203.5	0.91	0.81	26.9
9	R	809	0.0	0.957	94.7	LOS F	35.8	250.7	1.00	1.04	16.8
Approach		1494	0.0	0.957	66.6	LOS E	35.8	250.7	0.89	0.92	21.1
West: Broun Avenue W											
10	L	517	0.0	0.771	22.1	LOS C	18.8	131.3	0.62	0.78	37.4
11	T	605	0.0	0.926	78.7	LOS E	34.8	243.6	1.00	1.08	18.3
12	R	381	0.0	0.926	91.5	LOS F	25.0	175.0	1.00	1.04	17.3
Approach		1503	0.0	0.926	62.5	LOS E	34.8	243.6	0.87	0.96	21.9
All Vehicles		5803	0.0	0.957	67.2	LOS E	44.0	308.1	0.92	0.97	20.8

Table 11-6 SIDRA Analysis for Broun Avenue/ Collier Road - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	491	0.0	0.706	15.5	LOS B	11.3	78.9	0.52	0.74	42.1
2	T	1095	0.0	0.978	80.9	LOS F	42.7	299.1	1.00	1.26	18.1
3	R	43	0.0	0.444	49.3	LOS D	2.0	14.0	0.86	0.72	25.6
Approach		1629	0.0	0.978	60.3	LOS E	42.7	299.1	0.85	1.09	22.1
East: Broun Avenue E											
4	L	31	0.0	0.329	18.5	LOS B	0.7	5.2	0.49	0.66	39.9
5	T	691	0.0	0.906	67.1	LOS E	15.0	105.2	1.00	1.05	20.4
6	R	140	0.0	0.963	90.4	LOS F	10.0	70.3	1.00	1.10	17.3
Approach		862	0.0	0.963	69.1	LOS E	15.0	105.2	0.98	1.04	20.2
North: Collier Road N											
7	L	135	0.0	0.344	15.0	LOS B	2.7	18.9	0.44	0.69	42.5
8	T	363	0.0	0.738	43.9	LOS D	19.2	134.5	0.98	0.87	26.1
9	R	561	0.0	0.965	89.4	LOS F	20.7	145.2	1.00	1.10	17.4
Approach		1059	0.0	0.965	64.3	LOS E	20.7	145.2	0.92	0.97	21.5
West: Broun Avenue S											
10	L	750	0.0	0.751	25.3	LOS C	29.0	202.7	0.84	0.86	35.5
11	T	1028	0.0	0.978	81.5	LOS F	40.0	279.8	1.00	1.25	18.0
12	R	385	0.0	0.954	82.7	LOS F	28.0	196.0	1.00	1.08	18.4
Approach		2163	0.0	0.978	62.2	LOS E	40.0	279.8	0.94	1.09	21.8
All Vehicles		5713	0.0	0.978	63.1	LOS E	42.7	299.1	0.92	1.06	21.6

The results of assessment for this revised geometry show that the intersection will operate at the limit of acceptability during the weekday peak periods, under a full development build-out scenario and assuming the high levels of growth projected by Main Roads WA. Queue lengths for all turning movements are maintained at a sustainable level that should minimise impact on nearby access locations.

Figure 11-6 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

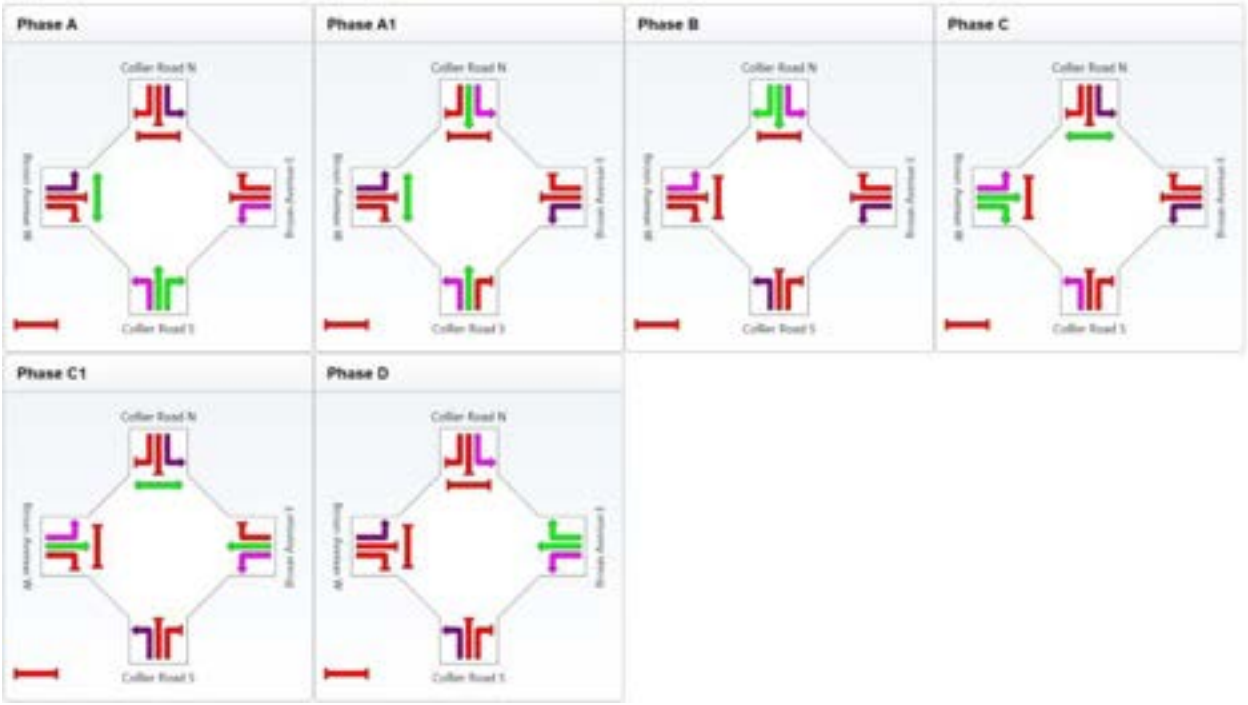

Figure 11-6 Broun Avenue/ Collier Road – AM/PM Peak Phasing Summary

11.5 Walter Road West/ Crimea Street

Walter Road West/ Crimea Street is located on the boundary of the Centre, and is not projected to experience the large growth of some of the more central intersections. However, the high volume of regional left-turning movements from Walter Road West into Crimea Street modelled by Main Roads WA ROM exceeds the capacity of a standard left-turn slip lane. The ROM shows a very prominent prevailing flow across both peak period and daily traffic flows. This result is not seen in the existing scenario and seems to be an artefact of the manner in which traffic is distributed along Crimea Street and Collier Road. However, should this result eventuate, a continuous slip lane has been shown to mitigate the impact of high left-turning volumes.

This also has some significant impacts on pedestrian crossing movements along the north side of Walter Road which should be considered if volumes meet projected demands.

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-7**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

The works required to accommodate the traffic growth projected in Main Roads WA modelling include the following:

> Creation of a continuous left-turn slip lane at the western approach to Walter Road West
> Additional right turning pockets on Walter Road westbound and extension of existing pockets
> New left-turning slip lanes at the southern and eastern approaches
> Modification of signal phasing (described in detail in **Appendix B**).

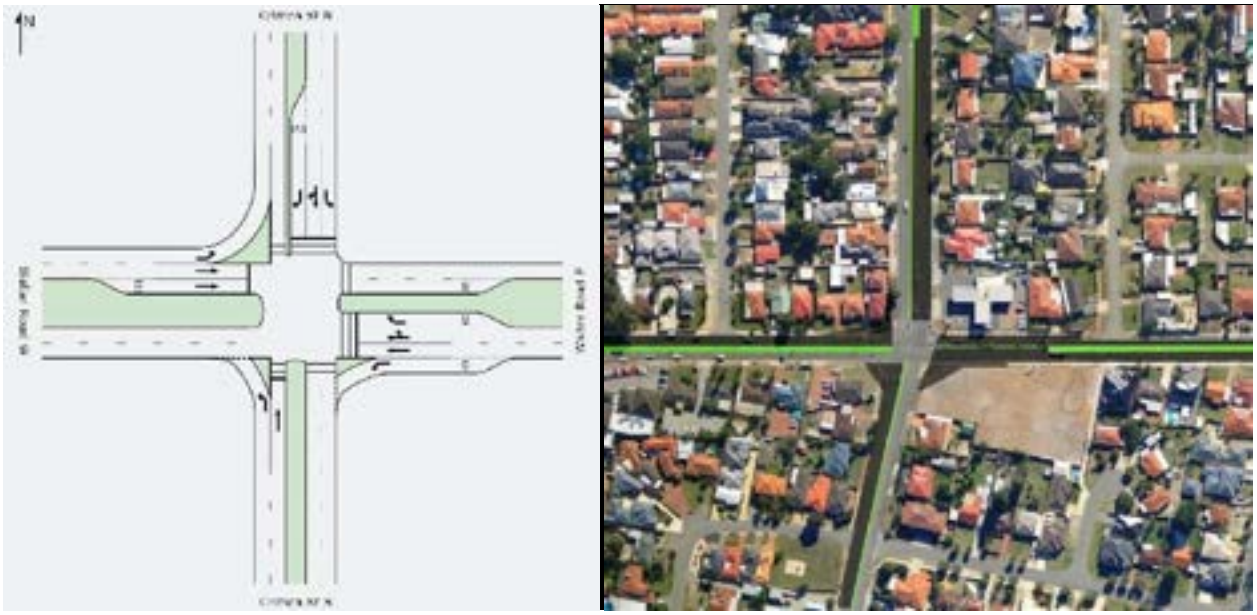

Figure 11-7 Walter Road West/ Crimea Street – Mitigated Geometry

Table 11-7 and **Table 11-8** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-7 SIDRA Analysis for Walter Road West/ Crimea Street - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Crimea St S											
1	L	273	0.0	0.358	13.8	LOS B	4.7	32.7	0.54	0.74	43.6
2	T	145	0.0	0.321	33.0	LOS C	5.6	39.5	0.87	0.71	30.1
Approach		418	0.0	0.358	20.5	LOS C	5.6	39.5	0.66	0.73	37.8
East: Walter Road E											
4	L	309	0.0	0.628	11.6	LOS B	4.6	32.3	0.42	0.71	45.5
5	T	363	0.0	0.536	26.8	LOS C	13.5	94.8	0.86	0.74	32.9
6	R	507	0.0	0.658	39.3	LOS D	10.4	72.9	0.96	0.84	28.9
Approach		1179	0.0	0.658	28.2	LOS C	13.5	94.8	0.79	0.77	33.4
North: Crimea St N											
7	L	511	0.0	0.747	37.4	LOS D	21.2	148.4	0.93	0.88	29.5
8	T	465	0.0	0.680	19.2	LOS B	21.7	151.8	0.84	0.73	36.5
9	R	608	0.0	0.680	30.7	LOS C	21.7	151.8	0.89	0.91	32.9
Approach		1584	0.0	0.747	29.5	LOS C	21.7	151.8	0.89	0.85	32.7
West: Walter Road W											
10	L	407	0.0	0.219	7.6	X	X	X	X	0.60	49.8
11	T	179	0.0	0.218	33.8	LOS C	3.5	24.3	0.87	0.68	29.8
Approach		586	0.0	0.219	15.6	LOS B	3.5	24.3	0.26	0.63	41.4
All Vehicles		3767	0.0	0.747	25.9	LOS C	21.7	151.8	0.73	0.78	34.5

Table 11-8 SIDRA Analysis for Walter Road West/ Crimea Street - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Crimea St S											
1	L	418	0.0	0.449	14.0	LOS B	8.0	56.3	0.55	0.76	43.4
2	T	262	0.0	0.709	40.9	LOS D	11.9	83.5	0.99	0.86	27.0
Approach		680	0.0	0.709	24.4	LOS C	11.9	83.5	0.72	0.80	35.2
East: Walter Road E											
4	L	88	0.0	0.149	10.0	LOS A	0.9	6.1	0.29	0.66	47.1
5	T	176	0.0	0.260	23.9	LOS C	5.8	40.9	0.76	0.63	34.7
6	R	199	0.0	0.727	59.3	LOS E	5.0	34.8	1.00	0.85	22.9
Approach		463	0.0	0.727	36.5	LOS D	5.8	40.9	0.77	0.73	29.6
North: Crimea St N											
7	L	306	0.0	0.505	36.2	LOS D	11.5	80.6	0.86	0.83	30.0
8	T	344	0.0	0.747	27.1	LOS C	19.6	137.1	0.92	0.96	31.7
9	R	685	0.0	0.747	38.4	LOS D	19.6	137.1	0.94	1.02	29.5
Approach		1335	0.0	0.747	35.0	LOS C	19.6	137.1	0.91	0.96	30.2
West: Walter Road W											
10	L	1272	0.0	0.685	7.7	X	X	X	X	0.60	49.6
11	T	236	0.0	0.389	34.7	LOS C	6.5	45.3	0.89	0.71	29.4
Approach		1508	0.0	0.685	12.0	LOS B	6.5	45.3	0.14	0.62	44.8
All Vehicles		3986	0.0	0.747	24.6	LOS C	19.6	137.1	0.57	0.78	35.3

The results of assessment for this revised geometry show that the intersection will operate acceptably during weekday peak periods.

Figure 11-8 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

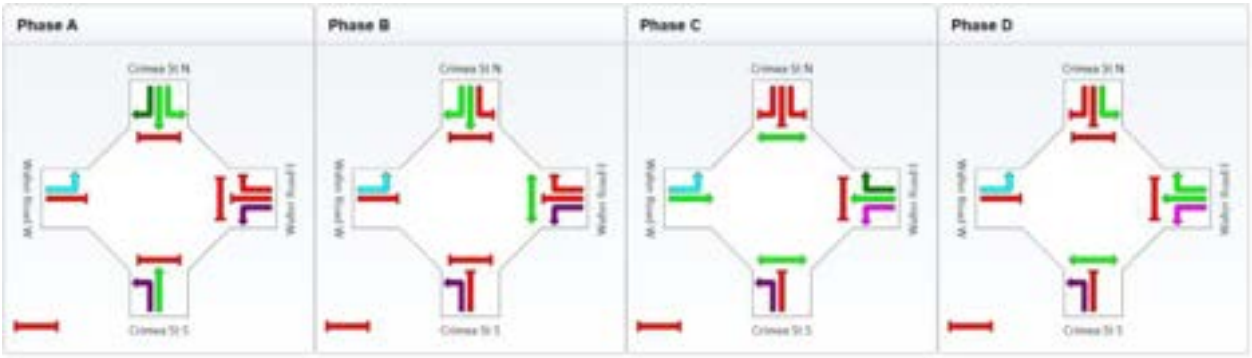

Figure 11-8 Walter Road West/ Crimea Street – AM/PM Peak Phasing Summary

11.6 Walter Road West/ Collier Road

The proposed mitigation measures at Walter Road / Collier Road are intended to improve intersection operation and limit queue lengths. Modifications to signal phasing, including pedestrian phasing are proposed to maintain Level of Service.

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-9**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

The mitigation measures recommended for this intersection are as follows:

> Extension of the existing right turning pocket on Walter Road West.
> Installation of a left-turn pocket and slip lane at the Walter Road east approach.
> Modification of signal phasing (described in detail in **Appendix B**).

Figure 11-9 Walter Road West/ Collier Road – Mitigated Geometry

Table 11-9 and **Table 11-10** show the results of SIDRA analysis for the existing intersection geometry under the 2031 background plus full development scenario, for the AM and PM Peak respectively.

Table 11-9 SIDRA Analysis for Walter Road West/ Collier Road - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	233	0.0	0.223	24.6	LOS C	7.0	49.0	0.57	0.74	36.0
3	R	112	0.0	0.210	55.3	LOS E	3.6	25.3	0.89	0.75	23.9
Approach		345	0.0	0.223	34.6	LOS C	7.0	49.0	0.68	0.74	30.9
East: Walter Road E											
4	L	408	0.0	0.648	13.7	LOS B	8.6	60.3	0.43	0.72	43.6
5	T	1167	0.0	0.779	36.7	LOS D	31.4	219.5	0.95	0.85	28.6
Approach		1575	0.0	0.779	30.7	LOS C	31.4	219.5	0.81	0.82	31.4
West: Walter Road W											
11	T	1063	0.0	0.749	10.7	LOS B	38.0	265.7	0.65	0.61	44.2
12	R	860	0.0	0.782	53.3	LOS D	24.9	174.3	0.98	0.89	24.5
Approach		1923	0.0	0.782	29.8	LOS C	38.0	265.7	0.80	0.74	32.4
All Vehicles		3843	0.0	0.782	30.6	LOS C	38.0	265.7	0.79	0.77	31.9

Table 11-10 SIDRA Analysis for Walter Road West/ Collier Road - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Collier Road S											
1	L	480	0.0	0.383	16.2	LOS B	8.6	60.1	0.54	0.75	41.7
3	R	542	0.0	0.643	35.4	LOS D	11.5	80.7	0.91	0.83	30.5
Approach		1022	0.0	0.643	26.4	LOS C	11.5	80.7	0.74	0.79	34.9
East: Walter Road E											
4	L	418	0.0	0.475	11.1	LOS B	5.1	35.7	0.44	0.72	45.9
5	T	719	0.0	0.737	32.0	LOS C	13.7	96.0	0.98	0.88	30.4
Approach		1137	0.0	0.737	24.3	LOS C	13.7	96.0	0.78	0.82	34.7
West: Walter Road W											
11	T	1052	0.0	0.721	16.9	LOS B	22.8	159.8	0.82	0.75	38.6
12	R	487	0.0	0.721	38.6	LOS D	14.6	102.0	0.97	0.88	29.5
Approach		1539	0.0	0.721	23.8	LOS C	22.8	159.8	0.87	0.79	35.1
All Vehicles		3698	0.0	0.737	24.7	LOS C	22.8	159.8	0.80	0.80	35.0

The results of assessment for this revised geometry show that the intersection will operate acceptably during the weekday peak periods.

Figure 11-10 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

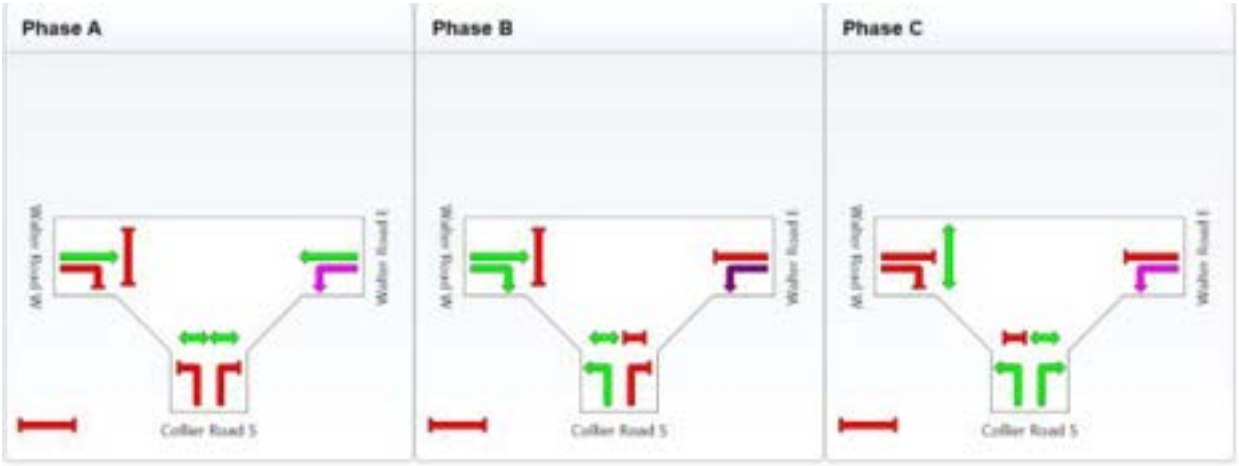

Figure 11-10 Walter Road West/ Collier Road – AM/PM Peak Phasing Summary

11.7 Walter Road West/ Wellington Road

This intersection is projected to carry a significant volume of right turning traffic from Walter Road into Wellington Road and a corresponding left-turn demand from Wellington Road. The location of this intersection between the Coventry Markets and the Centre Core suggests that significant pedestrian volumes can also be expected. As a result, controlled pedestrian phasing has been incorporated into peak signal operation. The modified signal phasing used is described in detail in **Appendix B**.

To maintain reasonable queuing and Level of Service for the 2031 growth scenario would require widening of the Wellington Road approach for a significant distance (approximately 100m). This would have an impact on the adjacent land uses that may not be acceptable from a land-use standpoint. In the event that overall growth follows the trends shown in the ROM, constraining Wellington Road to its existing form will result in some redirection of traffic to alternative approaches with better opportunities for modification. The operation of this intersection, in particular, will need to be monitored during the build-out of Morley.

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-11**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

Figure 11-11 Walter Road West/ Wellington Road – Mitigated Geometry

Table 11-11 and **Table 11-12** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-11 SIDRA Analysis for Walter Road West/ Wellington Road - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Old Collier Road											
1	L	34	0.0	0.126	32.5	LOS C	1.2	8.3	0.82	0.71	31.9
2	T	65	0.0	0.214	54.0	LOS D	3.8	26.4	0.91	0.70	23.3
3	R	114	0.0	0.395	63.8	LOS E	6.9	48.0	0.95	0.79	21.9
Approach		213	0.0	0.395	55.8	LOS E	6.9	48.0	0.92	0.75	23.5
East: Walter Road E											
4	L	188	0.0	0.614	14.5	LOS B	4.0	27.9	0.39	0.69	43.0
5	T	970	0.0	0.966	75.4	LOS E	65.0	454.7	1.00	1.14	18.8
6	R	911	0.0	0.966	70.7	LOS E	48.8	341.6	1.00	0.98	20.6
Approach		2069	0.0	0.966	67.8	LOS E	65.0	454.7	0.94	1.03	20.7
North: Wellington Road											
7	L	515	0.0	0.399	13.8	LOS B	11.4	80.1	0.43	0.73	43.6
8	T	722	0.0	0.961	73.1	LOS E	30.2	211.4	1.00	1.01	19.3
9	R	179	0.0	0.500	60.8	LOS E	10.6	74.4	0.94	0.81	22.6
Approach		1416	0.0	0.961	50.0	LOS D	30.2	211.4	0.79	0.88	24.8
West: Walter Road W											
10	L	195	0.0	0.443	17.9	LOS B	5.1	36.0	0.47	0.71	40.3
11	T	634	0.0	0.954	86.1	LOS F	26.0	182.2	1.00	1.14	17.3
12	R	114	0.0	0.921	91.9	LOS F	8.8	61.4	1.00	1.01	17.1
Approach		943	0.0	0.954	72.7	LOS E	26.0	182.2	0.89	1.03	19.6
All Vehicles		4641	0.0	0.966	62.8	LOS E	65.0	454.7	0.88	0.97	21.7

Table 11-12 SIDRA Analysis for Walter Road West/ Wellington Road - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Old Collier Road											
1	L	140	0.0	0.504	32.7	LOS C	5.2	36.5	0.82	0.77	31.5
2	T	357	0.0	0.852	62.2	LOS E	24.7	173.2	1.00	0.97	21.4
3	R	383	0.0	0.960	94.2	LOS F	32.2	225.4	1.00	1.06	16.8
Approach		880	0.0	0.960	71.4	LOS E	32.2	225.4	0.97	0.98	20.0
East: Walter Road E											
4	L	173	0.0	0.328	9.3	LOS A	1.8	12.3	0.22	0.65	47.8
5	T	621	0.0	0.796	38.5	LOS D	36.0	251.8	0.95	0.86	27.9
6	R	966	0.0	0.949	78.7	LOS E	39.6	277.3	1.00	0.99	19.0
Approach		1760	0.0	0.949	57.7	LOS E	39.6	277.3	0.91	0.91	23.0
North: Wellington Road											
7	L	837	0.0	0.815	29.4	LOS C	40.2	281.5	0.88	0.87	33.3
8	T	226	0.0	0.391	56.7	LOS E	6.8	47.8	0.95	0.76	22.6
9	R	255	0.0	0.927	88.1	LOS F	19.9	139.4	1.00	1.02	17.6
Approach		1318	0.0	0.927	45.5	LOS D	40.2	281.5	0.92	0.88	26.6
West: Walter Road W											
10	L	198	0.0	0.501	26.3	LOS C	7.2	50.1	0.61	0.74	35.0
11	T	667	0.0	0.924	76.3	LOS E	25.8	180.5	1.00	1.08	18.8
12	R	90	0.0	0.818	83.7	LOS F	6.5	45.3	1.00	0.90	18.2
Approach		955	0.0	0.924	66.6	LOS E	25.8	180.5	0.92	0.99	20.7
All Vehicles		4913	0.0	0.960	58.6	LOS E	40.2	281.5	0.92	0.93	22.7

The results of assessment for this revised geometry show that the intersection will operate at the limits of acceptability during the weekday peak periods, under the growth scenario described by 2031 ROM outputs.

Figure 11-12 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak.

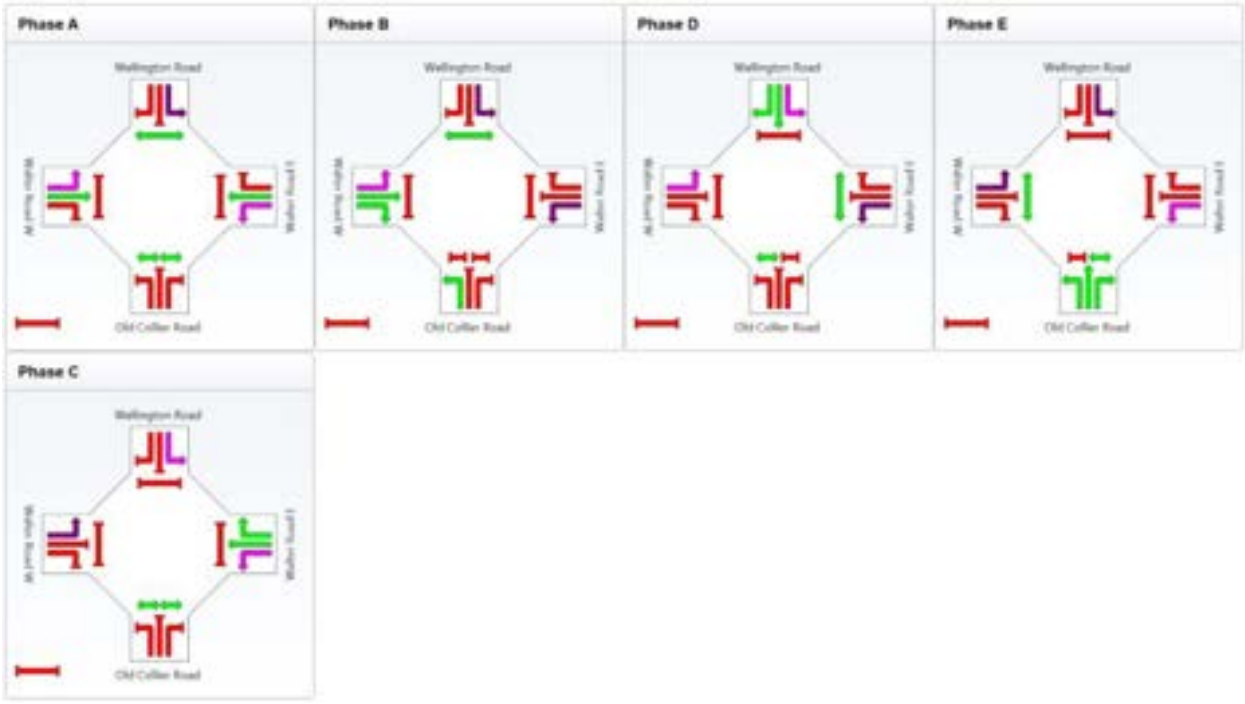

Figure 11-12 Walter Road West/ Wellington Road – AM/PM Peak Phasing Summary

11.8 Walter Road West/ Russell Street

The proposed changes to local land uses along Russell Street to the south of Walter Road, and in particularly, the location of large scale car parking designed to minimise traffic demands along this link should reduce the traffic volumes and improve the operation of this intersection. Proposed modifications are limited to an additional turn pocket and slip at the southern approach and creation of a turning pocket and central median at the Russell Street north approach.

Given that Russell Street is a primary pedestrian activation area; fully controlled pedestrian crossings have been included in the revised signal phasing. This modified signal phasing used is described in detail in **Appendix B**.

The modelled geometry for the mitigated scenario is illustrated in **Figure 11-13**, alongside a depiction of the potential space requirements for the revised intersection. A larger image of this maximum space requirement is given in **Appendix C**.

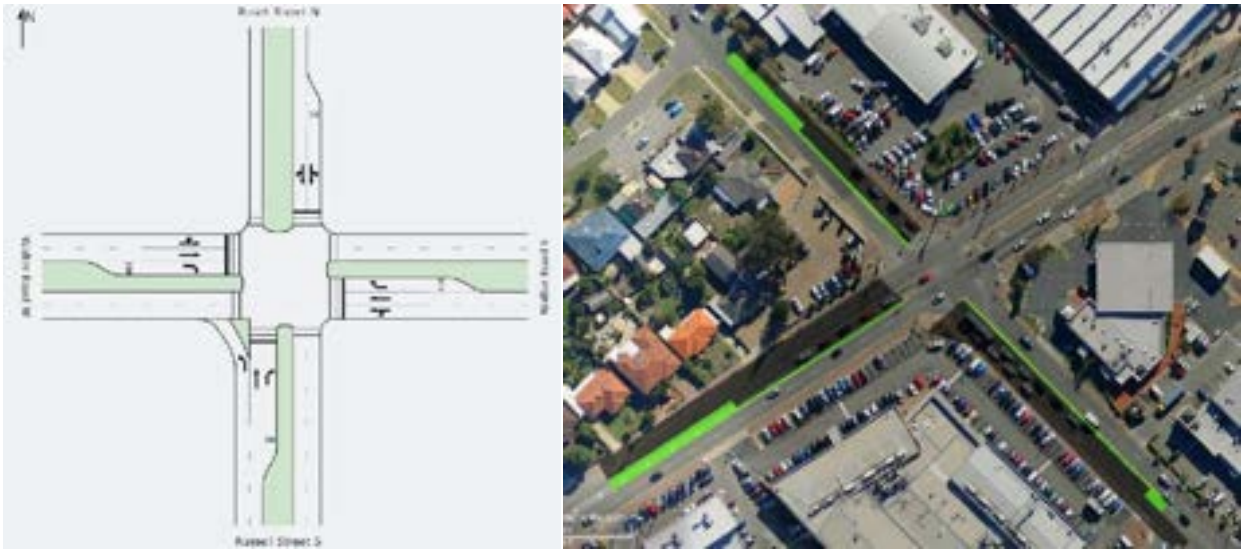

Figure 11-13 Walter Road West/ Russell Road – Mitigated Geometry

Table 11-13 and **Table 11-14** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-13 SIDRA Analysis for Walter Road West/ Russell Road - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Russell Street S											
1	L	200	0.0	0.196	12.3	LOS B	3.0	21.1	0.43	0.70	45.0
2	T	100	0.0	0.216	35.7	LOS D	4.3	30.1	0.84	0.67	28.3
3	R	221	0.0	1.013	114.9	LOS F	18.6	130.3	1.00	1.25	14.5
Approach		521	0.0	1.013	60.3	LOS E	18.6	130.3	0.75	0.93	22.5
East: Walter Road E											
4	L	243	0.0	0.960	85.8	LOS F	17.0	119.0	1.00	1.07	17.8
5	T	422	0.0	0.595	30.5	LOS C	18.3	128.4	0.87	0.76	31.2
6	R	78	0.0	0.308	55.2	LOS E	3.9	27.1	0.94	0.77	23.9
Approach		743	0.0	0.960	51.2	LOS D	18.3	128.4	0.92	0.86	24.4
North: Rusell Street N											
7	L	141	0.0	0.781	51.7	LOS D	9.7	67.6	0.89	0.91	25.0
8	T	94	0.0	0.781	44.8	LOS D	15.3	106.9	0.94	0.86	24.9
9	R	239	0.0	0.781	54.5	LOS D	15.3	106.9	0.99	0.92	24.2
Approach		474	0.0	0.781	51.7	LOS D	15.3	106.9	0.95	0.90	24.6
West: Walter Road W											
10	L	89	0.0	0.498	45.4	LOS D	11.2	78.7	0.90	0.85	27.4
11	T	598	0.0	0.498	26.4	LOS C	16.6	115.9	0.79	0.69	33.1
12	R	414	0.0	0.981	57.5	LOS E	23.3	163.2	1.00	0.89	23.3
Approach		1101	0.0	0.981	39.6	LOS D	23.3	163.2	0.88	0.78	28.2
All Vehicles		2839	0.0	1.013	48.5	LOS D	23.3	163.2	0.88	0.85	25.4

Table 11-14 SIDRA Analysis for Walter Road West/ Russell Road - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Russell Street S											
1	L	401	0.0	0.380	15.6	LOS B	7.0	49.1	0.52	0.77	42.2
2	T	115	0.0	0.210	26.2	LOS C	3.8	26.9	0.80	0.64	32.5
3	R	382	0.0	1.000	350.9	LOS D	18.7	130.6	1.00	0.92	25.1
Approach		898	0.0	1.000	32.0	LOS C	18.7	130.6	0.76	0.81	31.8
East: Walter Road E											
4	L	272	0.0	0.960	71.3	LOS E	31.9	223.4	1.00	1.20	20.6
5	T	787	0.0	0.960	62.6	LOS E	33.1	231.8	1.00	1.23	21.1
6	R	70	0.0	0.136	34.3	LOS C	2.3	16.2	0.79	0.75	30.9
Approach		1129	0.0	0.960	63.0	LOS E	33.1	231.8	0.99	1.19	21.4
North: Rusell Street N											
7	L	48	0.0	0.223	33.7	LOS C	2.3	15.8	0.77	0.77	31.6
8	T	32	0.0	0.223	25.9	LOS C	3.1	21.8	0.78	0.61	32.3
9	R	81	0.0	0.223	34.5	LOS C	3.1	21.8	0.80	0.77	31.0
Approach		161	0.0	0.223	32.5	LOS C	3.1	21.8	0.79	0.74	31.4
West: Walter Road W											
10	L	98	0.0	0.946	68.1	LOS E	24.6	172.2	1.00	1.19	21.5
11	T	754	0.0	0.946	59.7	LOS E	25.0	175.3	1.00	1.19	21.8
12	R	371	0.0	0.899	58.0	LOS E	19.5	136.2	1.00	1.03	23.2
Approach		1223	0.0	0.946	59.9	LOS E	25.0	175.3	1.00	1.14	22.2
All Vehicles		3411	0.0	1.000	52.3	LOS D	33.1	231.8	0.92	1.05	24.2

The results of assessment for this revised geometry show that the intersection should operate acceptably during the weekday peak periods.

Figure 11-14 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

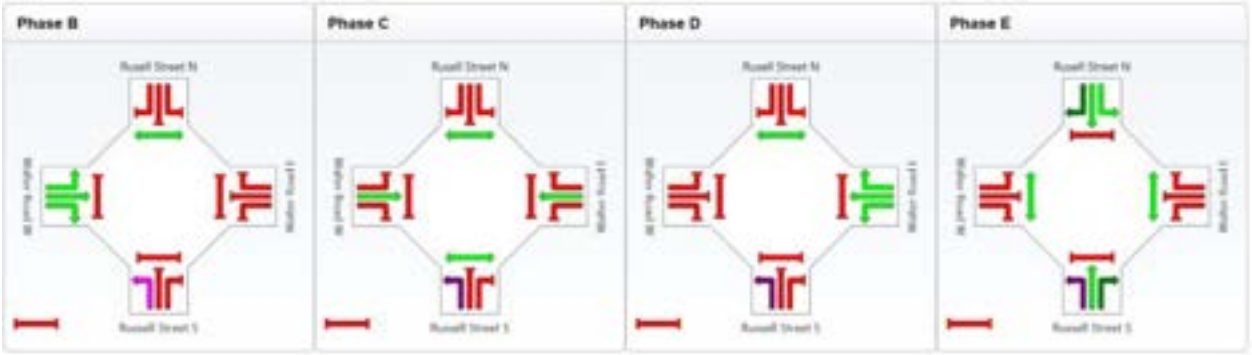

Figure 11-14 Walter Road West/ Russell Road – AM/PM Peak Phasing Summary

11.9 Walter Road West/ Coode Street

The mitigation measures recommended for this intersection are shown in **Figure 11-15**. No significant modifications are recommended for this intersection but minor changes include the following:

> Extension of right turning pockets on Walter Road.
> Lengthening of left turning pocket on Walter Road East.
> Installation of left turning slip lane and turning pocket for Walter Road West.
> Modification of signal phasing (described in detail in **Appendix B**).

Figure 11-15 Walter Road West/ Coode Street – Mitigated Geometry

A larger image of this maximum space requirement is given in **Appendix C**.

Table 11-15 and **Table 11-16** show the results of SIDRA analysis for the existing intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

Table 11-15 SIDRA Analysis for Walter Road West/ Coode Street - Future 2031 Mitigated Geometry (AM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	423	0.0	0.576	10.7	LOS B	4.7	32.8	0.52	0.75	46.3
2	T	135	0.0	0.198	15.6	LOS B	2.9	20.5	0.74	0.59	40.0
3	R	204	0.0	0.731	36.5	LOS D	6.6	46.4	0.98	0.92	30.1
Approach		762	0.0	0.731	18.5	LOS B	6.6	46.4	0.68	0.77	39.5
East: Walter Road E											
4	L	307	0.0	0.531	9.2	LOS A	1.9	13.6	0.35	0.69	47.8
5	T	690	0.0	0.384	12.1	LOS B	7.0	49.1	0.70	0.60	42.8
6	R	58	0.0	0.231	27.7	LOS C	1.5	10.2	0.80	0.76	34.1
Approach		1055	0.0	0.531	12.1	LOS B	7.0	49.1	0.60	0.63	43.6
North: Coode Streeet N											
7	L	270	0.0	0.476	25.8	LOS C	7.6	53.3	0.83	0.82	35.3
8	T	172	0.0	0.476	18.3	LOS B	7.6	53.3	0.84	0.71	36.6
9	R	117	0.0	0.476	26.3	LOS C	6.2	43.7	0.84	0.83	35.9
Approach		559	0.0	0.476	23.6	LOS C	7.6	53.3	0.83	0.79	35.8
West: Walter Road W											
10	L	251	0.0	0.644	11.1	LOS B	1.7	12.2	0.46	0.73	46.1
11	T	978	0.0	0.549	13.4	LOS B	11.1	77.4	0.77	0.68	41.2
12	R	158	0.0	1.253	275.9	LOS F	18.7	130.6	1.00	1.86	7.0
Approach		1387	0.0	1.253	42.8	LOS D	18.7	130.6	0.74	0.82	26.9
All Vehicles		3763	0.0	1.253	26.4	LOS C	18.7	130.6	0.70	0.75	34.0

Table 11-16 SIDRA Analysis for Walter Road West/ Coode Street - Future 2031 Mitigated Geometry (PM Peak)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Coode Street S											
1	L	234	0.0	0.357	9.1	LOS A	1.8	12.8	0.28	0.67	48.0
2	T	124	0.0	0.260	29.8	LOS C	4.4	31.1	0.85	0.68	31.5
3	R	153	0.0	0.586	45.3	LOS D	6.4	44.9	0.96	0.81	26.8
Approach		511	0.0	0.586	25.0	LOS C	6.4	44.9	0.62	0.72	35.3
East: Walter Road E											
4	L	255	0.0	0.420	8.9	LOS A	1.5	10.2	0.28	0.67	48.2
5	T	608	0.0	0.251	8.1	LOS A	5.9	41.2	0.48	0.41	47.3
6	R	96	0.0	0.291	22.1	LOS C	2.5	17.6	0.61	0.76	37.3
Approach		959	0.0	0.420	9.7	LOS A	5.9	41.2	0.44	0.52	46.3
North: Coode Street N											
7	L	75	0.0	0.321	38.6	LOS D	5.4	38.1	0.86	0.81	29.8
8	T	98	0.0	0.321	31.1	LOS C	5.4	38.1	0.87	0.70	30.0
9	R	75	0.0	0.321	41.1	LOS D	3.8	26.5	0.89	0.78	28.6
Approach		248	0.0	0.321	36.4	LOS D	5.4	38.1	0.87	0.76	29.5
West: Walter Road W											
10	L	190	0.0	0.530	9.3	LOS A	1.1	7.6	0.38	0.68	47.7
11	T	890	0.0	0.367	8.8	LOS A	9.4	66.1	0.53	0.46	46.4
12	R	219	0.0	0.778	46.2	LOS D	10.2	71.4	0.97	0.95	26.5
Approach		1299	0.0	0.778	15.2	LOS B	10.2	71.4	0.58	0.58	41.3
All Vehicles		3017	0.0	0.778	16.8	LOS B	10.2	71.4	0.57	0.60	40.2

The results of assessment for this revised geometry show that the intersection will operate at an acceptable Level of Service during weekday peak periods.

Figure 11-16 below shows the phasing summary from SIDRA analysis for the mitigated intersection geometry under the 2031 development scenario, for the AM and PM Peak respectively.

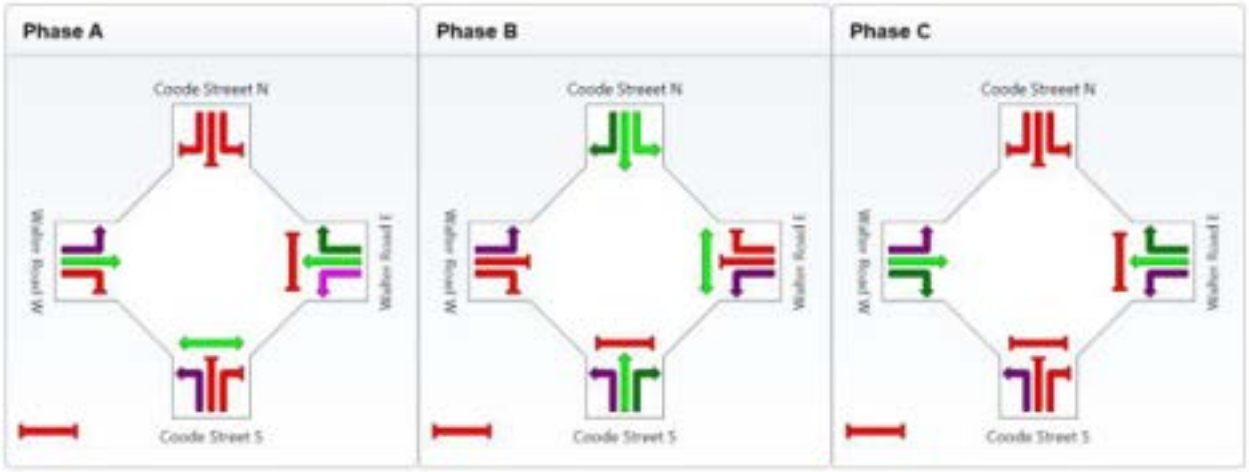

Figure 11-16 Walter Road West/ Coode Street – AM/PM Peak Phasing Summary

12 Pedestrian Movement and Amenity

Pedestrian activity and connectivity are critical factors in the effectiveness and vitality of an Activity Centre. For this reason, the pedestrian environment must be carefully considered, particularly along primary pedestrian routes. This includes construction of high quality paths, shade trees and street furniture to provide amenity. By allocating suitable resources to the pedestrian environment, the use of pedestrian modes will grow, reducing the demand for other modes as well as the requirement for parking.

Parking location is critical to determining both traffic and pedestrian movement. The location of car parking towards the periphery limits the impact of parking on trip volumes and land consumption, but requires parkers to travel an additional distance to their destination. The demand for peripheral car parking will be significantly improved where attractive legible pedestrian facilities are provided.

A Level of Service approach has been considered, which considers the quality of the pedestrian experience across the length of the trip. Therefore, higher-traffic areas with a high concentration of pedestrians require good quality, connected, covered and shaded paths, but so do paths which connect areas of high demand across relatively long distances, approaching or exceeding the nominal 400m or 800m walkable catchment.

12.1 Desire Lines

A desire line assessment has been undertaken for the adopted Masterplan. This primarily consists of pedestrian routes from major transport nodes (i.e. Morley Bus Station and large-scale public/private car parking) to commercial and retail activity. **Figure 12-1** shows the results of this analysis.

Figure 12-1 Pedestrian Desire Lines

12.2 Network Provision

All streets within the Centre will provide some form of off-street pedestrian path (along both sides of the road), with the quality of this provision improving along critical and high demand links. A fine-grained network of pedestrian paths is proposed to permeate the Centre to more closely match the desire lines of commuters, residents and visitors moving through the network.

Centro Galleria, due to its large land area creates both opportunities and barriers to pedestrian connection. During operating hours the wide, air-conditioned malls create an attractive pedestrian space full of activity, however, off peak it creates a barrier through the City Centre Core.

Pedestrian modes are at their most important along activated frontages which rely on pedestrian traffic to retain their commercial viability and 'place-making' appeal. These areas, predominantly along Russell Street and Rudloc Road will attract the best quality pedestrian infrastructure, and require the most attractive streetscapes. This is particularly important if the external public realm is to coexist with the nearby climate-controlled environment typified by Centro Galleria.

One example where this mix is shown to work successfully is in Claremont, where the streetscape environment and the Claremont Quarter form a cohesive whole, with effective and attractive transitions between the two.

12.3 Pedestrian Legibility

The existing Centre has generally poor legibility, being segmented into unrelated precincts by the impact of high traffic strategic roads. Of the existing land uses, Centro Galleria and Coventry Markets have effective legibility only as a destination, though the signal improvements completed at Progress Drive do support cross-over activity between them. Improvements along the higher-order road network, including pedestrian path widening to allow more effective sharing with cyclists and improvements to mid-block crossings will assist in removing some of the existing barriers to pedestrian legibility. It should be noted that these changes will become more important in the future, as a result of the project traffic growth by both regional and Centre traffic.

The legibility between the Morley Bus Station and Centro Galleria is relatively strong, as evidenced by the high pedestrian traffic observed between the two. This relationship could be further enhanced through a more integrated partnership, though this would require extensive negotiation and a common vision from all parties.

Within active pedestrian areas, vehicle movements will be restricted through infrastructure improvements to reduce speed and volume, promoting pedestrian needs and allowing free-flow pedestrian movement across streets. The interaction between pedestrians and buses along Russell Street will need to be carefully managed, with consideration for pedestrian refuges and other safety mechanisms to support the interaction between these two desired modes.

The Light Street/Drake Street link is proposed to be transformed into a 'bicycle boulevard' with traffic calming measures and streetscape improvements designed to create a coherent and legible route from areas to the south-east and north-west. The location of this treatment outside of the congested network will result in both safety and operational benefits that have the potential to significantly improve the viability of cycling as a transportation mode.

13 Cycling

13.1 Network Provision

The Centre's location along strategically important regional transport routes creates opportunities for cycling along these road corridors. However, the surrounding network has not yet been established to the extent that a consistent and legible trip route can be easily defined. Therefore, for the purpose of the Centre, commuter links have been retained off-street along high quality shared paths.

The exception to this for regional connections, including commuting to and from the Centre, as well as other destination trips, is the proposed 'bicycle boulevard' along Drake Street, potentially extending to the north-west to reach Mirrabooka, and to the south-west to connect to the Bayswater Station and the Midland PSP. This link is proposed to be treated as a primary on-road cycling route, shared with local traffic but treated to greatly reduce volumes and speed. Through the mechanisms of access restriction, streetscape treatments and Local Area Traffic Management, an environment with prevailing traffic speeds in the order of 30km/hr will be created. The main advantages of this route is that it lies outside of the primary traffic demands, forms a strong link between important destination nodes, and provides excellent access into the Centre via Rudloc Road.

On-street cycling will be encouraged through the activated pedestrian zones along Russell Street and Rudloc Road. The proposed bus priority infrastructure described in the *Russell Street Transport Priority Measures* report presents an opportunity for improved cycling connection along this important street. Minor modifications to the proposed infrastructure, namely a continuation of bicycle lanes in front of the Morley Bus Station, would allow effective shared use by buses and cyclists. The Rudloc Road approach will need to managed through traffic calming measures, on-street parking and other horizontal and vertical friction effects to reduce speeds down to the desired 30km/hr.

A network of off-street paths is also represented in an around the retail precinct, to be shared with pedestrians in areas where traffic volumes are predicted to remain high, or where casual cyclists are likely to congregate. These shared paths are expected to be used at slow speed, and this should be reinforced through the strategic use of street furniture and other passive obstructions that impede high-speed flow.

A core cycling network of on-street facilities, supplemented by off-street dual use paths is shown in **Figure 13-1.**

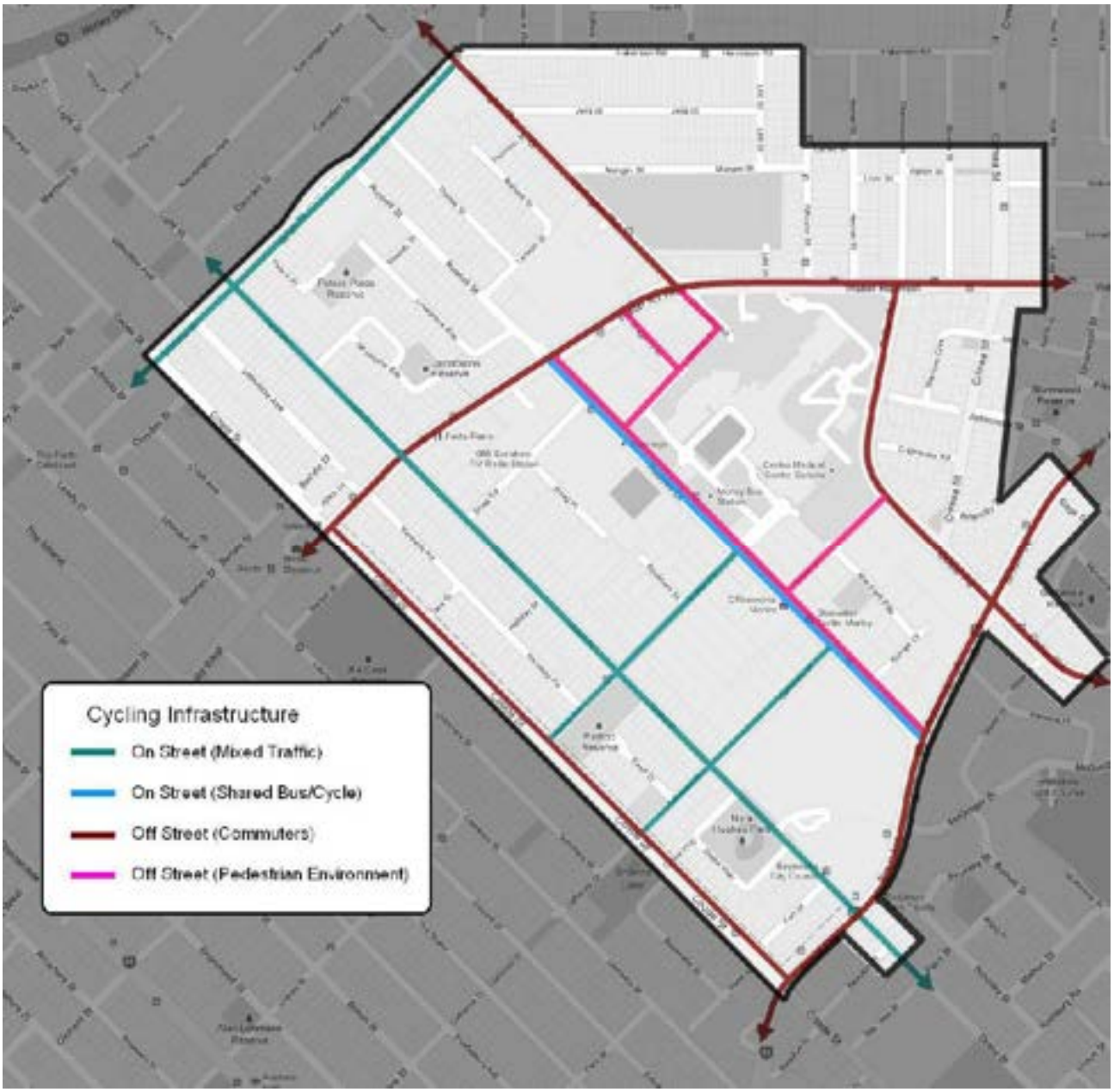

Figure 13-1 Indicative Cycling Network

13.2 End of Trip Facilities

End of trip facilities consist of bicycle parking, showers, lockers and other ancillary infrastructure designed to support cycling as a comfortable, practical mode choice, particularly for commuters. The level of end of trip facility provided depends on the target demographic and the available infrastructure funding sources.

For large-scale multi-level buildings with some proportion of undercroft or basement parking, commuter bicycle parking should be provided in secure areas adjacent to vehicular parking, along with shower and locker facilities sufficient to cater for the projected demand.

Precincts which constitute smaller office and retail, such as high-street environments, generally do not have the private infrastructure to enable businesses to provide secure commuter parking, let alone showers. In this instance, public facilities will be of greatest benefit. It is recommended that a large-scale cycle parking facility be investigated in the Activity Centre, ideally located near the core. A similar facility could be provided near Centro Galleria to provide public cycle parking for commuters.

Visitor parking can be of a lower scale, consisting of small clusters of bike racks near retail, office and civic buildings, in areas with good passive surveillance. Consideration should be given to utilising on-street

parking areas for bike parking, where pedestrian activity, and therefore the risk of conflict, is high. In particular, the installation of indented bike corrals outside of high-demand retail/commercial areas will support on-street cycling and reduce the incidence of cyclist/pedestrian conflicts in pedestrian activation zones.

13.3 Requirements

The requirements for cycling infrastructure should be mandated through Design Guidelines and Town Planning Scheme for both public facilities and private development. Austroads recommendations and Green Star ratings provide reasonable industry benchmarks for cycling provision and could be used as target provision rates.

14 Public Transport

14.1 Expansion of Public Transport Services

To facilitate mode shift towards public transport to the Centre, service improvements are proposed for bus modes.

Local Service Routes

The projected parking constraints within the Centre will tend to result in mode shift towards alternative transport. To facilitate this for nearby residents, an expansion of existing local service routes is recommended. In particular, residential neighbourhoods within a 3-5km catchment are important to capture through public transport. While in general this distance is considered ideal for cycling uptake, there are many people who will never cycle and viable alternative measures are necessary to reduce the dependence of local residents on their cars.

The Centre's growth as a major office/commercial and retail destination will also require improvements in more regional public transport links. Fortunately, at both local and regional levels, the Centre is well served by a variety of routes. Therefore, service frequency improvements alone will accomplish most of the goals associated with public transport uptake.

Strategic Service Routes

Additional connections will become necessary as strategic infrastructure is developed. This includes well-served links along Wellington Street and Grand Prom towards Mirrabooka and the MAX light rail corridor, and also towards Ellenbrook and the Swan Urban Growth Corridor, potentially via Bayswater or Bassendean Train Stations.

Impacts of Public Transport

The integration of the Morley Bus Station and additional public transport services will improve accessibility for commuters into the Centre, as well as residents within and surrounding the Centre. By reducing the reliance on private vehicle transport, parking rates in the Centre can be reduced, freeing up land for more productive uses. The expansion of local public transport services also improves social equity in the region, allowing households to transition away from private vehicle ownership and thereby reduces their vulnerability to external economic impacts.

Russell Street Bus Priority

Bus priority measures are recommended including extension of the Beaufort Street part-time bus lanes and bus lanes along Russell Street to improve public transport access into the Centre. Bus priority measures along Russell Street will provide capacity for the projected increased volume of buses into the Morley Bus Station, without significantly increasing private vehicle delays or impacting pedestrian crossing. The proposed bus/cycle lane also creates a segregated cycling link along Russell Street, minimising conflicts between cyclists and pedestrians.

14.2 Integration and Interchange

Public transport services will continue to interchange at the central Morley Bus Station. Services will tend to operate on a high-frequency basis to minimise both travel and wait times, ideally with a maximum 10 minute headway at all times, decreasing to 5 minutes during peak travel periods along critical routes.

The location of the existing Morley Bus Station, at the core of the Centre and at the nexus of the pedestrian activation zones, is ideal for the long-term function of public transport. However, the growth of demand projected over the next 20 years cannot be sustained within the existing station envelope. Therefore, the Morley Bus Station will need to expand, and its role within the context of the surrounding land uses will need to change.

Ideally then, to retain the function of the existing Station, improve the perception of safety for users, and to take advantage of the growth in destination trips, integration of the bus station with retail, office and

entertainment uses would be ideal. There are a number of technical and policy challenges associated with this concept, but the advantages to the delivery of high-quality, connected and integrated public transport would be profound.

Improved service will tend to increase the demand for all connection types, including park 'n' ride. Active parking management measures in the adjacent retail/entertainment precinct will assist to minimise the impact of these trips on the success and function of the Centre by ensuring that parking is consumed only for the benefit of Morley.

The increase in destination trips to the Centre creates opportunities for integration with the surrounding land uses which are not realised under the existing scenario. Through this integration, the social, environmental and economic health of the Centre can be improved.

14.3 Morley Light Rail

Light rail transit is a term which can mean anything from a traditional tramway to a modern efficient transit system operating partially on its own right-of-way. Light rail is undergoing worldwide resurgence in response to rising fuel costs, environmental concerns and traffic congestion, with a role which falls between that of buses and heavy rail for carrying capacity. In addition to its transport role, there is some evidence to suggest that investment in light rail along appropriate corridors encourages increases in density and a more transit-focused environment.

Within the context of the Morley Activity Centre, the most appropriate corridor for potential future light rail is Beaufort Street/Broun Avenue/Russell Street from Perth to the Morley bus interchange. Key features of this corridor which make it suitable for light rail include:

> Strong linear travel demand
> Multiple nodes along the route, e.g. Perth CBD, Northbridge, Highgate, Mt Lawley, Central Avenue, Inglewood, Morley
> 'Ribbon' type development, particularly along the inner portion of the corridor
> Mixed use development resulting in strong all-day and evening travel demand
> Significant potential for increased density within the walking catchment of the corridor

With the development of the MAX Light Rail project along the Alexander Drive corridor, it seems unlikely that light rail along the Beaufort Street corridor would be funded within the study timeframe. The draft *Public Transport for Perth 2031* strategy includes a Bus Rapid Transit facility along the Beaufort Street corridor to be implemented in two stages - between Perth and Inglewood by 2020 and from Inglewood to Morley by 2031. In the absence of a significant increase in density along this corridor, it is anticipated that the Bus Rapid Transit facility will provide sufficient capacity along this corridor within the study timeframe.

The section of the corridor within the City of Bayswater is, however, mostly of a low density residential nature with the exception of the Morley Activity Centre. In order to support a future case for light rail, or maximise the return from bus rapid transit, the City of Bayswater should consider the possibility of increasing the density of residential development and encouraging mixed use development along the corridor.

In the event that light rail is implemented along the Beaufort Street corridor, the likely terminal point will be the Morley bus interchange. It is therefore recommended that any redesign or improvement of the interchange should not prejudice its future use by light rail vehicles.

15 Conclusion

The Morley Activity Centre Structure Plan is an ambitious and long-term vision that will transform the Centre. To achieve the high quality transport environment envisaged in this Structure Plan, we propose an integrated network of transport modes encompassing private vehicles, public transport cycling and walking modes.

To accommodate the competing demands for these different forms of movement, the Department of Transport's *"Moving People"* framework has been used to allocated individual road segments to desired users. This enabled the determination of road cross-sections and network provision to ensure that the desired modes have safe, attractive, effective corridors within their activity zones, and without needing to support all users on every road.

The hierarchy chosen consists of the following general elements:

> Continued use by regional traffic along strategic boundary roads (Broun Avenue, Walter Road West, Collier Road)
> Local traffic will be encouraged at slow speeds within the Centre Core, through active and passive traffic management; to minimise the impact on other modes
> Pedestrian movement promoted within the Activated Zones through attractive streetscapes, safe and convenient crossings and high quality pedestrian provision
> Bus priority along Broun Avenue, and potentially along Walter Road West and Wellington Road according to strategic needs.
> Cycling is proposed on-street within the Centre Core in mixed traffic. Primary access via Drake Street and within shared bus/cycle lanes along Russell Street. The Drake Street / Light Street corridor will form a strategic 'bicycle boulevard' connecting development and transport nodes to the north and south.
> Off-street cycling is proposed along critical routes or where traffic volumes or speeds are high

Parking has been chosen as the focus for mode shift, with quantum and location determined through analysis. This has resulted in a maximum parking provision of 13,400 bays (assuming approximately 90% efficiency). These would be roughly split into 4,400 long-stay (commuter) and 8,000 short-stay (visitor) bays, plus an additional 1,000 flexible public parking bays suitable for office/commercial use during the day and entertainment uses in the evening. All parking within the Centre is proposed to be restricted to a maximum rate determined for general land uses, and partly offset through public provision via application of a cash-in-lieu policy.

This parking provision is sufficient to support a 74% private vehicle mode share, a reduction from the 85% mode share currently evidenced by commuters to the Centre. The remainder of all non-residential trips (150,000 total) have been allocated among public transport, walking and cycling modes, for an external target mode split as follows:

> Drive Alone: 74% (currently 85%)
> Car Pool: 8% (currently 7%)
> Public Transport: 12% (currently 4%)
> Cycling: 3% (currently 1%)
> Pedestrian: 3% (currently 2%)

This relatively minor shift in transport mode choice, acknowledges the lack of high-capacity public transport in the area, despite the location and strategic importance of the Morley Bus Station. For the purpose of this assessment, all internal trips (trips between land uses within the Activity Centre), are assumed to be taken by non-car modes. A general split for internal trips has been assumed for the purpose of infrastructure provision:

> Pedestrian: 90%
> Cycling: 10%

The anticipated generation for the Activity Centre is in the order of 149,000 non-residential trips per day (including approximately 32,000 internal trips and 118,000 external trips). The above target mode share would create approximately the following two-way demands:

> Private Vehicles: 87,000 trips (plus 9,000 passenger trips)
> Public Transport: 14,000 trips
> Cycling: 3,500 trips (plus 3,200 internal)
> Pedestrian: 3,500 trips (plus 28,800 internal)

These represent the approximate the demand that must be catered for by each mode.

Morley City Centre Plan
Transport Assessment

APPENDIX A
SMARTROADS ASSESSMENT AND MAPPING

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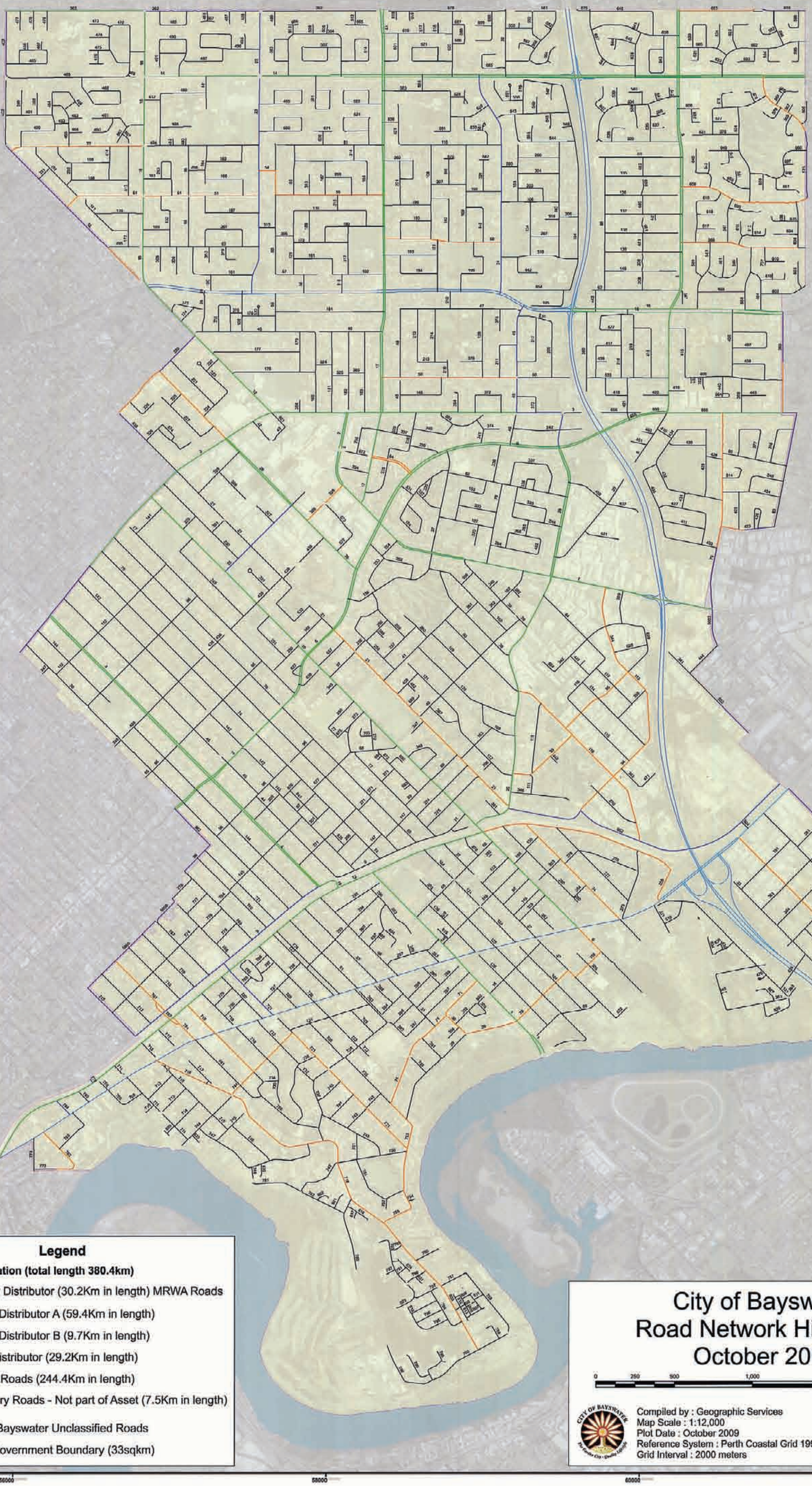
272000 270000 268000 266000 264000



Legend

Road Classification (total length 380.4km)

- Primary Distributor (30.2Km in length) MRWA Roads
- District Distributor A (59.4Km in length)
- District Distributor B (9.7Km in length)
- Local Distributor (29.2Km in length)
- Access Roads (244.4Km in length)
- Boundary Roads - Not part of Asset (7.5Km in length)
- City of Bayswater Unclassified Roads
- Local Government Boundary (33sqkm)

City of Bayswater
Road Network Hierarchy
October 2009

0 250 500 1,000 1,500 2,000 Meters

Compiled by : Geographic Services
Map Scale : 1:12,000
Plot Date : October 2009
Reference System : Perth Coastal Grid 1994
Grid Interval : 2000 meters

N W E S

Future Infrastructure

MORLEY TRANSPORT STUDY

Legend

- Signal with Pedestrian Crossing

Bus Routes

- Priority Lanes
- Queue Jump

Cycle Routes

- Off Street
- On Road
- Pedestrian

Car

N

W E

S

1:10,000 Scale at A3

Metres

0 250 500

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
Date: 2013-07-25
Coordinate System: GDA 1994 MGA Zone 50
Project:213125_001
Map: G1001_FutureInfrastructure.mxd 04

Aerial imagery supplied by NearMap (March 2013)

Existing Infrastructure

MORLEY TRANSPORT STUDY

Legend

- Signal with Pedestrian Crossing
- Car
- Pedestrian

Cycle Routes

- Off Street
- On Road

Bus Routes

- With Bus Embayment
- Without Bus Embayment

N
W E
S

1:10,000 Scale at A3

Metres
0 500

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
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Coordinate System: GDA 1994 MGA Zone 50
Project:213125_001
Map: G1002_ExistingInfrastructure.mxd 03

Aerial imagery supplied by NearMap (March 2013)

Future Smart Roads

MORLEY TRANSPORT STUDY

Legend

- Bus
- Cyclist
- Car
- Pedestrian

N
W E
S

1:10,000 Scale at A3

Metres
0 500

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
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Project:213125_001
Map: G1003_FutureSmartRoads.mxd 05

Aerial imagery supplied by NearMap (March 2013)

Existing Smart Roads

MORLEY TRANSPORT STUDY

Legend

- Bus
- Pedestrian
- Car

N
W E
S

1:10,000 Scale at A3

Metres
0 500

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
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Project:213125_001
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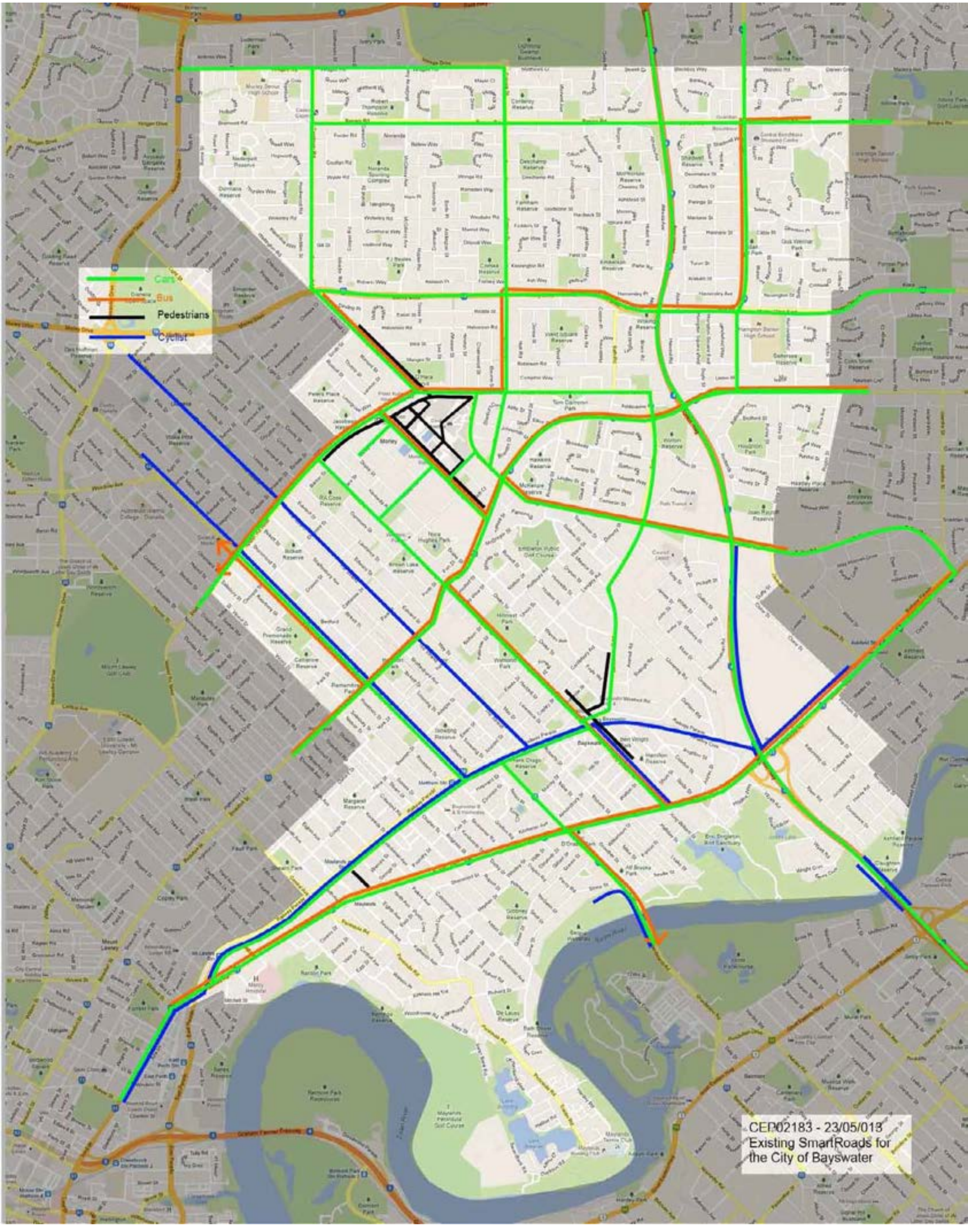
Aerial imagery supplied by NearMap (March 2013)


Cars
Bus
Pedestrians
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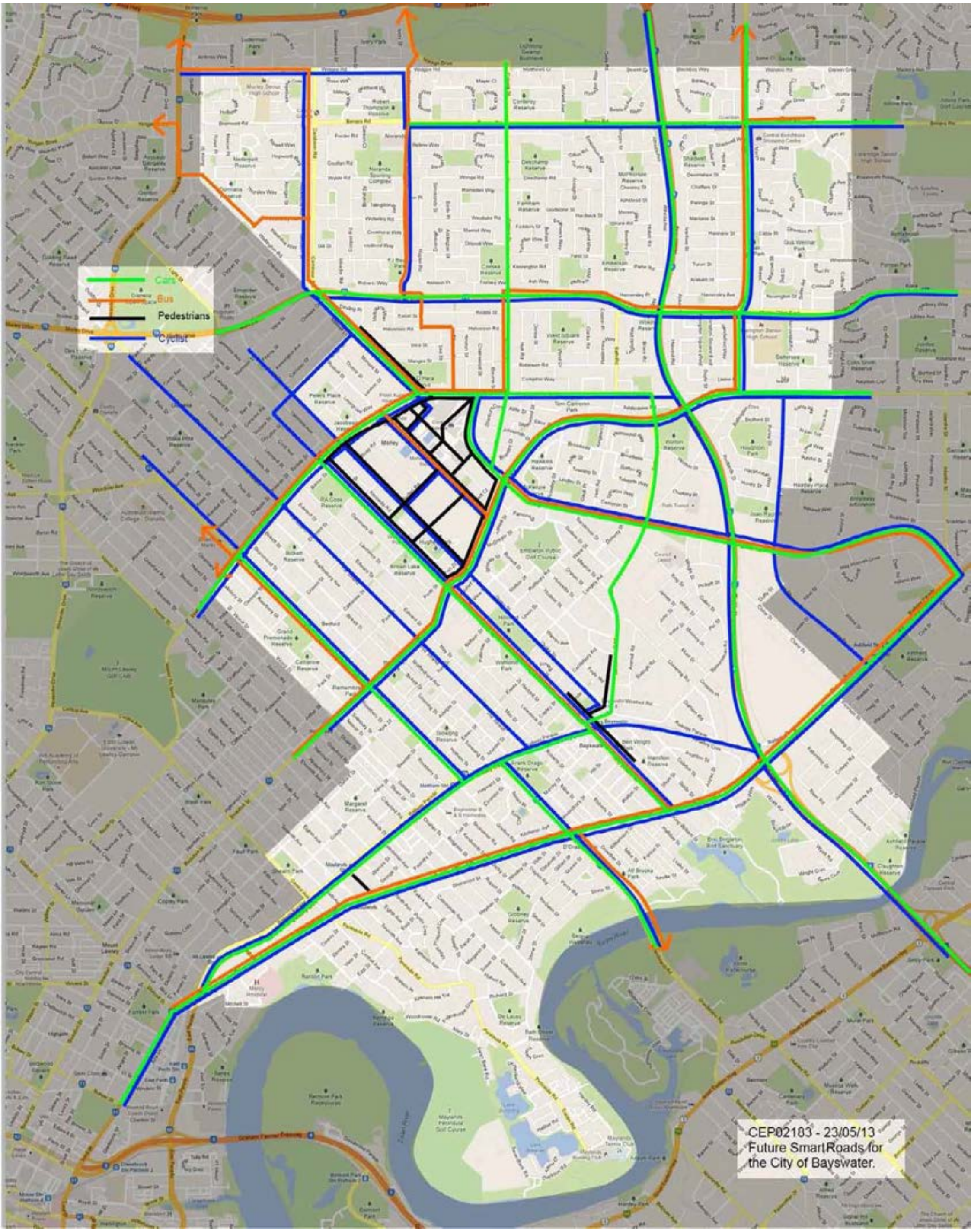
Existing SmartRoads for
the City of Bayswater


Cars
Bus
Pedestrians
Cyclist
CEP02183 - 23/05/13
Future SmartRoads for
the City of Bayswater.

Morley City Centre Plan
Transport Assessment

APPENDIX B
DETAILED SIDRA INTERSECTION ASSESSMENT

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Shaping the Future

Appendix B SIDRA Assessment

SIDRA intersection operation analysis was undertaken for a series of critical intersections with peak hour traffic volumes determined through the desktop modelling process described above. Intersections were assessed for the ultimate demand scenario including redistribution of local traffic to reflect regional growth.

The following intersections were assessed in this analysis:

> Broun Avenue/Coode Street
> Broun Avenue/Russell Street
> Broun Avenue/Collier Road
> Collier Road/Crimea Street
> Walter Road West/Collier Road
> Walter Road West/Crimea Street
> Walter Road West/Wellington Road
> Walter Road West/Russell Street
> Walter Road West/Coode Street
> Walter Road West/Progress Street
> Russell Street/Rudloc Road
> Coode Street/Rudloc Road

This Appendix includes outputs the Movements Summary and Phasing Summary for the optimum traffic operation under existing (2013), and future (2021 & 2031) scenarios.

Existing (2013) Assessment

MOVEMENT SUMMARY

Site: 1 Broun - Coode AM

Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 50 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	252	0.0	0.485	22.7	LOS C	6.2	43.1	0.84	0.82	37.3
2	T	211	0.0	0.485	15.7	LOS B	6.2	43.1	0.86	0.72	38.3
3	R	73	0.0	0.485	24.3	LOS C	4.7	33.1	0.87	0.84	37.4
Approach		535	0.0	0.485	20.2	LOS C	6.2	43.1	0.85	0.78	37.7
East: Broun Avenue E											
4	L	347	0.0	0.763	24.2	LOS C	14.2	99.7	0.91	0.94	36.9
5	T	882	0.0	0.763	16.0	LOS B	14.5	101.7	0.91	0.88	38.7
6	R	1	0.0	0.763	24.1	LOS C	14.5	101.7	0.91	0.97	38.6
Approach		1231	0.0	0.763	18.3	LOS B	14.5	101.7	0.91	0.90	38.2
North: Coode Street											
7	L	285	0.0	0.452	22.5	LOS C	5.6	39.2	0.83	0.81	37.0
8	T	101	0.0	0.281	15.0	LOS B	2.6	18.3	0.80	0.65	39.6
9	R	34	0.0	0.281	23.1	LOS C	2.6	18.3	0.80	0.83	38.3
Approach		420	0.0	0.452	20.7	LOS C	5.6	39.2	0.82	0.77	37.7
West: Broun Avenue W											
10	L	162	0.0	0.588	20.5	LOS C	9.1	63.9	0.82	0.87	39.9
11	T	506	0.0	0.588	14.4	LOS B	9.1	63.9	0.86	0.74	39.7
12	R	58	0.0	0.588	25.9	LOS C	5.6	39.5	0.91	0.85	36.8
Approach		726	0.0	0.588	16.7	LOS B	9.1	63.9	0.85	0.78	39.5
All Vehicles		2912	0.0	0.763	18.6	LOS B	14.5	101.7	0.87	0.83	38.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	16.0	LOS B	0.1	0.1	0.80	0.80
P3	Across E approach	50	19.4	LOS B	0.1	0.1	0.88	0.88
P5	Across N approach	50	16.0	LOS B	0.1	0.1	0.80	0.80
P7	Across W approach	50	19.4	LOS B	0.1	0.1	0.88	0.88
All Pedestrians		200	17.7	LOS B			0.84	0.84

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

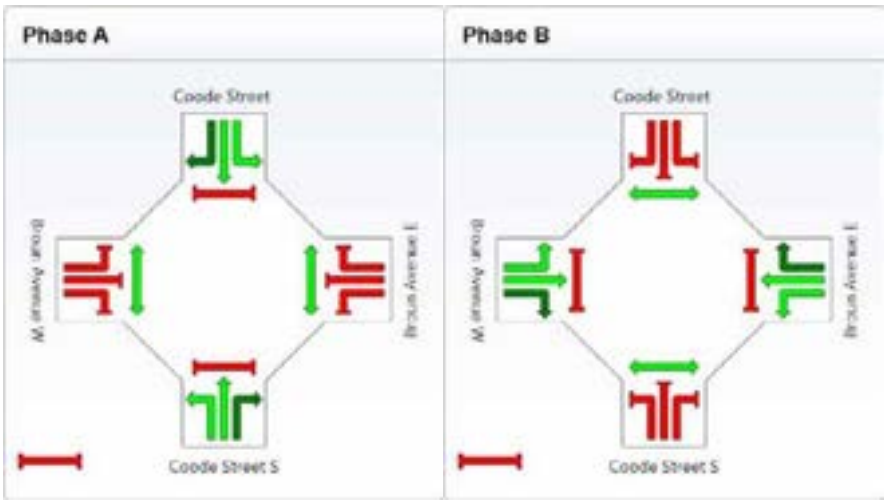
PHASING SUMMARY

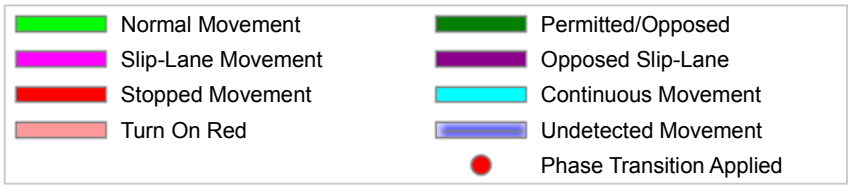
Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	17	21
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	23	27
Phase Split	46 %	54 %





MOVEMENT SUMMARY

Site: 1 Broun - Coode PM

Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 30 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	165	0.0	0.481	20.7	LOS C	2.5	17.8	0.93	0.79	38.4
2	T	92	0.0	0.481	12.7	LOS B	2.5	17.8	0.93	0.74	39.9
3	R	65	0.0	0.481	20.9	LOS C	2.1	14.4	0.93	0.80	39.5
Approach		322	0.0	0.481	18.5	LOS B	2.5	17.8	0.93	0.78	39.0
East: Broun Avenue E											
4	L	226	0.0	0.785	20.2	LOS C	9.6	66.9	0.93	1.01	40.2
5	T	688	0.0	0.785	13.1	LOS B	9.6	66.9	0.95	0.96	40.3
6	R	95	0.0	0.785	22.4	LOS C	6.8	47.8	0.97	1.00	39.2
Approach		1009	0.0	0.785	15.6	LOS B	9.6	66.9	0.95	0.98	40.1
North: Coode Street											
7	L	111	0.0	0.499	20.8	LOS C	2.7	18.9	0.93	0.80	39.2
8	T	178	0.0	0.499	12.7	LOS B	2.7	18.9	0.93	0.75	40.1
9	R	56	0.0	0.499	20.9	LOS C	2.2	15.7	0.93	0.81	39.8
Approach		344	0.0	0.499	16.6	LOS B	2.7	18.9	0.93	0.78	39.8
West: Broun Avenue W											
10	L	245	0.0	0.735	18.7	LOS B	8.2	57.5	0.91	0.95	41.2
11	T	886	0.0	0.735	10.5	LOS B	8.3	58.4	0.91	0.87	43.0
12	R	1	0.0	0.735	18.6	LOS B	8.3	58.4	0.91	0.97	42.7
Approach		1133	0.0	0.735	12.3	LOS B	8.3	58.4	0.91	0.89	42.6
All Vehicles		2808	0.0	0.785	14.7	LOS B	9.6	66.9	0.93	0.89	40.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

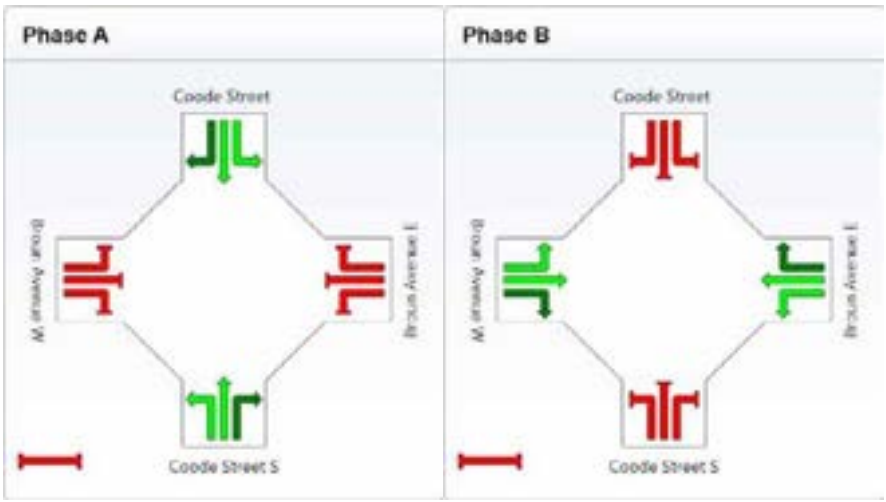
PHASING SUMMARY

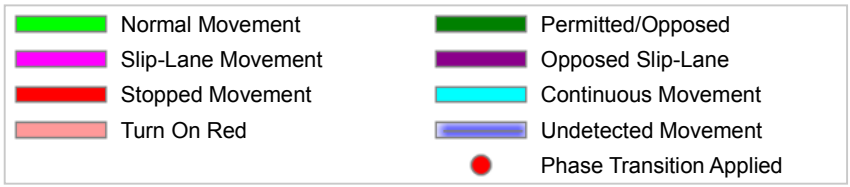
Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 30 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	6	12
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	12	18
Phase Split	40 %	60 %





MOVEMENT SUMMARY

Site: 3 Broun - Russell AM

Broun Avenue - Russell Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	1276	0.0	0.595	6.6	LOS A	8.5	59.8	0.72	0.63	47.9
6	R	289	0.0	0.573	15.9	LOS B	3.3	23.4	0.91	0.81	41.8
Approach		1565	0.0	0.595	8.4	LOS A	8.5	59.8	0.75	0.67	46.6
North: Russell Street N											
7	L	201	0.0	0.184	10.1	LOS B	1.3	9.2	0.50	0.70	46.8
9	R	157	0.0	0.310	25.5	LOS C	1.6	11.4	0.92	0.75	35.3
Approach		358	0.0	0.310	16.9	LOS B	1.6	11.4	0.68	0.73	41.0
West: Broun Avenue W											
10	L	272	0.0	0.240	9.5	LOS A	1.5	10.2	0.45	0.70	47.4
11	T	600	0.0	0.615	15.5	LOS B	5.6	39.2	0.94	0.80	39.5
Approach		872	0.0	0.615	13.6	LOS B	5.6	39.2	0.78	0.77	41.7
All Vehicles		2795	0.0	0.615	11.1	LOS B	8.5	59.8	0.75	0.71	44.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

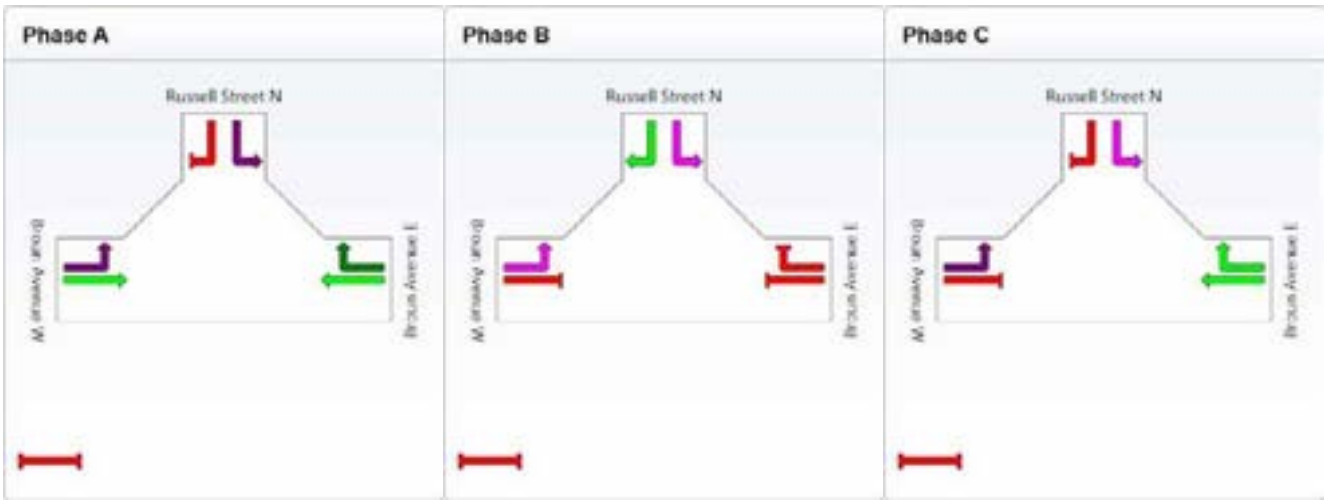
PHASING SUMMARY

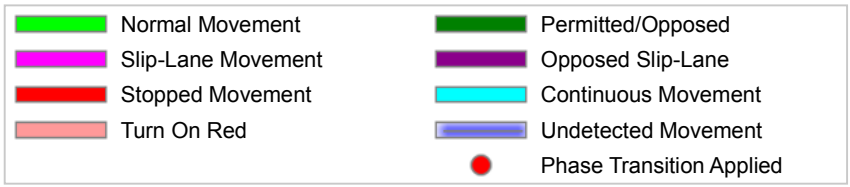
Broun Avenue - Russell Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	10	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	16	12	12
Phase Split	40 %	30 %	30 %





MOVEMENT SUMMARY

Site: 3 Broun - Russell PM

Broun Avenue - Russell Road PM
Signals - Fixed Time Cycle Time = 50 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	712	0.0	0.315	5.9	LOS A	4.5	31.5	0.55	0.47	49.4
6	R	259	0.0	0.624	18.3	LOS B	3.5	24.5	0.93	0.83	39.9
Approach		971	0.0	0.624	9.2	LOS A	4.5	31.5	0.65	0.57	46.5
North: Russell Street N											
7	L	487	0.0	0.486	12.6	LOS B	6.1	42.8	0.66	0.77	44.4
9	R	381	0.0	0.718	31.4	LOS C	6.2	43.3	0.97	0.89	32.3
Approach		868	0.0	0.718	20.8	LOS C	6.2	43.3	0.80	0.83	38.2
West: Broun Avenue W											
10	L	424	0.0	0.381	9.4	LOS A	2.4	17.0	0.42	0.70	47.5
11	T	938	0.0	0.707	17.1	LOS B	10.7	75.2	0.93	0.84	38.5
Approach		1362	0.0	0.707	14.7	LOS B	10.7	75.2	0.77	0.80	40.9
All Vehicles		3201	0.0	0.718	14.7	LOS B	10.7	75.2	0.74	0.74	41.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

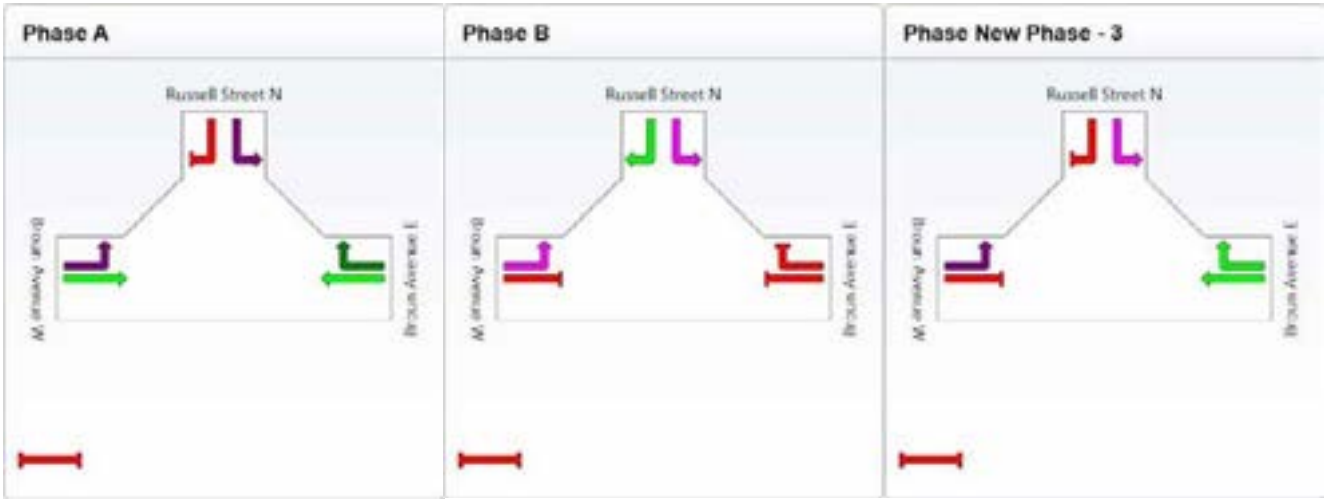
PHASING SUMMARY

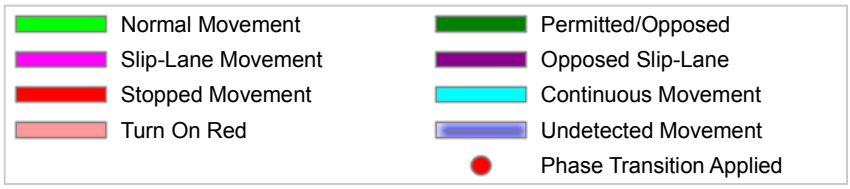
Broun Avenue - Russell Road PM
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, New Phase - 3
Output Sequence: A, B, New Phase - 3

Phase Timing Results

Phase	A	B	New Phase - 3
Green Time (sec)	17	9	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	15	12
Phase Split	46 %	30 %	24 %





MOVEMENT SUMMARY

Site: 4 Broun - Collier AM

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 70 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	207	0.0	0.248	13.7	LOS B	3.1	21.4	0.54	0.72	43.6
2	T	376	0.0	0.749	35.6	LOS D	6.9	48.0	1.00	0.90	28.9
3	R	19	0.0	0.089	38.2	LOS D	0.6	4.2	0.91	0.70	29.3
Approach		602	0.0	0.749	28.1	LOS C	6.9	48.0	0.84	0.83	32.8
East: Broun Avenue E											
4	L	29	0.0	0.798	37.4	LOS D	15.7	109.6	0.99	0.96	31.3
5	T	858	0.0	0.798	29.2	LOS C	15.7	109.9	0.99	0.95	31.5
6	R	194	0.0	0.562	23.8	LOS C	4.0	28.0	0.95	0.80	36.4
Approach		1081	0.0	0.798	28.4	LOS C	15.7	109.9	0.98	0.92	32.3
North: Collier Road N											
7	L	115	0.0	0.154	8.9	LOS A	0.7	4.7	0.27	0.65	48.2
8	T	183	0.0	0.286	19.0	LOS B	4.7	32.8	0.78	0.64	37.6
9	R	323	0.0	0.761	44.8	LOS D	6.0	42.1	1.00	0.90	27.0
Approach		621	0.0	0.761	30.6	LOS C	6.0	42.1	0.80	0.78	32.3
West: Broun Avenue S											
10	L	271	0.0	0.294	11.2	LOS B	3.0	21.0	0.45	0.71	45.8
11	T	334	0.0	0.599	32.1	LOS C	5.7	39.6	0.98	0.80	30.3
12	R	192	0.0	0.802	45.3	LOS D	7.3	50.8	1.00	0.94	26.9
Approach		796	0.0	0.802	28.2	LOS C	7.3	50.8	0.81	0.81	33.1
All Vehicles		3100	0.0	0.802	28.7	LOS C	15.7	109.9	0.87	0.85	32.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

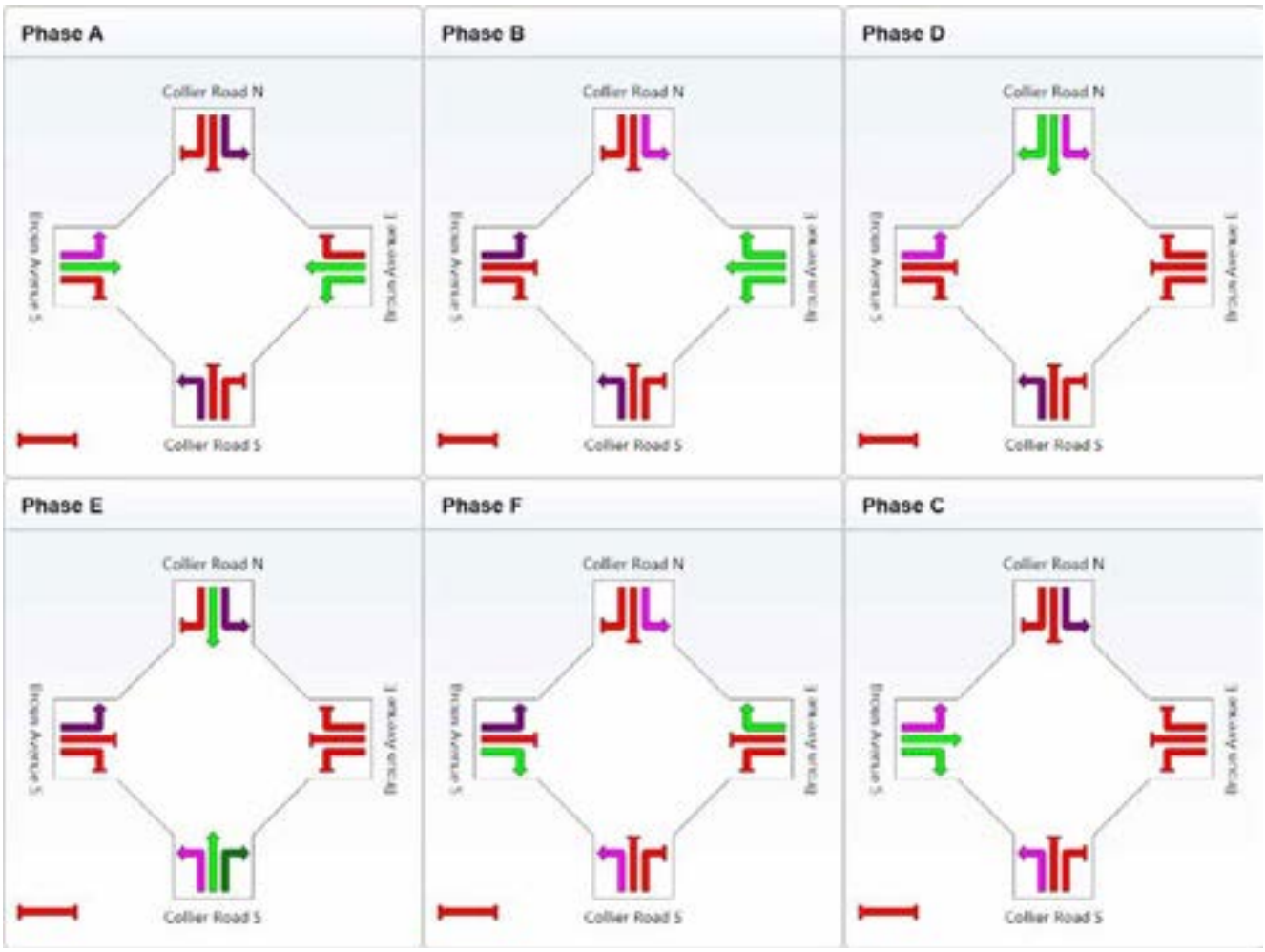
PHASING SUMMARY

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Broun/Collier
Input Sequence: A , B, D, E, F, C
Output Sequence: A , B, D, E, F, C

Phase Timing Results

Phase	A	B	D	E	F	C
Green Time (sec)	8	6	8	9	7	0
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	14	12	14	15	13	2
Phase Split	20 %	17 %	20 %	21 %	19 %	3 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 4 Broun - Collier PM

Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 90 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	338	0.0	0.450	11.3	LOS B	4.5	31.4	0.41	0.71	45.8
2	T	618	0.0	0.792	41.3	LOS D	14.1	98.7	1.00	0.94	26.9
3	R	26	0.0	0.100	41.3	LOS D	1.0	6.9	0.86	0.72	28.2
Approach		982	0.0	0.792	30.9	LOS C	14.1	98.7	0.79	0.85	31.4
East: Broun Avenue E											
4	L	14	0.0	0.582	45.9	LOS D	7.9	55.6	0.97	0.83	27.8
5	T	404	0.0	0.582	36.7	LOS D	9.2	64.7	0.96	0.79	28.5
6	R	99	0.0	0.467	32.9	LOS C	3.0	20.9	0.99	0.76	31.6
Approach		517	0.0	0.582	36.2	LOS D	9.2	64.7	0.97	0.79	29.0
North: Collier Road N											
7	L	98	0.0	0.193	9.9	LOS A	0.9	6.4	0.30	0.66	47.2
8	T	156	0.0	0.266	15.1	LOS B	3.7	25.7	0.80	0.64	40.2
9	R	275	0.0	0.740	54.7	LOS D	6.4	45.0	1.00	0.88	24.0
Approach		528	0.0	0.740	34.7	LOS C	6.4	45.0	0.81	0.77	30.4
West: Broun Avenue S											
10	L	464	0.0	0.524	11.7	LOS B	6.7	46.7	0.44	0.72	45.4
11	T	665	0.0	0.569	15.1	LOS B	6.9	48.4	0.89	0.75	40.0
12	R	236	0.0	0.762	31.9	LOS C	6.8	47.7	1.00	0.88	32.1
Approach		1365	0.0	0.762	16.8	LOS B	6.9	48.4	0.76	0.76	39.9
All Vehicles		3393	0.0	0.792	26.7	LOS C	14.1	98.7	0.81	0.79	33.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

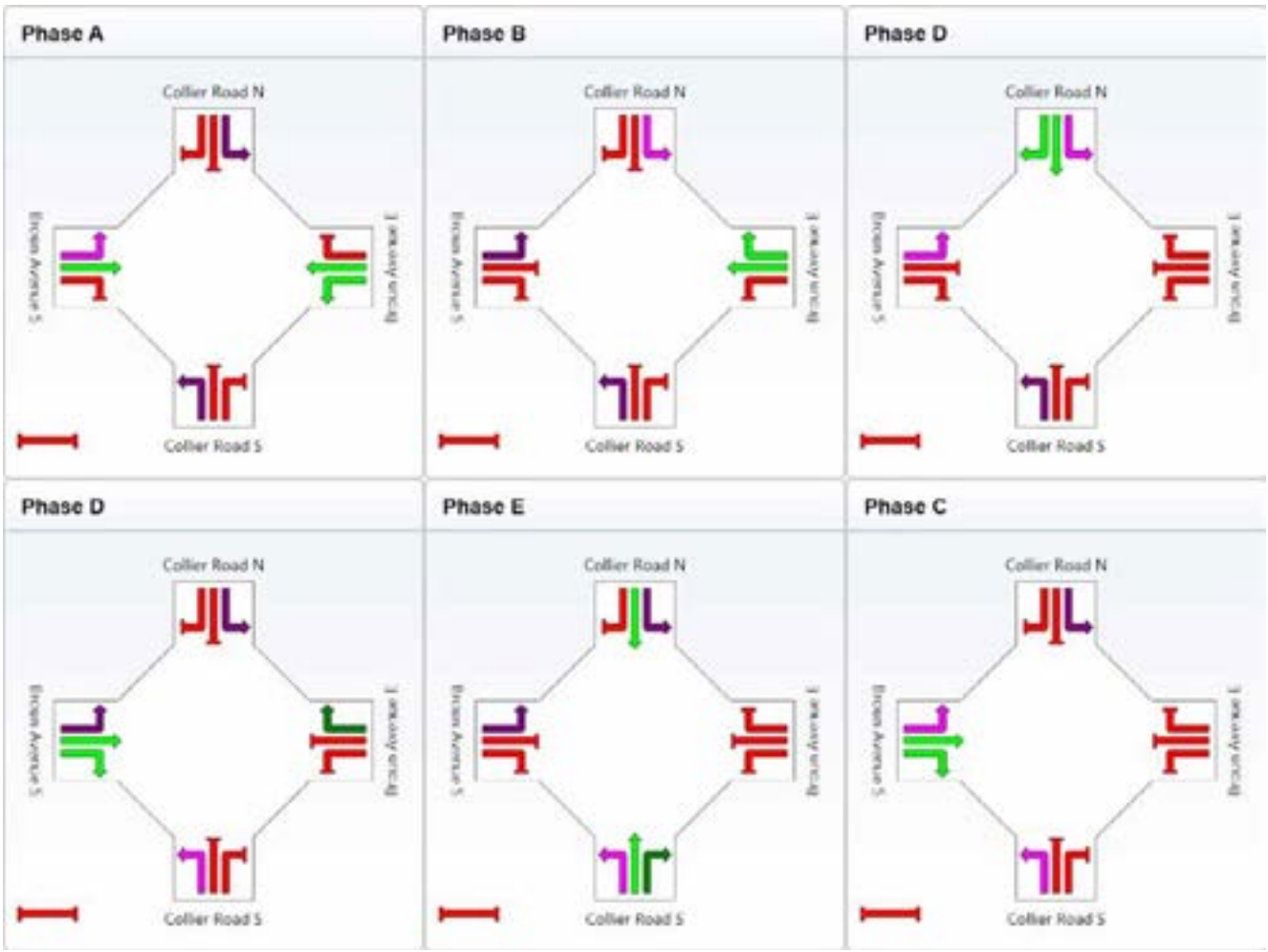
PHASING SUMMARY

Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Broun/Collier
Input Sequence: A , B, D, D, E, C
Output Sequence: A , B, D, D, E, C

Phase Timing Results

Phase	A	B	D	D	E	C
Green Time (sec)	6	6	9	9	18	6
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	12	12	15	15	24	12
Phase Split	13 %	13 %	17 %	17 %	27 %	13 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 5 Collier - Crimea AM

Collier Road - Crimea Street AM
Giveway / 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
2	T	596	0.0	0.153	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	243	0.0	0.329	12.6	LOS B	1.6	11.3	0.62	0.91	44.6
Approach		839	0.0	0.329	3.6	NA	1.6	11.3	0.18	0.26	54.5
East: Crimea Street E											
4	L	332	0.0	0.542	15.5	LOS C	3.4	24.0	0.68	1.03	42.0
6	R	123	0.0	1.932	943.7	LOS F	43.6	305.5	1.00	2.80	2.2
Approach		455	0.0	1.932	266.9	LOS F	43.6	305.5	0.77	1.51	7.2
North: Collier Road											
7	L	82	0.0	0.162	8.2	LOS A	0.0	0.0	0.00	0.93	49.0
8	T	547	0.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		629	0.0	0.162	1.1	NA	0.0	0.0	0.00	0.12	58.3
All Vehicles		1923	0.0	1.932	65.0	NA	43.6	305.5	0.26	0.51	21.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 5 Collier - Crimea PM

Collier Road - Crimea Street PM
Giveway / 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
2	T	838	0.0	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	342	0.0	0.493	14.6	LOS B	3.1	21.4	0.69	1.01	42.8
Approach		1180	0.0	0.493	4.2	NA	3.1	21.4	0.20	0.29	53.8
East: Crimea Street E											
4	L	199	0.0	0.346	14.1	LOS B	1.6	11.1	0.62	0.93	43.2
6	R	74	0.0	1.228	334.1	LOS F	12.8	89.7	1.00	1.83	5.9
Approach		273	0.0	1.228	100.6	LOS F	12.8	89.7	0.73	1.17	15.9
North: Collier Road											
7	L	88	0.0	0.175	8.2	LOS A	0.0	0.0	0.00	0.93	49.0
8	T	591	0.0	0.175	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		679	0.0	0.175	1.1	NA	0.0	0.0	0.00	0.12	58.3
All Vehicles		2132	0.0	1.228	15.5	NA	12.8	89.7	0.20	0.35	42.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Walter - Crimea AM

Walter Road - Crimea Street, AM Peak
Signals - Fixed Time Cycle Time = 80 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea Street S											
1	L	159	0.0	0.403	38.2	LOS D	5.5	38.4	0.91	0.80	29.2
2	T	100	0.0	0.241	28.7	LOS C	3.3	23.1	0.87	0.69	32.0
Approach		259	0.0	0.403	34.5	LOS C	5.5	38.4	0.89	0.75	30.2
East: Walter Road E											
4	L	119	0.0	0.493	34.1	LOS C	8.9	62.4	0.88	0.84	31.9
5	T	152	0.0	0.493	25.9	LOS C	8.9	62.4	0.88	0.74	32.5
6	R	225	0.0	0.825	48.5	LOS D	10.0	70.1	1.00	0.98	25.7
Approach		496	0.0	0.825	38.1	LOS D	10.0	70.1	0.93	0.87	28.9
North: Crimea Street N											
7	L	340	0.0	0.325	18.2	LOS B	7.1	49.5	0.57	0.78	39.9
8	T	336	0.0	0.306	9.9	LOS A	6.9	48.1	0.56	0.49	45.2
9	R	431	0.0	0.843	44.9	LOS D	18.4	128.7	1.00	0.96	26.8
Approach		1106	0.0	0.843	26.1	LOS C	18.4	128.7	0.74	0.76	34.6
West: Walter Road W											
10	L	268	0.0	0.227	14.7	LOS B	4.4	30.7	0.45	0.75	42.7
11	T	142	0.0	0.253	23.8	LOS C	4.3	30.1	0.81	0.65	34.6
Approach		411	0.0	0.253	17.9	LOS B	4.4	30.7	0.58	0.72	39.5
All Vehicles		2272	0.0	0.843	28.2	LOS C	18.4	128.7	0.77	0.78	33.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	28.9	LOS C	0.1	0.1	0.85	0.85
P3	Across E approach	50	11.6	LOS B	0.1	0.1	0.54	0.54
P5	Across N approach	50	30.6	LOS D	0.1	0.1	0.88	0.88
P7	Across W approach	50	34.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		200	26.3	LOS C			0.80	0.80

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

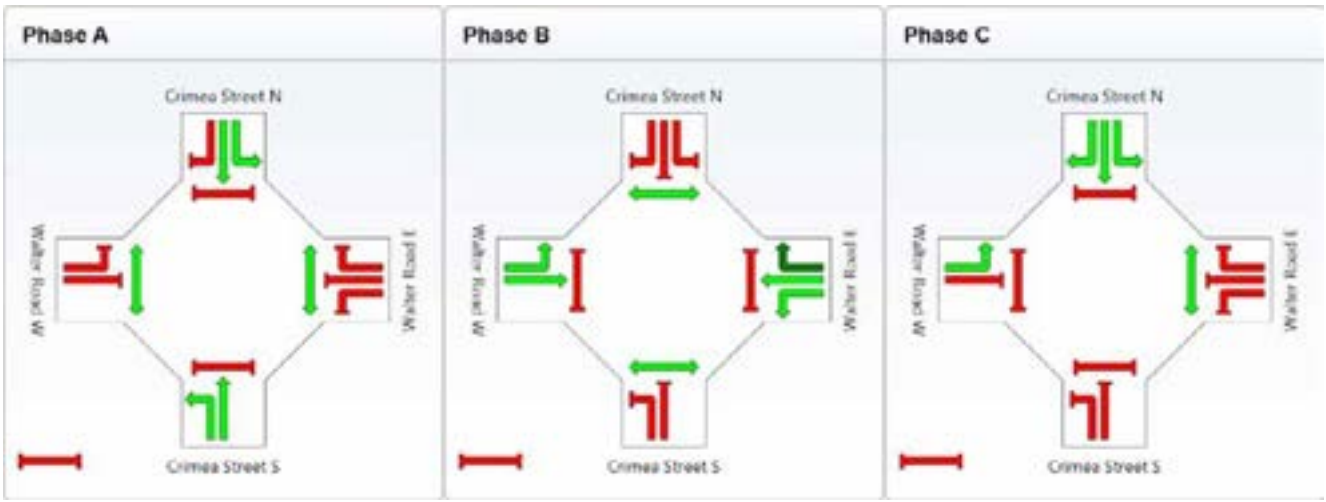
PHASING SUMMARY

Walter Road - Crimea Street, AM Peak
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Crimea
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	17	23	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	29	28
Phase Split	29 %	36 %	35 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Crimea PM

Walter Road - Crimea Street, PM Peak
Signals - Fixed Time Cycle Time = 80 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea Street S											
1	L	296	0.0	0.708	41.0	LOS D	11.3	78.9	0.98	0.87	28.2
2	T	206	0.0	0.470	29.6	LOS C	7.1	50.0	0.92	0.75	31.5
Approach		502	0.0	0.708	36.3	LOS D	11.3	78.9	0.95	0.82	29.4
East: Walter Road E											
4	L	49	0.0	0.248	23.3	LOS C	2.8	19.5	0.65	0.82	37.5
5	T	67	0.0	0.248	15.1	LOS B	2.8	19.5	0.65	0.51	39.6
6	R	171	0.0	1.722	708.3	LOS F	36.8	257.4	1.00	2.37	2.9
Approach		287	0.0	1.722	427.9	LOS F	36.8	257.4	0.86	1.66	4.7
North: Crimea Street N											
7	L	144	0.0	0.226	23.9	LOS C	4.5	31.3	0.67	0.79	36.5
8	T	223	0.0	0.226	15.7	LOS B	4.6	32.5	0.67	0.56	39.8
9	R	301	0.0	0.825	34.4	LOS C	9.8	68.7	1.00	0.93	30.8
Approach		668	0.0	0.825	25.9	LOS C	9.8	68.7	0.82	0.78	34.6
West: Walter Road W											
10	L	968	0.0	0.834	24.9	LOS C	33.0	230.9	0.85	0.91	35.6
11	T	182	0.0	0.220	15.7	LOS B	4.5	31.5	0.67	0.56	40.1
Approach		1151	0.0	0.834	23.4	LOS C	33.0	230.9	0.82	0.86	36.2
All Vehicles		2608	0.0	1.722	71.1	LOS E	36.8	257.4	0.85	0.92	20.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	20.3	LOS C	0.1	0.1	0.71	0.71
P3	Across E approach	50	18.9	LOS B	0.1	0.1	0.69	0.69
P5	Across N approach	50	21.8	LOS C	0.1	0.1	0.74	0.74
P7	Across W approach	50	34.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		200	23.8	LOS C			0.77	0.77

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

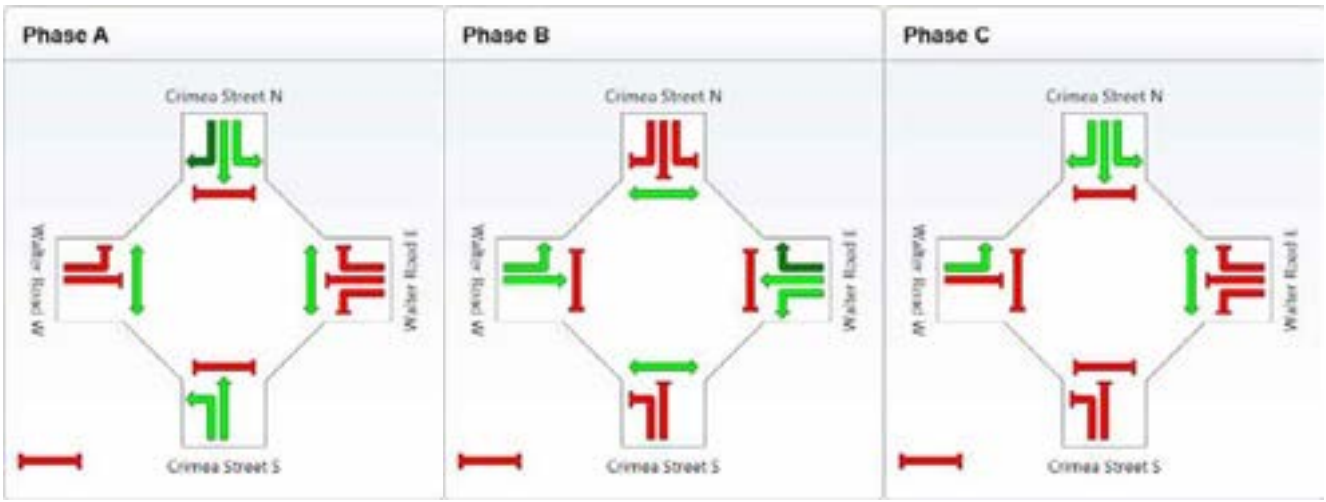
PHASING SUMMARY

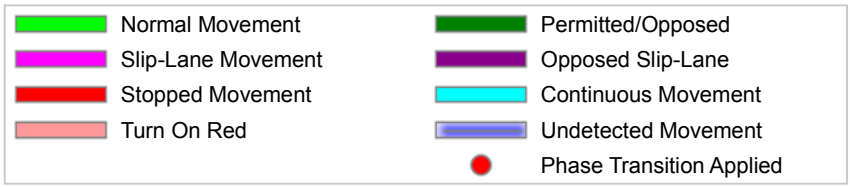
Walter Road - Crimea Street, PM Peak
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	18	34	10
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	24	40	16
Phase Split	30 %	50 %	20 %





MOVEMENT SUMMARY

Site: 7 Walter - Collier AM

Walter Road - Collier Road AM

Signals - Fixed Time Cycle Time = 80 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	234	0.0	0.213	18.3	LOS B	4.3	30.2	0.56	0.73	40.1
3	R	65	0.0	0.083	32.8	LOS C	1.2	8.1	0.79	0.72	31.5
Approach		299	0.0	0.213	21.5	LOS C	4.3	30.2	0.61	0.73	37.9
East: Walter Road E											
4	L	340	0.0	0.787	38.0	LOS D	18.6	130.0	0.97	0.93	29.7
5	T	640	0.0	0.787	29.7	LOS C	19.1	134.0	0.97	0.91	31.1
Approach		980	0.0	0.787	32.6	LOS C	19.1	134.0	0.97	0.92	30.6
West: Walter Road W											
11	T	355	0.0	0.152	7.5	LOS A	3.0	21.0	0.47	0.39	48.0
12	R	289	0.0	0.779	44.7	LOS D	11.8	82.6	1.00	0.92	27.0
Approach		644	0.0	0.779	24.2	LOS C	11.8	82.6	0.71	0.63	35.5
All Vehicles		1923	0.0	0.787	28.1	LOS C	19.1	134.0	0.83	0.79	33.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	27.2	LOS C	0.1	0.1	0.83	0.83
P7	Across W approach	50	34.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		100	30.7	LOS D			0.88	0.88

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

PHASING SUMMARY

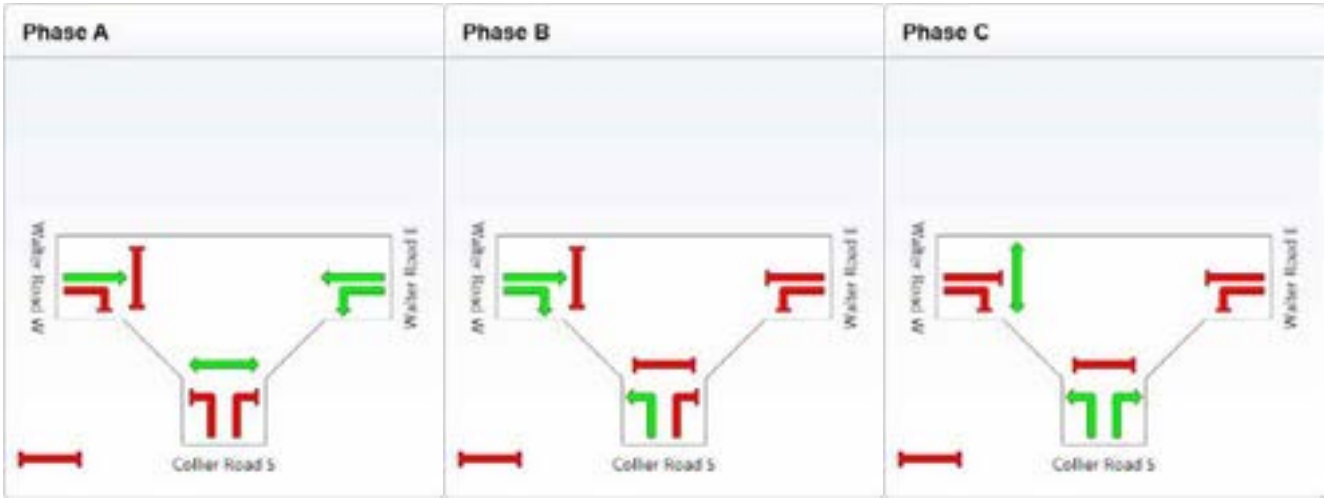
Walter Road - Collier Road AM

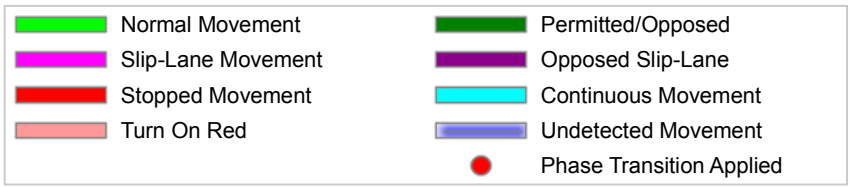
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Collier
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	26	16	20
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	32	22	26
Phase Split	40 %	28 %	33 %





MOVEMENT SUMMARY

Site: 7 Walter - Collier PM

Walter Road - Collier Road PM

Signals - Fixed Time Cycle Time = 70 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	341	0.0	0.297	16.8	LOS B	5.6	39.0	0.57	0.74	41.2
3	R	383	0.0	0.423	30.0	LOS C	6.4	44.6	0.84	0.79	32.9
Approach		724	0.0	0.423	23.8	LOS C	6.4	44.6	0.71	0.77	36.4
East: Walter Road E											
4	L	422	0.0	0.796	37.5	LOS D	15.0	104.7	0.99	0.93	29.5
5	T	156	0.0	0.280	21.2	LOS C	4.2	29.4	0.82	0.66	36.1
Approach		578	0.0	0.796	33.1	LOS C	15.0	104.7	0.94	0.86	31.0
West: Walter Road W											
11	T	827	0.0	0.391	10.0	LOS A	8.2	57.3	0.62	0.54	44.9
12	R	257	0.0	0.807	43.4	LOS D	9.6	67.3	1.00	0.95	27.5
Approach		1084	0.0	0.807	17.9	LOS B	9.6	67.3	0.71	0.64	39.0
All Vehicles		2386	0.0	0.807	23.4	LOS C	15.0	104.7	0.77	0.73	36.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	27.5	LOS C	0.1	0.1	0.89	0.89
P7	Across W approach	50	29.3	LOS C	0.1	0.1	0.91	0.91
All Pedestrians		100	28.4	LOS C			0.90	0.90

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

PHASING SUMMARY

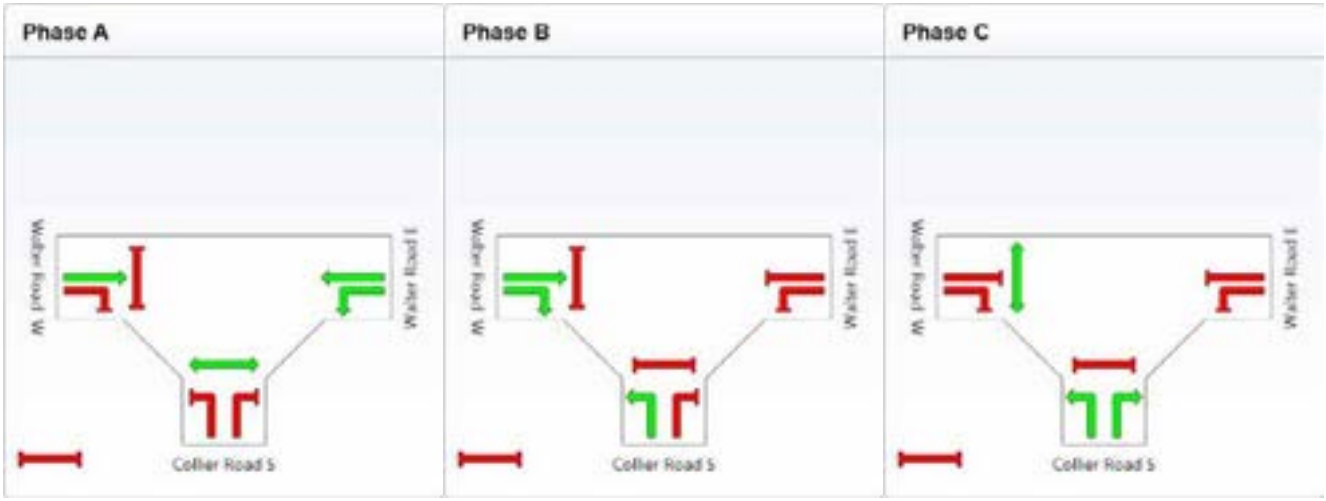
Walter Road - Collier Road PM

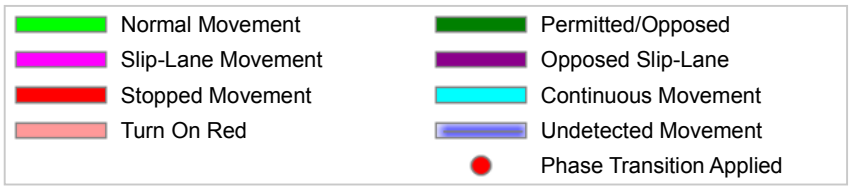
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Collier
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	20	12	20
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	26	18	26
Phase Split	37 %	26 %	37 %





MOVEMENT SUMMARY

Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 100 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	20	0.0	0.032	30.9	LOS C	0.6	4.5	0.69	0.69	32.6
2	T	38	0.0	0.093	34.4	LOS C	1.5	10.5	0.84	0.63	29.6
3	R	66	0.0	0.170	43.0	LOS D	2.7	18.7	0.86	0.75	27.6
Approach		124	0.0	0.170	38.4	LOS D	2.7	18.7	0.82	0.70	28.9
East: Walter Road E											
4	L	109	0.0	0.301	10.3	LOS B	1.2	8.3	0.30	0.66	46.8
5	T	555	0.0	0.508	32.8	LOS C	11.4	80.1	0.89	0.75	30.2
6	R	133	0.0	0.649	56.8	LOS E	6.6	46.0	1.00	0.82	23.5
Approach		797	0.0	0.649	33.7	LOS C	11.4	80.1	0.83	0.75	30.2
North: Wellington Road											
7	L	133	0.0	0.690	48.1	LOS D	13.2	92.2	0.98	0.86	26.5
8	T	421	0.0	0.690	40.9	LOS D	13.2	92.2	0.98	0.84	26.8
9	R	148	0.0	0.400	46.0	LOS D	6.4	44.9	0.92	0.80	26.6
Approach		702	0.0	0.690	43.3	LOS D	13.2	92.2	0.97	0.84	26.7
West: Walter Road W											
10	L	148	0.0	0.285	8.8	LOS A	1.0	7.1	0.22	0.65	48.3
11	T	408	0.0	0.436	35.1	LOS D	8.6	59.9	0.90	0.74	29.2
12	R	68	0.0	0.526	59.6	LOS E	3.5	24.2	1.00	0.76	22.8
Approach		625	0.0	0.526	31.5	LOS C	8.6	59.9	0.75	0.72	31.2
All Vehicles		2248	0.0	0.690	36.4	LOS D	13.2	92.2	0.85	0.77	29.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	12.5	LOS B	0.1	0.1	0.50	0.50
P2	Across S approach	50	28.9	LOS C	0.1	0.1	0.76	0.76
P3	Across E approach	50	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	50	40.5	LOS E	0.1	0.1	0.90	0.90
P7	Across W approach	50	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		250	34.0	LOS D			0.81	0.81

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

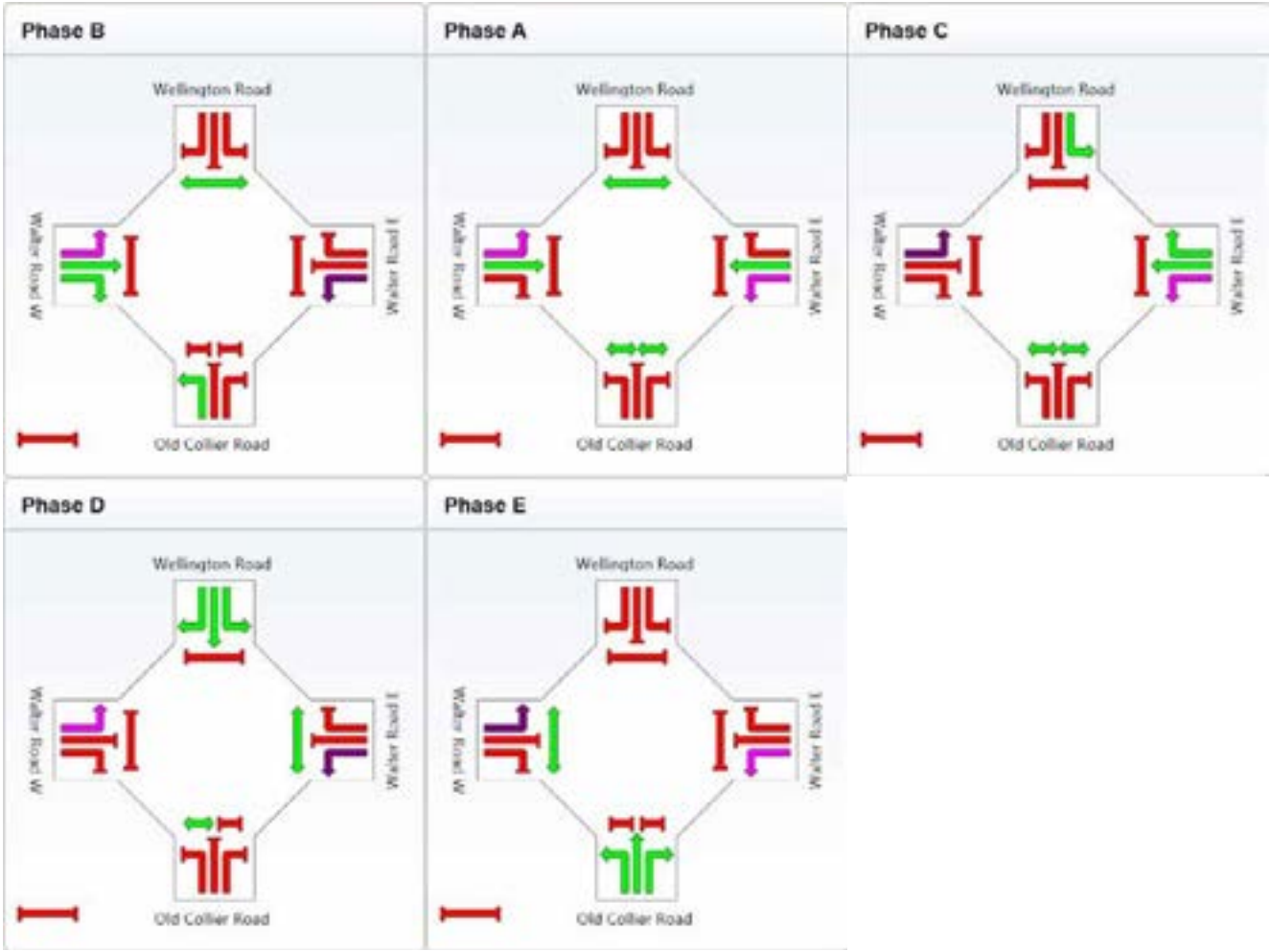
PHASING SUMMARY

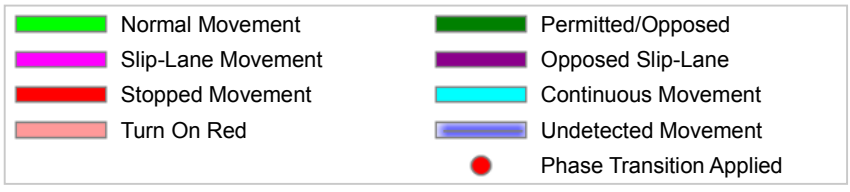
Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Wellington
Input Sequence: B, A, C, D, E
Output Sequence: B, A, C, D, E

Phase Timing Results

Phase	B	A	C	D	E
Green Time (sec)	7	11	11	20	21
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	13	17	17	26	27
Phase Split	13 %	17 %	17 %	26 %	27 %





MOVEMENT SUMMARY

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 100 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	99	0.0	0.152	31.5	LOS C	3.3	23.1	0.72	0.75	32.4
2	T	253	0.0	0.617	39.3	LOS D	11.4	79.8	0.96	0.80	27.6
3	R	271	0.0	0.694	48.7	LOS D	12.7	88.6	0.98	0.85	25.8
Approach		622	0.0	0.694	42.2	LOS D	12.7	88.6	0.93	0.82	27.4
East: Walter Road E											
4	L	122	0.0	0.259	9.1	LOS A	0.9	6.6	0.24	0.65	48.0
5	T	463	0.0	0.440	32.8	LOS C	9.4	66.0	0.88	0.73	30.2
6	R	283	0.0	0.897	64.9	LOS E	16.2	113.5	1.00	1.01	21.6
Approach		868	0.0	0.897	39.9	LOS D	16.2	113.5	0.83	0.81	28.0
North: Wellington Road											
7	L	283	0.0	0.373	28.9	LOS C	9.8	68.7	0.72	0.81	33.5
8	T	160	0.0	0.373	36.3	LOS D	9.8	68.7	0.89	0.72	28.7
9	R	205	0.0	0.553	47.4	LOS D	9.2	64.4	0.95	0.82	26.1
Approach		648	0.0	0.553	36.6	LOS D	9.8	68.7	0.84	0.79	29.6
West: Walter Road W											
10	L	205	0.0	0.779	21.0	LOS C	4.7	32.6	0.44	0.76	38.2
11	T	613	0.0	0.873	52.8	LOS D	16.8	117.8	1.00	1.02	23.5
12	R	65	0.0	0.439	57.9	LOS E	3.2	22.5	0.99	0.76	23.2
Approach		883	0.0	0.873	45.8	LOS D	16.8	117.8	0.87	0.94	25.9
All Vehicles		3022	0.0	0.897	41.4	LOS D	16.8	117.8	0.86	0.85	27.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	13.0	LOS B	0.1	0.1	0.51	0.51
P2	Across S approach	50	29.6	LOS C	0.1	0.1	0.77	0.77
P3	Across E approach	50	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	50	26.6	LOS C	0.1	0.1	0.73	0.73
P7	Across W approach	50	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		250	31.5	LOS D			0.78	0.78

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

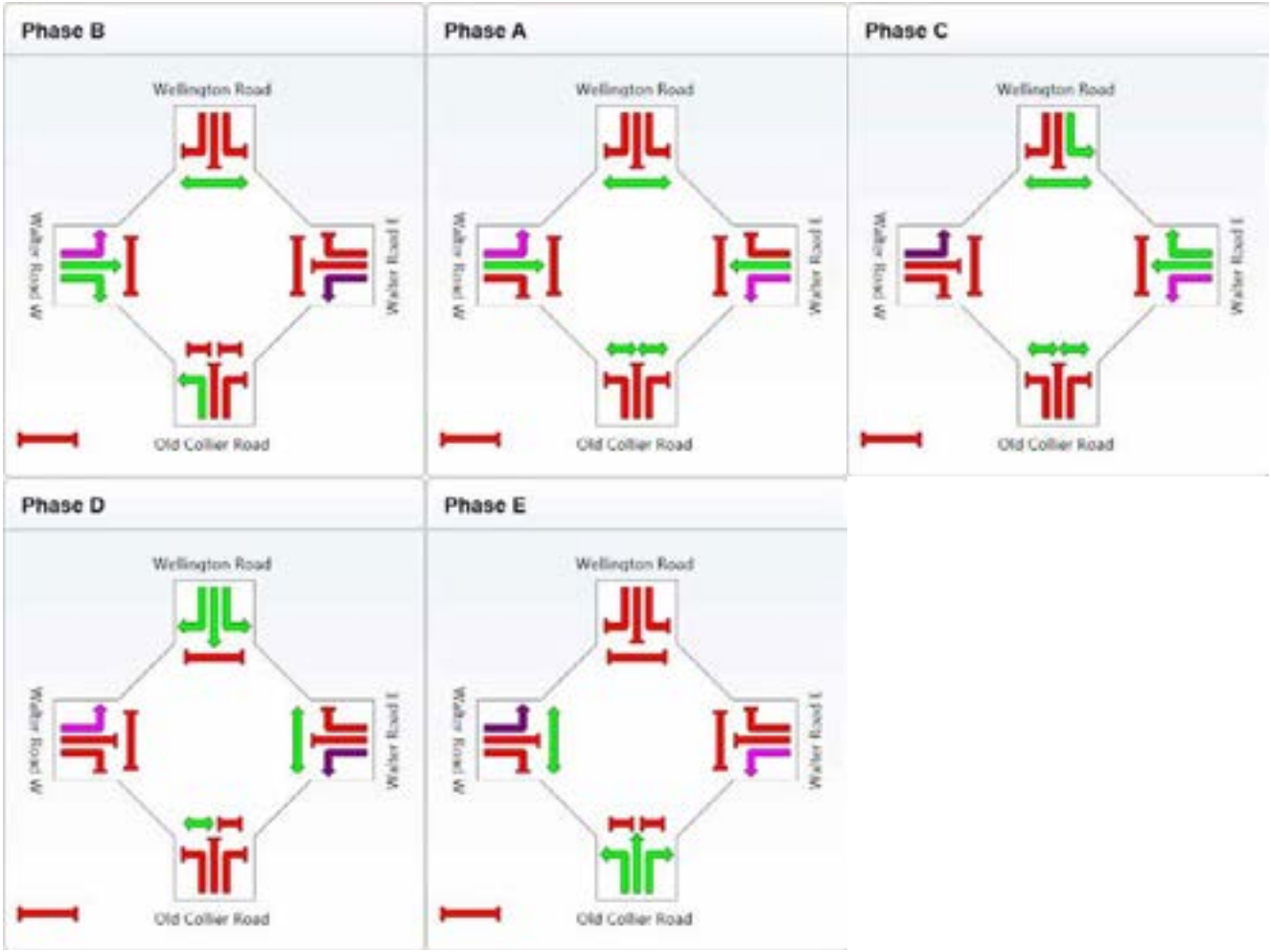
PHASING SUMMARY

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Wellington
Input Sequence: B, A, C, D, E
Output Sequence: B, A, C, D, E

Phase Timing Results

Phase	B	A	C	D	E
Green Time (sec)	8	4	17	20	21
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	14	10	23	26	27
Phase Split	14 %	10 %	23 %	26 %	27 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Progress AM

Walter Road - Progress Street AM

Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street S											
1	L	25	0.0	0.092	20.6	LOS C	0.5	3.2	0.65	0.70	38.2
3	R	21	0.0	0.030	20.3	LOS C	0.4	2.7	0.65	0.69	38.6
Approach		46	0.0	0.092	20.5	LOS C	0.5	3.2	0.65	0.70	38.4
East: Walter Road E											
4	L	76	0.0	0.180	19.7	LOS B	1.4	9.5	0.64	0.73	38.9
5	T	833	0.0	0.512	14.2	LOS B	9.2	64.3	0.79	0.68	40.9
Approach		908	0.0	0.512	14.6	LOS B	9.2	64.3	0.78	0.69	40.7
West: Walter Road W											
11	T	673	0.0	0.414	13.5	LOS B	7.0	49.3	0.75	0.64	41.6
12	R	36	0.0	0.147	27.2	LOS C	0.8	5.9	0.80	0.74	34.4
Approach		708	0.0	0.414	14.2	LOS B	7.0	49.3	0.75	0.64	41.1
All Vehicles		1663	0.0	0.512	14.6	LOS B	9.2	64.3	0.76	0.67	40.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

PHASING SUMMARY

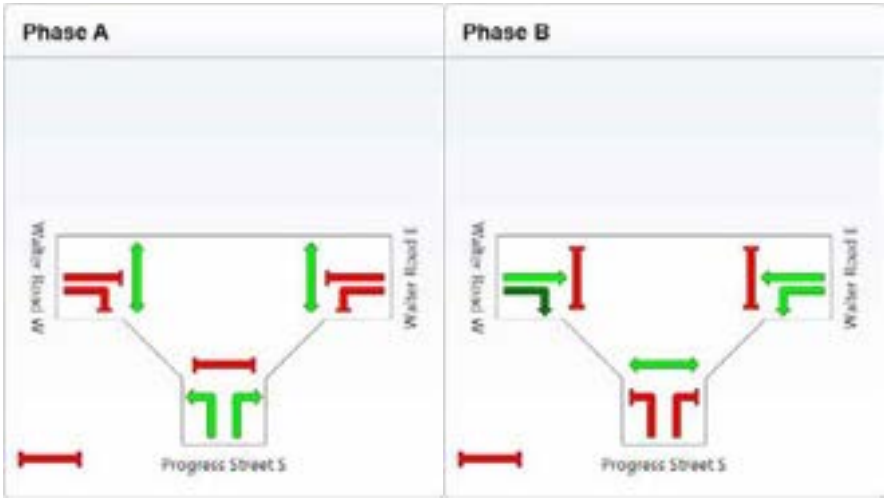
Walter Road - Progress Street AM

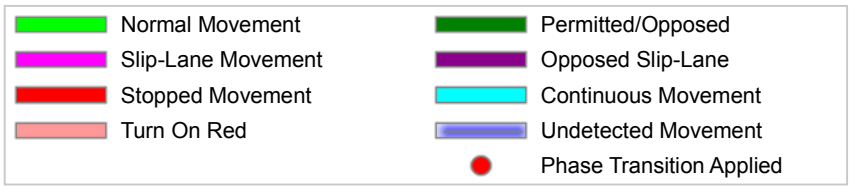
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Walter Road - Progress Street PM

Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street S											
1	L	44	0.0	0.161	20.8	LOS C	0.8	5.7	0.66	0.72	38.1
3	R	99	0.0	0.139	21.0	LOS C	1.9	13.3	0.68	0.74	38.1
Approach		143	0.0	0.161	20.9	LOS C	1.9	13.3	0.68	0.73	38.1
East: Walter Road E											
4	L	128	0.0	0.306	20.1	LOS C	2.4	16.6	0.66	0.75	38.6
5	T	741	0.0	0.456	13.8	LOS B	7.9	55.5	0.77	0.66	41.3
Approach		869	0.0	0.456	14.7	LOS B	7.9	55.5	0.75	0.67	40.9
West: Walter Road W											
11	T	942	0.0	0.580	14.7	LOS B	10.8	75.5	0.82	0.72	40.4
12	R	62	0.0	0.238	26.9	LOS C	1.5	10.4	0.80	0.76	34.5
Approach		1004	0.0	0.580	15.5	LOS B	10.8	75.5	0.82	0.72	40.0
All Vehicles		2017	0.0	0.580	15.5	LOS B	10.8	75.5	0.78	0.70	40.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

PHASING SUMMARY

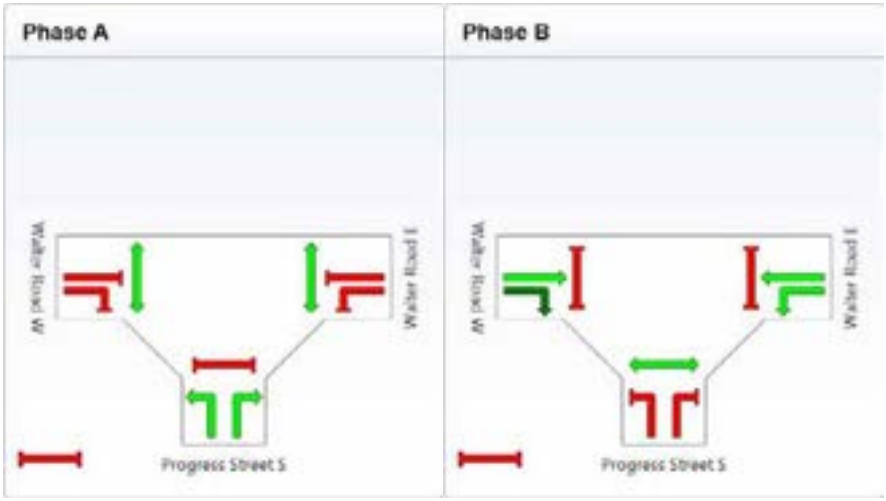
Walter Road - Progress Street PM

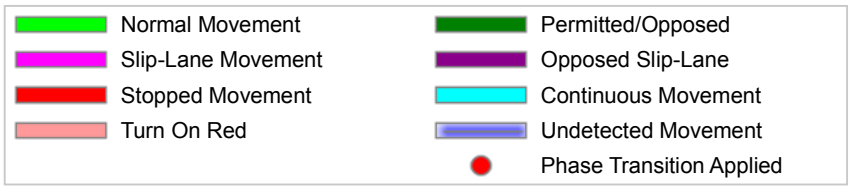
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Site: 9 Walter - Russell AM

Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russell Street S											
1	L	111	0.0	0.156	21.4	LOS C	2.2	15.1	0.69	0.76	37.7
2	T	19	0.0	0.796	32.3	LOS C	6.5	45.3	1.00	0.95	28.7
3	R	179	0.0	0.796	40.3	LOS D	6.5	45.3	1.00	0.95	28.6
Approach		309	0.0	0.796	33.0	LOS C	6.5	45.3	0.89	0.88	31.3
East: Walter Road E											
4	L	190	0.0	0.752	29.4	LOS C	8.9	62.1	0.98	0.95	34.1
5	T	485	0.0	0.752	24.9	LOS C	9.7	67.6	0.99	0.92	33.2
6	R	43	0.0	0.160	29.8	LOS C	1.1	7.5	0.85	0.74	33.0
Approach		718	0.0	0.752	26.4	LOS C	9.7	67.6	0.98	0.92	33.4
North: Russell Street N											
7	L	78	0.0	0.782	41.3	LOS D	3.8	26.6	1.00	0.91	28.5
8	T	52	0.0	0.782	33.2	LOS C	4.8	33.6	1.00	0.91	28.6
9	R	133	0.0	0.782	41.5	LOS D	4.8	33.6	1.00	0.92	28.1
Approach		263	0.0	0.782	39.8	LOS D	4.8	33.6	1.00	0.92	28.3
West: Walter Road W											
10	L	49	0.0	0.282	18.8	LOS B	4.6	32.2	0.65	0.88	41.2
11	T	461	0.0	0.282	10.6	LOS B	4.6	32.5	0.65	0.55	44.0
12	R	232	0.0	0.833	41.3	LOS D	7.8	54.6	1.00	0.99	28.1
Approach		742	0.0	0.833	20.8	LOS C	7.8	54.6	0.76	0.71	37.2
All Vehicles		2032	0.0	0.833	27.1	LOS C	9.7	67.6	0.89	0.84	33.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

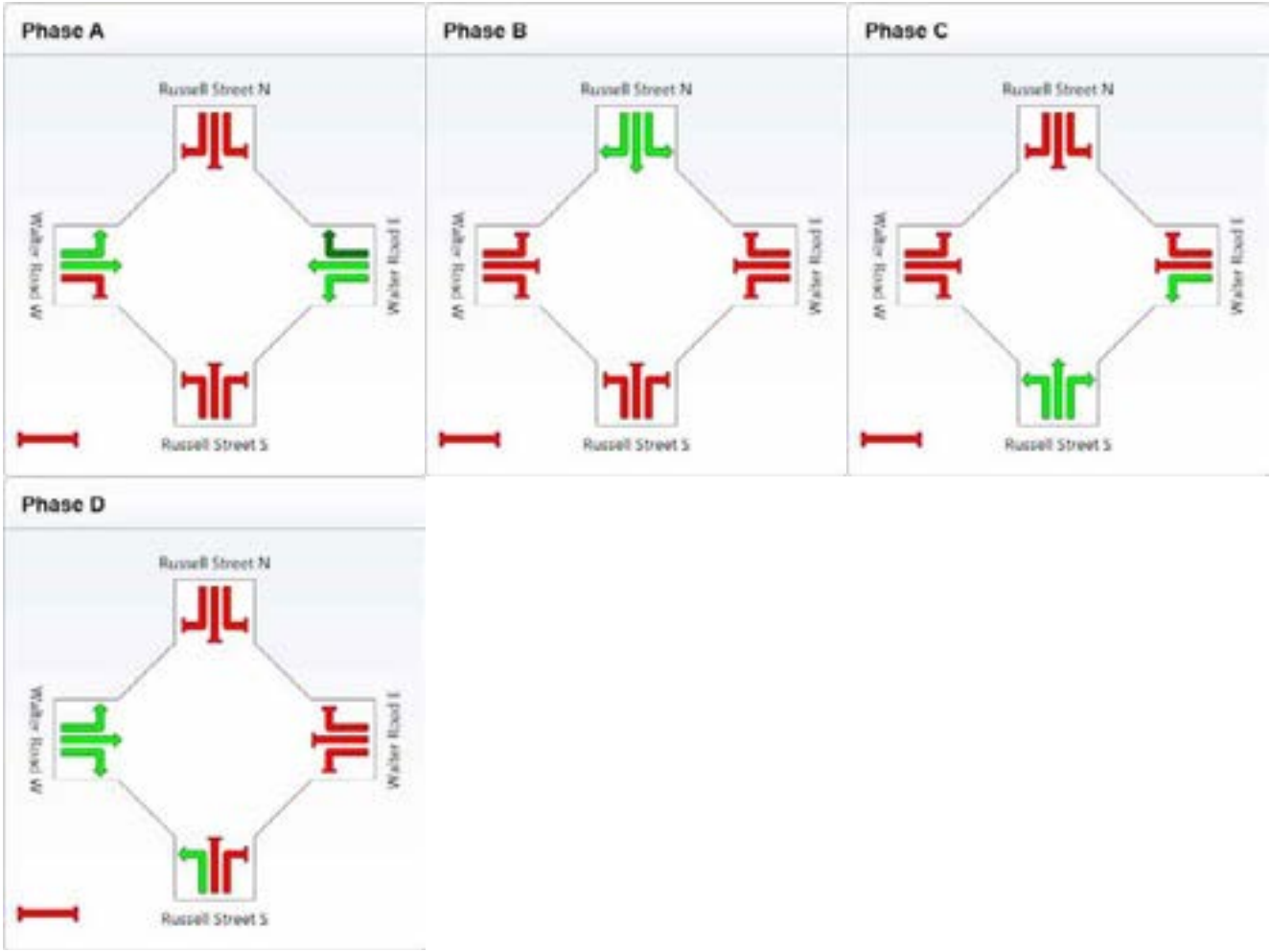
PHASING SUMMARY

Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Russell
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	6	8	9
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	12	14	15
Phase Split	32 %	20 %	23 %	25 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 80 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russeel Street S											
1	L	283	0.0	0.305	20.8	LOS C	6.5	45.5	0.63	0.78	38.1
2	T	38	0.0	0.837	37.5	LOS D	16.6	116.5	1.00	0.97	26.9
3	R	353	0.0	0.837	45.5	LOS D	16.6	116.5	1.00	0.97	26.8
Approach		674	0.0	0.837	34.7	LOS C	16.6	116.5	0.84	0.89	30.6
East: Walter Road E											
4	L	193	0.0	0.830	40.1	LOS D	13.2	92.6	1.00	0.99	29.2
5	T	489	0.0	0.830	36.8	LOS D	13.8	96.5	1.00	0.99	28.1
6	R	49	0.0	0.244	38.8	LOS D	1.7	12.0	0.88	0.76	29.0
Approach		732	0.0	0.830	37.8	LOS D	13.8	96.5	0.99	0.97	28.5
North: Rusell Street N											
7	L	34	0.0	0.393	49.0	LOS D	2.2	15.6	0.99	0.75	26.0
8	T	22	0.0	0.393	40.8	LOS D	2.2	15.6	0.99	0.74	26.1
9	R	57	0.0	0.505	49.1	LOS D	2.3	16.0	0.99	0.75	25.5
Approach		113	0.0	0.505	47.5	LOS D	2.3	16.0	0.99	0.75	25.8
West: Walter Road W											
10	L	69	0.0	0.413	24.2	LOS C	9.5	66.3	0.72	0.89	37.5
11	T	652	0.0	0.413	16.0	LOS B	9.6	66.9	0.72	0.62	39.5
12	R	266	0.0	0.819	48.4	LOS D	11.4	79.5	1.00	0.94	25.7
Approach		987	0.0	0.819	25.3	LOS C	11.4	79.5	0.80	0.73	34.4
All Vehicles		2505	0.0	0.837	32.5	LOS C	16.6	116.5	0.87	0.84	31.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

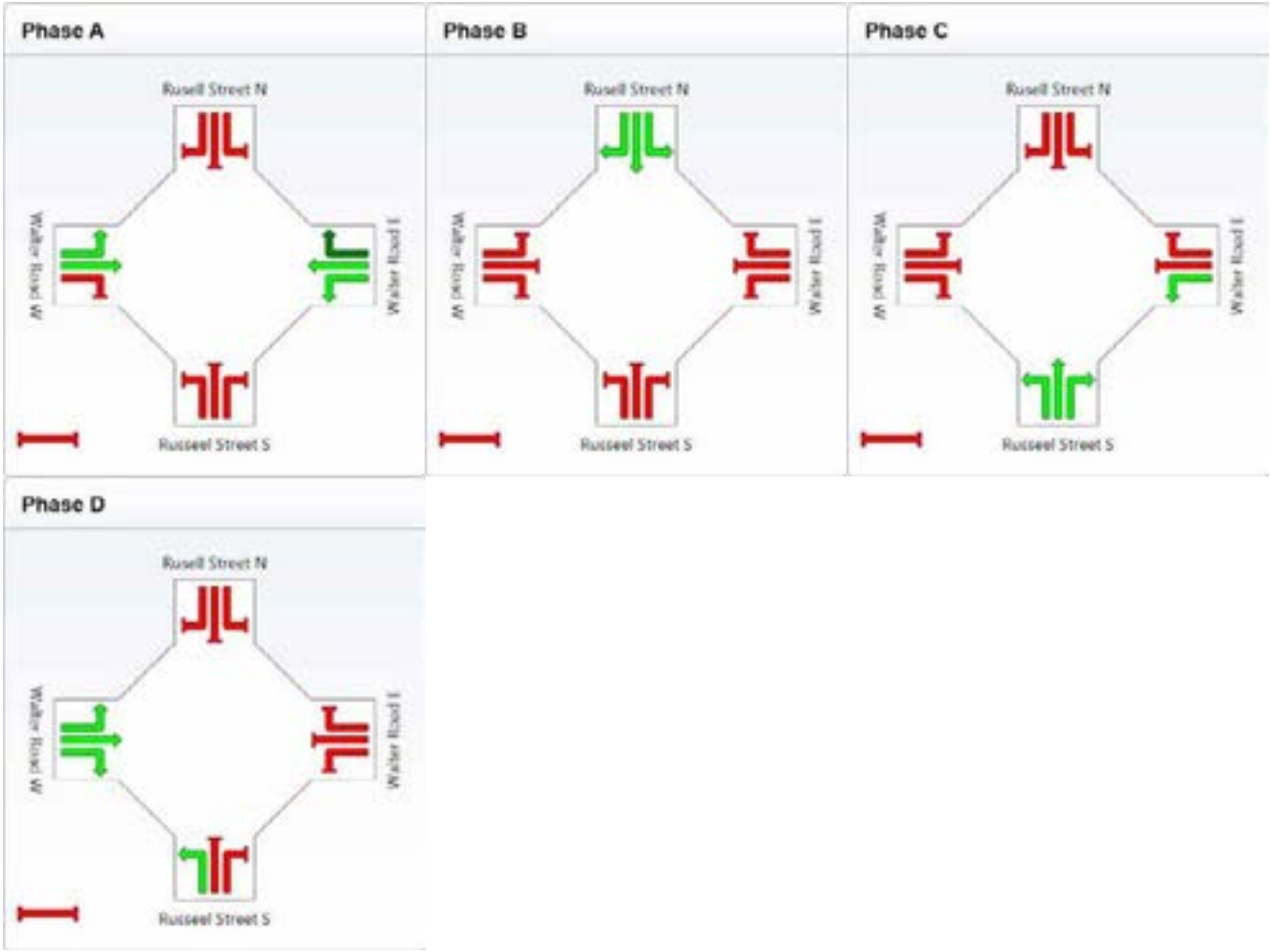
PHASING SUMMARY

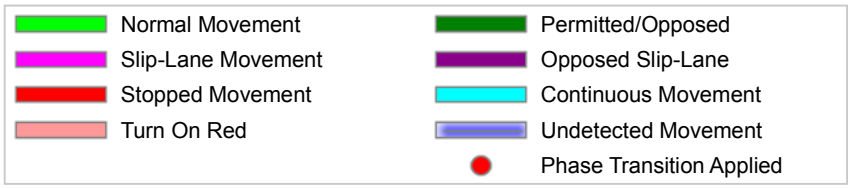
Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Russell
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	16	6	20	14
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	22	12	26	20
Phase Split	28 %	15 %	33 %	25 %





MOVEMENT SUMMARY

Site: 11 Walter- Coode AM

Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	252	0.0	0.493	22.0	LOS C	4.4	30.5	0.89	0.81	37.3
2	T	80	0.0	0.485	14.8	LOS B	3.2	22.7	0.90	0.73	38.7
3	R	101	0.0	0.485	22.7	LOS C	3.2	22.7	0.90	0.81	37.9
Approach		433	0.0	0.493	20.9	LOS C	4.4	30.5	0.89	0.79	37.7
East: Walter Road E											
4	L	178	0.0	0.379	8.9	LOS A	0.7	5.0	0.38	0.68	47.7
5	T	518	0.0	0.312	8.4	LOS A	3.4	24.1	0.70	0.58	46.1
6	R	32	0.0	0.092	19.6	LOS B	0.5	3.3	0.75	0.72	38.9
Approach		727	0.0	0.379	9.0	LOS A	3.4	24.1	0.63	0.61	46.1
North: Coode Streeet N											
7	L	158	0.0	0.377	21.5	LOS C	3.2	22.6	0.85	0.80	38.1
8	T	87	0.0	0.377	14.4	LOS B	3.2	22.6	0.87	0.70	38.6
9	R	74	0.0	0.377	23.3	LOS C	2.2	15.6	0.89	0.79	37.5
Approach		319	0.0	0.377	20.0	LOS B	3.2	22.6	0.87	0.77	38.1
West: Walter Road W											
10	L	146	0.0	0.427	17.2	LOS B	4.9	34.3	0.75	0.85	42.1
11	T	554	0.0	0.427	9.0	LOS A	5.0	35.0	0.75	0.63	45.0
12	R	212	0.0	0.513	20.0	LOS C	3.5	24.6	0.84	0.81	38.7
Approach		912	0.0	0.513	12.9	LOS B	5.0	35.0	0.77	0.71	42.9
All Vehicles		2391	0.0	0.513	14.1	LOS B	5.0	35.0	0.76	0.70	42.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	14.5	LOS B	0.0	0.0	0.85	0.85
All Pedestrians		50	14.5	LOS B			0.85	0.85

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

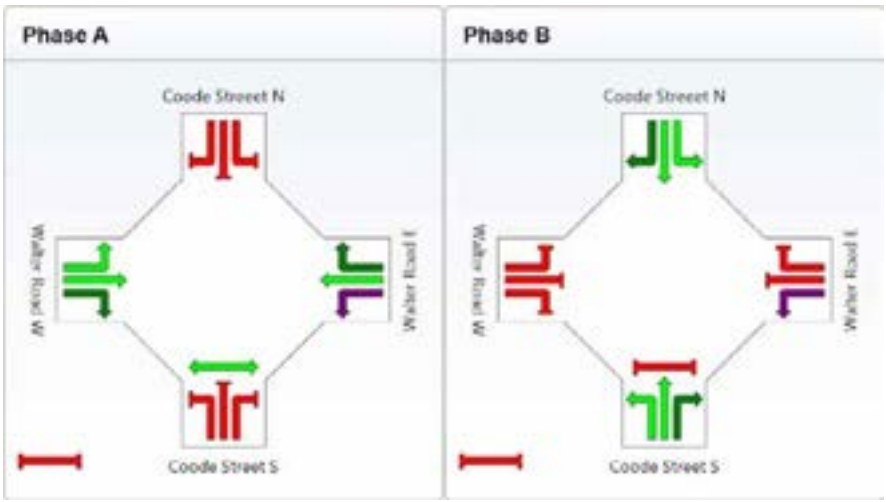
PHASING SUMMARY

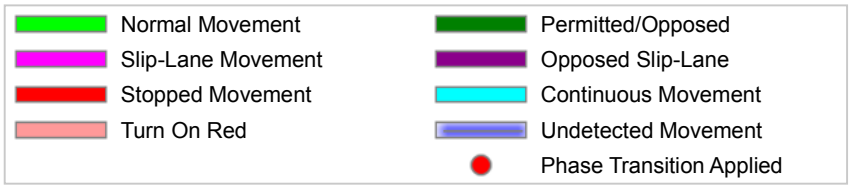
Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Coode
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	17	11
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	23	17
Phase Split	58 %	43 %





MOVEMENT SUMMARY

Site: 11 Walter- Coode PM

Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	123	0.0	0.313	22.9	LOS C	2.3	15.9	0.87	0.78	36.9
2	T	45	0.0	0.313	14.9	LOS B	2.3	15.9	0.87	0.69	38.3
3	R	74	0.0	0.313	22.8	LOS C	1.9	13.5	0.87	0.78	37.6
Approach		242	0.0	0.313	21.4	LOS C	2.3	15.9	0.87	0.76	37.4
East: Walter Road E											
4	L	184	0.0	0.350	8.7	LOS A	0.6	4.5	0.35	0.67	47.9
5	T	535	0.0	0.289	7.0	LOS A	3.3	22.8	0.64	0.54	47.8
6	R	64	0.0	0.158	17.6	LOS B	0.9	6.2	0.70	0.75	40.4
Approach		783	0.0	0.350	8.3	LOS A	3.3	22.8	0.58	0.59	47.1
North: Coode Streeet N											
7	L	53	0.0	0.207	22.5	LOS C	1.5	10.3	0.85	0.77	37.9
8	T	43	0.0	0.207	14.5	LOS B	1.5	10.3	0.85	0.66	38.7
9	R	57	0.0	0.207	23.4	LOS C	1.1	7.9	0.87	0.75	36.7
Approach		153	0.0	0.207	20.6	LOS C	1.5	10.3	0.86	0.73	37.7
West: Walter Road W											
10	L	134	0.0	0.349	15.5	LOS B	4.0	28.0	0.67	0.85	43.4
11	T	506	0.0	0.349	7.3	LOS A	4.1	28.5	0.67	0.57	46.9
12	R	111	0.0	0.245	17.2	LOS B	1.5	10.7	0.70	0.76	40.7
Approach		751	0.0	0.349	10.2	LOS B	4.1	28.5	0.67	0.65	45.2
All Vehicles		1928	0.0	0.350	11.7	LOS B	4.1	28.5	0.68	0.64	44.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	12.8	LOS B	0.0	0.0	0.80	0.80
All Pedestrians		50	12.8	LOS B			0.80	0.80

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

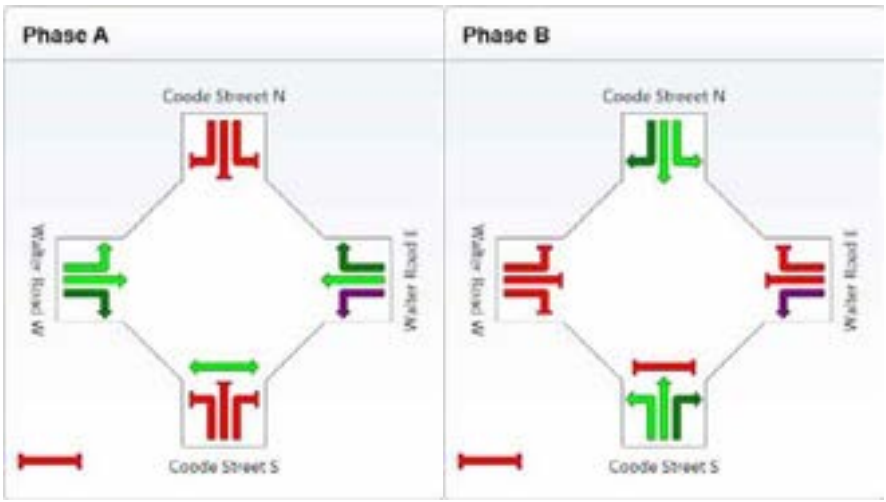
PHASING SUMMARY

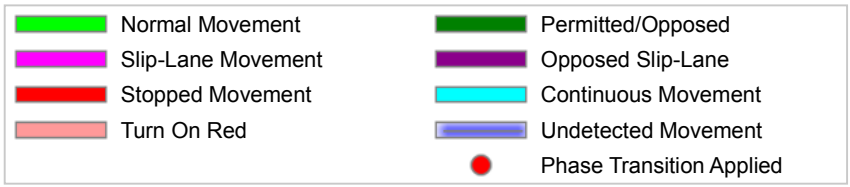
Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	19	9
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	25	15
Phase Split	63 %	38 %





MOVEMENT SUMMARY

Site: 12 Coode - Rudloc AM

Coode Street - Rudloc Road AM
Giveway / 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
2	T	332	0.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	132	0.0	0.155	10.8	LOS B	0.6	4.3	0.51	0.78	46.2
Approach		463	0.0	0.170	3.1	NA	0.6	4.3	0.15	0.22	55.3
East: Rudloc Road											
4	L	102	0.0	0.329	10.8	LOS B	0.5	3.6	0.45	0.76	46.2
6	R	101	0.0	0.443	29.1	LOS D	2.0	13.8	0.84	1.03	33.3
Approach		203	0.0	0.443	19.9	LOS C	2.0	13.8	0.64	0.90	38.7
North: Coode Street N											
7	L	217	0.0	0.250	8.2	LOS A	0.0	0.0	0.00	0.84	49.0
8	T	260	0.0	0.250	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		477	0.0	0.250	3.7	NA	0.0	0.0	0.00	0.38	54.4
All Vehicles		1143	0.0	0.443	6.3	NA	2.0	13.8	0.17	0.41	51.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 12 Coode - Rudloc PM

Coode Street - Rudloc Road PM
Giveway / 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
2	T	104	0.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	380	0.0	0.374	10.5	LOS B	2.1	14.5	0.51	0.78	46.5
Approach		484	0.0	0.374	8.3	NA	2.1	14.5	0.40	0.61	48.9
East: Rudloc Road											
4	L	139	0.0	0.407	10.2	LOS B	0.7	4.7	0.38	0.71	46.8
6	R	139	0.0	0.517	27.3	LOS D	2.6	18.4	0.83	1.07	34.3
Approach		278	0.0	0.517	18.7	LOS C	2.6	18.4	0.60	0.89	39.6
North: Coode Street N											
7	L	154	0.0	0.177	8.2	LOS A	0.0	0.0	0.00	0.84	49.0
8	T	183	0.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		337	0.0	0.177	3.7	NA	0.0	0.0	0.00	0.38	54.4
All Vehicles		1099	0.0	0.517	9.5	NA	2.6	18.4	0.33	0.61	47.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Russell - Rudloc AM

Russell Street - Rubloc Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russell St S											
1	L	60	0.0	0.190	13.7	LOS B	2.0	14.1	0.56	0.86	45.0
2	T	180	0.0	0.190	5.7	LOS A	2.0	14.1	0.60	0.48	47.9
3	R	72	0.0	0.190	14.3	LOS B	1.3	9.0	0.70	0.78	43.9
Approach		312	0.0	0.190	9.2	LOS A	2.0	14.1	0.61	0.62	46.4
East: Rudloc Road E											
4	L	41	0.0	0.177	21.5	LOS C	1.2	8.7	0.82	0.78	38.7
5	T	47	0.0	0.177	14.3	LOS B	1.2	8.7	0.84	0.64	39.0
6	R	35	0.0	0.177	25.4	LOS C	0.9	6.0	0.91	0.74	35.8
Approach		123	0.0	0.177	19.8	LOS B	1.2	8.7	0.85	0.71	38.0
North: Russell Street N											
7	L	84	0.0	0.326	23.0	LOS C	2.4	16.8	0.88	0.79	37.6
8	T	141	0.0	0.326	14.9	LOS B	2.4	16.8	0.88	0.69	38.9
9	R	37	0.0	0.326	23.0	LOS C	2.2	15.1	0.88	0.80	38.4
Approach		262	0.0	0.326	18.6	LOS B	2.4	16.8	0.88	0.74	38.4
West: Rudloc Road W											
10	L	68	0.0	0.329	24.9	LOS C	2.0	14.0	0.91	0.78	36.4
11	T	99	0.0	0.329	16.8	LOS B	2.0	14.0	0.91	0.71	37.3
12	R	37	0.0	0.329	25.0	LOS C	1.8	12.4	0.91	0.78	36.9
Approach		204	0.0	0.329	21.0	LOS C	2.0	14.0	0.91	0.75	36.9
All Vehicles		901	0.0	0.329	16.1	LOS B	2.4	16.8	0.79	0.70	40.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

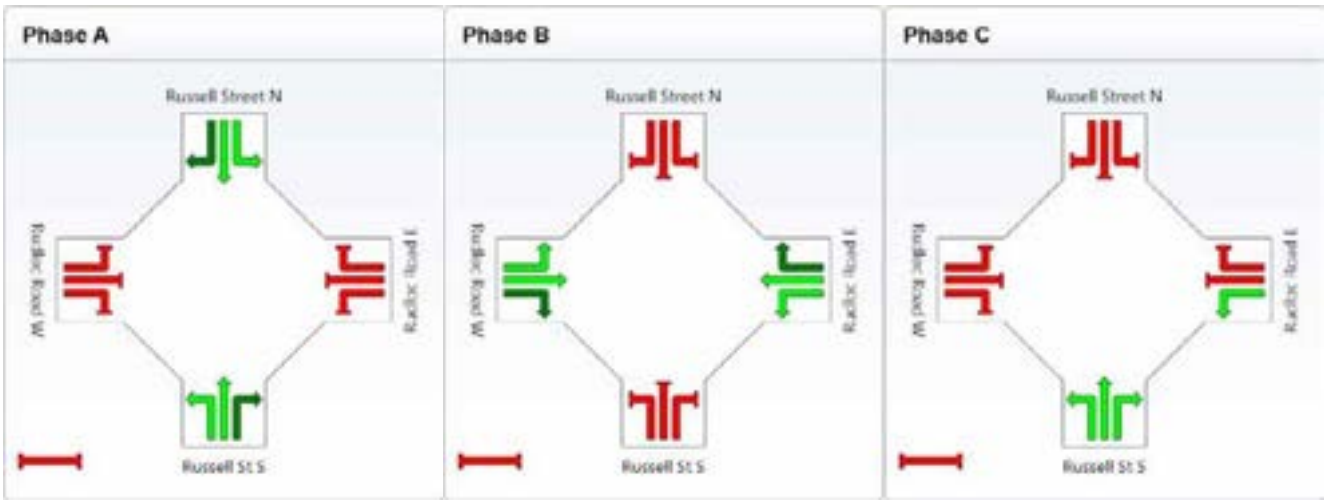
PHASING SUMMARY

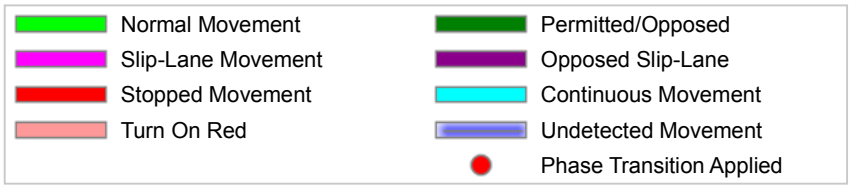
Russell Street - Rubloc Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Russell/Rudloc
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	9	7	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	15	13	12
Phase Split	38 %	33 %	30 %





MOVEMENT SUMMARY

Site: Russell - Rudloc PM

Russell Street - Rubloc Road PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	87	0.0	0.264	13.4	LOS B	2.9	20.5	0.56	0.87	45.3
2	T	256	0.0	0.264	5.4	LOS A	2.9	20.5	0.60	0.49	48.2
3	R	98	0.0	0.264	14.1	LOS B	1.7	11.9	0.73	0.79	44.2
Approach		441	0.0	0.264	8.9	LOS A	2.9	20.5	0.62	0.63	46.7
East: Rudloc Road E											
4	L	87	0.0	0.328	22.2	LOS C	2.4	16.6	0.86	0.80	38.1
5	T	83	0.0	0.328	15.8	LOS B	2.4	16.6	0.89	0.70	37.7
6	R	44	0.0	0.328	27.0	LOS C	1.5	10.3	0.95	0.76	35.3
Approach		215	0.0	0.328	20.7	LOS C	2.4	16.6	0.89	0.75	37.3
North: Russell Street N											
7	L	127	0.0	0.454	22.7	LOS C	3.8	26.3	0.89	0.81	37.9
8	T	215	0.0	0.454	14.6	LOS B	3.8	26.3	0.89	0.73	39.1
9	R	57	0.0	0.454	22.7	LOS C	3.3	22.8	0.89	0.82	38.6
Approach		399	0.0	0.454	18.3	LOS B	3.8	26.3	0.89	0.77	38.6
West: Rudloc Road W											
10	L	73	0.0	0.396	26.2	LOS C	2.2	15.1	0.94	0.78	35.6
11	T	99	0.0	0.396	18.1	LOS B	2.2	15.1	0.94	0.73	36.4
12	R	33	0.0	0.396	26.4	LOS C	1.8	12.5	0.94	0.78	36.2
Approach		204	0.0	0.396	22.3	LOS C	2.2	15.1	0.94	0.76	36.1
All Vehicles		1259	0.0	0.454	16.1	LOS B	3.8	26.3	0.80	0.72	40.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

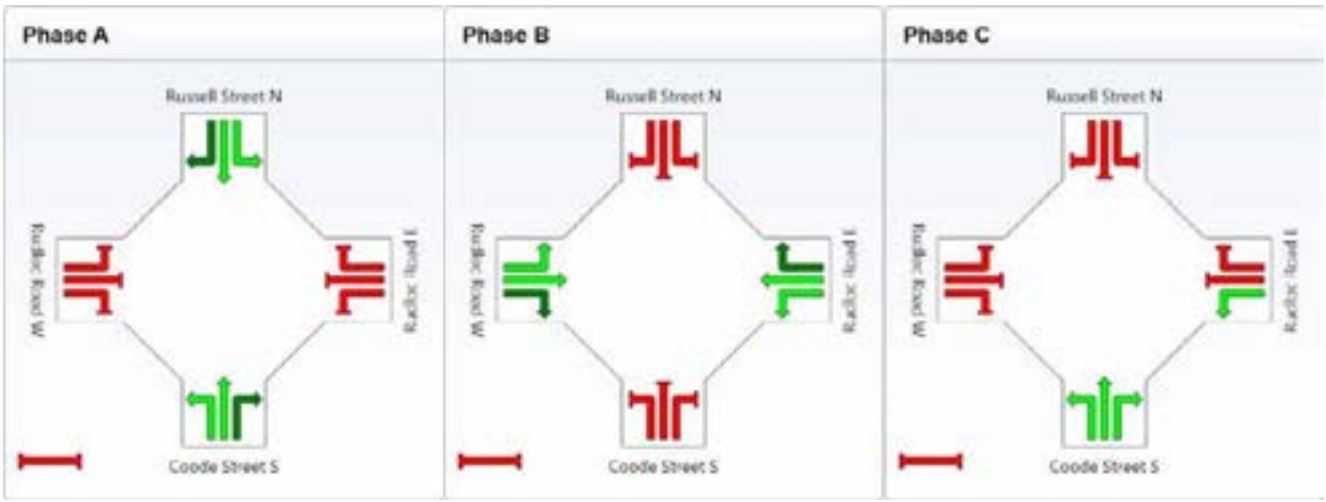
PHASING SUMMARY

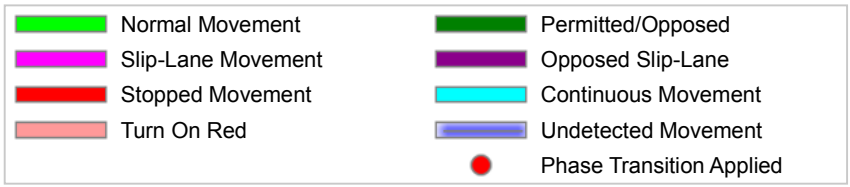
Russell Street - Rubloc Road PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Russell/Rudloc
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	10	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	16	12	12
Phase Split	40 %	30 %	30 %





Future (2021) Assessment

MOVEMENT SUMMARY

Site: 1 Broun - Coode AM

Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	237	0.0	1.329	388.7	LOS F	100.1	700.7	1.00	1.94	5.1
2	T	304	0.0	1.329	380.5	LOS F	100.1	700.7	1.00	1.94	5.2
3	R	114	0.0	2.153	1137.1	LOS F	34.1	238.7	1.00	1.83	1.9
Approach		655	0.0	2.153	514.9	LOS F	100.1	700.7	1.00	1.93	3.9
East: Broun Avenue E											
4	L	467	0.0	1.338	368.7	LOS F	352.8	2469.9	1.00	2.11	5.4
5	T	1353	0.0	1.338	360.5	LOS F	352.8	2469.9	1.00	2.11	5.4
6	R	237	0.0	1.661	705.7	LOS F	60.8	425.9	1.00	2.00	2.9
Approach		2057	0.0	1.661	402.1	LOS F	352.8	2469.9	1.00	2.10	4.9
North: Coode Street											
7	L	272	0.0	1.035	142.1	LOS F	45.7	319.6	1.00	1.22	12.3
8	T	149	0.0	1.035	134.0	LOS F	45.7	319.6	1.00	1.21	12.3
9	R	51	0.0	1.035	145.3	LOS F	5.7	39.6	1.00	1.04	12.0
Approach		472	0.0	1.035	139.9	LOS F	45.7	319.6	1.00	1.19	12.3
West: Broun Avenue W											
10	L	225	0.0	0.777	23.2	LOS C	49.3	344.9	0.71	0.95	38.1
11	T	838	0.0	0.777	15.3	LOS B	49.3	344.9	0.71	0.67	39.7
12	R	38	0.0	0.777	95.9	LOS F	3.3	23.3	1.00	0.82	16.5
Approach		1101	0.0	0.777	19.7	LOS B	49.3	344.9	0.72	0.73	37.6
All Vehicles		4284	0.0	2.153	292.2	LOS F	352.8	2469.9	0.93	1.62	6.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	10.1	LOS B	0.1	0.1	0.37	0.37
P3	Across E approach	50	55.5	LOS E	0.2	0.2	0.86	0.86
P5	Across N approach	50	10.1	LOS B	0.1	0.1	0.37	0.37
P7	Across W approach	50	55.5	LOS E	0.2	0.2	0.86	0.86
All Pedestrians		200	32.8	LOS D			0.61	0.61

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

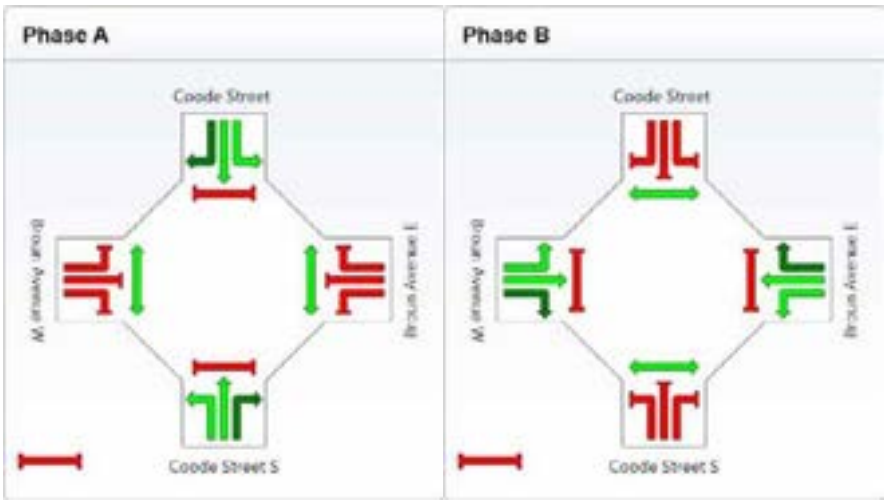
PHASING SUMMARY

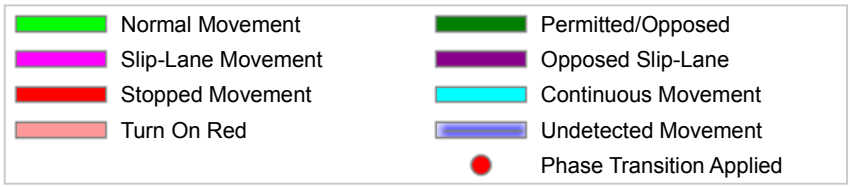
Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	32	106
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	38	112
Phase Split	25 %	75 %





MOVEMENT SUMMARY

Site: 1 Broun - Coode PM

Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 140 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	135	0.0	0.902	84.1	LOS F	21.8	152.6	1.00	1.02	18.4
2	T	147	0.0	0.902	75.9	LOS E	21.8	152.6	1.00	1.02	18.5
3	R	63	0.0	1.116	201.8	LOS F	7.7	53.6	1.00	1.13	9.2
Approach		345	0.0	1.116	102.2	LOS F	21.8	152.6	1.00	1.04	15.6
East: Broun Avenue E											
4	L	315	0.0	0.923	29.6	LOS C	79.8	558.3	0.89	0.98	34.5
5	T	1020	0.0	0.923	21.5	LOS C	79.8	558.3	0.89	0.88	35.2
6	R	157	0.0	1.815	837.7	LOS F	41.8	292.8	1.00	2.06	2.5
Approach		1492	0.0	1.815	109.0	LOS F	79.8	558.3	0.90	1.03	14.8
North: Coode Street											
7	L	177	0.0	0.980	108.0	LOS F	27.5	192.3	1.00	1.15	15.3
8	T	128	0.0	0.980	99.8	LOS F	27.5	192.3	1.00	1.15	15.3
9	R	62	0.0	1.098	185.9	LOS F	7.2	50.2	1.00	1.10	9.8
Approach		367	0.0	1.098	118.3	LOS F	27.5	192.3	1.00	1.14	14.0
West: Broun Avenue W											
10	L	316	0.0	0.891	22.0	LOS C	64.7	452.6	0.83	0.95	39.1
11	T	1124	0.0	0.891	22.5	LOS C	64.7	452.6	0.85	0.82	34.7
12	R	49	0.0	0.891	85.3	LOS F	16.5	115.6	1.00	1.06	18.4
Approach		1489	0.0	0.891	24.5	LOS C	64.7	452.6	0.85	0.86	34.5
All Vehicles		3694	0.0	1.815	75.2	LOS E	79.8	558.3	0.90	0.97	19.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

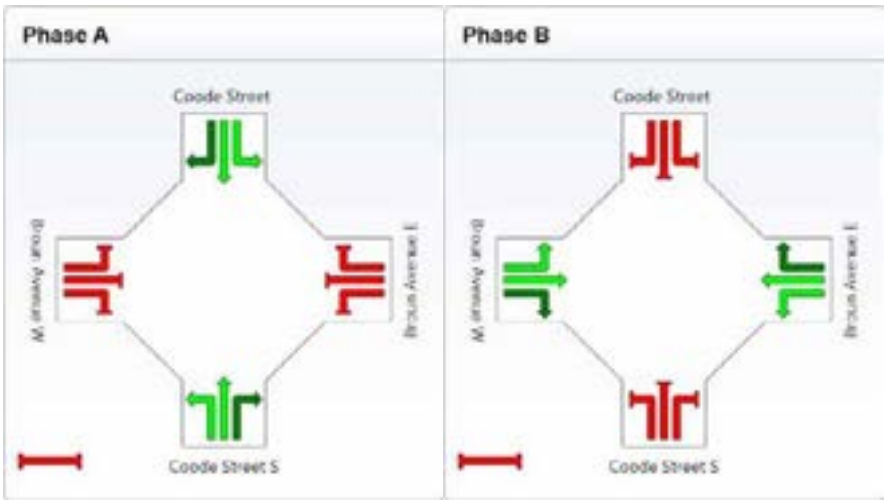
PHASING SUMMARY

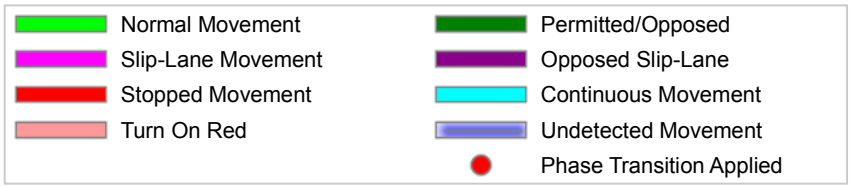
Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 140 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	105
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	111
Phase Split	21 %	79 %





MOVEMENT SUMMARY

Site: 3 Broun - Russell AM

Broun Avenue - Russel Road AM
Signals - Fixed Time Cycle Time = 90 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	2742	0.0	0.891	14.5	LOS B	50.7	354.9	0.78	0.80	40.7
6	R	380	0.0	0.508	15.9	LOS B	8.0	55.8	0.76	0.82	41.8
Approach		3122	0.0	0.891	14.7	LOS B	50.7	354.9	0.78	0.80	40.8
North: Russell Street N											
7	L	264	0.0	0.250	11.4	LOS B	3.9	27.0	0.42	0.71	45.7
9	R	206	0.0	0.839	59.9	LOS E	6.0	42.1	1.00	0.94	22.7
Approach		471	0.0	0.839	32.7	LOS C	6.0	42.1	0.67	0.81	31.7
West: Broun Avenue W											
10	L	332	0.0	0.335	8.9	LOS A	2.3	16.0	0.28	0.68	48.2
11	T	869	0.0	0.514	20.0	LOS B	13.9	97.3	0.78	0.68	36.9
Approach		1201	0.0	0.514	16.9	LOS B	13.9	97.3	0.64	0.68	39.5
All Vehicles		4794	0.0	0.891	17.0	LOS B	50.7	354.9	0.73	0.77	39.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

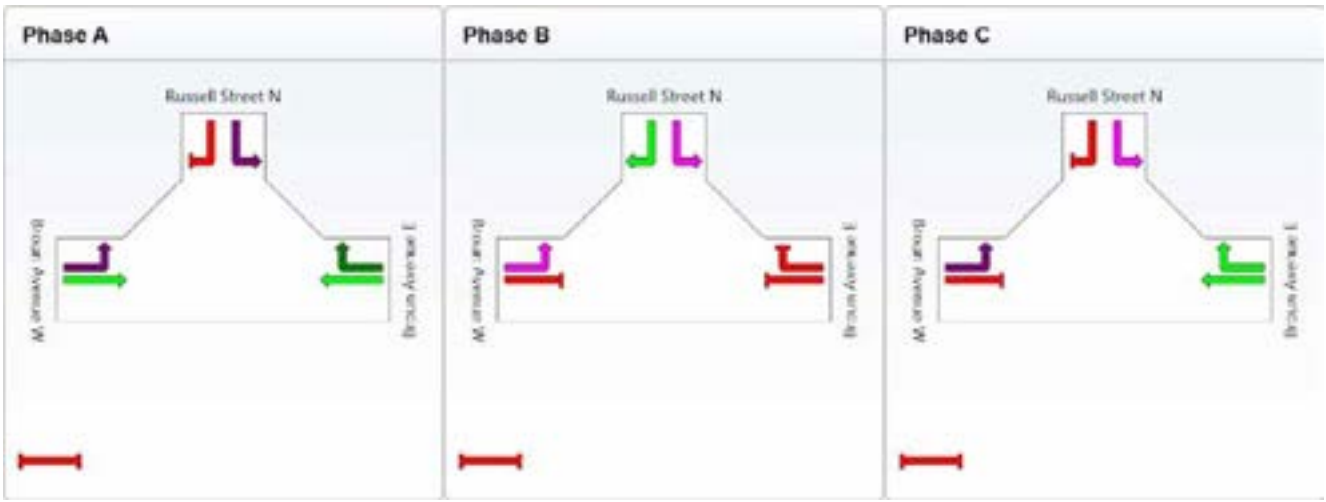
PHASING SUMMARY

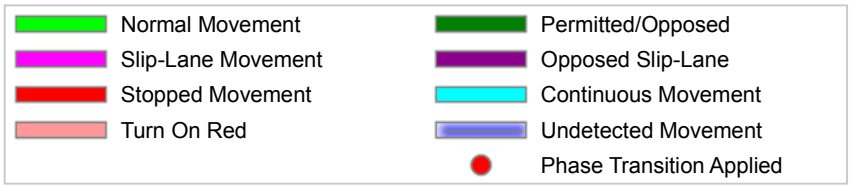
Broun Avenue - Russel Road AM
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	39	7	26
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	45	13	32
Phase Split	50 %	14 %	36 %





MOVEMENT SUMMARY

Site: 3 Broun - Russell PM

Broun Avenue - Russel Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	1578	0.0	0.601	14.1	LOS B	30.9	216.2	0.60	0.55	41.5
6	R	324	0.0	0.864	69.8	LOS E	20.2	141.1	1.00	1.04	20.6
Approach		1902	0.0	0.864	23.6	LOS C	30.9	216.2	0.67	0.63	35.4
North: Russell Street N											
7	L	606	0.0	0.647	37.0	LOS D	24.9	174.6	0.79	0.99	30.0
9	R	478	0.0	0.885	76.7	LOS E	32.1	224.8	0.98	0.93	19.3
Approach		1084	0.0	0.885	54.5	LOS D	32.1	224.8	0.88	0.96	24.2
West: Broun Avenue W											
10	L	483	0.0	0.645	12.1	LOS B	7.9	55.1	0.36	0.72	45.2
11	T	1621	0.0	0.878	42.9	LOS D	56.3	393.8	0.98	0.94	26.4
Approach		2104	0.0	0.878	35.8	LOS D	56.3	393.8	0.83	0.89	29.2
All Vehicles		5091	0.0	0.885	35.2	LOS D	56.3	393.8	0.78	0.81	29.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

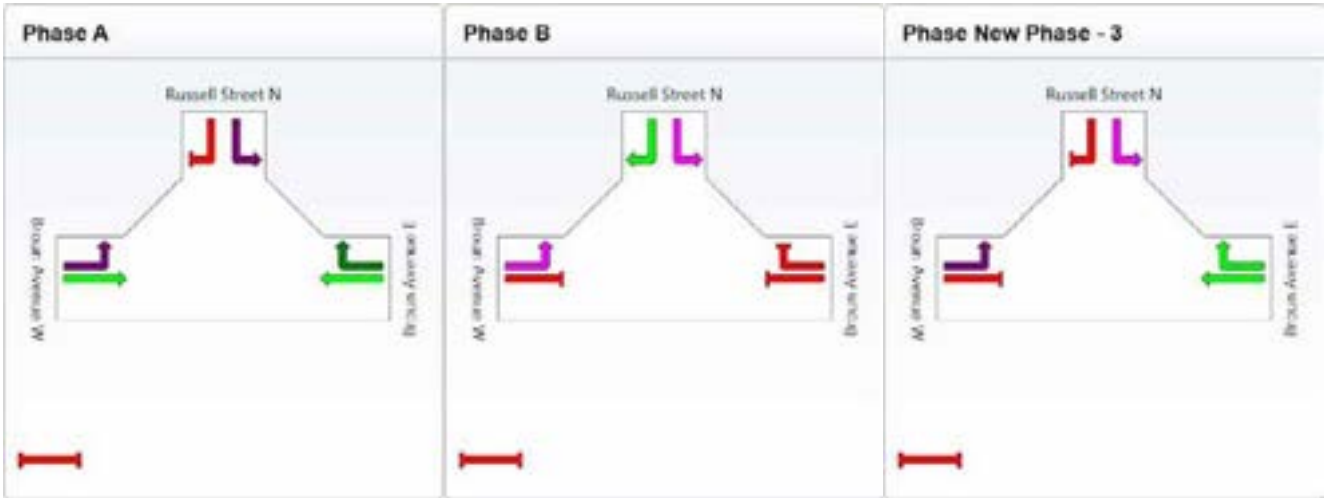
PHASING SUMMARY

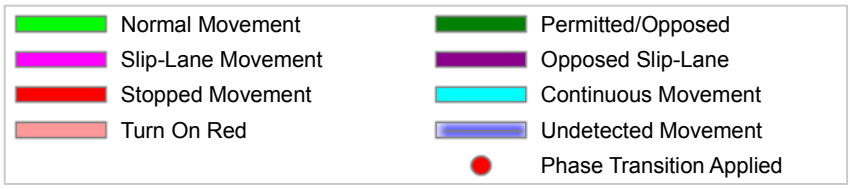
Broun Avenue - Russel Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, New Phase - 3
Output Sequence: A, B, New Phase - 3

Phase Timing Results

Phase	A	B	New Phase - 3
Green Time (sec)	71	37	24
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	77	43	30
Phase Split	51 %	29 %	20 %





MOVEMENT SUMMARY

Site: 4 Broun - Collier AM

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	281	0.0	0.790	49.7	LOS D	15.2	106.1	0.79	0.95	25.6
2	T	500	0.0	1.012	122.6	LOS F	25.3	177.2	1.00	1.22	13.4
3	R	19	0.0	0.139	72.7	LOS E	1.3	8.9	0.92	0.72	20.1
Approach		800	0.0	1.012	95.8	LOS F	25.3	177.2	0.92	1.11	16.3
East: Broun Avenue E											
4	L	44	0.0	1.031	128.3	LOS F	80.7	564.6	1.00	1.31	13.6
5	T	1427	0.0	1.031	120.1	LOS F	80.9	566.1	1.00	1.31	13.6
6	R	255	0.0	0.765	37.1	LOS D	10.1	70.6	0.89	0.84	29.8
Approach		1726	0.0	1.031	108.1	LOS F	80.9	566.1	0.98	1.24	14.8
North: Collier Road N											
7	L	151	0.0	0.425	11.8	LOS B	2.6	18.1	0.29	0.66	45.4
8	T	496	0.0	0.733	45.7	LOS D	31.5	220.3	0.94	0.83	25.5
9	R	673	0.0	1.006	125.6	LOS F	34.2	239.3	1.00	1.11	13.5
Approach		1319	0.0	1.006	82.6	LOS F	34.2	239.3	0.90	0.96	18.2
West: Broun Avenue S											
10	L	420	0.0	0.714	16.2	LOS B	11.5	80.2	0.46	0.73	41.6
11	T	706	0.0	0.832	65.5	LOS E	26.5	185.6	1.00	0.94	20.5
12	R	172	0.0	1.000[3]	70.3	LOS E	11.7	81.6	0.97	0.81	20.6
Approach		1298	0.0	1.000	50.2	LOS D	26.5	185.6	0.82	0.85	24.6
All Vehicles		5143	0.0	1.031	85.0	LOS F	80.9	566.1	0.91	1.05	17.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

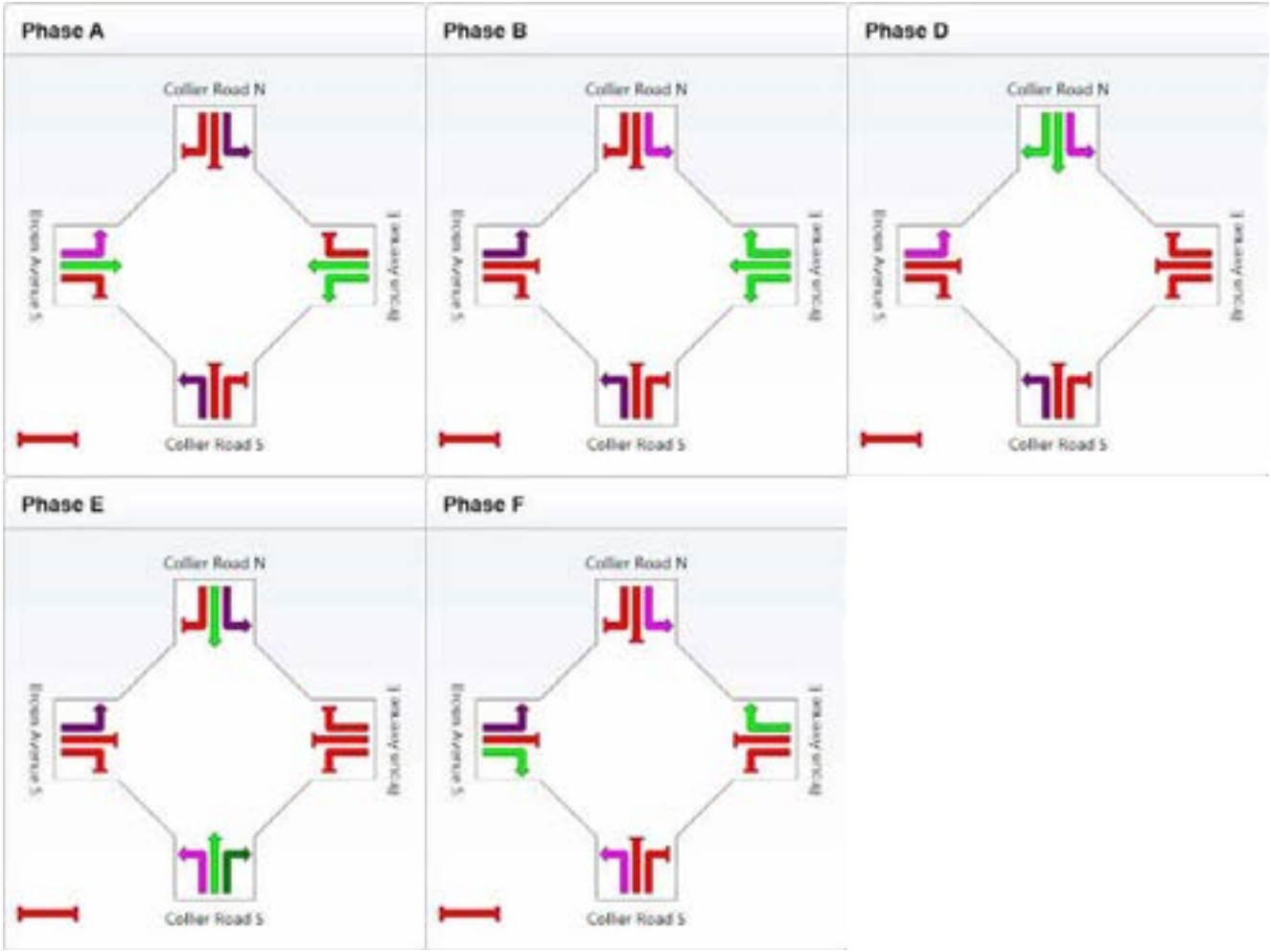
PHASING SUMMARY

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Broun/Collier (phase reduction applied)
Input Sequence: A , B, D, E, F, C
Output Sequence: A , B, D, E, F

Phase Timing Results

Phase	A	B	D	E	F
Green Time (sec)	33	16	27	19	25
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	39	22	33	25	31
Phase Split	26 %	15 %	22 %	17 %	21 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 4 Broun - Collier PM

Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	431	0.0	1.000[3]	21.5	LOS C	15.2	106.7	0.56	0.75	37.8
2	T	1102	0.0	0.923	71.3	LOS E	45.8	320.7	1.00	1.05	19.6
3	R	40	0.0	0.189	51.6	LOS D	2.2	15.4	0.78	0.74	24.8
Approach		1573	0.0	1.000	57.2	LOS E	45.8	320.7	0.87	0.96	22.8
East: Broun Avenue E											
4	L	28	0.0	1.005	125.4	LOS F	32.3	226.2	1.00	1.23	13.8
5	T	658	0.0	1.005	116.5	LOS F	37.0	258.9	1.00	1.24	13.9
6	R	124	0.0	0.977	88.3	LOS F	8.8	61.3	1.00	1.03	17.6
Approach		811	0.0	1.005	112.5	LOS F	37.0	258.9	1.00	1.21	14.4
North: Collier Road N											
7	L	120	0.0	0.466	15.9	LOS B	2.9	20.3	0.40	0.69	41.9
8	T	345	0.0	0.396	18.3	LOS B	12.5	87.8	0.72	0.61	38.1
9	R	494	0.0	0.949	102.1	LOS F	22.0	153.7	1.00	1.03	15.8
Approach		959	0.0	0.949	61.1	LOS E	22.0	153.7	0.82	0.84	22.2
West: Broun Avenue S											
10	L	524	0.0	1.000[3]	21.6	LOS C	18.7	130.6	0.59	0.77	37.8
11	T	1185	0.0	0.978	78.7	LOS E	46.7	327.2	1.00	1.20	18.3
12	R	293	0.0	1.000[3]	47.2	LOS D	11.8	82.6	1.00	0.86	26.2
Approach		2002	0.0	1.000	59.1	LOS E	46.7	327.2	0.89	1.03	22.3
All Vehicles		5344	0.0	1.005	67.0	LOS E	46.7	327.2	0.89	1.00	20.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

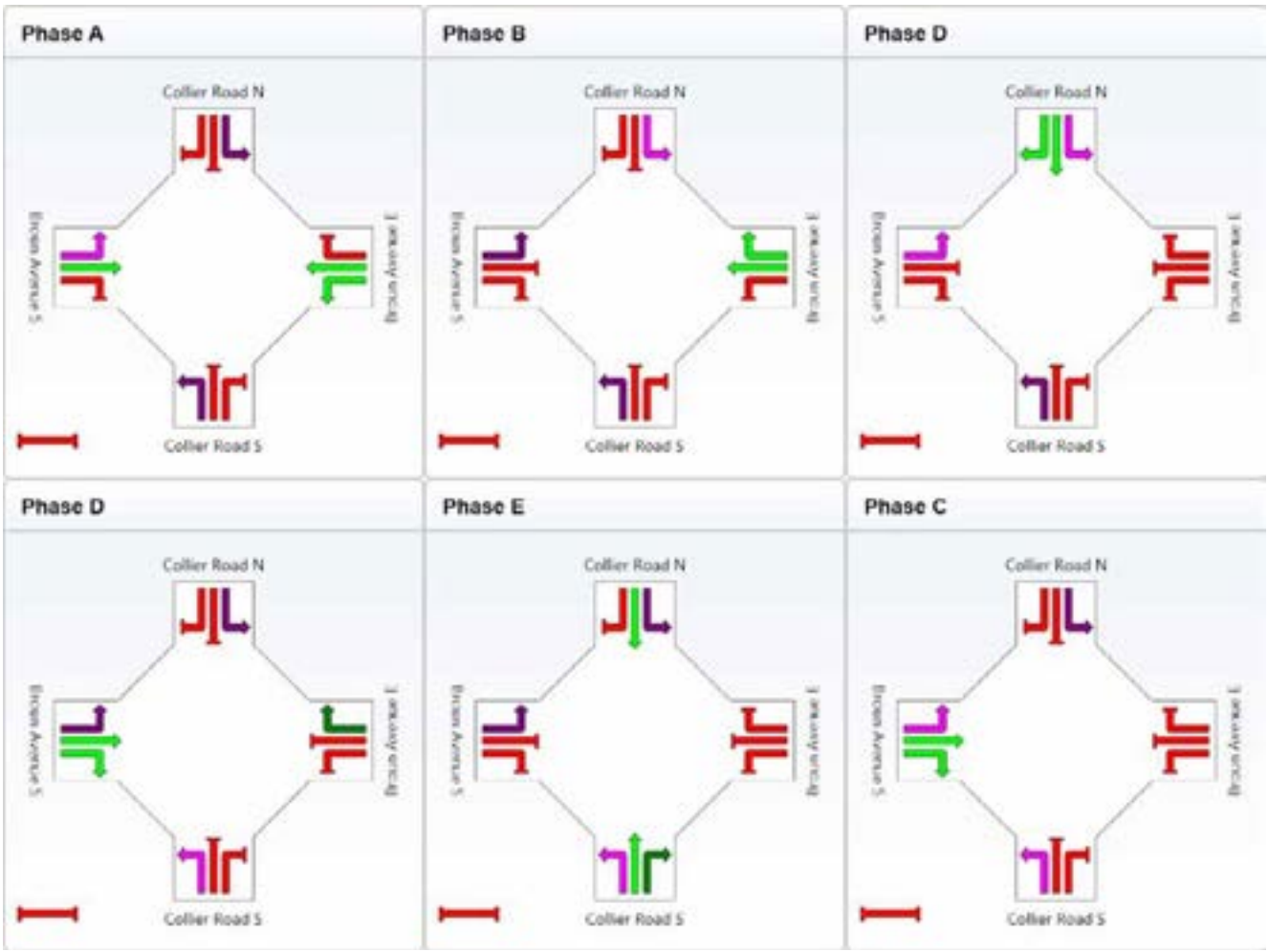
PHASING SUMMARY

Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Broun/Collier
Input Sequence: A , B, D, D, E, C
Output Sequence: A , B, D, D, E, C

Phase Timing Results

Phase	A	B	D	D	E	C
Green Time (sec)	16	6	21	11	46	14
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	22	12	27	17	52	20
Phase Split	15 %	8 %	18 %	11 %	35 %	13 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Crimea AM

Walter Road - Crimea Street, AM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea Street S											
1	L	208	0.0	0.990	120.1	LOS F	20.1	140.4	1.00	1.06	13.9
2	T	123	0.0	0.557	69.2	LOS E	8.7	61.0	0.99	0.79	20.0
Approach		332	0.0	0.990	101.2	LOS F	20.1	140.4	1.00	0.96	15.7
East: Walter Road E											
4	L	359	0.0	1.038	117.8	LOS F	124.3	869.8	1.00	1.21	14.3
5	T	422	0.0	1.038	109.6	LOS F	124.3	869.8	1.00	1.21	14.3
6	R	263	0.0	1.000[3]	45.1	LOS D	14.0	97.9	0.99	0.88	26.8
Approach		1371	0.0	1.038	101.2	LOS F	124.3	869.8	1.00	1.12	16.2
North: Crimea Street N											
7	L	424	0.0	0.753	53.1	LOS D	32.3	226.2	0.94	0.88	24.5
8	T	602	0.0	0.753	44.9	LOS D	33.0	231.1	0.94	0.84	25.2
9	R	328	0.0	1.000[3]	70.3	LOS E	23.3	163.2	1.00	0.85	20.4
Approach		1355	0.0	1.000	53.6	LOS D	33.0	231.1	0.96	0.86	23.7
West: Walter Road W											
10	L	406	0.0	0.271	11.9	LOS B	7.1	49.9	0.27	0.73	45.1
11	T	174	0.0	0.159	16.7	LOS B	6.0	41.8	0.51	0.43	39.8
Approach		580	0.0	0.271	13.4	LOS B	7.1	49.9	0.34	0.64	43.4
All Vehicles		3637	0.0	1.038	68.8	LOS E	124.3	869.8	0.88	0.83	21.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	19.8	LOS B	0.1	0.1	0.51	0.51
P3	Across E approach	50	36.1	LOS D	0.1	0.1	0.69	0.69
P5	Across N approach	50	20.8	LOS C	0.1	0.1	0.53	0.53
P7	Across W approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	36.4	LOS D			0.67	0.67

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

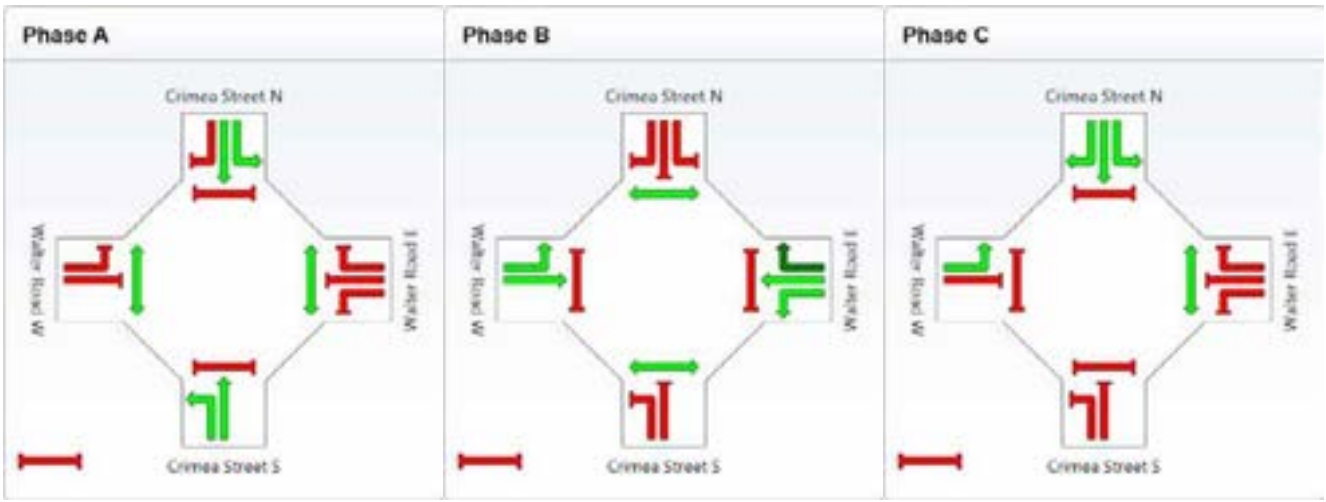
PHASING SUMMARY

Walter Road - Crimea Street, AM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Crimea
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	17	84	31
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	90	37
Phase Split	15 %	60 %	25 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Crimea PM

Walter Road - Crimea Street, PM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea Street S											
1	L	371	0.0	1.663	692.0	LOS F	90.1	630.9	1.00	1.89	3.0
2	T	246	0.0	1.053	149.4	LOS F	27.5	192.2	1.00	1.30	11.5
Approach		617	0.0	1.663	475.3	LOS F	90.1	630.9	1.00	1.65	4.2
East: Walter Road E											
4	L	102	0.0	0.595	19.1	LOS B	7.2	50.7	0.53	0.87	40.4
5	T	204	0.0	0.595	10.9	LOS B	7.2	50.7	0.53	0.46	43.7
6	R	232	0.0	1.760	798.0	LOS F	62.8	439.9	1.00	2.10	2.6
Approach		538	0.0	1.760	351.3	LOS F	62.8	439.9	0.73	1.24	5.6
North: Crimea Street N											
7	L	281	0.0	1.415	466.5	LOS F	109.0	763.2	1.00	2.04	4.3
8	T	785	0.0	1.415	458.4	LOS F	109.0	763.2	1.00	1.87	4.4
9	R	157	0.0	1.233	274.8	LOS F	23.3	163.2	1.00	1.32	7.0
Approach		1223	0.0	1.415	436.7	LOS F	109.0	763.2	1.00	1.84	4.6
West: Walter Road W											
10	L	1194	0.0	0.803	17.0	LOS B	47.7	333.6	0.61	0.84	40.9
11	T	235	0.0	0.167	7.0	LOS A	5.3	37.1	0.34	0.29	49.0
Approach		1428	0.0	0.803	15.3	LOS B	47.7	333.6	0.57	0.75	42.0
All Vehicles		3806	0.0	1.760	272.8	LOS F	109.0	763.2	0.80	1.32	7.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	9.4	LOS A	0.1	0.1	0.35	0.35
P3	Across E approach	50	55.5	LOS E	0.2	0.2	0.86	0.86
P5	Across N approach	50	10.1	LOS B	0.1	0.1	0.37	0.37
P7	Across W approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	36.0	LOS D			0.64	0.64

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

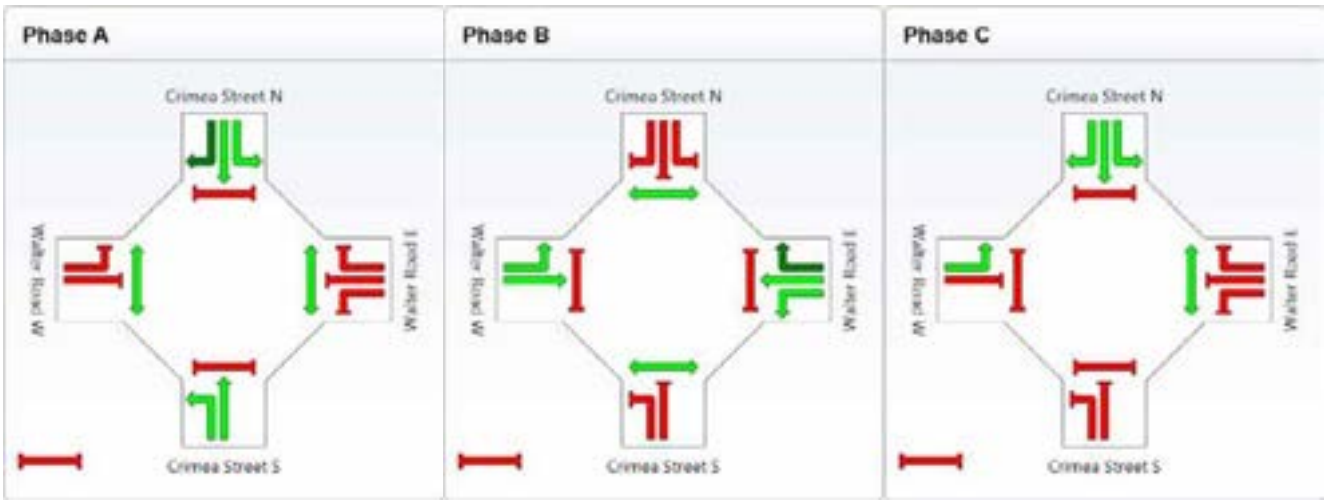
PHASING SUMMARY

Walter Road - Crimea Street, PM Peak
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	18	108	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	24	114	12
Phase Split	16 %	76 %	8 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 7 Walter - Collier AM

Walter Road - Collier Road AM

Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	234	0.0	0.208	24.2	LOS C	7.7	53.6	0.52	0.73	36.2
3	R	85	0.0	0.206	70.7	LOS E	3.4	23.5	0.92	0.74	20.4
Approach		319	0.0	0.208	36.6	LOS D	7.7	53.6	0.63	0.73	30.1
East: Walter Road E											
4	L	313	0.0	1.008	115.1	LOS F	70.6	494.1	1.00	1.18	14.6
5	T	1061	0.0	1.008	106.5	LOS F	72.0	503.9	1.00	1.23	14.8
Approach		1374	0.0	1.008	108.5	LOS F	72.0	503.9	1.00	1.22	14.8
West: Walter Road W											
11	T	1547	0.0	0.514	6.0	LOS A	20.0	140.3	0.39	0.36	49.3
12	R	273	0.0	1.000[3]	53.4	LOS D	14.0	97.9	1.00	0.84	24.4
Approach		1820	0.0	1.000	13.1	LOS B	20.0	140.3	0.48	0.43	42.7
All Vehicles		3513	0.0	1.008	52.5	LOS D	72.0	503.9	0.70	0.77	24.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	39.6	LOS D	0.2	0.2	0.73	0.73
P7	Across W approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		100	54.4	LOS E			0.84	0.84

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

PHASING SUMMARY

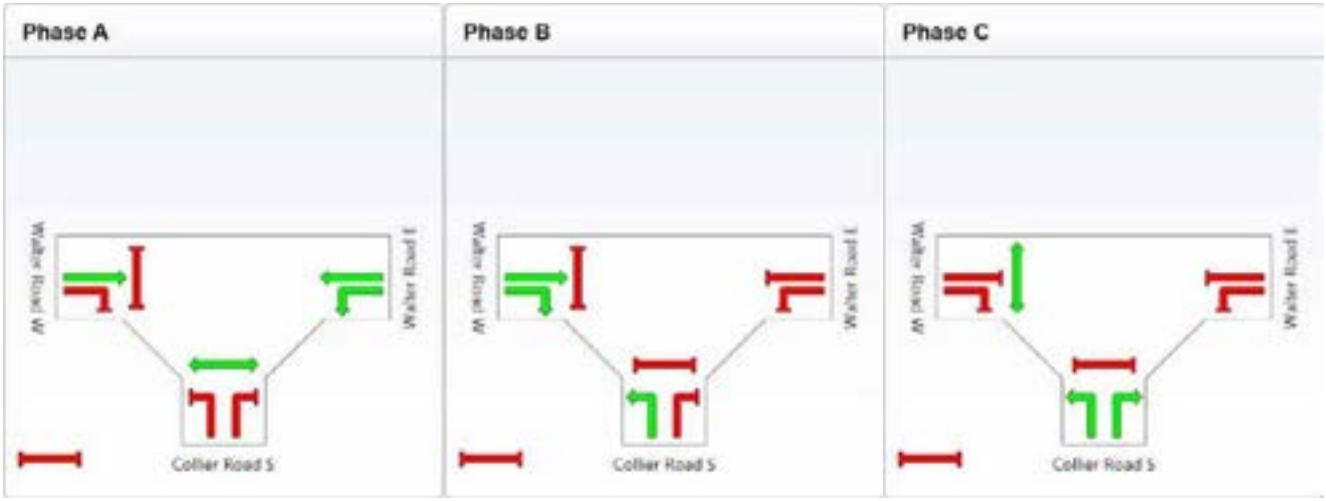
Walter Road - Collier Road AM

Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Collier
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	53	59	20
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	59	65	26
Phase Split	39 %	43 %	17 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 7 Walter - Collier PM

Walter Road - Collier Road PM

Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	512	0.0	0.405	21.6	LOS C	16.8	117.5	0.52	0.75	37.9
3	R	480	0.0	0.970	95.7	LOS F	29.1	203.5	0.99	0.97	16.5
Approach		992	0.0	0.970	57.4	LOS E	29.1	203.5	0.75	0.86	23.4
East: Walter Road E											
4	L	371	0.0	0.957	93.9	LOS F	46.9	328.4	1.00	1.05	16.9
5	T	681	0.0	0.957	85.1	LOS F	48.4	338.5	1.00	1.11	17.4
Approach		1052	0.0	0.957	88.2	LOS F	48.4	338.5	1.00	1.09	17.2
West: Walter Road W											
11	T	1167	0.0	0.404	7.2	LOS A	15.1	106.0	0.39	0.36	48.3
12	R	284	0.0	1.000[3]	51.4	LOS D	14.0	97.9	1.00	0.84	25.0
Approach		1451	0.0	1.000	15.8	LOS B	15.1	106.0	0.51	0.45	40.8
All Vehicles		3494	0.0	1.000	49.4	LOS D	48.4	338.5	0.73	0.76	25.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	47.2	LOS E	0.2	0.2	0.79	0.79
P7	Across W approach	50	63.5	LOS F	0.2	0.2	0.92	0.92
All Pedestrians		100	55.3	LOS E			0.86	0.86

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

PHASING SUMMARY

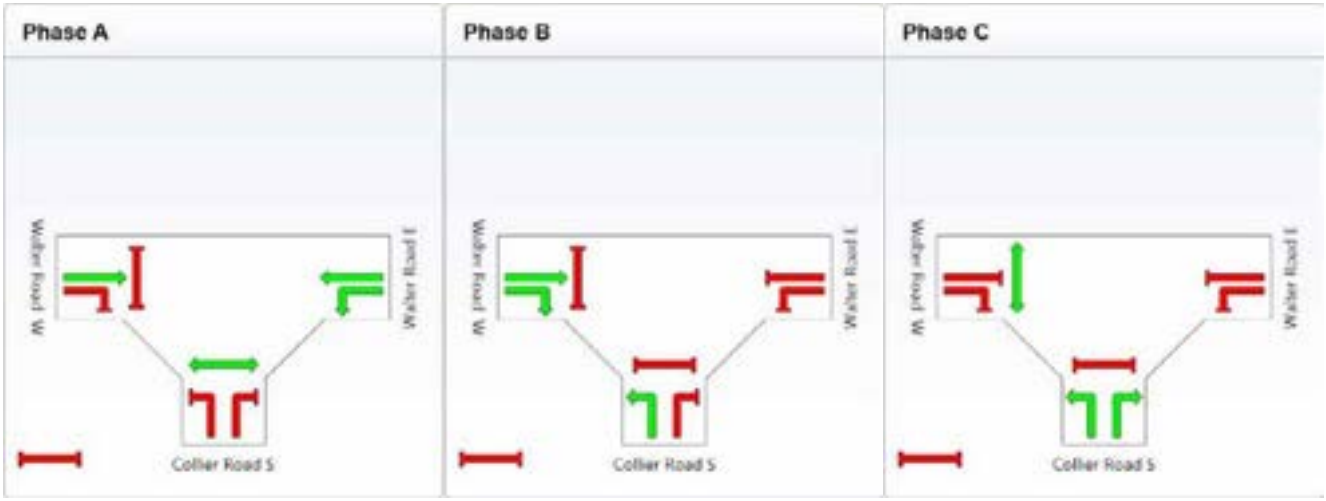
Walter Road - Collier Road PM

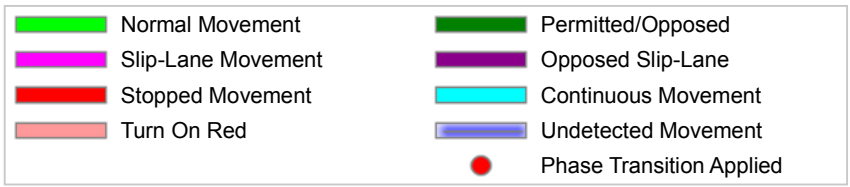
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Collier
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	43	63	26
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	49	69	32
Phase Split	33 %	46 %	21 %





MOVEMENT SUMMARY

Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	26	0.0	0.063	55.9	LOS E	1.5	10.4	0.82	0.71	23.9
2	T	49	0.0	0.181	61.6	LOS E	3.2	22.5	0.92	0.70	21.6
3	R	87	0.0	0.336	71.2	LOS E	5.8	40.9	0.95	0.78	20.4
Approach		163	0.0	0.336	65.8	LOS E	5.8	40.9	0.92	0.74	21.2
East: Walter Road E											
4	L	144	0.0	0.762	26.7	LOS C	4.7	32.6	0.42	0.73	34.8
5	T	1179	0.0	0.742	39.5	LOS D	36.6	255.9	0.91	0.82	27.2
6	R	512	0.0	1.000[3]	59.3	LOS E	35.0	244.8	1.00	0.89	22.8
Approach		1835	0.0	1.000	44.0	LOS D	36.6	255.9	0.90	0.83	26.2
North: Wellington Road											
7	L	523	0.0	1.009	118.6	LOS F	63.2	442.4	1.00	1.12	14.1
8	T	554	0.0	1.009	114.3	LOS F	63.2	442.4	1.00	1.26	14.1
9	R	171	0.0	0.416	59.0	LOS E	10.4	72.9	0.89	0.80	23.0
Approach		1247	0.0	1.009	108.5	LOS F	63.2	442.4	0.98	1.13	14.9
West: Walter Road W											
10	L	182	0.0	0.984	20.1	LOS C	4.7	32.6	0.56	0.72	38.8
11	T	544	0.0	0.997	113.5	LOS F	26.7	186.7	1.00	1.20	14.2
12	R	87	0.0	1.008	129.6	LOS F	8.5	59.8	1.00	1.08	13.2
Approach		814	0.0	1.008	94.3	LOS F	26.7	186.7	0.90	1.08	16.4
All Vehicles		4059	0.0	1.009	74.8	LOS E	63.2	442.4	0.93	0.97	19.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	8.3	LOS A	0.1	0.1	0.33	0.33
P2	Across S approach	50	28.2	LOS C	0.1	0.1	0.61	0.61
P3	Across E approach	50	54.6	LOS E	0.2	0.2	0.85	0.85
P5	Across N approach	50	68.2	LOS F	0.2	0.2	0.95	0.95
P7	Across W approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		250	45.7	LOS E			0.74	0.74

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

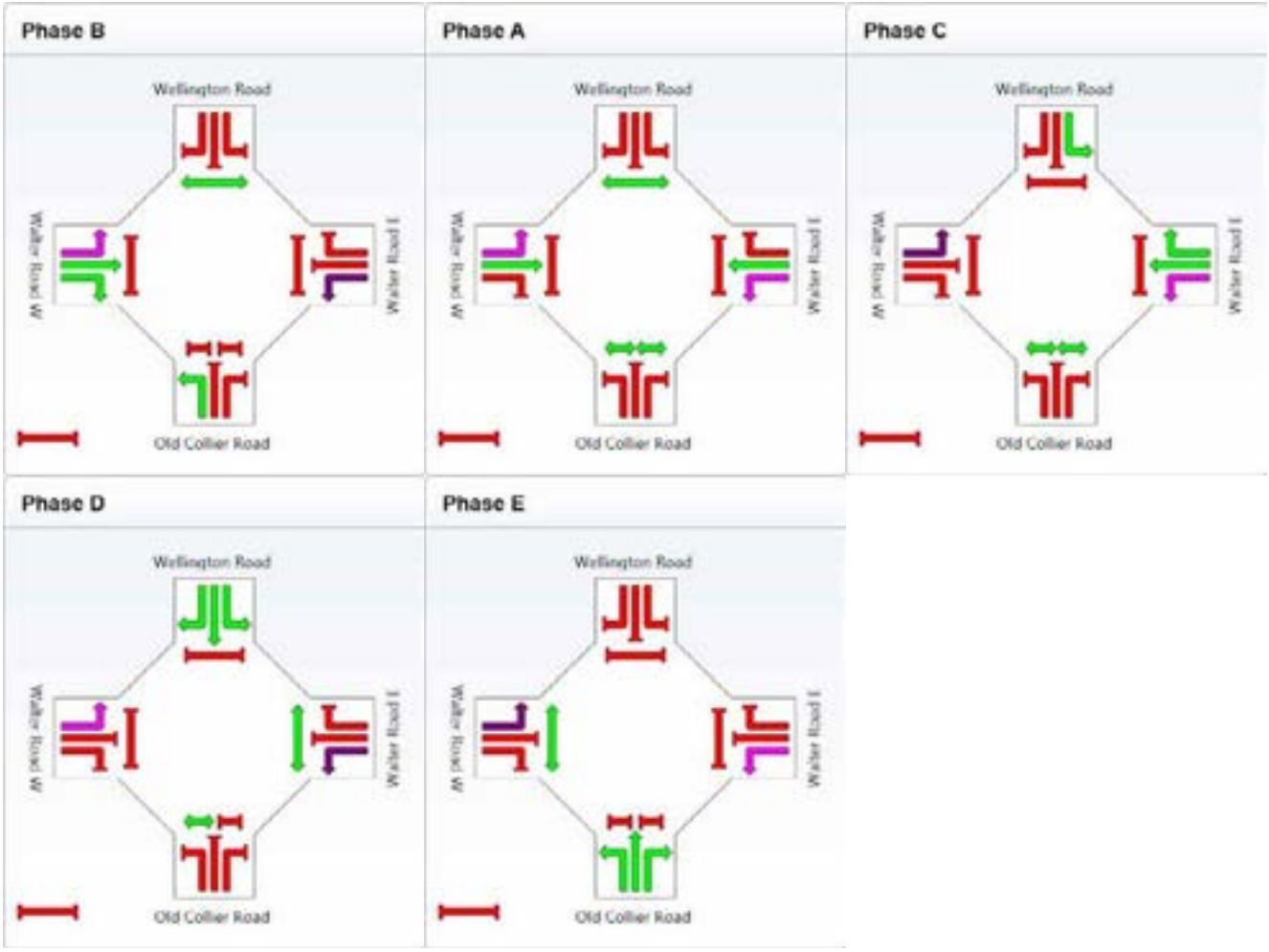
PHASING SUMMARY

Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Wellington
Input Sequence: B, A, C, D, E
Output Sequence: B, A, C, D, E

Phase Timing Results

Phase	B	A	C	D	E
Green Time (sec)	7	8	48	36	21
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	13	14	54	42	27
Phase Split	9 %	9 %	36 %	28 %	18 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 8 Walter - Wellington PM

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	124	0.0	0.228	50.3	LOS D	6.8	47.6	0.80	0.77	25.4
2	T	317	0.0	0.937	87.5	LOS F	27.5	192.4	1.00	1.09	17.1
3	R	339	0.0	1.053	156.4	LOS F	38.5	269.3	1.00	1.20	11.4
Approach		780	0.0	1.053	111.5	LOS F	38.5	269.3	0.97	1.09	14.7
East: Walter Road E											
4	L	153	0.0	0.495	10.6	LOS B	2.1	14.6	0.27	0.66	46.5
5	T	996	0.0	0.575	32.1	LOS C	27.1	189.4	0.80	0.71	30.0
6	R	540	0.0	1.000[3]	55.5	LOS E	35.0	244.8	1.00	0.89	23.8
Approach		1688	0.0	1.000	37.6	LOS D	35.0	244.8	0.81	0.76	28.5
North: Wellington Road											
7	L	846	0.0	0.844	39.0	LOS D	51.4	360.0	0.92	0.90	28.9
8	T	201	0.0	0.773	71.5	LOS E	14.9	104.5	1.00	0.89	19.6
9	R	247	0.0	0.999	123.6	LOS F	24.4	171.1	1.00	1.11	13.7
Approach		1295	0.0	0.999	60.2	LOS E	51.4	360.0	0.95	0.94	22.5
West: Walter Road W											
10	L	132	0.0	1.000[3]	25.1	LOS C	4.7	32.7	0.56	0.71	35.7
11	T	657	0.0	1.015	123.0	LOS F	34.0	238.2	1.00	1.26	13.4
12	R	79	0.0	0.531	81.9	LOS F	5.8	40.3	1.00	0.77	18.5
Approach		868	0.0	1.015	104.3	LOS F	34.0	238.2	0.93	1.13	15.2
All Vehicles		4632	0.0	1.053	68.9	LOS E	51.4	360.0	0.90	0.94	20.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	12.0	LOS B	0.1	0.1	0.40	0.40
P2	Across S approach	50	24.7	LOS C	0.1	0.1	0.57	0.57
P3	Across E approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	50	20.3	LOS C	0.1	0.1	0.52	0.52
P7	Across W approach	50	64.4	LOS F	0.2	0.2	0.93	0.93
All Pedestrians		250	38.1	LOS D			0.68	0.68

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

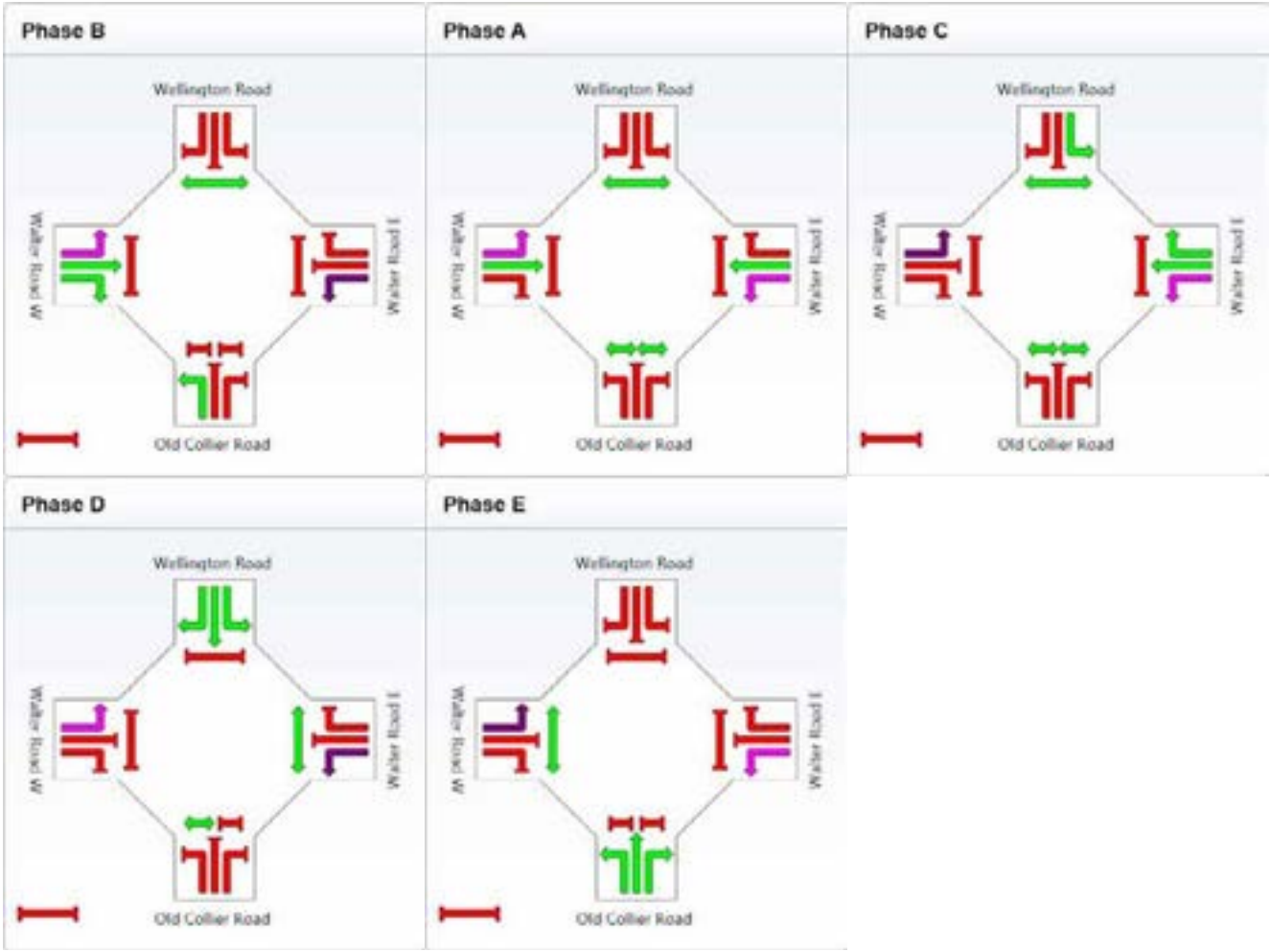
PHASING SUMMARY

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Wellington
Input Sequence: B, A, C, D, E
Output Sequence: B, A, C, D, E

Phase Timing Results

Phase	B	A	C	D	E
Green Time (sec)	12	7	55	20	26
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	18	13	61	26	32
Phase Split	12 %	9 %	41 %	17 %	21 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Progress AM

Walter Road - Progress Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street											
1	L	34	0.0	0.123	20.7	LOS C	0.6	4.3	0.65	0.71	38.2
3	R	27	0.0	0.038	20.4	LOS C	0.5	3.5	0.65	0.70	38.5
Approach		61	0.0	0.123	20.6	LOS C	0.6	4.3	0.65	0.70	38.3
East: Walter Road E											
4	L	100	0.0	0.238	19.9	LOS B	1.8	12.7	0.65	0.74	38.8
5	T	917	0.0	0.564	14.6	LOS B	10.4	72.8	0.81	0.71	40.5
Approach		1017	0.0	0.564	15.1	LOS B	10.4	72.8	0.80	0.71	40.3
West: Walter Road W											
11	T	751	0.0	0.462	13.8	LOS B	8.1	56.4	0.77	0.66	41.3
12	R	47	0.0	0.216	28.6	LOS C	1.2	8.3	0.83	0.75	33.6
Approach		798	0.0	0.462	14.7	LOS B	8.1	56.4	0.77	0.67	40.7
All Vehicles		1876	0.0	0.564	15.1	LOS B	10.4	72.8	0.78	0.69	40.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

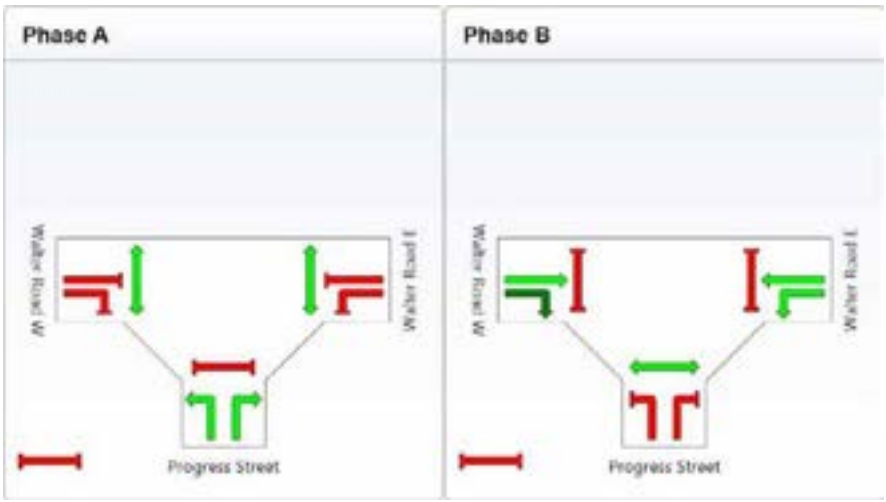
PHASING SUMMARY

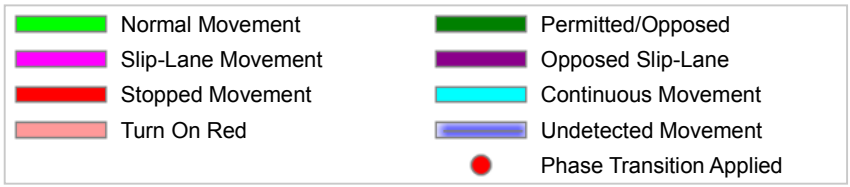
Walter Road - Progress Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Site: Walter - Progress PM

Walter Road - Progress Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street											
1	L	56	0.0	0.204	20.9	LOS C	1.0	7.3	0.66	0.72	38.1
3	R	124	0.0	0.174	21.2	LOS C	2.4	17.0	0.70	0.75	38.0
Approach		180	0.0	0.204	21.1	LOS C	2.4	17.0	0.69	0.74	38.0
East: Walter Road E											
4	L	161	0.0	0.385	20.3	LOS C	3.0	21.3	0.67	0.76	38.4
5	T	771	0.0	0.474	13.9	LOS B	8.3	58.3	0.77	0.67	41.2
Approach		932	0.0	0.474	15.0	LOS B	8.3	58.3	0.76	0.68	40.7
West: Walter Road W											
11	T	937	0.0	0.577	14.7	LOS B	10.7	74.9	0.82	0.71	40.4
12	R	78	0.0	0.314	27.5	LOS C	1.9	13.5	0.83	0.77	34.2
Approach		1015	0.0	0.577	15.7	LOS B	10.7	74.9	0.82	0.72	39.9
All Vehicles		2126	0.0	0.577	15.8	LOS B	10.7	74.9	0.78	0.71	40.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

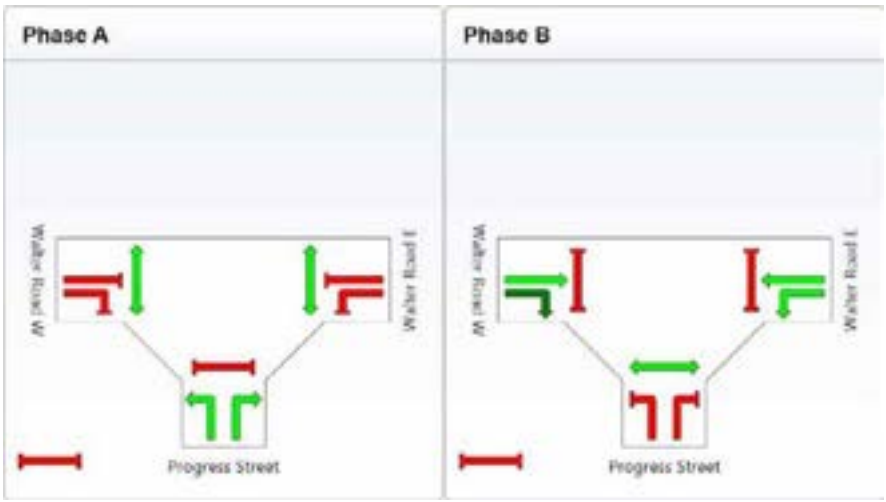
PHASING SUMMARY

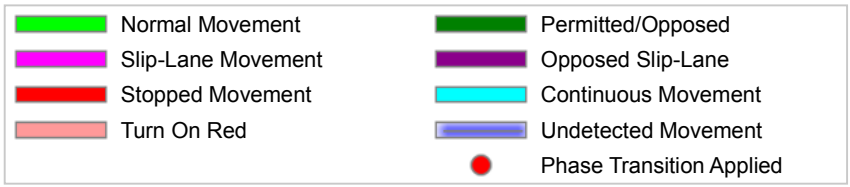
Walter Road - Progress Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Site: 9 Walter - Russell AM

Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 50 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russell Street S											
1	L	44	0.0	0.066	19.6	LOS B	0.7	5.0	0.68	0.72	38.9
2	T	8	0.0	0.317	23.4	LOS C	1.7	12.0	0.95	0.72	32.7
3	R	63	0.0	0.317	31.4	LOS C	1.7	12.0	0.95	0.75	32.4
Approach		115	0.0	0.317	26.3	LOS C	1.7	12.0	0.85	0.74	34.6
East: Walter Road E											
4	L	75	0.0	0.791	32.5	LOS C	5.7	40.0	1.00	0.97	33.0
5	T	379	0.0	0.791	25.8	LOS C	5.9	41.5	1.00	0.96	32.9
6	R	56	0.0	0.255	30.4	LOS C	1.3	9.2	0.93	0.75	32.6
Approach		510	0.0	0.791	27.3	LOS C	5.9	41.5	0.99	0.94	32.9
North: Russell Street N											
7	L	103	0.0	0.771	34.3	LOS C	3.8	26.5	0.98	0.92	31.3
8	T	68	0.0	0.771	26.3	LOS C	5.5	38.4	0.99	0.91	31.4
9	R	174	0.0	0.771	34.6	LOS C	5.5	38.4	1.00	0.93	31.0
Approach		345	0.0	0.771	32.9	LOS C	5.5	38.4	0.99	0.93	31.2
West: Walter Road W											
10	L	65	0.0	0.389	20.6	LOS C	5.2	36.3	0.77	0.86	40.0
11	T	508	0.0	0.389	12.4	LOS B	5.2	36.7	0.77	0.65	42.0
12	R	95	0.0	0.426	31.9	LOS C	2.3	16.3	0.97	0.77	31.9
Approach		668	0.0	0.426	16.0	LOS B	5.2	36.7	0.80	0.69	40.0
All Vehicles		1638	0.0	0.791	23.8	LOS C	5.9	41.5	0.90	0.82	35.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

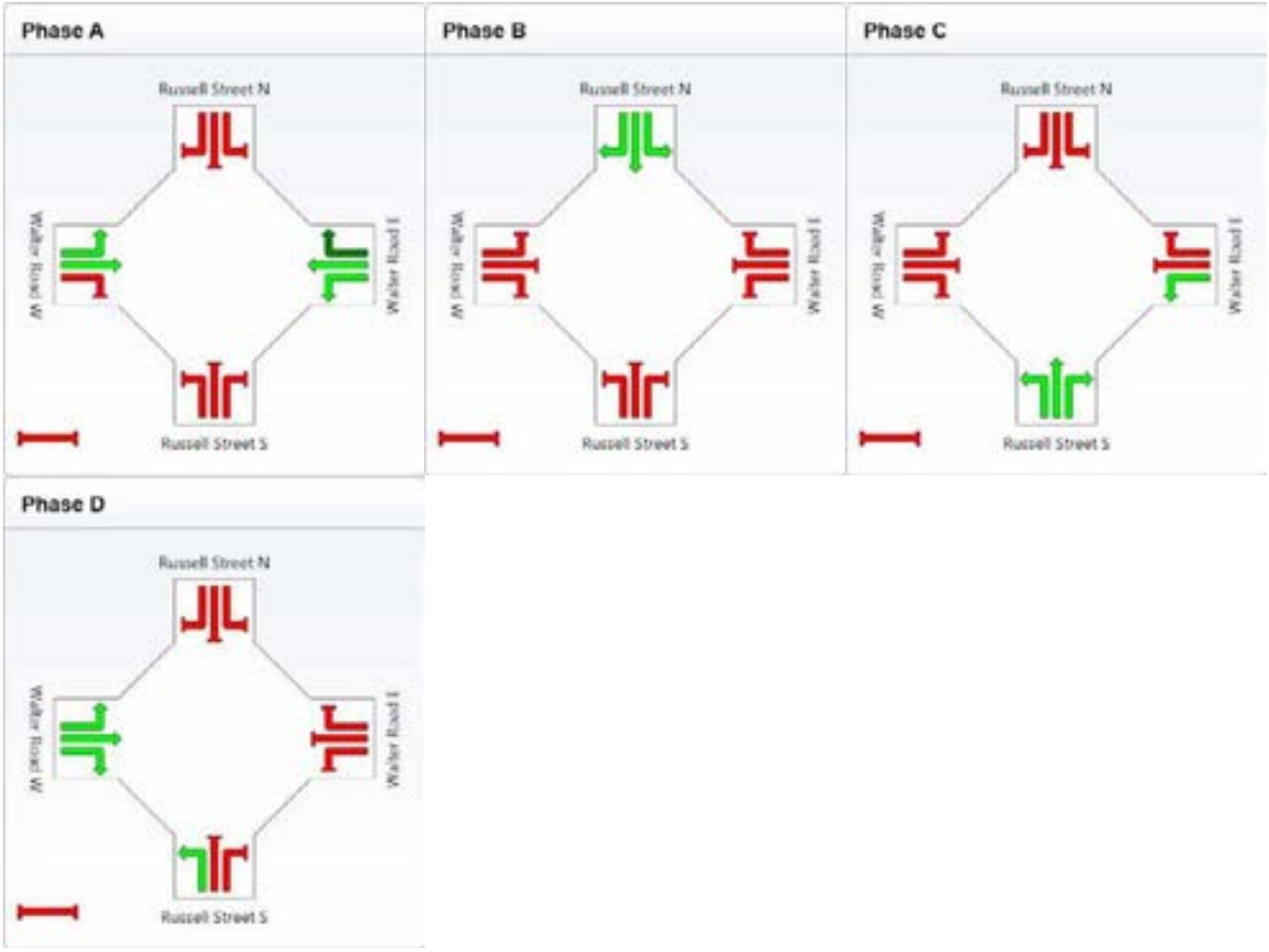
PHASING SUMMARY

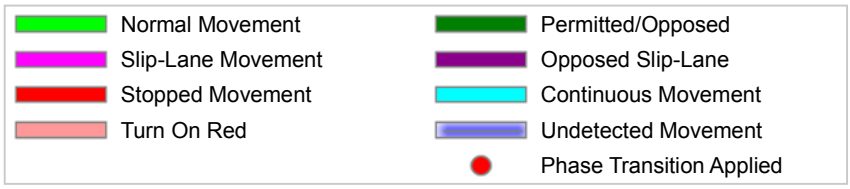
Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Russell
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	7	7	6	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	13	13	12	12
Phase Split	26 %	26 %	24 %	24 %





MOVEMENT SUMMARY

Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russeel Street S											
1	L	106	0.0	0.181	24.5	LOS C	2.3	16.1	0.76	0.76	35.8
2	T	14	0.0	0.604	29.6	LOS C	4.0	28.0	0.99	0.81	29.8
3	R	118	0.0	0.604	37.6	LOS D	4.0	28.0	0.99	0.82	29.7
Approach		238	0.0	0.604	31.3	LOS C	4.0	28.0	0.89	0.79	32.1
East: Walter Road E											
4	L	73	0.0	0.731	32.4	LOS C	11.4	79.5	0.96	0.95	33.3
5	T	741	0.0	0.731	23.7	LOS C	11.6	81.1	0.96	0.89	34.2
6	R	62	0.0	0.231	27.0	LOS C	1.5	10.4	0.80	0.76	34.4
Approach		876	0.0	0.731	24.6	LOS C	11.6	81.1	0.95	0.89	34.1
North: Rusell Street N											
7	L	42	0.0	0.372	37.5	LOS D	2.1	14.6	0.97	0.76	30.1
8	T	28	0.0	0.372	29.3	LOS C	2.1	14.6	0.97	0.74	30.4
9	R	72	0.0	0.476	37.5	LOS D	2.1	14.9	0.97	0.75	29.6
Approach		142	0.0	0.476	35.9	LOS D	2.1	14.9	0.97	0.75	29.9
West: Walter Road W											
10	L	87	0.0	0.418	19.1	LOS B	7.5	52.2	0.69	0.89	41.0
11	T	697	0.0	0.418	10.9	LOS B	7.5	52.8	0.69	0.60	43.6
12	R	101	0.0	0.544	38.3	LOS D	3.1	21.5	0.99	0.79	29.2
Approach		885	0.0	0.544	14.8	LOS B	7.5	52.8	0.73	0.65	41.0
All Vehicles		2141	0.0	0.731	22.1	LOS C	11.6	81.1	0.85	0.77	36.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

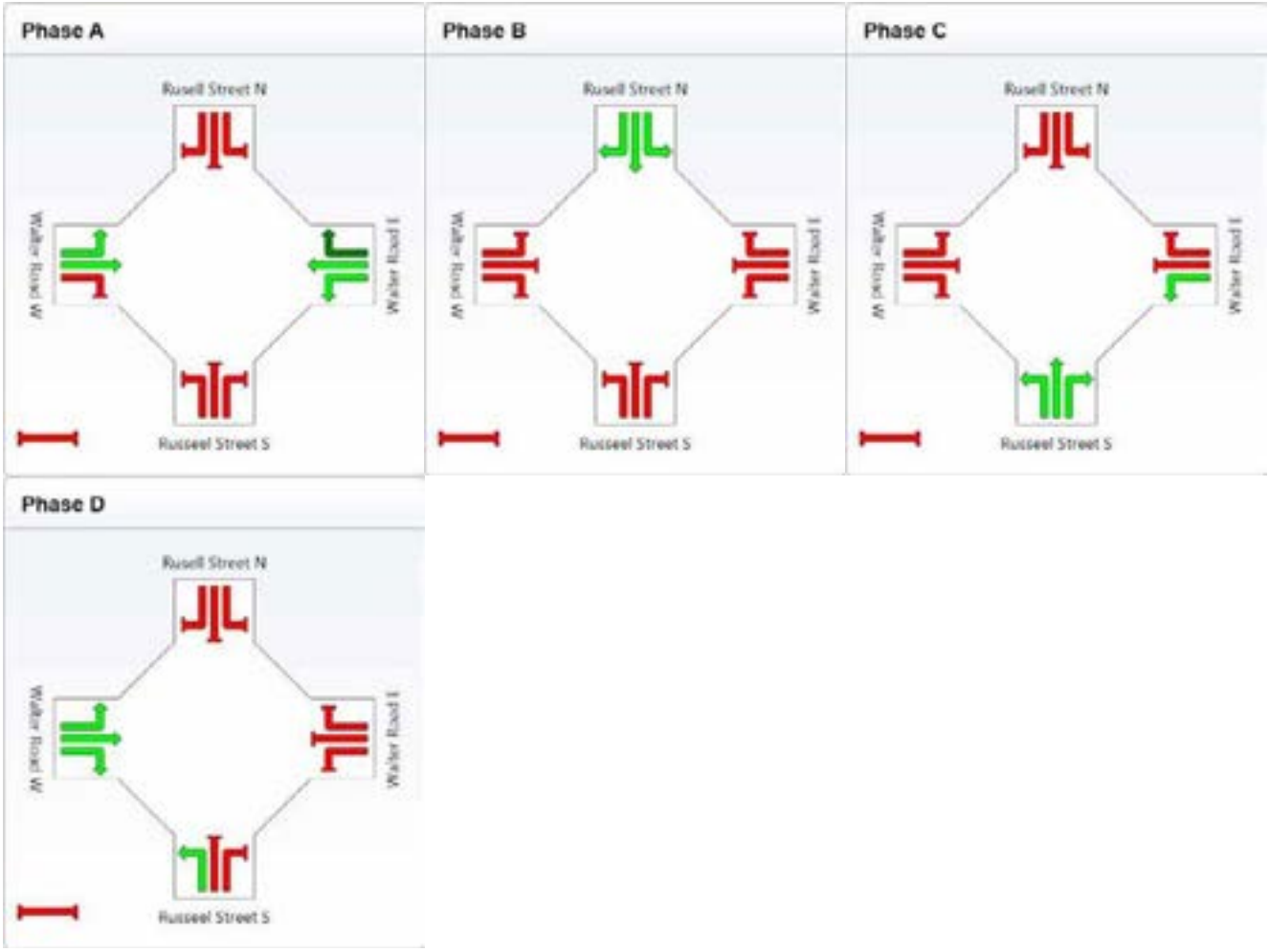
PHASING SUMMARY

Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Russell
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	17	6	7	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	23	12	13	12
Phase Split	38 %	20 %	22 %	20 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 11 Walter- Coode AM

Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 50 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	341	0.0	0.668	24.4	LOS C	9.4	65.8	0.91	0.87	36.3
2	T	120	0.0	0.668	17.9	LOS B	9.4	65.8	0.93	0.82	35.9
3	R	165	0.0	0.668	29.7	LOS C	5.0	35.2	0.96	0.88	33.4
Approach		626	0.0	0.668	24.6	LOS C	9.4	65.8	0.93	0.86	35.4
East: Walter Road E											
4	L	251	0.0	0.599	10.2	LOS B	1.4	9.5	0.49	0.72	47.0
5	T	604	0.0	0.369	10.9	LOS B	5.2	36.1	0.73	0.62	43.7
6	R	46	0.0	0.185	24.8	LOS C	0.9	6.6	0.81	0.75	35.7
Approach		901	0.0	0.599	11.4	LOS B	5.2	36.1	0.67	0.65	44.1
North: Coode Streeet N											
7	L	207	0.0	0.519	22.9	LOS C	6.7	47.2	0.85	0.84	37.6
8	T	151	0.0	0.519	15.8	LOS B	6.7	47.2	0.87	0.73	37.7
9	R	105	0.0	0.519	29.7	LOS C	3.1	21.7	0.95	0.80	33.4
Approach		463	0.0	0.519	22.2	LOS C	6.7	47.2	0.88	0.79	36.6
West: Walter Road W											
10	L	193	0.0	0.556	20.3	LOS C	8.4	59.1	0.81	0.86	39.8
11	T	708	0.0	0.556	12.1	LOS B	8.6	60.3	0.81	0.70	42.0
12	R	243	0.0	0.704	27.6	LOS C	6.0	42.2	0.93	0.91	34.1
Approach		1144	0.0	0.704	16.8	LOS B	8.6	60.3	0.83	0.77	39.7
All Vehicles		3135	0.0	0.704	17.6	LOS B	9.4	65.8	0.81	0.76	39.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	16.0	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		50	16.0	LOS B			0.80	0.80

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

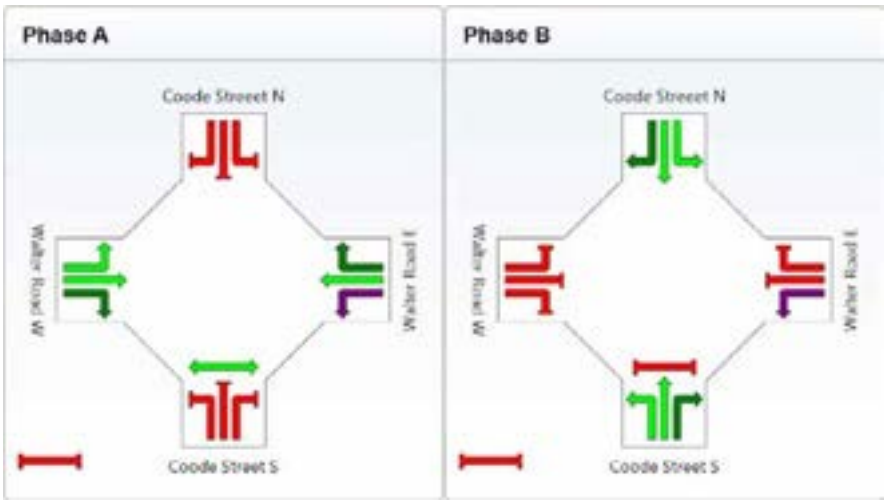
PHASING SUMMARY

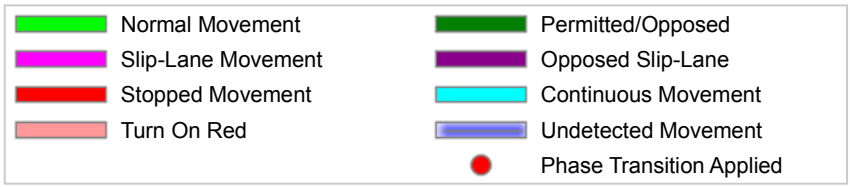
Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Walter/Coode
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	21	17
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	27	23
Phase Split	54 %	46 %





MOVEMENT SUMMARY

Site: 11 Walter- Coode PM

Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	215	0.0	0.588	23.4	LOS C	5.1	35.5	0.93	0.83	36.9
2	T	120	0.0	0.588	15.9	LOS B	5.1	35.5	0.93	0.79	37.3
3	R	142	0.0	0.588	24.4	LOS C	3.9	27.1	0.94	0.84	36.6
Approach		477	0.0	0.588	21.8	LOS C	5.1	35.5	0.93	0.82	36.9
East: Walter Road E											
4	L	232	0.0	0.493	9.2	LOS A	1.0	6.8	0.43	0.69	47.5
5	T	558	0.0	0.318	7.8	LOS A	3.6	25.1	0.68	0.57	46.8
6	R	86	0.0	0.307	21.6	LOS C	1.5	10.2	0.83	0.77	37.6
Approach		876	0.0	0.493	9.5	LOS A	3.6	25.1	0.63	0.62	45.9
North: Coode Streeet N											
7	L	66	0.0	0.329	22.1	LOS C	2.6	18.5	0.86	0.81	38.6
8	T	104	0.0	0.329	14.4	LOS B	2.6	18.5	0.87	0.69	39.1
9	R	69	0.0	0.329	25.9	LOS C	1.6	11.1	0.93	0.76	35.4
Approach		240	0.0	0.329	19.9	LOS B	2.6	18.5	0.88	0.74	37.8
West: Walter Road W											
10	L	168	0.0	0.564	17.2	LOS B	7.2	50.6	0.79	0.87	42.4
11	T	813	0.0	0.564	9.0	LOS A	7.3	51.4	0.79	0.68	44.8
12	R	192	0.0	0.457	19.0	LOS B	3.0	21.2	0.80	0.80	39.4
Approach		1173	0.0	0.564	11.8	LOS B	7.3	51.4	0.79	0.73	43.5
All Vehicles		2765	0.0	0.588	13.5	LOS B	7.3	51.4	0.77	0.71	42.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	13.6	LOS B	0.0	0.0	0.83	0.83
All Pedestrians		50	13.6	LOS B			0.83	0.83

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

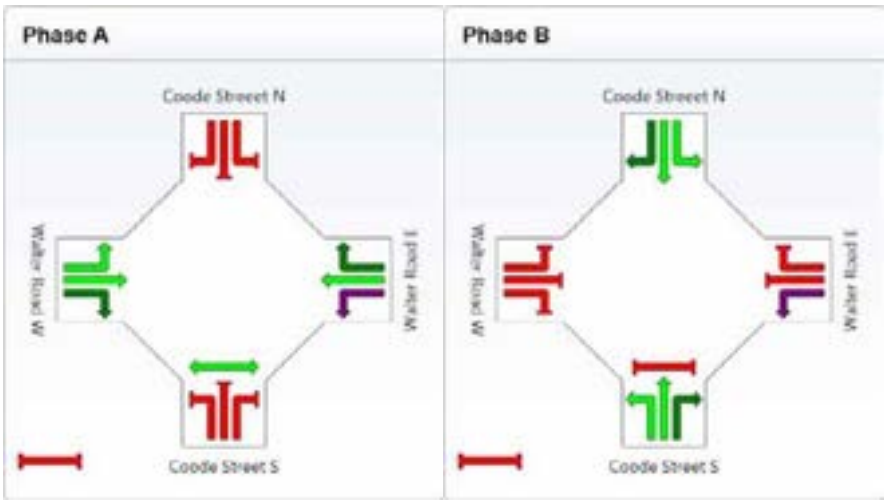
PHASING SUMMARY

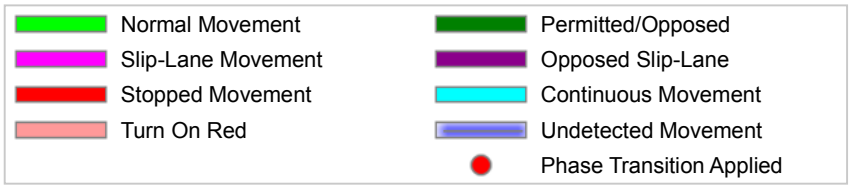
Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	18	10
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	24	16
Phase Split	60 %	40 %





MOVEMENT SUMMARY

Site: Russell - Rudloc AM

Russell Street - Rubloc Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	23	0.0	0.067	13.3	LOS B	0.7	4.6	0.51	0.83	45.2
2	T	62	0.0	0.067	5.2	LOS A	0.7	4.6	0.54	0.41	48.7
3	R	28	0.0	0.067	13.7	LOS B	0.5	3.3	0.61	0.76	44.3
Approach		114	0.0	0.067	9.0	LOS A	0.7	4.6	0.56	0.58	46.8
East: Rudloc Road E											
4	L	17	0.0	0.067	21.0	LOS C	0.5	3.2	0.79	0.74	39.0
5	T	19	0.0	0.067	13.7	LOS B	0.5	3.2	0.81	0.59	39.5
6	R	14	0.0	0.067	23.9	LOS C	0.3	2.4	0.86	0.71	36.8
Approach		49	0.0	0.067	19.0	LOS B	0.5	3.2	0.82	0.67	38.5
North: Russell Street N											
7	L	34	0.0	0.136	22.2	LOS C	0.9	6.6	0.83	0.76	38.2
8	T	63	0.0	0.136	14.0	LOS B	0.9	6.6	0.83	0.63	39.8
9	R	15	0.0	0.136	22.2	LOS C	0.9	6.2	0.83	0.78	38.9
Approach		112	0.0	0.136	17.6	LOS B	0.9	6.6	0.83	0.69	39.2
West: Rudloc Road W											
10	L	27	0.0	0.129	24.1	LOS C	0.7	5.2	0.88	0.74	36.8
11	T	39	0.0	0.129	16.0	LOS B	0.7	5.2	0.88	0.64	38.0
12	R	15	0.0	0.129	24.1	LOS C	0.7	4.7	0.88	0.75	37.4
Approach		81	0.0	0.129	20.2	LOS C	0.7	5.2	0.88	0.70	37.5
All Vehicles		356	0.0	0.136	15.6	LOS B	0.9	6.6	0.75	0.65	40.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

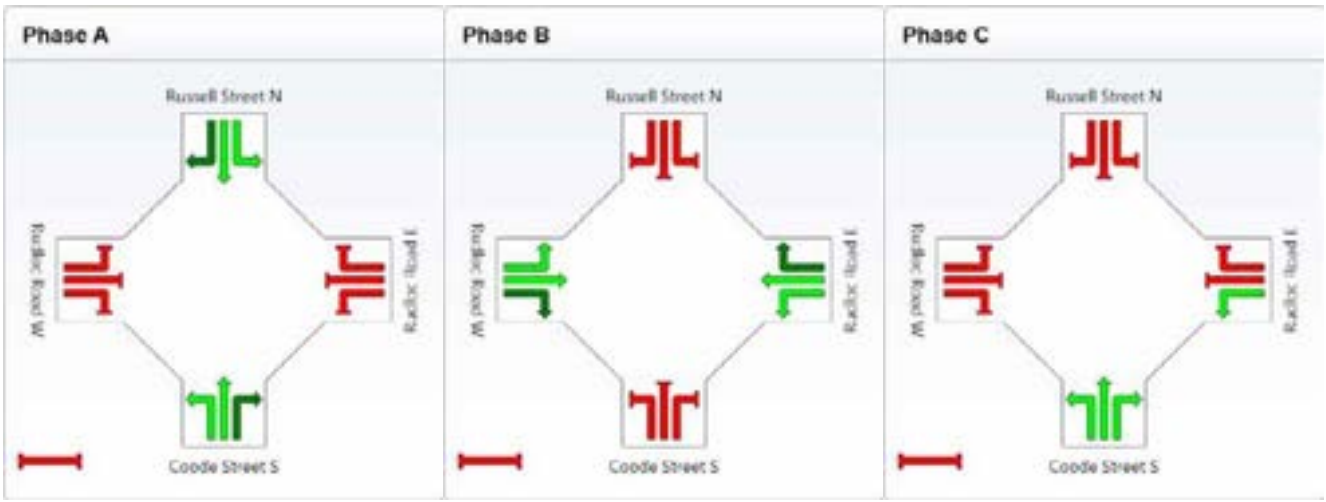
PHASING SUMMARY

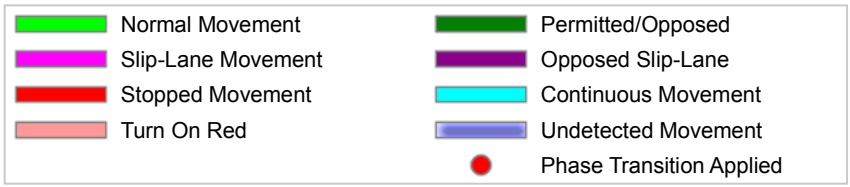
Russell Street - Rubloc Road AM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Russell/Rudloc
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	9	7	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	15	13	12
Phase Split	38 %	33 %	30 %





MOVEMENT SUMMARY

Site: Russell - Rudloc PM

Russell Street - Rubloc Road PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	11	0.0	0.035	12.6	LOS B	0.3	2.3	0.48	0.83	45.8
2	T	26	0.0	0.035	4.5	LOS A	0.3	2.3	0.48	0.36	50.5
3	R	39	0.0	0.060	13.6	LOS B	0.4	2.6	0.66	0.71	43.6
Approach		76	0.0	0.060	10.3	LOS B	0.4	2.6	0.57	0.60	46.1
East: Rudloc Road E											
4	L	35	0.0	0.119	21.2	LOS C	0.8	5.8	0.80	0.75	38.6
5	T	33	0.0	0.119	14.8	LOS B	0.8	5.8	0.85	0.62	38.6
6	R	17	0.0	0.119	25.1	LOS C	0.6	4.0	0.90	0.73	36.5
Approach		84	0.0	0.119	19.5	LOS B	0.8	5.8	0.84	0.70	38.1
North: Russell Street N											
7	L	51	0.0	0.152	21.4	LOS C	1.1	8.0	0.81	0.76	38.4
8	T	86	0.0	0.152	13.2	LOS B	1.1	8.0	0.81	0.62	40.9
9	R	6	0.0	0.152	21.3	LOS C	1.1	8.0	0.81	0.81	40.0
Approach		143	0.0	0.152	16.4	LOS B	1.1	8.0	0.81	0.68	40.0
West: Rudloc Road W											
10	L	8	0.0	0.046	24.7	LOS C	0.2	1.6	0.88	0.69	36.4
11	T	12	0.0	0.046	16.6	LOS B	0.2	1.6	0.88	0.60	37.6
12	R	4	0.0	0.046	24.8	LOS C	0.2	1.4	0.88	0.70	37.0
Approach		24	0.0	0.046	20.9	LOS C	0.2	1.6	0.88	0.65	37.1
All Vehicles		327	0.0	0.152	16.1	LOS B	1.1	8.0	0.77	0.66	40.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

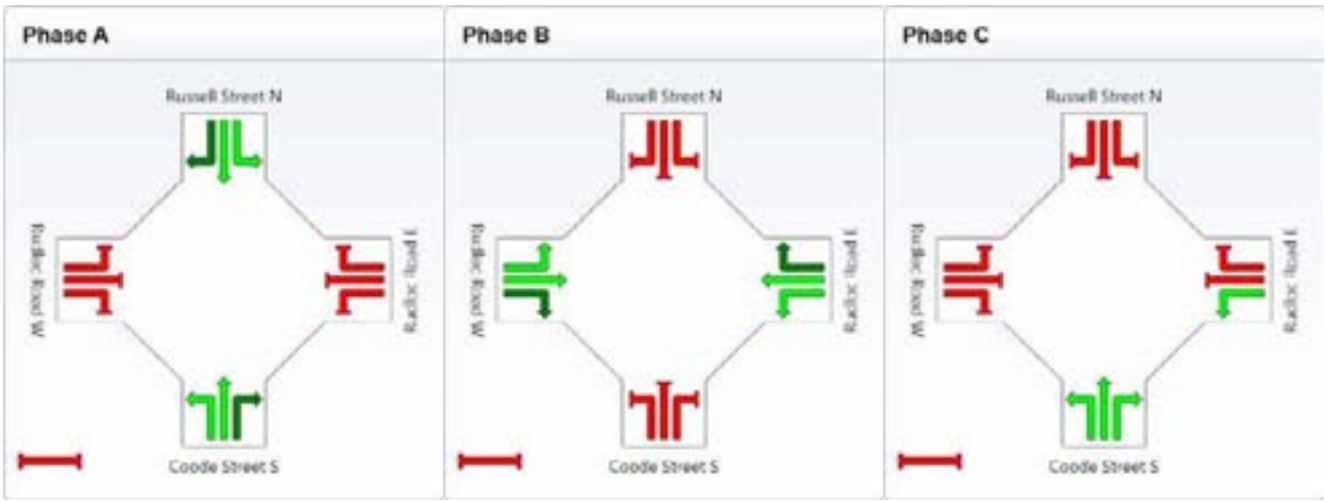
PHASING SUMMARY

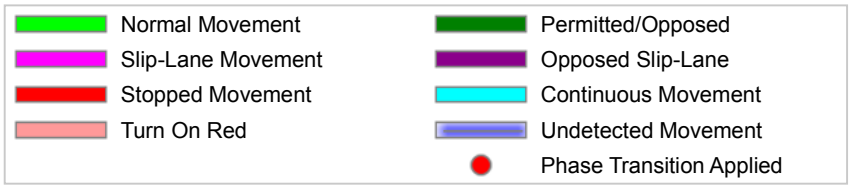
Russell Street - Rubloc Road PM
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Russell/Rudloc
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	10	6	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	16	12	12
Phase Split	40 %	30 %	30 %





Future (2031) Assessment

MOVEMENT SUMMARY

Site: 1 Broun - Coode AM

Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	304	0.0	0.829	45.0	LOS D	16.9	118.5	1.00	0.92	27.0
2	T	361	0.0	0.829	51.8	LOS D	18.3	128.0	1.00	0.95	23.7
3	R	140	0.0	0.566	51.9	LOS D	7.3	51.1	0.98	0.81	24.9
Approach		805	0.0	0.829	49.2	LOS D	18.3	128.0	1.00	0.91	25.0
East: Broun Avenue E											
4	L	606	0.0	0.748	10.2	LOS B	7.1	49.4	0.41	0.72	46.8
5	T	1642	0.0	0.849	30.9	LOS C	42.6	298.5	0.94	0.91	30.9
6	R	301	0.0	0.847	64.1	LOS E	18.2	127.4	1.00	0.94	21.8
Approach		2549	0.0	0.849	29.9	LOS C	42.6	298.5	0.82	0.86	31.9
North: Coode Street											
7	L	335	0.0	0.415	32.1	LOS C	12.8	89.9	0.74	0.81	31.8
8	T	153	0.0	0.410	44.5	LOS D	7.6	53.4	0.92	0.75	25.9
9	R	59	0.0	0.591	59.5	LOS E	3.2	22.6	0.97	0.77	22.9
Approach		547	0.0	0.591	38.5	LOS D	12.8	89.9	0.81	0.79	28.8
West: Broun Avenue W											
10	L	289	0.0	0.588	17.4	LOS B	7.1	49.4	0.52	0.73	40.7
11	T	933	0.0	0.671	33.6	LOS C	22.1	154.6	0.91	0.80	29.8
12	R	46	0.0	0.475	69.1	LOS E	2.7	18.9	1.00	0.74	20.8
Approach		1268	0.0	0.671	31.2	LOS C	22.1	154.6	0.82	0.78	31.3
All Vehicles		5169	0.0	0.849	34.1	LOS C	42.6	298.5	0.85	0.84	30.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

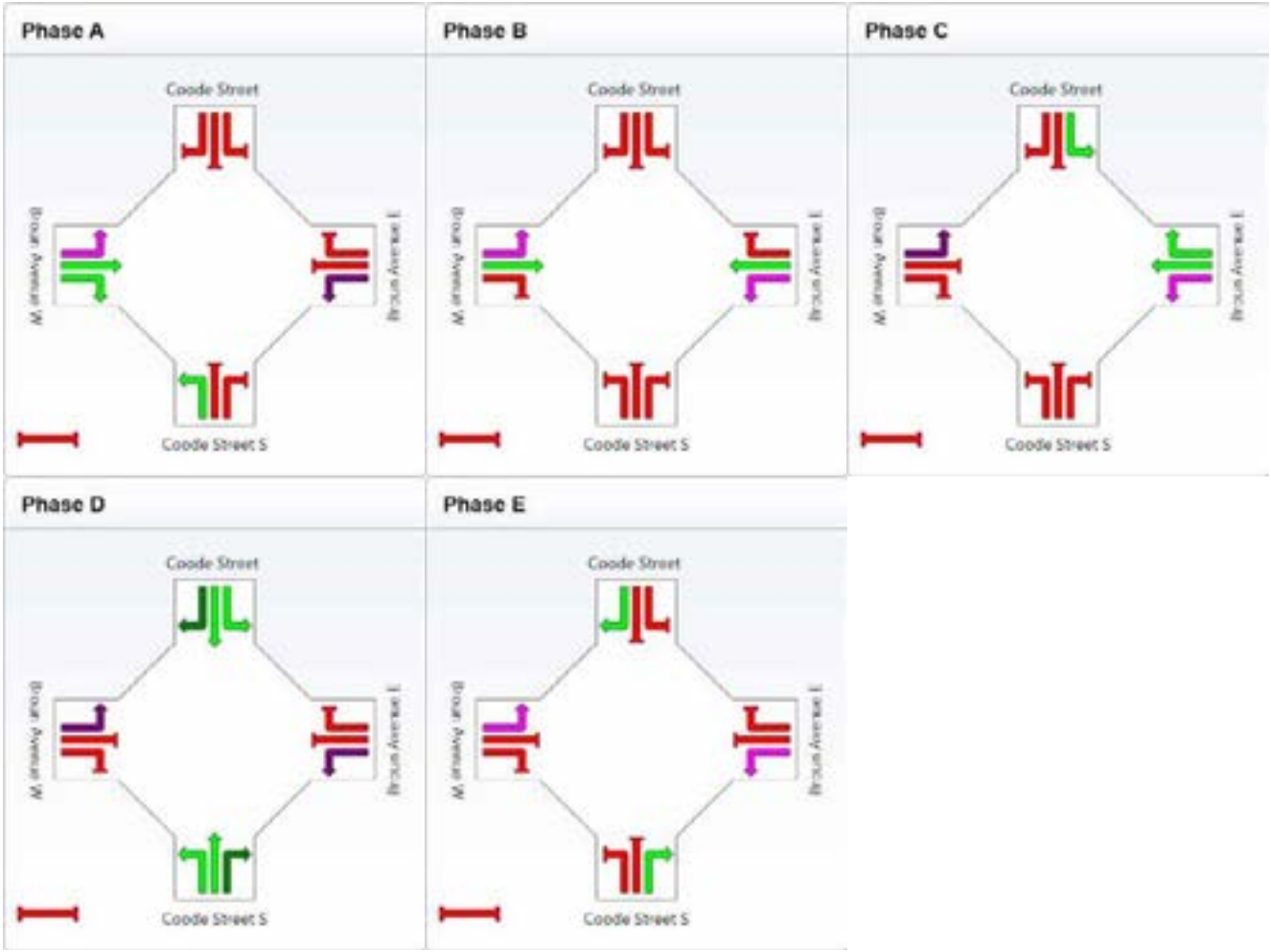
PHASING SUMMARY

Broun Avenue - Coode Street AM Peak
Signals - Fixed Time Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C, D, E
Output Sequence: A, B, C, D, E

Phase Timing Results

Phase	A	B	C	D	E
Green Time (sec)	6	29	22	22	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	12	35	28	28	12
Phase Split	10 %	30 %	24 %	24 %	10 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 1 Broun - Coode PM

Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 70 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	151	0.0	0.718	29.4	LOS C	5.0	34.7	1.00	0.86	33.5
2	T	158	0.0	0.718	33.8	LOS C	5.0	34.7	1.00	0.86	29.3
3	R	76	0.0	0.279	34.4	LOS C	2.3	16.2	0.93	0.73	30.9
Approach		385	0.0	0.718	32.2	LOS C	5.0	34.7	0.99	0.83	31.2
East: Broun Avenue E											
4	L	362	0.0	0.352	8.9	LOS A	2.2	15.7	0.30	0.68	48.1
5	T	1122	0.0	0.719	19.9	LOS B	16.7	116.7	0.90	0.81	36.7
6	R	172	0.0	0.810	46.4	LOS D	6.6	46.1	1.00	0.95	26.5
Approach		1656	0.0	0.810	20.2	LOS C	16.7	116.7	0.78	0.80	37.2
North: Coode Street N											
7	L	202	0.0	0.577	35.7	LOS D	7.2	50.6	0.95	0.82	30.4
8	T	122	0.0	0.577	34.3	LOS C	7.2	50.6	0.99	0.79	29.1
9	R	68	0.0	0.383	34.3	LOS C	2.1	14.5	0.93	0.73	31.0
Approach		392	0.0	0.577	35.0	LOS D	7.2	50.6	0.96	0.79	30.1
West: Broun Avenue W											
10	L	354	0.0	0.407	10.5	LOS B	3.6	25.0	0.42	0.71	46.5
11	T	1194	0.0	0.824	26.7	LOS C	21.1	148.0	0.97	0.97	32.8
12	R	56	0.0	0.434	42.8	LOS D	1.9	13.6	0.98	0.74	27.7
Approach		1604	0.0	0.824	23.7	LOS C	21.1	148.0	0.85	0.90	34.9
All Vehicles		4037	0.0	0.824	24.2	LOS C	21.1	148.0	0.85	0.84	34.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

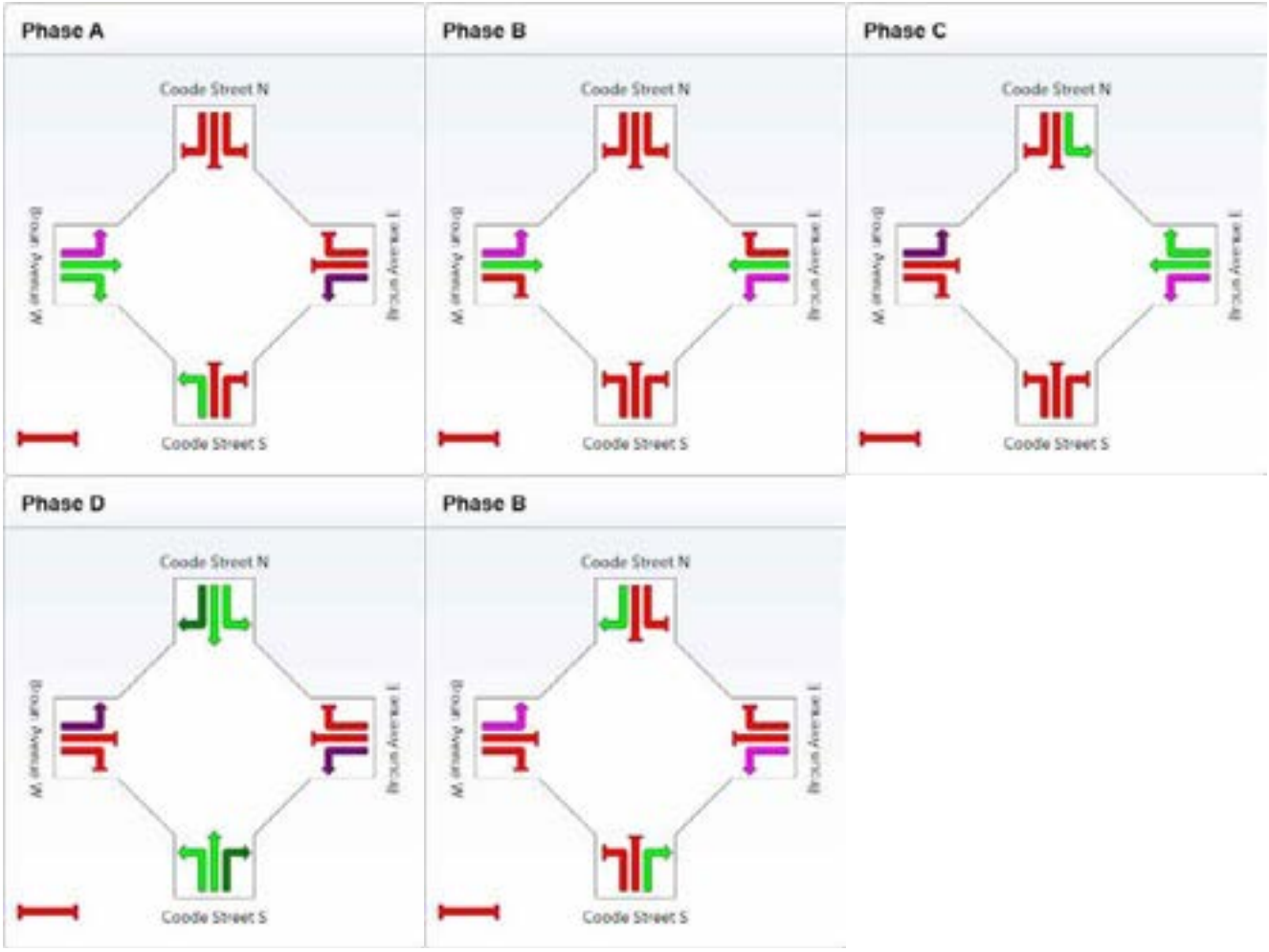
PHASING SUMMARY

Broun Avenue - Coode Street PM Peak
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C, D, B
Output Sequence: A, B, C, D, B

Phase Timing Results

Phase	A	B	C	D	B
Green Time (sec)	6	14	8	6	6
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	12	20	14	12	12
Phase Split	17 %	29 %	20 %	17 %	17 %



MOVEMENT SUMMARY

Site: 3 Broun - Russell AM - 5lane

Broun Avenue - Russel Road AM
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	3039	0.0	0.712	8.0	LOS A	27.3	191.4	0.61	0.57	46.9
6	R	496	0.0	0.763	40.5	LOS D	22.3	155.8	0.95	0.89	28.5
Approach		3535	0.0	0.763	12.6	LOS B	27.3	191.4	0.66	0.61	43.0
North: Russell Street N											
7	L	344	0.0	0.369	12.7	LOS B	5.7	39.8	0.44	0.72	44.5
9	R	269	0.0	0.483	51.1	LOS D	6.2	43.4	0.96	0.79	25.0
Approach		613	0.0	0.483	29.6	LOS C	6.2	43.4	0.67	0.75	33.2
West: Broun Avenue W											
10	L	432	0.0	0.601	14.1	LOS B	8.5	59.4	0.51	0.74	43.3
11	T	926	0.0	0.742	33.7	LOS C	20.6	144.5	0.95	0.85	29.7
Approach		1358	0.0	0.742	27.5	LOS C	20.6	144.5	0.81	0.82	33.0
All Vehicles		5506	0.0	0.763	18.1	LOS B	27.3	191.4	0.70	0.68	38.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	50	44.2	LOS E	0.1	0.1	0.94	0.94
P4	Across E approach	50	11.5	LOS B	0.1	0.1	0.48	0.48
P5	Across N approach	50	31.2	LOS D	0.1	0.1	0.79	0.79
All Pedestrians		150	29.0	LOS C			0.74	0.74

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

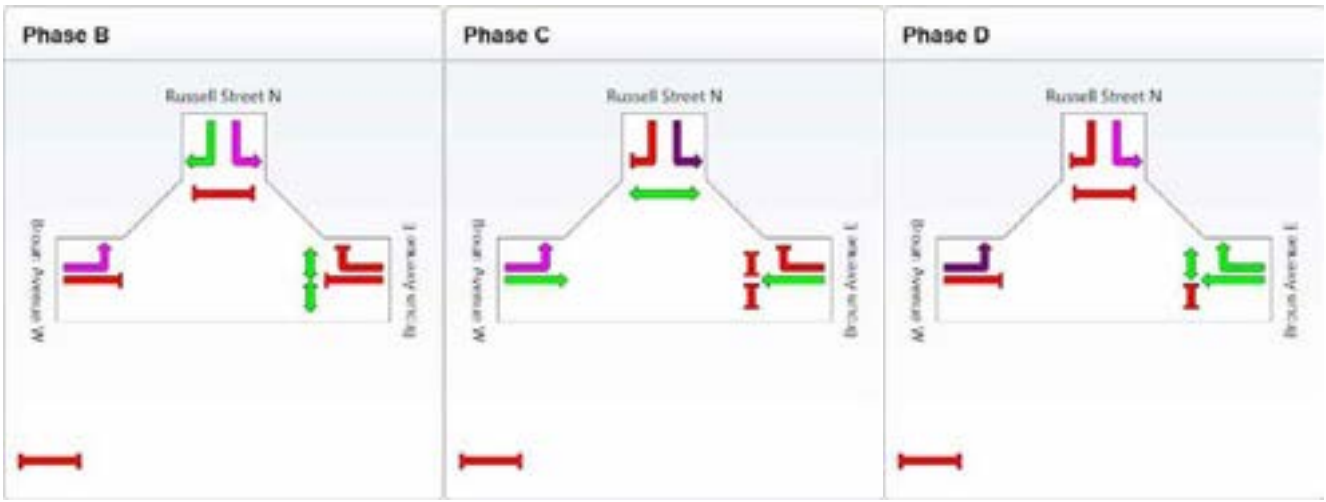
PHASING SUMMARY

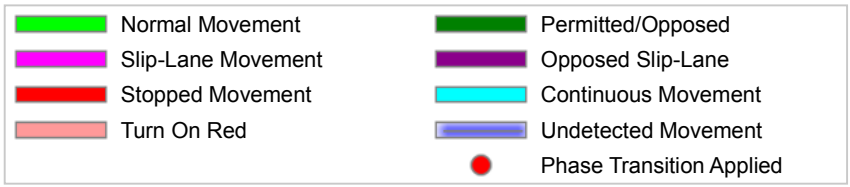
Broun Avenue - Russel Road AM
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: B, C, D
Output Sequence: B, C, D

Phase Timing Results

Phase	B	C	D
Green Time (sec)	15	32	35
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	21	38	41
Phase Split	21 %	38 %	41 %





MOVEMENT SUMMARY

Site: 3 Broun - Russell PM - 5lane

Broun Avenue - Russel Road PM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Broun Avenue E											
5	T	1704	0.0	0.396	5.7	LOS A	11.1	77.7	0.40	0.36	50.2
6	R	366	0.0	0.943	77.2	LOS E	25.0	174.7	1.00	1.07	19.3
Approach		2070	0.0	0.943	18.3	LOS B	25.0	174.7	0.51	0.49	39.1
North: Russell Street N											
7	L	678	0.0	1.000[3]	28.6	LOS C	28.0	196.2	0.91	0.87	33.7
9	R	545	0.0	0.950	81.9	LOS F	18.7	131.2	1.00	1.09	18.5
Approach		1223	0.0	1.000	52.3	LOS D	28.0	196.2	0.95	0.97	24.7
West: Broun Avenue W											
10	L	557	0.0	0.690	12.9	LOS B	10.5	73.8	0.45	0.72	44.3
11	T	1703	0.0	0.924	46.3	LOS D	53.3	373.3	1.00	1.08	25.3
Approach		2260	0.0	0.924	38.1	LOS D	53.3	373.3	0.87	0.99	28.3
All Vehicles		5553	0.0	1.000	33.9	LOS C	53.3	373.3	0.75	0.80	30.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	50	47.3	LOS E	0.1	0.1	0.93	0.93
P4	Across E approach	50	21.0	LOS C	0.1	0.1	0.62	0.62
P5	Across N approach	50	21.6	LOS C	0.1	0.1	0.63	0.63
All Pedestrians		150	30.0	LOS C			0.72	0.72

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

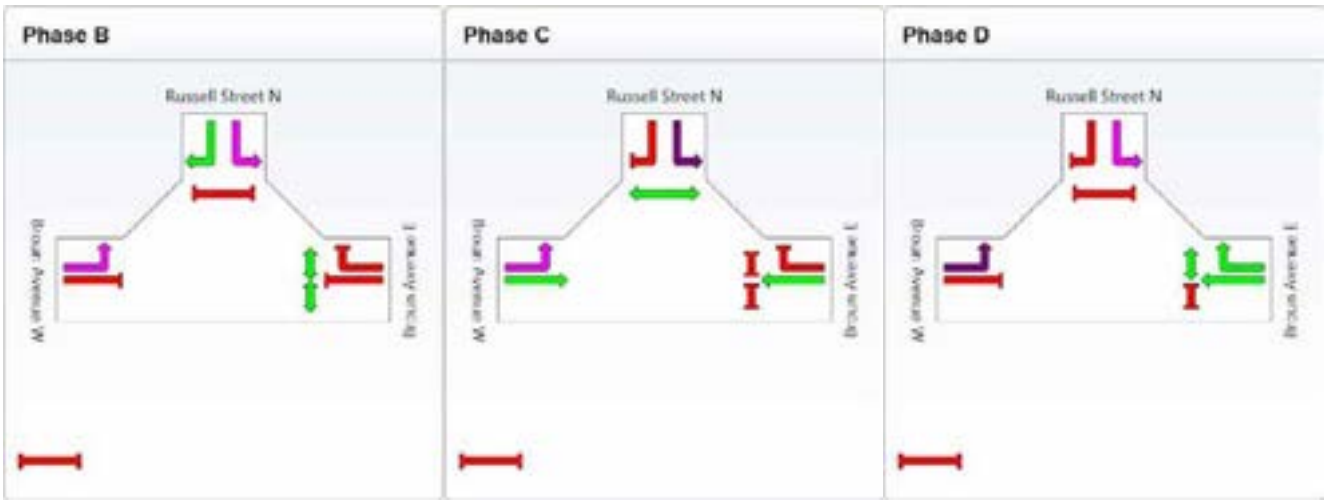
PHASING SUMMARY

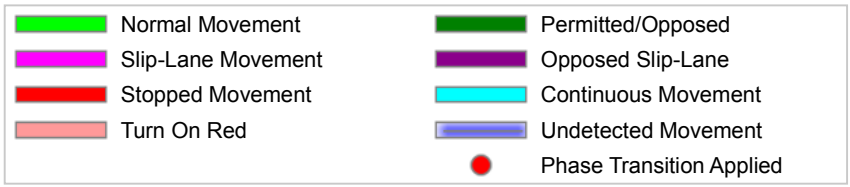
Broun Avenue - Russel Road PM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: B, C, D
Output Sequence: B, C, D

Phase Timing Results

Phase	B	C	D
Green Time (sec)	17	52	23
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	58	29
Phase Split	21 %	53 %	26 %





MOVEMENT SUMMARY

Site: 4 Broun - Collier AM - 5lane

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	325	0.0	0.801	39.2	LOS D	16.1	112.5	0.71	0.83	29.1
2	T	579	0.0	0.828	67.5	LOS E	21.1	148.0	1.00	0.94	20.3
3	R	21	0.0	0.336	84.7	LOS F	1.5	10.7	1.00	0.70	18.2
Approach		925	0.0	0.828	58.0	LOS E	21.1	148.0	0.90	0.90	22.7
East: Broun Avenue E											
4	L	48	0.0	0.595	23.9	LOS C	1.5	10.8	0.46	0.70	36.4
5	T	1501	0.0	0.949	74.7	LOS E	44.0	308.1	1.00	1.07	19.0
6	R	332	0.0	0.926	89.0	LOS F	27.5	192.8	1.00	1.01	17.5
Approach		1881	0.0	0.949	75.9	LOS E	44.0	308.1	0.99	1.05	19.0
North: Collier Road N											
7	L	195	0.0	0.481	13.4	LOS B	3.9	27.3	0.35	0.68	44.0
8	T	490	0.0	0.687	41.5	LOS D	29.1	203.5	0.91	0.81	26.9
9	R	809	0.0	0.957	94.7	LOS F	35.8	250.7	1.00	1.04	16.8
Approach		1494	0.0	0.957	66.6	LOS E	35.8	250.7	0.89	0.92	21.1
West: Broun Avenue W											
10	L	517	0.0	0.771	22.1	LOS C	18.8	131.3	0.62	0.78	37.4
11	T	605	0.0	0.926	78.7	LOS E	34.8	243.6	1.00	1.08	18.3
12	R	381	0.0	0.926	91.5	LOS F	25.0	175.0	1.00	1.04	17.3
Approach		1503	0.0	0.926	62.5	LOS E	34.8	243.6	0.87	0.96	21.9
All Vehicles		5803	0.0	0.957	67.2	LOS E	44.0	308.1	0.92	0.97	20.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	50	55.6	LOS E	0.2	0.2	0.88	0.88
P7	Across W approach	50	66.6	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		100	61.1	LOS F			0.92	0.92

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

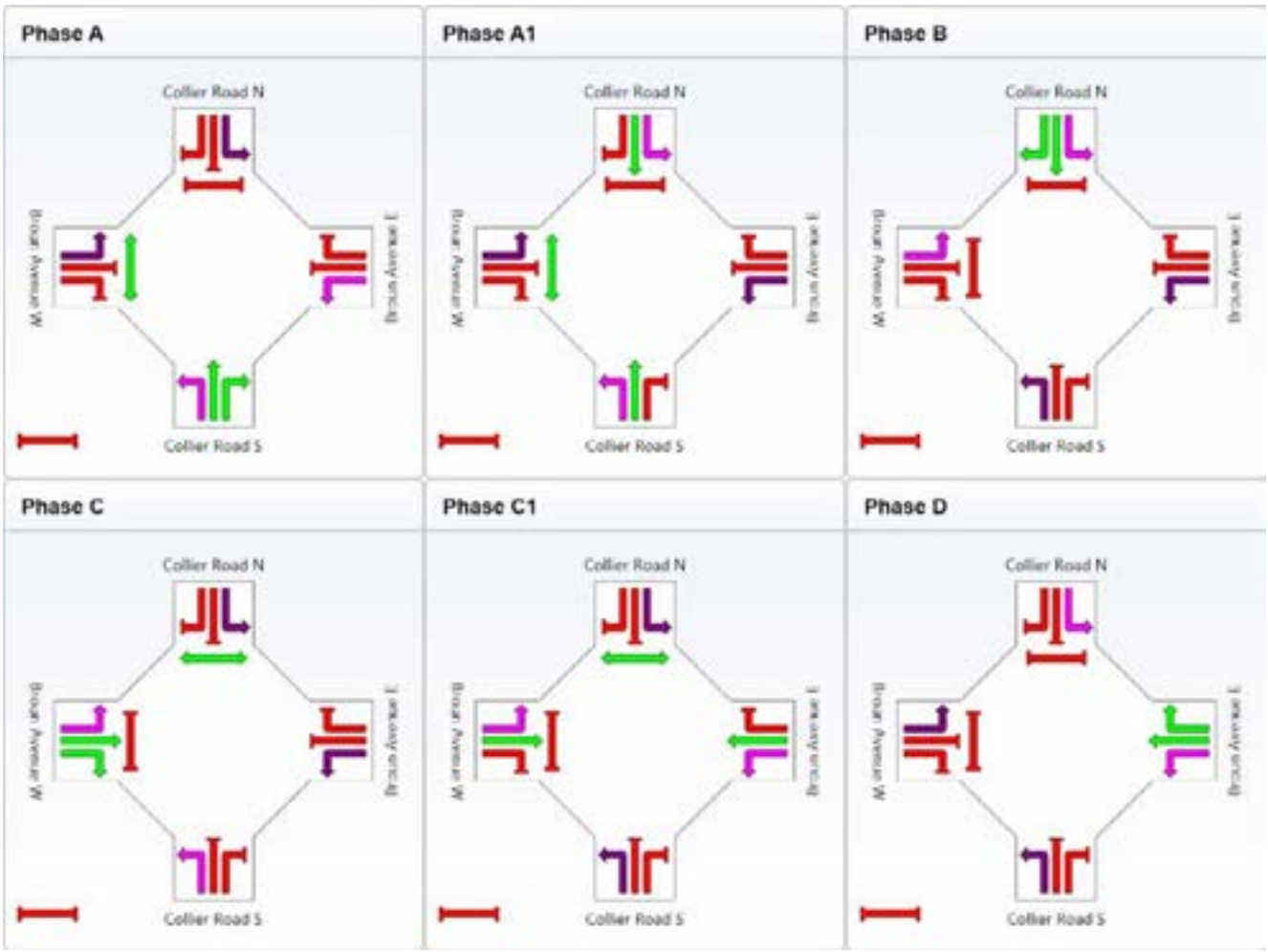
PHASING SUMMARY

Broun Avenue - Collier Road AM
Signals - Fixed Time Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, A1, B, C, C1, D
Output Sequence: A, A1, B, C, C1, D

Phase Timing Results

Phase	A	A1	B	C	C1	D
Green Time (sec)	6	14	33	22	6	28
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	12	20	39	28	12	34
Phase Split	8 %	14 %	27 %	19 %	8 %	23 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 4 Broun - Collier PM - 5lane

Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	491	0.0	0.706	15.5	LOS B	11.3	78.9	0.52	0.74	42.1
2	T	1095	0.0	0.978	80.9	LOS F	42.7	299.1	1.00	1.26	18.1
3	R	43	0.0	0.444	49.3	LOS D	2.0	14.0	0.86	0.72	25.6
Approach		1629	0.0	0.978	60.3	LOS E	42.7	299.1	0.85	1.09	22.1
East: Broun Avenue E											
4	L	31	0.0	0.329	18.5	LOS B	0.7	5.2	0.49	0.66	39.9
5	T	691	0.0	0.906	67.1	LOS E	15.0	105.2	1.00	1.05	20.4
6	R	140	0.0	0.963	90.4	LOS F	10.0	70.3	1.00	1.10	17.3
Approach		862	0.0	0.963	69.1	LOS E	15.0	105.2	0.98	1.04	20.2
North: Collier Road N											
7	L	135	0.0	0.344	15.0	LOS B	2.7	18.9	0.44	0.69	42.5
8	T	363	0.0	0.738	43.9	LOS D	19.2	134.5	0.98	0.87	26.1
9	R	561	0.0	0.965	89.4	LOS F	20.7	145.2	1.00	1.10	17.4
Approach		1059	0.0	0.965	64.3	LOS E	20.7	145.2	0.92	0.97	21.5
West: Broun Avenue S											
10	L	750	0.0	0.751	25.3	LOS C	29.0	202.7	0.84	0.86	35.5
11	T	1028	0.0	0.978	81.5	LOS F	40.0	279.8	1.00	1.25	18.0
12	R	385	0.0	0.954	82.7	LOS F	28.0	196.0	1.00	1.08	18.4
Approach		2163	0.0	0.978	62.2	LOS E	40.0	279.8	0.94	1.09	21.8
All Vehicles		5713	0.0	0.978	63.1	LOS E	42.7	299.1	0.92	1.06	21.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	50	42.6	LOS E	0.1	0.1	0.86	0.86
P7	Across W approach	50	51.7	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		100	47.1	LOS E			0.90	0.90

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

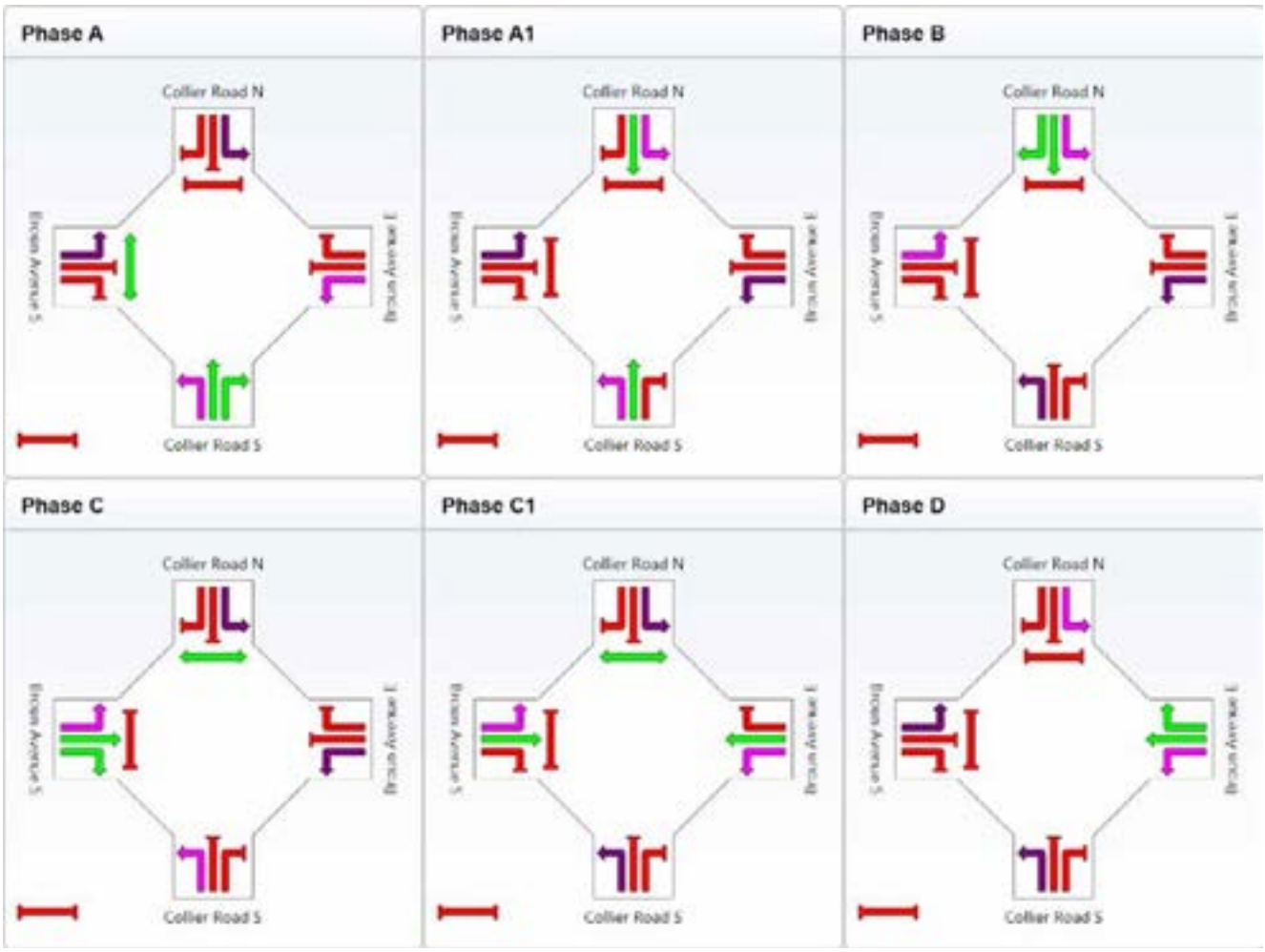
PHASING SUMMARY

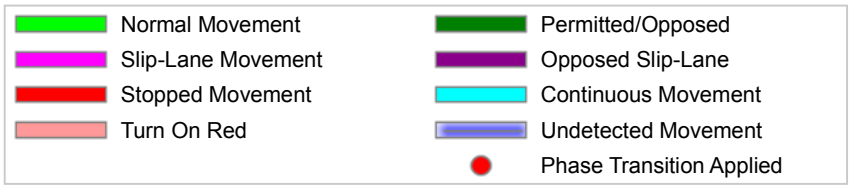
Broun Avenue - Collier Road PM
Signals - Fixed Time Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, A1, B, C, C1, D
Output Sequence: A, A1, B, C, C1, D

Phase Timing Results

Phase	A	A1	B	C	C1	D
Green Time (sec)	22	5	18	25	0	9
Yellow Time (sec)	4	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2	2
Phase Time (sec)	28	11	24	31	6	15
Phase Split	24 %	10 %	21 %	27 %	5 %	13 %





MOVEMENT SUMMARY

Site: Walter - Crimea AM

Walter Road West - Crimea Street AM Peak
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea St S											
1	L	273	0.0	0.358	14.2	LOS B	4.8	33.8	0.55	0.75	43.3
2	T	145	0.0	0.336	34.0	LOS C	5.7	40.1	0.89	0.72	29.7
Approach		418	0.0	0.358	21.1	LOS C	5.7	40.1	0.67	0.74	37.4
East: Walter Road E											
4	L	309	0.0	0.637	12.0	LOS B	4.8	33.5	0.43	0.71	45.2
5	T	363	0.0	0.520	26.0	LOS C	13.3	93.1	0.84	0.73	33.4
6	R	507	0.0	0.647	38.0	LOS D	10.2	71.3	0.95	0.84	29.4
Approach		1179	0.0	0.647	27.5	LOS C	13.3	93.1	0.78	0.77	33.8
North: Crimea St N											
7	L	511	0.0	0.792	41.4	LOS D	22.8	159.6	0.97	0.91	28.0
8	T	465	0.0	0.694	20.2	LOS C	21.7	152.1	0.85	0.75	35.8
9	R	608	0.0	0.694	31.7	LOS C	21.7	152.1	0.90	0.93	32.4
Approach		1584	0.0	0.792	31.4	LOS C	22.8	159.6	0.91	0.87	31.7
West: Walter Road W											
10	L	407	0.0	0.219	7.6	X	X	X	X	0.60	49.8
11	T	179	0.0	0.198	31.9	LOS C	3.4	23.6	0.84	0.66	30.6
Approach		586	0.0	0.219	15.0	LOS B	3.4	23.6	0.26	0.62	41.8
All Vehicles		3767	0.0	0.792	26.5	LOS C	22.8	159.6	0.74	0.78	34.2

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	25.1	LOS C	0.1	0.1	0.73	0.73
P3	Across E approach	50	41.7	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	50	41.7	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		150	36.1	LOS D			0.87	0.87

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

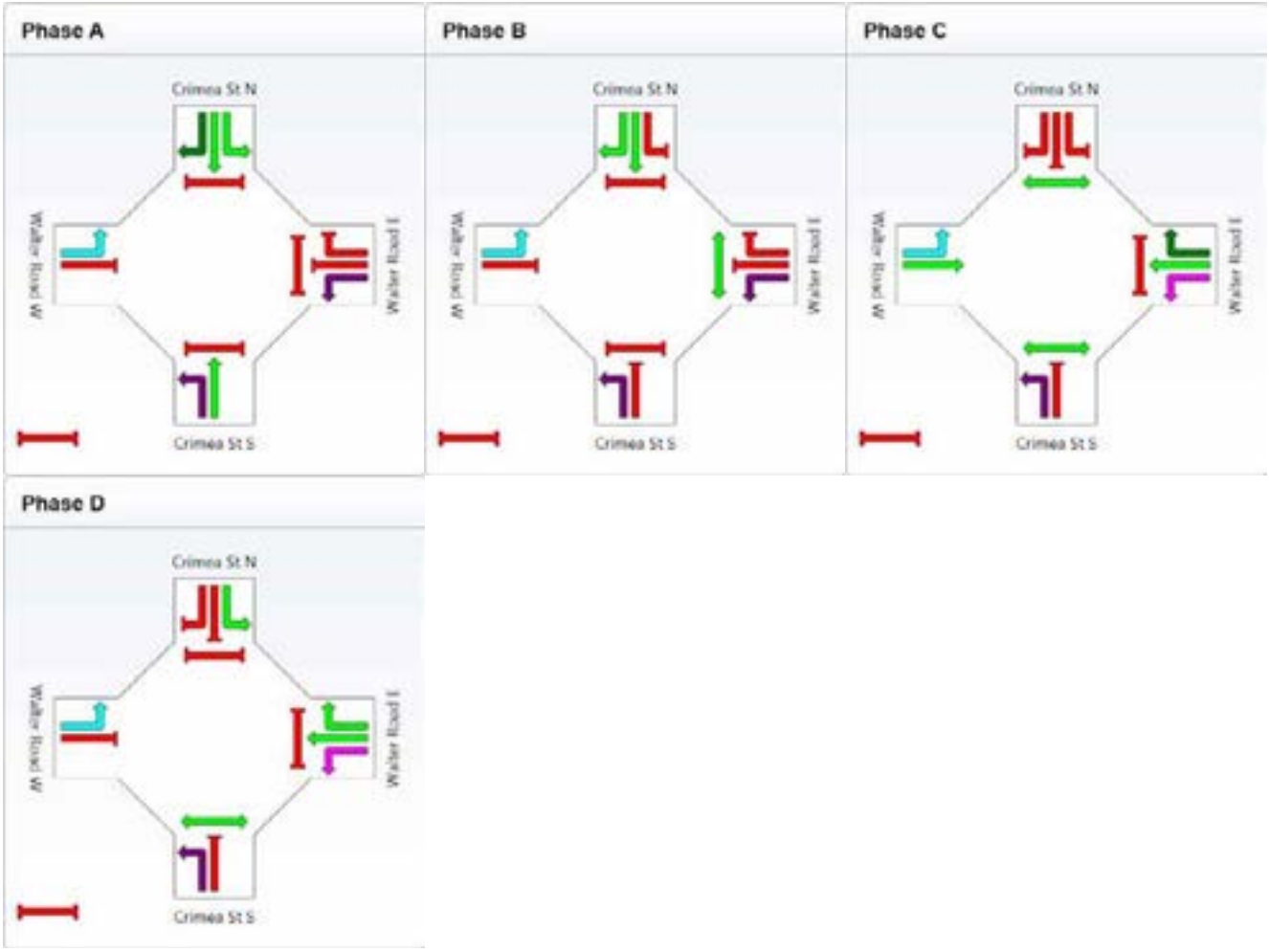
PHASING SUMMARY

Walter Road West - Crimea Street AM Peak
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Walter/Crimea
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	21	22	22	6
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	27	28	28	12
Phase Split	28 %	29 %	29 %	13 %



MOVEMENT SUMMARY

Site: Walter - Crimea PM

Walter Road West - Crimea Street PM Peak
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Crimea St S											
1	L	418	0.0	0.449	14.0	LOS B	8.0	56.3	0.55	0.76	43.4
2	T	262	0.0	0.709	40.9	LOS D	11.9	83.5	0.99	0.86	27.0
Approach		680	0.0	0.709	24.4	LOS C	11.9	83.5	0.72	0.80	35.2
East: Walter Road E											
4	L	88	0.0	0.149	10.0	LOS A	0.9	6.1	0.29	0.66	47.1
5	T	176	0.0	0.260	23.9	LOS C	5.8	40.9	0.76	0.63	34.7
6	R	199	0.0	0.727	59.3	LOS E	5.0	34.8	1.00	0.85	22.9
Approach		463	0.0	0.727	36.5	LOS D	5.8	40.9	0.77	0.73	29.6
North: Crimea St N											
7	L	306	0.0	0.505	36.2	LOS D	11.5	80.6	0.86	0.83	30.0
8	T	344	0.0	0.747	27.1	LOS C	19.6	137.1	0.92	0.96	31.7
9	R	685	0.0	0.747	38.4	LOS D	19.6	137.1	0.94	1.02	29.5
Approach		1335	0.0	0.747	35.0	LOS C	19.6	137.1	0.91	0.96	30.2
West: Walter Road W											
10	L	1272	0.0	0.685	7.7	X	X	X	X	0.60	49.6
11	T	236	0.0	0.389	34.7	LOS C	6.5	45.3	0.89	0.71	29.4
Approach		1508	0.0	0.685	12.0	LOS B	6.5	45.3	0.14	0.62	44.8
All Vehicles		3986	0.0	0.747	24.6	LOS C	19.6	137.1	0.57	0.78	35.3

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	25.8	LOS C	0.1	0.1	0.74	0.74
P3	Across E approach	50	38.0	LOS D	0.1	0.1	0.89	0.89
P5	Across N approach	50	41.7	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		150	35.2	LOS D			0.86	0.86

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

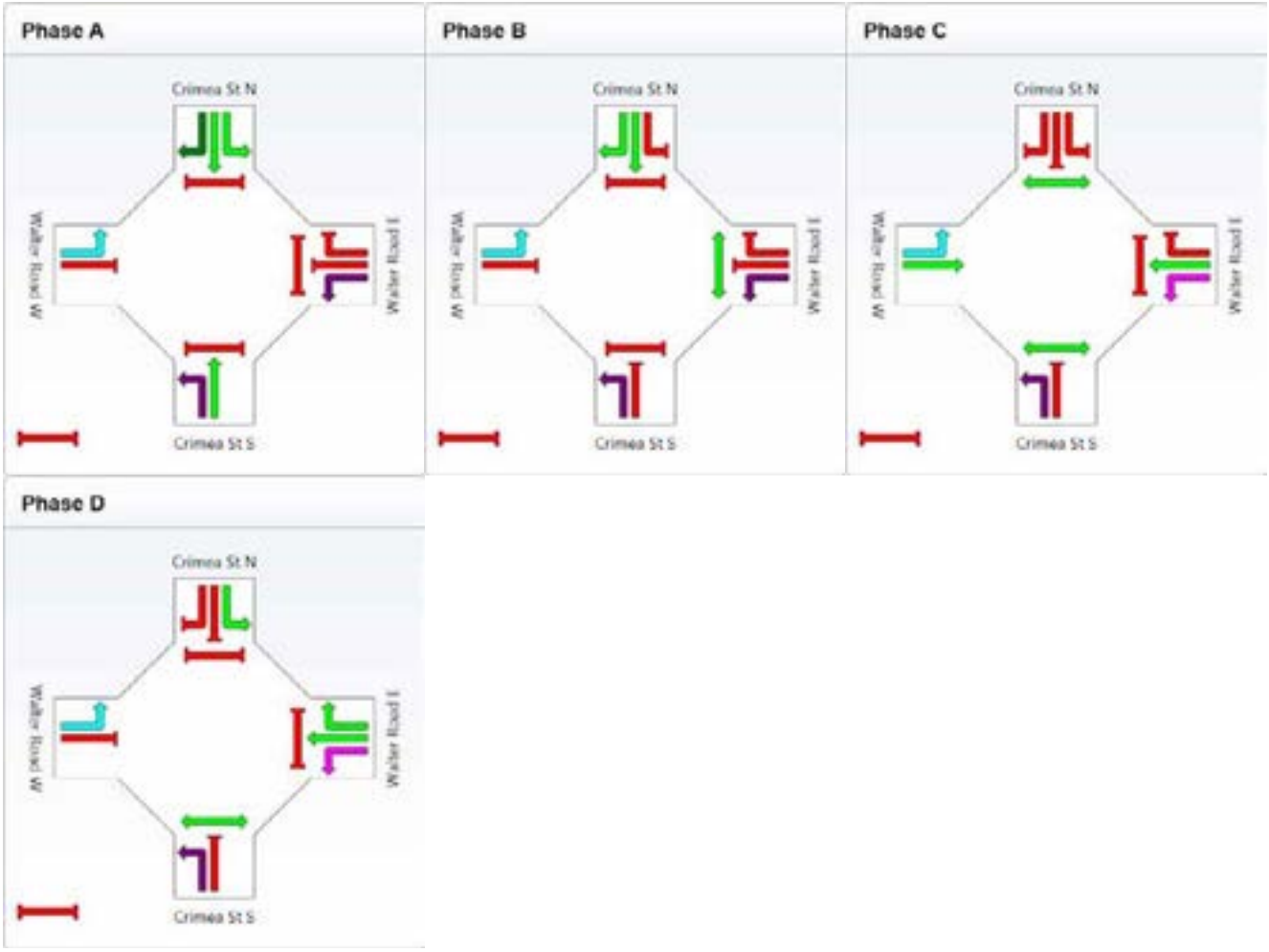
PHASING SUMMARY

Walter Road West - Crimea Street PM Peak
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Walter/Crimea
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	18	26	20	7
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	24	32	26	13
Phase Split	25 %	34 %	27 %	14 %



MOVEMENT SUMMARY

Site: 7 Walter - Collier AM

Walter Road - Collier Road AM

Signals - Fixed Time Cycle Time = 125 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	233	0.0	0.223	24.6	LOS C	7.0	49.0	0.57	0.74	36.0
3	R	112	0.0	0.210	55.3	LOS E	3.6	25.3	0.89	0.75	23.9
Approach		345	0.0	0.223	34.6	LOS C	7.0	49.0	0.68	0.74	30.9
East: Walter Road E											
4	L	408	0.0	0.648	13.7	LOS B	8.6	60.3	0.43	0.72	43.6
5	T	1167	0.0	0.779	36.7	LOS D	31.4	219.5	0.95	0.85	28.6
Approach		1575	0.0	0.779	30.7	LOS C	31.4	219.5	0.81	0.82	31.4
West: Walter Road W											
11	T	1063	0.0	0.749	10.7	LOS B	38.0	265.7	0.65	0.61	44.2
12	R	860	0.0	0.782	53.3	LOS D	24.9	174.3	0.98	0.89	24.5
Approach		1923	0.0	0.782	29.8	LOS C	38.0	265.7	0.80	0.74	32.4
All Vehicles		3843	0.0	0.782	30.6	LOS C	38.0	265.7	0.79	0.77	31.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	5.8	LOS A	0.1	0.1	0.30	0.30
P2	Across S approach	50	11.2	LOS B	0.1	0.1	0.42	0.42
P7	Across W approach	50	56.6	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		150	24.6	LOS C			0.56	0.56

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

PHASING SUMMARY

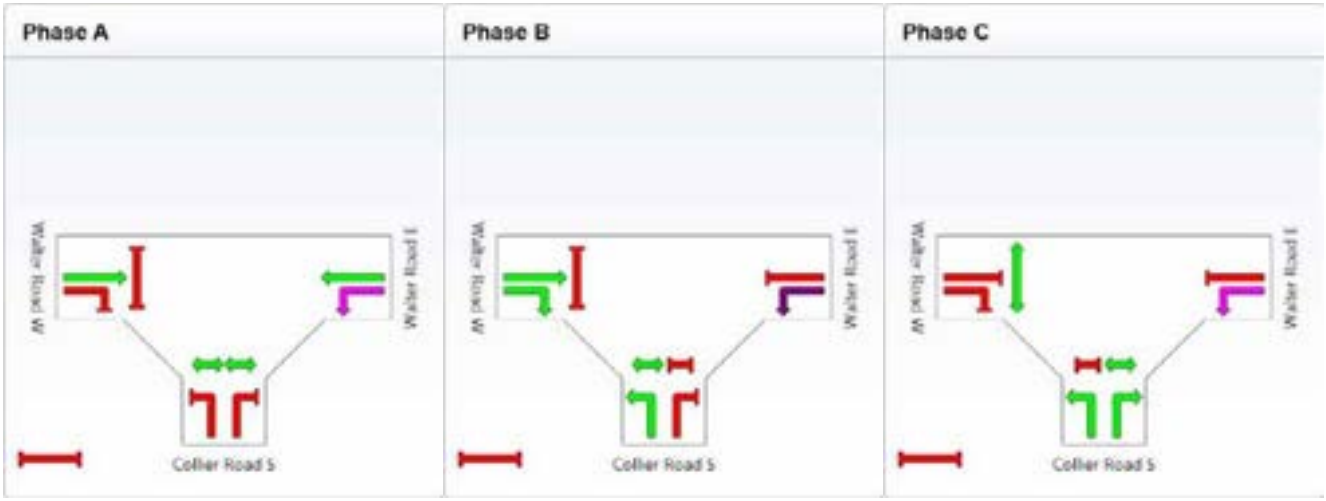
Walter Road - Collier Road AM

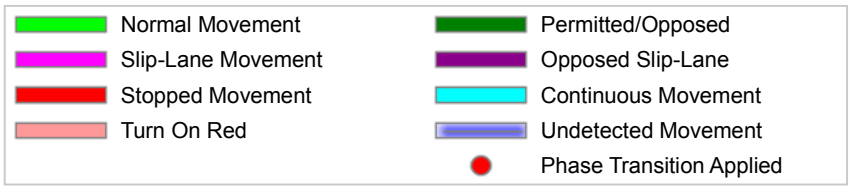
Signals - Fixed Time Cycle Time = 125 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	48	37	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	54	43	28
Phase Split	43 %	34 %	22 %





MOVEMENT SUMMARY

Site: 7 Walter - Collier PM

Walter Road - Collier Road PM

Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collier Road S											
1	L	480	0.0	0.383	16.2	LOS B	8.6	60.1	0.54	0.75	41.7
3	R	542	0.0	0.643	35.4	LOS D	11.5	80.7	0.91	0.83	30.5
Approach		1022	0.0	0.643	26.4	LOS C	11.5	80.7	0.74	0.79	34.9
East: Walter Road E											
4	L	418	0.0	0.475	11.1	LOS B	5.1	35.7	0.44	0.72	45.9
5	T	719	0.0	0.737	32.0	LOS C	13.7	96.0	0.98	0.88	30.4
Approach		1137	0.0	0.737	24.3	LOS C	13.7	96.0	0.78	0.82	34.7
West: Walter Road W											
11	T	1052	0.0	0.721	16.9	LOS B	22.8	159.8	0.82	0.75	38.6
12	R	487	0.0	0.721	38.6	LOS D	14.6	102.0	0.97	0.88	29.5
Approach		1539	0.0	0.721	23.8	LOS C	22.8	159.8	0.87	0.79	35.1
All Vehicles		3698	0.0	0.737	24.7	LOS C	22.8	159.8	0.80	0.80	35.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	9.0	LOS A	0.1	0.1	0.48	0.48
P2	Across S approach	50	8.1	LOS A	0.1	0.1	0.45	0.45
P7	Across W approach	50	34.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		150	17.1	LOS B			0.62	0.62

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

PHASING SUMMARY

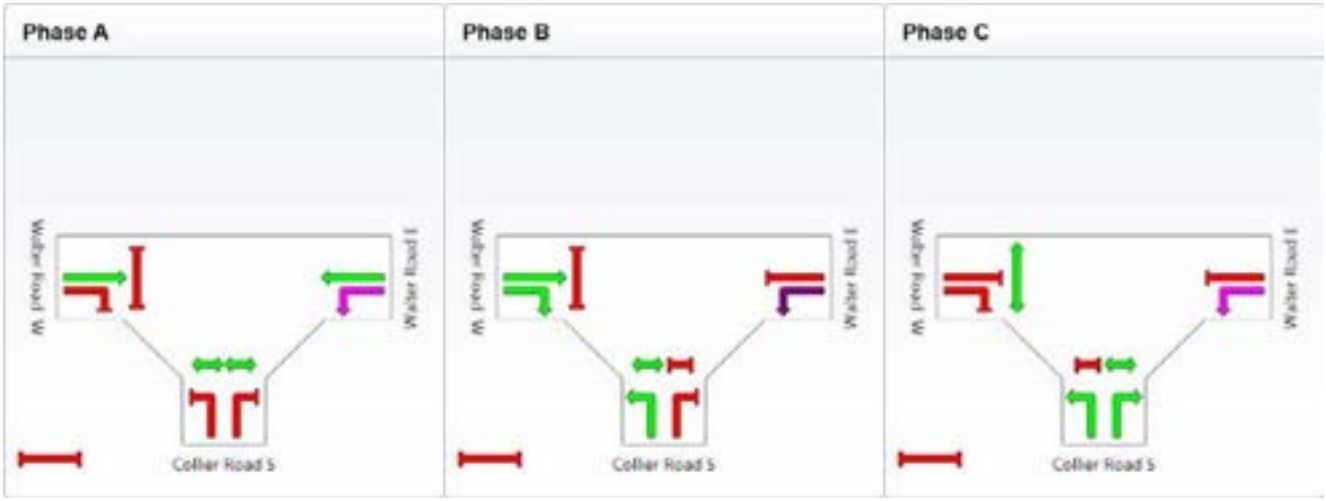
Walter Road - Collier Road PM

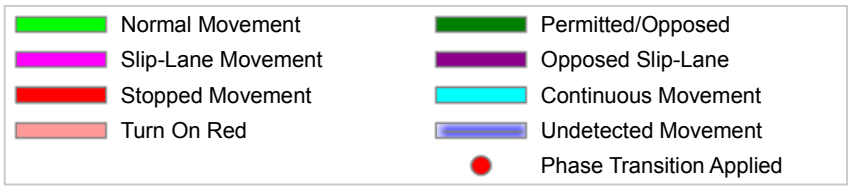
Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	20	20	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	26	26	28
Phase Split	33 %	33 %	35 %





MOVEMENT SUMMARY

Site: 8 Walter - Wellington AM

Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	34	0.0	0.126	32.5	LOS C	1.2	8.3	0.82	0.71	31.9
2	T	65	0.0	0.214	54.0	LOS D	3.8	26.4	0.91	0.70	23.3
3	R	114	0.0	0.395	63.8	LOS E	6.9	48.0	0.95	0.79	21.9
Approach		213	0.0	0.395	55.8	LOS E	6.9	48.0	0.92	0.75	23.5
East: Walter Road E											
4	L	188	0.0	0.614	14.5	LOS B	4.0	27.9	0.39	0.69	43.0
5	T	970	0.0	0.966	75.4	LOS E	65.0	454.7	1.00	1.14	18.8
6	R	911	0.0	0.966	70.7	LOS E	48.8	341.6	1.00	0.98	20.6
Approach		2069	0.0	0.966	67.8	LOS E	65.0	454.7	0.94	1.03	20.7
North: Wellington Road											
7	L	515	0.0	0.399	13.8	LOS B	11.4	80.1	0.43	0.73	43.6
8	T	722	0.0	0.961	73.1	LOS E	30.2	211.4	1.00	1.01	19.3
9	R	179	0.0	0.500	60.8	LOS E	10.6	74.4	0.94	0.81	22.6
Approach		1416	0.0	0.961	50.0	LOS D	30.2	211.4	0.79	0.88	24.8
West: Walter Road W											
10	L	195	0.0	0.443	17.9	LOS B	5.1	36.0	0.47	0.71	40.3
11	T	634	0.0	0.954	86.1	LOS F	26.0	182.2	1.00	1.14	17.3
12	R	114	0.0	0.921	91.9	LOS F	8.8	61.4	1.00	1.01	17.1
Approach		943	0.0	0.954	72.7	LOS E	26.0	182.2	0.89	1.03	19.6
All Vehicles		4641	0.0	0.966	62.8	LOS E	65.0	454.7	0.88	0.97	21.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	14.2	LOS B	0.1	0.1	0.46	0.46
P2	Across S approach	50	12.0	LOS B	0.1	0.1	0.42	0.42
P3	Across E approach	50	56.0	LOS E	0.2	0.2	0.91	0.91
P5	Across N approach	50	58.8	LOS E	0.2	0.2	0.93	0.93
P7	Across W approach	50	61.6	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		250	40.5	LOS E			0.74	0.74

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

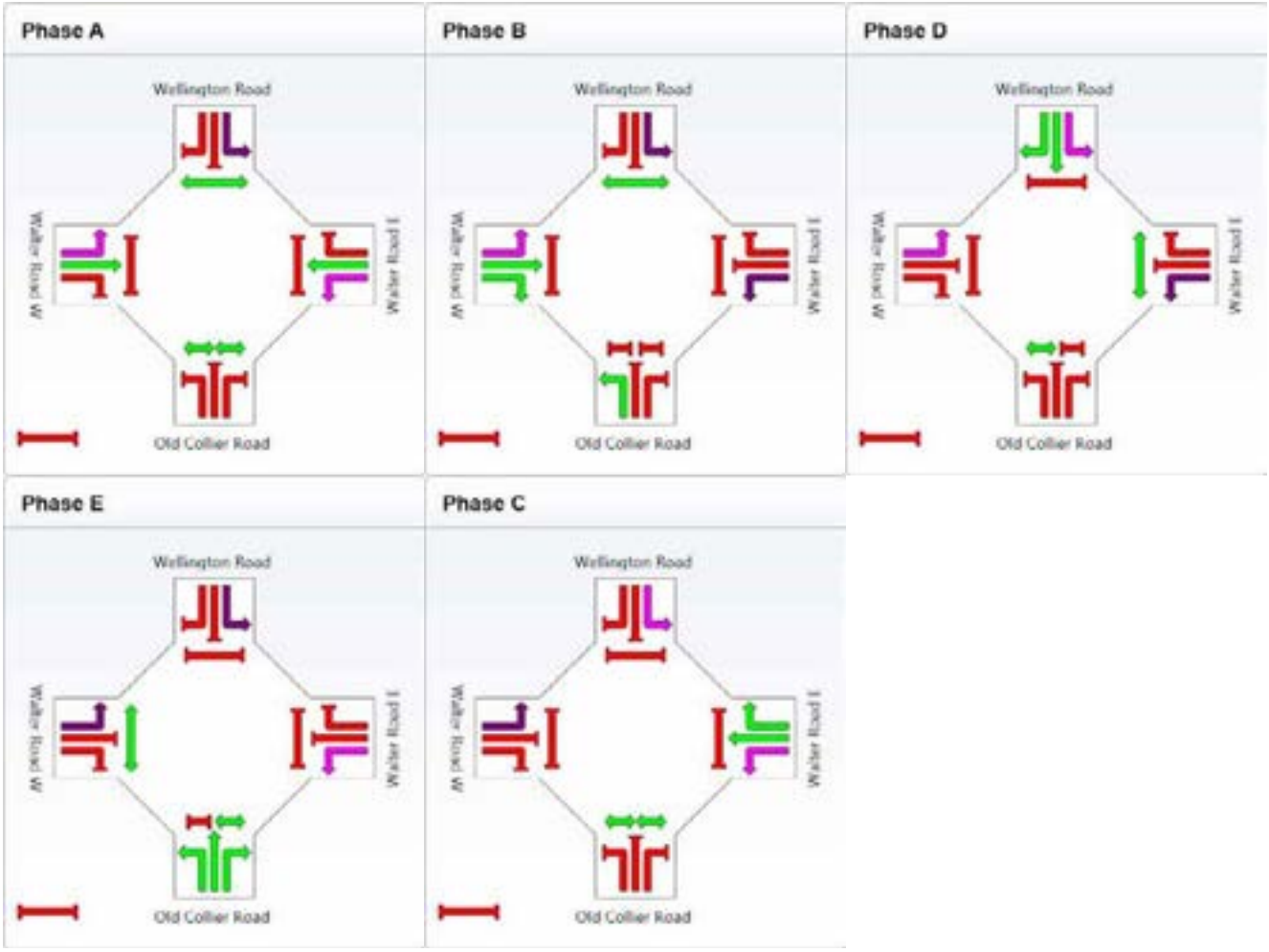
PHASING SUMMARY

Walter Road - Wellington Road AM
Signals - Fixed Time Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, D, E, C
Output Sequence: A, B, D, E, C

Phase Timing Results

Phase	A	B	D	E	C
Green Time (sec)	8	9	26	21	41
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	14	15	32	27	47
Phase Split	10 %	11 %	24 %	20 %	35 %



MOVEMENT SUMMARY

Site: 8 Walter - Wellington PM

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Collier Road											
1	L	140	0.0	0.504	32.7	LOS C	5.2	36.5	0.82	0.77	31.5
2	T	357	0.0	0.852	62.2	LOS E	24.7	173.2	1.00	0.97	21.4
3	R	383	0.0	0.960	94.2	LOS F	32.2	225.4	1.00	1.06	16.8
Approach		880	0.0	0.960	71.4	LOS E	32.2	225.4	0.97	0.98	20.0
East: Walter Road E											
4	L	173	0.0	0.328	9.3	LOS A	1.8	12.3	0.22	0.65	47.8
5	T	621	0.0	0.796	38.5	LOS D	36.0	251.8	0.95	0.86	27.9
6	R	966	0.0	0.949	78.7	LOS E	39.6	277.3	1.00	0.99	19.0
Approach		1760	0.0	0.949	57.7	LOS E	39.6	277.3	0.91	0.91	23.0
North: Wellington Road											
7	L	837	0.0	0.815	29.4	LOS C	40.2	281.5	0.88	0.87	33.3
8	T	226	0.0	0.391	56.7	LOS E	6.8	47.8	0.95	0.76	22.6
9	R	255	0.0	0.927	88.1	LOS F	19.9	139.4	1.00	1.02	17.6
Approach		1318	0.0	0.927	45.5	LOS D	40.2	281.5	0.92	0.88	26.6
West: Walter Road W											
10	L	198	0.0	0.501	26.3	LOS C	7.2	50.1	0.61	0.74	35.0
11	T	667	0.0	0.924	76.3	LOS E	25.8	180.5	1.00	1.08	18.8
12	R	90	0.0	0.818	83.7	LOS F	6.5	45.3	1.00	0.90	18.2
Approach		955	0.0	0.924	66.6	LOS E	25.8	180.5	0.92	0.99	20.7
All Vehicles		4913	0.0	0.960	58.6	LOS E	40.2	281.5	0.92	0.93	22.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	20.8	LOS C	0.1	0.1	0.56	0.56
P2	Across S approach	50	9.3	LOS A	0.1	0.1	0.37	0.37
P3	Across E approach	50	61.6	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	50	56.9	LOS E	0.2	0.2	0.92	0.92
P7	Across W approach	50	54.2	LOS E	0.2	0.2	0.90	0.90
All Pedestrians		250	40.6	LOS E			0.74	0.74

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

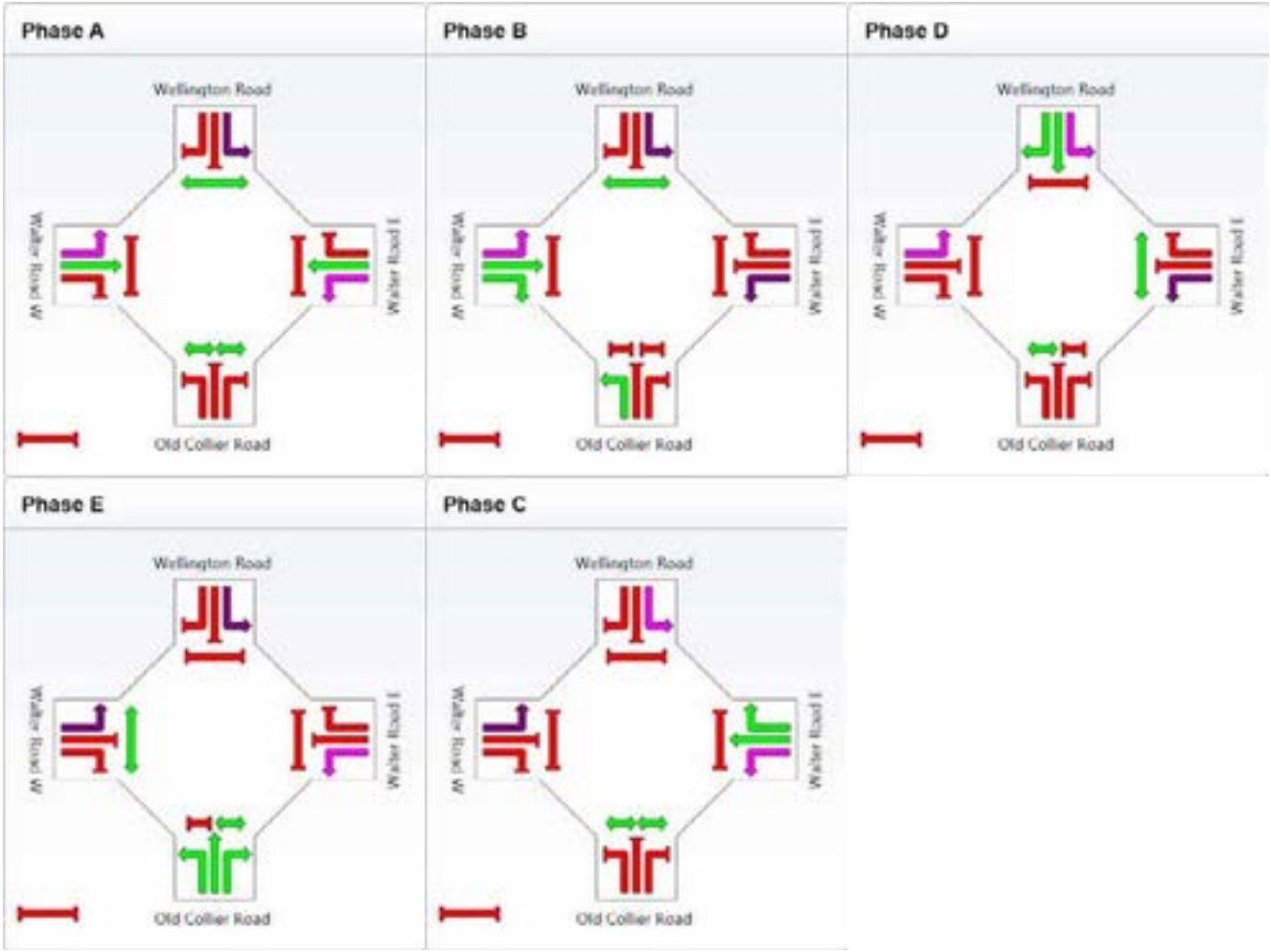
PHASING SUMMARY

Walter Road - Wellington Road PM
Signals - Fixed Time Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, D, E, C
Output Sequence: A, B, D, E, C

Phase Timing Results

Phase	A	B	D	E	C
Green Time (sec)	11	8	20	29	37
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	17	14	26	35	43
Phase Split	13 %	10 %	19 %	26 %	32 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: Walter - Progress AM

Walter Road - Progress Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street S											
1	L	45	0.0	0.165	20.8	LOS C	0.8	5.9	0.66	0.72	38.1
3	R	38	0.0	0.053	20.5	LOS C	0.7	4.9	0.66	0.71	38.5
Approach		83	0.0	0.165	20.7	LOS C	0.8	5.9	0.66	0.71	38.3
East: Walter Road E											
4	L	137	0.0	0.326	20.2	LOS C	2.5	17.8	0.66	0.76	38.6
5	T	1109	0.0	0.683	15.8	LOS B	13.6	94.9	0.87	0.77	39.5
Approach		1246	0.0	0.683	16.3	LOS B	13.6	94.9	0.85	0.77	39.4
West: Walter Road W											
11	T	942	0.0	0.580	14.7	LOS B	10.8	75.5	0.82	0.72	40.4
12	R	47	0.0	0.265	31.7	LOS C	1.3	8.9	0.88	0.76	32.1
Approach		989	0.0	0.580	15.5	LOS B	10.8	75.5	0.82	0.72	39.9
All Vehicles		2319	0.0	0.683	16.1	LOS B	13.6	94.9	0.83	0.75	39.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

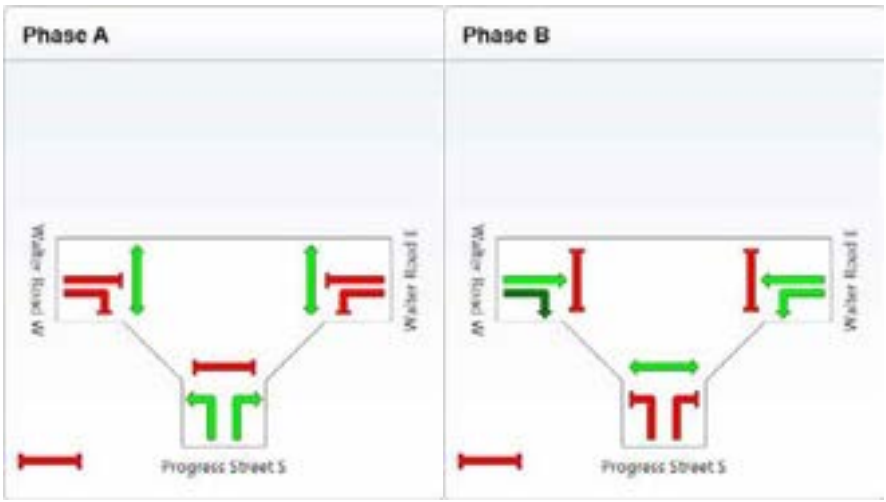
PHASING SUMMARY

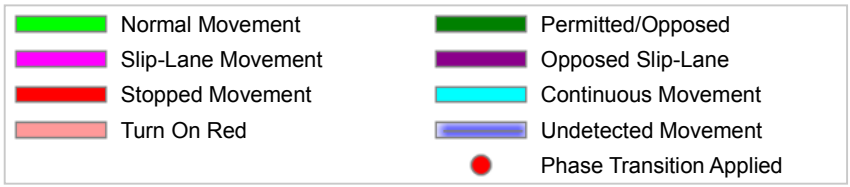
Walter Road - Progress Street AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Site: Walter - Progress PM

Walter Road - Progress Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical 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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Progress Street S											
1	L	66	0.0	0.242	21.0	LOS C	1.2	8.7	0.67	0.73	38.0
3	R	147	0.0	0.207	21.4	LOS C	2.9	20.5	0.71	0.76	37.8
Approach		214	0.0	0.242	21.3	LOS C	2.9	20.5	0.69	0.75	37.9
East: Walter Road E											
4	L	192	0.0	0.458	20.6	LOS C	3.7	25.8	0.69	0.77	38.3
5	T	878	0.0	0.540	14.4	LOS B	9.8	68.8	0.80	0.70	40.7
Approach		1069	0.0	0.540	15.5	LOS B	9.8	68.8	0.78	0.71	40.2
West: Walter Road W											
11	T	1078	0.0	0.663	15.5	LOS B	12.9	90.6	0.86	0.76	39.8
12	R	93	0.0	0.425	30.0	LOS C	2.5	17.3	0.88	0.79	32.9
Approach		1171	0.0	0.663	16.6	LOS B	12.9	90.6	0.86	0.76	39.1
All Vehicles		2454	0.0	0.663	16.5	LOS B	12.9	90.6	0.81	0.74	39.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	21.6	LOS C			0.84	0.84

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

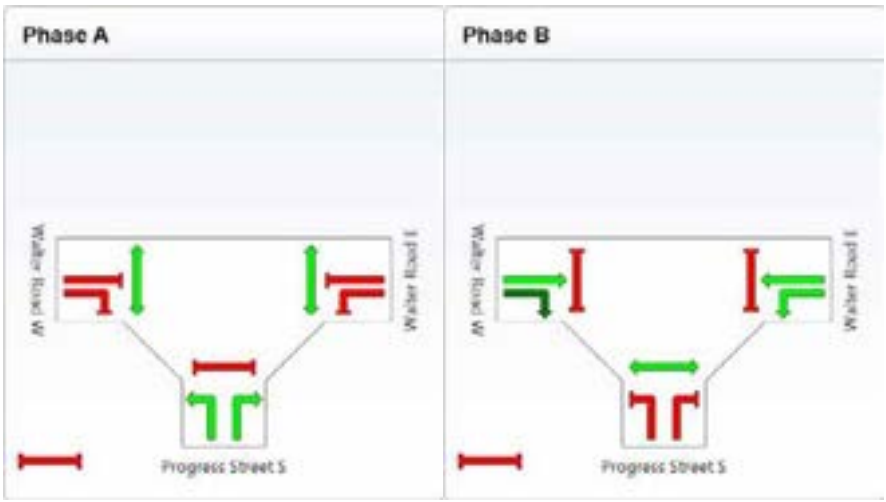
PHASING SUMMARY

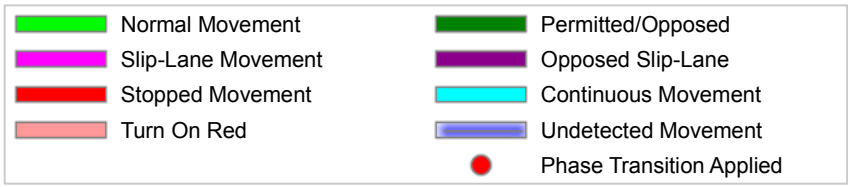
Walter Road - Progress Street PM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Two-Phase
Input Sequence: A, B
Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	23	25
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	29	31
Phase Split	48 %	52 %





MOVEMENT SUMMARY

Site: 9 Walter - Russell AM

Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russell Street S											
1	L	200	0.0	0.196	12.3	LOS B	3.0	21.1	0.43	0.70	45.0
2	T	100	0.0	0.216	35.7	LOS D	4.3	30.1	0.84	0.67	28.3
3	R	221	0.0	1.013	114.9	LOS F	18.6	130.3	1.00	1.25	14.5
Approach		521	0.0	1.013	60.3	LOS E	18.6	130.3	0.75	0.93	22.5
East: Walter Road E											
4	L	243	0.0	0.960	85.8	LOS F	17.0	119.0	1.00	1.07	17.8
5	T	422	0.0	0.595	30.5	LOS C	18.3	128.4	0.87	0.76	31.2
6	R	78	0.0	0.308	55.2	LOS E	3.9	27.1	0.94	0.77	23.9
Approach		743	0.0	0.960	51.2	LOS D	18.3	128.4	0.92	0.86	24.4
North: Rusell Street N											
7	L	141	0.0	0.781	51.7	LOS D	9.7	67.6	0.89	0.91	25.0
8	T	94	0.0	0.781	44.8	LOS D	15.3	106.9	0.94	0.86	24.9
9	R	239	0.0	0.781	54.5	LOS D	15.3	106.9	0.99	0.92	24.2
Approach		474	0.0	0.781	51.7	LOS D	15.3	106.9	0.95	0.90	24.6
West: Walter Road W											
10	L	89	0.0	0.498	45.4	LOS D	11.2	78.7	0.90	0.85	27.4
11	T	598	0.0	0.498	26.4	LOS C	16.6	115.9	0.79	0.69	33.1
12	R	414	0.0	0.981	57.5	LOS E	23.3	163.2	1.00	0.89	23.3
Approach		1101	0.0	0.981	39.6	LOS D	23.3	163.2	0.88	0.78	28.2
All Vehicles		2839	0.0	1.013	48.5	LOS D	23.3	163.2	0.88	0.85	25.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	49.2	LOS E	0.1	0.1	0.95	0.95
P3	Across E approach	50	44.6	LOS E	0.1	0.1	0.90	0.90
P5	Across N approach	50	11.4	LOS B	0.1	0.1	0.45	0.45
P7	Across W approach	50	44.6	LOS E	0.1	0.1	0.90	0.90
All Pedestrians		200	37.4	LOS D			0.80	0.80

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

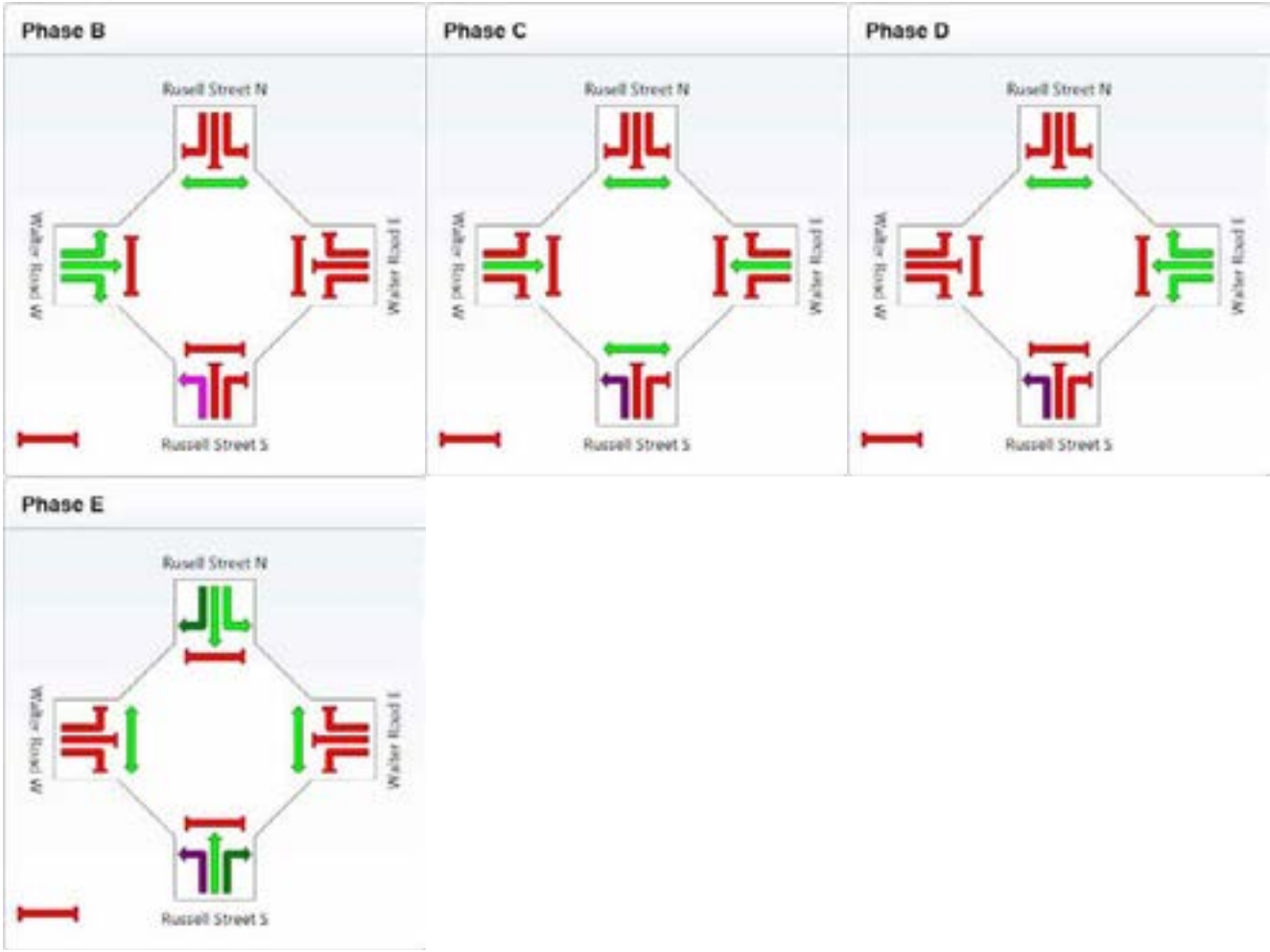
PHASING SUMMARY

Walter Road - Russell Street AM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: B, C, D, E
Output Sequence: B, C, D, E

Phase Timing Results

Phase	B	C	D	E
Green Time (sec)	25	19	15	27
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	31	25	21	33
Phase Split	28 %	23 %	19 %	30 %



MOVEMENT SUMMARY

Site: 9 Walter - Russell PM

Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Russell Street S											
1	L	401	0.0	0.448	25.1	LOS C	11.0	77.1	0.67	0.86	35.7
2	T	193	0.0	0.434	38.8	LOS D	8.9	62.4	0.90	0.74	27.0
3	R	304	0.0	1.000[3]	67.3	LOS E	18.7	130.6	1.00	0.93	21.1
Approach		898	0.0	1.000	42.3	LOS D	18.7	130.6	0.83	0.86	27.4
East: Walter Road E											
4	L	272	0.0	0.956	83.5	LOS F	22.0	154.3	1.00	1.10	18.2
5	T	787	0.0	0.956	63.2	LOS E	52.6	368.0	1.00	1.18	21.1
6	R	70	0.0	0.218	50.6	LOS D	3.3	22.9	0.90	0.76	25.1
Approach		1129	0.0	0.956	67.3	LOS E	52.6	368.0	0.99	1.13	20.5
North: Rusell Street N											
7	L	48	0.0	0.280	44.1	LOS D	2.9	20.6	0.83	0.77	27.4
8	T	32	0.0	0.280	36.8	LOS D	4.1	29.0	0.84	0.66	27.7
9	R	81	0.0	0.280	46.3	LOS D	4.1	29.0	0.87	0.78	26.6
Approach		161	0.0	0.280	43.8	LOS D	4.1	29.0	0.85	0.75	27.0
West: Walter Road W											
10	L	98	0.0	0.664	49.6	LOS D	14.7	103.0	0.96	0.85	26.2
11	T	754	0.0	0.664	30.8	LOS C	23.6	165.1	0.89	0.78	30.9
12	R	371	0.0	0.999	70.8	LOS E	23.3	163.2	1.00	0.96	20.4
Approach		1223	0.0	0.999	44.5	LOS D	23.6	165.1	0.93	0.84	26.4
All Vehicles		3411	0.0	1.000	51.4	LOS D	52.6	368.0	0.92	0.94	24.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	49.2	LOS E	0.1	0.1	0.95	0.95
P3	Across E approach	50	45.5	LOS E	0.1	0.1	0.91	0.91
P5	Across N approach	50	10.9	LOS B	0.1	0.1	0.45	0.45
P7	Across W approach	50	45.5	LOS E	0.1	0.1	0.91	0.91
All Pedestrians		200	37.7	LOS D			0.80	0.80

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

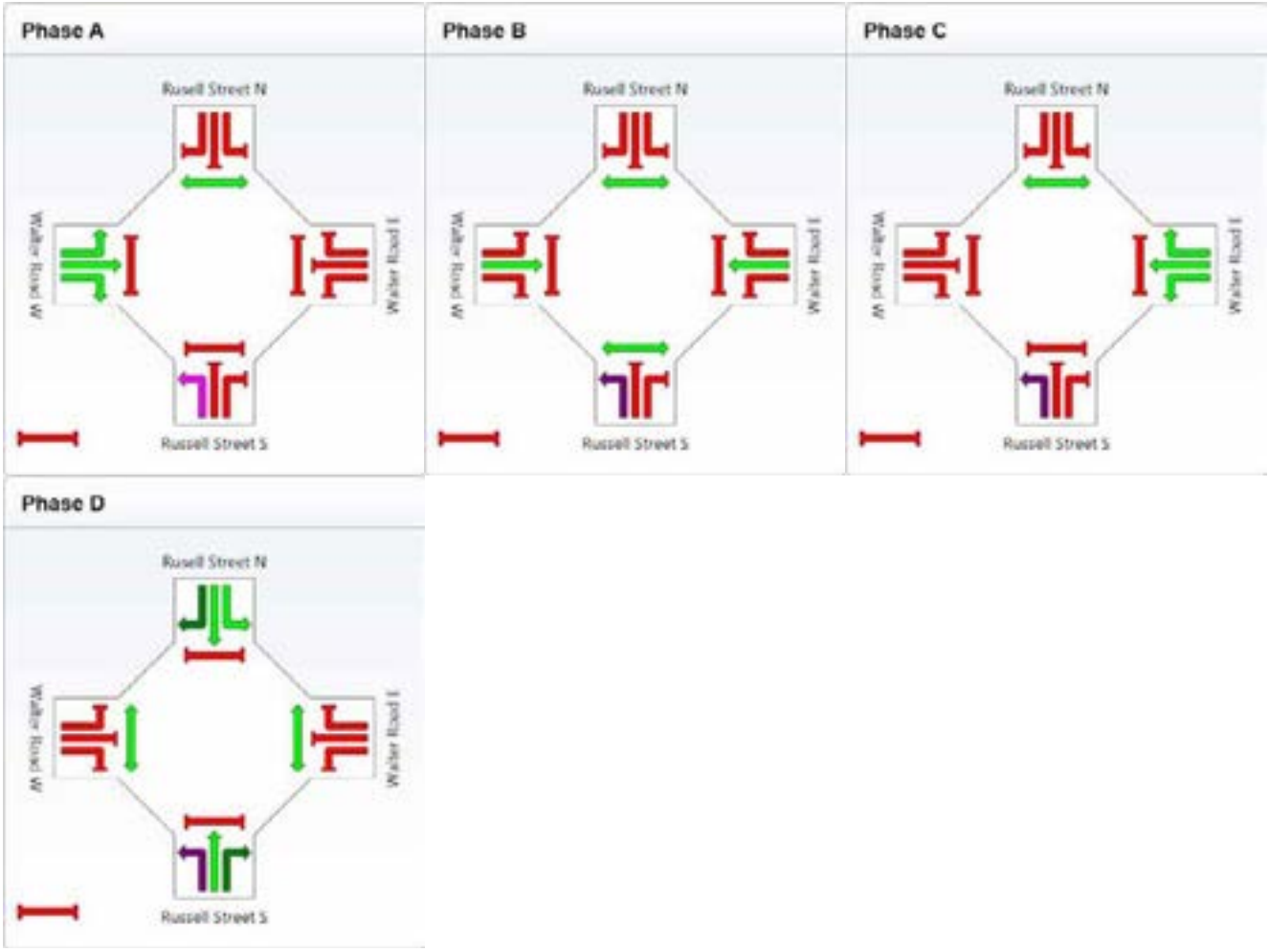
PHASING SUMMARY

Walter Road - Russell Street PM
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	22	19	19	26
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	28	25	25	32
Phase Split	25 %	23 %	23 %	29 %



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

MOVEMENT SUMMARY

Site: 11 Walter- Coode AM

Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 63 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	423	0.0	0.576	10.7	LOS B	4.7	32.8	0.52	0.75	46.3
2	T	135	0.0	0.198	15.6	LOS B	2.9	20.5	0.74	0.59	40.0
3	R	204	0.0	0.731	36.5	LOS D	6.6	46.4	0.98	0.92	30.1
Approach		762	0.0	0.731	18.5	LOS B	6.6	46.4	0.68	0.77	39.5
East: Walter Road E											
4	L	307	0.0	0.531	9.2	LOS A	1.9	13.6	0.35	0.69	47.8
5	T	690	0.0	0.384	12.1	LOS B	7.0	49.1	0.70	0.60	42.8
6	R	58	0.0	0.231	27.7	LOS C	1.5	10.2	0.80	0.76	34.1
Approach		1055	0.0	0.531	12.1	LOS B	7.0	49.1	0.60	0.63	43.6
North: Coode Streeet N											
7	L	270	0.0	0.476	25.8	LOS C	7.6	53.3	0.83	0.82	35.3
8	T	172	0.0	0.476	18.3	LOS B	7.6	53.3	0.84	0.71	36.6
9	R	117	0.0	0.476	26.3	LOS C	6.2	43.7	0.84	0.83	35.9
Approach		559	0.0	0.476	23.6	LOS C	7.6	53.3	0.83	0.79	35.8
West: Walter Road W											
10	L	251	0.0	0.644	11.1	LOS B	1.7	12.2	0.46	0.73	46.1
11	T	978	0.0	0.549	13.4	LOS B	11.1	77.4	0.77	0.68	41.2
12	R	158	0.0	1.253	275.9	LOS F	18.7	130.6	1.00	1.86	7.0
Approach		1387	0.0	1.253	42.8	LOS D	18.7	130.6	0.74	0.82	26.9
All Vehicles		3763	0.0	1.253	26.4	LOS C	18.7	130.6	0.70	0.75	34.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	25.8	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	50	25.8	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		100	25.8	LOS C			0.90	0.90

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

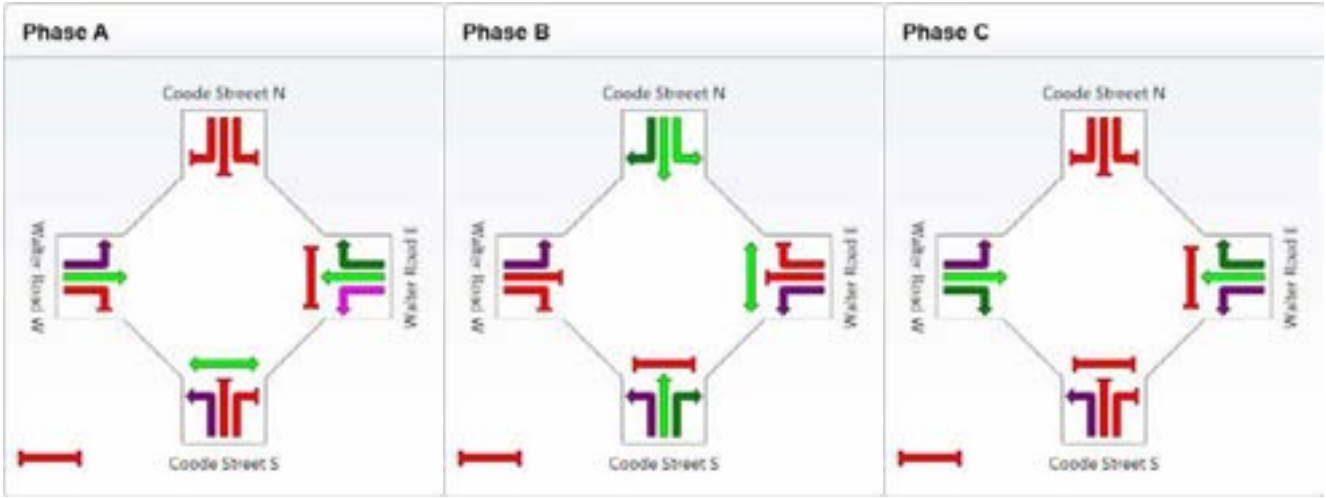
PHASING SUMMARY

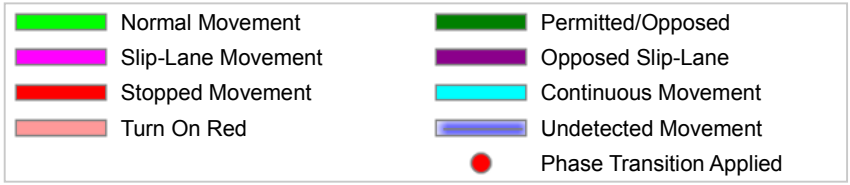
Walter Road - Coode Street AM
Signals - Fixed Time Cycle Time = 63 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	17	22	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	28	12
Phase Split	37 %	44 %	19 %





MOVEMENT SUMMARY

Site: 11 Walter- Coode PM

Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coode Street S											
1	L	234	0.0	0.357	9.1	LOS A	1.8	12.8	0.28	0.67	48.0
2	T	124	0.0	0.260	29.8	LOS C	4.4	31.1	0.85	0.68	31.5
3	R	153	0.0	0.586	45.3	LOS D	6.4	44.9	0.96	0.81	26.8
Approach		511	0.0	0.586	25.0	LOS C	6.4	44.9	0.62	0.72	35.3
East: Walter Road E											
4	L	255	0.0	0.420	8.9	LOS A	1.5	10.2	0.28	0.67	48.2
5	T	608	0.0	0.251	8.1	LOS A	5.9	41.2	0.48	0.41	47.3
6	R	96	0.0	0.291	22.1	LOS C	2.5	17.6	0.61	0.76	37.3
Approach		959	0.0	0.420	9.7	LOS A	5.9	41.2	0.44	0.52	46.3
North: Coode Street N											
7	L	75	0.0	0.321	38.6	LOS D	5.4	38.1	0.86	0.81	29.8
8	T	98	0.0	0.321	31.1	LOS C	5.4	38.1	0.87	0.70	30.0
9	R	75	0.0	0.321	41.1	LOS D	3.8	26.5	0.89	0.78	28.6
Approach		248	0.0	0.321	36.4	LOS D	5.4	38.1	0.87	0.76	29.5
West: Walter Road W											
10	L	190	0.0	0.530	9.3	LOS A	1.1	7.6	0.38	0.68	47.7
11	T	890	0.0	0.367	8.8	LOS A	9.4	66.1	0.53	0.46	46.4
12	R	219	0.0	0.778	46.2	LOS D	10.2	71.4	0.97	0.95	26.5
Approach		1299	0.0	0.778	15.2	LOS B	10.2	71.4	0.58	0.58	41.3
All Vehicles		3017	0.0	0.778	16.8	LOS B	10.2	71.4	0.57	0.60	40.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	39.2	LOS D	0.1	0.1	0.93	0.93
P3	Across E approach	50	39.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		100	39.2	LOS D			0.93	0.93

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

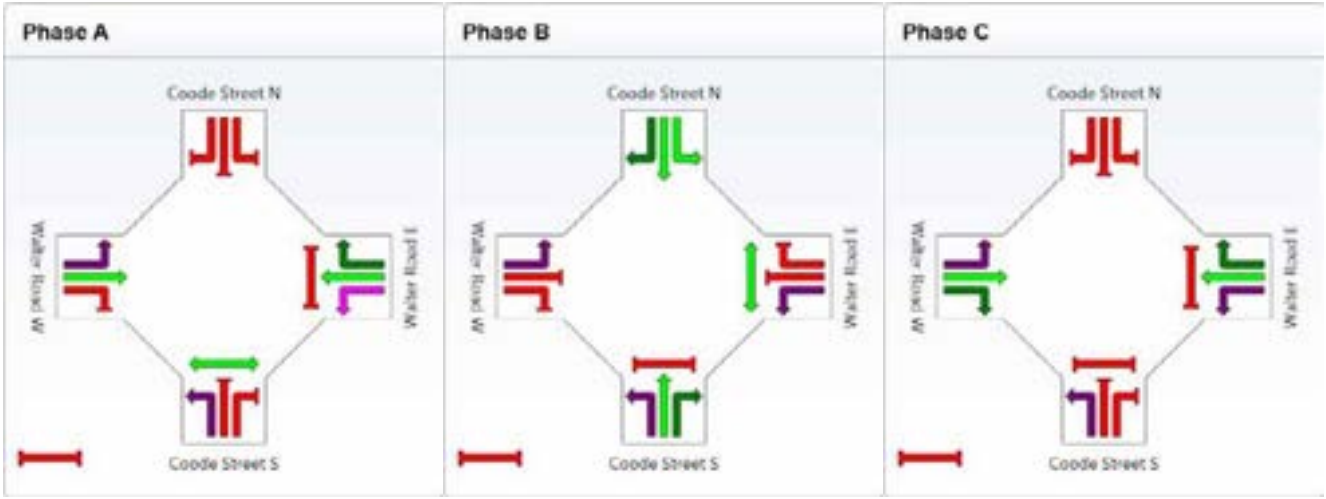
PHASING SUMMARY

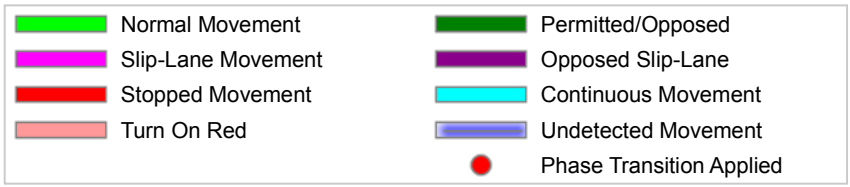
Walter Road - Coode Street PM
Signals - Fixed Time Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Split Phasing
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	17	22	33
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	23	28	39
Phase Split	26 %	31 %	43 %





Morley City Centre Plan
Transport Assessment

APPENDIX C
IMPACT OF MITIGATION MEASURES

Cardno
Shaping the Future

Impact of Mitigated Geometry of Broun Avenue – Coode Street

Impact of Mitigated Geometry of Broun Avenue – Russell

Impact of Mitigated Geometry of Broun Avenue – Collier Road

Impact of Mitigated Geometry of Walter Road West – Crimea Street

Impact of Mitigated Geometry of Walter Road West – Collier Road

Impact of Mitigated Geometry of Walter Road West – Wellington Road

Impact of Mitigated Geometry of Walter Road West – Russell Street

Impact of Mitigated Geometry of Walter Road West – Coode Street